# 9 Infrastructure

This Chapter describes the regulatory context and existing conditions related to infrastructure on the Site, including stormwater, water use, sewerage, energy, other utility systems and the City of Boston's Smart Utilities Policy. It presents the proposed conditions and potential impacts, as well as proposed mitigation measures.

The systems discussed in this chapter include those owned or managed by the Boston Water and Sewer Commission (BWSC) and private utility companies. There will be further coordination among these entities and with the Project engineers and architects as the Project design develops and during the construction process for the Project.

## 9.1 Key Findings

The key findings of the Project related to infrastructure are listed below.

- The existing city and utility infrastructure systems are expected to be adequately sized to accept the increased demand associated with the development and operation of the Project;
- The Project will aim to reuse existing water, sewer, and drainage systems as determined is possible based on proposed building layout, project phasing, and roadway reconstruction;
- Construction of the Project will incorporate on-site stormwater management and treatment systems that are expected to improve water quality, provide stormwater storage, reduce runoff volume, and control peak rates of runoff in comparison to existing conditions;
- The Project will not result in the introduction of any increased peak flows, pollutants, or sediments that would potentially impact the local drainage systems;
- The Project is estimated to generate approximately 218,880 gallons per day (net new) of sanitary sewage and will require approximately 240,768 gallons of water per day (net new); and
- The Project Site is currently serviced by the BWSC for domestic and fire protection water and sanitary sewage conveyance.

## 9.2 Phase 1 Impacts

The impacts of and requirements for the Phase 1 Project are described below.

### 9.2.1 Stormwater

Stormwater infiltration systems for Phase 1 will be designed to capture 1.25-inches of stormwater from building roof and impervious site areas to the greatest extent possible to meet BWSC and BPDA requirements. Stormwater runoff will be directed to underground recharge systems in the available site surrounding the building. For storm events greater than 1.25-inches, overflow drains will connect to the existing storm drain mains in Decatur Street and/or Corey Street for Building F and the existing storm drain mains in Corey Street, Tufts Street and/or Medford Street for Building M. The Project may require new storm drain mains in Moulton Street and Samuel Morse Way for roadway drainage and building overflow drain connections may connect to these mains. Refer to Figure 9.3.

Based on the approximate site areas for Phase 1, the stormwater management systems may need to be designed to store up to approximately 5,000 cubic feet for Building F and approximately 3,700 cubic feet for Building M, assuming that the entire site areas are impervious cover. It is likely that there will be landscaped areas that will reduce impervious cover, and as a result, the buildings will require less stormwater storage than the estimates provided.

### 9.2.2 Water Use

The Phase 1 (Building F and Building M) total estimated domestic water demand is approximately 66,913 gpd, or an increase of 29,524 gpd compared to the existing condition. The existing buildings within the Phase 1 area are estimated to consume approximately 37,389 gpd. New domestic water and fire protection services for Building F will connect to either the 8-inch water main in Decatur Street, the 8-inch water main in Moulton Street, and/or the 12-inch water main in Corey Street. The Project may require new water mains in Moulton Street and Samuel Morse Way to service hydrants and new Building F services may connect to these mains. Refer to Figure 9.3. New domestic water and fire protection services for Building M will connect to either the 12-inch water main in Medford Street, the 8-inch water main in Tufts Street, and/or the 12-inch water main in Corey Street.

### 9.2.3 Waste Water

For Phase 1 construction, the total estimated sewer flows due to Building F and Building M is approximately 60,830 gpd, or an increase of 26,840 gpd compared to the existing condition, as shown in Table 9.1. The sewer flows for the existing buildings within the Phase 1 area was estimated to be 33,990 gpd.

**TABLE 9.1 PHASE 1 SEWER GENERATION**

| Program Type | Units | Generation Rate | Sewer Generation (GPD) |
|---|---|---|---|
| **Proposed Phase 1 Sewer Flows** | | | |
| Studio | 40 | 110 gpd/bedroom | 4,400 |
| One Bedroom Units | 171 | 110 gpd/bedroom | 18,810 |
| Two Bedroom Units | 109 | 110 gpd/bedroom | 23,980 |
| Three Bedroom Units | 28 | 110 gpd/bedroom | 9,240 |
| Four Bedroom Units | 10 | 110 gpd/bedroom | 4,400 |
| TOTAL | 358 | | 30,830 |
| **Existing Phase 1 Buildings Sewer Flows** | | | |
| One Bedroom Units | 29 | 110 gpd/bedroom | 3,190 |
| Two Bedroom Units | 37 | 110 gpd/bedroom | 8,140 |
| Three Bedroom Units | 34 | 110 gpd/bedroom | 11,220 |
| Four Bedroom Units | 26 | 110 gpd/bedroom | 11,440 |
| TOTAL | 126 | | 33,990 |
| **NET PHASE 1 INCREASE** | | | **26,840** |

New building sanitary services for Phase Building F will connect to the existing BWSC sewer mains in Moulton Street, Decatur Street, and/or Corey Street. The Project may require extension of the sewer main in Moulton Street and/or a new sewer main in Samuel Morse Way to allow Building F sanitary services to connect to them. Refer to Figure 9.3. New building sanitary services for Building M will connect to the existing BWSC sewer mains in Corey Street and/or Medford Street, or if required, a new sewer main extension in Tufts Street.

### 9.2.4 Other Utilities

The Proponent will work with Eversource, National Grid, and the private telecommunication companies to determine the infrastructure improvements needed, confirm adequate system capacity for the Project, coordinate service connection locations, and obtain appropriate approvals.

## 9.3 Regulatory Context

A complete list of the state and local permits anticipated associated with Project-related infrastructure is included in Chapter 1, *Project Summary*. The following discusses the regulatory framework for stormwater management, utility connection reviews and standards.

- Article 80, Section B -3(5) requires applicants to conduct studies that are necessary to determine the direct or indirect damage to the environmental reasonably attributable to the infrastructure component of the proposed Project.
- The Project is subject to the Massachusetts Stormwater Standards as a redevelopment.
- BWSC approval will be required for all water, sewer and stormwater systems.

- The Project will work with City of Boston Public Works Department (PWD), BWSC, and the Boston Groundwater Trust (BGwT) as applicable on infrastructure impact for any proposed or anticipated infrastructure improvements/mitigation around the Project Site.
- The Boston Fire Department will review the Project with respect to fire protection measures such as siamese connections, hydrants, and standpipes.
- Design of the site access, hydrant locations, and energy systems (gas and electric) will also be coordinated with the respective system owners.
- Where new utility connections are needed and existing connections are to be capped, the excavation will be authorized by the Boston Public Works Department (BPWD) through the street opening permit process, as required.
- Since the Project will disturb more than one-acre of land, a National Pollution Discharge Elimination System (NPDES) General Permit for Construction consistent with the requirement of the U.S. Environmental Protection Agency, the Massachusetts Department of Environmental Project and the BWSC will be required, including a stormwater pollution prevention plan submitted prior to construction.

All improvements and connections to BWSC infrastructure will be reviewed by BWSC as part of the BWSC site plan review process. This process includes a comprehensive design review of the proposed service connections, assessment of system demands and capacity, and establishment of service accounts.

## 9.4 Stormwater

The existing Site is comprised of 42 existing buildings, as well as concrete sidewalk, parking, roadways, parks, playgrounds, and pervious landscape areas. Stormwater is currently captured by existing closed drainage systems at each building and directed to existing combined sewer mains and storm drain mains in the adjacent and interconnecting roadways. Stormwater in the roadways is captured by existing catch basins, which flow to the existing BWSC combined sewer mains or the existing BWSC storm drain mains in the streets surrounding the Site, including Medford, Decatur, Bunker Hill, and Monument streets.

