3

Air Quality

NOTE: No signficant changes have been made to this chapter from the NPC.

Introduction

This section presents an overview of the regional, or mesoscale, air quality assessment for the Project. A mesoscale air quality assessment was conducted in accordance with MassDEP's *Guidelines for Performing Mesoscale Analysis of Indirect Sources* because the Project is estimated to generate over 6,000 new Unadjusted vehicle trips per day. The purpose of this assessment is to demonstrate that the Project does not violate applicable local, state, and federal air quality standards.

The air quality assessment for this Project includes a mesoscale analysis, which evaluated the regional ozone precursor impacts of volatile organic compounds (VOC) and nitrogen oxides (NO_x). The ozone mesoscale analysis presented herein demonstrates that the Project is in consistent with the guidelines of MassDEP because it will incorporate reasonable and feasible measures to reduce the projected 2024 Build Condition ozone emissions associated with the Project's mobile sources, or single-occupancy vehicle trips.

Summary of Project Change Impacts

The following changes from the Prior Project will affect the mesoscale ozone analysis:

- Since the Prior Project, standard ozone modeling and mesoscale air quality analysis methodology has changed. Recently, the U.S. Environmental Protection Agency (EPA) has adopted the Motor Vehicle Emission Simulator (MOVES) 2014 for determination of mobile source emission factors, as compared to the previously used Mobile 6.2. The EPA has concluded that MOVES provides more accurate results, which often result in smaller emissions as compared to Mobile 6.2. However, with the adoption of MOVES, mesoscale air quality analysis is now

conducted on a county-wide scale. This results in much larger emissions when comparing to the local-regional scale emissions from the past mesoscale analysis approach. This often results in small proportional increases of emissions directly due to development projects when quantified on a county-wide scale, as seen in this analysis.

- The proposed new net gross square footage occupied by the Project is 1,034,600 gross square feet. Additionally, traffic in the KSURP area will increase with the Project from the Prior Project.
- Under the new project timeline, the existing conditions and build year have been pushed to 2014 and 2024, respectively. These later dates will mean that overall base mesoscale emissions will be less than those that may have been stated in previous air quality analyses as vehicle emissions decrease with time due to increasing regulations on vehicle and fuel cleanliness.

Mesoscale Analysis

Mesoscale Analysis Background

The purpose of the mesoscale analysis is to estimate the area-wide emissions of VOC, and NO_x during a typical day in the peak ozone season, consistent with the requirements of the State Implementation Plan (SIP). The mesoscale analysis evaluates the change in VOC and NO_x emissions from the average daily traffic volumes and vehicle emission rates. To demonstrate compliance with the SIP criteria, the air quality study must show the Project's change in daily (24-hour period) VOC and NO_x emissions.

MassDEP has established guidelines that define the modeling and review criteria for air quality studies prepared pursuant to review under MEPA. These guidelines require that mesoscale analyses be prepared for proposed development projects to determine the change in Project-related ozone precursor emissions. The predominant source of ozone precursor emissions anticipated from the Project is emissions from Project-related traffic. Ozone is not directly emitted by motor vehicles, but is generated when VOC and NO_x emissions from motor vehicles, stationary sources, and area sources react in the atmosphere with sunlight and heat. Project-related ozone and carbon monoxide impacts are determined by assessing the changes in VOC and NO_x emissions of motor vehicles. MassDEP criteria require that proposed development projects include all reasonable and feasible emission reduction mitigation measures if the ozone emissions from the Build Condition are greater than the No-Build Condition. Massachusetts has incorporated this criterion into the SIP.

The mesoscale analysis evaluated the change in emissions from Project-related traffic for the Existing, No-Build, and Build Conditions. The air quality analysis demonstrates that

the Project will meet MassDEP air quality criteria of including all reasonable and feasible emission reduction mitigation measures. While the Build Condition VOC, and NO_x emissions are estimated to increase (0.11 kg/day for VOC and 0.62 kg/day for NO_x) as compared to the No-Build Condition, the Project will be implementing mitigation measures (including a TDM program) that will reduce VOC emissions by 0.04 kg/day and NO_x emissions by 0.08 kg/day.

Mesoscale Analysis Modeling Methodology

The mesoscale analysis evaluates the change in emissions associated with and without the Project, specifically, daily (24-hour period) VOC and NO_X emissions from the average daily traffic volumes and vehicle emission rates. MassDEP guidelines require that the air quality study utilize traffic and emissions data for existing and future (No-Build and Build) conditions. The traffic and emissions data are incorporated into the Environmental Protection Agency (EPA) and MassDEP air quality models to generate emission's estimates that demonstrate whether the Project will have air quality impacts.

The mesoscale air quality analysis utilizes developed traffic data (volumes, speeds, and roadway geometry) and emission factor data for Existing, No-Build, Build, and Build with Mitigation Conditions. The mesoscale study area includes Middlesex County, the county in which the City of Cambridge is located. Major roadways and intersections that were included in the mesoscale analysis include:

- Broadway Street
- Cambridge Street
- Main Street
- Massachusetts Avenue
- Binney Street
- Vassar Street
- Memorial Drive
- Ames Street
- 3rd Street
- Fulkerson Street
- 1st Street
- Monsignor O'Brien Highway
- Galileo Galilei Way
- East Street
- Land Boulevard
- Charleston Avenue

The mesoscale analysis calculates the changes in VOC and NO_x emissions for the existing and future conditions within the mesoscale study area. The mesoscale analysis traffic and emission factor data were developed for the four conditions mentioned above. These data were incorporated into the air quality models to evaluate the changes in VOC and NO_x emissions.

Emission Rates

EPA's Office of Transportation and Air Quality (OTAQ) has developed the MOVES[1]. MOVES2014 is EPA's latest motor vehicle emissions model for state and local agencies to estimate VOCs and NOx and other emissions' precursors from cars, trucks, buses, and motorcycles.

All of the vehicle emissions used in the mesoscale analysis were obtained using EPA's MOVES2014 emissions model. MOVES2014 calculates emission factors from motor vehicles in kilograms per vehicle-mile for existing and future conditions. The emissions calculated for this air quality assessment include Tier 3 emission standards, which is an EPA program that sets new vehicle emissions standards, including lowering the sulfur content of gasoline, heavy-duty engine and vehicle greenhouse gas regulations (2014-2018), and the second phase of light-duty vehicle GHG regulations (2017-2025). It also includes Massachusetts-specific conditions, such as the state vehicle registration age distribution and the statewide Inspection and Maintenance (I/M) Program.[2]

Traffic Data

The air quality analysis utilized traffic data (volumes) developed for each analysis condition. The mesoscale analysis uses typical daily peak and off-peak traffic volumes to determine the highest daily emissions of VOC and NO_x. The vehicle miles traveled used in the air quality analysis were developed based on the traffic data analyzed for the Project (refer to Appendix C). With the adoption of MOVES2014, the mesoscale air quality analysis is now conducted on a county-wide scale. The mesoscale study area for this Project includes the entire Middlesex County.

Existing Mesoscale Emissions

The mesoscale analysis calculated the existing VOC and NO_x emissions from the major roadways in the mesoscale study area. These emissions, estimated to be 15,246.90 kilograms per day (kg/day) of VOCs and 23,259.80 kg/day of NO_x, establish an existing baseline to which future emissions can be compared.

Future Air Quality Conditions

Future Project-related emission calculations are based upon changes in traffic and emission factor data. The traffic data include traffic volumes and vehicle miles traveled. The emission factor data included emission reduction programs and years of

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[1] MOVES2014 (Motor Vehicles Emission Simulator), 2014, US EPA, Office of Mobile Sources, Ann Arbor, MI.
[2] *The Stage II Vapor Recovery System* is the process of collecting gasoline vapors form vehicles as they are refueled. This requires the use of a special gasoline nozzle at the fuel pump.

analysis. Under the No-Build Condition, VOC emissions were estimated to be 7,614.52 kg/day and NOx emissions were estimated to be 9,232.92 kg/day. The 2024 VOC and NO_x, emissions are lower than the 2014 emissions due to the implementation of emission control programs, such as the Federal Motor Vehicle Emission Control Program (Tier 3), the Stage II Vapor Recovery System, and the Massachusetts Vehicle Inspection and Maintenance program.

Under the Build Condition, as presented in Table 3-1: *Mesoscale Air Quality Analysis Results*, the VOC emissions are estimated to be 7,614.63 kg/day and the NOx emissions are estimated to be 9,233.54 kg/day. The project is estimated to generate 0.11 kg of VOC and 0.62 kg of NOx per day. The results show that the Project-related mobile source emissions are projected to be minimal at a mesoscale level (Middlesex County).

Table 3-1 Mesoscale Air Quality Analysis Results (kg/day)

Pollutant	2014 Existing Conditions	2024 No-Build Conditions	2024 Build Conditions	Project-Related Emission[1]
Volatile Organic Compounds (VOCs)	15,246.90	7,614.52	7,614.63	0.11
Oxides of Nitrogen (NO_x)[1]	23,259.80	9,232.92	9,233.54	0.62

1 The future no build condition emissions are lower than the existing conditions emissions due to the implementation of state and federal emission control programs, such as the Federal Motor Vehicle Emission Control Program (Tier 3) and the Stage II Vapor Recovery System, and the Massachusetts Inspection and Maintenance program.

Proposed Air Quality Mitigation

The SIP requires that proposed projects with Build Condition VOC, and NOx emissions greater than the No-Build Condition include all reasonable and feasible emission reduction measures. As discussed in Chapter 2, *Transportation and Parking*, the Proponent will coordinate with the City to potentially implement intersection improvements to reduce delays and queuing as well as implement TDM measures in order to reduce single-occupant vehicle trips to the KSURP area and to minimize peak-period traffic demands in the KSURP area—all of which will benefit air quality. Refer to Chapter 2, *Transportation and Parking* for a full description of the proposed transportation-related improvements.

Based on the new requirement to use MOVES2014 and the corresponding regional nature of the mesoscale analysis, emissions reduction from Project-specific traffic mitigation, such as intersection improvements and the implementation of TDM measures are minor reductions when compared to the overall county plus Project-related emissions (which are projected on a county-wide level). The safety performance examinations of existing intersections that will be conducted in the future (i.e., Roadway Safety Audits), as required by MassDOT, are also expected to reduce mobile source air emissions by improving intersections to operate more efficiently.

The implementation of the TDM plan is also expected to improve air quality in the KSURP area by promoting the use of alternative forms of transportation as the principal travel mode to and from the Project in place of single-occupancy vehicles. Previous estimates of similar TDM programs have ranged on the order of two to five percent reduction in vehicles miles traveled (VMT), which in turn will have a slight decrease in regional VOC and NOx emissions from the Build Condition. Separate from TDM measures implemented during the operation of the buildings, the pedestrian enhancements and bicycle accommodations proposed as part of the Project will further contribute to improving air quality through reduced vehicle trips.

As shown in Table 3-2, the results of the mesoscale analysis demonstrate that the roadway improvements will meet the transportation conformity criteria by reducing both VOC and NOx emissions. The mitigation measures included improved geometry and operation in the KSURP area. The mitigation measures would result in an emission reduction of 0.04 Kg/day of VOCs and 0.08 kg/day of NOx
The mitigation measures would result in an emission reduction of 0.04 Kg/day of VOCs and 0.08 kg/day of NOx.

Table 3-2 Mobile Source Emissions Mitigation Analysis Results (kg/day)

Pollutant	2024 Build Conditions	Project-Related Emissions[1]	Estimated Reductions Due to Traffic Mitigation[2]	Resulting Project-Related Emissions
Volatile Organic Compounds (VOCs)	7,614.63	0.11	0.04	0.07
Oxides of Nitrogen (NO_x)[1]	9,233.54	0.62	0.08	0.54

1 Represents the difference in VOC and NOx emissions between the 2024 No-Build and Build Conditions.
2 The traffic mitigation includes physical and operations upgrades at the intersections and does not include TDM programs which would result in minor additional emissions reductions.

The Proponent and Redeveloper are committed to developing an expanded program of transportation mitigation and enhancements (the proposed KSTEP) designed to both preserve the favorable mode share balance in Kendall Square and provide additional improvements to mitigate the trip generation and associated air emissions projected to result from the Project. The KSTEP will be developed in conjunction with the many stakeholders engaged in transportation planning and operations in Kendall Square, including the Kendall Square Mobility Task Force, the MBTA, and MassDOT. The KSTEP would supplement the transportation mitigation measures outlined in Chapter 2.

Conclusion

The air quality assessment demonstrates that the Project complies with local, state, and federal air quality requirements. The Project is consistent with the guidelines of

MassDEP because the Project will incorporate reasonable and feasible mitigation measures to reduce VOC and NO_x, emissions in the ozone mesoscale analysis. The implementation of these mitigation measures will reduce the 2024 Build VOC and NO_x emissions associated with the Project.

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Sustainability and Greenhouse Gas Emissions Assessment

KEY:

Text represents new or substantially revised narrative description from the NPC.

Section Heading represents an entirely new or substantially revised section from the NPC.

Table Heading represents an entirely new or substantially revised table from the NPC.

Introduction

The following chapter describes how the Project will address the local and state regulations, policies, and procedures related to sustainability, Greenhouse Gas (GHG) emissions, and climate change preparedness and resiliency. It presents the findings of the GHG emissions assessment prepared in accordance with the Executive Office of Energy and Environmental Affairs (EEA) MEPA Greenhouse Gas Policy and Protocol (the "MEPA GHG Policy").

The following information is provided herein, in accordance with the NPC Certificate and to address other comments received on the NPC:

- Updated stationary source GHG emissions assessment, including:
  - Revised building energy models for Cambridge Center North Garage Office Buildings, Eleven Cambridge Center Residential Building, and Three Cambridge Center Mixed Use Building were revised so that the overall electric power consumption is less compared to the AHSRAE 90.1-2007 baseline models. The additional design improvements presented herein resulted in an additional 5.3 percent (495 tons per year) reduction in stationary source CO_2 emissions from the Design Case presented in NPC (from 17.2 to 23.2 percent).

- Updated Energy Use Indexes (EUI) for these three Project Components were based on the revised building energy model results (Table 4-11).
- An evaluation of additional GHG emissions reductions that could be achieved through effective waste reduction measures during construction and operations.
- Draft Tenant Design and Construction Guidelines (provided in Appendix E).
- Expanded evaluation of on-site renewable energy sources, including federal and state tax incentives that could be available to the Project for solar PV and wind harvesting.
- Updated evaluation of the potential connection to the local Kendall Combined Heat and Power (CHP) plant (Dalkia) based on the revised models and DOER formulas.

- Consideration of the proposed KSTEP and corresponding potential mobile source GHG emissions reductions expected.
- Updated climate change impacts evaluation based on a specific sea level rise emissions scenario, building design life, and inland flooding impacts due to intensified precipitation events with climate change from Cambridge DPW data.
- Additional information on increasing resiliency from increasing intense and frequent heat, and precipitation events for the MBTA Kendall Square Station.

Summary of Project Change Impacts

The Prior Project did not require a GHG assessment. Since that filing in 2008, the MEPA GHG Policy became effective for any project requiring an Environmental Impact Report (EIR) or at the discretion of the Secretary of EEA. Given the proposed approximately 1,034,000 million square feet (net new) associated with Project Change, a full assessment of stationary and mobile source GHG emissions was required. Additionally, since the Prior Project, the City has adopted the Stretch Energy Code, which includes more stringent energy efficiency requirements than the state's base energy code.

Also since the Prior Project, the MEPA Office developed a draft policy that would require projects to consider and assess the risk and vulnerabilities of a project or action in the context of climate change as part of the MEPA review process.

Key findings and benefits related to sustainability, GHG emissions and climate change preparedness/resiliency include:

- Through the implementation of a comprehensive design strategy, including responsive mitigated design and operational commitments, the Project is expected to result reductions in GHG emissions consistent with the MEPA GHG Policy.

- The Project consists of urban infill with dense, high-efficient buildings, a building reuse component (the North Garage Office Buildings) and reduced single-occupancy vehicle trips through alternative modes of transportation—all of which result in significantly less GHG emissions compared to a suburban "greenfield" development.
- All Project Components will meet the current Stretch Energy Code requirements, where applicable (i.e., achieve at least a 20 percent overall reduction in annual energy use compared to a baseline using requirements of ASHRAE 90.1-2007).
- The Proponent has considered additional energy efficiencies that may be required to meet the future potential Stretch Energy Code (i.e., approximately 15 percent more efficient than the IECC2012 and ASHRAE standard 90.1-2010—the new/updated state-wide Base Energy Code).
- As demonstrated by the stationary source GHG assessment, overall the Project will achieve an estimated 23.2 percent reduction in stationary source CO_2 emissions by reducing overall energy consumption by approximately 29.5 percent through the implementation of energy optimizing building design and systems. (Note, the percentages of energy use are different than emission reductions due to emissions conversion factors.)
- A reduction of 105 tons per year in mobile source GHG emissions by implementing the traffic mitigation measures.
- During the early stages of project planning and design, the Proponent has begun to evaluate potential climate change impacts and plan for resilience.

Regulatory Context

The following sections provides an overview of the state and local regulatory context related to energy efficiency and GHG emissions.

Commonwealth of Massachusetts

MEPA Greenhouse Gas Policy and Protocol

The Executive Office of Energy and Environmental Affairs (EEA) has developed the MEPA Greenhouse Gas Emissions Policy and Protocol (the "MEPA GHG Policy") – an initiative under the MEPA review process that requires project proponents to identify and describe the feasible measures to minimize both mobile and stationary source GHG emissions generated by their proposed project(s). Mobile sources consider vehicles traveling to and from a project. Stationary sources consider on-site boilers, heaters, and/or internal combustion engines (direct sources) as well as from the consumption of energy in the form of fossil fuels (indirect sources). Greenhouse

gases include several air pollutants, such as carbon dioxide (CO_2), methane, hydrofluorocarbons, and perfluorocarbons. The MEPA GHG Policy calls for the evaluation of CO_2 emissions for a land development project because CO_2 is the predominant man made contributor to global warming. This evaluation makes use of the terms CO_2 and GHG interchangeably.

The MEPA GHG Policy states that all projects undergoing MEPA review requiring the submission of an Environmental Impact Report (EIR) must quantify the project's GHG emissions and identify measures to avoid, minimize, or mitigate such emissions. In addition to quantifying project-related GHG emissions, the MEPA GHG Policy requires proponents to quantify the effectiveness of proposed improvements in terms of energy savings, and therefore, potential emissions reductions. The goal of the MEPA GHG Policy is to identify and implement measures to minimize or reduce the total GHG emissions anticipated to be generated by that respective project.

Massachusetts Stretch Energy Code

As part of the Green Communities Act of 2008, Massachusetts developed an optional building code that gives cities and towns the ability to choose stronger energy performance in buildings than the state building code (the "Stretch Energy Code"). Codified by the Board of Building Regulations and Standards as 780 CMR Appendix 115.AA of the 8th edition Massachusetts Building Code, the Stretch Energy Code is an appendix to the Massachusetts building code, based on further amendments to the International Energy Conservation Code (IECC). The Stretch Energy Code increases the energy efficiency code requirements for new construction (both residential and commercial) and for major residential renovations or additions in municipalities that adopt it.

The City was designated a Green Community under the Green Communities Designation and Grant Program, an initiative of the Department of Energy Resources (DOER). The goal of the grant program is for the municipality to use this grant money to help residents, businesses, and the municipality departments/facilities reduce energy use or install renewable energy systems. In order to be designated a Green Community and, therefore, eligible for grant money available annually, the community is required to find ways to minimize life-cycle costs, such as adopting and implementing the Stretch Energy Code, which the City did in July 2010.

The current Stretch Energy Code requires the Project to achieve at least a 20 percent overall reduction in annual energy use compared to a baseline using requirements of ASHRAE 90.1-2007. For projects of this size and type, the Stretch Energy Code requires modeling of base and proposed cases based on the methodology as is defined in ASHRAE 90.1- Appendix G. On July 1, 2014, the IECC2009 and ASHRAE 90.1-2007 ceased to be a code option for non-stretch Code communities, and the IECC2012 and ASHRAE standard 90.1-2010 became the new/updated state-wide Base Energy Code. It is expected that an updated Stretch Energy Code, when enacted, will require

additional energy reductions beyond these standards and that Green Communities, such as Cambridge will automatically adopt any updates to the Stretch Energy Code (unless they vote to change their bylaw to no longer be a stretch code community). At the time of this NPC filing, the updated Stretch Energy Code requirements remain unknown, however, the MEPA Office and DOER suggest new large projects target approximately 15 percent energy savings beyond the Base Energy Code requirements based on IECC2012 and ASHRAE 90.1-2010.[1]

Based on the history of the Project and through discussions with MEPA, a Base Energy Code using ASHRAE 90.1-2007 has been assumed. However, the ASHRAE 90.1-2010 building improvement requirements are also presented to demonstrate how the Project would meet the future potential Stretch Energy Code. Because the Project is in early stages of design, the assumptions on certain Project elements, such as interior fit-out and specific HVAC equipment efficiency ratings have been made to calculate the estimated GHG emissions reduction associated with the Project.

MEPA *DRAFT* Climate Change Adaptation and Resiliency Policy

In September 2014, the MEPA Office issued for public comment a draft policy for addressing potential impacts associated with climate change as part of the MEPA review process. The policy is proposed in order to fulfill MEPA's statutory obligations under the Global Warming Solutions Act of 2008. The policy's intent is to facilitate the consideration and assessment of risk and vulnerabilities of a project or action under foreseeable scenarios or conditions associated with climate change in order to identify potential mitigation measures. Public comments on the draft policy were received until February 23, 2015.

City of Cambridge Initiatives

The City has already committed to a range of initiatives to support and encourage sustainable lifestyles and move the community toward greater resilience to climate change:

- In December 2013, the City created the "Getting to Net Zero Task Force" charged with advancing the goal of putting Cambridge on the trajectory towards becoming a "net zero community," with focus on GHG emissions from building operations. This includes reducing energy use of buildings and taking advantage of opportunities to harvest energy from renewable sources. In June 2015, the City Council unanimously voted to adopt the *Net Zero 25-Year Action Plan*.

[1] MA Commercial Building Energy Code Status for Projects Subject to the MEPA GHG emissions Policy and Protocol, with Building Related Stationary Sources, MA DOER, August 1, 2013.

- The Climate Protection Action Committee (CPAC) proposed new greenhouse gas emission reduction goals to the City Manager in spring 2014. These involve both community and municipal government actions toward greater sustainability.
- Early 2015, the City began to turn the information gathered through the Climate Change Vulnerability Assessment into a Climate Change Preparedness & Resilience Plan, relying heavily on community input to design an actionable plan.
- The City secured major grant funding to support the development of a Kendall Square EcoDistrict and initiate a study of district energy opportunities. The CRA and most major landowners and property managers in the KSURP are deeply involved in the formation of the EcoDistrict and related study of district energy. The study is scheduled to begin in late fall 2015 and is anticipated to be complete by summer 2016.
- In 2013, the City signed the Compact for a Sustainable Future, in partnership with Harvard University, MIT and key business stakeholders. This Compact, which has since expanded to include the CRA and Boston Properties as signatories, creates a framework for collaboration on climate change mitigation and resiliency planning.
- Through the CitySmart and Cambridge Energy Alliance programs, Cambridge is engaging closely with residents and businesses to educate and push for action through behavior change towards sustainable modes of transportation, residential and business energy efficiency measures, and use of renewable energy in local buildings.
- The City passed a Building Energy Use Disclosure Ordinance in 2014, and is considered a key step in efforts to reduce GHG emissions city-wide. Efforts to improve the energy performance of our building stock is hampered by the invisible nature of energy use. The ordinance is intended to address this problem by requiring owners of larger buildings to track and report annual energy use to the City and publicly disclose the data. Disclosure places the information in the marketplace, where various users such as potential property buyers, tenants, realtors, energy service providers, and others can use the data and to help create value for higher energy performing properties. The data will also aid the City and others in planning for higher energy performance in our building stock. The ordinance is a foundational strategy for various community sustainability initiatives including the Community Compact for a Sustainable Future, Kendall Square EcoDistrict, and efforts to move the community toward net zero emissions. Municipal buildings reported energy use for calendar year 2013, some non-municipal buildings will need to begin reporting energy use for the 2014 calendar year by May of 2015, with the remainder one year later.
- The City is one of 50 communities competing over the next two years in the Georgetown University Energy Prize, a national competition that is challenging communities across the U.S. to rethink their energy use. To compete for the $5 million prize, local governments, residents, utilities, and others will need to work together to demonstrate success in sustainably reducing energy consumption over

a two-year period. The energy competition will heighten the City's drive to unite the entire community to embrace energy efficiency on a large scale, and result in further positive outcomes for GHG emissions.

- The Cambridge Bicycle Network Plan identifies streets and paths which provide direct connectivity between neighborhoods and key destinations within the City and adjacent jurisdictions. It will prioritize the funding, redesign, reconstruction, and maintenance of projects to promote the completion of a connected low-stress network that provides a bicycling option for people of all ages and abilities throughout the City. It is envisioned that over time all streets within the City will ultimately be designed to facilitate comfortable, low- stress bicycling, thereby influencing mode shift to bicycling and walking and resulting in further positive outcomes for GHG emissions.
- A Cambridge Transit Strategic Plan is currently in development through the combined efforts of an Interdepartmental Staff Working Group that includes the CRA, as well as the Cambridge Transit Advisory Committee. In January 2013, the City launched a 2- year public transit strategic planning process. The purpose was to develop an action plan for how Cambridge will take a stronger leadership role to improve quality and expand capacity of our transit system. The City issued a Transit Strategic Plan Update Report in January 2014, and is currently integrating prioritized objectives into the FY16 budget processes which is underway. This plan is intended to influence mode shift to transit and result in further positive outcomes for GHG emissions.
- The City has established an Eastern Cambridge/Kendall Square Open Space Study and design competition to explore ways to provide a network of well connected, managed and programmed new and existing parks and open spaces that serve a variety of users, and provide a range of experiences and environments. The implementation and long-term outcomes of this effort are expected to further solidify the internal walkability and livability of the district as well as address the impact of the urban heat island effect, thereby resulting in further positive outcomes for GHG emissions.

K2 Plan

As described previously in Chapter 1, *Project Change Description,* the K2 Plan was published in December 2013 as the result of an extensive community-based planning and design process. The K2 Plan contains a specifically actionable set of four goals and several recommendations within each goal. Goal #4 is simply "Promote Environmental Sustainability." Recommendations outlined below from Goal #4, while the K2 Plan itself contains detailed actionable implementation strategies for each recommendation.

Goal #4: Promote Environmental Sustainability

A. Incorporate significant sustainability elements through land use planning approach.

B. Continue to require green design for buildings and site design.

   a. Improve building energy performance.

   b. Prevent urban heat gain.

   c. Reduce reliance on automobiles.

   d. Reduce stormwater runoff.

C. Go beyond existing approaches to more sustainable design.

   a. Minimize waste generation.

   b. Increase use of renewable energy and/or district energy.

D. Create K2 EcoDistrict through public-private partnership.

The implementation strategies found in Goal #4 are seen as critical actions to further improve the City's already notable position as a model for smart growth, active healthy communities through design and reduced per-capita GHG emissions.

Getting to Net Zero Energy Task Force

The Getting to Net Zero Task Force committee, comprised of residents, community advocates, business and property owners, and representatives of local universities, is working with City staff and a team of technical consultants to examine strategies and develop recommendations. The Task Force is charged with advancing the goal of putting Cambridge on the trajectory towards becoming a "net zero community", with focus on carbon emissions from building operations. This includes reducing energy use intensity of buildings and taking advantage of opportunities to harvest energy from renewable resources. The Task Force is tasked with addressing the following topics:

- Reduce GHG emissions from buildings;
- Improve energy efficiency and conservation in existing and new buildings;
- Support renewable energy generation both on- and off-site; and
- Best practices to engage and educate building users and influence occupant behavior.

The Task Force is assigned to study the technical aspects of GHG emissions from buildings and develop comprehensive, actionable, long and short term recommendations, which may include changes to City ordinances, zoning policies, and other directives. A draft Net Zero Report released in March 2015 included

recommendations and a short and long term action plan. The following key elements, or actions, have been identified in order to move closer to a net zero community:

- Highly energy efficient new and existing buildings;
- The use of onsite renewables;
- The use of offsite renewables; and
- The use of offsets and RECs (as a temporary measure).

In June 2015, the City Council unanimously voted to adopt the *Net Zero 25-Year Action Plan*, which includes key actions to reduce emissions as follows:

1. Retrofits to existing buildings
2. Net Zero new construction
3. Energy supply
4. Local carbon fund

The City Council also requested that language be drafted and referred to the City Council to include LEED Gold plus additional points. Updates to the LEED requirement will be before the Council early fall 2015.

Cambridge Climate Change Planning

In December 2002, the City Council adopted the Cambridge Climate Protection Plan. Both the state and the City have adopted a goal of 80 percent reductions in greenhouse gas emissions by 2050. The City is completing a new plan with interim measures aimed at 2020.

The City's planning around climate change focuses on reducing greenhouse gas emissions. When Cambridge began to draft its initial Climate Protection Plan, staff evaluated the relative sizes of the various sources of emissions. The City already had extensive transportation and recycling programs that worked to reduce the community's generation of greenhouse gases. However, Cambridge found that most emissions are related to buildings. The Climate Protection Plan, therefore, focuses largely on actions around building-related energy. The Cambridge Energy Alliance was one important initiative. Other building energy initiatives target both existing buildings—much of the City's building stock is relatively old and inefficient—and new construction, with more stringent energy efficiency requirements.
As the effect of existing human-derived greenhouse gases already present in the atmosphere has made climate disruption inevitable, Cambridge has concluded that the City should begin to prepare now for the effects of climate change. With that goal in mind, the City has been preparing a Climate Change Vulnerability Assessment (described further below) and intends to launch its Climate Change Preparedness and

Resilience Plan process by the end of 2015. It is anticipated that future action will involve both mitigation and adaptation to climate change.

The Climate Protection Plan proposes to reduce GHG emissions by 20 percent below 1990 levels. While its strategies focus on municipal actions, a number of actions can be taken by the private sector as well. The Project is consistent with the following goals and actions:

- **Improve energy efficiency:** All Project Components will meet the current Stretch Energy Code requirement to achieve at least a 20 percent overall reduction in annual energy use compared to a baseline. The Proponent has also considered additional energy efficiencies that may be required to meet the future potential Stretch Energy Code. The Proponent also commits to encouraging the use of ENERGY STAR appliances and equipment, where available and reasonably practicable, and to investigate the use of on-site solar photovoltaics as an energy source.
- **Reduce SOV commuting; Reduce motor vehicle travel with promotion and education programs; and Reduce motor vehicle emissions:** The Proponent and Redeveloper will develop a robust program of TDM measures, the implementation of which is expected to improve air quality in the study area by promoting the use of alternative forms of transportation to the use of single-occupant motor vehicles (SOV) as the principal travel mode to and from the KSURP area. The Redeveloper currently has TDM Plans in place for its existing properties, which it will build off for the Project. Previous estimates of similar TDM programs have ranged on the order of two to five percent reduction in vehicles miles traveled (VMT), which in turn will have a slight decrease in regional greenhouse gas emissions from the Build condition.
- **Improve facilities for walking and cycling:** Pedestrian infrastructure within the KSURP study area allows for great connectivity to and from the Kendall Square MBTA Red Line Station and area businesses. Sidewalks are provided on all roadways within the study area, and crosswalks are provided at all study area intersections. The Project is committed to creating a cohesive integrated network of open spaces and connecting pathways while improving pedestrian safety, access and circulation within the KSURP area. The Proponent will work with the City to identify areas of improvement, which may include additional pedestrian countdown timers, a new mid-block crosswalk, and streetscape enhancements.

  The KSURP area is well serviced by bicycle facilities, including on-street bike lanes, cycle tracks, and multi-use pathways. The Proponent is committed to enhancing bicycle infrastructure at each Project Component and within the KSURP area by connecting this infrastructure with other area-wide improvements, and will also explore opportunities to create a full service bike station within the area. The Project will provide approximately 800 long-term bicycle spaces and 142 short-term bicycle spaces.

- **Promote transit improvements:** The Proponent will establish a program in conjunction with MassDOT, MBTA and other stakeholders (the Enhanced Transit Mitigation Program) designed to enhance mobility around the KSURP area, including major transportation initiatives that will improve transit options and services. Initiatives may include a range of projects, programs, and services directed at improving and enhancing transit and other forms of alternative transportation options for people working, living and visiting the Kendall Square area.
- **Use zoning and incentives to foster mixed-use, transit-oriented development (TOD):** As a TOD, the Project is environmentally, economically, and socially sustainable; it promotes greater mobility, walking and biking, healthy lifestyles; value for property owners, businesses, local governments, transit authorities and residents. A recent study by the Center for Transit-Oriented Development shows that TOD produces approximately 43 percent less emissions than conventional suburban development.
- **Optimize building design and the use of vegetation to shade buildings and reduce the urban heat island effect:** The Project will include a number of sustainable strategies including green roofs to mitigate the heat island effect.
- **Promote the design and construction of "green buildings."** The project design will prioritize sustainability as a core strategic imperative and will implement state-of-the-art high performance green building technologies, construction, and operating procedures. Sustainability planning with an integrated design team during conceptual design will establish a pathway to Gold-level certification under the Core & Shell Leadership in Energy and Environmental Design (LEED®) Green Building Rating System and superior energy use intensity performance,
- **Prevent waste:** The Project has a construction and demolition waste diversion goal of 95 percent. Recycling/reuse programs will be developed as part of the CMP and implemented by all construction contractors to reduce the amount of waste that is sent to landfill throughout construction. By keeping the Cambridge Center North Garage intact, a significant amount of construction waste associated with demolition and new construction to rebuild a garage structure is eliminated by the Project.

Climate Change Vulnerability Assessment and Preparedness & Resiliency Plan

The City is undertaking a climate change vulnerability assessment, which will run until early 2015 and serve as the foundation for a Climate Change Preparedness and Resilience Plan. This effort is being coordinated by an inter-departmental steering committee consisting of the Public Works, Public Health, and Community Development Departments. A consultant team led by Kleinfelder, a Cambridge-based architecture, engineering, and sustainability services firm, is working with City staff to perform the assessment. A Technical Advisory Committee (TAC) composed of

community stakeholders is helping guide the assessment and providing critical information. An Expert Advisory Panel (EAP) is providing feedback on the assessment's technical approach and assumptions. Public workshops and community presentations are engaging residents, businesses, and organizations

The assessment includes modeling of coastal storm surges to understand the potential for surges to bypass dams; modeling of inland storms to assess the capacity of the stormwater system to cope with intense rainfall; and mapping of heat vulnerability. Information on vulnerable populations, buildings, and infrastructure is being collected to create a baseline for analysis. With this information, the City will rate the sensitivity of critical assets and populations as well as their capacity to adapt and recover from impacts. This will help to establish priorities for Cambridge's climate change preparedness plan.

The flood modeling includes:

- Using the City's storm water system model to understand the impact of changes in precipitation and the implications for drainage system backups and riverine flooding.
- Working with the Massachusetts Department of Transportation on modeling coastal storm surges associated with sea level rise in Boston Harbor with the Advanced Circulation (ADCIRC) model to assess whether the storm surges could overwhelm the Charles River Dam and the Amelia Earhart Dam in 2030 or 2070.
- Looking at the flooding that might result from the combined effect of sea level rise, coastal storm surges, and greater precipitation.

Other technical analyses that are being performed include:

- Mapping and projecting surface and air temperatures to understand heat vulnerability;
- Assessing the vulnerability of our urban forest to flooding and increased temperatures;
- Mapping of demographic factors, infrastructure, and community assets and;
- Modeling economic impacts from flooding and business disruption.

In December 2014, a public meeting was held to discuss the climate change vulnerability assessment project approach and preliminary findings. Preliminary findings indicated that heat island effect may need to be the top focus of the City's Preparedness and Resilience Plan. A second meeting was held in March 2015 where the presented preliminary results from its Climate Change Vulnerability Assessment at a public meeting. The preliminary findings indicate that Cambridge should prioritize vulnerability to increasing heat and precipitation-driven flooding in the near term. Preliminary results from storm surge modeling with sea level rise indicates the risks of a storm surge reaching Cambridge by 2030 are exceedingly low

(less than 0.1 percent probability). The modeling for 2070 is still in progress and the results are expected in the fall of 2015. When the 2070 storm surge results are available, the City will discuss them with the community and complete its vulnerability assessment. The City intends to launch its Climate Change Preparedness and Resilience Plan process by the end of 2015.

Approach to Sustainability

Sustainability is integrated in to the Project concept and design. A sustainable approach to a project can include repurposing previously developed land rather than building on untouched land, as well as locating new development within high density areas and areas with highly accessible public transportation access. By constructing new commercial and residential spaces on previously developed sites a portion of which will be constructed above a reused portion of an existing building, the Project is designed to achieve energy savings associated with construction and associated GHG emissions.

As a Transit Oriented Development (TOD), the Project will utilize the existing public transportation and mode share infrastructure to further reduce traffic and indirect air emissions, including mobile source GHG emissions. TOD is environmentally, economically, and socially sustainable; it promotes greater mobility, walking and biking, healthy lifestyles; value for property owners, businesses, local governments, transit authorities and residents. A recent study by the Center for Transit-Oriented Development shows that TOD produces approximately 43 percent less emissions than conventional suburban development.

The project design will prioritize sustainability as a core strategic imperative and will implement state-of-the-art high performance green building technologies, construction, and operating procedures. Sustainability planning with an integrated design team during conceptual design will establish a pathway to Gold-level certification under the Core & Shell Leadership in Energy and Environmental Design (LEED®) Green Building Rating System and superior energy use intensity performance, consistent with the K2 Plan. The project design team will use iterative energy modeling and life cycle analysis that considers the long-term value of sustainable property investment decisions. The following is a summary of key sustainable design goals for the Project:

- Stretch Code Compliance and associated Energy Savings and stationary source GHG reductions
- Energy Conservation Measures (ECMs) will continue to be considered/evaluated as design progresses, including:
  - Reduced window-to-wall ratio in residential buildings
  - Reduced lighting power densities in the office and retail spaces

  - Building orientation and window locations shall be suited for improved energy efficiency
  - Cogeneration
  - Rooftop Solar PV
- Decreased Energy Use Intensity (EUI)
- Construction and Demolition Waste Diversion (require construction contractors to aim for a goal of 95 percent as part of the CMP). By keeping the North Garage intact, a significant amount of construction waste associated with demolition and new construction to rebuild a garage structure is eliminated by the Project.
- Reduce operational waste through recycling/reuse programs in coordination with future tenants (as part of the Tenant Design and Construction Guidelines)
- Use of low-VOC finishes, paints, adhesives, and sealants
- Reduced irrigation through rainwater harvesting
- Reduced potable water use through installation of low-flow plumbing fixtures

Sustainable Site Features

The Project is inherently sustainable because it is within a dense urban area with access to public transit. As shown previously in Figure 2.4, the MBTA Red Line directly serves the KSURP area via Kendall Square/MIT subway station as well as four bus routes. This station is within a 5-minute walk from the Project Components (a 1-minute walk from Three Cambridge Center). The Project is a model for transit-oriented development (TOD) since it reduces the need for single-occupancy vehicle use by proposing density in an area accessible by pedestrians and supported by an extensive public transit network. In compliance with the City's bike parking requirements, the Project will provide approximately 800 long-term bicycle spaces and 142 short-term bicycle spaces for the Project. Additionally, the Proponent will develop a robust program of TDM measures to reduce automobile trips generated by the Project.

The Proponent is planning to implement sustainable site features for the Project to mirror the sustainability strategies of the City, which will also serve to make the Project more resilient to climate change. These features are discussed further in the Climate Change Adaptation section. The Project will be required to implement Low Impact Development (LID) technologies to aid in the stormwater mitigation required by the City. These technologies are discussed in later sections, but include the implementation of subsurface infiltration, landscaped bioretention areas, nutrient reduction technologies, green roofs, efficient irrigation systems and rainwater harvesting. As the individual developments progress, sustainable site features will be researched and implemented to the greatest extent practicable given the high urban density of the Project as a whole.

Sustainable Building Features

Green building strategies are integral to the project design. The Project will strive for the greatest achievable and economically viable design and construction. For the commercial components, the facilities will be energy efficient with a long term focus on maintenance to minimize long term impacts on the environment. The facilities will include a number of sustainable strategies, such as green roofs to mitigate the heat island effect, storm water detention, reduced water usage and solar photovoltaic (PV) panels.

Resource Efficiency

The current Stretch Energy Code requires that the Project show at least 20 percent overall reduction in energy used as compared to the IECC2009/ASHRAE 90.1-2007 code compliant baseline model. Since the IECC 2012 and ASHRAE 90.1-2010 is more stringent than the current Code, the proposed HVAC and lighting systems and the ECMs were selected so that the overall energy savings fall within 25 and 30 percent better than 90.1-2007 and, therefore, also meet the potential future Stretch Energy Code requirements.

The Project was split into four stages and the proposed ECMs and systems were categorized under four key components for building energy model purposes: (i) commercial office; (ii) residential; (iii) laboratory; and (iv) retail.

For the commercial office components, a Dedicated OA system was proposed to provide fresh air to the office and amenity spaces, heating and cooling systems depending on the geometry of the building and energy efficiency factors were proposed to be a floor-by-floor water-cooled, DX system or a zone-by-zone Fan Coil Unit system. In the residential components, units will be naturally ventilated, and heating and cooling will be provided through high-efficiency Water Source Heat Pump system. A high-efficiency Energy Recovery Unit provides fresh air to the corridors while it recovers heat from the toilet exhaust. Finally, the laboratory space (60 percent lab and 40 percent office was assumed for the Whitehead Office Addition) will be ventilated, heated and cooled via a 100 percent outside air (OA) VAV Air Handling Unit equipped with energy recovery, using chilled water and hot water to condition to the supply air.