### 9.4.1 Existing Conditions

There are existing BWSC storm drain and combined sewer mains in Medford Street, Decatur Street, Bunker Hill Street, Polk Street, Monument Street, Tufts Street, Corey Street, Walford Way, Moulton Street adjacent to and within the Project Site, and Boston Housing Authority (BHA) storm drain mains within the Site. The existing storm drain mains in Medford Street, Decatur Street, Bunker Hill Street, Polk Street, Monument Street, Tufts Street, Corey Street, Walford Way, Moulton Street, and private roadways ultimately flow to multiple outfalls into the Little Mystic Channel and Charles River, and the existing combined sewer mains join the Charlestown Branch Sewer, which ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

**Medford Street**

There are multiple existing BWSC storm drain mains in Medford Street which flow easterly. There is a 48-inch storm drain main which flows easterly before joining another 48-inch main near the intersection with Monument Street which flows northerly to an outfall and ultimately discharges to the Little Mystic Channel. The second storm drain main starts as a 15-inch storm drain main flowing easterly, which increases to a 24-inch main, which then increases to a 30-inch main, which then increases to a 36-inch main, and finally increases to a 42-inch main which flows northerly to another outfall and ultimately discharges into the Little Mystic Channel.

**Decatur Street**

There is an existing 12-inch BWSC storm drain in Decatur Street which flows southerly before increasing to an 18-inch main, which then joins a 60-inch drain main and ultimately outfalls into the Charles River.

**Bunker Hill Street**

There are multiple existing BWSC storm drains in Bunker Hill Street. There is a 24-inch storm drain main which flows northerly before joining a 24-inch storm drain main in Polk Street described below. There is also a 21-inch storm drain main which flows southerly, increasing to a 24-inch main, which then increases to 30-inch main, which then increases to a 36-inch main, which then increases to a 45-inch main, before ultimately connecting to the same aforementioned 60-inch drain main as Decatur Street and leading to the outfall into the Charles River.

**Polk Street**

There is an existing 24-inch BWSC storm drain main in Polk Street which flows northerly before joining a 30-inch storm drain main until it joins the aforementioned 48-inch storm drain in Medford Street which ultimately outfalls into the Little Mystic Channel.

**Monument Street**

There is both an existing BWSC storm drain main and an existing BWSC combined sewer main in Monument Street. There is a 12-inch BWSC storm drain main which increases to an 18-inch storm drain main, which then increases to a 24-inch storm drain main before joining the aforementioned 48-inch storm drain main coming off of Medford Street and flowing northerly to the outfall at Little Mystic Channel. There is also a 20-inch by 28-inch BWSC combined sewer main which flows northerly in Monument Street before joining a 24-inch by 30-inch BWSC sewer main in Medford Street. The 24-inch by 30-inch combined main flows easterly along Medford Street before joining a 19-inch by 26-inch MWRA main near the intersection of Medford Street and Chelsea Street which leads to the Charlestown Branch Sewer and ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

**Tufts Street**

There is an existing BWSC storm drain main in Tufts Street that flows in a northerly and southerly direction with each segment starting approximately in the middle of the street. The northerly segment is an 18-inch storm drain main which connects into the aforementioned 24-inch storm drain main in Medford Street where it increases to a 30-inch storm drain main, ultimately leading to an outfall in the Little Mystic Channel. The southerly segment is an 18-inch storm drain main which increases to a 20-inch storm drain main before connecting to the aforementioned 45-inch storm drain main in Bunker Hill Street which ultimately leads to the outfall in the Charles River.

**Corey Street**

There is an existing BWSC storm drain main in Corey Street that flows in a northerly and southerly direction with each segment starting near the intersection of Corey Street and Moulton Street. The northerly segment is a 12-inch main which connects into the aforementioned 36-inch storm drain main in Medford Street, ultimately leading to an outfall in the Little Mystic Channel. The southerly segment is a 12-inch storm drain main which connects into the aforementioned 45-inch storm drain main stemming from Bunker Hill Street and ultimately leading to the outfall into the Charles River.

**Walford Way**

There are multiple segments of BWSC storm drain mains in Walford Way which flow to the storm drain mains in the adjacent roadways. There is a 12-inch storm drain on the western edge of Walford Way which flows westerly to the aforementioned 30-inch storm drain main in Polk Street which flows northerly. There is a storm drain main which flows easterly to the 24-inch storm drain main in Monument Street which flows northerly. There is a 12-inch storm drain main which flows easterly to the aforementioned 18-inch storm drain in Tufts Street which flows northerly. There is a 12-inch storm drain main which flows westerly to the aforementioned 12-inch storm drain main in Corey Street. There is a 6-inch storm drain main which flows easterly to the aforementioned 12-inch storm drain main in Decatur Street.

**Moulton Street**

There is a 12-inch storm drain main in Moulton Street which appears to either flow westerly to aforementioned 18-inch storm drain main in Decatur Street, or overflows the 12-inch sewer main in Moulton Street which flows southerly to the 39-inch x 41-inch BWSC sanitary sewer main in Vine Street flowing easterly and ultimately to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

**O'Reilly Way**

The existing private roadway, O'Reilly Way, has an existing 12-inch storm drain main which flows easterly to the aforementioned 20-inch storm drain main in Tufts Street.

**Boston Housing Authority (BHA) Storm Drain Mains**

There are existing BHA storm drain mains which run through the Project Site and connect to BWSC storm drain mains. There is a 12-inch BHA storm drain main east of Monument Street which starts at O'Reilly Way and flows northerly to the aforementioned 15-inch storm drain main in Medford Street. There is also a 12-inch BHA storm drain main west of Monument Street which starts within the site near Bunker Hill Street and flows northerly to aforementioned 48-inch BWSC storm drain main in Medford Street.

Site Areas, including building roof runoff, paved parking lot, private paved roads and driveways, and landscape areas appear to be collected by existing catch basins and directed to the various BWSC and BHA-owned storm drain mains. There do not appear to be existing stormwater systems for storage, treatment, or groundwater recharge systems apart from catch basin and the storm drain mains.

The existing drainage system is illustrated in Figures 9.1a and 9.1b.

### 9.4.2 Proposed Conditions

The Project will meet or reduce the existing peak rate of stormwater discharge and volumes of stormwater runoff from the site and promote infiltration to promote groundwater recharge to the greatest extent possible. The Project will strive to minimize the increase in impervious area at full buildout.

Stormwater infiltration systems will be designed to capture 1.25-inches of stormwater from building roof and impervious site areas to the maximum extent practicable to meet BWSC and BPDA requirements. Different approaches to stormwater recharge will be assessed and may vary on a block-by-block basis, including:

- Stormwater from building roofs will be directed to underground recharge systems on-site by gravity. If a particular block does not have available space for an underground recharge system on site, the Project may pursue recharge systems under building slabs;
- Stormwater from paved parking lots, walkways, and landscape will be collected via deep sump and hooded catch basins and area drains from the private site areas and directed to the underground recharge systems;
- Potential green roofs, as permitted by the building designs, to provide additional storage and reduce impervious area;
- Landscape areas with vegetative features to the maximum extent practicable to encourage infiltration and minimize runoff:
- Providing public sidewalks with porous paver strips that promote stormwater infiltration and reduce stormwater directed to the BWSC storm drain mains or combined sewer mains; and

- The underground recharge systems will be designed with overflow connections to direct excess stormwater to existing BWSC infrastructure.

The existing storm drain main in Monument Street and Moulton Street may be replaced due to the realignment of those roadways. New catch basins will be required to collect runoff from the new and widened roadways. As a result, new storm drain mains may be required for the proposed Concord Street, Lexington Street, O'Reilly Way, McNulty Court, O'Brien Court and Samuel Morse Way. Storm drain services for these proposed buildings may also connect to these new storm drain mains. Refer to Figure 9.3.

Improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review process. The process will include a comprehensive design review of the proposed service connections, and assessment of Project demands and system capacity. For existing BWSC storm drain mains that may be impacted by the proposed relocated roadways, the Proponent will work with the BWSC to determine the extent of storm drain main replacement that will be required. For new roadways, the Proponent will work with the BWSC to determine where new storm drain mains will connect, as well as ensure new storm drain mains are appropriately sized.

The Project will strive to improve the water quality of the stormwater that is not contained on site and overflows to the existing BWSC system. If it is determined that groundwater recharge is not feasible, the Proponent will treat the stormwater runoff to adequately capture Total Suspended Solids (TSS) and phosphorus prior to discharging to the BWSC system.

### 9.4.3 Compliance with MassDEP Standards

In March 1997, MassDEP adopted a new Stormwater Management Policy to address non-point source pollution. In 1997, MassDEP published the Massachusetts Stormwater Handbook as guidance on the Stormwater Policy, which was revised in February 2008. The Policy prescribes specific stormwater management standards for development projects, including urban pollutant removal criteria for projects that may impact environmental resource areas. Compliance is achieved through the implementation of Best Management Practices (BMPs) in the stormwater management design. The Policy is administered locally pursuant to MGL Ch. 131, s. 40. The Project complies with the Stormwater Management Standards as applicable to the redevelopment.

A brief explanation of each Policy Standard and the system compliance is provided below:

**Standard #1:** No new stormwater conveyances (e.g., outfalls) may discharge untreated stormwater directly to or cause erosion in wetlands or waters of the Commonwealth.

**Compliance:** The proposed design will comply with this Standard. The design will incorporate the appropriate stormwater treatment and no new untreated stormwater will be directly discharged to, nor will erosion be caused to wetlands or waters of the Commonwealth as a result of stormwater discharges related to the Project.

**Standard #2:** Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates. This Standard may be waived for discharges to land subject to coastal storm flowage as defined in 310 CMR.

**Compliance:** The proposed design will comply with this Standard. The existing discharge rate will be met or decreased as a result of the improvements associated with the Project.

**Standard #3:** Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmental sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This Standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

**Compliance:** The Project will comply with this standard to the maximum extent practicable.

**Standard #4:** Stormwater management systems shall be designed to remove 80% of the average annual post-construction load of Total Suspended Solids (TSS). This Standard is met when:

- Suitable practices for source control and pollution prevention are identified in a long-term pollution prevention plan, and thereafter are implemented and maintained;
- Structural stormwater best management practices are sized to capture the required water quality volume determined in accordance with the Massachusetts Stormwater Handbook; and
- Pretreatment is provided in accordance with the Massachusetts Stormwater Handbook.

**Compliance:** The proposed design will comply with this standard. Within the Project's limit of work, there will be mostly building roof, paved sidewalk, and roadways. Runoff from paved private areas that would contribute unwanted sediments or pollutants to the existing storm drain system will be collected and conveyed through groundwater recharge systems before discharging into the BWSC system.

**Standard #5:** For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable. If through source control and/or pollution prevention all land uses with higher potential pollutant loads cannot be completely protected from exposure to rain, snow, snow melt, and stormwater runoff, the proponent shall use the specific structural stormwater BMPs determined by the Department to be suitable for such uses as provided in the Massachusetts Stormwater Handbook. Stormwater discharges from land uses with higher potential pollutant loads shall also comply with the requirements of the Massachusetts Clean Waters Act, M.G.L. c. 21, §§ 26-53 and the regulations promulgated thereunder at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

**Compliance:** The proposed design will comply with this standard. The Project is not associated with Higher Potential Pollutant Loads (per the Policy, Volume I, page 1-6).

**Standard #6:** Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook. A discharge is near a critical area if there is a strong likelihood of a significant impact occurring to said area, taking into account site-specific factors. Stormwater discharges to Outstanding Resource Waters and Special Resource Waters shall be removed and set back from the receiving water or wetland and receive the highest and best practical method of treatment. A "storm water discharge" as defined in 314 CMR 3.04(2)(a)1 or (b) to an Outstanding Resource Water or Special Resource Water shall comply with 314 CMR 3.00 and 314 CMR 4.00. Stormwater discharges to a Zone I or Zone A are prohibited unless essential to the operation of a public water supply.

**Compliance:** The proposed design will comply with this Standard. The Project will not discharge untreated stormwater to a sensitive area or any other area.

**Standard #7:** A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3, and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5, and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

**Compliance:** The proposed design will comply with this Standard. The Project complies with the Stormwater Management Standards as applicable to the redevelopment.

**Standard #8:** A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentation, and pollution prevention plan) shall be developed and implemented.

**Compliance:** The Project will comply with this standard. Sedimentation and erosion controls will be incorporated as part of the design of these projects and employed during construction.

**Standard #9:** A Long-Term Operation and Maintenance (O&M) Plan shall be developed and implemented to ensure that stormwater management systems function as designed.

**Compliance:** The Project will comply with this standard. An O&M Plan including long-term BMP operation requirements will be prepared for the Proposed Project and will assure proper maintenance and functioning of the stormwater management system.

**Standard #10:** All illicit discharges to the stormwater management system are prohibited.

**Compliance:** The Project will comply with this standard. There will be no illicit connections associated with the Proposed Project.

## 9.5 Water Use

This section describes existing conditions, proposed conditions, and potential impacts and mitigation measures associated with use of potable water.

### 9.5.1 Existing Conditions

Water for the Project Site will be provided by the BWSC. There are five water systems within the City, and these provide service to portions of the City based on ground surface elevation. The five systems are southern low (commonly known as low service), southern high (commonly known as high service), southern extra high, northern low, and northern high. There are existing BWSC water mains in Medford Street, Decatur Street, Bunker Hill Street, Polk Street, Monument Street, Tufts Street, and Corey Street adjacent to and within the Project Site as listed below:

- **Medford Street:** 24-inch northern low; 12-inch northern low
- **Decatur Street:** 6-inch northern low
- **Bunker Hill Street:** 8-inch northern low; 12-inch northern low
- **Polk Street:** 8-inch northern low
- **Monument Street:** 12-inch northern low
- **Tufts Street:** 8-inch northern low
- **Corey Street:** 12-inch northern low
- **Moulton Street:** 8-inch dead-ended water main

The existing water system is illustrated in Figures 9.2a through 9.2c.

### 9.5.2 Proposed Conditions

The Project's water demand for domestic services is based on the Project's estimated sewage generation, described in Section 9.6.2. A conservative factor of 1.1 (10%) is applied to the estimated average daily wastewater flows calculated with 310 CMR 15.203 values to account for consumption, system losses and other usages to estimate an average daily water demand. The Project's estimated domestic water demand is approximately 512,171 gpd, or an increase in water demand of approximately 240,768 gpd compared to the existing condition. The expected water demand is approximately 150,345 gpd less than the 662,516 gpd anticipated from the previous project. The water for the Project will be supplied by the existing BWSC systems in Medford Street, Decatur Street, Bunker Hill Street, Polk Street, Tufts Street, and/or Corey Street. Realignment and widening of Monument Street and Moulton Street may require

new or extended water mains. The Project may require new water mains in the new Concord Street, Lexington Street, O'Reilly Way, McNulty Court, Walford Way, O'Brien Court, and Samuel Morse Way and the building domestic water and fire protection systems may connect to them. New hydrants will connect to these new mains and will be located in proximity to the new building entrances to ensure sufficient coverage across the site. Refer to Figure 9.3.