The proposed light fixtures will incorporate LED and CFL technology wherever possible, which will help in reducing the interior lighting power density in all spaces by at least 10 percent (reduced to 20 percent in the in the office and retail spaces from the initial models) as compared to the Base Energy Code, as suggested by DOER. Additionally, the overall window-to-wall ratios were decreased for the proposed Cambridge Center redevelopments (Phases 1A, 1B, and 2). These changes were made so that the overall electric power consumption was reduced compared to the

AHSRAE 90.1-2007 baseline models. Refer to the 'Stationary Source GHG Emissions Assessment' section below, specifically Table 4-1 for further details.

The following is a summary of the proposed ECMs:

- Improved Glazing Properties
- Improved Roof Insulation
- Improved Exterior Wall Insulation
- Improved Interior Lighting Power Density
- Low-flow Water Fixtures and High-efficiency Domestic Water Heater
- Variable Volume Condensing and Chilled, and Hot Water Pumping
- High-Efficiency Centrifugal Chillers
- VFD on Cooling Tower Fans and Higher CW Delta T
- High-Efficiency Condensing Gas-fired Hot Water Boilers
- High-Efficiency Water Source Heat Pumps
- High-Efficiency Energy Recovery Ventilator
- Differential CO_2 Based Demand Control Ventilation for Offices
- CO Control and VFD for Underground Garage Fans
- Solar photovoltaics (to be investigated further as the design progresses)[2]

Greenhouse Gas Emissions Assessment

In addition to quantifying project-related GHG emissions, the MEPA GHG Policy also requires proponents to quantify the impact of proposed GHG reduction measures in terms of emissions and energy savings. The goal of the MEPA GHG Policy is to identify measures to reduce or minimize GHG emissions. While GHG emissions include several gases, Carbon Dioxide (CO_2) was selected for evaluation because it is the most significant component of project-related GHG emissions. EPA has not set NAAQS for GHGs; however, they do encourage strategies to reduce emissions and save fuel.

This following presents the results of the GHG emissions assessment, in accordance with the MEPA GHG Policy. The Proponent is committed to incorporate many key aspects of sustainability and high performance building design as well as addressing

[2] At this early stage it is difficult to predict how much roof area will be available to support PV due to competing uses, including rooftop mechanical equipment and roof gardens/green rooftops. This GHG assessment includes preliminary order-of-magnitude calculations in order to demonstrate the possible PV capacity for the Project. This evaluation will continue to evolve through the design process.

climate change impacts and planning for resilience, where applicable and feasible, as it is their intent to lease and operate the buildings in a sustainable manner.

Effective July 2010, the City adopted the Stretch Energy Code. The Project has been designed to meet the requirements of the current Stretch Energy Code requirements for GHG emissions (compared to a base design compliant with ASHRAE 80.1-2007). At the request of MEPA, the ASHRAE 90.1-2010 building improvement requirements are also presented to demonstrate how the Project would meet the future potential Stretch Energy Code. The Project will be evaluated with and incorporate sustainable design, including energy conservation measures throughout the design process in order to meet future requirements.

Stationary Source Assessment Methodology

To provide for energy efficiency and reduced stationary source GHG emissions, the Proponent has evaluated the following key planning and design criteria:

1. Methods to reduce overall energy demand through appropriate design and sizing of systems; and
2. Methods to incorporate cost-effective energy-optimizing systems.

The Project was modeled with the proposed building geometry, HVAC system type, occupancy schedule, and ventilation rates as the baseline buildings.

Direct stationary source CO_2 emissions include those emissions from the facility itself, such as boilers, heaters, and internal combustion engines. Indirect stationary source CO_2 emissions are derived from the consumption of electricity, heat, or cooling from off-site sources, such as electrical utility or district heating and cooling systems. The direct and indirect stationary source CO_2 emissions from the proposed building sources are calculated using the computer-based eQUEST model[3] based on assumptions for the Project's building elements, such as (but not limited to) the specific type of use(s) and users of the buildings, building configuration and architecture type, building envelope (walls/windows), interior fit-out (where known), and HVAC system and equipment efficiency ratings.

The GHG mitigation measures can be divided into the buildings' construction materials, architecture, and the heating and cooling processes. The following presents the specific proposed building improvements (and their correlating eQUEST modeling parameters for reference, where applicable) that are assumed to be included as part of the Project for the purpose of this analysis. Since the design and future users of the Project Components are conceptual, the specific proposed improvements may be subject to design modifications, as necessary, where the stationary source GHG

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[3] eQUEST (the Quick Energy Simulation Tool), from James J. Hirsch, DBA James J. Hirsch & Associates, Camarillo, CA.

emissions reductions goals established by this assessment will be used to guide final building design.

eQUEST Model and Analysis Conditions

The eQUEST model is used to estimate the amount of annual energy consumption by simulating a year of building operations based on typical yearly weather and user inputs. The model estimates the buildings' electricity and gas usage based on building design and system assumptions following the energy modeling protocol outlined in Appendix G of ASHRAE 90.1-2007.[4] The amount of consumed energy is then converted into the amount of CO_2 emitted using the standardized conversion factor.[5] The stationary source assessment calculated CO_2 emissions for the following build conditions:

- **Build Condition with MA Building Code (the "Base Case"):** The Project assuming typical construction materials and building equipment/systems that meet the minimum requirements of the MA Building Code (8th Edition), or the base code. This baseline is established by the energy code as being defined by ASHRAE 90.1 – 2007.
- **Build Condition with Stretch Energy Code (the "Design Case"):** The Project assumes building design and system improvements in order to meet the current Stretch Energy Code (i.e., 20 percent over ASHRAE 90.1-2007).

Stationary Source GHG Emissions Assessment

As suggested by DOER in their comments on the NPC, the proposed building models for the North Garage and Office Buildings, Eleven Cambridge Center Residential Building, and Three Cambridge Center Mixed Use Building were revised so that the overall electric power consumption is less compared to the AHSRAE 90.1-2007 baseline models. To achieve this, the overall window-to-wall ratios were decreased and the lighting power densities in the office and retail spaces were reduced by 20 percent.

The window to wall ratio was analyzed under two categories: Office and residential components. As illustrated in Figure 4.1, the window-to-wall ratio was reduced from 60 percent and 75 percent vision glass to 57 percent vision glass in the office components and maintained at 60 percent vision glass in the residential components. For the proposed Eleven Cambridge Center Residential Building, the vision glass area was further decreased to 50 percent on the west and southwest facades in order to reduce the cooling load in the residential units facing these exposures.

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[4] American National Standards Institute/American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., ASHRAE 90.1-2007-Energy Standard for Buildings Except Low-Rise Residential Buildings, Appendix G, 2007.

[5] 730 lb CO2/MWh was used to convert electricity consumption into the amount of CO2 emissions (2013 ISO-New England Marginal Emissions Report). 117.08 lb CO2/Mbtu was used to convert gas consumption into the amount of CO2 emissions (The Energy Information Administration Documentation for Emissions for GHG).

While reducing stationary source GHG emissions is the main focus of this study, maintaining good indoor environmental quality for future occupants of these buildings is vital to the Redeveloper. Therefore, in order to provide sufficient daylight and views for the occupants, the overall vision glass area for all buildings was kept below 50 percent in the office component and below 60 percent in the residential component. Table 4-1 summarizes the before and after window to wall ratios.

Table 4-1 Window-to-Wall Ratios (WWR)

Project Component	Original WWR	Revised WWR
North Garage Office Buildings	69%	48%
Eleven Cambridge Center Residential Building	64%	57%
Three Cambridge Center Mixed Use Building	49%	47%

The revisions to the wall-to-window rations and decrease in interior lighting power density for the office and retail spaces result in the space cooling demand reduction and, therefore, a decrease in an annual electricity use. The EUIs (for all spaces) associated with revised models decreased because the electric power consumption was reduced for all the proposed buildings over the baseline, however, they are still close to the DOER benchmarks (refer to Table 4-11 below). Appendix D includes more tables that demonstrate the changes in the proposed EUIs and overall energy consumptions.

As noted by DOER, because the GHG emission factor for grid supplied electricity is more than twice as much as far natural gas, the design team implemented the suggested design measures to lower the potential stationary source GHG emissions associated with the buildings on a source-energy basis. Both suggested design measures, vision glass area and interior lighting density, are in direct relation with grid electricity demand and, therefore, any reduction in these measures result in an improved electricity demand.

Future Stationary Source CO_2 Emissions

The Project includes the construction of multiple buildings with various uses, including commercial office, innovation space, laboratory space, residential, retail and parking. The approach to and results of the building energy model for each Project Component is presented below. The Project was split into the following Project Components for building energy modeling purposes: Cambridge Center North Garage; Eleven Cambridge Center; Three Cambridge Center; and Whitehead Office

Addition.[6] The noteworthy improvements for the base building (or core and shell) of each Project Component are also presented below. While these core and shell building design improvements are preliminary based on conceptual design, they will be mandated by the Redeveloper. While specific improvements may be subject to design modification as design progresses, the Redeveloper is committed to achieving the stationary source GHG emissions reductions estimated herein for the final building program and design.

Other beneficial improvements or measures that are expected to result in further reductions of stationary source GHG emissions, but were not accounted for in the building energy model are also discussed. These improvements/measures are generally operational in nature and, therefore, will be encouraged by the Proponent and/or Redeveloper. As presented in the draft Tenant Design and Construction Guidelines provided in Appendix E, the Redeveloper is committed to encouraging ECMs and other sustainable design, construction, and operation that will help achieve further GHG emissions reductions most of which cannot be quantified for the purposes of this GHG assessment. Two exceptions are plug load reductions and solid waste reduction/recycling. The potential energy savings and associated stationary source CO_2 emissions associated with these operational measures has been estimated for the purposes of this GHG assessment.

Cambridge Center North Garage Office Buildings

Table 4-2 below provides a summary of the proposed building improvements assumed for the commercial office buildings to be constructed over the Cambridge Center North Garage. Key energy savings features include more efficient building materials (walls), high efficiency HVAC system, high efficiency natural gas boilers, and lighting savings. The design of the North Garage has been updated to include a reduced window to wall ratio which was reduced from 69 to 48 percent and the office interior lighting was reduced by 20 percent from the Design Case presented in the NPC.

The total estimated annual electricity use and natural gas consumption, and associated emissions for the restaurants are presented in Table 4-3. Under the Base Case, the CO_2 emissions are estimated to be 3,389.0 tons per year. With the currently proposed building design and system improvements, the estimated energy use reduction for North Garage is 29.2 percent, which equates to a 23.4 percent reduction in stationary source CO_2 emissions when compared to the Base Case. The stationary source CO_2 emissions percent reduction for the North Garage under the Design condition was quantified as follows: 793.1/ 3,389.0 = 0.234 x 100 = 23.4%.

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[6] The proposed conversion of 15,100 square feet of mechanical space into office space at the Broad Institute was not modeled given the de minimus energy usage and stationary source GHG emissions that would result from a small change in use.

$$\text{Reduction \%} = \frac{\text{Emissions Reductions Due to Project Improvements (End Use Savings)}}{\text{Project-Generated Emissions (Base Case Emissions)}}$$

This methodology is applied consistently to the remaining buildings to determine the percent reduction of stationary source emissions.

Table 4-2 Cambridge Center North Garage and Office Buildings Key Model Assumptions

Summary of Key Assumptions for Energy Model	Base Case	Design Case[1]
Building Envelope (Construction Assemblies)		
Walls	R-value: 13, with Continuous Insulation adding 7.5 R	R-value: 13, with Continuous Insulation adding 10 R
Roof	R-value: 20	R-value: 30
Fenestration and Shading		
Fenestration Area	40%	48%
Vertical Glazing	Curtainwall-U: 0.45; SHGC: 0.4	Curtainwall- Low-E Double Pane Glass
HVAC (Air-side)		
HVAC System	Building: Floor-by-floor ASHRAE 62.1 Minimum Rates Garage: 0.75 CFM/SF; 24 hour operation, constant volume	Building: Dedicated OA System Garage: CO Control: VAV operation – 0.75 CFM/SF only 4 hours/day and 0.05 CFM/SF the remaining hours.
Space Heating/Cooling	Packaged Rooftop, Chilled Water Cooling; VAV with Reheat	Water Cooled AC; DX Cooling; Perimeter FPT with Reheat and EC Motors
System Efficiency	Chilled Water Cooling: 6.1 COP Chiller	At least 13 EER
HVAC (Water-side)		
Boiler Efficiency	80% Efficient Natural Draft	96% Efficient Condensing
Lights		
Interior Lighting	1.0 W/SF office; 0.2 W/SF Parking Garage	0.72 W/SF Office; 0.15 W/SF Parking Garage

1The window to wall ratio was reduced from 69% to 48% and the office interior lighting was reduced by 20% from the Design Case presented in the EXNPC.

Table 4-3 Cambridge Center North Garage Office Buildings Stationary Source CO_2 Emissions

	Energy Consumption			CO_2 Emissions		
	Electricity (MWh/yr)	Natural Gas (MBtu/yr)	Total (MBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	6,714.3	16,027.9	38,937.0	2,450.7	938.3	3,389.0
Design Case	5,947.3	7,261.7	27,553.9	2,170.8	425.1	2,595.9
End-Use Savings	767.0	8,766.2	11,383.1	279.9	513.2	793.1
Percent Savings			**29.2%**			**23.4%**

tons/yr = short tons per year

Eleven Cambridge Center Residential Building

Table 4-4 below presents a summary of the improvements that were included in the eQUEST model for the new Eleven Cambridge Center Residential Building. Key energy savings features include high efficiency HVAC system, high efficiency condensing boilers, and lighting savings. The design of Eleven Cambridge Center has been updated to include a reduced window to wall ratio which was reduced from 64 to 57 percent from the Design Case presented in the NPC.

Table 4-4 Eleven Cambridge Center Residential Building Key Model Assumptions

Summary of Key Assumptions for Energy Model	Base Case	Design Case[1]
Building Envelope (Construction Assemblies)		
Walls	R-value: 13, with continuous insulation adding 7.5 R	R-value: 13, with continuous insulation adding 13 R
Roof	R-value: 20	R-value: 25
Fenestration and Shading		
Fenestration Area	40%	57%
Vertical Glazing	Curtainwall/Storefront: U-value 0.42, SHGC 0.4	Low-E Double Pane Glass
HVAC (Air-side)		
HVAC System	PTAC: 9.3 < EER < 11	WSHP: Cooling EER > 12 and Heating COP > 4.2
	Floor-by—Floor: ASHRAE 62.1 Minimum Rates (fixed rates)	100% OA, VAV Energy Recovery Ventilator for corridors and toilet exhaust
HVAC (Water-side)		
Boiler Efficiency	80% Efficient Natural Draft	N/A
Lights		
Interior Lighting	Residential: 1 W/SF Retail: 1.7 W/SF	Residential: 1.0 W/SF Retail: 1.5 W/SF

1The window to wall ratio was reduced from 64% to 57% from the Design Case presented in the EXNPC.

The total estimated annual electricity use and natural gas consumption, and associated emissions for the residential building is presented in Table 4-5 below. Under the Base Case, the CO_2 emissions are estimated to be 1,712.8 tons per year. With the currently proposed building design and system improvements, the estimated energy use reduction for the new Eleven Cambridge Center Residential Building is approximately 30.9 percent, which equates to a 23.8 percent reduction (407.5 tons per year) in stationary source CO_2 emissions when compared to the Base Case.

Table 4-5 Eleven Cambridge Center Residential Building Stationary Source CO_2 Emissions

	Energy Consumption			CO_2 Emissions		
	Electricity (MWh/yr)	Natural Gas (MBtu/yr)	Total (MBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	2,535.6	13,448.5	22,099.9	925.5	787.3	1,712.8
Design Case	2,488.2	6,782.9	15,272.6	908.2	397.1	1,305.3
End-Use Savings	47.4	6,665.6	6,827.3	17.3	390.2	407.5
Percent Savings			**30.9%**			**23.8%**

tons/yr = short tons per year

Three Cambridge Center Mixed Use Building

Table 4-6 below presents a summary of the improvements that were included in the eQUEST model for the new Three Cambridge Center Mixed Use Building. Key energy savings features include upgraded more efficient building materials (walls), high efficiency HVAC system, and high efficiency condensing boilers. The design of Three Cambridge Center has been updated to include a reduced window to wall ratio which was reduced from 51% to 47% and the office and retail interior lighting was reduced by 20% from the Design Case presented in the EXNPC.

The total estimated annual electricity use and natural gas consumption, and associated emissions for the office building are presented in Table 4-7 below. Under the Base Case, the CO_2 emissions are estimated to be 2,057.4 tons per year. With the currently proposed building design and system improvements, the estimated energy use reduction for the new office building is approximately 29.8 percent, which equates to a 22.4 percent (461.1 tons per year) reduction in stationary source CO_2 emissions when compared to the Base Case.

Table 4-6 Three Cambridge Center Mixed Use Building Key Model Assumptions

Summary of Key Assumptions for Energy Model	Base Case		Design Case[1]	
	Residential	Commercial	Residential	Commercial
Building Envelope (Construction Assemblies)				
Walls	R-value: 13, with continuous insulation adding 7.5 R	R-value: 13, with continuous insulation adding 7.5 R	R-value: 13, with continuous insulation adding 13 R	R-value: 13, with continuous insulation adding 13 R
Roof	R-value: 20	R-value: 20	R-value: 25	R-value: 25
Fenestration and Shading				
Fenestration Area	40%	40%	47%	47%
Vertical Glazing	Curtainwall U: 0.45	Retail U: 0.45 Commercial U: 0.55	Curtainwall U: 0.38	Curtainwall U: 0.45
HVAC (Air-side)				
HVAC System	Packaged Rooftop, Chilled Water Cooling; VAV with Reheat with Min. Volume Setpoint of 40%	Packaged Rooftop, Chilled Water Cooling; VAV with Reheat with Min. Volume Setpoint of 40%	Energy Recovery Ventilator: Packaged Rooftop; DX Cooling and Gas Furnace	Water Cooled VPAC, DX Cooling; Perimeter FPT with Reheat and EC Motors
Efficiency	9.3 - 11 EER Efficiency	-	EER > 12	>13.0 EER Efficiency
HVAC (Water-side)				
Boiler Efficiency	80% natural draft	80% natural draft	96% Condensing	96% Condensing
Lights				
Interior Lighting	1 W/SF Units, 0.5 W/SF Corridors	1 W/SF Office, 1.7 W/SF Retail	1 W/SF Units, 0.45 W/SF Corridors	0.72 W/SF Office, 1.5 W/SF Retail

1The window to wall ratio was reduced from 51% to 47% and the office interior lighting was reduced by 20% from the Design Case presented in the EXNPC.

Table 4-7 Three Cambridge Center Mixed Use Building Stationary Source CO2 Emissions

	Energy Consumption			CO_2 Emissions		
	Electricity (MWh/yr)	Natural Gas (MBtu/yr)	Total (MBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	3,361.7	14,185.2	25,655.4	1,227.0	830.4	2,057.4
Design Case	3,282.2	6,804.6	18,003.4	1,198.0	398.3	1,596.3
End-Use Savings	79.5	7,380.6	7,652.0	29.0	432.1	461.1
Percent Savings			**29.8%**			**22.4%**

tons/yr = short tons per year

Whitehead Office Addition

Table 4-8 below presents a summary of the improvements that were included in the eQUEST model for the proposed commercial office expansion of the Whitehead

Institute. For the purposes of the energy model, the office expansion was a split into 60 percent lab space and 40 percent office space in order to account for anticipated energy needs for potential laboratory space. Key energy savings features include improved building envelope, high efficiency condensing boilers, and lower lighting power densities.

The total estimated annual electricity use and natural gas consumption, and associated emissions for the Residential Expansion are presented in Table 4-9 below. Under the Base Case, the CO_2 emissions are estimated to be 1,162.4 tons per year. With the currently proposed building design and system improvements, the estimated energy use reduction for the Residential Expansion is approximately 27.5 percent, which equates to a 22.8 percent (264.9 short tons) reduction in stationary source CO_2 emissions when compared to the Base Case.

Table 4-8 Whitehead Office Addition Key Model Assumptions

Summary of Key Assumptions for Energy Model	Base Case	Design Case
Building Envelope (Construction Assemblies)		
Walls	R-value: 13, with continuous insulation adding 7.5 R	R-value: 13, with continuous insulation adding 13 R
Roof	R-value: 20	R:value: 25
Fenestration and Shading		
Fenestration Area	40%	47%
Vertical Glazing	Curtainwall U: 0.45	Curtainwall U: 0.41
HVAC (Air-side)		
HVAC System	Package Rooftop, Chilled Water Cooling; VAV with reheat	Lab: Packaged Rooftop With ERV, Chilled Water Cooling, and VAV with HW Reheat Office: 4-pipe Fan Coil Units
CHW System		
Chiller Type	Rotary Screw	Variable Speed Fans
Chiller Efficiency	4.9 COP	6.1 COP
CHW Pump Control	One Speed Pumps	Variable Speed Pumps
Service Hot Water		
HW Boilers	80% Efficient Natural Draft	96% Efficient Condensing
HW Pump Control	One Speed Pumps	Variable Speed Pumps
Lights		
Interior Lighting	Office: 1 W/SF Lab: 1.4 W/SF Retail: 1.7 W/SF	Office: 0.9 W/SF Garage: 0.15 W/SF

Table 4-9 Whitehead Office Addition Stationary Source CO_2 Emissions

	Energy Consumption			CO_2 Emissions		
	Electricity (MWh/yr)	Natural Gas (MBtu/yr)	Total (MBtu/yr)	Electricity (tons/ yr)[1]	Natural Gas (tons/ yr)	Total (tons/ yr)
Base Case	1,491.5	10,556.6	15,645.5	544.4	618.0	1,162.4
Design Case	1,413.9	6,516.2	11,340.5	516.1	381.5	897.5
End-Use Savings	77.6	4,040.4	4,305.0	28.3	236.5	264.9
Percent Savings			**27.5%**			**22.8%**

tons/yr = short tons per year

Overall Project Emissions (Full Build)

The total estimated annual electricity use and natural gas consumption, and associated emissions for the Project (all buildings combined, or full build out) are presented in Table 4-10 below. Under the Base Case, the CO_2 emissions for the Project are estimated to be 8,321.6 tons per year. With the currently proposed building design and system improvements, the estimated CO_2 emissions are 6,395.0 tons per year which is a savings of 1,926.6 tons per year. The equivalent estimated energy use reduction for the Project is approximately 29.5 percent, which equates to an approximately 23.2 percent overall reduction in stationary source CO_2 emissions when compared to the Base Case. The additional design improvements presented in this document results in an additional 5.3 percent (495 tons per year) reduction in CO_2 emissions from the Design Case presented previously in NPC (from 17.2 percent to 22.8 percent). The reduction in stationary source CO_2 emissions is consistent with the Massachusetts Stretch Code.

Table 4-10 Stationary Source CO_2 Emissions for the Overall Project (Full Build)

	Energy Consumption (MWh/yr)			CO_2 Emissions (tons/yr)[1]		
Project Component	Base Case	Design Case	Percent Savings	Base Case	Design Case[2]	Percent Reduction
Cambridge Center North Garage Office Buildings	38,937.0	27,553.9	29.2%	3,389.0	2,595.9	23.4%
Eleven Cambridge Center Residential Building	22,099.9	15,272.6	30.9%	1,712.8	1,305.3	23.8%
Three Cambridge Center Mixed Use Building	25,655.4	18,003.4	29.8%	2,057.4	1,596.3	22.4%
Whitehead Office Addition	15,645.5	11,340.5	27.5%	1,162.4	897.5	22.8%
Total	**102,337.9**	**72,170.4**	**29.5%**	**8,321.6**	**6,395.0**	**23.2%**

MWh/yr = million kilowatt-hour per year
tons/yr = short tons per year

Energy Use Index

The Energy Use Index (EUI) is a tool used to provide a common basis of comparison for energy use for various building uses. It is the total amount of energy used at a project over a one-year period, divided by the square footage of that building and represents the energy consumed by a building relative to its size. Based on the most recent Commercial Building End-Use Consumption Survey (CBECS), the average office building is EUI 90 with a maximum of 35 recommended.[7] Table 4-11 below provides the EUI for each of the Project Components under the Base and Design Cases. These EUI's are well below the averages presented in the CBECS however, the CBECS is based on older buildings where the EUI presented herein represent more aggressive state building codes as well as aggressive mitigation measures to reduce the energy use and greenhouse emissions.

Table 4-11 Energy Use Index

Project Component	Energy Use Index (kBtu/sf-yr)[1]	
	Base Case	Design Case
Cambridge Center North Garage Office Buildings	50.9	36.0
Eleven Cambridge Center Residential Building	63.4	43.8
Three Cambridge Center Mixed Use Building	79.6	55.9
Whitehead Office Addition	229.7	166.5

1 For all spaces.

Other Beneficial Stationary Source CO_2 Emissions Improvements

Building Reuse

There are significant GHG emissions associated with energy expended for new building construction from the materials manufacturing processes and transportation of those building materials as well as from construction equipment. By redeveloping an urban site and reusing the Cambridge Center North Garage instead of constructing all new parking structures to support the proposed uses, the Project further reduces GHG emission and the impact on the climate by preserving the embodied energy and carbon in the existing materials. Reuse of the garage equates to over 257 million BTUs of energy (or over two million gallons of gasoline) and approximately 27 short tons/year of CO_2 emissions.[8]

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7 Website link to article: http://greensource.construction.com/news/2012/04/120417-zero-energy-buildings-attainable-across-climates-researchers-say.asp

8 Source: http://thegreenestbuilding.org/

Furthermore, the Redeveloper will make energy efficiency-related improvements, such as replacing inefficient lighting fixtures to the Cambridge Center North Garage in the future. Since these upgrades are not yet confirmed, they were not quantified as part of this stationary source GHG emissions assessment, but they can be assumed as beneficial measures to reducing CO_2 emissions under the future build condition.

Water Efficiency/Wastewater Generation Reduction

Water efficiency is not only important for conserving potable water and reducing wastewater generation, but also for reducing energy. Nationally, about four (4) percent of electricity use can be attributed to the treatment of potable water and wastewater, excluding the energy use associated with water heating. Therefore, the Proponents' commitment to reducing water use and wastewater generation through the installation of low-flow fixtures not only supports the overall sustainability goals, but further mitigates the potential impacts from energy use on the climate.

As outlined in the current MEPA GHG Policy, projects that will consume greater than 300,000 gallons per day (gpd) of water or wastewater may be required to model GHG emissions associated with energy usage for water or wastewater treatment on a case-by-case basis. This project will require 118,740 gpd of potable water and will generate 107,945 gpd of wastewater. Since the combined total of 226,685 gpd of water and wastewater is less than the screening threshold, therefore, no GHG analysis is needed.

Plug Loads

The Proponent commits to encouraging the use of ENERGY STAR appliances and equipment, where available and reasonably practicable. Additionally, it is anticipated that task lights will be installed with motion sensors and schedule systems in the commercial office spaces. The building energy model for the Design Case does not take credit for reduced plug loads because building users are not fully identified at this time and, therefore, it is not possible to accurately estimate the number and/or type of these appliances, which depend, in large part, on the nature of the ultimate building user types. However, the use of ENERGY STAR appliances and equipment has proven to result in a reduction in overall energy use and, therefore, a reduction in stationary source CO_2 emissions for the Project is anticipated.[9] To quantify this, a 10 percent reduction was applied to the total annual electrical output of the Miscellaneous[10] category derived from the eQUEST model for each Project Component to account for ENERGY STAR appliances and equipment. The total annual Miscellaneous electricity would be reduced from 4,329.2 MWh to 3,896.2 MWh, which equates to a reduction in 158 tons of stationary source CO_2

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[9] Compared to standard office equipment and home appliances (non-ENERGY STAR- rated), ENERGY STAR-qualified products use 30 to 75 percent less electricity according to the ENERGY STAR website: http://www.energystar.gove/index.cfm?c=ofc

[10] The Miscellaneous category is one of the six categories eQUEST breaks electrical use into and the most applicable to plug-in loads.

emissions. This results in an overall stationary source CO_2 emissions reduction of 25.1 percent for the Project and overall energy reduction of 30.9 percent.

Building Commissioning and Sub-Metering

The Proponent will consider the opportunity to conduct building commissioning. The intent of commissioning buildings is to improve the performance/efficiency of energy-related systems resulting in energy savings and GHG benefits. Enhanced commissioning, as defined by LEED, would also be implemented for the North Garage Office Buildings, Eleven Cambridge Center Residential Building, and Three Cambridge Center Mixed Use Building.

It is likely that commercial and residential tenants will be responsible for their own energy costs via lease agreements. By charging individual tenants for energy usage, the Redeveloper will have a better understanding of the energy profile, and can identify areas and specific systems for energy conservation measures and improvement. In addition, with direct payment and control of use, tenants leasing the building can encourage reduction in consumption of energy and water, and associated GHG emissions. The Proponent may explore and evaluate the costs associated with installing trackers or meters. The Proponent may also work with Eversource to design/employ high-efficiency equipment, where reasonable and feasible.

Utility Incentives

The Proponent will consider the use of LED lighting and/or efficient utility systems for the majority of the Project Components. Electrical service providers typically offer technical assistance and/or incentives when such measures are implemented. The Redeveloper has a strong working relationship with service providers and currently engages them to explore utility incentives and rebates for expanding energy efficiency measures for new construction projects. The Redeveloper plans to use this same approach for the Project.

"Green" Tenant Leasing/Guidelines

During the leasing process, the Redeveloper will provide Tenant Design and Construction Guidelines to potential office and retail tenants as a guide to use when fitting out their spaces. Refer to Appendix E for the draft Tenant Design and Construction Guidelines. The intent of these guidelines is to educate future tenants about implementing sustainable design and construction features in their tenant improvement build-out as well as adopting green building practices that support the overall sustainability goals of the Project. The guidelines will also communicate the sustainable and resource-efficient features incorporated into the base building(s) and

provide specific suggested sustainable strategies enabling tenants to coordinate their leased space design and construction with the rest of the building systems.

In summary, the lease guidelines may include the following information:

- Descriptions of sustainable design, construction and operations features of the proposed building(s), including resource conservation goals and features for tenant fit-out spaces (e.g., low-flow plumbing fixtures, sub-metered systems, lighting controls) as well as building certifications (i.e., LEED certification).
- Encourage tenant commitments for meeting various energy and water conservation goals.
- Descriptions of current regulatory requirements that pertain to leasable spaces.
- Possible strategies for energy efficiency, such as those for HVAC equipment recommendations, lighting/lighting controls, and low-flow/high-efficiency plumbing fixture recommendations may be included in the guidelines.
- Information on the various high performance building rating systems, such as EPA's ENERGY STAR, Green Globes, and LEED for Commercial Interiors (CI) as well as information on how the design case building(s) can contribute towards these certifications.
- Waste reduction goals and recycling facilities/programs.
- Information on Green Cleaning guidelines/policies.
- Information regarding Project-wide features that aim to encourage alternative transportation and TDM measures.
- Information on how to train/inform maintenance staff and employees on sustainable design/operation features.

Solid/C&D Waste Reduction

Tenants have not been identified so it is difficult to predict how much recycled materials will be generated. However, in order to project the quantity of solid waste material generated for an office building, we have estimated the amount of generated waste based on a State of California study entitled "Waste Disposal and Diversion Findings for Selected Industry Groups." According to the study, large office buildings generate an average of 1,988 pounds of waste per 1,000 square feet per year. Therefore, it is estimated that the 719,400 square feet of office space in the Cambridge Center North Garage Office Buildings, Three Cambridge Center Mixed Use Building, and Whitehead buildings will generate approximately 1,437,361 pounds of waste annually. Based on the State of California study and Volume to Weight Data provided by the EPA, we estimate the volume of recycled materials generated for these building to be 1,241,880 pounds, which includes both operational and Construction & Demolition (C&D) waste. In order to achieve whole-building sustainability performance, the Redeveloper and Other Developers support and will follow the

LEED Green Building Rating System guidelines. Therefore, it is anticipated that 100 percent of paper, corrugated cardboard, glass, plastic and metal would be recycled during operations and it is assumed that a minimum 75 percent of C&D waste will be diverted, as required by Massachusetts law. Following these assumptions, it is estimated that approximately 940,000 pounds of generated waste will be diverted annually instead of being landfilled.

In order to estimate the potential GHG emissions reduction, two scenarios were established. The first scenario follows the survey results published in the California Study which shows majority of recyclables in an average commercial buildings are disposed instead of being diverted. This scenario is presented as "Baseline Scenario." The second scenario, presented as "Alternative Scenario," follows the Redeveloper's sustainability goals and objectives described previously. Using the US EPA's GHG calculator, Waste Reduction Model (WARM), the "Alternative Scenario" shows a reduction of 1,116 metric tons of Carbon Dioxide in GHG emissions as compared to the "Baseline Scenario." Appendix D provides the detailed Warm GHG Emission Analysis.

Evaluation of Alternative Energy Sources

On-Site Renewable Energy

Rooftop Solar PV

The Proponent has conducted a preliminary evaluation of installing solar photovoltaic (PV) systems on the proposed building rooftops as the most practical and cost-effective application of on-site renewable energy for the Project. Table 4-12 below presents a summary of the estimated solar power and associated stationary source GHG emissions reductions for the potential available rooftop area for North Garage, Eleven Cambridge Center, and Three Cambridge Center. The calculations for the solar power emissions savings is provided in the Appendix D.

Table 4-12 Estimated Photovoltaic (Solar) Power

Project Component	Available Roof Area (sf)[1]	Estimated Annual Output (kWh)[2]	Annual CO_2 Emissions Savings (tons per year)
Cambridge Center North Garage Office Buildings	20,832	337,444	256
Eleven Cambridge Center Residential Building	8,450	143,424	109
Three Cambridge Center Mixed Use Building	13,000	212,569	162
Whitehead Commercial Office Addition	6,208	102,178	78
TOTAL	**36,790**	**795,615**	**605**

1 Roof area available for solar PV installation excluding competing space requirements for the building rooftop mechanical units and proposed vegetated roof.
2 Assumes no obstruction to sunlight.

The solar PV systems for the Project could produce an estimated average annual energy output of approximately 795,615 kWh. This equates to an additional reduction of approximately 605 tons per year of stationary source CO_2 emissions for the Project if PV system was installed on the respective buildings.

Solar PV availability will continue to be evaluated as the design progresses and as tenants and their needs are better identified. The Proponent understands the capacity of PV arrays continues to be roughly 10 watt/SF, which is an improvement over earlier versions of this equipment, but it is still lower than the average power draw of a multi-story office building (4-5 W/SF) or lab building (8-10 W/SF). The economics of installing solar PV continue to improve with tax credits available and the secondary renewable energy credits market available.

Given the estimated electricity generation, several federal and state tax incentives could be available to the Project, including, but not limited to, Business Energy Investment Tax Credit, and Massachusetts SREC-II, if it remains in effect. The Business Energy Investment Tax Credit is a Corporate Tax Credit available to commercial sectors for Solar, Geothermal, Wind, CHP, Fuel Cell, and Microturbine technologies. The incentive amount is 30 percent of expenditures for solar systems, such as PVs. Assuming the initial cost of $3.50 per Wdc, the estimated simple payback for installed PV on 4 buildings would be close to 12 years. Refer to Appendix D for the simple payback calculation.

While solar PV provides the advantage of supplying power while generating zero GHG emissions during operation, the capacity limitations of the equipment prevent obtaining all the building power from local Solar PV sources. Furthermore, the Proponent will have to consider the City's setback and screening requirements for rooftop equipment, which may have a significant impact on the available area for solar PV.

The Redeveloper cannot commit to installing solar PV systems on the rooftops of the proposed buildings at this time due to lack of final building design and understanding of competing rooftop space needs (for mechanical systems and green roofs/rooftop open space). The Proponent and Redeveloper need to further consider the opportunity costs and trade-offs for creating a livable high-density urban environment that depends on the creation of open space most likely on building rooftops. However, the Proponent is committed to constructing all new buildings to be "solar ready," including designing the roof structure to support the weight and wind loads associated with solar energy collectors as well as providing space to accommodate associated infrastructure, including conduit to the roof and space in the electrical room for an inverter should rooftop solar PV be a cost-effective ECM in the future.

Wind (Architectural)

In accordance with the NPC Certificate, the design team evaluated the economic feasibility of incorporating wind harvesting in the design of the Project and associated potential stationary source GHG emissions reductions. For this analysis the "Solar-Estimate" calculator developed with support from U.S. Department of Energy was used. The annual average wind speed in Cambridge, MA is estimated at 5.45 m/s or 12.3 mph. It is assumed that thirty (30), 1 kW turbines are mounted on the roof of the proposed Cambridge Center North Garage Office Buildings. The "Solar-Estimate" calculator indicates that this 30 kW system can generate 31,022 kWh annually which is approximately 1 percent of the estimated annual electricity use for the office building and the parking garage combined. Please refer to Appendix D for detailed calculations. Based on the recent wind harvesting analysis performed for one of the Redeveloper's other projects, the cost to furnish, install and maintain each 1 kW turbine is estimated to be $30,000 over a 10-year period. Considering an electric utility rate of $0.16/ kWh and the annual inflation rate of 3.78 percent, over a 10 year period the turbines will offset $59,000 in energy cost. These calculations show that the payback is over 100 years making wind harvesting technology economically infeasible. From an energy savings and stationary source GHG emissions reductions point of view, using such a system would reduce the electricity demand by 31,022 kW-hr annually resulting in an estimated reduction in GHG emissions by 488 tons over its 10-year system life (assuming a 0.0007 MTCO2E per kW-hr generated based on the EPA Greenhouse Gas Equivalencies Calculator).

The Redeveloper has a long-term commitment to sustainability and has a vast portfolio of installed and/or planned solar PV systems and wind turbines; they have been committed to investigating the feasibility of any sustainable and renewable energy source to be implemented in these or any given projects. However, as previous and current analyses show, the wind harvesting technology is not economically feasible due to its high cost of furnishing, installation, and maintenance. That being said, the Redeveloper recently decided to implement the wind harvesting system in one project in Boston, considering only the environmental impacts of the system, and they will continue to investigate the feasibility of wind harvesting for any of the

projects associated with this application as design progresses, even though the investment is not financially feasible.

Geothermal

There are several factors as to why geothermal energy, or Ground Source Heat Pumps (GSHPs), are not feasible for the Project. These include:

- The Project is located in a dense urban setting with subway tunnels and existing city and utility infrastructure running below the parcels.
- The well field area required to be cost-effective for the Project is large and the urban location makes it infeasible to install the GSHP system. Based on load estimates as noted below from the proposed case energy models, assuming each well is 3,000 feet deep and 30 feet apart; a well field of the approximate area of open land area as noted is required.
- The Cambridge Center North Garage occupies the majority of the ground plane prohibiting the inclusion of geothermal wells.

The above estimates are based on 350 foot per ton of cooling for office, 550 SF/ton for residential, and 200 SF/ton for lab, and 15 ton per well cooling available. Table 4-13 presents the number of geothermal wells and associated land area required for each Project Component.

Table 4-13 Land Area Required for Geothermal Wells

Project Component	Well Quantity	Acres of Land Required
Cambridge Center North Garage	115	2.54
Eleven Cambridge Center	34	0.76
Three Cambridge Center	48	1.04
Whitehead Office Addition	20	0.42

District Energy Opportunities

Steam

According to the "Guidance for the Application of the MEPA GHG Policy and Protocol to the Use of the Dalkia Cambridge CHP District Steam" document, MEPA allows the quantification of stationary source fuel consumption using of a source energy compliance path based on the results of site energy path modeling performed in compliance with the Stretch Energy Code and converted using the site to source fuel conversion factors (SSFCF).[11] The site path energy modeling for all four buildings

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[11] Guidance for the Application of the MEPA GHG Policy and Protocol to the Use of the Dalkia Cambridge CHP District Steam as a Fuel Source, Draft from March 11, 2014

and the steps indicated in the guideline were used to evaluate the electricity generated and to calculate the CO2 emission reduction. The Dalkia steam approach needs more study; although the initial review seems to indicate small reductions in GHG generation due to the shared steam/electric generation, the costs are unclear and future flexibility is a concern. Further, the Project would be able to capture only the GHG reduction for electricity that corresponds to amount of steam purchased; it cannot be assumed that all electricity used on-site is generated by Dalkia locally, especially in the summer when local demand for steam is greatly reduced. Refer to Appendix D for the detailed calculations.

The potential connection to the local Kendall CHP district plant was initially investigated in the NPC based on the site path energy modeling for heating energy only. As recommended by DOER, the analysis has been expanded so it considers the CHP for both heating and cooling, using absorption chillers. The analysis was updated based on the revised models and the detailed results are presented in the following table based on formula furnished by DOER "Guidance for the Application of the MEPA GHG Policy and Protocol to the use of the Dalkia CHP District Steam."

Assuming an installation of absorption chillers with COP of approximately 0.7, meaning that it takes 17,140 Btu of steam to produce one ton-hour of cooling, and following the MEPA/DOER guidance the calculations were performed for both cooling and heating. The analysis shows that if steam is used to both heat and cool the building, the total source energy associated with the proposed buildings would be reduced by approximately 90 percent. The generated electricity exceeds the Project's need and it is equivalent to 990 home's energy use for one year. Detailed calculations are provided in Appendix D. These calculations demonstrate if steam is used to offset natural gas used for heating, the total source energy associated with the proposed buildings would be reduced by approximately 62 percent, thereby, significantly reducing stationary source GHG emissions, based on DOER formulas. However, there are several challenges to using the central plant steam approach economically feasible:

1. Locating the steam supply piping underground in relation to the buildings and findings connection route that avoids existing obstacles (e.g. other utilities, MBTA, Red Line, etc.)
2. Ensuring adequate capacity in the utility steam system to support building needs and future expansions.
3. Utility steam condensate is dumped to the sanitary waste system in Kendall Square. Therefore, the condensate must be quenched with potable water to be less than 140° F before being dumped to drain. There may be an opportunity to capture quenched condensate and use it as reclaimed water for toilet flushing or irrigation. But thus also adds more equipment and infrastructure to the building.
4. Long-term steam pricing is contract negotiated; it is not a regulated utility, like gas and electricity. Therefore, long-term pricing is an inherent risk.

5. The steam supplier is a private entity and is subject to being sold to other companies, with the inherent policy and procedure change, which also considered a risk.

Co-Generation/Combined Heat and Power

Co-generation, the combined generation of electricity and heat, will continue to be reviewed as the design progresses. The Proponent will evaluate whether it makes sense to locate a co-generation plant on one of the Project Component sites being proposed for redevelopment, or whether to take advantage of an opportunity to use the heat and electricity generated by the existing Biogen co-generation plant adjacent to the Project. Co-generation can be good in the fact that it uses fuel once to create both heat and electricity, which reduces fuel usage and GHG generation. However, it is the project team's experience is that co-generation makes sense economically only when both the electricity and the heat generated can be fully utilized by a project. For this reason, the co-gen capacity would be optimized and sized for the continuous background operating load of electricity with the corresponding heat requirement. This means that additional electricity, generated off-site, would be needed to serve the Project during peak usage periods. Residential uses usually do better with co-generation than commercial/office buildings because this use has both heating and domestic hot water requirements. Other uses, such as community centers, with swimming pools, showers, and laundry requirements, are ideal candidates for co-gen. Lab buildings that need reheat in order to temper large volumes of fume hood make-up air can also be good candidates, but this will depend on the tenants operations and space, and will need to be reviewed again as the design develops and as tenants are identified.

Kendall Square Eco-District

Kendall Square is experiencing growth in all sectors, from commercial and institutional development to residential projects. With Kendall Square responsible for one-third of energy consumption in Cambridge and continued growth placing certain pressures on existing infrastructure systems, the City, CRA, and key stakeholders in the Kendall Square community are looking at ways to make the area more sustainable and resilient. The EcoDistrict model streamlines sustainability efforts through an integrated approach that emphasizes projects at the district or neighborhood scale. EcoDistricts offer a new model of public-private-civic partnership with an emphasis on innovation, transparency, and collaborative action. The framework for the EcoDistrict process provides a management and monitoring framework to help stakeholders navigate planning, project delivery and performance over time of efforts that will move Kendall Square forward to become a sustainable and resilient district.

Since May 2013, the Kendall Square EcoDistrict stakeholder committee has been collaboratively working towards establishing an EcoDistrict governance structure along with specific goals, metrics and projects for Kendall Square. The stakeholder group includes the Proponent, the City, property owners, real estate developers, local

institutions, businesses, community leaders and the Kendall Square Association. This group has hired a project manager, the consulting firm Linnean Solutions, to facilitate and manage the process. The group is utilizing the EcoDistrict process to work towards more efficient and sustainable energy and water infrastructures, stronger ties within the community, enhanced public space and connections to surrounding neighborhoods, and a stronger ecosystem and natural habitat.

The Stakeholder Group is focusing on four phases of EcoDistrict development: District Organization, District Assessment, District Projects, and District Management. Linnean Solutions is working with the stakeholder group to identify the major priorities, goals, and metrics for the EcoDistrict, which will lead to collaborative district-scale projects for the Kendall Square area.

In June 2014, the Kendall Square EcoDistrict was included as part of the EcoDistrict.org Target Cities Program, joining eight other North American cities in a program to amplify and accelerate district-scale community regeneration and create replicable models for next-generation urban revitalization. The partnership with the Target Cities program brings together EcoDistricts.org staff to collaboratively work with Stakeholders to move the EcoDistrict process forward in Kendall Square.

The Kendall Square EcoDistrict is conducting a large-scale district assessment process and is managing a comprehensive district energy assessment and analysis. In August 2015, a Request for Proposal was released seeking consultants to develop an Energy Assessment and Study to analyze current energy supply and demand and future supply and demand projected to 2035 in Kendall Square, along with resilience strategies for energy supply and distribution, and specific district-oriented energy opportunities within the Kendall Square EcoDistrict. A consultant was chosen on October 5, 2015. The Energy Assessment is scheduled to begin in late fall 2015 and is anticipated to be complete by summer 2016.

The Kendall Square EcoDistrict would provide additional opportunities for combined heat and power and shared generation, provided projects are co-located that can utilize the heat and power generated. The Kendall Square EcoDistrict is intended to incorporate renewable energy generation, and should promote combined/cooperative development with shared information about project needs and contributions. Ideally, the eco-district will apply the concept of “live-work-play” in order to reduce auto transportation and promote human powered transportation. Finally, the eco-district should provide a framework for the utilities, the City, and the developers to work together to right size projects and infrastructure, with a goal of minimizing energy usage, water usage, and greenhouse gas generation.

Mobile Source Emissions Assessment

Mobile source GHG emissions are based upon the traffic volumes, the distance traveled and GHG emission rates. The mobile source emissions are calculated by

performing a yearly mesoscale analysis to evaluate the changes in CO_2 emissions for the existing and future conditions within the traffic study area. The GHG mobile source analysis estimates the area-wide CO_2 emissions from vehicle traffic for a time period of one year. Mobile source emissions were calculated by performing an annual GHG emissions mesoscale analysis to evaluate the estimated change in CO_2 emissions for the existing and future conditions within the study area. The mobile source CO_2 assessment was conducted for the Existing, No-Build, Build and Build with Mitigation Conditions, as described below.

Analysis Conditions

This NPC compares the future No-Build and Build conditions in order to identify the potential impact from the Project. Where applicable, the existing conditions are considered for comparison. In order to compare the effects of the proposed Project, the following analysis conditions were identified:

- **Existing Condition** represents the year 2014, the baseline analysis condition for comparison to future conditions;
- **No-Build Condition** represents the year 2024 and reflects existing traffic volumes increased to account for anticipated background traffic volume growth, and includes traffic related to specific development projects within the study area that are expected to be completed by 2024, and assumes no Project-related vehicle trips;
- **Build Condition** represents the year 2024 and includes the No-Build Condition traffic volumes plus the traffic associated with the Full-Build of the Project;
- **Build with Mitigation Condition** represents the 2024 Build Condition with the Project fully constructed and in operation with proposed transportation-related mitigation measures in place which includes all intersection improvements that results in reductions in delay (as presented in Chapter 2, *Transportation and Parking* and the 'Proposed Mitigation Measures' section below).

Future conditions were selected to reflect a ten-year traffic planning horizon. A comparison between the No-Build and Build Conditions of the same year show changes anticipated to occur as a result of the Project.

Mobile Source Emission Rates

EPA's Office of Transportation and Air Quality (OTAQ) has developed the Motor Vehicle Emission Simulator (MOVES)[12]. MOVES2014 is U.S. Environmental Protection Agency's (EPA's) latest motor vehicle emissions model for state and local agencies to estimate greenhouse gases from cars, trucks, buses, and motorcycles.

[12] MOVES2014 (Motor Vehicles Emission Simulator), 2014, US EPA, Office of Mobile Sources, Ann Arbor, MI.

All the vehicle emissions used in the mobile source GHG analysis were obtained using EPA's MOVES2014 emissions model. MOVES2014 calculates emission factors from motor vehicles in kilograms per vehicle-mile for existing and future conditions. The emissions calculated for this air quality assessment includes elements such as Tier 3 emission standards (which is an EPA program that sets new vehicle emissions standards, lowering the sulfur content of gasoline), heavy-duty engine and vehicle greenhouse gas regulations (2014-2018), and the second phase of light-duty vehicle GHG regulations (2017-2025). It also includes Massachusetts-specific conditions, such as the state vehicle registration age distribution and the statewide Inspection and Maintenance (I/M) Program.[13]

Traffic Data

The air quality study used traffic data (volumes, delays, and speeds) developed for each analysis condition. The mesoscale analysis for CO_2 emissions used a yearly traffic volume for weekday and weekend periods. The vehicle miles traveled data used in the air quality analysis were developed based on the traffic data analyzed in this NPC. The mobile source GHG study area includes the entire Middlesex County.

Existing Mobile Source CO_2 Emissions

Table 4-14 presents CO_2 emissions from mobile sources under all conditions. The calculation of Existing Conditions mobile source emissions provides a base for which future years are evaluated. The mobile source analysis calculated the existing CO_2 emissions from the major roadways in the study area and represents Middlesex County. These emissions, estimated to be 5,745,642 tons per year, establish a baseline to which future emissions can be compared.

Future Mobile Source CO_2 Emissions

Future Project-related mobile source CO_2 emissions calculations are based upon changes in traffic and emission factor data. The traffic data includes traffic volumes, vehicle miles traveled, roadway operations, and physical roadway improvements. The emission factor data included emission reduction programs and years of analysis.

The mobile source analysis estimated the future study area CO_2 emissions due to the changes in traffic and emission data. Under the No-Build Condition, CO_2 emissions were estimated to be 5,542,707 tons per year. Under the Build Condition, the CO_2 emissions were estimated to be 5,543,753 tons per year.

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6 *The Stage II Vapor Recovery System* is the process of collecting gasoline vapors form vehicles as they are refueled. This requires the use of a special gasoline nozzle at the fuel pump.

The total Project-related mobile source GHG emissions are 1,046 tons per year, as presented in Table 4-14 below. The 1,046 tons per year increase in CO_2 emission represents a 0.02 percent increase in CO_2 emissions for the Middlesex County area for future 2024 conditions.

Table 4-14 Mobile Source CO_2 Emissions Analysis Results (tons per year)

Pollutant	2014 Existing Conditions	2024 No-Build Conditions	2024 Build Conditions	Project-Related CO_2 Emission[1]
Mobile Source GHG emissions (CO_2)	5,745,642	5,542,707	5,543,753	1,046

GHG Greenhouse Gas
1 Represents the difference in CO_2 emissions between the Build and No-Build Conditions.

Proposed Mitigation Measures

The mobile source GHG emissions assessment calculated the GHG emissions for the Project-related mobile sources. As discussed in Chapter 2, *Transportation and Parking* of this NPC, the Proponent will coordinate with the City to potentially implement intersection improvements to reduce delays and queuing as well as implement TDM measures in order to reduce single-occupant vehicle trips to the KSURP area and to minimize peak-period traffic demands in the KSURP area—all of which will provide for mobile source CO_2 emissions benefits. For the purposes of quantifying mobile source GHG emissions and projected reductions, this assessment assumed the local intersection operation improvements as described in Chapter 2.

Based on the new requirement to use MOVES2014 and the corresponding regional nature of the mesoscale analysis, the emissions related to Project-specific improvements, such as the intersection improvements and TDM program are minor reductions relative to the overall area (which are projected on a county-wide level).

The implementation of the TDM program is expected to improve air quality in the study area by promoting the use of alternative forms of transportation to the use of single-occupant motor vehicles as the principal travel mode to and from the KSURP area. Previous estimates of similar TDM programs have ranged on the order of two to five percent reduction in vehicles miles traveled (VMT), which in turn will have a slight decrease in regional greenhouse gas emissions from the Build condition.

The proposed traffic mitigation (physical and operational upgrades at the intersections) is projected to reduce CO_2 emission by an estimated 102 tons per year, which results in a total Project-related CO_2 emissions of 941 tons per year. Table 4-15 below presents a summary of the projected emissions reduction related to the traffic mitigation.

Table 4-15 Mobile Source CO_2 Emissions Mitigation Analysis Results (tons per year)

Pollutant	Project-Related CO_2 Emission[1]	Estimated Reductions Due to Traffic Mitigation[2]	Resulting Project-Related CO_2 Emissions
Greenhouse Gas (CO_2) Emissions	1,046	105	941

1 Represents the difference in CO_2 emissions between the 2024 Build and No-Build Conditions
2 The traffic mitigation includes the physical and operations upgrades at the intersections and does not include TDM programs which would result in minor additional emissions reductions.

The Proponent and Redeveloper are committed to developing an expanded program of transportation mitigation and enhancements (the proposed KSTEP) designed to both preserve the favorable mode share balance in Kendall Square and provide additional improvements to mitigate the trip generation and associated mobile source GHG emissions projected to result from the Project. The KSTEP will be developed in conjunction with the many stakeholders engaged in transportation planning and operations in Kendall Square, including the Kendall Square Mobility Task Force, the MBTA, and MassDOT. The KSTEP would supplement the transportation mitigation and other beneficial measures outlined in Chapter 2, *Transportation and Parking*.

The traffic projections already took into account the aggressive transit mode share that is currently experienced and is projected to continue to be experienced in the future in the Kendall Square area. Because of the nature of TDM strategies quantification of specific measures is infeasible and is generally included in the mode share estimates for a project, as was done for the traffic and air quality studies.

The Proponent is current working with the Kendall Square (KS) Mobility Task Force, the City, MassDOT and the MBTA to develop a comprehensive effective plan for the transit enhancements for the Kendall Square area (the KSTEP). Details of the KSTEP are currently being developed and will include immediate, mid-range, and longer term Kendall Square access and transit and mobility improvements. Refer to the 'Proposed Public Transit Improvements' section of Chapter 2, *Transportation and Parking* for additional information.

Climate Change Adaptation

During the early stages of project planning and design, the Proponent began to consider potential climate change impacts and plan for resilience. This section provides an evaluation of potential impacts to the KSURP area associated with predicted sea level rise, increased frequency and intensity of precipitation events, and extreme heat events. The *Draft MEPA Climate Adaptation & Resiliency Policy* issued in September 2014 was used as guidance. Furthermore, the City is currently preparing the Cambridge Climate Change Vulnerability Assessment, which will be referred to by the Proponent as the design of each Project Component moves forward.

Future Potential Sea Level Rise/Flooding

To fully evaluate the KSURP area's susceptibility to flooding from precipitation, coastal surge events, and sea level rise a detailed dynamic model is required, which can compile the available data and determine the probability and severity of flooding from the three sources relevant to this discussion. Such a model has been in development by MassDOT to assess risks to the Central Artery. The City is working with MassDOT to extend the study area into Cambridge and incorporating the results into the Cambridge Climate Change Vulnerability Assessment. MassDOT's Advanced Circulation (ADCIRC) model which, with Cambridge's input, will account for flooding in the context of climate change, coupled with the complex topography of the City and the area between Cambridge and Boston Harbor. It will produce probabilities of flooding throughout the City at a resolution of 50 square meters for the present day, as well as the years 2030 and 2070. The City has not finished translating the work completed by MassDOT to provide the required data for this the publication of this document. The City has determined that there is less than a 0.1% chance of flooding due to climate driven sea level for all of East Cambridge. The following investigation was completed to better understand the underlying exposure to flooding of the Project Component sites in lieu of the City's assessment for the year 2070.

The Kendall Square neighborhood is vulnerable to flooding through several means, the first of which is the Charles River. The Charles River Basin has the capability of inundating the KSURP area in extreme weather events, especially when coupled with sea level rise. The Charles River Basin elevation is set by sluice gate operations at the Charles River Dam constructed in 1910 at the Museum of Science and pumping from the New Charles River Dam adjacent to the Zakim Bridge constructed in 1978. A U.S. Army Corps of Engineers (USACOE) Report determined the stillwater elevations immediately upstream of the Charles River Dam for the 100-year and 500-year precipitation events to be elevation +3.5' and +5.2' NAVD 88[14], respectively. The FEMA Flood Insurance Study for the Kendall Square map unit (Map 25017C0577E), denoted that Cambridge is susceptible to flooding when Charles River Basin elevations are above +4.6' NAVD 88. It also indicates that the New Charles River Dam can maintain the 100-year storm at elevation +4.35' NAVD 88, in moderate contradiction to the USACOE report. These dams could be vulnerable to overtopping, as well as flanking, from Massachusetts Bay through storm surge and sea level rise.

An evaluation of the FEMA flood maps for the Charles River Basin was conducted to understand the limits of the 100-year floodplain. The KSURP area is located within the limits of FEMA flood insurance rate map (FIRM) 25017C0577E. Refer to Figure 4.2 for the Cambridge limits of the 100-year floodplain which is at elevation +4 feet NAVD 88, which is rounded down from +4.35 feet, the previously discussed 100-year elevation set by basin pumping. No preliminary FIRM updates have been prepared

[14] To convert elevations in NAVD 88 to Cambridge City Base add 11.65'

for Cambridge as the Charles River dams are meant to maintain the Charles River Basin elevations. However, this is not true downstream of the dams. The preliminary, but not effective 100-year flood elevation downstream of the Charles River and New Charles River dams are elevations +10 feet and +13 feet NAVD 88, respectively. The difference in flood elevation is due to the New Charles River dam being subject to coastal flooding and wave action. For the purposes of this study, the 100-year flood elevation of +10.0 feet NAVD 88 will be used. Refer to Figure 4.3 for the adjacent Boston FIRM detailing the Charles River 100-year floodplain on either side of the Charles River Dam. The New Charles River Dam was designed to withstand overtopping from sea levels up to +11.6 feet NAVD 88 making it vulnerable to the extreme storm event. In contrast, the original Charles River Dam height is +14.6 feet NAVD 88, with only the sluice gates at risk of overtopping during the 100 year storm event. Therefore, Charles River Basin flooding from overtopping is limited to the quantity of water that is able to overtop the 90 linear feet of sluice gate, as opposed to the 1200-foot length of the entire dam. In addition to overtopping, the Charles River Dams are subject to flooding via flanking, where water from an extreme surge event bypasses the dams by overland routes adjacent to the dam ends. To evaluate the effect of flanking a detailed topographic analyses is required.

The Proponent has also evaluated the findings outlined in *Sea Level Rose: Understanding and Applying Trends and Future Scenarios for Analysis and Planning* prepared by the Massachusetts Office of Coastal Zone Management.[15] Potential sea level rise scenarios were evaluated by CZM for four different climate change scenarios in Boston, Massachusetts, which can be used as a proxy for Cambridge. The design life for the buildings in this Project are 50 years, which will be permitted and constructed over the next decade. Therefore, the sea level estimates for the year 2075 were evaluated in this document. The CZM Report documents a range in sea level rise from 0.60 feet to 3.92 feet in the year 2075, between the Lowest and Highest scenarios, with Intermediate Low and Intermediate High scenarios being established at 1.21 feet and 2.47 feet, respectively. Comparatively, the Cambridge Climate Change Vulnerability Assessment team uses the National Climate Assessment Intermediate High and Highest sea level rise curves (2.6 and 3.9 feet by 2075), a decision based on the current emissions trajectories.

The CZM sea level rise estimates were applied to the 100-year flood elevation downstream of the Charles River Dam at elevation +10.0 feet NAVD 88 previously discussed. Should the expected sea level rise exceed the top of the New Charles River Dam at elevation +11.6 feet NAVD 88, then the Project may become vulnerable to coastal events if the pumping capacity of the dams is insufficient. The climate change scenarios produce the following elevations in future sea level rise from the preliminary 100-year flood plain elevation at the Charles River Dam:

- Lowest Scenario – Elevation +10.60 feet NAVD 88

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[15] Massachusetts Office of Coastal Zone Management, *Sea Level Rose: Understanding and Applying Trends and Future Scenarios for Analysis and Planning*, December 2013.

- Intermediate Low Scenario – Elevation +11.21 feet NAVD 88
- Intermediate High Scenario – Elevation +12.47 feet NAVD 88
- Highest Scenario – Elevation +13.92 feet NAVD 88

The Charles River Dam, at elevation+14.6 NAVD 88, would not be overtopped by the 100-year event even with sea level rise for any scenario. In the Lowest through High scenario, Basin flooding would be limited to the quantity of water able to overtop the limited length of the sluice gates. The 2075 Highest Scenario is the most appropriate to evaluate given the 50 year lifetime of the proposed buildings and the latest data suggesting that global emissions are currently in line for the Highest Emission Scenario. It's worth noting that the New Charles River Dam is susceptible to overtopping by all CZM scenarios but the Lowest, which may further exacerbate the flood elevations experienced by the original Dam. In the Highest Scenario, wave action may be able to surpass the New Charles River Dam, effectively raising the flood elevation at the original Charles River Dam and increasing the risk of flanking. Flooding from wave action would be significantly less than that of baseline flood elevation overtopping. Overtopping of the Charles River Dam by wave action and flooding through the sluice gates will not directly translate to a large increase in the elevation of the Charles River Basin. The pumps at the Dam are regularly used to maintain elevations in the basin, and should have capacity to handle the limited flooding over sluice gates and possible wave action. Ultimately, the actual flood elevation, and its relation to the Project, is based on a number of factors including the actual flood elevation, the extent of flanking, the rate at which wave action overtops and flanks the dam, flow rates over the sluice gates, duration of the storm, pumping capacity at the dams, and volume of hydrologically connected land below the minimum elevation of the KSURP area.

The KSURP area has an elevation between +6.0 feet and +12.0 feet NAVD 88 with building finished floor elevations around +10 feet NAVD 88, as determined by the Massachusetts (Boston Area) LiDAR data which has an accuracy of +/-0.5 feet. Therefore, the KSURP area as a whole is not currently believed to be susceptible to the 100- or 500-year precipitation event from the Charles River Basin, with flood elevations of +4.35 feet and +5.2 feet NAVD 88. On the other hand, the Charles River Dam is susceptible to sluice gate flooding from the 100-year coastal event. Based on current data, the entire Dam will not be overtopped by a 100-year event if the Highest Scenario of sea level rise is realized in the year 2075. The extent of flooding from the sluice gates and wave action cannot be determined using a "bathtub model" approach. A dynamic model is required to balance the incoming water, which is a function of the interactions of twice-daily tide shifts, wave action, and the flooding elevation, with outgoing water, which is a function of pumping capacity. It is worth noting that the Project is also potentially susceptible to flooding from the Mystic River. The most concerning flood pathway for the KSURP area, according to the Climate Vulnerability Assessment team, is via overland flow downstream of the Amelia Earhart Dam. In addition, overland coastal flooding routes through Boston

and overtopping and flanking at the Earhart Dam could increase the severity of flooding at the KSURP area.

The adjacent roadway networks to the Project may also be vulnerable to sea level rise, which can be evaluated once the final ADCIRC model results are made available. Generally, the roadways are about one foot below the building elevations. Adjacent to the Project Component sites, Broadway has local low points around elevation +7 feet NAVD 88, while Main Street is about elevation +8 feet NAVD 88. Galileo Galilei Way ramps up from elevation +8 feet to +10 feet NAVD 88 near the KSURP area. Therefore, roadways are more likely to experience flooding due to sea level rise than the building, as they are below the flood elevations described above. Once again, the extent of sea level rise driven flooding cannot be meaningfully employed to determine the level of vulnerability. Early model results from the ADCIRC model revealed a flooding probability of less than 0.1 percent for Eastern Cambridge, including roadways. Similarly, the MBTA Kendall Square station may be vulnerable to flooding in the year 2075, which would affect the accessibility of the Project. A dynamic model is required to truly evaluate the location and severity of flooding from the combined effects of precipitation, coastal surges, and sea level rise.

Inland Flooding Due to Extreme Precipitation

In addition to the above discussed flooding, the Project will also be subject to localized flooding given the capacity issues of the Cambridge Stormwater and Combined Sewer System. As the stormwater system is overwhelmed by precipitation and inundation from the coast/Charles River Basin, flows can be transferred to the combined system which also experiences groundwater infiltration. When the capacity of both systems are exceeded, surface ponding will occur to varying degrees. As shown in Figure 4.4, East Cambridge is subject to inland flooding for the current 100-year flood, which is expected to be exacerbated by climate change and sea level rise. Climate change is expected to increase the severity of the 10-year precipitation event from 4.9 to 5.6 inches and 7.4 inches for the years 2030 and 2070, respectively. Similarly the 100-year, 24 hour storm event is expected to increase in severity from 8.9 to 10.2 inches and 11.7 inches for the years 2030 and 2070. For context, the surcharging conditions in the current 10-year storm for the stormwater and combined sewer system are shown in Figures 5.2 and 6.2, respectively. Eventually, the City will combine the results of the MassDOT ADCIRC model with inland flooding and inundation to further refine the flooding depths (Figure 4.4). For this document, a qualitative evaluation of infrastructure was performed in the context of precipitation change with climate, for a net estimation of flooding severity.

As shown in Figure 5.3, the stormwater infrastructure in the KSURP area is currently susceptible to surcharging in the 10-year, 24-hour precipitation event. Fortunately, the stormwater conveyance systems adjacent to the Project Components sites have significantly less surcharging than the worst portions of infrastructure in Eastern Cambridge. As detailed in Chapter 5, *Stormwater Management*, each Project

Component will reduce stormwater runoff peak rate and volume for the 25-year storm event to the level of the 2-year event in the existing conditions. Therefore, the conveyance systems receiving runoff from the Project will have significantly more capacity after the completion of this Project. The system as a whole will be less vulnerable to extreme precipitation events. Riverine flooding of the stormwater system will be significant in the 100-year storm, and infrastructure will likely be overwhelmed (Figure 4.4).

Extreme Temperature Events

Over the past decades, the Intergovernmental Panel on Climate Change (IPCC) has focused significantly to characterize the potential impacts of greenhouse gas emissions from human activities on the complex interactions of our global climate. IPCC generated General Circulation Models (GCM), which predict climate at a relatively high level of spatial resolution (5 x 5° latitude and longitude). The four major GCMs are HadCM3 (United Kingdom), CSIRO2 (Australia), CGCM2 (Canada), and PCM (USA), based on the 2001 report. In the study, which was done by the US Department of Energy, a prototypical small office building was created in an energy modeling software and used to evaluate the impacts of climate change in 25 locations (20 climate regions). The research group developed a series of weather files, by modifying the existing meteorological weather files, to represent the climate change scenarios for 2100; then the typical building was simulated in different climates. This study shows that in cold climates, the net change to annual energy use due to climate change will be positive because of decrease in heating demand and less increase in cooling demand.

According to research conducted by Hayhoe, Stoner and Gelca provided by the City, the average temperature in Cambridge is expected to increase by 2 - 3° F by the 2030s. By the 2070s, the annual temperature is predicted to increase by 4 - 5° F under the lower scenario and 7 - 8° F under the higher scenario.

In order to evaluate the impacts of climate change on the proposed buildings, the project MEP followed the quantitative path and run the models for the climate change scenario for 2050. In 2012, the University of Southampton, UK developed a spreadsheet tool which allows the users to generate climate change weather files for World-wide locations ready for use in building performance simulation programs. The Climate Change World Weather File Generator (CCWorldWeatherGen) uses IPCC Third Assessment Report model summary data of the HadCM3 A2 experiment ensemble, and its underlying weather file generation routines are based on the "morphing" methodology for climate change transformation of weather data, which was developed by Belcher, Hacker and Powell. A screenshot of the weather file generator is provided in Appendix D.

The EPW weather file (EnergyPlus Weather file) of Boston was translated into a 2050s TMY2 weather file, using the "CCWorldWeatherGen" tool and then it was converted

to a BIN file so that it can be used in eQuest. The weather file in all proposed models was replaced by the 2050 weather file and all four buildings were simulated. The results are presented tables and a bar graph provided in Appendix D.

The analysis shows that the net change to annual energy use due to climate change will be positive for all buildings because the decrease in the space heating energy use is much larger than the increase in the space cooling energy use; the gap in annual energy usage is much larger in the Whitehead Institute because it's a lab/ office use with 100 percent outside air (OA) requirements. Space heating energy is much larger in this building because of the large amount of OA. However, comparing the annual energy cost shows that the operating cost for all buildings, except the Whitehead Institute Addition, increases even if the utility rates stay the same between 2016 and 2050; and by implementing the utility rates fluctuations, the annual energy cost of each building in 2050 is almost double of the cost in 2016.

The buildings are designed following and/or exceeding the energy code requirements, with engineering judgement applied, knowing that the nature of weather events is unlikely to remain the same throughout a building's lifetime. The ASHRAE 90.1-2010 energy standard continues to recommends a design temperature of 7°F winter and 87°F summer for the Boston area. These temperatures are based on historic averages, and represent the outer limits of temperatures that will be experienced in 99 percent of the year. This means that just 1 percent of the year, or 87.6 hours annually, will be colder than 7°F, or warmer than 87°F. Projects regularly use these temperatures to design the HVAC system heating and cooling capacity; projects also regularly apply a safety factor (usually 10 percent) to the load calculated using these temperatures, and then equipment is selected using the smallest unit with capacity exceeding the calculated load. This means that the actual operating temperature range for the building (assuming just the safety factor is applied) can be considered 88°F annually, rather than 80°F annually, as recommended by the standard, potentially boosting operability down to 3°F and up to 91°F. Further, projects often select multiple units to provide for redundant capacity and operability when units are out of service; this provides additional capacity that can be used for periods of extreme temperatures.

Resiliency and Adaptation Measures to be Considered

The Proponent and project design team plan to use the results of the Cambridge Vulnerability Assessment as well in input from the Cambridge Department of Public Works (DPW), to evaluate potential design elements to mitigate the effects of potential sea level rise at the KSURP area as the design of each Project Component progresses.

Potential Site Design Measures

The proposed buildings cover a significant majority of each Project Component site, which limits how much area is available for site design measures to mitigate flooding and heat island effect risks. The Proponent and/or Redeveloper continue to plan to implement a comprehensive set of site design measures aimed at making each Project Component less vulnerable to climate change. These measures will work in combination with building design measures to increase the building's resiliency (discussed further below under 'Potential Building Design Measures'). As part of the sanitary sewer connection requirements discussed in Chapter 6, *Water and Wastewater*, each Project Component will be required to store 24 hours' worth of wastewater flow on-site, protecting the newly constructed buildings from backups, which are a symptom of the limited capacity in the combined sewer system which services Cambridge. In addition, the Project will be infiltrating stormwater as part of the Cambridge stormwater requirements to be discussed in Chapter 5, *Stormwater Management*. Improving the hydrologic condition on-site will make the site more resilient to flooding, as stormwater is slowed and diverted from interfering with building operations through landscaped areas and infiltration systems. Both the sanitary storage and stormwater improvement features insulate the Project Components from potential issues due to climate change, while simultaneously improving the Cambridge infrastructure's ability to cope with extreme weather phenomena. Backflow preventers will also be installed on sanitary and stormwater laterals connecting to vulnerable collection systems in the public way, thereby ensuring one-directional flow offsite in the event of extreme wet weather flows. To cope with increasing intensity in precipitation, stormwater infrastructure will be evaluated for capacities to handle short-duration, high intensity rain events, including inlet and piping capacities.

Additional site design measures are being considered to reduce the effects of a warmer climate with longer dry spells. Increased pervious/green area at the ground level and installing green roofs are two ways the Project is anticipated to help reduce area-wide elevated temperatures associated with Urban Heat Island Effect. Additionally, landscaping could be designed to create a positive and comfortable microclimate by segregating large areas of impervious, heat trapping materials, providing tree canopy cover for pedestrians and low level plants, and encouraging evaporative cooling with dense greenery and water features where practical. To increase resiliency to heat and drought, vegetation will predominantly be native species to minimize irrigation requirements, while efficient irrigation systems will be used to maintain landscape features during droughts. The practicality of rainwater harvesting for irrigation, xeriscaping (landscaping without irrigation), and incorporating green roofs will be explored as designs progress. Maximizing pervious and green space will simultaneously increase resiliency and aid the stormwater mitigation strategy on-site. Similarly, green roofs will be used to further increase the Project's resiliency by reducing the heat island effect, as well as mitigate stormwater runoff rates and volumes.

If required, the Proponent and/or Redeveloper could consider the use of portable flood protection systems as a final defense between excessive flooding on-site and the building, such as those presented in Figure 4.5. Technologies, such as the Flood Log, Portadam, and the Aquafence Flood Barrier System can be stored in the building and deployed on-site when extreme flooding events are predicted. These systems effectively raise the required flood level required to impact the building internally. They can be installed around the entirety of a site or limited to protecting vulnerable building elements, such as doors, low windows, and areaways. While these systems have been successfully installed in coastal cities for building owners conscious to make their buildings more resilient to current and potential future flooding, additional data on the potential for excessive flooding in the future once the Project Components come online is required before the Proponent and/or Redeveloper can commit to implementing such measures..

Potential Kendall Square MBTA Station Resiliency Measures

While the full extent of the potential future sea level rise impacts is not yet understood for the KSURP area (as discussed previously above under section 'Future Potential Sea Level Rise/Flooding'), the MBTA Kendall Square station may be vulnerable to flooding in the future, which would affect the accessibility to public transit for the Project. Additionally, the MBTA recognizes that the Kendall Square Red Line station is currently susceptible to both heat stress and flooding, which is projected to be exacerbated in the future. Therefore, the Proponent and Redeveloper have begun to explore potential measures to assist the MBTA with making its transit facilities in the KSURP area more resilient to extreme heat events and inland flooding due to extreme precipitation.

Figure 4.6 shows conceptual, potential measures aimed at making the Kendall Square station more resilient to flooding. For example, trench drains with greater capacity than the existing systems could be installed at all entrances to the station to redirect more runoff from the area away from staircases to the station platforms. A more intensive, but effective means of flood protection would be mobile flood barriers. These walls can be stored by the MBTA on-site for use when flooding from extreme storm events are predicted. The flood barriers could be installed at station entrances around ground level utility vaults and adjacent to air intake/exhaust (Figure 4.6) to greatly minimize the potential for flooding to effect operations of the station. The most intensive resiliency measures that could be considered for the Kendall Square station are elevating power, HVAC, and other critical systems as well as installing pumping equipment to minimize the effects of flooding should the less intensive options fail. However, these more intensive resiliency measures require significate station construction.

The MBTA station can be made more resilient to heat stress by placing more, large fans on platforms to increase the circulation of air with the outdoor environment. A

more intensive strategy would include installing HVAC systems/upgrade air handling systems throughout the station to further increase air circulation. In total, these resiliency efforts would allow the MBTA red line to function at or near capacity during the more frequent and intensified heat waves, and prevent failure during extreme flooding events allowing normal function once conditions return to normal. All of these potential measures require significant coordination with the MBTA. Additionally, the Proponent and Redeveloper will continue to evaluate the City's climate-induced sea level rise predictions for East Cambridge in conjunction with the Project, and work closely with the MBTA to aid in making the Kendall Square station more resilient, given a full understanding of the potential KSURP area flooding events due to climate change.

The Proponent is also committed to working with the MBTA to improve Red Line resiliency to flooding more comprehensively throughout the KSURP area. This could potentially be accomplished by raising or protecting at-grade ventilation vents adjacent to the Whitehead Commercial Office site, and incorporating infrastructure resiliencies at the MBTA Electrical Facility at One Cambridge Center, such as mobile flood barriers and raising or relocating sensitive at-grade facility components. Also, the Proponent will work with MIT, which has proposed to explore a new headhouse location for the south side of Main Street.

Potential Building Design Measures

Although the full extent of sea level rise data was not made available, both the Proponent and Redeveloper are aware of precipitation-based inland flooding events. Potential building design resiliency measures include locating critical infrastructure above the first floor level (i.e. transformers, switchgear rooms, and mechanical rooms), limiting basement areas, and evaluating raised finish floor elevations and other improvements that may mitigate potential flooding.

Building finish floor elevations and necessary building utilities for all Project Components will be raised to the greatest practical extent to reduce the risk of flooding internally. Additionally, flood-resilient materials will be specified for first floor uses, where practicable. The Cambridge Center North Garage Office Buildings are proposed to be constructed over an existing garage structure minimizing the ground floor exposure to the effects of extreme weather events, such as flooding. Other flood prevention techniques could include: sealed wall penetrations for cable and electrical lines; watertight door barriers; septic line backflow prevention valves, sump pumps, and discharge pumps—all of which could be connected to auxiliary external generator connections or resilient backup power. In addition, the Project is anticipated to include green roofs/roof gardens and roofing membranes with high Solar Reflectance Index (SRI) to reduce the volume of stormwater runoff and reduce solar heat gain to minimize air conditioning loads, respectively. Additionally, high-performance curtain wall is being considered to maximize views and daylighting of interior spaces, thus reducing overall lighting loads and associated internal heat

gains, which has a direct impact on the space cooling load. As the climate change analysis shows, the rising temperature increases the space cooling demand in the Cambridge climate; therefore, any strategy that can reduce the space cooling demand is considered an adaptive strategy for climate change.

The Project's climate change mitigation includes the incorporation of several ECMs to reduce GHG emissions associated with energy use beyond what is required by Code, as discussed in the previous 'Stationary Source GHG Emissions Assessment' section. Some of these measures can also be considered adaptive design approaches to mitigate the potential impacts of climate change on the Project. These GHG emissions mitigation and climate change adaptation measures are considered mutually re-enforcing and, therefore, cannot be considered in isolation. As an example, the design team was conscious about reducing the window area in the residential setting as creating natural ventilation and mixed-mode design is an adaptive strategy in response to increases in temperature. Therefore, the window area was maintained at a ratio that can help in energy use reduction while it's still providing enough daylight and opening area for natural ventilation. Other climate change adaptive strategies considered in the conceptual design include improved envelope insulation and high performance glazing in response to increasing temperatures. The design team also investigated the deployment of several renewable energy sources and highly energy-efficient technologies, such as solar PV, wind, and co-generation plant (discussed further below under the previous 'Evaluation of Alternative Energy Sources' section). The design team is also aware that the extreme climate change is not only limited to temperature rise, but also may include flooding, intensified downpours, and/or hail evets. Therefore, the design team will continue to consider whether the design and architectural elements selected for the Project Components can reduce the vulnerability to these extreme events.

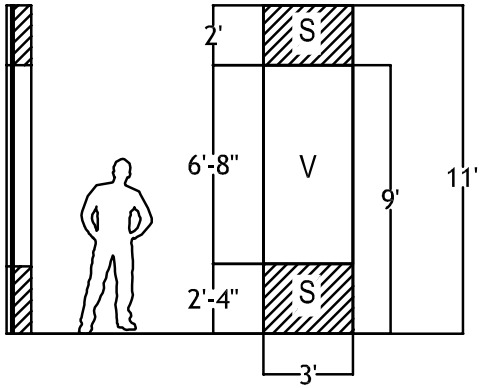
Other Potential Resiliency Measures

On-site renewable energy, a district energy network, and CHP systems also provide opportunities for added resiliency during periods of power loss during storms. While the KSURP area is served by underground utility power lines and gas mains, and as such, is not normally effected by storms that disrupt power or gas transmissions, according to DOER, the Kendall Square CHP district plant has been registered by the ISO-NE as a black start generation asset that can operate in island mode to provide both electricity to the Cambridge grid and thermal energy to the KSURP area in the event of a grid outage.

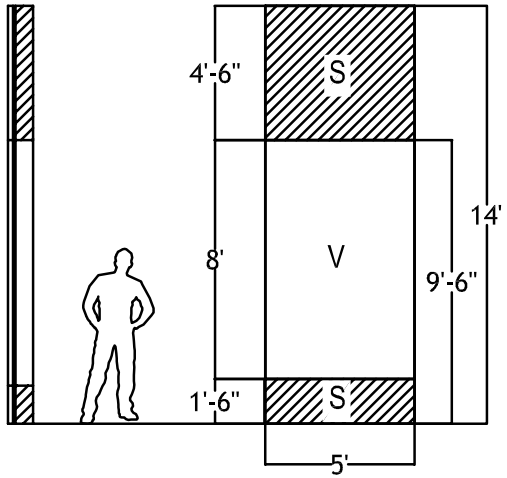
On-site CHP, or solar PV, generally will operate in phase with the incoming utility power, and needs incoming power to synchronize phase delivery. In "island mode", generators and CHP systems can be made to operate independently of the grid and self-synchronize power phasing with on-site solar. However, this approach is normally used in large-scale shelter locations only, when long-term operation may be needed to protect a group of people.

In most cases, the proposed commercial buildings will shut down and send occupants home in storm-related power failure scenarios. Any generators provided will most likely be optional standby generators that are sized to maintain server room or process operations only. In the case of the residential components, the generators provided will be for life-safety uses only (stairway pressurization, egress elevators, fire pump, etc.) and cannot by Code be used for ordinary ongoing operations in a building. The capacity provided by solar PV, even if the available space is maximized, will not be more than 10 percent of the power needed by the building, and cannot provide all power needed for normal operations. A CHP system could be used to provide limited ongoing operation, but the economics of such a system when compared to the likelihood of repeated power outages in the Kendall Square area would not be favorable. Storm response actions and resiliency measures will be incorporated into leasing agreements or tenant guidelines, including guidance related to tenant fit-out of commercial space, particularly those located on the lower floors. Refer to Appendix E for the draft Tenant Design and Construction Guidelines.