The domestic and fire protection water service connections required for the Project will meet the applicable City and State codes and standards, including cross-connection backflow prevention. Compliance with the standards for the domestic water system service connection will be reviewed as part of BWSC's Site Plan Review process. This review will include sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and siamese connections that conform to BWSC and Boston Fire Department requirements.

### 9.5.3 Potential Impacts and Mitigation Measures

Efforts to reduce water consumption will be made. Aeration fixtures and appliances will be chosen for water conservation qualities. In public areas, sensor operated faucets and toilets will be installed.

New water services will be installed in accordance with the latest local, state, and federal codes and standards. Backflow preventers will be installed at fire protection service connections. New meters will be installed with Meter Transmitter Units (MTU's) as part of the BWSC's Automatic Meter Reading (AMR) system. All units will be individually metered, which can result in a reduction in water use.

The domestic and fire protection water services for the Project will connect to the existing BWSC systems in Medford Street, Decatur Street, Bunker Hill Street, Polk Street, Monument Street, Tufts Street, Corey Street, and/or Moulton Street. The proposed Project's impacts to the existing water system will be reviewed as part of the BWSC's Site Plan Review process.

The domestic and fire protection water service connections required for the Project will meet the applicable City and State codes and standards, including cross-connection backflow prevention. Compliance with the standards for the domestic water system service connection will be reviewed as part of the BWSC's Site Plan Review Process. This review will include sizing of domestic water and fire protection services, calculation of meter sizing, backflow prevention design, and location of hydrants and Siamese connections that conform to BWSC and Boston Fire Department requirements.

Hydrant flow data was available for one hydrant near the Project site. The existing hydrant flow data is shown in Table 9.2 Current BWSC record flow test data containing actual flow and pressure for hydrants within the vicinity of the Project site will be requested as the design progresses.

**TABLE 9.2 EXISTING HYDRANT FLOW DATA**

| Flow Hydrant Number | Date of Test | Static Pressure (psi) | Residual Pressure (psi) | Total Flow (gpm) |
|---|---|---|---|---|
| H126 28KH126 | 3/26/2013 | 67 | 64 | 1,584 |
| H104 Monument Street | 10/19/16 | 66 | 60 | 2,014 |
| H96 Tufts Street | 10/19/16 | 70 | 62 | 1,876 |
| H112 Polk Street | 10/19/16 | 61 | 54 | 1,418 |

## 9.6 Waste Water

This section describes existing conditions, proposed conditions, and potential impacts and mitigation measures associated with waste water infrastructure.

### 9.6.1 Existing Conditions

The local wastewater collection system is owned and operated by BWSC. The system conveys wastewater to the Massachusetts Water Resources Authority (MWRA) system, which flows to the MWRA Deer Island Wastewater Treatment Plant.

There are existing BWSC sewer mains in Medford Street, Decatur Street, Bunker Hill Street, Polk Street, Monument Street, Tufts Street, and Corey Street adjacent to and within the Project site. The mains ultimately flow to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

**Medford Street**

There is a 24-inch by 30-inch BWSC sewer main in Medford Street which flows southerly before joining a 19-inch by 26-inch MWRA main near the intersection of Medford Street and Chelsea Street which leads to the Charlestown Branch Sewer and ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

**Decatur Street**

There is a 12-inch BWSC sewer main and a 20-inch BWSC sewer main in Decatur Street which flow southerly before joining a 36-inch BWSC sewer main in Vine street, it continues to flow southerly and join a 48-inch by 51-inch BWSC sewer main which leads to the Charlestown Branch Sewer and ultimately flows to the MWRA Deer Island Waste Water Treatment Plant for treatment and disposal.

**Bunker Hill Street**

There are multiple BWSC sewer mains in Bunker Hill Street; a 20-inch, a 24-inch by 36-inch, a 26-inch by 39-inch flow easterly before increasing to the aforementioned 36-inch main in Vine Street, ultimately leading to the Charlestown Branch Sewer and flowing to Deer Island for treatment and disposal. A 10-inch BWSC sewer main in the northern side of Bunker Hill Street

flows easterly, increases to a 15-inch sewer main in Vine Street, and ultimately leading to the Charlestown Branch Sewer and flowing to Deer Island for treatment and disposal.

**Polk Street**

There is an 18-inch BWSC sewer main in Polk Street flowing northerly until it connects into the aforementioned 24-inch by 30-inch main in Medford Street, ultimately flowing to the Charlestown Branch Sewer and to Deer Island for treatment and disposal.

**Monument Street**

There is a 20-inch by 28-inch BWSC combined sewer main in Monument Street flowing northerly to the aforementioned 24-inch by 30-inch main in Medford Street, ultimately flowing to the Charlestown Branch Sewer and to Deer Island for treatment and disposal.

**Walford Way**

There is a 10-inch BWSC sewer main in Walford Way flowing easterly which flows to the 12-inch main in Tufts Street, ultimately connecting to the Charlestown Branch Sewer and flowing to Deer Island for treatment and disposal.

**Tufts Street**

There is a 12-inch BWSC sewer main flowing southerly in Tufts Street until it joins a 26-inch by 39-inch BWSC sewer main in Vine Street, ultimately connecting to the Charlestown Branch Sewer and flowing to Deer Island for treatment and disposal.

**Corey Street**

There is a 10-inch BWSC sewer main in Corey Street flowing southerly until it joins the aforementioned 26-inch by 39-inch main in Vine Street, ultimately connecting to the Charlestown Branch Sewer and flowing to Deer Island for treatment and disposal.

**Moulton Street**

There is a 12-inch and an 18-inch BWSC sewer mains in Moulton Street which flow southerly until they join the aforementioned 26-inch by 39-inch main in Vine Street, ultimately connecting to the Charlestown Branch Sewer and flowing to Deer Island for treatment and disposal.

**Boston Housing Authority (BHA) Sewer Mains**

There are existing BHA storm sewer mains which run through the Project Site and connect to BWSC storm drain mains. There is an 8-inch BHA sewer main east of Monument Street which starts at O'Reilly Way and flows northerly to the aforementioned 24-inch x 30-inch sewer main in Medford Street. There is also an 8-inch BHA storm drain main west of Monument Street which starts within the site near Bunker Hill Street and flows northerly to the aforementioned 24-inch by 30-inch BWSC sewer main in Medford Street.

The existing sewer system is illustrated in Figures 9.1a and 9.1b.

### 9.6.2 Wastewater Generation

The Project's sewage generation rates were estimated using 310 CMR 15.203 and the proposed building program. 310 CMR 15.203 lists typical sewage generation values for the proposed building use, as shown in Table 9.2. Typical generation values are conservative values for estimating the sewage flows from new construction. The site is comprised of new residential buildings and retail/community space. The existing site is comprised of 42 buildings. Due to the limited information available for the existing buildings, all flows from the existing buildings were determined by calculating estimated usage based off housing unit and bedroom counts provided by the Boston Housing Authority. Table 9.3 describes the increased sewage generation in gallons per day (gpd) due to the Project.