TYPICAL RESIDENTIAL
20 sf(vision) 13sf(span)
60% (vision) 40% (span)



TYPICAL OFFICE FLOORS
40 sf(vision) 30sf(span)
57% (vision) 43% (span)

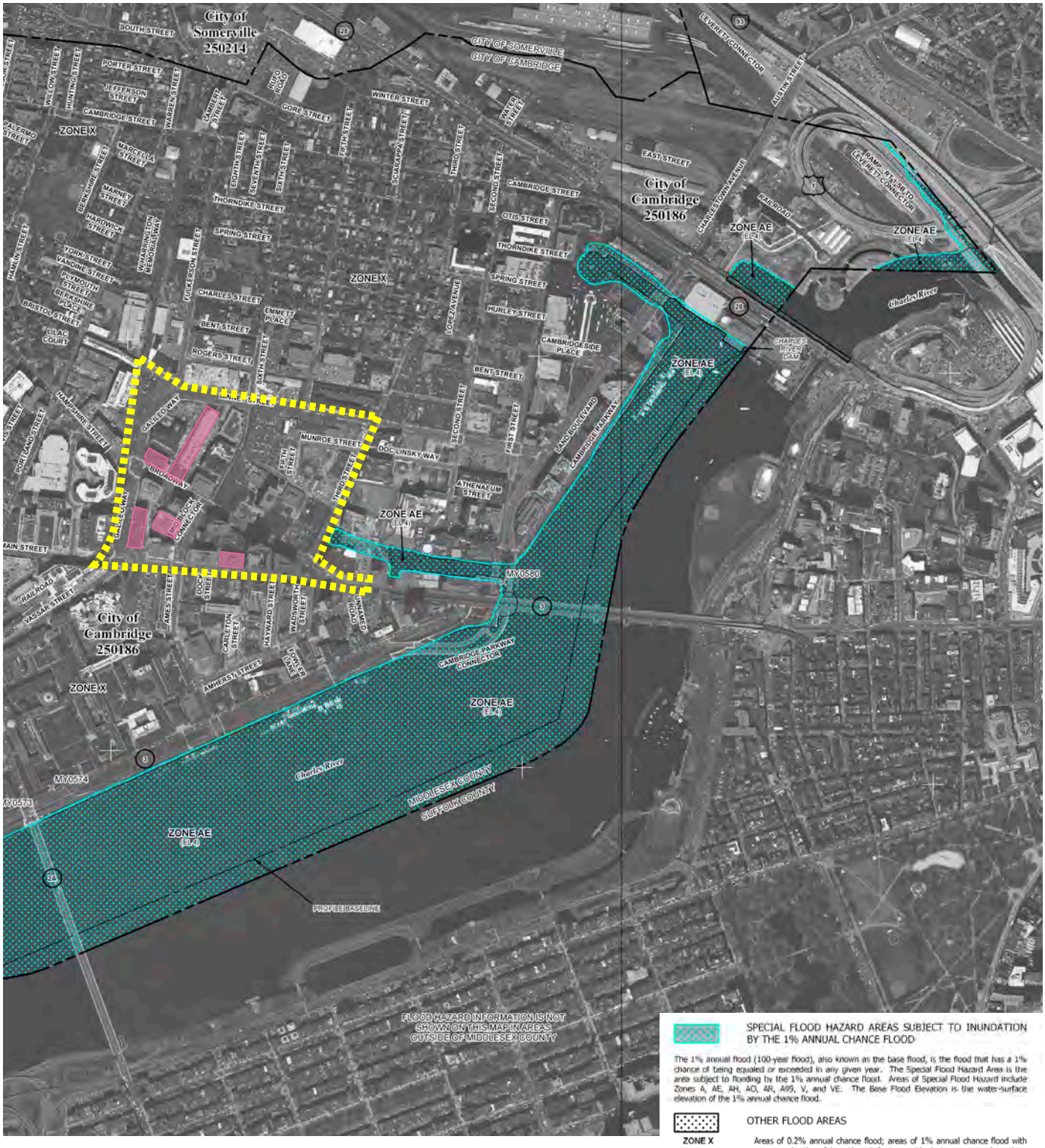


CRA

Figure 4.1
Window to Wall Ratios

Source: MEP

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA



KSURP Boundary

Proposed Project Component

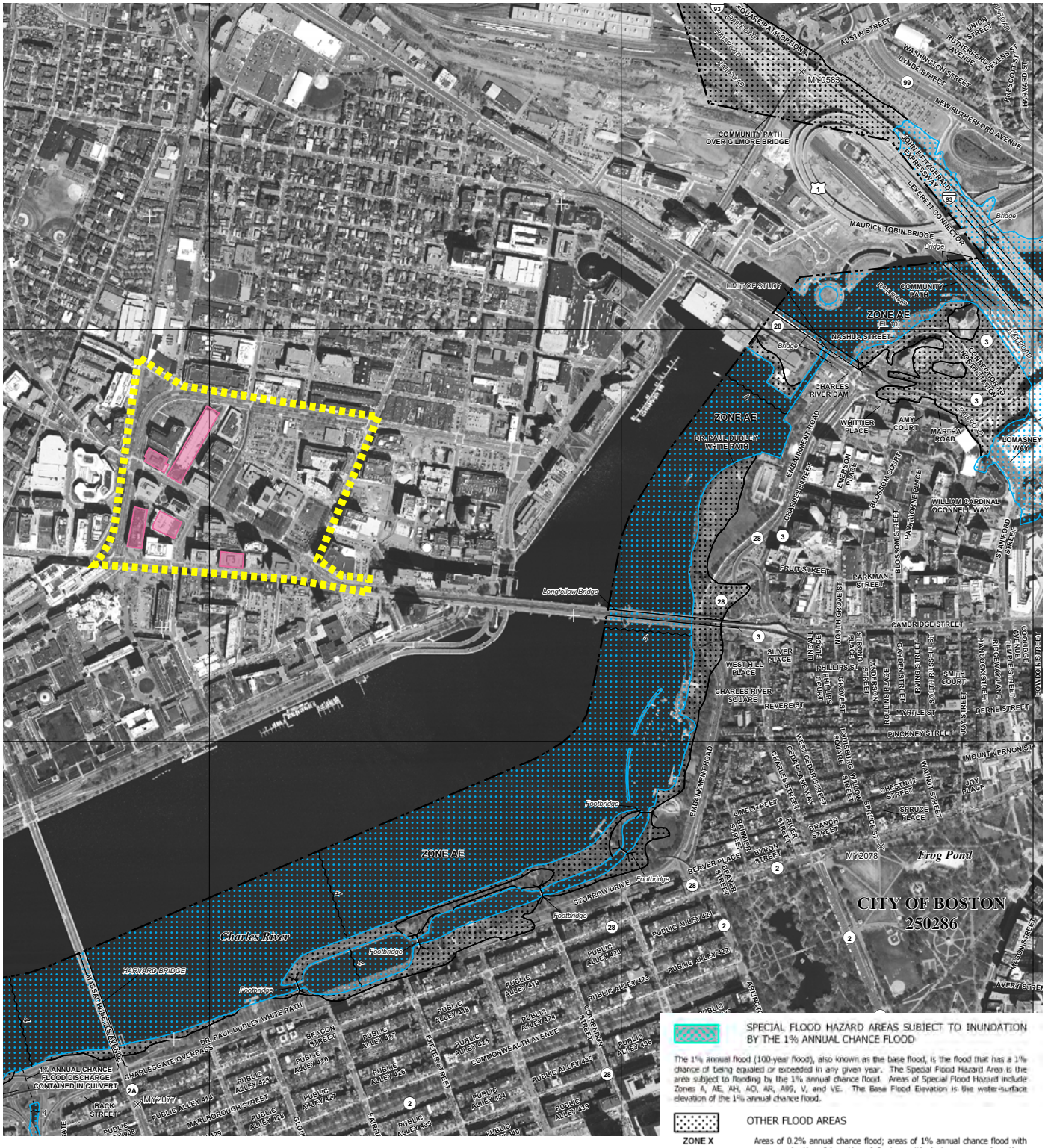
Note: This graphic is a modified version of the FEMA Flood Insurance Rate Map #25017C0577E, Panel 577 of 656, effective June 4, 2010

CRA

Figure 4.2
FIRM Flood Insurance Rate Map, Cambridge & Somerville

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: National Flood Insurance Program



KSURP Boundary

Proposed Project Component

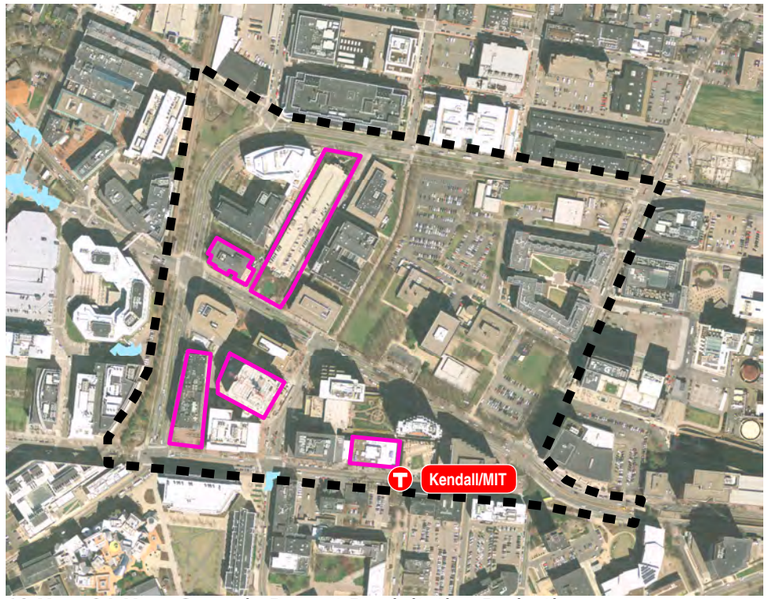
Note: This graphic is a modified version of the FEMA Flood Insurance Rate Map #25025C077J, Panel 77 of 176, preliminary November 15, 2013

CRA

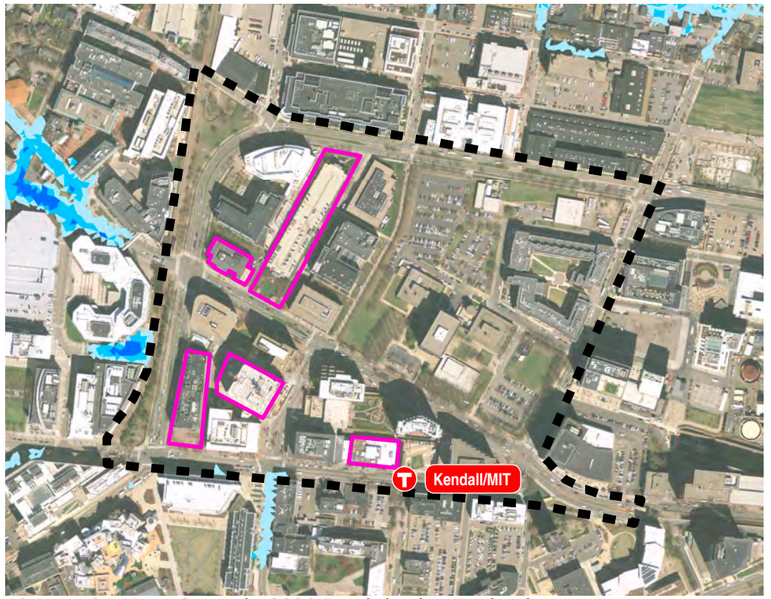
Figure 4.3
FIRM Flood Insurance Rate Map, City of Boston

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

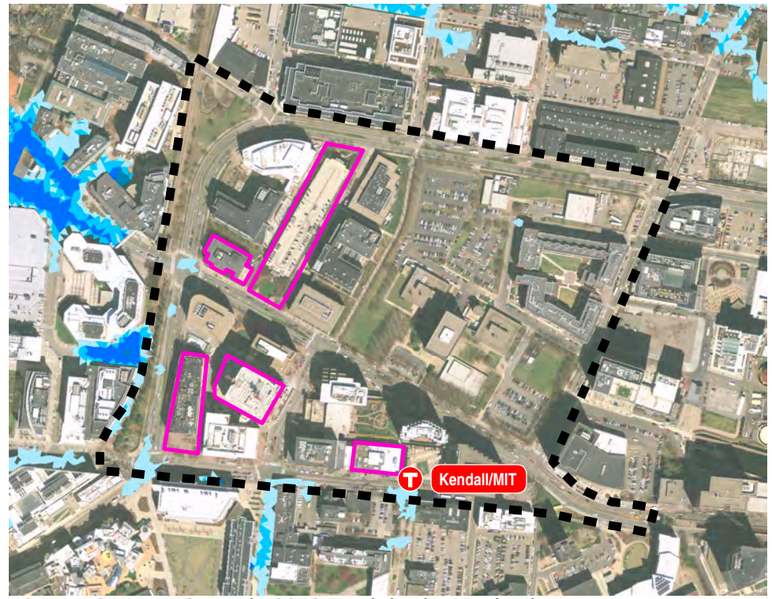
Source: National Flood Insurance Program



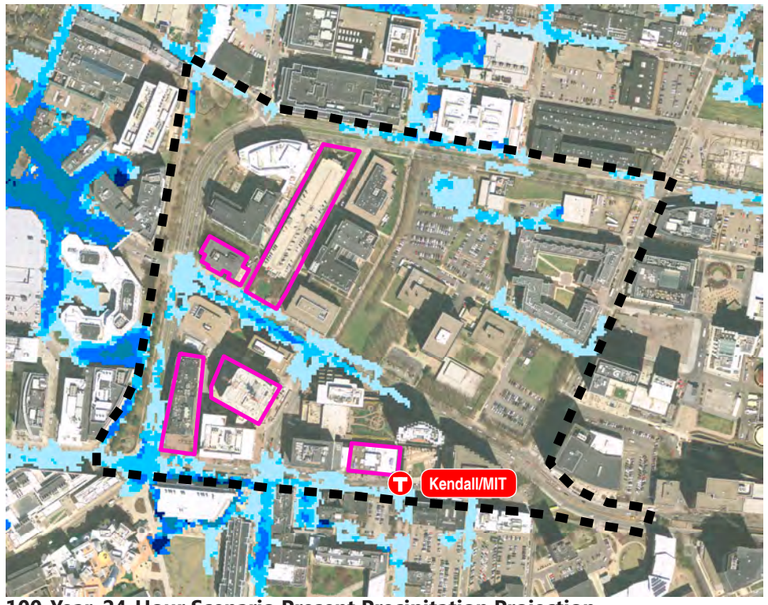
10-Year, 24-Hour Scenario Present Precipitation Projection



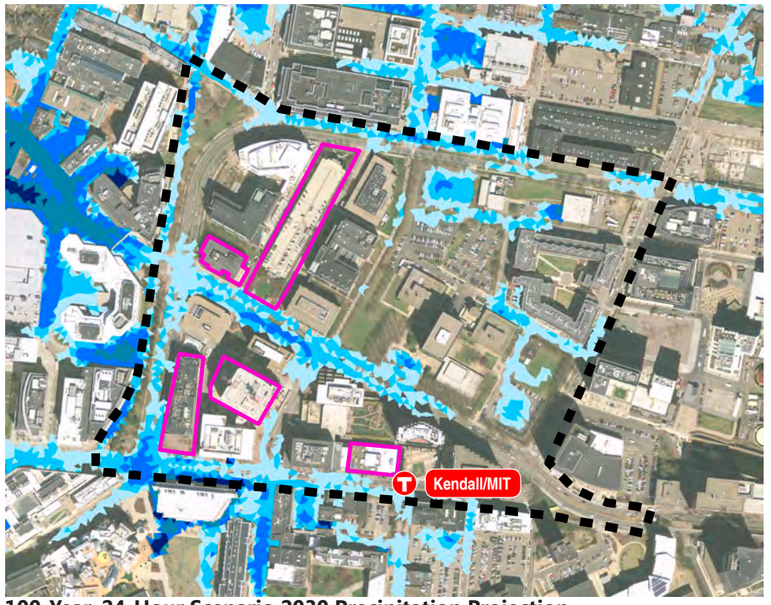
10-Year, 24-Hour Scenario 2030 Precipitation Projection



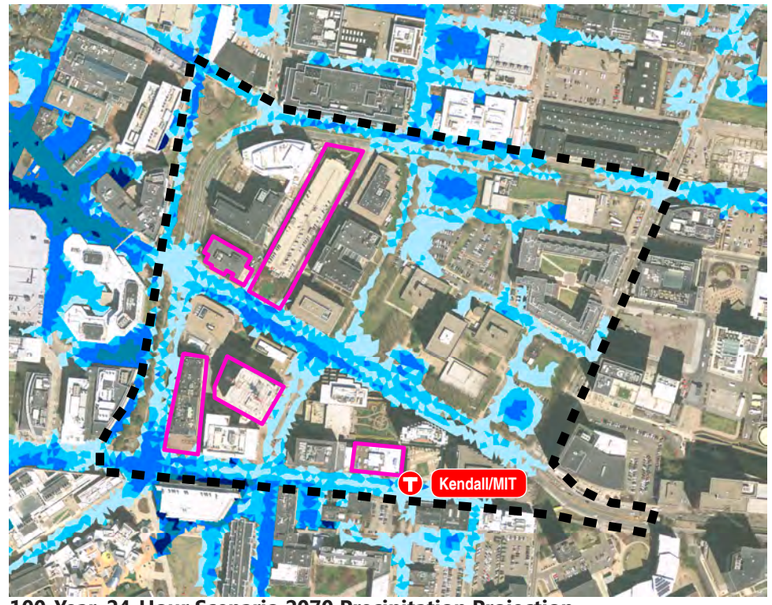
10-Year, 24-Hour Scenario 2070 Precipitation Projection



100-Year, 24-Hour Scenario Present Precipitation Projection



100-Year, 24-Hour Scenario 2030 Precipitation Projection



100-Year, 24-Hour Scenario 2070 Precipitation Projection

0 300 600 Feet

KSURP Boundary

Proposed Project Component

Depth of Flooding above Ground (feet)

- 0 - 0.5 ft.
- 0.5 - 1.0 ft.
- 1.0 - 2.0 ft.
- 2.0 - 3.0 ft.
- > 3.0 ft.

Source: City of Cambridge

CRA

Figure 4.4
Inland Flooding due to Precipitation

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

A: Flood Log

Source: Flood Panel

B: Flood Log

Source: Flood Panel

THESE PHOTOS REPRESENT DIFFERENT MEASURES THAT COULD BE EMPLOYED FOR PROTECTION. THE PRODUCT SHOWN IN A AND B REQUIRES A SMALL AMOUNT OF PERMANENT EQUIPMENT TO ACCEPT TEMPORARY BARRIERS. ITEMS C AND D ARE MORE TEMPORARY.

C: Portadam

Source: Portadam

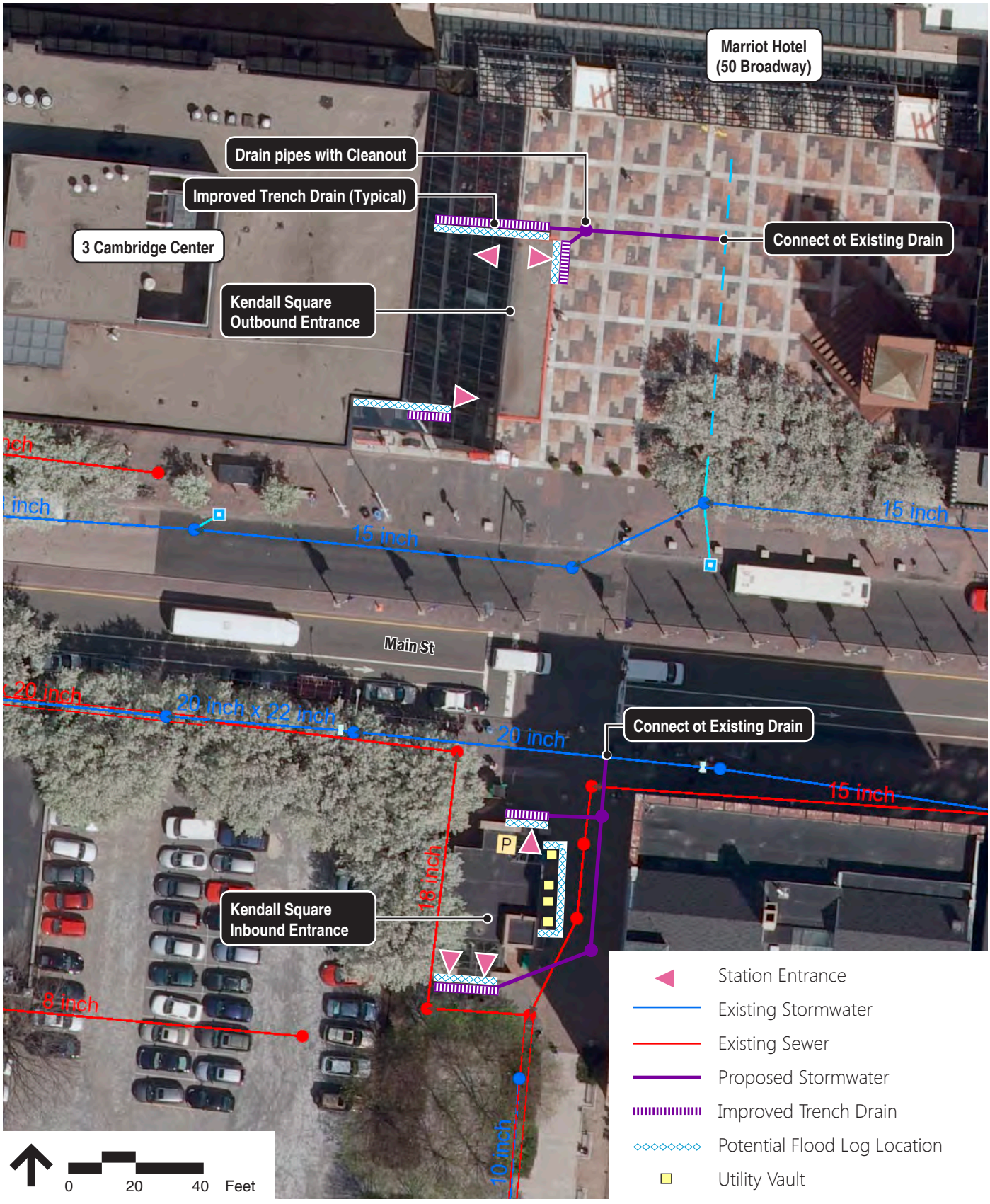
D: Aquafence Flood Barrier System

Source: AquaFence

CRA

Figure 4.5
Potential Flood Control Measures

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA



CRA

Figure 4.6
Conceptual Flood Protection Plan

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: City of Cambridge GIS, www.cambridgema.gov/gis

5

Stormwater Management

KEY:

Text represents new or substantially revised narrative description from the NPC.

Section Heading represents an entirely new or substantially revised section from the NPC.

Table Heading represents an entirely new or substantially revised table from the NPC.

Introduction

The following chapter describes the existing and proposed drainage conditions as well as how the Project may impact or improve these conditions. The design of each Project Component site will consider existing drainage conditions to ensure that all redevelopment activities will fully comply with all applicable regulatory requirements. Much of the existing utility systems in the KSURP area were rebuilt in the 1960's and 1980's in the initial implementation of the urban renewal project. In addition, the City has invested significant funds to increase stormwater capacity in the Kendall Square neighborhood in recent years, and has several projects planned to continue increasing local capacity. This Project, as infill development in an already densely developed urban area, will benefit from the recently upgraded infrastructure and aim to support the City's plans to further improve neighborhood stormwater conditions.

The following information is provided herein, in accordance with the NPC Certificate and to address other comments received on the NPC:

- Expanded discussion of the existing stormwater infrastructure, a proposed conceptual drainage design, and an evaluation of that design in terms of stormwater peak rate, volume runoff, and pollutant loadings; and
- Additional information on the municipal stormwater conveyance systems as well as provided a conceptual stormwater management design, which will meet

Cambridge's stringent stormwater improvement requirements for both quantity and quality control.

Summary of Project Change Impacts

Each Project Component site has an existing building covering much of the parcel area, with the remainder a mix of hardscape and landscape. The Cambridge Center North Garage will be reconstructed to incorporate additional office and innovation space in two new towers atop the existing parking structure (Cambridge Center North Garage), which will be maintained to support the redevelopment. The existing building at Eleven Cambridge Center will be replaced by a mixed use commercial tower. At Three Cambridge Center, a residential office will replace the existing building.

As with past developments within the KSURP area, each Project Component will largely maintain the existing drainage replacing existing impervious rooftop and hardscape in kind on-site. The Project will be required to mitigate stormwater runoff to comply with City and MassDEP standards. Stormwater infrastructure will be designed and installed for each Project Component to reduce the runoff discharge rate and improve the quality of the runoff to the City's stormwater system and the Charles River basin. The incorporation of green roofs and rainwater harvesting tanks into building design will be considered.

Regulatory Context

In March 1997, DEP adopted a new Stormwater Management Policy to address non-point source pollution. In 1997, DEP 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 redevelopment projects, including urban pollutant removal criteria for projects that may impact environmental resource areas. Compliance will be 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. A brief explanation of each Policy Standard and the system compliance is provided under the 'Proposed Conditions' section below.

In addition, the City requires a thorough site plan review process, which includes stormwater management requirements following the LID design guidelines. City stormwater rate and flow requirements are more rigorous than those required to be addressed by the DEP Stormwater Management Policy. Specifically, effluent stormwater rates for the post-development 25-year design storm must be reduced to equal the pre-development 2-year design storm rates. In addition, 80 percent of Total Suspended Solids (TSS) must be removed from stormwater effluent thereby lessening

the Project's impact on the City's stormwater infrastructure and Charles River. Each Project Component will be required to meet these regulations as discussed below.

Existing Drainage Conditions

Figure 5.1 illustrates the existing drainage and combined sewer systems serving the KSURP area. The Project is located in a densely developed urban area consisting almost entirely of impervious rooftops and impervious paved surfaces. The DPW owns and maintains an extensive system of catch basins, manholes, and drain pipes in the area immediately adjacent to each Project Component site. The drainage system in this area drains to specific parts of the Charles River.

The storm drainage system serving the several developments under this Project drain to the Charles River. The surface drainage on Main Street, Broadway, Binney Street, and Galileo Galilei Way drain to the 54-inch Stormwater Outfall in the Charles River at Broad Canal Way.

The following is a list of drain services adjacent to each Project Component (Figure 5.1):

Cambridge Center North Garage

- A 24-inch main in Binney Street
- A 12-inch main in the pedestrian walk
- A 54-inch main in Broadway

Eleven Cambridge Center

- A 54-inch main in Broadway

Three Cambridge Center

- 21-inch main in Main Street
- 18-inch main in Main Street

The existing stormwater discharge rates are not currently known, as the limits of the proposed work is not expressly defined at this time. As the KSURP area is predominantly impervious, discharges are representative of a highly developed urban area in rate and water quality. The Project Components will define their respective existing drainage conditions and proceed to design stormwater infrastructure as required to meet both City and MassDEP standards.

At this point in time, the Proponent is aware of some minor flooding risk from severe precipitation events surcharging the existing drainage system. Figure 4.4 shows the localized flooding for the 24-hour, 10-year and 100-year precipitation events in the

present condition. Although the Project is not currently susceptible to precipitation based inland flooding for the 10-year storm event, some Components may be exposed to 0.5'-1' of flooding in the 100-year storm event. As part of this Project, the Proponent will coordinate with the DPW to determine the source of this inland flooding and whether or not this Project can decrease this risk to surcharging. In addition, the Proponent will discuss the possibility of improving system infrastructure in lieu of meeting DPW's stringent stormwater reduction standards, while still meeting water quality standards. A HydroCAD model was created to model the hydrologic conditions for each Project Component. Please note the areas listed were estimated with satellite images without the availability of survey, only the areas within the current limits of work were included, and current limits of work may change as designs progress. Therefore, the Project Component site areas may change as design advances. Table 5-1 describes the site impervious and pervious areas, as well as the existing site runoff peak rate and volume for the 2-year, 24-hour design storm.

Table 5-1 Existing Site Hydrology

Project Component	Existing Site Impervious Area (SF)	Existing Site Pervious Area (SF)	Existing Site Runoff Rate 2-year, 24-hour Design Storm (CFS)	Existing Site Runoff Volume 2-year, 24-hour Design Storm (AF)
Three Cambridge Center Mixed Use Building	28,572	250	1.83	0.155
Eleven Cambridge Center Residential Building	29,642	8,220	2.15	0.170
North Garage Office Buildings	79,644	12,200	5.51	0.447
Whitehead Commercial Office Addition	14,500	500	0.94	0.078
TOTAL	**152,358**	**21,170**	**10.43**	**0.850**

Proposed Drainage Conditions

The following section describes the proposed stormwater quantity and quality mitigation measures in order to comply with the local and state requirements. This section also addresses how the Project will comply with the applicable City stormwater requirements and MassDEP Stormwater Management Policy. Where possible, the Proponent will coordinate with the City to explore creative solutions to stormwater management that go beyond the scope of individual Project Components to provide a more district-wide solutions.

Stormwater Management Measures

Each Project Component will be designed in accordance with City and MassDEP stormwater standards. As the limits of the developments have not been set, stormwater control measures will be investigated as each Project Component undergoes their respective design processes. The Proponent will consider several stormwater quantity and quality control measures as part of this process. These control measures include but are not limited to the following:

- Subsurface infiltration systems
- Green roofs
- Rainwater harvesting
- Permeable pavements
- Proprietary treatment devices for Phosphorus and Nutrient removal
- Bioretention landscaped areas and streetscape design
- Deep sump, hooded catch basins

In a meeting with the Cambridge DPW on July 21, 2015, the Proponent reaffirmed a commitment to meeting the City's stringent stormwater management requirements through conventional technologies, while also considering more contemporary strategies. One such strategy is to evaluate the feasibility of a communal stormwater management system, which centralizes infiltration and/or rainwater harvesting. Although this strategy requires additional infrastructure beyond what a single development could provide, the Proponent will explore its viability with Cambridge DPW.

Compliance with MassDEP Stormwater Management Policy

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 designs are intended to comply with this Standard. 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 proposed Projects.

The Proponent is exploring rainwater harvesting tanks, subsurface stormwater infiltration systems and the incorporation of green roofs as potential stormwater control measures. It is the Proponent's intention to treat runoff through the options listed above or through mechanical treatment units prior to discharge into the public storm drain system.

Standard #2: *Stormwater management systems must be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.*

Compliance: The proposed Project will be designed to comply with this Standard. To comply with City stormwater requirements, the post-development discharge rate for the 25-year design storm will be mitigated to meet the 2-year pre-development design storm discharge rate. The implementation of potential rainwater harvesting tanks, infiltration systems, and green roofs will help achieve these numbers for the proposed Project.

Standard #3: *Loss of annual recharge to groundwater should be minimized through the use of infiltration measures to the maximum extent practicable. The annual recharge from the post development site should approximate the annual recharge from the pre-development or existing site conditions, based on soil types.*

Compliance: The proposed Project will explore the use of recharge to the maximum extent feasible. The loss of annual recharge to groundwater by new developments will be limited, as the proposed Projects will be located on parcels which are significantly impervious in the existing condition. To compensate for any possible annual recharge loss, and to meet City stormwater requirements, recharge to groundwater will be a major component of the stormwater mitigation strategy. Refer to the 'Drainage Analysis' section below on page 5-10, specifically Table 5-2 for detail of groundwater recharge measures.

Standard #4: *For new development, stormwater management systems must be designed to remove 80% of the average annual load (post-development conditions) of Total Suspended Solids (TSS). It is presumed that this standard is met when: Suitable nonstructural practices for source control and pollution prevention are implemented; Stormwater management best management practices (BMPs) are sized to capture the prescribed runoff volume; and Stormwater management BMPs are maintained as designed.*

Compliance: The proposed designs will include BMPs intended to remove TSS. Within the proposed Project's limit of work, there will be predominantly roof areas. The Proponent intends to direct runoff from any paved areas within each Project Component site that would contribute unwanted sediments or pollutants to deep sump, hooded catch basins and then subsurface infiltration systems or propriety stormwater treatment systems before discharging into the City's stormwater system. The Proponent will design each Project Component to remove at least 80 percent of TSS. Refer to the 'Phosphorus Loading Calculations' section below on page 5-11 and accompanying Appendix F for an evaluation of the conceptual stormwater management design.

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 there under at 314 CMR 3.00, 314 CMR 4.00 and 314 CMR 5.00.

Compliance: The vast majority of each Project Component site will be occupied by buildings not associated with land uses with higher potential pollutant loads. The Project is expected to produce reduced pollutant loads as compared to the existing conditions, with increased pervious areas including green roofs. These reduced pollutant loads will be further mitigated, as the stormwater management system will be designed to remove 80 percent of TSS.

Standard #6: *Stormwater discharge to critical areas must utilize certain stormwater management BMPs approved for critical areas. Critical areas are Outstanding Resource Waters (ORWs), shellfish beds, swimming beaches, cold-water fisheries and recharge areas for public water supplies.*

Compliance: The proposed Project does not discharge to a critical 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 Project is considered a redevelopment project. The proposed Project will comply with the Stormwater Management Standards to the extent practicable and is anticipated to improve upon existing conditions.

Standard #8: *Erosion and sediment controls must be implemented to prevent impacts during construction or land disturbance activities.*

Compliance: Sedimentation and erosion controls will be incorporated as part of the design of the Project components and employed during the various phases of construction. Erosion and sediment control plans will be submitted to the DPW as each Project Component moves forward and the contractor will be required to implement the measures.

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: An O&M Plan will be developed during the design processes of each Project Component.

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

Compliance: There are no currently known illicit discharges. All proposed discharges will be reviewed by the DPW to ensure consistency with this standard.

Compliance with City of Cambridge Stormwater Management Regulations

In addition to complying with the relevant DEP stormwater policies, the Project will meet the requirements set forth by the City. As previously mentioned, the Project will be required to mitigate stormwater effluent from the post-development 25-year design storm to the rates of the pre-development 2-year design storm, as well as reduce TSS by 80 percent in the post-development condition. While the Proponent intends to meet these base requirements, it will also seek to replace some of the on-site stormwater mitigation strategies through supporting efforts by the City to increase stormwater capacity in the overall Kendall Square area. In discussions with the DPW on March 13, 2015, the Proponent was informed of two planned ventures to refurbish and expand two large stormwater storage tanks near the KSURP area. Upgrading neighborhood infrastructure will not aid not only the Project, but other existing local buildings become more resilient to flooding. They will also compensate for local developments that were installed before the DPW's current stormwater mitigation standards were implemented. These developments negatively impact the Kendall Square area runoff, and a neighborhood-scale infrastructure project will help mitigate runoff from sites that won't be required to be compliant in the near future. The Project Components do not meet Cambridge stormwater requirements under the existing condition. Therefore, stormwater infrastructure serving the existing sites will not be worse off without stormwater mitigation, until extreme wet weather events are exasperated climate change. A neighborhood-scale stormwater management investment will improve stormwater conditions for the Kendall Square area now and in the future at the expense of a select few stormwater mains in the long term.

As the design of each Project Component progresses, the Proponent will coordinate with the City to determine if support can be given to neighborhood-scale stormwater projects in lieu of some on-site stormwater mitigation infrastructure. These large-scale mitigation projects will be developed along with I/I mitigation projects currently being evaluated by the DPW in the next 3 to 6 months as discussed at the July 21, 2015 meeting. Permitting of such improvements in place of on-site mitigation will require discussion between the relevant personnel at Cambridge DPW, MassDEP, and the Charles River Watershed Association. All parties would need to be in agreement to allow this type of stormwater mitigation strategy. In the event that the Proponent commits to aiding the City with neighborhood-scale stormwater infrastructure

improvement, each Project Component will still install stormwater BMPs to meet the required TSS removal requirements.

Drainage Analysis

The Proponent completed the following hydrology analysis to show how the Project will comply with both peak runoff rate and volume, as well as meet the required water quality standards set forth by Cambridge and MassDEP. For the purposes of this discussion, each project component was assumed to implement green roofs covering 50% of the building, allowing sufficient area for mechanical infrastructure and other impervious roof surfaces. Subsurface infiltration systems were then designed to reduce the peak rate and volume from the 25-year, 24-hour design storm in the post-development condition to meet those of the 2-year, 24-hour design storm pre-development condition. These infiltration systems are also designed to drain within 72 hours, as required by the City's stormwater management guidelines. As shown in Table 5-1, each Project Component site is almost entirely impervious in the existing condition. Buildings are generally situated adjacent to the roadway with small landscape areas between the sidewalk and existing buildings. As this Project is increasing the development density of the Project Component sites, pervious area can only be significantly increased by implementing green roofs. Hardscape and softscape will be limited to the area between the public Right-of-Way and the proposed buildings. The Project will maintain the Cambridge City standard impervious sidewalk design, but will evaluate implementing permeable pavers in the limited Project Component site walkways. If they are found to be feasible during the Component design processes, they will included as complements in the stormwater mitigation strategy. The Proponent is committed to meeting the stormwater quantity and quality requirements with subsurface infiltration, green roofs, and proprietary structural components, to be supplemented with on-site LIDs.

The East Cambridge/Kendall Square Open Space Study and design competition was consulted in preparing this document. The winning design proposal did not include significant suggestions to the areas adjacent to the Project Component sites, except providing open space and connectivity on the southern side of the North Garage to connect with the 'Broad Wetland'. The Proponent will coordinate with the City to implement and design initiatives that ultimately result from the winning design. The open space provisions are proposed to be revised as part of the KSURP Amendment No. 10 to provide opportunities to implement concepts of the open space study.

Figure 5.2 shows the stormwater contributions to the KSURP area stormwater infrastructure from each Project Component in the 10-year storm event, as well as the current flooding conditions and capacity in the infrastructure. The Project will greatly reduce the stormwater effluent rate and volume, as compared to the existing condition, which will help make the neighborhood infrastructure more resilient to increases extreme precipitation event frequency and severity with climate change.

Table 5-2 Proposed Site Hydrology

Project Component	Proposed Site Impervious Area (SF)	Proposed Site Pervious Area (SF)	Infiltration System Capacity (CF)	Proposed Site Runoff Rate 25-year, 24-hour Design Storm (CFS)	Proposed Site Runoff Volume 25-year, 24-hour Design Storm (AF)
Three Cambridge Center Mixed Use Building	18,072	10,750	3,700	1.81	0.143
Eleven Cambridge Center Residential Building	20,842	17,020	4,940	2.11	0.164
North Garage Office Buildings	52,607	39,237	10,190	5.32	0.420
Whitehead Commercial Office Addition	7,500	7,500	1,850	0.94	0.076
TOTAL	**99,021**	**74,507**	**19,440**	**10.18**	**.803**

Phosphorus Loading Calculations

MassDEP Stormwater Quality Policy Standard 4 requires that 80 percent of TSS be removed from stormwater effluent for this Project. The Lower Charles River Basin also has a TMDL requiring the removal of 65 percent of Total Phosphorus, among other pollutants. The Proponent and/or Redeveloper intends to exceed these requirements through stormwater mitigation. The following exercise details the phosphorus loadings from the developments being evaluated in this MEPA filing, and a feasible strategy to reduce these phosphorus loadings to meet both Cambridge and Charles River TMDL requirements. The evaluation utilizes the methodology detailed in the MA MS4 Draft General Permit Appendix F Attachment 3, Methods to Calculate Phosphorus Load Reductions for Structural Stormwater Best Management Practices in the Watershed. Using this methodology, the land-use based phosphorus loading requiring treatment from the proposed Project was first determined, as well as phosphorus generated from the project area in the existing condition. The areas of impervious and pervious cover were estimated by aerial imagery, and, in the proposed condition, it was assumed that 5 percent of the proposed buildings will be green roofs. Currently, the development area discharges 8.21 pounds/year of phosphorus, while in the proposed condition the Project area will only generate 1.90 pounds/year of phosphorus due to the significant increase in pervious (green roof) area. Next, Method 4, from Appendix F Attachment 3 was performed '…to determine the phosphorus load reduction for a structural BMP with a known storage volume when the contributing drainage area has impervious and pervious surfaces.' In this methodology, an iterative process is used to determine the design storm depth which can be treated by the known storage volume, as well as the portion of the storage volume available to treat the phosphorus from both the impervious and pervious drainage areas, with a maximum 5 percent margin of error. It was determined that the conceptual design storage volume is able to treat the 1.86-inch storm event for the contributing areas. It was then assumed that each Project Component site will allow

infiltration of 1-inch per hour, based on geotechnical information from recent projects in the KSURP area. BMP Performance 3-13 for Long-Term Phosphorus Load Reduction for the Infiltration Basin BMP with 1.02-inch per hour infiltration was then evaluated for the 1.86-inch design treatment storm to determine that phosphorus load reduction will be between 99 to 100 percent. Even if geotechnical exploration of the proposed Project Components reveal an infiltration of 0.17 inch/hour (the minimum design infiltration rate BMP performance table provided), the phosphorus load reduction will be between 97 to 99 percent for the 1.86-inch design storm. Therefore, the conceptual drainage design will reduce phosphorus loadings by 5.57 pounds/year from 5.63 pounds/year to 0.06 pounds/year.

The preceding evaluation details how a conceptual stormwater management approach which includes 50 percent green roofs and the infiltration structures designed to meet Cambridge required peak rate and volume reductions will meet the required Phosphorus removal for the Lower Charles River Basin TMDL and MassDOT standards. The Total Phosphorus loading for this scenario in the final condition is 0.06 pounds/yr. In the existing condition, 8.21 pounds of Total Phosphorus are generated from the Project Components, as determined by this methodology. Therefore, the Project reduces Total Phosphorus to the Lower Charles River Basin by 8.15 pounds, or over 99 percent from the existing condition in the described stormwater mitigation scenario. The complete set of calculations is provided in Appendix F.

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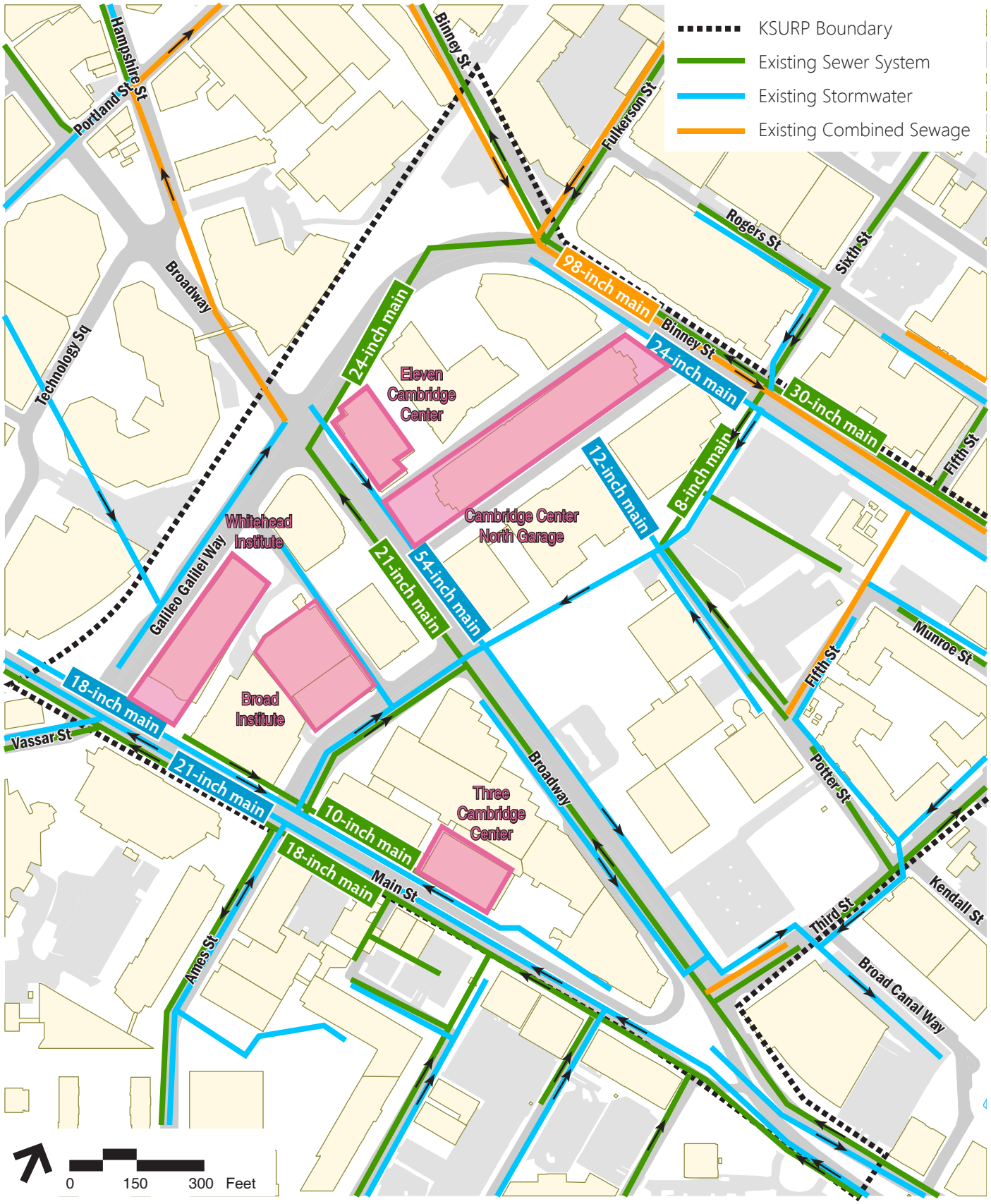

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Figure 5.1
Existing Drainage & Sewer Systems

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: City of Cambridge CityViewer

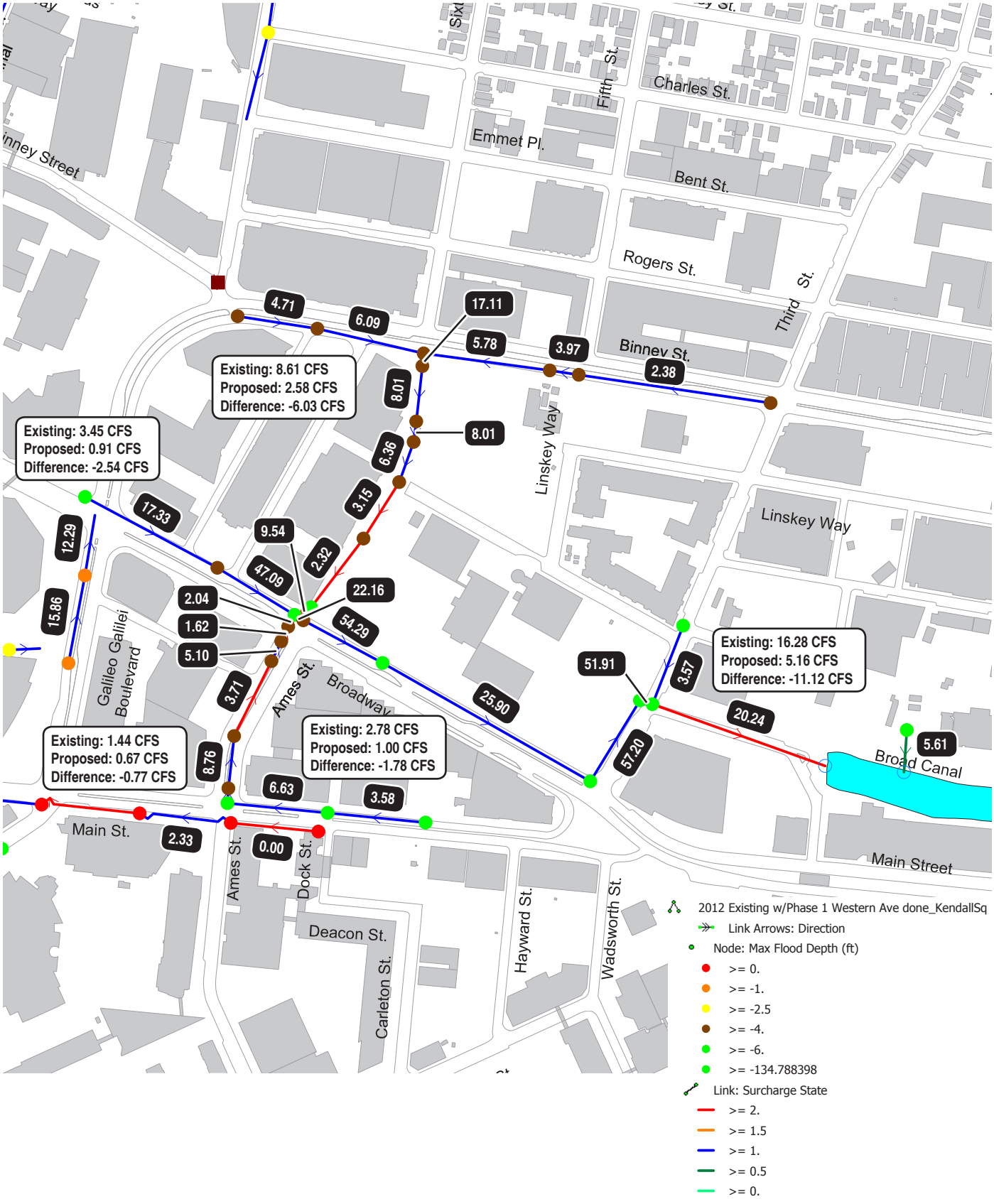

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Figure 5.2
10-Year, 24-Hour Precipitation Event
Stormwater Infarstructure

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

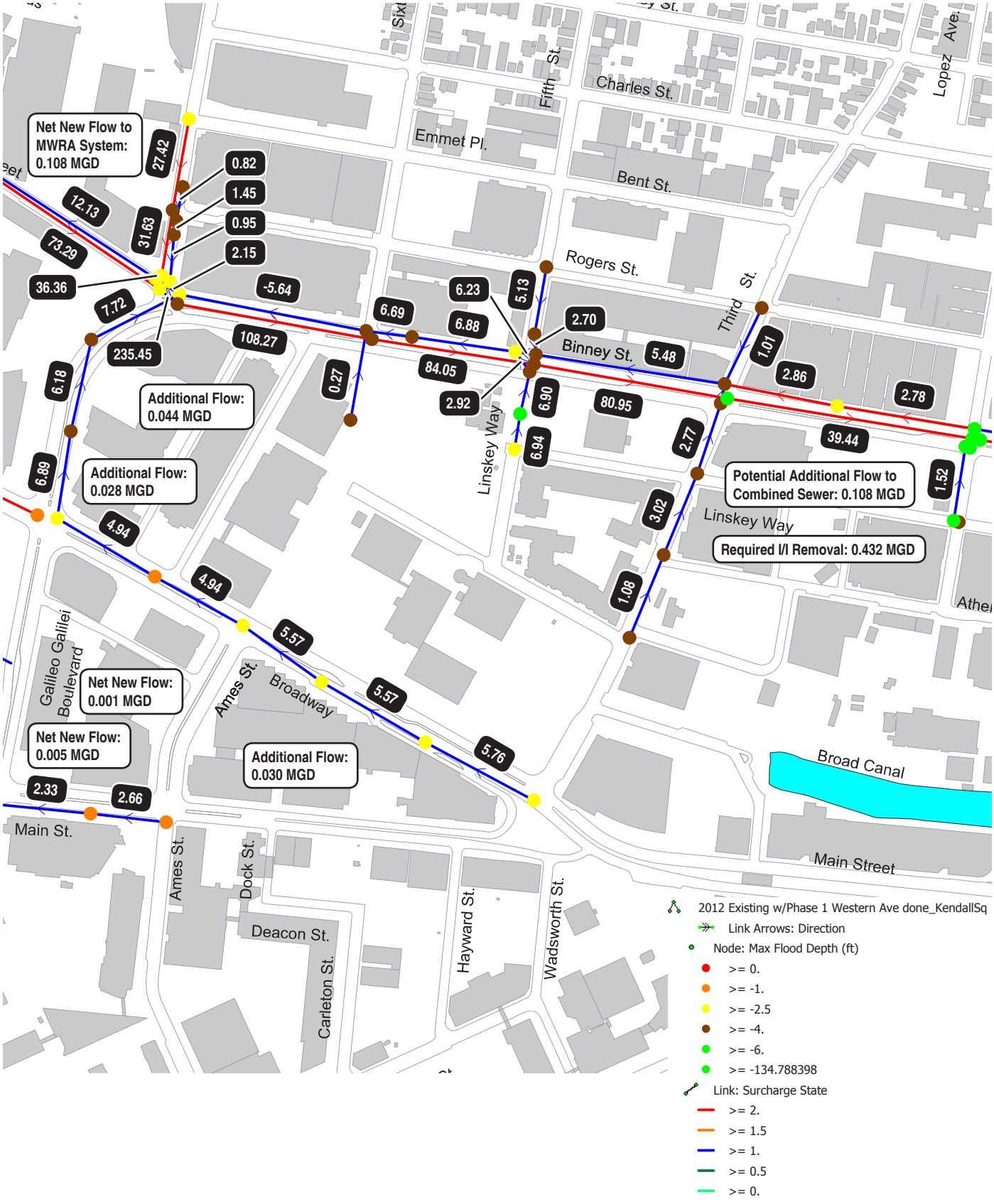

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Figure 5.3
10-Year, 24-Hour Precipitation Event
Sanitary Sewer/Combined Sewer Infarstructure

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

6

Water and Wastewater

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Table Heading represents an entirely new or substantially revised table.

Introduction

The following chapter presents the anticipated water demand and wastewater generation for the Project and evaluates changes to impacts associated with the Project Change compared to the Prior Project. As part of the initial implementation of the KSURP, utility systems were rebuilt in the KSURP area in the 1960's and 1980's. Furthermore, the DPW and Cambridge Water Department (CWD) have invested in several projects in recent years to improve capacity issues in the Kendall Square neighborhood. The Project will further infill the heavily developed area and, therefore, will benefit from these infrastructure improvements and seek to aid the City in improving the local services.

The following information is provided herein, in accordance with the NPC Certificate and to address other comments received on the NPC:

- Additional information of the existing sewer and combined sewer systems;
- Update to the infiltration and inflow (I/I) mitigation strategy, including a breakdown of the proposed I/I removal requirement for each Project Component and how the City's requirement to store 24 hours of wastewater flow on-site;
- Discussion on how the Project will comply with the Massachusetts Water Resources Authority (MWRA) Toxic Reduction and Control (TRAC) Group requirements;

- Discussion of water conservation measures the Redeveloper is committed to implementing as part of design.

Summary of Project Change Impacts

As described in Chapter 1, *Project Change Description*, the Project consists of the redevelopment of three existing buildings within the KSURP area as well as an office expansion at the Whitehead building and conversion of mechanical space to office space at the Broad Institute. Overall, the Project will result in the creation of approximately 1,034,000 square feet of net new commercial office/lab/innovation space, residential units, and retail space. These additional uses will generate new potable water demands and wastewater effluent in the KSURP area compared to the Prior Project. The DPW owns and operates the wastewater collection systems within the KSURP area, while the CWD locally operates the water distribution systems. The Project will require DPW and CWD review and approval of all plans relating to utility work as each Project Component moves forward in design. All water and wastewater infrastructure will be in accordance with MassDEP requirements as well.

Regulatory Context

The Project design will be consistent with the requirements of both the DPW and CWD, as well as, MassDEP Title V requirements. The City has its own requirements for new construction connecting to its water and wastewater systems which is reviewed for compliance by their agencies. The most significant requirement for large construction projects in Cambridge is the ability to hold 24 hours of wastewater flow on-site. This is completed using sanitary holding tanks with electronic sensors to detect when the sewer service is in danger of backing up into the building. An actuated valve in the sanitary holding tank then closes, and wastewater is held up to 24 hours, until the sensor detects wastewater levels in the main have fallen. This is a result of significant combined sewer capacity issues that Cambridge experiences during large precipitation events.

The City also requires all new developments mitigate their contributions at a ratio of 4:1 to stormwater infiltration and inflow (I/I) in their neighborhood sanitary sewers. As such, the Proponent will need to negotiate with the City to determine the best way to reduce the amount of I/I equivalent to four (4) times the Project wastewater generation. Generally, the Proponent either makes a payment to the City to implement I/I reduction measures, prorated to what the Proponent is responsible for, or incorporates reduction measures as a part of the Project. These reduction measures include separating stormwater infrastructure from sanitary infrastructure or replacing damaged and/or leaking sanitary sewers adjacent to each Project Component site, as needed.

MassDEP Title V, 310 CMR 15.000, is a state environmental code meant generally for the installation of septic tanks, but includes some requirements of general sewer system installations, as well as being the standard for wastewater sewer generation rates in the Commonwealth of Massachusetts. Specifically, sections 310 CMR 15.221: General Construction Requirements for All System Components and 310 CMR 15.222: Building Sewers are applicable to the Project. Other sections of Title V may become relevant if alternative wastewater components are incorporated into the individual designs of each Project Component, such as a greywater reuse system. The Project as a whole will be in compliance with all applicable Title V requirements, which will be explored further upon the design of each Project Component.

Wastewater

Existing Wastewater Infrastructure

There are several City sanitary sewer mains in the KSURP area, as shown in Figure 5.1. Wastewater flows from the Project will travel northeasterly by gravity flow to the MWRA's system located in Cardinal Medeiros Avenue. Individual service connections to the Cambridge wastewater infrastructure will be designed as each Project Component progresses in its design. No capacity issues in the gravity mains are known at this time, but the ability of the municipal system to take on additional wastewater from these projects will be confirmed through coordination of each Project Component with the DPW. The Proponent will coordinate with the DPW on the design for proposed connections to their sewer systems.

The following is a list of sewer services adjacent to each Project Component (Figure 5.1):

Cambridge Center North Garage

- A 30-inch main in Binney Street
- A 98-inch combined sewer main in Binney Street
- A 8-inch main in the pedestrian walk
- A 21-inch main in Broadway

Eleven Cambridge Center

- A 21-inch main in Broadway
- A 24-inch main in Galileo Galilei Way

Three Cambridge Center

- A 18-inch main in Main Street

- A 10-inch main in Main Street

In a meeting with the Cambridge DPW and their infrastructure consultants on July 21, 2015, the Proponent discussed the existing sanitary sewer system in the Kendall Square neighborhood. The City is currently evaluating the East Cambridge sanitary system capacity for wet-weather flows, and looking at a comprehensive I/I strategy to improve the local system. The Proponent has committed to discussing the individual components of this Project with the DPW over the next 3 to 6months, during which time a DPW will identify key improvements which will provide the maximum benefit to the sanitary sewer system as a whole.

Estimated Wastewater Generation

The Project's proposed approximately 1,034,000 square feet of net new uses will generate additional wastewater flows. Table 6-1 below presents the summary of wastewater generation by Project Component and use for both the existing and proposed condition. Overall, the Project is projected to generate an estimated 107,945 gallons per day (gpd) of new wastewater flows. Each Project Component is required by the DPW to have sanitary holding capacity on-site equivalent to 24 hours of sanitary flows, which for the Project in its entirety will require 107,945 gallons of storage. MassDEP no longer requires Self-certifications, as they have an agreement with the City for project reviews concerning wastewater. The Proponent will coordinate all sewer connections to City infrastructure with the City as required by the DPW as designs progress.

Table 6-1 Estimated Wastewater Generation

Building	Use	Quantity	Flow Rate (gpd)	Sewage Generation (gpd)
New Project-Related Sewage Generation				
Three Cambridge Center	Commercial	106,200	75/1,000 sf	7,965
	Residential	266	110/bdrm	29,260
	Retail	20,000	50/1,000 sf	1,000
Three Cambridge Center Total				*38,225*
Eleven Cambridge Center	Residential	294	110/bdrm	32,340
	Retail	25,000	50/1,000 sf	1,250
Eleven Cambridge Center Total				*33,590*
Cambridge Center North Garage	Commercial	546,000	75/bdrm	40,950
	Retail	5,000	50/1,000 sf	250
	Innovation	39,000	75/1,000 sf	2,925
Cambridge Center North Garage Total				*44,125*
Whitehead Institute	Commercial	60,000	75/1,000 sf	4,500
Whitehead Institute Total				*4,500*
Broad Institute	Commercial	15,100	75/1,000 sf	1,133
Broad Institute Total				*1,133*
Total New Project-Related Sewage Generation				**121,573**
Existing Sewage Generation to be Removed				
Three Cambridge Center	Commercial	105,100	(75/1,000sf)	(7,883)
Eleven Cambridge Center	Commercial	76,600	(75/1,000sf)	(5,745)
Total Existing to be Removed				**(13,628)**
Net New Wastewater Generation				**107,945**

gpd gallons per day
bdrm bedroom

Proposed Wastewater Mitigation

As the project design progresses, the Proponent will coordinate with the DPW to determine the most effective strategy to improve local wastewater infrastructure. In a meeting on March 13, 2015, the DPW indicated that they have a number of projects planned to increase both stormwater and wastewater capacity in the KSURP area.

Inflow/Infiltration Mitigation

As previously mentioned, the Proponent will be required to remove stormwater I/I to the Kendall Square neighborhood sanitary infrastructure equivalent to the volume of four (4) times the Project-related estimated wastewater generation. At this stage of the design, it is anticipated that the Project will be required to remove 431,780 gpd of stormwater from the sewer system. This I/I reduction will be accomplished by coordinating with the City to either correct I/I issues within the KSURP area or pay for projects the City is performing in an effort to reduce I/I. Table 6-2 below describes the I/I removal requirements for each Project Component. Although each Project component will be responsible for mitigating the flow shown below, the Proponent will discuss with the City if mitigating the effects of the total required removal is more effective for their I/I removal plans. The Proponent will coordinate with the City to determine the most effective strategy for mitigating I/I while exploring the possibility to make additional improvements in lieu of holding the required 24 hours of sanitary flow on-site during a surcharge condition.

Table 6-2 Proposed I/I Removal by Project Component

Project Component	Net New Sewage Generation (gpd)	I/I Removal Requirement (gpd)
Three Cambridge Center Net New	30,342	121,368
Eleven Cambridge Center Total	27,845	111,380
Cambridge Center North Garage Total	44,125	176,500
Whitehead Institute Total	4,500	18,000
Broad Institute Total	1,133	4,532
Total I/I Removal		**431,780**

In a meeting on July 21, 2015 with Cambridge DPW, along with their sanitary and storm water infrastructure consultant team, the Proponent discussed the required I/I mitigation for the Project. The City did not have any issue with the Proponent's approach to mitigating I/I and agreed that the Proponent should continue to coordinate with the DPW as each Project Component progresses into design. The DPW was not prepared to comment on specific measures this Project could perform to remove I/I, as they are currently exploring strategies to most effectively remove stormwater from the local sanitary infrastructure. The Proponent will continue to coordinate their efforts with the DPW as their I/I mitigation strategy finalizes in late 2015 or early 2016.

Figure 5.3 graphically documents the net new wastewater generation, estimated volume of I/I the Redeveloper is committed to removing, and the total generation and removal volumes in the context of surcharging conditions and pipe capacities in the KSURP area sewer and combined sewer infrastructure. Although DPW preferred to continue coordination beyond the date of this document's filing, there are several

pipes with surcharge states of '>=2' and manhole's with flood depths '>=-2.5' within the KSURP area, which could potentially be improved with the commitments made by the Proponent for this Project.

While the Project will commit to holding the required 24 hours of wastewater volume on-site, the Proponent will negotiate with the City to determine if focusing efforts on improving system infrastructure is a more effective improvement strategy. Therefore, the Project may accept responsibility for performing sanitary infrastructure improvements in excess of the required I/I mitigation in place of on-site sanitary storage tanks.

In the July 21, 2015 meeting, the DPW was open to discussing the expanded removal of I/I in lieu of holding the required 24 hours of sanitary flow. The DPW preferred to further discuss these design alternatives as they develop their I/I mitigation strategy and Project Component design's progress.

MWRA Toxic Reduction and Control

The MWRA Toxic Reduction and Control (TRAC) Group is responsible for monitoring discharges to the MWRA owned wastewater system. The Proponent will be required to comply with several Massachusetts State wastewater codes, which the TRAC Group will verify. Each Project Component disturbing more than one (1) acre of land will be required to secure a USEPA-NPDES General Permit for Storm Water Discharges, which will detail how stormwater will be discharged during construction activities. This will include the stipulation that the contractor is forbidden from discharging groundwater to the sanitary sewer. If a commercial tenant proposing to discharge process and/or laboratory wastewater to the MWRA system occupies space within the Project Components discussed in this document, a MWRA Sewer Use Discharge Permit will be obtained from the TRAC Group to ensure compliance with applicable regulations. The Redeveloper will also comply with all state regulations, including the State Plumbing Code, in regards to the installation of gas/oil separators in enclosed parking garages associated with the Project. Each Project Component intending to install gas/oil separators will obtain MWRA TRAC approval including the required field inspection by the MWRA and Local Plumbing Inspector before backfilling. The Redeveloper will coordinate all Project Components with the TRAC Group to obtain necessary permits and ensure compliance with all relevant MWRA requirements as the design of each Project Component progresses in design.

Wastewater Reduction Measures

The Project will attempt to reduce wastewater reduction as much as practicable. Title V wastewater generation rates are generally considered conservative for determining sewage generation rates and, therefore, actual generation is expected to be less for each Project Component than what is presented herein. The Project will apply water

conservation measures, as described in the 'Domestic Water' section below, which consequently leads to reduced wastewater generation. The inclusion of low-flow plumbing fixtures, efficient air conditioning systems, and possible use of greywater or rainwater harvesting systems will all contribute to reducing sewage generation.

Domestic Water

Existing Domestic Water System

The existing water system servicing the KSURP area is shown on Figure 6.1. Domestic water and fire protection services will be supplied by local water mains in central Cambridge to each of the Project Components. The water system is maintained by the CWD, who reviews the design of all connections to their services. Systems will be made as redundant as possible. Although there are some large 30-inch transmission lines in the KSURP area, each Project Component will focus on connecting to 12-inch and 16-inch water mains. The CWD indicated via phone conversation on March 25, 2015 that there should not be a capacity issue in the KSURP area given the size of existing mains. The CWD did indicate that water pressure in the KSURP area is around 60 psi, indicating that both water and fire protection services for this Project would require booster pumps to provide sufficient pressure to the proposed buildings. The CWD specifically mentioned that access will need to be maintained to a line that runs under the Cambridge Center North Garage servicing a private hydrant, and that public water lines and service laterals will not generally be allowed to be under buildings or structural slabs for maintenance reasons.

The Proponent will meet with the CWD in the early stages of design for each Project Component to determine where capacity and pressure may become an issue and evaluate adjacent infrastructure to determine the most effective means of providing water service.

The following is a list of water services adjacent to each Project Component (Figure 6.1):

Cambridge Center North Garage

- A 16-inch main in Binney Street
- A 12-inch main in Binney Street
- A 30-inch main in Broadway
- A 16-inch main in Broadway

Eleven Cambridge Center

- A 30-inch main in Broadway

- A 16-inch main in Broadway
- A 16-inch main in Galileo Galilei Way

Three Cambridge Center

- Two 12-inch mains in Main Street

Estimated Domestic Water Demand

Domestic water demand is based on estimate sewage generation with an added factor of 10 percent for consumption, system losses, and other use. Based upon sewage generation rates outlined in MassDEP Sewer Connection and Extension Regulations, 310 CMR 15.203.f, the Project will require approximately 118,740 gpd of net new potable water demand.

Water Conservation Measures

The Project will conserve water through a variety of methods, such as low-flow plumbing fixtures (to design plumbing systems to be at least 20 percent efficient), and efficient air conditioning systems. Additionally, water conserving landscape irrigation practices will be implemented, such as the use of native vegetation and minimal/efficient irrigation systems. The Proponent and Redeveloper will also continue to consider the viability of alternate water sources, such as water reuse systems or rainwater harvesting as well as the practicality of xeriscaping, which is landscaping that does not require irrigation.

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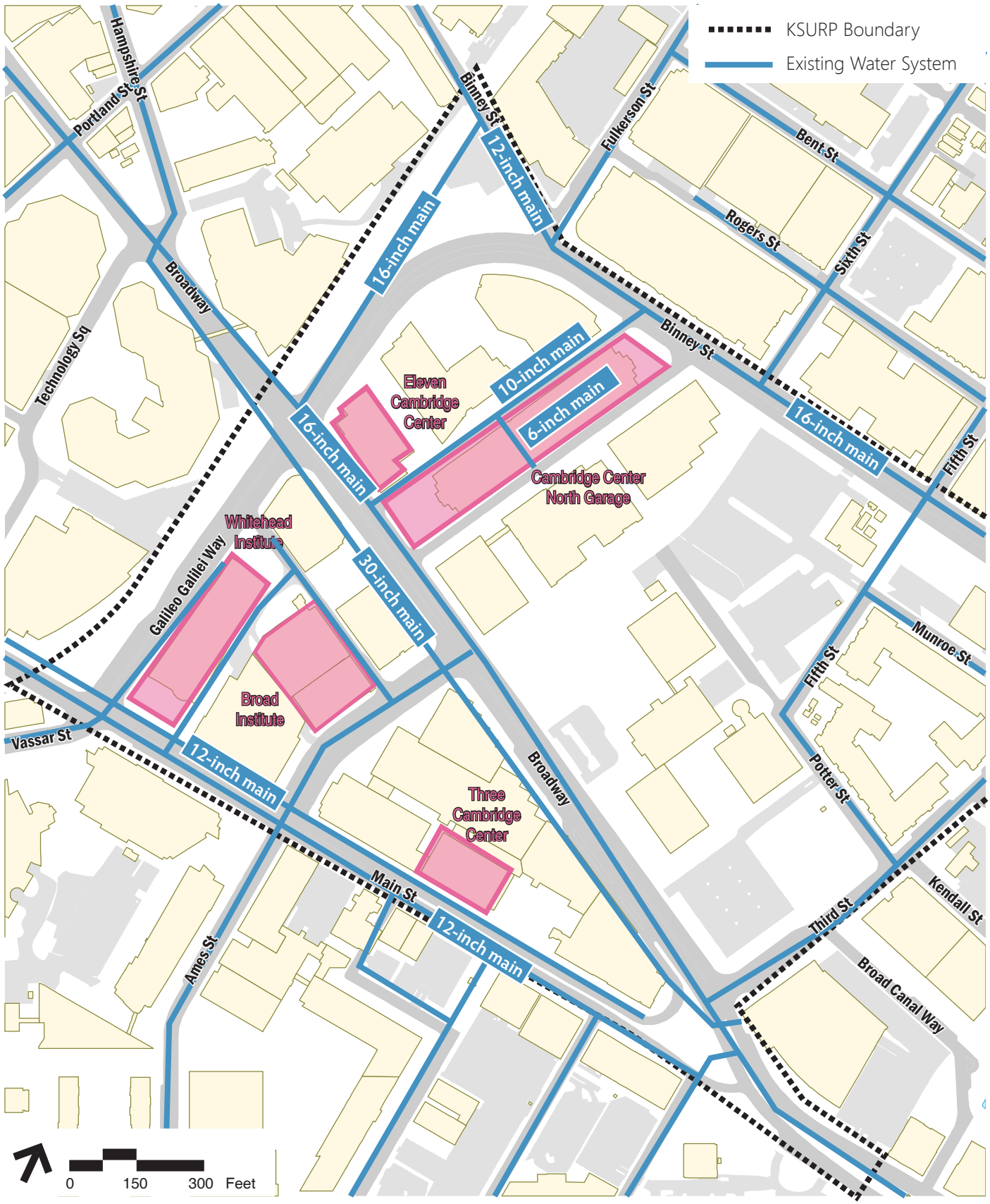

Source: City of Cambridge CityViewer

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Figure 6.1
Existing Water System

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

7

Hazardous Materials

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Text represents new or substantially revised narrative description.

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Table Heading represents an entirely new or substantially revised table.

Introduction

This chapter describes the existing hazardous materials conditions for each Project Component. The Cambridge Center properties included as part of the Project are located on three separate parcels (Parcels 2, 3 and 4), as used historically to describe hazardous materials conditions. The historic and existing site conditions of these parcels as well as the potential measures proposed to handle or mitigate conditions are described herein.

The following information is provided herein, in accordance with the NPC Certificate and to address other comments received on the NPC:

- Information on prior records of site contamination (i.e., Release Tracking Number(s), as provided previously in the NPC, is based on available data contained in MassDEP files as a majority of the Project Component sites are documented disposal sites that have been through the MCP regulatory process and achieved regulatory closure[1];
- Additional detail regarding compliance with the Massachusetts Contingency Plan (MCP);

[1] No new subsurface investigations, soil and/or groundwater sampling and testing, or Environmental Site Assessments have been conducted as part of the SEIR; however, a site-specific characterization of on-site hazardous materials and potential remediation requirements will be conducted during the design of each Project Component, in conformance with MCP regulatory requirements

- Description of how the vapor intrusion system will be incorporated into design and whether it would result in design changes; and
- Additional detail on proposed mitigation measures.

Summary of Project Change Impacts

The MXD Zoning District of the KSURP area was identified as having the potential for another approximately one million square feet of development (commercial, retail and residential) by infilling sites. As described in Chapter 1, *Project Change Description* of this NPC, new commercial space would envelope and rise above the existing Cambridge Center North Garage (Figure 1.1). Additionally, a new high-rise residential building would occupy the lot that currently is occupied by a low-rise office building at Eleven Cambridge Center (Figure 1.3). As part of a later phase, a residential and commercial building with retail is proposed at Three Cambridge Center following demolition of the existing building (Figure 1.5). The new development also includes new parking both above and below-grade.

From a hazardous materials perspective, there are no key changes to report as the Project Change consists of potential new development associated with rezoning the KSURP area. As each Project Component moves forward, it will be required to adhere to applicable hazardous materials regulations.

Regulatory Context

The first environmental regulations in Massachusetts related to evaluating properties for the presence of oil and hazardous materials were enacted in 1983. Rules and regulations regarding assessment and remediation of contaminated sites known as the Massachusetts Contingency Plan (MCP) was first adopted in 1988. Since 1988 and development of the subject properties the regulations have been rewritten and updated numerous times. The most recent and significant regulation rewrite occurred in June 2014.

The properties subject to Plan Amendment No. 10 have either achieved regulatory closure under the MCP or were developed prior to the adoption of MCP (1988), as summarized below.

North Garage and Eleven Cambridge Center

Response actions were conducted under Phase IV of the 1988 MCP as finalized in the Final Inspection Report submitted to MassDEP in 1990 under (RTN 3-00758). A long-term groundwater monitoring program was conducted from 1990 to 1994 to monitor groundwater quality in the remediated area. Low levels of petroleum and VOCs were

detected throughout the monitoring period. The Project Component site is currently pending a No Further Action determination.

No documented releases have occurred at Eleven Cambridge Center. The property was developed before the MCP regulations in 1988.

Three Cambridge Center

No documented releases have occurred at Three Cambridge Center (and the adjacent plaza area) as the property was developed before the MCP regulations in 1988; however, based on a recent assessment of the plaza area between the existing buildings at Three, Four, and Five Cambridge Center detected contaminated soil that was managed under RTN 3-31047. This Project Component site achieved a Permanent Solution, Class A-2 Response Action Outcome (RAO) in August 2013.

Whitehead Institute

Soil and groundwater contamination were encountered in investigations conducted prior to construction in 1983. Although the building was constructed prior to the 1988 MCP regulations contaminated soil and groundwater was managed with guidance and oversight from MassDEP (previously known as DEQE) under RTN 3-00273. This Project Component site is currently designated as No Further Action, as determination by MassDEP.

Historical and Existing Site Conditions

As described in the *Notice of Project Change Form Narrative/Project Summary* section of this NPC, Cambridge Center emerged from approximately 24 acres of vacant land parcels previously occupied by low-rise manufacturing and industrial buildings, which were demolished beginning in 1968 as part of the approved KSURP. Cambridge Center had a number of industrial usages dating back to the late 1800's that have impacted subsurface environmental conditions. Available information indicates that the KSURP area was occupied by wetlands and marshland surrounding Leachmere's Point until the early 1800's. Originally, the general KSURP area was developed in 1805 as a port of delivery connected to the Charles River tidal basin. By 1850, the KSURP area had been filled. A network of canals, canal-oriented streets and building lots were subsequently established.

The *Notice of Project Change Form Narrative/Project Summary* section provides general descriptions of existing site conditions for each Project Component site. These sites are located in an urban environment, characterized by flat-lying topography dipping slightly to the south. The depth to groundwater ranges from 8 to 12 feet below existing ground surface. Groundwater flow direction is anticipated to be towards the

southeast. Subsurface soil conditions consist of a surficial layer of miscellaneous fill (urban fill) overlying former marsh and marine deposits consisting of organic soil and peat, marine sand and marine clay. Glacial outwash and till soil strata are present below the marine clay at depths greater than 50 feet from ground surface.

KSURP Parcel 2

KSURP Parcel 2 now occupied by the Cambridge Center North Garage and Eleven Cambridge Center (Figure S.6a) was occupied by a variety of industrial facilities, including an oil storage terminal, piano manufacturing, bus and truck body works, paint manufacturers, a plumbing supplies company, a liquid carbonic company, and a rubber stamp company. The Broad Canal was constructed through the southern portion of the parcel in the early 1800's running parallel to Broadway, as shown on Figure 7.1. Figures 7.2a-c present the historical maps of KSURP Parcel 2. By 1969 the former industrial buildings had been demolished and the canal filled. This parcel remained vacant until site development began in the early 1980's. The parcel is now completely occupied by low to high rise commercial and biotech lab buildings and a parking garage constructed from 1983 to 2013. No vacant lots remain within this parcel.

The Cambridge Center North Garage was constructed in 1990 is a 6-story precast concrete garage founded on end-bearing piles driven to glacial soils approximately 50 to 70 feet below-grade. No below-grade space exists below the garage.

The existing office/research building at Eleven Cambridge Center to be demolished as part of the Project is a 4-story building founded on spread footing foundations following excavation of the fill and organic soils and backfilling to footing level with compacted structural fill. During construction and surrounding site improvements in 1983/1984 a majority of the historic fill was excavated and stockpiled. Visibly contaminated soil was not observed during excavation. Some stockpiled fill material was reused for backfill and clean fill was imported to the site to raise the footing grades. The remainder of the stockpiled fill soils were removed from the site. Although no chemical testing of soil or groundwater has been conducted at this property the potential for significant contamination to be present in soil is low. Testing of groundwater at the adjacent and upgradient property at Fifteen Cambridge Center indicates that groundwater has been impacted by VOCs (carbon tetrachloride and chloroform) contamination RTN 3-19217. Although Fifteen Cambridge Center is updradient from Eleven Cambridge Center, it was historically separated from the subject property by the former Broad Canal. However, it is possible that groundwater at the subject property could be impacted from historical site usage or more recent use as research and development.

KSURP Parcel 3

KSURP Parcel 3 now occupied by Whitehead Institute located north of Main Street (Figure S.6c) was occupied by UBS Chemical Corporation, which manufactured adhesives. Other historic uses of the parcel included an auto salvage and scrap yard, typesetters, a printed circuits company, an electrotype research building, a Gulf gasoline station (Main Street), a machine and tool company, an auto parts manufacturing company, residential houses, a diner, and the former South Canal. Whitehead Institute was the first building to occupy this parcel in 1983-84. KSURP Parcel 3 is currently occupied by the Marriott Residence Inn at Six Cambridge Center, a parking garage, The Broad Institute at Seven Cambridge Center and a commercial office building at Eight Cambridge Center all constructed during the late 1980 to 2005. The most recent construction to occupy this parcel was completed as an addition to the Broad Institute at 75 Ames Street in 2012/2013.

KSURP Parcel 4

KRURP Parcel 4 now occupied by Three Cambridge Center located east of Ames Street and north of Main Street (Figure S.6b). Historical maps, as shown on Figures 7.3a-c, indicate that the Three Cambridge Center area was occupied by residential dwellings and additional buildings shown as stores and flats. The 1934 and 1950 plans indicate that the dwellings were demolished and replaced by a bus yard and subway exit while the buildings shown as stores and flats remained. Other historical uses in this parcel included an electroplating facility, MBTA power traction station and auto repair and filling stations. Three Cambridge Center and the adjoining plaza were constructed in 1986. A parking garage with loading dock is located beneath the plaza area. This parcel is currently occupied by high rise commercial buildings known as One, Three, Four and Five Cambridge Center were constructed during the period 1980 to 1990. The most recent construction on this parcel included a connector between Three, Four, and Five Cambridge Center, and a renovated plaza area completed in 2013.

Three Cambridge Center is a four-story commercial and retail building constructed in 1987. Site development included excavation of fill materials to naturally deposited soils to construct a single basement level and spread footing foundations. Historic fill was completely removed below the building to construct the below-grade space. Historic fill has also been removed below and around the adjoining properties to the north and east, including the plaza area and reconstruction of the MBTA station. Historic fill remains in the area below the Five Cambridge Center tract to the west. Recent soil testing conducted in the unexcavated portions of the area around Three, Four and Five Cambridge Center for recent plaza improvements detected levels of VOCs, metals, and PAH that required management as contaminated soil. While groundwater contamination has not been encountered historically, low levels of VOCs are anticipated to be present.

Status of On-Site Releases

A summary table of the Release Tracking Numbers (RTNs) for the Cambridge Center parcels is provided in Table 7-1 below. The on-site releases subject to the proposed KSURP Amendment No. 10 are summarized below. No documented releases have occurred at Eleven Cambridge Center.

RTN 3-00758 (290 to 300 Binney Street - North Garage)

Remediation was conducted in 1989 in compliance with the MassDEP-approved Remedial Response Implementation Plan (RRIP). Oil contaminated soil and underground storage tanks were remediated prior to construction at site. Remediation included excavation, stockpiling, and on-site treatment and subsequent removal of oil contaminated soils by asphalt batching, along with removal of USTs conducted during construction of the above-grade parking garage in 1990. Long-term groundwater monitoring program, conducted as part of RRIP from 1991 to 1994 indicate the presence low levels of VOCs and total petroleum hydrocarbons (TPH). A No Further Action determination was achieved in 1993.

RTN 3-31047 (Three, Four, and Five Cambridge Center Connector)

Site assessment activities conducted in support of site development identified compounds in soil at concentrations exceeding MCP Reportable Concentrations, including VOCs (cis-1,2-DCE, TCE, and PCE), PAHs, cadmium, and lead, attributed to historical site filling and usage. RAM activities were conducted to manage Remediation Waste associated with below-grade foundation construction of two new building connectors and new utilities. The site achieved a Class A-2 Response Action Outcome (RAO) in 2013.

RTN 3-00273 (Whitehead Addition)

Soil and groundwater at the Whitehead Institute Addition site has been impacted by heavy metals and VOCs as a results of historical site use as a chemical manufacturing facility. A No Further Action determination was achieved in 1993.