**TABLE 9.3 SEWER GENERATION**

| Program Type | Units | Generation Rate | Sewer Generation (GPD) |
|---|---|---|---|
| Proposed Master Plan Sewer Flows | | | |
| Studios | 342 | 110 gpd/bedroom | 37,620 |
| One Bedroom Units | 1,215 | 110 gpd/bedroom | 133,650 |
| Two Bedroom Units | 802 | 110 gpd/bedroom | 176,440 |
| Three Bedroom Units | 320 | 110 gpd/bedroom | 105,600 |
| Four Bedroom Units | 20 | 110 gpd/bedroom | 8,800 |
| Retail/Civic Space | 70,000 | 50 gpd/1,000 sf | 3,500 |
| TOTAL | | | 465,610 |
| Previous Project Sewer Flows | | | |
| Studio | 350 | 110 gpd/bedroom | 38,500 |
| One Bedroom Units | 1,200 | 110 gpd/bedroom | 132,000 |
| Two Bedroom Units | 1,200 | 110 gpd/bedroom | 264,000 |
| Three Bedroom Units | 400 | 110 gpd/bedroom | 132,000 |
| Four Bedroom Units | 50 | 110 gpd/bedroom | 22,000 |
| Retail/Civic Space | 100,000 sf | Various uses | 13,787 |
| TOTAL | | | 602,287 |
| Existing Building Sewer Flows | | | |
| One Bedroom Units | 352 | 110 gpd/bedroom | 38,720 |
| Two Bedroom Units | 425 | 110 gpd/bedroom | 93,500 |
| Three Bedroom Units | 254 | 110 gpd/bedroom | 83,820 |
| Four Bedroom Units | 66 | 110 gpd/bedroom | 29,040 |
| Five Bedroom Units | 3 | 110 gpd/bedroom | 1,650 |
| TOTAL | - | - | 246,730 |
| **NET INCREASE COMPARED TO EXISTING CONDITION** | | | +218,880 |
| **Net Increase from previously proposed project** | | | -136,677 |

The Proponent will coordinate with the BWSC on the design and capacity of the proposed connections to the existing sewer system. The Project is expected to generate approximately 465,610 gpd in wastewater flows, or an increase of approximately 218,880 gpd compared to the existing condition. The expected increase in sewer flows is approximately 136,677 gpd less than the 602,287 gpd anticipated from the previously proposed project.

Relocated sewer mains may be required in Monument Street and Moulton Street due to the roadway widenings. Extensions of the existing sewer mains in Tufts Street and Corey Street may be required to serve the new buildings. New sewer mains in Concord Street, Lexington Street, O'Reilly Way, McNulty Court, O'Brien Court, and Samuel Morse Way may be installed depending on the location of the proposed building sanitary sewer services (Figure 9.3).

New services for the proposed buildings will connect to the existing BWSC sewer mains in Medford Street, Decatur Street, Bunker Hill Street, and Polk Street. Improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's Site Plan Review process for the Project. The process will include a comprehensive design review of the existing and proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts.

The Project will not trigger any permits directly from the Department of Environmental Protection for this increase in sewage flow.

### 9.6.3 Existing Sewage Capacity

The Project's impact on the existing BWSC systems in Medford Street, Decatur Street, Bunker Hill Street, Polk Street, Monument Street, Tufts Street, and Corey Street and potential building service connections were analyzed. Table 9.3 indicates the hydraulic capacity of the 24-inch by 30-inch sewer main in Medford Street; the 12-inch sewer main in Decatur Street; the 24-inch by 30-inch sewer main and 18-inch sewer main in Bunker Hill Street; the 18-inch sewer main in Polk Street; the 20-inch by 28-inch sewer main in Monument Street; the 12-inch sewer main in Tufts Street; and the 12-inch sewer main in Corey Street.

The minimum hydraulic capacity is:

- 11.76 million gallons per day (MGD) or 18.20 cubic feet per second (cfs) for the sewer system in Medford Street;
- 0.85 MGD or 1.31 cfs for the sewer system in Decatur Street;
- 31.41 MGD or 48.60 cfs for the sewer system in Bunker Hill Street;
- 5.93 MGD or 9.18 cfs for the sewer system in Polk Street;
- 11.49 MGD or 17.78 cfs for the sewer system in Monument Street;
- 0.65 MGD or 1.01 cfs for the sewer system in Tufts Street;
- 1.00 MGD or 1.55 cfs for the sewer system in Corey Street.

Refer to Table 9.4 for the full capacity analysis.

**TABLE 9.4 SEWER HYDRAULIC CAPACITY ANALYSIS**

| Manhole (BWSC Number) | Distance (ft) | Inv Elev (Up) | Inv Elev (Down) | Slope (%) | Dia/ Size (in) | Manning's Number | Flow Capacity (cfs) | Flow Capacity (MGD) |
|---|---|---|---|---|---|---|---|---|
| **Medford Street** | | | | | | | | |
| 16 to 21 | 827 | 13.3 | 10.3 | .4% | 24 x 30 | .013 | 18.20 | 11.76 |
| 21 to 29 | 859 | 10.3 | 6.2 | .5% | 24 x 30 | .013 | 20.87 | 13.49 |
| 29 to 31 | 292 | 6.2 | 4.6 | .5% | 24 x 30 | .013 | 22.36 | 14.45 |
| | | | | | | Minimum Flow Analyzed: | 18.20 | 11.76 |
| **Decatur Street** | | | | | | | | |
| 366 to 362 | 623 | 9.97 | 5.50 | .7% | 12 | .013 | 1.31 | .85 |
| | | | | | | Minimum Flow Analyzed: | 1.31 | .85 |
| **Bunker Hill Street** | | | | | | | | |
| 150 to 291 | 228 | 29.2 | 23.3 | 2.6% | 24 x 30 | .013 | 48.60 | 31.41 |
| 291 to 309 | 448 | 21.8 | 13.16 | 1.9% | 18 | .013 | 52.52 | 33.95 |
| | | | | | | Minimum Flow Analyzed: | 48.60 | 31.41 |
| **Polk Street** | | | | | | | | |
| 146 to 16 | 639 | 29.0 | 13.90 | 2.4% | 18 | .013 | 9.18 | 5.93 |
| | | | | | | Minimum Flow Analyzed: | 9.18 | 5.93 |
| **Monument Street** | | | | | | | | |
| 394 to 18 | 593 | 16.8 | 12.70 | .7% | 20 x 28 | .013 | 17.78 | 11.49 |
| | | | | | | Minimum Flow Analyzed: | 17.78 | 11.49 |
| **Tufts Street** | | | | | | | | |
| 402 to 339 | 374 | 8.60 | 7.00 | .4% | 12 | .013 | 1.01 | .65 |
| | | | | | | Minimum Flow Analyzed: | 1.01 | 0.65 |
| **Corey Street** | | | | | | | | |
| 415 to 360 | 173 | 7.85 | 6.10 | 1.0% | 12 | .013 | 1.55 | 1.00 |
| | | | | | | Minimum Flow Analyzed: | 1.55 | 1.00 |

Notes: Manhole numbers are taken from a BWSC Sewer System GIS Map received on January 26, 2016.
Flow calculations are based on Manning's equation.

### 9.6.4 Proposed Conditions

New building services will connect to the existing BWSC sanitary sewer mains in the adjacent roadways. Improvements and connections to BWSC infrastructure for the will be reviewed as part of the BWSC's Site Plan Review process for the Project. This process will include a comprehensive design review of the existing and proposed service connections, an assessment of Project demands and system capacity, and the establishment of service accounts. Because the Project will increase sanitary sewage flows by more than 15,000 gpd, the Project will be required to contribute BWSC's 4:1 Inflow and Infiltration (I/I) mitigation program. The Project will work with the BWSC to development I/I mitigation agreements by block as the design progresses.

### 9.6.5 Potential Impacts and Mitigation Measures

It is likely that the proposed Project will require multiple connections to existing and proposed BWSC sewer mains in Medford Street, Decatur Street, Bunker Hill Street, Polk Street, Monument Street, Tufts Street, or Corey Street , thereby distributing the impacts until these sewer mains join together and the sewage flows to Deer Island for treatment. Based on this assumption and an average increase in daily flow estimate for the Project of 218,880 gpd, or 0.2188 MGD, no sewer capacity problems are expected within the proposed Project area.