Table 7-1 Summary of Other RTNs at Cambridge Center Properties

Name/Address	RTN	Description of Release	Regulatory Status
Main Street (MIT Whitehead Institute, 9 Cambridge Center)	3-00273	Volatile organic compounds (VOCs) were encountered in test pit excavations conducted in 1983 in preparation of building construction. Additional investigations determined that metals and VOCs are present in soil and groundwater at the site. The contamination was due to spills and releases from former underground storage tanks at the site. Polymers and adhesives were manufactured at the site in 1971 releasing chemicals associated with these processes in fill, natural soil, and groundwater. A risk assessment conducted by Environmental Research & Technology, Inc. in 1983 assigned a low risk of potential environmental/human health impairment from conditions at this site; however, the report cautioned that uncontrolled exposure or release of chemicals could occur during excavation of soil.	DEPNFA (No further action required) 1993
99 -109 Broadway (10 Cambridge Center)	3-00747	Historical use of this property included soap manufacturer, building wrecker's yard and storage, metals storage, rubber goods manufacturer, carpenter, saw mill, piano/organ factory, lumber company, auto garage, and electrical fixtures. A 1987 Environmental Site Assessment (ESA) conducted at the site just prior to construction of the current building indicated that contaminants are present in soil including oil and grease, total metals arsenic, barium, cadmium, lead and mercury, and trace level toluene. Contaminants including oil and grease, Ploycyclic Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs) benzene, vinyl chloride, and trans-1,2 dichloroethene are present in groundwater. The risk assessment concluded negligible risk of cancer or pollutant-related health risks associated with development and use of site. A letter from MassDEP to the Cambridge Redevelopment Authority dated 21 July 1988 indicated that MassDEP concluded that the site is a "disposal site for which no further action is necessary."	PENNFA (pending no further action) 1988
12 Cambridge Center (Potter Parcel)	3-01988 3-25774	The site formerly known as the Potter Parcel on Parcel 2 of the Kendall Square Urban Renewal Area was occupied with an oil storage facility from 1886 to 1966. Environmental evaluation conducted in the 1987 and 1993 concluded that soil and groundwater at the site are contaminated with petroleum constituents consistent with former site usage. The source of contamination appears to be a tank farm that was formerly located on the property. The site was listed as location to be investigated in 1989 and was given RTN 3-1988 in 1993. RTN 3-25774 was assigned to address groundwater contamination following development of the site in 2006. In 2009 a Phase V Status Report to maintain a Remedy Operation Status monitoring this disposal site. A Remedy Implementation Plan was conducted in 2006 concurrently with the construction of Building 6A (office, lab, steam/power co-generation) and included removal and off-site disposal of petroleum source-area impacted soils and groundwater dewatering, treatment, and discharge. Quarterly groundwater sampling indicates declining trend in concentrations of petroleum related compounds (EPH, VPH, PAHs, and petroleum related VOCs).	RTN 3-01988 related to soil contamination achieved regulatory closure with a Class A-3 RAO and Activity Use Limit (AUL) in 2009 Remedial activities associated with underslab drainage effluent below Biogen Bldg 6A is currently on-going as MCP Phase V under RTN 3-25774

Table 7-1 Summary of RTNs at Cambridge Center (Continued)

Name/Address	RTN	Description of Release	Regulatory Status
262 Binney Street (14 Cambridge Center)	3-03274	This site, located at the northeast side of the North Garage was developed in 1983 with the current building. Petroleum contamination was noted during construction in 1982-83. Fill was removed in the northern portion of the building and replaced with clean soil. A limited site investigation was conducted at the property in 1990. Soil testing detected kerosene contamination. NAPL was measured in one monitoring well. Haley & Aldrich concluded in a Consultant of Record Statement dated 31 July 1997 that conditions at the site do not represent potential exposures to the building occupants based on the results of a health risk assessment conducted in 1992 and concluded that no further remedial action was necessary. MassDEP concluded in a letter dated 22 September 1992 that the conditions do not appear to present an immediate threat to public health, safety or the environment.	PENNFA (pending no further action)
12 Cambridge Center (Potter Parcel)	3-25774	Continued monitoring of underslab drainage effluent is currently on-going under RTN 3-25774. Concentrations of 1,2-dichloroethane, the primary contaminant, have been non-detect since 2012.	MCP Phase V REMOPS (2012)
346 Binney Street (15 Cambridge Center)	3-01987 3-15370	Site was originally listed as an MCP Disposal Site under RTN 3-1987. During an initial environment assessment on the Fulkerson Parcel, metals, semi-volatile organic compounds (SVOCs), and petroleum hydrocarbons were identified in soil and groundwater samples. A new RTN 3-15370 was issued in 1997. Remediation occurred concurrent with development. MCP Phase I and Tier Classification Report were written in 1998. RAM activities included management of contaminated soil and groundwater concurrently with the construction of the existing building in 1999-2001. A RAM completion report and Response Action Outcome (RAO) were submitted in 2002.	Class A-3 RAO with Activity Use Limit (AUL) 2002, AUL Amended in 2013.
346 Binney Street (15 Cambridge Center)	3-19217, *linked to 3-15370 (Primary RTN)*	January 2000 groundwater samples associated with dewatering activities during construction reported carbon tetrachloride and chloroform in concentration above MCP RCGW-2. Immediate Response Action (IRA) activities were undertaken.	linked to Primary RTN 3-15370 with Class A-3 RAO
346 Binney Street (15 Cambridge Center)	3-18804, *linked to 3-15370 (Primary RTN)*	Release from an abandoned UST was identified September 1999 during remedial actions for redevelopment of the site (RTN 1987). An Immediate Response Action (IRA) was implemented to mitigate release from UST. RTN was linked to the Class A-3 RAO Statement. The contents of the tank are unknown, though residual contents may be paint thinner. Tank capacity is ~3,000 gallons. IRA Completion Statement submitted February 2000.	linked to Primary RTN 3-15370 with Class A-3 RAO
290- 300 Binney (North Garage)	3-00758	Remediation completed in compliance with the MassDEP-approved Remedial Response Implementation Plan (RRIP) in 1989. Oil contaminated soil and underground storage tanks were remediated prior to construction at site. Remediation included excavation, stockpiling, and on-site treatment and subsequent removal of oil contaminated soils by asphalt batching, along with removal of USTs conducted during construction of the above-grade parking garage in 1990. Long-term groundwater monitoring program, conducted as part of RRIP from 1991 to 1994 indicate the presence low levels of VOCs and total petroleum hydrocarbons (TPH).	PENNFA (pending no further action) 1993

Table 7-1 Summary of RTNs at Cambridge Center (Continued)

Name/Address	RTN	Description of Release	Regulatory Status
3, 4 and 5 Cambridge Center Connectors	3- 31047	Site assessment activities conducted in support of site development identified compounds in soil at concentrations exceeding MCP Reportable Concentrations, including VOCs (cis-1,2-DCE, TCE, and PCE), PAHs, cadmium, and lead, attributed to historical site filling and usage. RAM activities were conducted to manage Remediation Waste associated with below-grade foundation construction of two new building connectors and new utilities.	Class A-2 RAO 2013
310-344 Binney (17 Cambridge Center)	3-01987 3-03437	RTN 3-01987 was originally assigned to the Fulkerson Parcel located within the Kendall Square Urban Renewal Parcel 2. The Fulkerson Parcel was divided into two parcels and assigned different RTNs (one for 310 to 344 Binney Street and one for the remainder of the Fulkerson Parcel which eventually transitioned to 15 Cambridge Center). RTN 3-03437 was assigned to 310 to 344 Binney Street in 1990 when an ESA identified metals, VOCs, SVOCs, PAHs, and petroleum hydrocarbons in soils samples, along with metals, petroleum hydrocarbons, and SVOCs in groundwater, likely due to numerous petroleum and solvent based USTs and ASTs. ESA concluded that development and use of the site posed no significant pollutant-related health risks and RTN 3-03437 achieved a No Further Action determination in 1997. Three USTs were uncovered in 2012 during pre-excavation activities for construction of the currently existing building, one of which was leaking and assigned RTN 3-30699. After UST removal disposal of impacted soil was addressed under the RAM Plan submitted under RTN 3-3437. A subslab vapor barrier and passive ventilation system was installed below the ground floor slab of the new building and the connector to 15 Cambridge Center. RAM activities related to monitoring of indoor air are on-going and RAM status reports are submitted every 6 months.	PENNFA (pending no further action) 1997 RAM activities on-going related to monitoring of indoor air
7 Cambridge Center	3-01989	This site is part of a larger site (Parcel 3) which is listed as a disposal site by MassDEP. Results of a 1989 Phase I Environmental Site Assessment detected petroleum hydrocarbons, heavy metals, volatile organic compounds and semi-volatile organic compounds in the soil and groundwater at the site. A Consultant-of-Record Statement under the 1993 Massachusetts Contingency Plan (MCP) was prepared for Parcel 3 and submitted to MassDEP on August 2, 1995. The Consultant-of-Record statement affirmed that based upon a review of existing information pertaining to the site, the conclusion contained in the 1989 assessments recommending the No Further Action determination was valid and complied with the 1988 MCP. A RAM Plan was submitted in 2004 to manage contaminated soil associated with the construction of the current building at Seven Cambridge Center. A Class A2 RAO was achieved on 5 December 2005 following completion of RAM activities. Recent construction of the Broad Institute addition at 75 Ames Street was conducted as a Post-RAO response action.	Class A-2 RAO 2005
6 Cambridge Center	3-12210	This site is also part of a larger site under RTN 3-01989, Kendall Square Urban Renewal Parcel 3. RTN 3-12210 was assigned to a historic release from a gasoline discovered during demolition of the former gasoline station and removal of two 8000 gallon gasoline USTs. Response actions conducted as an Immediate Response Action (IRA) also included removal of contaminated soil and groundwater.	Class A-2 RAO 1996

Future Conditions/Project Impacts and Proposed Mitigation

Compliance with Massachusetts Contingency Plan (MCP)

The Project will require pre-characterization of the soil and groundwater conditions for management of contaminated soil in advance of the proposed construction and to evaluate potential exposures for workers and the future building occupants and prepared the required regulatory submittals under the MCP, 310 CMR 40.0000. It is assumed that testing of soil and groundwater at the North Garage and Eleven Cambridge Center will result in a new reporting condition to MassDEP and that activities at the properties would be subject to the requirements of the MCP. It is anticipated that conditions in the area outside Three Cambridge Center will encounter similar contaminant levels in soil as those encountered during the recent plaza improvement and connector work at Three, Four, and Five Cambridge Center and, therefore, it is likely that new activities can proceed under the existing RTN; however, testing of groundwater may result in a new reporting condition.

Management of contaminated soil and groundwater and implementation of measures to reduce the risk of exposure to contaminants at these properties will be conducted under a Release Abatement Measure (RAM) Plan prepared by a Licensed Site Professional (LSP). The RAM Plan will address items pertaining to construction of new buildings in contaminated areas per 310 CMR 40.0042(3) within the area within and adjacent to the footprint of the proposed structure. The RAM plan will also include requirements for environmental monitoring for dust, vapors and odors resulting from disturbance of contaminated soils. Threshold criteria for fence line exposures to the nearby public will be established in the RAM Plan based on the construction timeframe for the specific contaminants of concern and worker exposures will be established in a site-specific Health & Safety Plan prepared by a qualified person on behalf of the Contractor conducting the work. To the extent feasible vapors and dust levels will be measured in real-time using portable instruments. Stationary and mobile units will be deployed at the perimeter of the site. The RAM Plan will also include measures to be undertaken for suppression of dust and for control of vapors and odors if exposure criteria is exceeded. Oversight of the RAM activities will be conducted by the LSP and their qualified representatives who will monitor and document the remedial activities in the field. Below-grade construction will require temporary construction dewatering. Treatment of groundwater dewatering effluent is anticipated to be a RAM activity. Discharge to the storm drains will be conducted under a NPDES Remedial General Permit (RGP).

Utility upgrades conducted in the public way or on private property will be conducted under a Utility-Related Abatement Measure (URAM). Soils will be precharacterized within the proposed utility corridors prior to off-site removal or temporary storage. Contaminated soils removed from the utility trench will be

replaced with "clean" soils reducing the risk of exposure to future utility workers conducting repairs or replacement. Utility trench backfill will be interrupted prior to connection with buildings with a segment of impervious flowable fill or lean concrete to prevent preferential pathways for vapor intrusion into buildings.

It is anticipated that the measures undertaken under the RAM will result in achieving a Permanent Solution for each property redevelopment.

Given the construction period of the buildings (1982 to 1990) the presence of asbestos containing material (ACM) is not anticipated. If ACM is encountered during demolition it will be handled appropriately in accordance with state and local regulations.

A summary of the anticipated assessment and remedial activities for each property is summarized below.

North Garage Commercial Component (Parcel 2)

As previously mentioned, no below-grade space exists under the garage. The new office buildings are planned on top of the existing garage. New at-grade and limited below-grade space is planned at the north and south ends of the existing garage for a proposed lobby and Winter Garden, respectively. Construction of below-grade space will require removal of the existing historic fill and organic soils that remain. New foundations will be required to support loads imposed by the planned additional levels of above-grade parking and the new office building. It is anticipated that a majority of the historic fill and underlying soils will be significantly impacted with petroleum oils and hazardous materials and, therefore, characterization of soil materials in-place prior to excavation is planned as part of the Project. It is anticipated that contaminated groundwater will also be encountered and that treatment of construction dewatering effluent will be required. It may also be necessary to install a vapor mitigation system to eliminate the vapor intrusion pathway based on the outcome of the groundwater data.

Eleven Cambridge Center Residential Component (Parcel 2)

As previously mentioned, it is possible that groundwater at Eleven Cambridge Center could be impacted. Groundwater testing and the potential for vapor intrusion will need to be evaluated as part of the proposed residential use. No basement exists below the ground floor of Eleven Cambridge Center. Construction of below-grade parking will require removal of the existing fill and the garage will act to eliminate the vapor intrusion pathway to residences. It is anticipated that a small volume of contaminated soil will be encountered during excavation and, therefore,

characterization of soil materials in-place prior to excavation is planned as part of the Project. The initial phase of the characterization program would take place prior to building demolition at the exterior of the existing building. A second characterization phase would occur following building demolition and removal of the existing footing foundations. Groundwater testing and the potential for vapor intrusion will need to be evaluated as part of the proposed residential use although the presence of below-grade parking will act to eliminate the vapor intrusion pathway to residences.

Three Cambridge Center Residential and Commercial Component (Parcel 4)

The presence of contaminated soil is not anticipated below the excavated portions of the property, however additional deeper excavation would require sampling and testing of soil prior to new construction. However, based on recent soil testing conducted in the unexcavated portions of the area around Three, Four, and Five Cambridge Center for recent plaza, it is anticipated that soil beneath the unexcavated portions of the plaza area around Three Cambridge Center will detect levels of VOCs, metals, and PAH that will require management as contaminated soil that can be managed as a Post-RAO construction activity. Additionally, while groundwater contamination has not been encountered historically, low levels of VOCs are anticipated to be present. Levels of contaminants that exceed the applicable Reportable Concentrations in groundwater will require new reporting under the MCP and the potential for vapor intrusion will need to be evaluated as part of the proposed residential use under this new RTN.

Whitehead Institute Addition (Parcel 3)

Assessment of the Whitehead Institute Addition site has not been conducted since its construction in 1983. Historical data indicate the presence of metals and VOCs in soil and groundwater. New data required for the planned addition will likely encounter levels of VOCs and other contaminants at levels that will require remediation to achieve a condition of No Significant Risk under the current MCP. The potential for vapor intrusion is considered likely at this site.

Vapor Intrusion Evaluation and Assessment

The potential for vapor intrusion (VI) into the new buildings will be evaluated and assessed early in the building design phase to identify site conditions that may indicate when a VI pathway is probable. MassDEP Vapor Intrusion Guidance WSC #14-434 will be used as the basis for evaluation of the potential for vapor intrusion potential at sites where VOCs have been released into the environment. We have assumed that some level of VOCs are present in subsurface media within the limits of the KSURP area based on historical site usage. The VI assessment will consist of developing a Conceptual Site Model based on multiple lines of evidence including

soil, groundwater and soil gas data, the presence of non-aqueous phase liquid (NAPL) in/on groundwater and the presence of preferential pathways through existing or future utility corridors will be considered. If a VI pathway is potentially complete based on the data collected a vapor mitigation system will be designed and incorporated into the new building design. The presence and use of planned below grade space will also be considered in the VI evaluation.

MassDEP has issued toxicity information and guidance for trichloroethylene (TCE) a chlorinated VOC which can result in significant risk at relatively low levels and Critical Exposure Pathways (CEP) for residential buildings. Although detection of TCE is not common in the KSURP area, soil and groundwater testing will include VOC analyses for this and other chlorinated VOCs. Detection of these highly toxic compounds could result in design changes to eliminate the vapor intrusion pathway for proposed residential usage. These design changes would include commercial usage of ground floor or construction of a below grade parking garage below the residences.

Proposed Mitigation Measures

Protective Barriers

Contaminants in soil at the site which are typical in urban areas are anticipated to include heavy metals, PAHs and petroleum hydrocarbons at levels which could pose risk under the MCP for direct contact, ingestion and/or inhalation. It is planned to incorporate "protective barriers" into the new building design to mitigate risk of direct contact with contaminated soils. The protective barriers are anticipated to include the following:

- Landscaped Areas – Excavation and off-site removal of contaminated soil to a depth of 3 feet below final design grades and placement of a marker fabric and clean soil to the new grades.
- Exterior Hardscape Areas – placement of engineered pavement sections, concrete sidewalks or patios, landscape pavers or other systems which block exposure to underlying contaminated soil at the ground surface.

Vapor Mitigation Systems

New buildings constructed above contaminated soil or groundwater will be constructed with the elements of a vapor mitigation system below the ground floor slab to mitigate the source of vapor intrusion from the environmental media that could potentially contribute contaminants to indoor air. The vapor mitigation will consist of the following elements; ventilation layer, ventilation pipes or depressurization points and a vapor liner. The design of the vapor mitigation system

(passive or active), liner thickness and type will depend on the type, level and toxicity of the contaminants detected. The effectiveness of the vapor mitigation will be evaluated post-construction by sampling and testing of sub-slab and indoor air.

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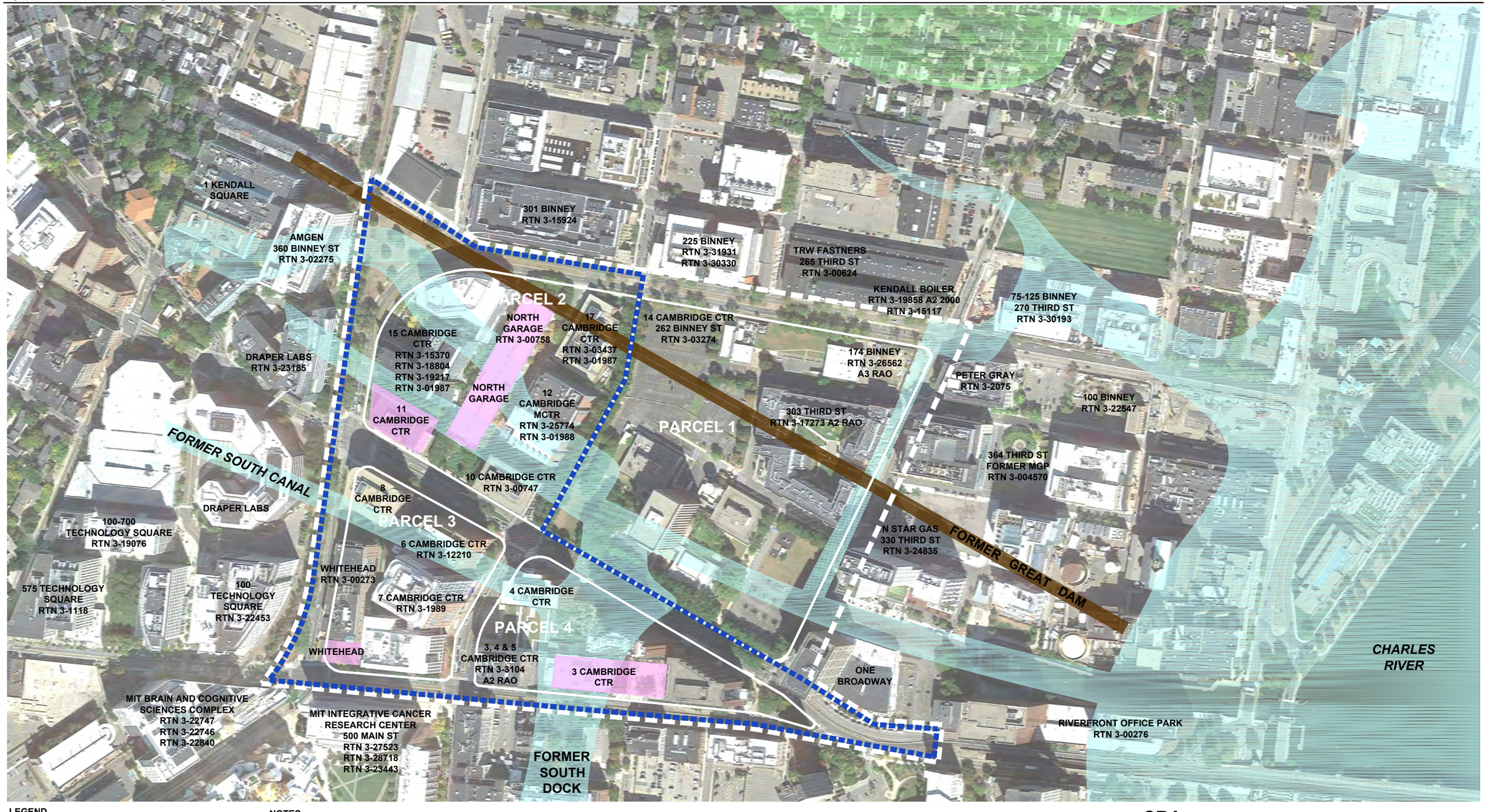

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Figure 7.1

RTN LOCATIONS

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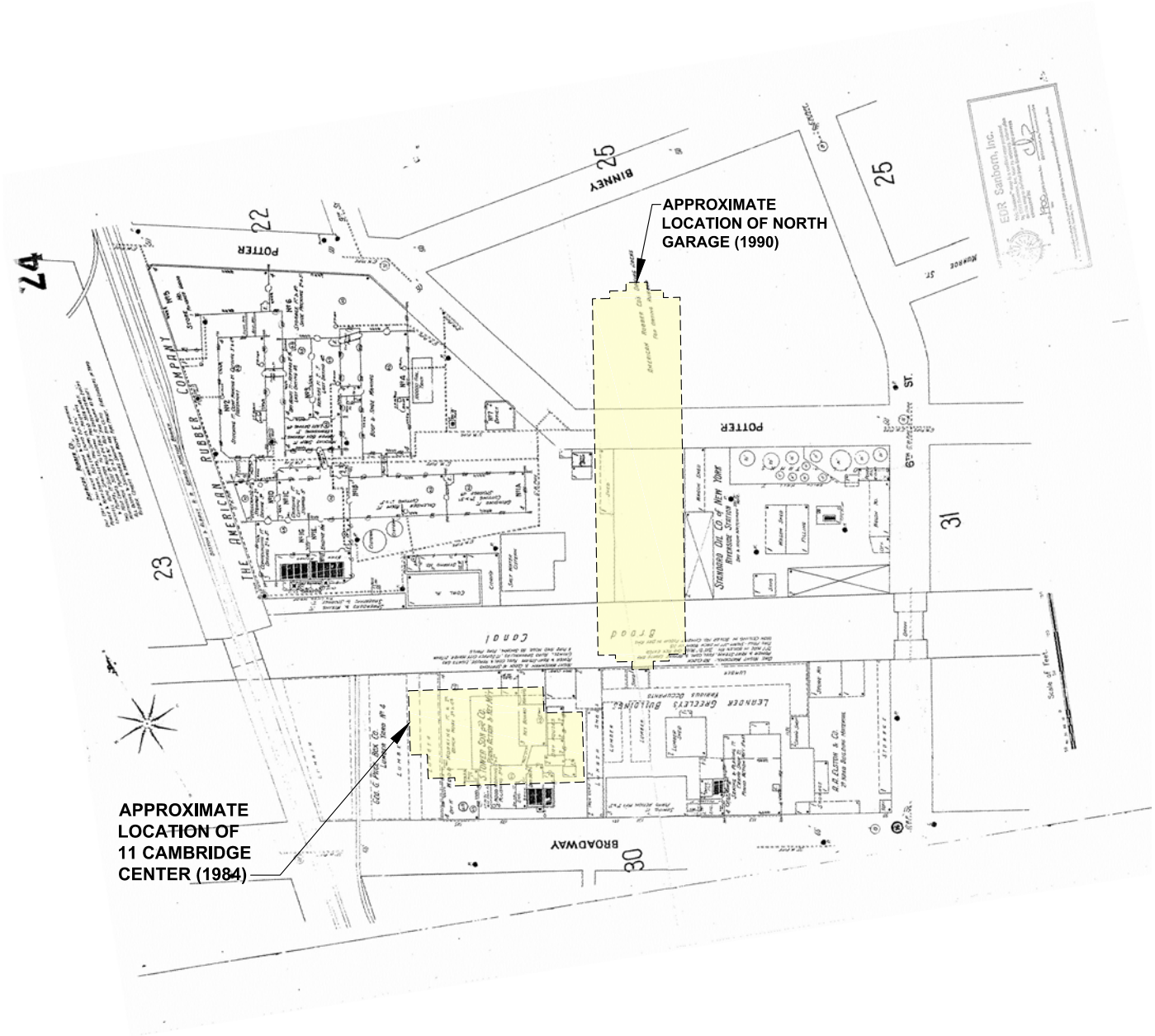
Cambridge, MA



1900 CERTIFIED SANBORN MAP

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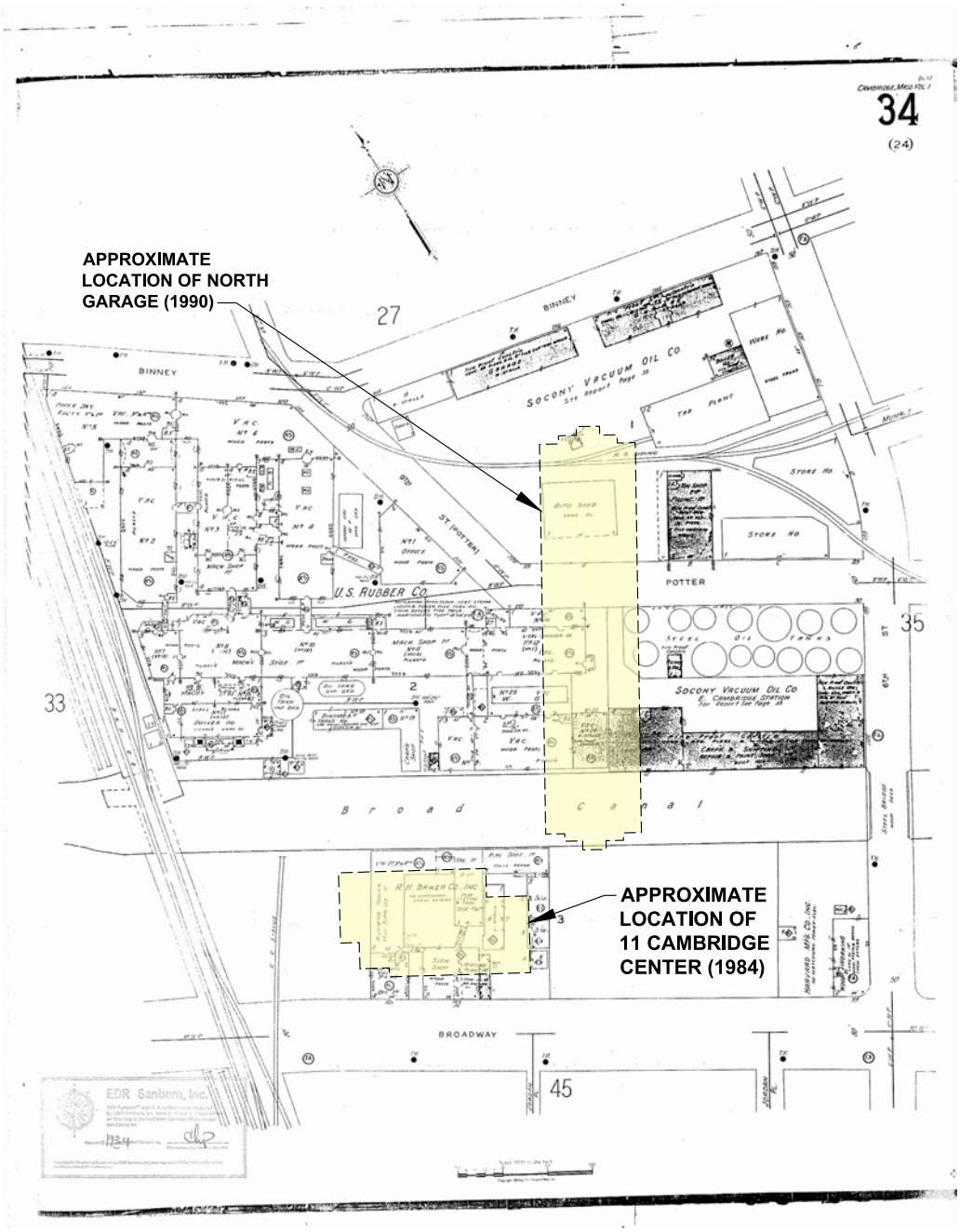
Figure 7.2a
Historical Plan 1900 - KSURP Parcel 2

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA



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1934 CERTIFIED SANBORN MAP

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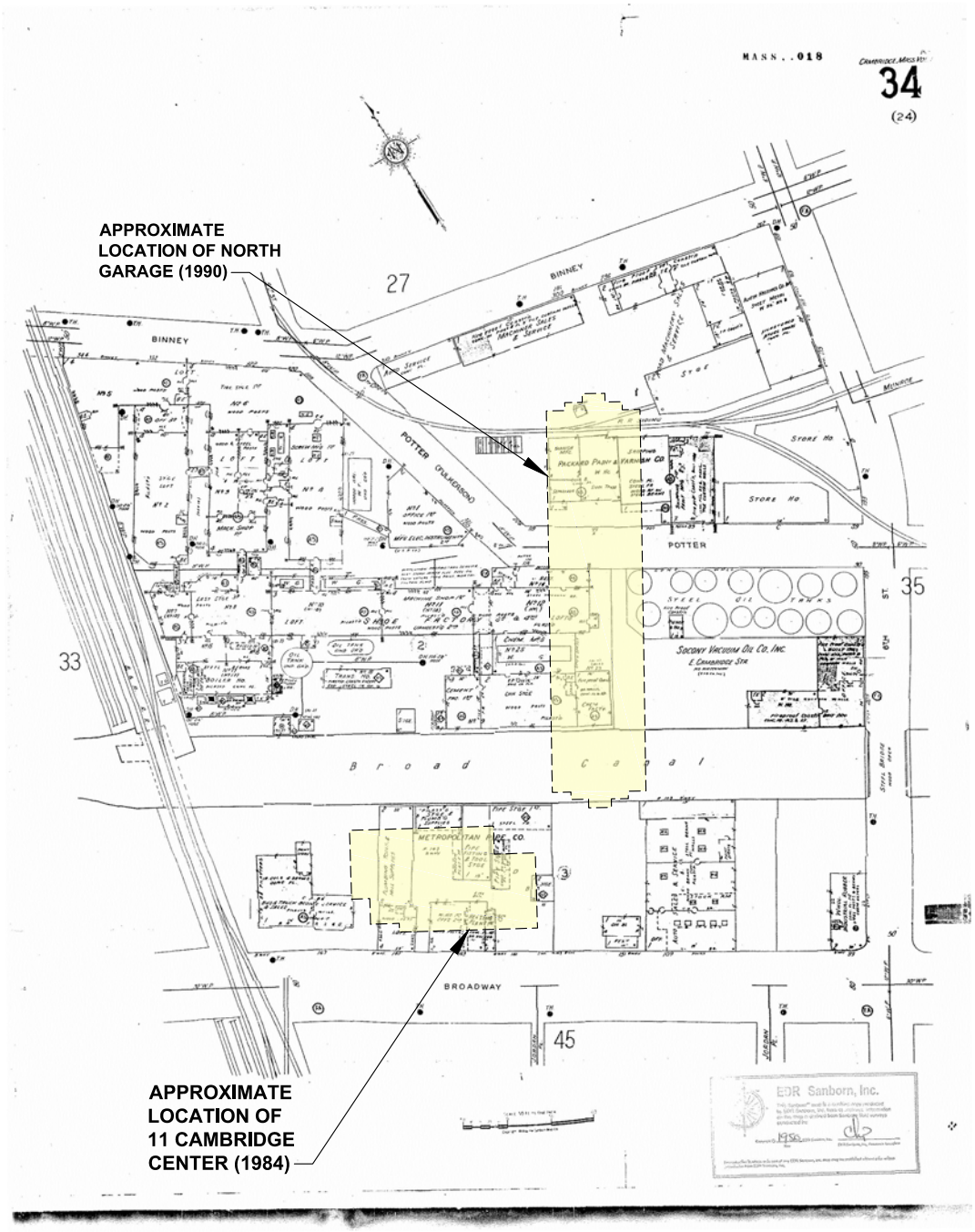
Figure 7.2b
Historical Plan 1934 - KSURP Parcel 2

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA



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1950 CERTIFIED SANBORN MAP

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Figure 7.2c
Historical Plan 1950 - KSURP Parcel 2

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

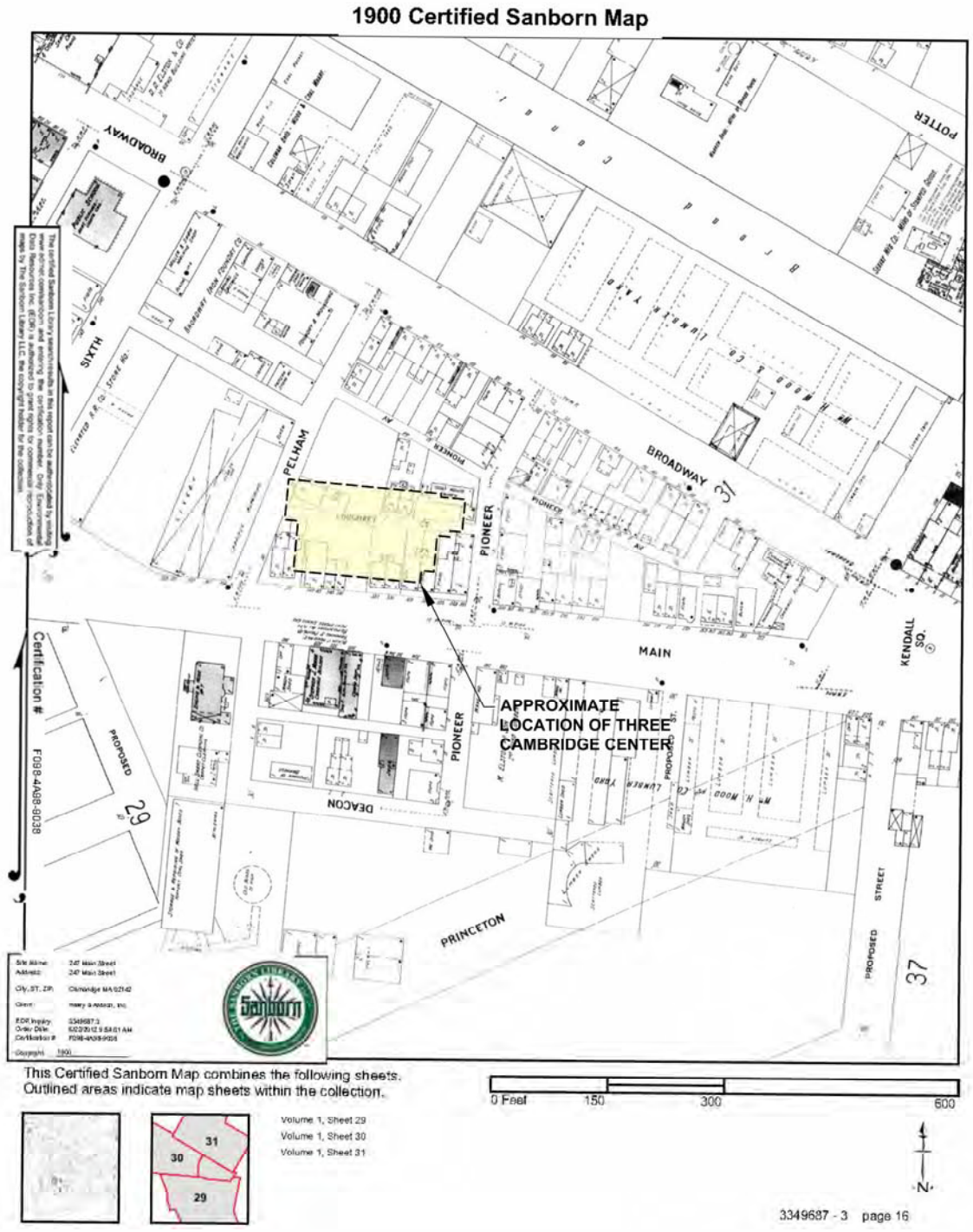

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Figure 7.3a
Historical Plan 1900 - KSURP Parcel 4

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

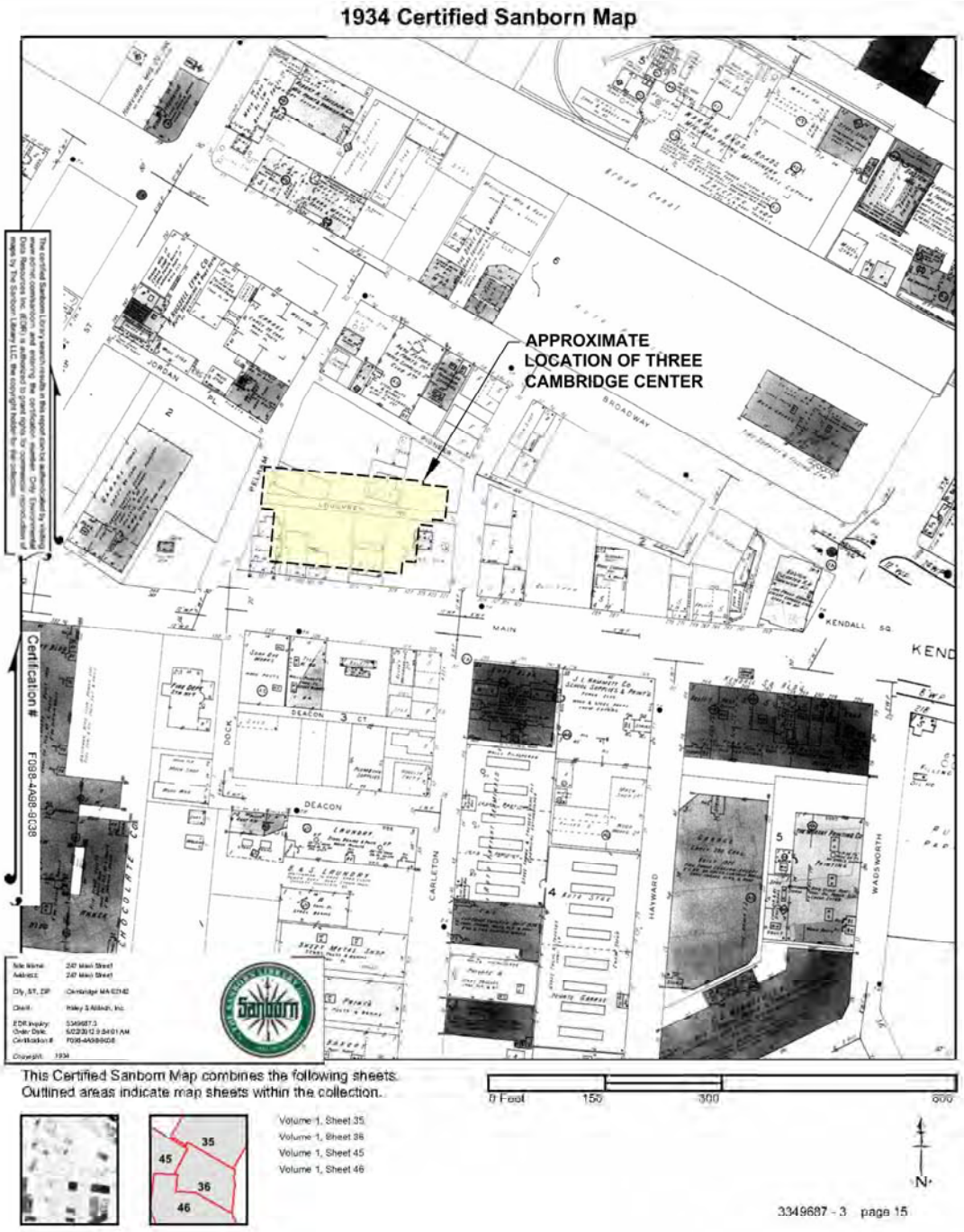

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Figure 7.3b
Historical Plan 1934 - KSURP Parcel 4

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

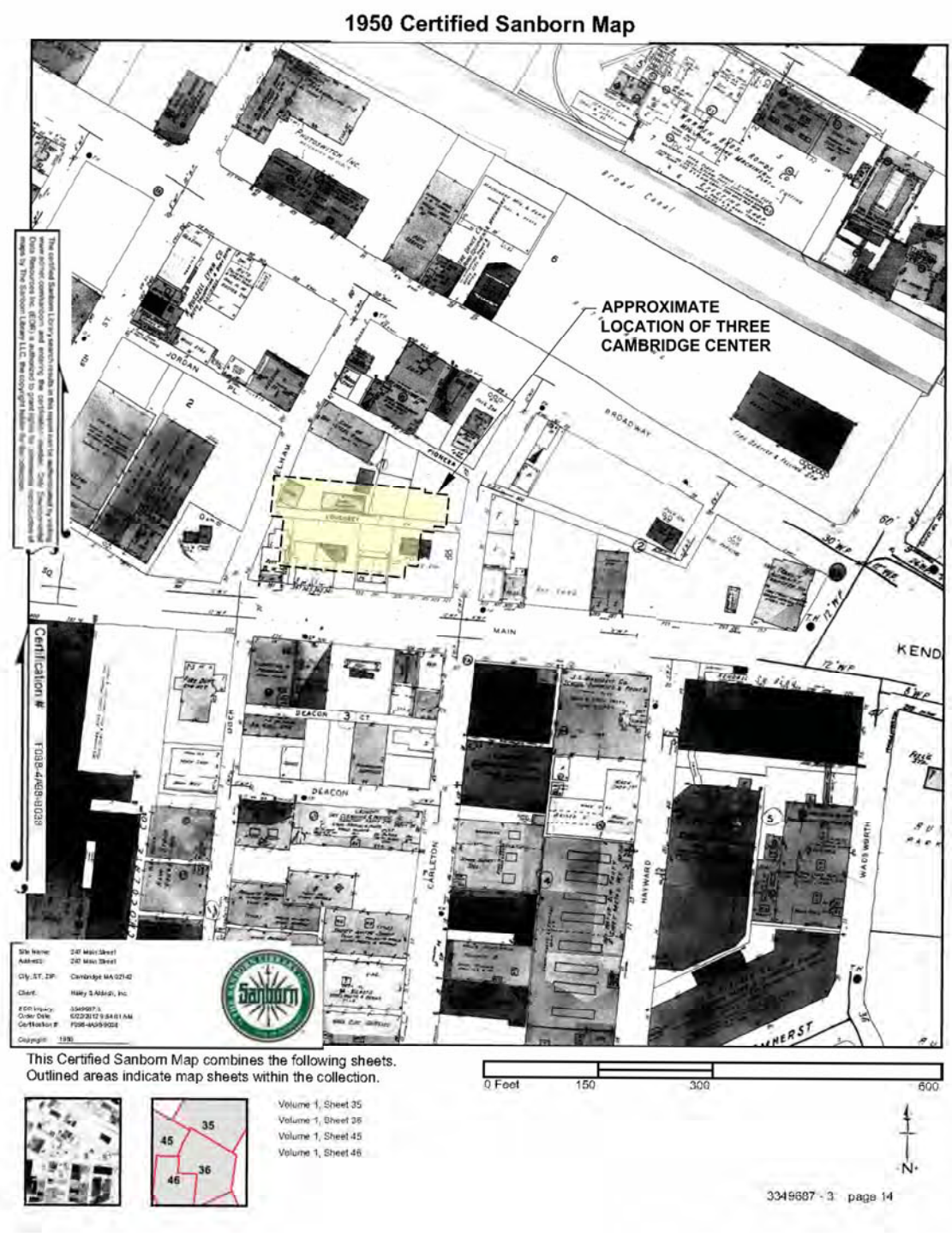

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Figure 7.3c
Historical Plan 1950 - KSURP Parcel 4

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

8

Construction

NOTE: No signficant changes have been made to this chapter from the NPC.