All improvements and connections to BWSC infrastructure will be reviewed as part of the BWSC's site plan review process for the Proposed Project. This process includes a comprehensive design review of the proposed service connections, an assessment of project demands and system capacity, and the establishment of service accounts. The Proponent will coordinate with BWSC to reach an agreement regarding the requirement for 4:1 Inflow and Infiltration (I/I) mitigation. The Project will work with the BWSC to development I/I mitigation agreements by block as the design progresses.The Project will be serviced by separate sanitary and storm drain systems, and not combined sewers. As a result, I/I impact from the post-development Project Site is minimal. The Proponent will work with the MassDEP, the MWRA, and BWSC to develop a plan to meet I/I mitigation requirements as the blocks are developed.

## 9.7 Other Utilities

**Electrical Infrastructure**

Eversource owns the existing below-grade electrical system in the in the public ways, including Polk Street, Medford Street, Bunker Hill Street, Monument Street, Tufts Street, Corey Street and Walford Way. It is expected that adequate service is available in the existing electrical system for Project improvements. Electrical services from existing vaults in the roadways connect to the existing buildings. There are also electrical services connecting from building to building. The Proponent will work with Eversource to determine the infrastructure improvements necessary for the new and relocated roadways, to confirm adequate system capacity for the Proposed Project as the design is finalized, and to determine new electrical service locations and connections for the new buildings. A conceptual layout for new electrical ductbanks and services to the new buildings is shown in Figure 9.3.

The Proponent is committed to taking an integrated and comprehensive approach to energy planning which is sensitive to high and rising energy prices and growing concern over global climate change. The highest priority, and most cost-effective approach is to make the Project's buildings as energy efficient as possible through Passive House certification. In addition, as the Project's electric load and energy requirements are calculated and assessed, the Proponent will undertake an energy planning process, working closely with the City of Boston and Eversource.

**Gas Infrastructure**

National Grid owns the existing underground gas system in the public ways near the site, including Polk Street, Medford Street, Bunker Hill Street, Decatur Street, Monument Street, Tufts Street, Corey Street, Moulton Street, O'Reilly Way. There is also a gas main running through the site between Medford Street and Bunker Hill Street just west of Monument Street. The existing buildings have private service connections to the gas mains in the roadways. It is expected that adequate service is available in the existing system for the Proposed Project improvements. Although the Project will only utilize gas for hot water heating, the Project may require new gas mains in the new and/or widened roadways to provide service to the new buildings. The Proponent will work with National Grid to determine the required gas main infrastructure improvements necessary for the new and relocated roadways, to confirm adequate system capacity for the Proposed Project as the design is finalized, and to determine new gas service locations and connections for the new buildings. As noted above with respect to electricity, the Proponent is committed to taking a comprehensive and integrated approach to energy planning, one which will also include working closely with the City of Boston and National Grid with respect to gas usage. A conceptual layout for new gas mains and services to the new buildings is shown in Figure 9.3.

**Telecommunication Infrastructure**

There are existing below-grade telecommunication systems to provide telephone, cable and data services in the public ways, including Medford Street, Bunker Hill Street, Moulton Street, Tufts Street, Corey Street, O'Reilly Way and Walford Way with service provided by various private telecommunication companies. The existing buildings have private connections from the existing vaults in the roadways. There are also telecommunication services connecting from building to building. It is expected that adequate service is available in the existing system for the Project improvements. The Proponent will work with the private telecommunication companies to determine the infrastructure improvements needed, confirm adequate system capacity for the Project, coordinate service connection locations, and obtain appropriate approvals. A conceptual layout for new telecommunications ductbanks and services to the new buildings is shown in Figure 9.3.

## 9.8 Smart Utilities Policy

BPDA's Smart Utility Policy expects proponents of projects subject to Article 80B – Large Project review to integrate applicable Smart Utility Technologies (SUTs) into the design and planning of utility infrastructure for water, energy, communications, and transportation services. Below is a description of the Project's approach to compliance with this policy.

### 9.8.1 District Energy Assessment/Solar + Storage

A Feasibility Assessment for a District Energy Microgrid is recommended for Projects with more than 1.5 million square feet of floor area.

The Proponent has worked closely with the BPDA's Smart Utilities staff to identify the most appropriate technologies to study for the District Energy Assessment aspect of the Smart Utilities Policy. Because Passive House design leverages space heating technology that is powered by electricity, fossil fuel fired district energy and microgrid options would be inconsistent with this approach and therefore were not explored. Instead, the Proponent conducted a Solar + Storage study to evaluate the feasibility of and optimal solutions for maximizing renewable energy generation and energy resilience. This study will be filed separately.

### 9.8.2 Telecom Utilidor

For projects that are adding or altering road surface in excess of 0.5 miles of roadway, the BPDA recommends the incorporation of a Telecom Utilidor or other technologies that serve to reduce street disruptions, yield efficient use of underground space, and promote more equitable access to telecom infrastructure.

As the utility infrastructure design advances, the Project design team will incorporate a Telecom Utilidor to service the Project and will work closely with BPDA Smart Utilities staff to design a strategy that meets the BPDA's goals for minimizing street openings, for enabling efficient current and future use of underground space, and for providing equitable access.

### 9.8.3 Green Infrastructure

For projects with 100,000 or more square feet of floor area, the BPDA recommends the use of Green Infrastructure to retain on-site a volume of runoff equal to 1.25 inches of rainfall times the total impervious area, prior to discharge, and in compliance with any applicable BWSC stormwater mitigation requirements.

The Project will accomplish this primarily through implementation of various stormwater management practices, including underground recharge systems or underslab recharge systems depending on available space. Other potential strategies like green roofs and reusing stormwater for irrigation will be further evaluated as the design progresses. For proposed public rights-of-way, the Project will review opportunities to reduce stormwater runoff such as permeable pavers and street trees in the furnishing zones of the public sidewalks.

The underground recharge systems will likely consist of open-bottomed tanks and/or perforated pipes in a bed of crushed stone sized to store the 1.25-inch volume before overflowing by gravity to BWSC storm drain mains in the surrounding roadways. Stormwater from the roofs and site impervious areas will be directed to the recharge system through a closed drainage system. Green roofs may be proposed to reduce the amount of impervious surface onsite, to absorb and store stormwater on the roof, and to reduce the footprint of other underground recharge systems if space constraints are encountered, though available roof area will be limited by solar PV.

### 9.8.4 Adaptive Signal Technology

For projects where the BTD requires that traffic signals be installed or where existing signal equipment will be fully upgraded, the BPDA recommends incorporating Adaptive Signal Technology (AST). To mitigate Project impacts, signalization is being considered at the intersection of Bunker Hill Street at Medford Street/Main Street. If it is deemed appropriate, adaptive signal technology will be explored to allow real-time management of traffic systems.

### 9.8.5 Streetlights

For projects making right-of-way improvements that are responsible for streetlight installation or a contribution toward the same, the BPDA recommends that those streetlights include additional electrical connection and fiber optic service. The existing streets contain various types of streetlight poles and fixtures owned and maintained by the City of Boston Public Works Department (PWD) Street Lighting Division. Streetlights will be impacted due to the reconstruction of the roadways adjacent to and within the Project Site. Removal of existing streetlights and design for new streetlight locations for both existing and new roadways will be coordinated with the PWD as the design progresses. Refer to Figure 9.3 for a conceptual layout of street lighting conduit.

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**Chapter from Final Environmental Impact Report dated 7-31-20**

# 5

# Wastewater/Stormwater

This chapter addresses comments related to sewer system connections and contributions, infiltration and inflow (I/I) mitigation, stormwater system capacity, and proposed best management practices (BMPs).

## 5.1 Sewer Connections

In their comment letters on the DEIR, the BWSC and MWRA requested information about the ability of the BWSC storm drain system and the MWRA Charlestown Branch Sewer Main to accommodate both the increase in sewer flows from the Project and anticipated volumes of stormwater runoff from the Site due to climate change. The Proponent confirmed that the Site stormwater is directed to dedicated storm drains, rather than to the sewer main. A few existing internal roadway catch basins may connect to BWSC sewer mains, although it is unclear from the information available. Record plans indicate that when the current housing development was built, both storm drain and sanitary services for each building were connected to combined sewer mains. Record plans also indicate that dedicated storm drain mains have been installed over time and the existing building storm drain services have been connected to the new storm drain mains. Proposed sewer connections are shown in Figure 5.1.

## 5.2 I/I Mitigation

The Proponent prepared a schematic utility plan as part of the BPDA's Smart Utility Policy to establish where new sewer and drain mains will be needed to serve the new buildings and where existing sewer and drain mains will be removed. No new buildings will connect to combined sewer mains.

The Proponent is working with BWSC and MWRA to identify areas where system upgrades can be performed to mitigate I/I and waive or reduce I/I fees. A breakdown of the Project phasing, schedule, and increase in sewage flows by phase were sent to BWSC and MWRA to help identify appropriate mitigation measures.

## 5.3 Stormwater System Capacity

In order to adequately size the stormwater system for the Project, the pre- and post-development Site conditions were analyzed to delineate the existing and proposed subwatershed areas; changes in calculations of impervious surfaces were assessed; and a drainage analysis was performed. Chapter 3 describes how the Site will accommodates future precipitation conditions.

### 5.3.1 Subwatershed Delineation

The Site's watersheds were delineated by examining the existing drainage system, record plans, surface topography, land features, and discharge points to the BWSC and MWRA systems beyond the Site. The existing buildings and site drainage structures are directed to the BWSC storm drain mains in the internal roadways and perimeter roadways. The existing site does not contain stormwater detention or infiltration systems.

The Site is divided into three proposed subwatersheds (Figure 5.2). Subwatershed 1 comprises the southeastern portion of the Site, which directs stormwater runoff off-site to the 60-inch BWSC main in Vine Street and flows to Regulator 020-2 in Chelsea Street. Regulator 020-2 in Chelsea Street connects to several sewer and drain mains, and also connects to the MWRA Charlestown Branch Sewer at the intersection of Vine Street and Chelsea Street. There is also a 46-inch by 64-inch storm drain outfall that flows to the Boston Inner Harbor (Storm Drain Outfalls 020 and 022). Subwatershed 2 comprises the northeastern portion of the Site, which directs stormwater runoff north to the BWSC storm drain mains off-site in Medford Street. Subwatershed 2 ultimately discharges to the Little Mystic Channel via Storm Drain Outfall 010 north of Old Landing Way. Subwatershed 3 comprises the western portion of the Site, which directs stormwater runoff north to the BWSC Storm drain mains off-site to the intersection of Medford Street and Monument Street. Subwatershed 3 ultimately discharges to the Little Mystic Channel via Storm Drain Outfall just west of Old Ironside Way.

### 5.3.2 Impervious Area Assessment

Area take-offs were calculated to determine the percentage of impervious area of each subwatershed under both existing and proposed conditions (see Table 5-1 below). Sitewide, the impervious area is expected to increase from approximately 71-percent in the existing condition to approximately 85-percent in the proposed condition. The increase in impervious area is mainly due to the widening of public roadways and creation of new paved roadways. This calculation is likely slightly inflated, as the addition of street trees, permeable pavers, and methods to reduce impervious areas in the public roadways were not subtracted from the pervious area total, and in the absence of fully developed site plans, a conservative approach was used, assuming more impervious area. Therefore, the stormwater analysis is conservative to provide flexibility in the design and avoid undersizing the proposed stormwater management systems.

Impervious areas for each proposed parcel were also estimated to calculate the approximate volume of stormwater that will be required to be managed Site-wide. BWSC requires that all

projects constructing 100,000 square feet or more of floor area retain on-site a volume of runoff equal to 1.25 inches of rainfall times the Site's total impervious area. This volume must be infiltrated prior to discharge to a storm drain. The Project's stormwater management system will be designed in compliance with all BWSC regulations.

### 5.3.3 Drainage Analysis for Current and Future Conditions

A drainage analysis was performed using HydroCAD to estimate rates and volumes of runoff from each of the Site's sub-watersheds and for the full Project build-out for both existing and proposed conditions. The post-development analysis included infiltration systems sized for the 1.25-inch storage requirements for groundwater recharge mentioned above. The analysis demonstrated that the rates and volumes of runoff would be lower under proposed conditions than under existing conditions. Since site runoff was analyzed without the inclusion of the proposed storage areas within the public ways (i.e. street trees and permeable pavers), the proposed stormwater management system is more robust than required for current conditions.

The Proponent will continue working with BWSC to ensure the proposed Site is designed with sufficient capacity and that the rate and volume of runoff leaving the Site will be less than the existing condition.

## 5.4 Stormwater Best Management Practices

The existing site contains private closed drainage systems, BHA storm drain mains, and BWSC storm drain mains, but does not have any systems that provide storage or promote adequate treatment or infiltration. Existing buildings have drain services that connect to the BHA and BWSC storm drain mains. Runoff from existing site areas and roadways is collected by catch basins and also directed to the BHA and BWSC storm drain mains.

The Project Site will be developed with stormwater management systems designed for each block to manage stormwater locally and meet BPDA and BWSC requirements. The systems will be designed to provide storage, promote infiltration, replenish groundwater, provide treatment to improve water quality, and reduce rates and volumes of runoff from the Site compared to the existing condition.

### 5.4.1 Blocks

Within each block, infiltration systems will be sized for 1.25" of runoff from the impervious roof and site areas. As described in Chapter 3, Section 3.3,current and future rainfall events for the 2070 10-, 25-, and 100-year, 24-hour storms were evaluated to ensure that the systems sized for 1.25-inches will be sufficient to reduce runoff rates and volumes from the total site during future storm events. As previously stated, the Site is comprised of three subwatersheds. Although the Site areas contributing to each subwatershed vary from existing to proposed condition, the runoff rates and volumes from the total site will be reduced overall. Required storage volumes were calculated based on approximate proposed impervious areas for each subwatershed, as shown in Table 5-1 below.