Introduction

The following chapter discusses the proposed project phasing, and the potential construction-related impacts and proposed mitigation measures. Construction impacts are temporary in nature and are typically related to stormwater runoff, truck traffic, air quality (dust), noise and construction waste. Temporary construction-period impacts will be managed to minimize disruption to the surrounding neighborhood.

Project Construction Phasing

The proposed Broad Institute mechanical space conversion is expected to begin in 2016 shortly after the plan amendment and zoning are approved. The Whitehead Institute Office Addition is also likely to begin construction in 2017 and is likely to be completed within 12-15 months.

The Project will be constructed in two key phases where Phase 1 will be split into two sub-phases. Phase 1A will consist of the redevelopment of the North Garage with new commercial office/innovation space over the existing garage. Phase 1B will include demolition of the existing Eleven Cambridge Center commercial office building and construction of a new 294-unit residential with ground-floor retail space and below-grade parking. Phase 2 will include demolition of the existing Three Cambridge Center commercial office building and construction of a new mixed use building with commercial office space, ground-floor retail space, and 320 residential units.

The Proponent, Redeveloper, and Other Developers will all work with the City and local community as well as the MBTA, needed to coordinate construction and seek to

minimize any impacts from demolition and construction of new buildings. Specifically, during Phase 2, the Redeveloper is committed to minimizing potential construction-related impacts to MBTA service at the Kendall Square/MIT subway station entrance/exit headhouse located in the courtyard area adjacent to Three Cambridge Center.

Temporary Construction Impacts

Construction impacts are temporary in nature and are typically related to stormwater runoff, truck traffic, air quality (dust), noise and construction waste. Temporary construction-period impacts will be managed to minimize disruption to the surrounding neighborhood. Construction Management Plans (CMPs) will be prepared for each Project Component to address numerous temporary construction-related impacts, such as mitigation measures, road closures, detours, and staging. The TP&T will review and approve each CMP. The Redeveloper will work closely with the City throughout the construction of each Project Component.

Over the duration of the Project, there are likely to be other development projects in the areas adjacent to each Project Component. In order to help minimize disruption to local residents and businesses, the Redeveloper is committed to participating in coordinated construction management planning efforts that may be sponsored by the City and/or local community groups. Coordinated construction communication and logistical planning (i.e., signage programs, selective truck routes, etc.) can help mitigate local temporary transportation issues associated with concurrent construction projects.

Because the KSURP area is located in a highly active urban environment, the Project will aim to integrate high quality aesthetics into construction protection fencing and walls along the streetscape that are erected for more than six months. For example, partnerships with local artists, muralists, and schools will be explored as well as highly graphical fence wraps, or fences made from unique materials in unusual forms and colors. Messaging, peek-in plexiglass windows, or interactive displays will also be explored.

Water Quality

Each Project Component is set within sites less than one (1) acre in size and, therefore, do not require a U.S. Environmental Protection Agency Construction General Permit. However, consistent with the sustainability goals, including LEED Certification, each Project Component will comply with National Pollutant Discharge Elimination System (NPDES) to minimize water pollution by regulating point sources that discharge pollutants into local waterways by developing and implementing an Erosion and Sedimentation Control (ESC) Plan. As required by the LEED Pre-requisite, the General Contractor will be required to implement an ESC Plan for each

Project Component. Furthermore, any construction dewatering discharges will be appropriately controlled and discharged in accordance with the NPDES state and local dewatering standards.

Construction Truck Traffic

Construction truck traffic will vary throughout the construction period, depending on the work activity. Idling of trucking will not be allowed on-site by the General Contractor. Based on recent redevelopment at Seven Cambridge Center by the Redeveloper, trucking to the construction sites for all project phases is expected to enter from Interstate-93 (I-93) via Route 28, left onto Land Boulevard and right onto Main Street to access Three Cambridge Center and Whitehead Institute (and then right onto Service Road to access the North Garage and Eleven Cambridge Center sites). Leaving the construction site, construction vehicles will exit through Binney Street to Land Boulevard, right onto Route 28 to I-93. Additionally police detail will be provided, as needed. As each Project Component progresses in design and moves into construction, the General Contractor will identify specific truck routes as part of each CMP for TP&T review and approval. These plans will also reflect overlapping construction phases or buildings simultaneously under construction within the vicinity of the KSURP area.

Construction Bicycle and Pedestrian Accommodations

It is extremely important in Kendall Square (especially along Broadway and Main Street) that pedestrian and bicycle accommodations of equivalent width, quality, and accessibility be provided and protected during construction. During construction, the Project will aim to not close any sidewalks and/or bike lanes, but will relocate and/or protect such facilities. All temporary sidewalk and/or bike lane accommodations will be treated as a normal sidewalk and bike lane with regards to winter weather operations (clearing of snow and ice) and extreme rain events (prevent/resolve large puddles), to the extent feasible.

As each Project Component progresses in design and moves into construction, the General Contractor will identify changes required in any bicycle and/or pedestrian routes as part of each CMP for Cambridge TP&T review and approval. These plans will also reflect overlapping construction phases or buildings simultaneously under construction within the vicinity of the KSURP area.

Construction Air Quality

Project-related construction and demolition activities are expected to result in a short-term increase in air pollution emissions associated. The primary sources of potential construction air emissions is from fugitive dust resulting from construction operations

(e.g., demolition) and vehicle emissions from construction equipment. Overall, potential impacts on ambient air quality from construction activities associated with site-specific development are temporary and not expected to be significant. Specific measures to be implemented by contractors to reduce potential emissions and minimize impacts include:

- Using wetting agents to control and suppress dust that may come from excavated and construction materials.
- Fully covering all trucks used for transportation of construction debris.
- No site storage of construction debris.
- Daily cleaning of street and sidewalks by mechanical means so as to minimize dust and dirt accumulation.

Fugitive Dust

Fugitive dust consists of soil particles that become airborne when disturbed by heavy equipment operations or through wind erosion of exposed soil after groundcover (either lawn or pavement) is removed. This construction-related air-quality impact (i.e., fugitive dust) would be of relatively short duration.

Dust control measures during dry or windy periods will be implemented. The appropriate methods of dust control would be determined by the surfaces affected (i.e., roadways or disturbed areas) and would include, as necessary, the application of water and/or the use of stone in construction roads and staging areas. Additionally, regular sweeping of pavement of adjacent roadway surfaces during construction will be conducted to minimize the potential for vehicular traffic to create airborne dust and particulate matter.

Construction Vehicle Emissions

Emissions from the operation of construction machinery (i.e., carbon monoxide [CO], nitrogen oxides [NOx], particulate matter [PM], volatile organic compounds [VOCs], and greenhouse gases) are short-term and not generally considered substantial.

Emission controls for construction vehicle emissions will be employed, including, as appropriate, proper maintenance of all motor vehicles, machinery, and equipment associated with construction activities (i.e., the maintenance of manufacture's muffler equipment or other regulatory-required emissions control devices). The state's anti-idling law will be enforced during all construction phases of the Project with the installation of on-site anti-idling signage at loading and drop-off/pick-up/waiting areas. In addition, the Proponent is committed to meeting the requirements the MassDEP State Revolving Fund (SRF) for diesel construction equipment. These require that all non-road diesel equipment rated 50 horsepower or greater that will be

used meet EPA's Tier 4 emission limits or be retrofitted with appropriate emission reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified or MassDEP-approved diesel oxidation catalysts or diesel particulate filters.

Construction Noise and Vibration

The construction activity associated with the Project may temporarily increase nearby sound levels due to the use of heavy machinery. Heavy machinery is expected to be used intermittently throughout the Project's construction phases, typically during daytime periods. The construction phases that will generate the highest sound levels include the demolition of existing structures, site excavation and grading, and construction of the foundation for the proposed buildings. Each CMP will include a construction noise assessment and identify measures to ensure that the City's Noise Ordinance related to construction activities are met. For example, all work the may result in elevation noise levels will be conducted between 7AM (9 a.m. on Saturdays and Holidays). Also, construction work will be prohibited on Sunday unless approval is obtained from the Police Department. Other construction noise mitigation measures will include:

- Initiating a proactive program to ensure compliance with the City's noise limitation policy.
- Using appropriate mufflers on all equipment and regular maintenance of intake and exhaust mufflers.
- Muffling enclosures of continuously running equipment, such as air compressors and welding generators.
- Replacing specific construction operations and techniques by less noisy ones where feasible.
- Selecting the quietest of alternative items of equipment (e.g. electric instead of diesel powered equipment, hydraulic tools instead of pneumatic impact tools).
- Scheduling equipment operations to keep average noise levels low, to synchronize noisiest operations with times of highest ambient levels, and to maintain relatively uniform noise levels.
- Turning off idling equipment.
- Locating noise equipment as far as possible from sensitive areas.

Hazardous Materials and Construction Waste

As discussed in Chapter 7, *Hazardous Materials*, the Project will require characterization of the soil and groundwater conditions for management of contaminated soil during construction and to evaluate the residential use exposure scenario. Construction of below-grade spaces will require removal of the existing

historic fill and organic soils that remain. It is anticipated that contaminated groundwater will also be encountered and that treatment of construction dewatering effluent will be required.

Given the construction period of the buildings (1982 to 1990) the presence of asbestos containing material (ACM) is not anticipated. If ACM is encountered during demolition it will be handled appropriately in accordance with state and local regulations. The Proponent is aware of the U.S. EPA Remediation General Permit program and, if applicable, will apply for the permit.

In compliance with MassDEP construction waste/debris regulations, recycling/reuse programs will be developed as part of the CMP and implemented by all construction contractors to reduce the amount of waste that is sent to landfill throughout construction. Measures to reuse/recycling materials associated with building demolition will be evaluated. By keeping the North Garage intact, a significant amount of construction waste associated with demolition and new construction to rebuild a garage structure is eliminated by the Project.

9

Landlocked Tidelands

NOTE: This chapter is an entirely new section from the NPC, as required by the NPC Certificate.

Introduction

In accordance with the 2015 NPC Certificate, this chapter in its entirety is new information to describe the public benefits of the Project, as required in the Public Benefit Determination regulations (301 CMR 13.00). The Project is subject to the jurisdiction of the 2007 statute *An Act Relative to Licensing Requirements for Certain Tidelands* (2007 Mass. Acts ch. 168, sec 8) (the "Act") because a portion of the KSURP area is located on tidelands associated with an approximately 100 foot-wide channel, the Broad Canal, constructed in the early/mid-19th century to provide ship access through the City. This area of the canal was filled in the middle of the 20th century and is, therefore, considered "filled tidelands" under M.G.L. Chapter 91. Such filled tidelands are not subject to licensing under M.G.L. Chapter 91. Refer to Figure 9.1 for the limits of the landlocked tidelands and portions of each Project Component that falls within this area.

Project Landlocked Tidelands

In accordance with the NPC Certificate, Table 9-1 below summarizes the total area and describes the nature of work proposed to occur within the tidelands. The proposed Three Cambridge Center Mixed Use Building is not located in filled tidelands (Figure 9.1).

Table 9-1 Project Landlocked Tidelands[1]

Project Component	Total Area within Tidelands (square feet)	Nature of Work within Tidelands
Cambridge Center North Garage Office Buildings	60,2881 sf	Construction of commercial office space with innovation space, ground-floor retail, and indoor/outdoor public open space[2]
Eleven Cambridge Center Residential Building	28,600 sf	Change in use from office to residential
Whitehead Institute Addition	23,589 sf	No work within tidelands[3]
Broad Institute Office Conversion	64,230 sf	Change in use to existing facility (conversion of approximately 15,100 square feet of mechanical space to commercial office space)

1 Refer to Figure 9.1 for the project landlocked tidelands.
2 As illustrated in Figure 1.1.
3 The building addition is proposed for the portion of the building fronting Main Street, as illustrated in Figure 1.6.

The Project will not only provide for significant urban design and public realm improvements, contribute to increasing the tight Boston/Cambridge/Somerville housing supply, expand sustenance retail options, job creation and additional tax revenues, but it will result in sustainable, smart growth by developing on top of existing parking structures and within already developed land, favoring development in an existing walkable, bikeable and transit-rich urban area that may otherwise be pushed into less sustainable suburban developments. These public benefits are further described below and in Chapter 10, *Summary of Proposed Mitigation and Other Beneficial Measures*.

Public Benefits Determination

As shown in Figure 9.1, the KSURP area boundary is separated from the Broad Canal water sheet by Third Street, a Public Way, which existed prior to 1984 and is greater than 250 feet from the contemporary high water mark. Because the Project Change exceeds Mandatory EIR review thresholds, as defined in 301 CMR 11.03, a Public Benefit Determination is required from the Secretary of the Massachusetts of Energy and Environmental Affairs (the "Secretary"), in accordance with the regulations at 301 CMR 13.00. The Act requires the Secretary to consider the following when making a Public Benefit Determination:

- Purpose and effect of the development;
- The impact on abutters and the surrounding community;
- Enhancement of the property;
- Benefits to the public trust rights in tidelands or other associated rights;

- Community activities on the development site;
- Environmental protection and preservation;
- Public health and safety, and
- General welfare.

In weighing the adequacy of the proposed public benefit, the Secretary is required to place particular emphasis on the benefit to the public trust rights in tidelands. The Secretary is further instructed by the Act to consider the differences between tidelands, landlocked tidelands, and great ponds when assessing the public benefit and shall consider the practical impact of the public benefit on development.

The following sections describe how the Project provides appropriate public benefits, enhances the public use of landlocked filled tidelands and is adequately protective of the Public Trust rights inherent therein. All of the public benefits and improvements described below will occur within landlocked filled tidelands.

Purpose and Effect of the Development

The purpose of the Project is to continue to allow the KSURP area to reach its full economic development potential by providing the opportunity to infill underdeveloped areas and achieve the full build out of the urban renewal district. As the development plan described in the original KSURP and subsequent Plan Amendments has been realized over the last several decades, both Cambridge Center and Kendall Square have developed into one of the Commonwealth's most important economic development engines and a major center for academic, technological, and biomedical innovation nationally. However, past development has focused on commercial office development and, more recently, limited ground floor retail, which has not yet resulted in an optimal "18-hr" urban mixed use neighborhood. This is the focus of the proposed Project – to support the continued success of Kendall's innovation economy including thousands more jobs, and build on that achievement by creating a more livable complete neighborhood of lasting value by introducing more residents, expanding retail uses to sustain a more active district, improving the quality of open spaces, growing the capacity of public transit, and more.

To accomplish this, the CRA is proposing changes to existing zoning to allow for approximately 1,034,000 gross square feet of new development in the form of three significant Project Components anticipated to be constructed in two phases (refer to Table 1-1 of Chapter 1, *Project Change Description*).

- **Phase 1**, totaling approximately 748,400 net new gross square feet, includes the redevelopment and vertical expansion of the existing Cambridge Center North Garage with commercial office, innovation space, and retail space, and construction of a new Eleven Cambridge Center Residential Building with ground-floor retail and residential (294 units) on the upper floors.

- **Phase 2**, totaling approximately 211,100 net new gross square feet, includes construction of the Three Cambridge Center Mixed Use Building with a combination of commercial, retail, and residential space (266 units).

In addition, the Whitehead Institute Addition and Broad Institute Office Conversion together will add approximately 75,100 net new gross square feet of commercial space. In total, the Project will introduce approximately 584,600 gross square feet of office space, 50,000 gross square feet of retail space, 560 residential units and up to 740 parking spaces.

Impact on Abutters and Community

In line with the goals originally set forth by the KSURP in 1977, the Project will bring new residents, employees, customers and visitors to the area, supporting economic development and public activity. More activity in the KSURP area will be generated beyond the typical business day by introducing new residents to the area. Up to 560 new housing units will be created, 15 percent (84 units) of which will be provided at an affordable rate to low- and moderate-income households. A building height bonus to incentivize developers to provide middle-income units will provide a mechanism to further address the affordability situation facing Kendall Square today. This additional residential combined with new incentives in the KSURP Amendment encourage a broader array of sustenance retail, such as a food market or drug store that are so necessary for a livable, complete urban neighborhood. Commercial space will be targeted to a mix of tenants from the bio-tech, information technology and/or health care industries, including dedicated innovation space which is designed to support smaller startup companies – helping build Kendall Square's innovation ecosystem. The Project will create an estimated 2,650 construction jobs in all trades and over 2,600 permanent jobs, as well as a total of approximately $6.7 million in new annual local tax revenue.

The Project will have many positive impacts on abutters and the community related to transportation, open space, environmental impacts/sustainability, and social and economic development. The KSURP area is already well-served by multi-modal transportation infrastructure, including a variety of MBTA services (on-site access to the Red Line as well as several bus lines, as well as Green Line nearby), EZ RIDE shuttles, on-street bike lanes, cycle tracks, sidewalks, crosswalks and multi-use pathways. Improved pedestrian accommodations at study area intersections, new mid-block crossings, and improved pedestrian lighting will improve the pedestrian environment. The proposed Kendall Square Transit Enhancement Program (the "KSTEP") in coordination with MassDOT, MBTA, and the City will attempt to solidify the future of needed growth in public transit capacity in the district. An aggressive TDM plan will aim to improve on an already exceptional two-decade mode split record that continues to reduce single-occupancy trips to the KSURP area, while intersection improvements will improve traffic circulation performance and emissions on the local roadway network. New parking to support the new

commercial and residential development will be provided at a reduced ratio reflecting and reinforcing the favorable walking/biking/transit mode split in the district by adding an additional level to the Cambridge Center North Garage and in a new, separate below-grade facility to be located under the new Eleven Cambridge Center Residential Building.

New and upgraded public green spaces will connect buildings within the KSURP area, including an upgraded Sixth[h] Street Walkway and interstitial spaces connecting through the block between Broadway and Binney. A new partially enclosed public green space, or winter garden, is proposed to replace the existing public park at the Cambridge Center North Garage, and is designed to be open-air during good weather, explicitly welcoming visitors in with retail or food and beverage. Additional public open space may be provided along the Grand Junction Rail Corridor and on building rooftops, where roof gardens could help improve water quality and reduce the heat island effect. The Project also encourages private open spaces, such as balconies and terraces as part of residential development. The Proponent views this as an important quality of life component of dense vertical urban living that also adds a distinctly human component to residential architecture, further differentiating it from commercial buildings.

Enhancement of the Property

The Project will use land efficiently through infill development, including the re-use and vertical expansion of an above-ground parking structure with dense commercial development and replacing underutilized and outdated office buildings with a mix of uses that is responsive to the area's needs, especially residential. The Cambridge Center North Garage property will be further enhanced by enveloping the existing parking structure in new development concealing it visually from public view and introducing a new buildings on the north and south sides that address the sidewalk including a new year-round (summer indoor/outdoor) public green space and winter garden (Figure 1.2) on the Broadway. The ground level of the Eleven Cambridge Center and Three Cambridge Center properties will be activated with new retail uses. Expansion of the Whitehead Institute and conversion of the Broad Institute by Other Developers will enhance those properties with new/modern commercial space providing new research and employment opportunities in the KSURP area.

Other proposed elements of the Project will enhance the KSURP area beyond the Project Component property boundaries. These include streetscape improvements using superior urban design, the extension of the Grand Junction Multi-Use Path, capacity improvements to the Sixth Street Walkway, increased pedestrian permeability between buildings, new mid-block crosswalks, new bike paths and infrastructure upgrades (as needed). Further, the proposed KSTEP will result in a range of projects, programs, and services directed at improving and enhancing transit and related options for all properties within the KSURP area.

Benefits to the Public Trust Rights in Tidelands or Other Associated Rights

The KSURP area is located on filled tidelands associated with an approximately the former 100 foot-wide channel, the Broad Canal, constructed in the early/mid-19th century to provide ship access through the City of Cambridge. This area of the canal was filled in the middle of the 20th century. Until the mid-1960s, the KSURP area was an industrial and commercial area. Clearance of the land under the KSURP allowed a range of new commercial structures to be built totaling approximately 2.77 million gross square feet, three (3) parking garages to support the new development as well as public open space (parks, plazas) and other public improvements over the past 50 years. While the KSURP has been successful in eliminating historically blighted conditions, the Project will continue to meet many of the economic development goals and objectives of the KSURP.

The Project provides the opportunity to further study improvement projects that would benefit the public including, but not limited to, the following considerations;

1. Improving the public realm by activating the ground-level spaces with pedestrian-oriented retail and residential and office lobbies.
2. Creating a vital public realm component by constructing the new Winter Garden along Broadway at the base of the Cambridge Center North Garage Office Buildings for year round use (Figure 1.2).
3. Improving pedestrian permeability through and around the Project Site, including along service roads on both sides of the Cambridge Center North Garage and between buildings by enhancing pathway qualities and features, and construction of a mid-lock pedestrian crosswalk at the Cambridge Center North Garage (Figure 1.4), and improvements to the Sixth Street Connector (new hardscapes, seating, lighting and accessibility for food trucks).
4. Expanding bicycle connections through the incorporation of bike paths, routes, and infrastructure throughout the KSURP area as prioritized on the City's Bicycle Network Plan, including, but not limited to, the extension of the Grand Junction Multi-Use Path (which the CRA has already begun constructing on the edge of the KSURP) as well as the extension of the existing Binney Street Cycle Track from Sixth Street to Vassar and Main Streets (Figure 2.7).
5. Enhancing public transit services and improving mobility throughout Kendall Square.

The traditional public trust rights in tidelands (i.e., the right to fish, fowl, and navigate) have long been precluded at the Project Site by the historic filling and development the Broad Canal in the middle of the 20th century. However, the modern expression of these traditional public trust rights (such as improved public access to the ground-plane and facilities of public accommodation) on filled land isolated from the existing water sheet will be realized by the proposed public realm

improvements, such as the Winter Garden create public access a year-round and pedestrian enhancements aimed at improving permeability through and around the Project Component sites. Additionally, transforming a parking structure and generally private, inaccessible, outdate office uses into a more active mix of uses through the introduction of residential and ground floor retail uses fulfills a key community desire within the KSURP area.

Community Activities on the Project Site

A core principle driving the changes seen in the KSURP Amendment No. 10 and the Project's preliminary design is to create a more dynamic, livable, complete urban environment and civic realm in Kendall Square. The Proponent is seeking to create an "18-hour" urban neighborhood that is more socially vibrant, environmentally responsible, economically sustainable, and measurably healthy than before. The Project will result in a substantial net improvement to community activities within and surrounding the Project Site by enhancing walkability, bikeability and transit-friendliness of the neighborhood, by introducing more active uses, including ground-floor retail and hundreds of market, middle and lower income units of residential to support them, as well as creating a unique year-round public open space—the winter garden – that is designed as an indoor/outdoor space in good weather. The winter garden is proposed for the entry plaza of the Cambridge Center North Garage Office Buildings that will provide an activated, public and climate-controlled public space available for year round use. Improvements to the Sixth Street Walkway and connecting interstitial spaces that permeate the block between Broadway and Binney Street will also be made, including new hardscapes, seating, lighting and opportunities for more programming in these spaces. Additionally, the expansion of bike routes prioritized in the City's Bicycle Network Plan, is proposed throughout the KSURP area, including extending the Grand Junction Multi-Use Path which passes through the MXD District, and the Binney Street Cycle Track. These projects will further advance Kendall's connectedness to adjacent neighborhoods and cities.

As Kendall Square infill's, the Proponent seeks to create a more socially inclusive neighborhood and contribute in small part to the housing affordability crisis in the urban core by dedicating a portion of the up to 560 new housing units as inclusionary units for low- and moderate-income households (15%), as well as a height bonus to incentivize construction of additional middle income units (additional 100' of height).

A hallmark of the Project is the Enhanced Transit Mitigation Fund (ETMF), which is a unique economically sustainable mechanism to enable the enhancement of transit service/capacity that will accommodate future Kendall Square development. A small amount of additional structured parking will be integrated to support the new commercial and residential development.

Environmental Protection/Preservation

The overall goal of the Project is to create a variety of new uses while avoiding or minimizing potential adverse environmental and community impacts to the greatest extent feasible. Potential environmental impacts will be mitigated in accordance with all applicable local, state, and federal environmental protection regulations. Table 1-2 of Chapter 1, *Project Change Description* provides a list of the local, state, and federal permits or approvals anticipated to be required. Additionally, the Project will result in substantial community benefits, including new housing and job opportunities, mobility improvements, public open space and other public realm improvements.

In accordance with the MEPA regulations, the 2015 NPC and this SEIR examined the potential for the Project to result in environmental impacts and included detailed descriptions of how the Project aims to avoid, minimize or mitigate potential impacts related to:

- Traffic/Transportation
- Parking
- Air Quality
- Sustainability and Greenhouse Gas Emissions
- Climate Change Adaptation
- Stormwater Management
- Water and Wastewater
- Hazardous Materials
- Construction

The 2015 NPC and this SEIR build on previous impact analyses by re-evaluating traffic impacts based on updated background growth information, evaluating changes in regional air quality (i.e., mesoscale air quality analysis), and assessing GHG emissions, in accordance with the current MEPA GHG Policy. The Project consists of urban infill with dense, highly-efficient buildings, a building reuse component (the Cambridge Center North Garage Office Buildings) that preserves the embodied energy of existing materials and a proven record of significantly reduced single-occupancy vehicle trips through alternative modes of transportation—all of which result in significantly less GHG emissions compared to a suburban "greenfield" development.

Historically, as documented by the FST analysis, actual trip generation in Kendall Square is significantly lower than the typically suburban-oriented methodology for average daily vehicle trip projections due to the high proportion of alternative modes, including transit, walk and bike, by commuters, shoppers, visitors, and residents in Kendall Square. When taking the historic FST traffic monitoring data and adjustments for area-specific mode splits and vehicle occupancy rates into account, the Project will generate an estimated 3,638 adjusted vehicle trips. The Project will improve access and circulation through intersection improvements to the local roadway network as well as pedestrian and bicycle facilities. Additionally, the Proponent proposes to establish the KSTEP—a program designed to enhance mobility around the KSURP

area, including major transportation initiatives that will improve transit options and services—in conjunction with MassDOT, MBTA, the City and other stakeholders.

While the new development as described in the Project Change will result in relatively confined long-term impacts on traffic, the substantial community benefits that redevelopment will bring to the community and the continuation of growth in the KSURP area far outweigh the potential negative impacts. Further, the proposed redevelopment will result in improved conditions of each Project Component site, including improved streetscapes, enhanced pedestrian and bicycle facilities, and improved water quality and other infrastructure systems.

Public Health and Safety

The Project will promote public health and safety through implementing a site design that provides safe and universally accessible facilities. The design includes improvements to increase pedestrian and bicyclist safety, and accessibility throughout Kendall Square while continuing to upgrade the ADA accessibility and Universal Design compliant features of the public realm. Improvements include additional or modified pedestrian countdown timers at study area intersections, improved lighting on sidewalks and pathways for safer pedestrian accommodation, and a new mid-block pedestrian crossing on the south side of Broadway between the proposed North Garage Office Buildings and Danny Lewin Park. It will also aim to provide a high-quality indoor environment for users by creating a Tenant Manual/Guidelines to encourage sustainable design and operation of tenant spaces, such as encouraging the use of the LEED-CI standard for tenant fit-out of commercial spaces.

In the face of public health challenges facing the United States, the design of our built environment has become a key element in combating the risk factors for chronic disease such as heart disease and obesity. Evidence shows that the design of the built environment where we live and work has strong links to health, with living and working conditions in homes and communities being just as important a factor influencing health as medical care and personal behavior. The existing Kendall Square today already supports most of the key features of the Urban Land Institute's 21 evidence-based recommendations found in their 2015 Building Healthy Places Toolkit; incorporating a mix of land uses, designing well connected street networks at the human scale, providing sidewalks and enticing pedestrian oriented streetscapes, providing infrastructure to support biking, accommodating a grocery store, hosting a farmers market, supporting on-site gardening and farming, and facilitating social engagement. The Project components and proposed mitigations build on this success to move Kendall Square toward becoming a model healthy urban neighborhood.

General Welfare

The Project will protect the general welfare in a variety of ways as described previously including but not limited to the integration of affordable and middle income housing, zoning incentives for grocery stores and pharmacies, more and better public and private open/green space, dedicated long-term funding for public transit, pedestrian and bicycle safety improvements, and strong attention to environmental sustainability and climate change adaptation/resiliency.

The Project will comply with and seek to go above and beyond applicable local, state, and federal environmental protection standards. As discussed in Chapter 8, *Construction*, the Project will be constructed in accordance with Construction Management Practices (CMP) prepared for each Project component subject to review and approval by the City. The CMPs will be designed to avoid, minimize and mitigate construction period impacts protecting the general welfare in a meaningful way during the construction process.

Protection of Groundwater

The Project Site is not located in an area identified by the City for having low groundwater levels which would be a threat to building foundations. As described more fully in Chapter 5, *Stormwater Management*, the Project will comply with the applicable City stormwater requirements and MassDEP Stormwater Management Policy. The Project will explore the use of recharge to the maximum extent feasible. The loss of annual recharge to groundwater by new developments will be limited as each Project Component will be located on parcels that are significantly impervious in the existing condition. To compensate for any possible annual recharge loss, and to meet City stormwater requirements, recharge to groundwater will be a key component of the stormwater mitigation strategy. Therefore, the Project will provide a net benefit over the existing condition to groundwater, if levels are identified as being low enough to affect building foundations. As a comparison, the Boston Groundwater Trust, which identifies and monitors low groundwater levels in the Boston Groundwater Conservation Overlay District, requires all new developments infiltrate the equivalent of 1 inchof stormwater runoff over the impervious area to groundwater. As shown in Table 5-2 Proposed Site Hydrology, the conceptual stormwater management plan includes 19,440 CF of stormwater infiltration systems, which will provide the equivalent of infiltrating 1.75 inches of runoff over the site impervious area, or 1.34 inches over the impervious and pervious areas. These infiltration volumes significantly exceed the requirements of the Boston Groundwater Trust, and are equally relevant to improving low groundwater levels in the KSURP area.

Stormwater quantity and quality control measures will be investigated and considered as design progresses for each Project Component. These control measures may include, but are not limited to, the following:

- Subsurface infiltration systems
- Green roofs
- Rainwater harvesting
- Permeable pavements
- Proprietary treatment devices
- Bioretention landscaped areas and streetscape designs
- Deep sump, hooded catch basins

As discussed in Chapter 7, *Hazardous Materials*, the Project will require characterization of the soil and groundwater conditions for management of contaminated soil during construction and to evaluate the residential use exposure scenario. It is assumed that testing of soil and groundwater at the Cambridge Center North Garage and Eleven Cambridge Center will result in a new reporting condition to MassDEP and that activities at the properties would be subject to the requirements of the MCP, 310 CMR 40.0000. It is anticipated that testing of groundwater in the area outside Three Cambridge Center may also result in a new reporting condition.

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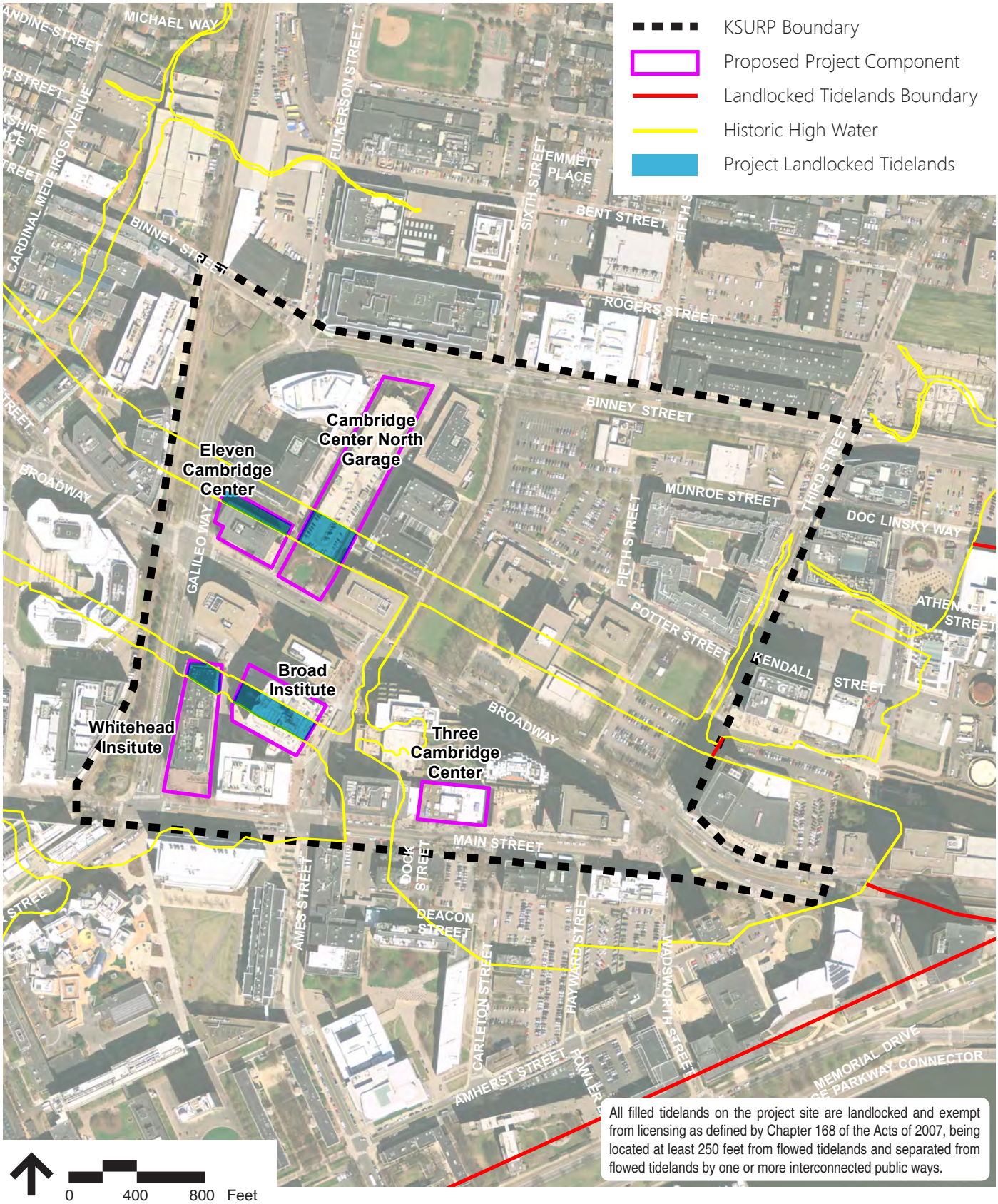

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Figure 9.1
Landlocked Tidelands

Kendall Square Urban Renewal Project Amendment No. 10
Cambridge, MA

Source: City of Cambridge GIS, MassGIS

10

Summary of Proposed Mitigation and Other Beneficial Measures

NOTE: This chapter was previously numbered Chapter 9 in the NPC.

KEY:

Text represents new or substantially revised narrative description from the NPC.

Section Heading represents an entirely new or substantially revised section from the NPC.

Table Heading represents an entirely new or substantially revised table from the NPC.

Introduction

In accordance with the NPC Certificate, the following chapter first presents a consolidated overview of the proposed mitigation measures required to demonstrate the Project will avoid, minimize, or mitigate Damage to the Environment to the maximum extent practicable, per the MEPA regulations. Separately, this chapter also summarizes the other components of the Project that will benefit the environment and/or community.

The Project requires DHCD's approval of the Major Plan Amendment to the KSURP. The Proponent will continue to monitor traffic within Kendall Square on an annual basiss to determine the effectiveness of TDM initiatives and/or traffic improvements in compliance with the 1994 Section 61 Findings. Aditionally, in accordance with the MEPA GHG Policy, the Redeveloper will submit a self-certification to the MEPA Office following construction of each Project Component to demonstrate that GHG emissions mitigation measures have been implemented. See the draft Letter of Commitment provided at the end of this chapter.

As demonstrated by the environmental analyses provided herein, the Project includes measures that fully and adequately address any actual or potential environmental impacts from the Project. Key public benefits from the Project include significant urban design and public realm improvements, increased housing opportunities, expanded retail options in Kendall Square, job creation and additional state and local tax revenues. The Project will result in sustainable, smart growth by favoring development in an urban area well-served by public transit over suburban, sprawling development. A summary of public benefits associated with the Project is provided in the *Project Summary* chapter.

Detailed descriptions of the proposed mitigation and other beneficial measures are set forth below. In addition to the public benefits and physical mitigation and other beneficial meausres, the Proponent and Redeveloper as well as other stakeholders in the KSURP area, including MassDOT, MBTA, the City and Task Force, recognize that preserving and enhancing the public transit that serves Kendall Square is central not only to the success of the Project, but is required to support other planned development in the area. Therefore, through the creation of the KSTEP (a program of transit enhancements described more fully under the 'Transportation and Parking' section), the Proponent is committed to developing a MOU with MassDOT and the MBTA, together with the Redeveloper and the City, as a mechanism to identify and implement appropriate transit improvements consistent with the KSTEP. The MOU will be developed following completion of Task Force efforts, which are expected to identify appropriate transit improvements in the KSURP area.

Transportation

As discussed in Chapter 2, *Transportation and Parking*, the proposed transportation mitigation is aimed at addressing the Project-related impacts associated with additional vehicle trips. Proposed traffic operations mitigation measures include local intersection improvements, such as signal timing adjustments and roadway geometric changes which are to be coordinated and confirmed by the City through the future local review process for each Project Component.

As documented by the FST analysis, the KSURP area has consistently shown that actual vehicle trip generation in Kendall Square is significantly lower than the accepted methodology for projecting increases in traffic. The Proponent and Redeveloper are committed to continuing to implement a robust TDM plan targeted at reducing single-occupancy vehicle trips associated with the Project to preserve the favorable mode share balance in Kendall Square. In addition, the Proponent will continue to conduct annual traffic analysis of Kendall Square in compliance with the 1994 Section 61 Findings. The Proponent proposes to update the scope of the monitoring program to reflect the evolution of Cambridge's transportation priorities in a complex multi-modal urban environment such as Kendall Square.

Proposed Vehicular Access and Circulation Improvements

All traffic operations mitigation proposed at local intersection improvements will be coordinated and confirmed by the City through the future local review process for each Project Component. The LOS analysis performed at the study area intersections indicate that there are intersections where improvements can be made to reduce vehicle delay and enhance the overall intersection operations. These intersections have been studied from a vehicular operations standpoint and possible improvements have been suggested below. These suggested improvements will be discussed in detail with all stakeholders in the broader context of other proposed improvements. The final design and implementation of any vehicular access and circulation improvements associated with the Project will be agreed upon by all involved parties.

The Proponent understands that other users including pedestrian and bicyclist use these intersections and any improvements made need to consider the safety of all users. Therefore, additional studies may need to be done to ensure improvements at study area intersections have considered all user groups and maintained or improved safety and operations for all. The intersections studied for the purposes of this mitigation analysis are summarized below (refer to Chapter 2, *Transportation and Parking* for further details):

- **Cambridge Street/Third Street** – PM signal optimization;
- **Broadway/Galileo Galilei Way** – Signal optimization with permitted left turns;
- **Main Street/Vassar Street/Galileo Galilei Way** – Protected east/west left turn phase and signal optimization;
- **Memorial Drive/Route 3/Ames Street** – Additional right-turn only lane on Ames Street; and
- **Massachusetts Avenue/Memorial Drive Off-Ramps** – Signal optimization with right-turn on red.

The proposed mitigation at each of the intersections is documented. Refer to Chapter 2, *Transportation and Parking* for the 2024 Build Mitigated LOS analysis was performed to quantify the improved traffic operations at these intersections. The proposed vehicular improvements to particular intersection timings and phasing will maintain current cycle times as to not greatly impact pedestrian wait times at these intersections All intersections with proposed mitigation will continue to provide adequate walk time for pedestrians of all abilities to safely cross the intersection. The Proponent will work with the City to determine the specific vehicular access and circulation improvements to be made within the study area.

Proposed Transportation Demand Management Measures

The proposed TDM measures aim to reduce drive-alone trips, or single occupancy vehicles (SOVs), by encouraging employees, residents and visitors to use alternative modes of transportation. The proposed TDM plan for the Project includes consideration of enhanced TDM measures outlined in the K2 Final Report 2013, where applicable and feasible as well as Project-specific measures. Overall, the goal of the proposed TDM Plan is to reduce the use SOVs by encouraging carpooling and vanpooling, bicycle commuting and walking, and increased use of the Kendall Square public transportation system by employees and residents. The following TDM measures will be implemented as part of the Project:

- Appropriate pricing of parking – market rate paid by employees.
- Encourage employers and tenants to provide transportation benefits paid to all employees for commuter expenses regardless of mode, or 100 percent transit subsidy.
- Offer new residents a transit subsidy (exact terms to be based on City coordination).
- Provide free access to EZRide shuttle to Lechmere and North Station.
- Encourage employers and tenants to provide private employee shuttles.
- Provide adequate bicycle parking and benefits including Hubway availability and possible membership subsidy.
- Maintain eight (8) parking spaces for ZipCar® car share parking currently in East Garage and determine the feasibility of implementing or sponsoring additional car-sharing program.
- Provide designated car-share parking spaces within and/or nearby Cambridge Center parking garages to the car-share business, if deemed feasible.
- Provide preferential parking to carpool and vanpool participants.
- Provide additional electric vehicle (EV) charging stations and preferential parking to alternative fuel vehicles, as dictated by market.
- Designate a Transportation Coordinator to oversee all transportation-related operational matters at each Project Component site, including vehicular operations, servicing and loading, parking and implementation of the TDM Plan. The Transportation Coordinator will act as the contact and liaison for the City, local Transportation Management Association (TMA) and tenants of the Project.
- Post and make available transit maps, schedules and other information relevant to commuting options in the office and residential building lobbies.
- Provide real-time transportation information in all new and "significantly" renovated/improved lobbies within the Project Components using Transit Screen or other similar products including online platforms.