**Table 5-1 Site Characteristics by Subwatershed**

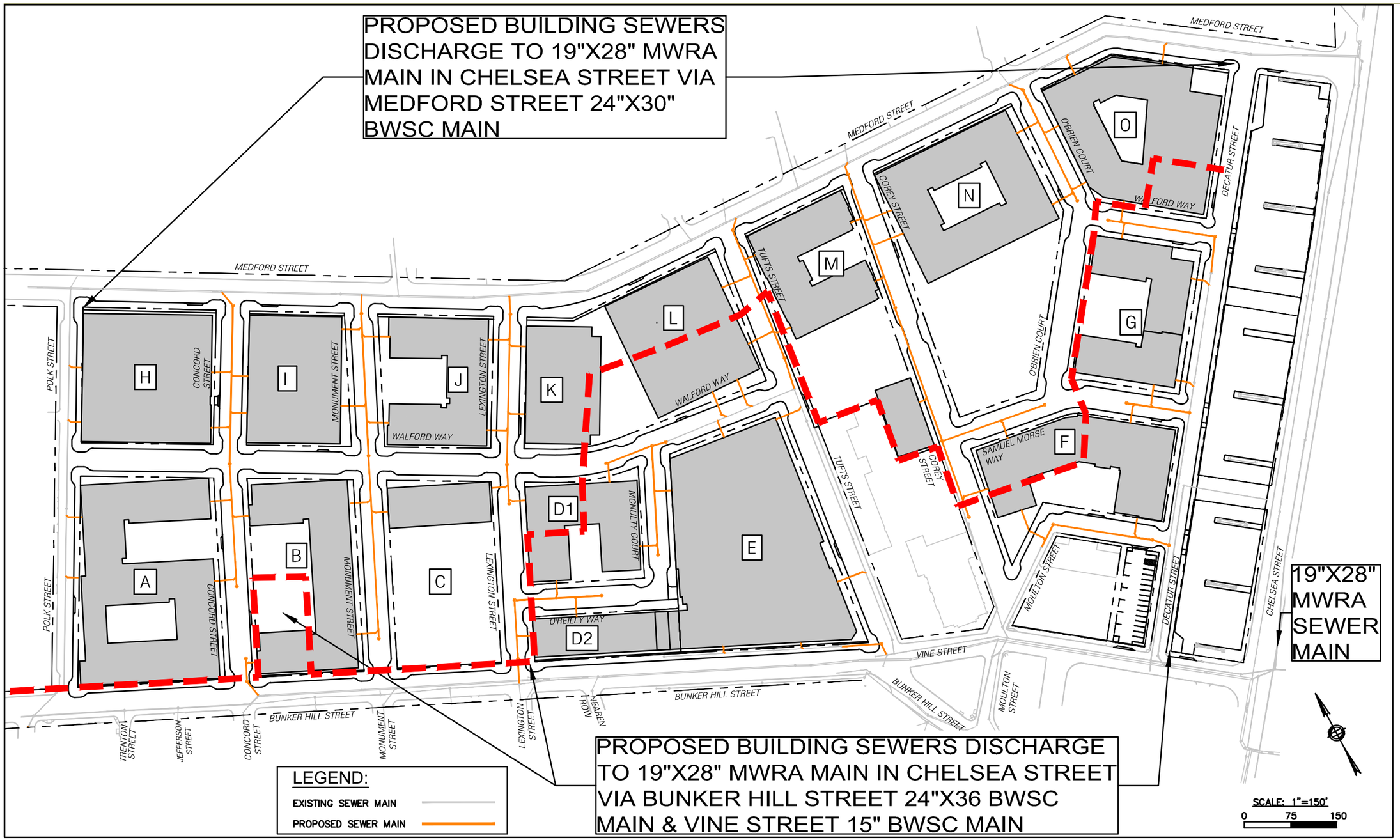
| Subwatershed | Proposed Impervious (s.f.) | Storage Depth (in.) | Storage Required (c.f.) | Parcels Included |
|---|---|---|---|---|
| DP1 | 193,874 | 1.25 | 20,195 | C, D1, D2, E, F |
| DP2 | 239,622 | 1.25 | 24,961 | G1, G2, K, L, M, N, O |
| DP3 | 222,579 | 1.25 | 23,185 | A, B, H, I, J |

In addition, the following stormwater design elements will be incorporated into each block:

- Stormwater from paved parking lots, walkways, and landscape will be collected via deep sump and hooded catch basins and area drains from the private site areas and directed to the underground recharge systems;
- Landscape areas with vegetative features and beds of crushed stone to provide storage and promote infiltration and minimize runoff;
- Landscape and grass swales to provide treatment and direct runoff to on-site infiltration systems;
- Reuse of stormwater for irrigation or cooling tower makeup will be further evaluated as the design progresses; and
- Green roofs, as permitted by the building designs, may provide additional storage and reduce impervious area.

### 5.4.2 Public Ways

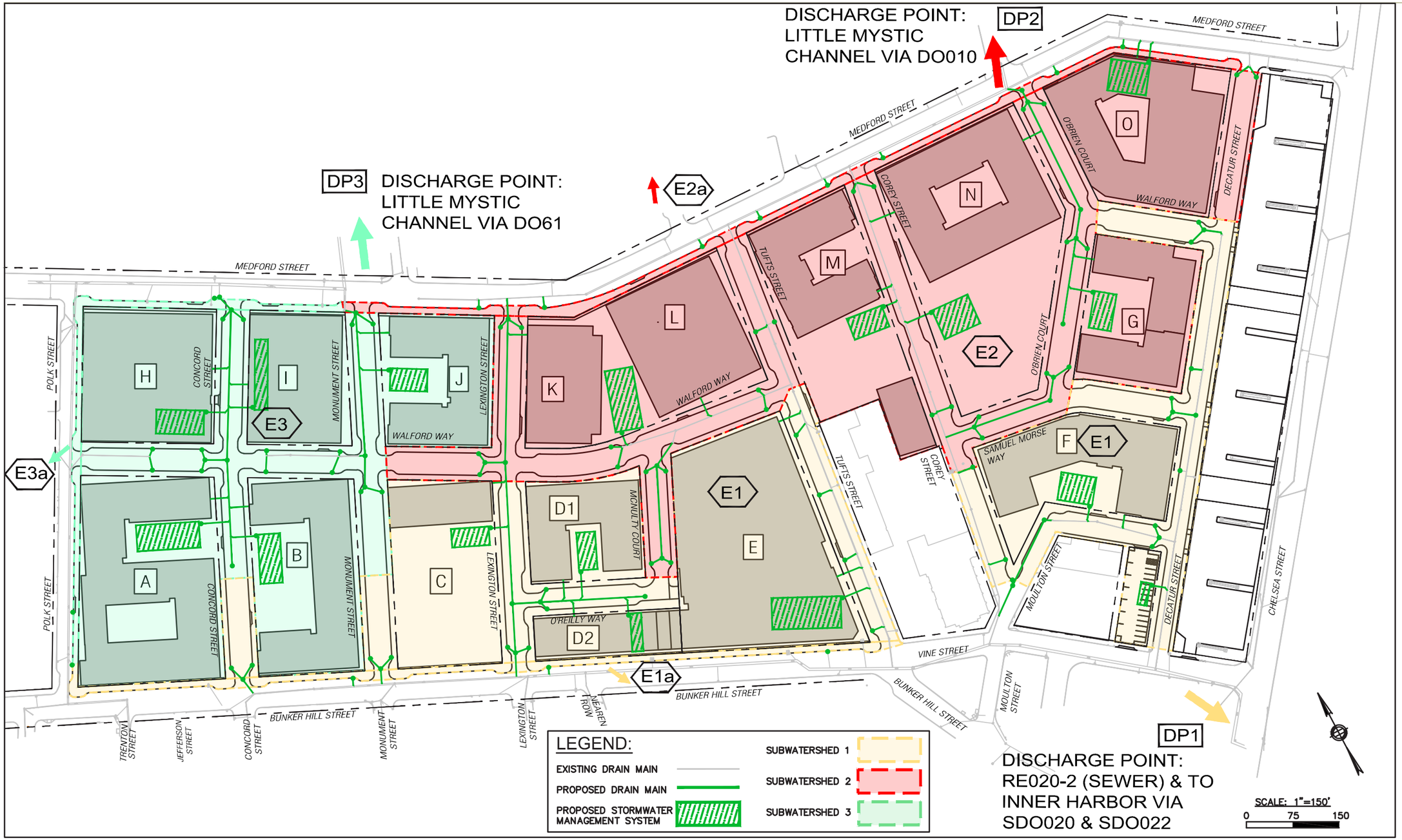
Within the public ways, sidewalks with street trees, permeable pavers or landscape strips will promote stormwater infiltration and reduce stormwater directed to the roadways and BWSC storm drain mains.




Source: Nitsch

Figure 5.1
Proposed Sewer Plan

**Bunker Hill Housing Redevelopment**
**Charlestown, MA**




Source: Nitsch

Figure 5.2
Proposed Drainage Plan

**Bunker Hill Housing Redevelopment**
**Charlestown, MA**