- Display real-time transit information in the public plaza framed by the Marriott Hotel at Two Cambridge Center, and One and Three Cambridge Center on Parcel 4.
- Continue to participate in the Charles River TMA who's membership includes, but not limited to:
  - Emergency Ride Home,
  - NuRide – Ridematching system from MassRIDES, and
  - Carpool and vanpool matching.
- Implement shared parking strategies to reduce the number of new parking spaces needed to support the Project.
- Implement new parking pricing strategies to discourage parking in the area and reduce vehicle trips to the area.
- Monitor mode share goals identified as part of the K2 planning process though the proposed Traffic Monitoring Program (described further in the next section).

Proposed Traffic Monitoring Program

The Proponent will continue to conduct the annual traffic study and analysis of Kendall Square based on the 20 years of vehicle traffic data collected in compliance with the 1994 Section 61 Findings. The Proponent plans to update the scope of the monitoring program to reflect the evolution of Cambridge's transportation priorities in a complex multi-modal urban environment such as Kendall Square. The improved study shall utilize the most up to date development square footage and traffic projections as well as more holistically consider additional data on bicycles, pedestrians, travel behavior and transit service, as it becomes available.

Changes that may be considered in a new scope of work to be developed by the Proponent in the near future may include, but not limited to, the following:

- Obtain and utilize basic data on ridership at the MBTA Kendall Square/MIT station for both subway and bus services.
- Include boarding information from EZRide shuttle and other bus services in the area, as data becomes available.
- Update the tenant questionnaire to be more specific on the mode split – differentiating the type of bus (MBTA, EZRide) or new systems, such as Bridj™ and Uber.
- Differentiate between transient and monthly parkers in the garage data collection process.
- Evaluate new bicycle count locations in response to installation of new bicycle facilities.

- Evaluate the annual traffic data collected by other parties and investigate collaborative reporting over a broader geographic scope.
- Utilize emerging pedestrian, bicycle, and traffic counting technologies as they become feasible and fully comparable to existing dataset.

Proposed Public Transit Improvements

The transit operations analysis previously presented was expanded both in accordance with the NPC Certificate and to address reviewer comments received on the NPC. The updated analysis demonstrates that the potential impacts on Red Line capacity as a result of the Project are *de minimus*. Assuming that the Red Line operates according to the published schedule, it can accommodate future ridership with and without the Project, with the exception of one service segment. Without the Project and accounting for estimated future ridership, the morning peak hour inbound train entering Kendall Square/MIT station would operate at over capacity (Table 2-36b). With the Project, there is a slight increase in passenger demand (two percent) due to an estimated additional 181 transit trips during this service segment (Table 2-36b). The proposed TDM measures, including encouraging employers to allow employee flex-time and/or provide employee shuttles, will help to manage peak period congestion. However, the MBTA system operational improvements that would be needed to address the Red Line capacity and frequency of service issues are larger and more complicated than any single development can reasonably impact.

In recognition of the critically important role transit access and mobility play to the successful redevelopment and expansion in the MXD District and the Kendall Square area, the Proponent and Redeveloper have been meeting to discuss a more comprehensive approach to address potential future public transit capacity issues through development of a fund to implement transit improvements in the Kendall Square area following the completion of certain public review processes described below.

Led by MassDOT, the Kendall Square Mobility Task Force (the "Task Force") has been charged with work over the next year to identify public transit improvement projects and policy initiatives in support of the continued success of Kendall Square. These projects and initiatives are intended to be technically and financially achievable over the short, medium, and long-term horizons. Both the Proponent and Redeveloper are active members of the Task Force, and the Proponent intends to use the outcomes of the Task Force's study and recommendations to shape the final transit mitigation plan and measures for the Project, working in close cooperation with MassDOT and the MBTA.

The City established a Transit Advisory Committee in May of 2013 to help identify, plan, and provide support to the public transportation problems within the City. The committee published the Cambridge Transit Strategic Plan to identify the current conditions of public transportation in the City and established seven unique goals to help improve the system and provide better services to the residents, businesses and visitors of the City. These goals, listed below, align with the Proponents vision for the KSURP area.

- Mobility
- Funding
- Efficiency and Reliability
- Expansion
- Usability, Accessibility, and Safety
- Public Participation, Support, and Outreach
- Resiliency

The Proponent is currently discussing these goals and future vision of public transportation in the KSURP area with stakeholders, including MassDOT, the MBTA, and the City.

Proposed Kendall Square Transit Enhancement Program (KSTEP)

The Proponent and the Redeveloper remain focused, as they have throughout the development of Cambridge Center, on preserving and enhancing the favorable transportation mode split in Kendall Square that has played such an important role in the successful redevelopment of the area. It is acknowledged and well documented that 70 percent of trip making in Kendall Square utilizes transit, walking, biking, shuttle and carpool. This remarkable factor is at the core of the opportunity for the Project. The importance of preserving and enhancing this condition cannot be overstated and is central to the Proponent's plans for expansion of the KSURP.

The Proponent and Redeveloper are committed to developing an expanded program of transportation enhancements designed to both preserve the favorable mode share balance in Kendall Square and provide additional improvements to support local efforts to further reduce the vehicle trips generated as a result of the Project and the broader Kendall Square area. The KSTEP will be developed in conjunction with the many stakeholders engaged in transportation planning and operations in Kendall Square, including the Task Force, the MBTA, and MassDOT. The KSTEP would supplement the proposed transportation-related mitigation and other beneficial measures described herein.

The Proponent and Redeveloper have engaged in multiple discussions with MassDOT and the MBTA to discuss the Project, its impacts, and potential transportation mitigation and enhancements in the Kendall Square area. A range of issues have been identified and potential improvement opportunities considered for

inclusion in the KSTEP program. The KSTEP would be designed to enhance access to and mobility around Kendall Square, which the Proponent believes is critical to the long-term economic success of the area. It is expected that the KSTEP will be focused on major transportation initiatives that will improve transit options and services in Kendall Square. They will include a range of projects, programs, and services directed at improving and enhancing transit and related options for people working, living, and visiting the Kendall Square area. The KSTEP would focus on enhancements to transit. Transit and transit-related improvements options to be considered would include both capital and operational investments that would result in service level improvements and capacity expansion in Kendall Square.

The Proponent recognizes that the development of the KSTEP will require detailed consideration and analysis of the enhancement alternatives as well as careful coordination with the stakeholders and service providers. As stated above, the Proponent believes that this analysis can be undertaken in conjunction with the Task Force. The analysis will be designed to coordinate with the City's Transit Strategic Plan, which is focused on improving transit capacity and quality throughout the City. The Proponent, in coordination with the City, will work with Mass DOT and the MBTA to develop the elements of the KSTEP, which can be refined supplemented over time as the Task Force completes it work.

The KSTEP would be supported by immediate and long-term funding commitments facilitated by the Proponent and Redeveloper in connection with the approvals for the Project. It is the expectation of the Proponent that consultations with the MBTA, MassDOT, and the City will continue to examine a range of potential transit improvements for Kendall Square to be included in the KSTEP and on the appropriate mechanism(s) for making commitments for these improvements and incorporating the program elements into the transportation planning processes at the City and state level. The Proponent recognizes the extensive demands and limited resources available to MassDOT and the MBTA for service improvements throughout the system.

The Proponent is committed to developing a MOU with MassDOT and the MBTA, together with the Redeveloper and the City, as a mechanism to identify and implement appropriate transit improvements consistent with the KSTEP. The MOU will be developed following completion of Task Force efforts, which are expected to identify appropriate transit improvements in the KSURP area. The Proponent, in coordination with the City and the other parties to the MOU, will establish and maintain the KSETF for the purpose of establishing funding priorities and allocations for identified transit improvement projects.

The Proponent is committed to filing the draft MOU with MEPA for review by July 1, 2016 following the completion of the Task Force's work and the initial efforts to create the KSTEP. The KSTEP will be based upon the recommendations of Task Force, which is anticipated to be completed in February 2016. As a transit mitigation measure for the Project, an initial payment of the sum of not less than $6 million for transit improvements

recommended by the KSTEP will be contributed to the KSETF as a "fair share" contribution. This one-time payment would be made at the time a Building Permit is obtained for the first major phase of the Project. Additionally, through a mechanism(s) to be determined by the terms of the MOU, the KSETF will receive additional funding to be provided by the Redeveloper, which will represent an allocation of funding under the KSURP supplemented by contributions from others. The MOU process will ultimately lead to a plan, agreed upon by all involved parties, of mitigation measures the Proponent and Redeveloper will implement to improve the public transportation infrastructure and experience within the KSURP area.

Over the coming months, the key stakeholders will continue to work closely to develop and refine the KSTEP proposal, including additional details on the potential source of these funds and the range of transit mitigation projects and program options for consideration, including:

- **MBTA Red Line Kendall Station Improvements** - Immediate operating and capital improvements to the existing transit infrastructure at Kendall Station, including station capacity and egress, Kendall Square transit information, communications and way-finding, Red Line ticketing, climate change adaptation/resiliency, bus and bicycle connectivity, and overall station functionality and appearance.
- **Kendall Station / Kendall Square Connection Enhancements** - Capital support for improving existing or new ground transportation via non-MBTA shuttles and/or MBTA buses or Bus Rapid Transit (BRT) aimed at facilitating access to and from Kendall Square.
- **MBTA Red Line Service Modernization and Improvements** - Signal, track and other technology improvements designed to increase capacity and reliability especially at peak-of-the-peak including enhancing headways (time between service) and other improvements that will positively impact the quality of transit service and the customer experience.
- **Long-Range Feasibility Investigations** – Planning for and potential capital investment toward new public transit services.

Proposed MBTA Bus and EZRide Shuttle Improvements

The Proponent understands the importance of the bus system within the Kendall Square area, both the MBTA routes and the EZRide Shuttle. As indicated in the analysis, bus operations will be affected by Project-generated traffic, particularly the EZRide Shuttle. The Proponent will work with the MBTA, City, and Charles River TMA to evaluate potential bus operations improvements in the KSURP area, including:

- Studying and partially funding the increase in EZRide service. The Proponent will work with the Charles River TMA to devise a plan as to how EZRide can best

serve the community in the future and provide support to the expansion of EZRide service including, but not limited to:

- Decreasing headways
- Increasing bus fleet
- Optimizing bus routes

- Implement the proposed local roadway intersection signal improvements, discussed and analyzed (refer to the 'Proposed Vehicular Access and Circulation Improvements' section below), which will decrease delay at specific intersections that MBTA buses pass through. The bus routes anticipated to experience reductions in delay include Routes 64, 68, 85 and EZRide at the intersections of Broadway at Galileo Galilei Way and Main Street at Galileo Galilei Way/Vassar Street, respectively.
- The Proponent will discuss with the City, MBTA and MassDOT as part of the MOU process, the study and possible implementation of the following bus mitigation measures along the bus routes serving the area:
  - Bus Priority Signals
  - Bus Lanes
  - Bus Shelter Improvements
- Implementing the extension of bus routes from Central Square to Kendall Square.

The August 25, 2014 draft report, Central Square Access and Circulation Study Existing conditions Analysis (Task 1) presents a story that there is a potential need for a bus connection between Central Square and Kendall Square. Many passengers riding buses that terminate at Central Square use the Red Line to make their last connection to Kendall Square. With the extension of MBTA bus route(s) to Kendall Square demand could be shifted away from the Red Line and a vital second connection would be made between Central Square and Kendall Square. This study is still ongoing as there are three more tasks to be completed with the anticipation that the study will result is recommendations directed at the topic of extending MBTA bus routes to Kendall Square. The Proponent is eager to learn of these recommendations and is committed to helping implement any recommendations directed at this topic. Due to the timeframe of this study and the proposed Project schedule, the Proponent will revisit this topic when the final recommendations are published and will work with the City and other stakeholders as to how these recommendations can be implemented.

Proposed Pedestrian Access, Safety, and Streetscape Improvements

As discussed previously, the KSURP area provides excellent pedestrian accommodations, including sidewalks on all study area roadways and crosswalks at all study area intersections. The City is ahead of many other communities in utilizing pedestrian countdown timers with LPI programming and many of the signalized

intersections within the KSURP area have pedestrian countdown timers with such technology.

Both the Proponent and Redeveloper are committed to creating a cohesive integrated network of open spaces and connecting pathways while improving pedestrian safety, access and circulation within the KSURP area. The Proponent, in conjunction with the Redeveloper, will work with the City to identify areas of improvement. Measures could include the following:

- Provide additional pedestrian countdown timers at study area intersections.
- Implement LPI programming at study area intersection.
- Incorporate a new mid-block pedestrian crossing on Broadway between the proposed Cambridge Center North Garage Office Buildings and Danny Lewin Park on the south side of Broadway (refer to discussion below for more details).
- Improve the Sixth Street Connector by increasing driver awareness of the pedestrian crossing with advanced warning signs. In addition, this connection should be studied for the implementation of a HAWK system (discussed further below).
- Review all pedestrian crossings within the KSURP boundaries to assess their potential for bulb-outs, raised crossings, pedestrian refuge islands, Rectangular Rapid Flashing Beacons (RRFB's), re-aligned non-apex ramps and/or other treatments to enhance the comfort and visibility of crosswalks.
- Enhance the Main Street streetscape between Ames Street and Galileo Galilei Way.
- Enhance the Broadway streetscape from Ames Street to Galileo Galilei Way.
- Enhance the Binney Street and Galileo Galilei Way streetscape from Sixth Street to Broadway.
- Improve pedestrian safety by enhancing lighting along sidewalks and pathways for safer pedestrian accommodations.
- Enhance open spaces with multiple outdoor connection to buildings within the KSURP area.
- Support roadway and streetscape improvements along Galileo Galilei Way between Binney and Main Streets.

Broadway Mid-Block Crossing

The segment of roadway between the proposed Cambridge Center North Garage Office Buildings and Danny Lewin Park on the south side of Broadway is a popular area for pedestrians to cross under existing conditions, although there is currently no crosswalk treatment at this location. With the addition of pedestrian attractions on the north side of Broadway (i.e., The Winter Garden), the addition of a mid-block crossing

would accommodate pedestrians who will continue to create crossing desire lines in the future. As the design of each Project Component advances, the Proponent and/or Redeveloper will study the infrastructure needed to accommodate safe and efficient pedestrian crossing activity at this location in greater detail. These improvements will be reviewed and approved by the City in advance of their implementation. Possible crosswalk treatment options could include the following:

High Intensity Activated Crosswalk (HAWK)

HAWK systems consist of a three light beacon with one cluster overhead attached to a signal arm and another attached to the signal pole on the sidewalk. The beacon only illuminates once a pedestrian presses the button, and this begins the flashing yellow phase to warn vehicles that a change is about to occur. The next phase is a solid yellow light—an indication that vehicles should slow down and be prepared to stop soon. The third phase is a solid red light for vehicles to stop for pedestrians crossing the street. Once the pedestrian crossing time expires, the signal head changes from a solid red to a flashing red. The flashing red phase indicates to vehicles that they should stop and only proceed through the crosswalk after looking both ways. Once the entire cycle is complete, the signal lights are restored to their resting phase until the cross button is activated once again. This crossing treatment is ideal for streets with multiple lanes or wide lanes due to the use of a signal arm and a side signal on the post.

Rectangular Rapid Flash Beacon (RRFB)

This type of crosswalk treatment is pedestrian activated and it consists of pedestrian warning signs with two amber lights directly below. Once the system is activated, the two amber lights alternate flashing to indicate to drivers that there is a pedestrian present at or inside the crosswalk pavement markings. This system best serves roadways with more than one lane or wide geometry with the goal of avoiding the possible multiple threat crash scenario.

Illuminated Street Markings

The crosswalk could incorporate activated flashing lights that outline the markings along the crosswalk. These lights flash yellow for a designated crossing period to emphasize that drivers should use caution and stop if a pedestrian is present in the crosswalk area. In certain situations, this type of crosswalk treatment is used in conjunction with a raised crosswalk.

Advanced Warning Signage

The use of advanced warning signage alerts drivers that there is an upcoming crosswalk, and they should proceed with caution. This is the simplest crosswalk treatment due to the fact that it consists of signage and does not incorporate additional lighting, but some argue that the lack of dynamic lighting does not command driver attention and loses its effectiveness after it is implemented.

Pavement Markings

In areas of high pedestrian volumes, sometimes it is necessary to use more than one form of crosswalk treatment at one crossing location. The use of Sharks Teeth pavement markings before a crosswalk implies that the driver should slow down or yield. These markings may also be used with rumble strips to both reduce vehicle speeds and alert drivers that there is an upcoming crosswalk.

Raised Crosswalk

A raised crosswalk elevates the pedestrians in comparison to the standard at-grade crosswalk. Commonly, raised crosswalks consist of a different roadway material such as red brick to help drivers distinguish the change in elevation along the roadway. Signage is typically incorporated to label the raised crosswalk and provide advanced warning.

Proposed Bicycle Facilities

As discussed previously, the KSURP area is well serviced by bicycle facilities, including on-street bike lanes, cycle tracks, and multi-use pathways. As shown in Figure 2.7, the City and other improvement projects will further add to the bicycle infrastructure in the area.

Both the Proponent and Redeveloper are committed to enhancing bicycle infrastructure at/around each Project Component and within the KSURP area by connecting this infrastructure with other area-wide improvements. The Proponent will discuss with the City the possibility of contributing to the proposed infrastructure improvements within the area, including the cycle track along Galileo Galilei Way and the Grand Junction Multi-Use Path. Additionally, in close coordination with the City, the Redeveloper, and Other Developers, the Proponent will also explore opportunities to create a full service bike station within the area.

Based on the comprehensive evaluation of the existing KSRUP bicycle parking, the current number of supplied spaces complies with the original 1981 Bicycle Parking Requirements, while retrofitting the KSURP area to meet the 2013 Bicycle Parking Ordinance is not required by zoning. However, the Redeveloper is committed to supporting and expanding bicycle ridership within the district through current and

future efforts in a variety of ways. The Redeveloper has donated sites for two Hubway stations located at 250 Binney St and 255 Main Street. And, a third Hubway station will be installed at 88 Ames St in 2018. In addition to these infrastructure commitments, the Redeveloper sponsors a breakfast during the annual "Bike to Work Week" in May as well as provides free bike tune-up and safety checks twice a year (in the Spring and Fall).

Based on the bicycle parking existing conditions occupancy study, the overall existing supply provides more than enough bicycle parking to meet current demand. The analysis did indicate that the North Garage was slightly over capacity during the day. In order to provide enough supply to meet this demand the Redeveloper will provide additional bicycle parking within the North Garage as part of the proposed parking addition as part of the Cambridge Center North Garage Office Buildings.

In accordance with the City's Bicycle Parking Guidelines, the Project will include approximately 802 long-term bicycle spaces and 142 short-term bicycle spaces. Long-term secure bicycle spaces will be distributed between the Cambridge Center North, West, and East Garages, proposed Eleven Cambridge Center Residential Building garage, and Three Cambridge Center Mixed Use Building. Outdoor short-term bicycle parking spaces will be distributed around the KSURP area, focusing on areas around the Project Component sites and other high demand areas observed as part of the existing conditions occupancy study.

Air Quality

A mesoscale air quality analysis was conducted in accordance with MassDEP's *Guidelines for Performing Mesoscale Analysis of Indirect Sources* because the Project is estimated to generate over 6,000 new Unadjusted vehicle trips per day. As summarized in Chapter 3, *Air Quality*, the air quality assessment demonstrates that the Project complies with local, state, and federal air quality requirements. The Project is consistent with the guidelines of MassDEP because it will incorporate reasonable and feasible measures to reduce the projected 2024 Build Condition VOC and NO_X emissions associated with the Project's mobile sources, or single-occupancy vehicle trips.

As discussed in Chpater 3, the SIP requires that proposed projects with Build Condition VOC, and NO_X emissions greater than the No-Build Condition include all reasonable and feasible measures to reduce emissions. As discussed in the 'Transportation and Parking' section above, the Proponent and Redeveloper will coordinate with the City to potentially implement local roadway intersection improvements to reduce delays and queuing as well as implement TDM measures in order to reduce single-occupant vehicle trips to/from the Project and to minimize peak-period traffic demands in the KSURP area—all of which will benefit air quality.

The results of the mesoscale analysis demonstrate that the roadway improvements will meet the transportation conformity criteria by reducing both VOC and NOx emissions (Table 3-2). The mitigation measures, which include improved geometry and operation of local roadways in the KSURP area, are expected to result in an emission reduction of 0.04 Kg/day of VOCs and 0.08 kg/day of NOx. Based on the new requirement to use MOVES2014 and the corresponding regional nature of the mesoscale analysis, emissions reductions from Project-specific traffic mitigation are minor reductions when compared to the overall region plus Project-related emissions (which are projected on a county-wide level). The safety performance examinations of existing intersections that will be conducted in the future (i.e., Roadway Safety Audits), as required by MassDOT, are also expected to reduce mobile source air emissions by improving intersections to operate more efficiently.

Additionally, the implementation of the proposed TDM plan is expected to improve air quality in the KSURP area by promoting the use of alternative forms of transportation as the principal travel mode to and from the Project in place of single-occupancy vehicles. Previous estimates of similar TDM programs have ranged on the order of two to five percent reduction in vehicles miles traveled (VMT), which in turn would have a slight decrease in regional VOC and NOx emissions under the 2024 Build Condition. Separate from TDM measures implemented during the operation of the buildings, the pedestrian enhancements and bicycle accommodations proposed as part of the Project will further contribute to improving air quality through reduced vehicle trips.

Greenhouse Gas Emissions

As discussed in Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment*, the Project's sustainable design goals and operational measures demonstrate that the Proponent is committed to constructing and operating a sustainable and environmental-sensitive development. Specifically, the incorporation of the sustainable design principles and measures currently being considered will result in an overall reduction in Project-related stationary source and mobile source GHG emissions.

The GHG emissions assessment provided in Chapter 4 demonstrates that the Project meets the intent and requirements of the MEPA GHG Policy because it estimates potential Project-related GHG emissions and evaluates and incorporates measures to reduce the GHG emissions to the extent practical and feasible. The GHG emissions assessment is based upon the best information available at the current planning phase. The Project has been designed to meet the current Stretch Energy Code (i.e., a minimum 20 percent energy savings over ASHRAE 90.1-2007 standards). As suggested by DOER in their comments on the NPC, the proposed building models for the North Garage and Office Buildings, Eleven Cambridge Center Residential Building, and Three Cambridge Center Mixed Use Building were revised so that the

overall electric power consumption is less compared to the AHSRAE 90.1-2007 baseline models. To achieve this, the overall window-to-wall ratios were decreased and the lighting power densities in the office and retail spaces were reduced by 20 percent. Based on the updated building energy models, overall the Project, as currently designed, is projected to result in an energy savings of approximately 29.5 percent compared to the Base Energy Code requirements (an increase from 25 percent in the NPC). This energy savings equates to an estimated 23.2 percent reduction in stationary source CO_2 emissions (an increase from 17 percent in the NPC). Furthermore, the GHG assessment demonstrates the additional building improvements required to meet the future potential Stretch Energy Code requirements currently under consideration.

As a result of transportation-related mitigation, including site access and local roadway improvements as well as a robust TDM plan (described above), the Project is projected to reduced mobile source CO_2 emissions by an estimated 105 tons per year. This reduction also accounts for the mobile source GHG emissions benefits associated with the Project's urban location (i.e., walkability), existing bicycle facilities, and direct access to an extensive network of public transportation (i.e., the MBTA Red Line at Kendall Square/MIT station).

The Proponent will submit a self-certification, signed by an appropriate professional, to the MEPA Office that identifies the as-built energy conservation measures and documents the stationary source GHG emissions reductions from the baseline case for each Project Component post-construction, as required by the MEPA GHG Policy.

Stormwater Management/Water Quality

As discussed in Chapter 5, *Stormwater Management*, all Project Components will be designed to mitigate stormwater runoff in compliance with the MassDEP Stormwater Management Policy and the City's more stringent stormwater management requirements. Per the requirements set forth by the City, the Project will be required to mitigate stormwater effluent from the post-development 25-year design storm to the rates of the pre-development 2-year design storm, as well as reduce TSS by 80 percent from the pre-development condition.

Compliance with state and city stormwater management requirements will be achieved through the implementation of BMPs in the stormwater management design. Stormwater infrastructure will be designed and installed at Project Component site, as required, to reduce the runoff discharge rate and improve the quality of the runoff to the Cambridge stormwater system and the Charles River basin. Proposed site design measures being considered are described below. In addition, the Proponent will coordinate with DPW to explore creative solutions to stormwater management that go beyond the scope of individual Project Components to provide a more district-wide solutions.

The limits of work for each Project Component site have not yet been set; thus, stormwater control measures will be investigated further as each development undergoes their respective design review processes. The Proponent and/or Redeveloper will consider several stormwater quantity and quality control measures as part of this process. These control measures include, but are not limited to, the following:

- Subsurface infiltration systems
- Green roofs
- Rainwater harvesting
- Permeable pavements
- Proprietary treatment devices
- Bioretention landscaped areas and streetscape designs
- Deep sump, hooded catch basins

While the Proponent and Redeveloper intend to meet both the stormwater management requirements of MassDEP and the City, they also plan to support efforts by the City to increase stormwater capacity in the Kendall Square area as a more comprehensive district-wide approach. In discussions with the DPW on March 13, 2015, the Proponent was informed of two planned ventures to refurbish and expand two large stormwater storage tanks near the KSURP area. In a follow-up meeting with the DPW on July 21, 2015, a strategy to evaluate the feasibility of a communal stormwater management system, which centralizes infiltration and/or rainwater harvesting was discussed. Although this strategy requires additional infrastructure beyond what a single development could provide, the Proponent will continue to explore its viability with the DPW.

Upgrading neighborhood infrastructure will not aid not only the Project, but other existing local buildings become more resilient to flooding. They will also compensate for local developments that were installed before the DPW's current stormwater mitigation standards were implemented. These developments negatively impact the Kendall Square area runoff, and a neighborhood infrastructure project will help mitigate runoff from sites that won't be required to be compliant in the near future. The Project Components do not meet Cambridge stormwater requirements in the existing condition. Therefore stormwater infrastructure serving the existing sites will not be worse off without stormwater mitigation, until extreme wet weather events are exasperated climate change. Therefore, neighborhood scale stormwater management investment will improve stormwater conditions for the Kendall Square area now and in the future at the expense of a select few stormwater mains in the long term. As the Project develops, the Proponent will coordinate with DPW to determine if support can be given to neighborhood-scale stormwater projects in lieu of some on-site stormwater mitigation infrastructure. These large-scale mitigation projects will be

developed along with the I/I mitigation projects currently being evaluated by the DPW in the next 3 to 6 months as discussed at the July 21, 2015 meeting. Permitting of such improvements in place of on-site mitigation will require discussion between the relevant personnel at Cambridge DPW, MassDEP, and the Charles River Watershed Association. All parties would need to be in agreement to allow this type of stormwater mitigation strategy. In the event that the Proponent commits to aiding the City with neighborhood-scale stormwater infrastructure improvement, each Project Component will still install stormwater BMPs to meet the required TSS removal requirements.

Water and Wastewater

Proposed Inflow/Infiltration Removal

The Project's proposed 1,034,000 million square feet of added uses will generate significant additional wastewater flows. Overall, the Project is projected to generate an estimated 107,945 gpd of new wastewater flows. MassDEP no longer requires self-certifications, as they have an agreement with the City for project reviews concerning wastewater. In order to obtain a municipal sewer connection permit, the City requires new developments to reduce stormwater inflow and infiltration (I/I) at a ratio of 4:1 from the Cambridge Sewer System. This requirement stems from capacity issues as a whole in the City sewer system, which causes combined sewer overflows during large precipitation events. Therefore, at this stage of the design, it is anticipated that the Project will be required to remove 431,780 gallons per day of stormwater from the sewer system, which is four (4) times the overall estimated sewage generation. (Refer to Table 6-2 on page 6-6 of Chapter 6, *Water and Wastewater* for a breakdown of I/I removal required by Project Component.) This I/I reduction will be accomplished by coordinating with the City to either correct I/I issues in the vicinity of the Project or pay for projects the City is performing in an effort to reduce I/I.

In a meeting with the Cambridge DPW and their infrastructure consultants on July 21, 2015, the Proponent discussed the existing sanitary sewer system in the Kendall Square neighborhood and required I/I mitigation for the Project. The City did not have any issue with the Proponent's approach to mitigating I/I and agreed that the Proponent should continue to coordinate with the DPW as each Project Component progresses into design. While the City is currently evaluating the East Cambridge sanitary system capacity for wet-weather flows and looking at a comprehensive I/I strategy to improve the local system, the DPW was not prepared to comment on specific measures this Project could perform to remove I/I. Additionally, the DPW was open to discussing the expanded removal of I/I in lieu of holding the required 24 hours of sanitary flow. The Proponent has committed to discussing the individual components of this Project with the DPW over the next three to six months, during

which time the DPW will identify key improvements that provide the maximum benefit to the sanitary sewer system as a whole.

Proposed Water Conservation Measures

The Project will attempt to conserve water through several methods including low flow plumbing fixtures (to design plumbing systems to be at least 20 percent efficient) and efficient air conditioning systems. Additionally, water conserving landscape irrigation practices will be implemented, such as the use of native vegetation and minimal/efficient irrigation systems. The Proponent and Redeveloper will also continue to consider the viability of alternate water sources, such as water reuse systems or rainwater harvesting as well as the practicality of xeriscaping, which is landscaping that does not require irrigation.

Hazardous Materials

Compliance with MCP

The Project will require characterization of the soil and groundwater conditions for management of contaminated soil in advance of the proposed construction and to evaluate potential exposures for workers and the future building occupants and prepared the required regulatory submittals under the MCP, 310 CMR 40.0000. It is assumed that testing of soil and groundwater at the Cambridge Center North Garage and Eleven Cambridge Center will result in a new reporting condition to MassDEP and that activities at the properties would be subject to the requirements of the MCP, 310 CMR 40.0000. It is anticipated that conditions in the area around Three Cambridge Center will encounter similar contaminant levels in soil as those encountered during the recent plaza improvement and connector work at Three, Four, and Five Cambridge Center and, therefore, it is likely that new activities can proceed under the existing RTN. However, testing of groundwater may result in a new reporting condition.

The management of contaminated soil and groundwater, and implementation of measures to reduce the risk of exposure to contaminants at each Project Component site will be conducted under a RAM Plan prepared by a Licensed Site Professional (LSP). The RAM Plan will address items pertaining to construction of new buildings in contaminated areas per 310 CMR 40.0042(3) within the area within and adjacent to the footprint of the proposed structure. The RAM plan will also include requirements for environmental monitoring for dust, vapors and odors resulting from disturbance of contaminated soils. Threshold criteria for fence line exposures to the nearby public will be established in the RAM Plan based on the construction timeframe for the specific contaminants of concern and worker exposures will be established in a site-specific Health & Safety Plan prepared by a qualified person on behalf of the

Contractor conducting the work. To the extent feasible vapors and dust levels will be measured in real-time using portable instruments. Stationary and mobile units will be deployed at the perimeter of the site. The RAM Plan will also include measures to be undertaken for suppression of dust and for control of vapors and odors if exposure criteria is exceeded. Oversight of the RAM activities will be conducted by the LSP and their qualified representatives who will monitor and document the remedial activities in the field. Below-grade construction will require temporary construction dewatering. Treatment of groundwater dewatering effluent is anticipated to be a RAM activity. Discharge to the storm drains will be conducted under a NPDES Remedial General Permit (RGP).

Utility upgrades conducted in the public way or on private property will be conducted under a Utility-Related Abatement Measure (URAM). Soils will be precharacterized within the proposed utility corridors prior to off-site removal or temporary storage. Contaminated soils removed from the utility trench will be replaced with "clean" soils reducing the risk of exposure to future utility workers conducting repairs or replacement. Utility trench backfill will be interrupted prior to connection with buildings with a segment of impervious flowable fill or lean concrete to prevent preferential pathways for vapor intrusion into buildings.

It is anticipated that the measures undertaken under the RAM will result in achieving a Permanent Solution for each property redevelopment.

A summary of the anticipated assessment and remedial activities for each property is summarized below.

Cambridge Center North Garage Office Buildings

No below-grade space exists below the Cambridge Center North Garage. The new office buildings are planned on top of the existing garage. New at-grade and limited below-grade space is planned at the north and south ends of the existing garage for a proposed lobby and Winter Garden, respectively. Construction of below-grade space will require removal of the existing historic fill and organic soils that remain. New foundations will be required to support loads imposed by the planned additional levels of above-grade parking and the new office building. It is anticipated that a majority of the historic fill and underlying soils will be impacted with petroleum oils and hazardous materials and, therefore, characterization of soil materials in-place prior to excavation is planned as part of the Project. It is anticipated that contaminated groundwater will also be encountered and that treatment of construction dewatering effluent will be required. It may also be necessary to install a vapor mitigation system under all occupied spaces to eliminate the vapor intrusion pathway based on the outcome of the groundwater data.

Eleven Cambridge Center Residential Building

It is possible that groundwater at Eleven Cambridge Center could be impacted. Groundwater testing and the potential for vapor intrusion will need to be evaluated as part of the proposed residential use. No basement exists below the ground floor of Eleven Cambridge Center. Construction of below-grade parking will require removal of the existing fill and act to eliminate the vapor intrusion pathway to residences. It is anticipated that a small volume of contaminated soil will be encountered during excavation and, therefore, characterization of soil materials in-place prior to excavation is planned as part of the Project. The initial phase of the characterization program would take place prior to building demolition at the exterior of the existing building. A second characterization phase would occur following building demolition and removal of the existing footing foundations. Groundwater testing and the potential for vapor intrusion will need to be evaluated as part of the proposed residential use although the presence of below-grade parking will act to eliminate the vapor intrusion pathway to residences.

Three Cambridge Center Mixed Use Building

The presence of contaminated soil is not anticipated below the excavated portions of the property, however additional deeper excavation would require sampling and testing of soil prior to new construction. However, based on recent soil testing conducted in the unexcavated portions of the area around Three, Four, and Five Cambridge Center for recent plaza, it is anticipated that soil beneath the unexcavated portions of the plaza area around Three Cambridge Center will detect levels of VOCs, metals, and PAH that will require management as contaminated soil that can be managed as a Post-RAO construction activity. Additionally, while groundwater contamination has not been encountered historically, low levels of VOCs are anticipated to be present. Levels of contaminants that exceed the applicable Reportable Concentrations in groundwater will require new reporting under the MCP and the potential for vapor intrusion will need to be evaluated as part of the proposed residential use under this new RTN.

Proposed Mitigation Measures

Protective Barriers

Contaminants in soil at the site which are typical in urban areas are anticipated to include heavy metals, PAHs and petroleum hydrocarbons at levels which could pose risk under the MCP for direct contact, ingestion and/or inhalation. It is planned to incorporate “protective barriers” into the new building design to mitigate risk of direct contact with contaminated soils. The protective barriers are anticipated to include the following:

- Landscaped Areas – Excavation and off-site removal of contaminated soil to a depth of 3 feet below final design grades and placement of a marker fabric and clean soil to the new grades.
- Exterior Hardscape Areas – placement of engineered pavement sections, concrete sidewalks or patios, landscape pavers or other systems which block exposure to underlying contaminated soil at the ground surface.

Vapor Mitigation Systems

New buildings constructed above contaminated soil or groundwater will be constructed with the elements of a vapor mitigation system below the ground floor slab to mitigate the source of vapor intrusion from the environmental media that could potentially contribute contaminants to indoor air. The vapor mitigation will consist of the following elements; ventilation layer, ventilation pipes or depressurization points and a vapor liner. The design of the vapor mitigation system (passive or active), liner thickness and type will depend on the type, level and toxicity of the contaminants detected. The effectiveness of the vapor mitigation will be evaluated post-construction by sampling and testing of sub-slab and indoor air.

Temporary Construction

As discussed in Chapter 8, *Construction*, the Proponent will develop a CMP for each Project Component. The purpose of the CMP is to develop a proactive approach to identify and address the potential impacts on the community that may arise during construction and to minimize these impacts where possible. The CMP will aim to address impacts of the Project-related construction activities on the City, the public ways/spaces, and the on-site MBTA facilities, where applicable. The Cambridge Traffic, Parking & Transportation Department will review and approve each CMP. The Redeveloper will work closely with the City throughout the construction of each Project Component.

The Redeveloper is committed to minimizing impacts to service at and access to the Kendall Square/MIT subway station throughout construction of the Project, but particularly during Phase 2 (construction of the residential and commercial at Three Cambridge Center). Furthermore, a key goal of the Project is to not close any sidewalks and/or bike lanes during construction activities. All pedestrian and bike accommodations will be relocated, if needed, and/or protected. Any temporary facilities will be maintained as a normal sidewalks and bike lanes with regards to winter weather operations (clearing of snow and ice) and extreme rain events (prevent/resolve large puddles), to the extent feasible.

Over the duration of the Project, there are likely to be other development projects in the areas adjacent to each Project Component. In order to help minimize disruption to

local residents and businesses, the Redeveloper is committed to participating in coordinated construction management planning efforts that may be sponsored by the City and/or local community groups. Coordinated construction communication and logistical planning (i.e., signage programs, selective truck routes, etc.) can help mitigate local temporary transportation issues associated with concurrent construction projects.

Sustainable Design, Construction and Operational Beneficial Measures

Sustainability is integrated in to the Project concept and design. A sustainable approach to a project can include repurposing previously developed land rather than building on untouched land, as well as locating new development within high density areas and areas with highly accessible public transportation access. By constructing new commercial and residential spaces on previously developed sites a portion of which will be constructed above a reused portion of an existing building, the Project is designed to achieve energy savings associated with construction and associated GHG emissions.

The project design will prioritize sustainability as a core strategic imperative and will implement state-of-the-art high performance green building technologies, construction, and operating procedures. Sustainability planning with an integrated design team during conceptual design will establish a pathway to Gold-level certification under the Core & Shell Leadership in Energy and Environmental Design (LEED®) Green Building Rating System and superior energy use intensity performance, consistent with the K2 Plan. The project design team will use iterative energy modeling and life cycle analysis that considers the long-term value of sustainable property investment decisions. The following is a summary of key sustainable design goals for the Project:

- Stretch Code Compliance and associated Energy Savings and stationary source GHG reductions
- Energy Conservation Measures (ECMs) will continue to be considered/evaluated as design progresses, including:
  - Reduced window-to-wall ratio in residential buildings
  - Reduced lighting power densities in the office and retail spaces
  - Building orientation and window locations shall be suited for improved energy efficiency
  - Cogeneration
  - Rooftop Solar PV
  - Efficient common area lighting, such as LED fixtures

- Decrease Energy Use Intensity (EUI)
- Construction and Demolition Waste Diversion (require construction contractors to aim for a goal of 95% as part of the CMP). By keeping the North Garage intact, a significant amount of construction waste associated with demolition and new construction to rebuild a garage structure is eliminated by the Project.
- Reduce operational waste through recycling/reuse programs in coordination with future tenants (as part of the Tenant Design and Construction Guidelines)
- Use of low-VOC finishes, paints, adhesives, and sealants
- Reduced irrigation through rainwater harvesting
- Reduced potable water use through installation of low-flow plumbing fixtures

Refer to the 'Approach to Sustainability' section of Chapter 4, *Sustainability and Greenhouse Gas Emission Assessment* for additional information.

In addition to the base building design, it is the Redeveloper's intent to construct and operate the proposed buildings in a sustainable manner. To further ensure this, the Redeveloper will provide Tenant Design and Construction Guidelines to potential office and retail tenants as a guide to use when fitting out their spaces. Refer to Appendix E for the draft Tenant Design and Construction Guidelines. The intent of these guidelines is to educate future tenants about implementing sustainable design and construction features in their tenant improvement build-out as well as adopting green building practices that support the overall sustainability goals of the Project. The guidelines will also communicate the sustainable and resource-efficient features incorporated into the base building(s) and provide specific suggested sustainable strategies enabling tenants to coordinate their leased space design and construction with the rest of the building systems.

Potential Climate Change Adaptation and Resiliency Measures

Potential measures that could be applied as part of the Project to address impacts associated with climate change have been identified as part of this filing to address a draft policy developed by the MEPA Office. As described in Chapter 4, the draft policy proposes to require projects to consider impacts associated with projected sea level rise and extreme weather/temperatures as part of the MEPA review process.

The Proponent and project design team plan to use the results of the Cambridge Vulnerability Assessment as well in input from the Cambridge Department of Public Works (DPW), to evaluate potential design elements to mitigate the effects of potential sea level rise at the KSURP area as the design of each Project Component progresses.

Potential Site Design Measures

The proposed buildings cover a significant majority of each Project Component site, which limits how much area is available for site design measures to mitigate flooding and heat island effect risks. The Proponent and/or Redeveloper continue to plan to implement a comprehensive set of site design measures aimed at making each Project Component less vulnerable to climate change. These measures will work in combination with building design measures to increase the building's resiliency (discussed further below under 'Potential Building Design Measures'). As part of the sanitary sewer connection requirements discussed in Chapter 6, *Water and Wastewater*, each Project Component will be required to store 24 hours' worth of wastewater flow on-site, protecting the newly constructed buildings from backups, which are a symptom of the limited capacity in the combined sewer system which services Cambridge. In addition, the Project will be infiltrating stormwater as part of the Cambridge stormwater requirements to be discussed in Chapter 5, *Stormwater Management*. Improving the hydrologic condition on-site will make the site more resilient to flooding, as stormwater is slowed and diverted from interfering with building operations through landscaped areas and infiltration systems. Both the sanitary storage and stormwater improvement features insulate the Project Components from potential issues due to climate change, while simultaneously improving the Cambridge infrastructure's ability to cope with extreme weather phenomena. Backflow preventers will also be installed on sanitary and stormwater laterals connecting to vulnerable collection systems in the public way, thereby ensuring one-directional flow offsite in the event of extreme wet weather flows. To cope with increasing intensity in precipitation, stormwater infrastructure will be evaluated for capacities to handle short-duration, high intensity rain events, including inlet and piping capacities.

Additional site design measures are being considered to reduce the effects of a warmer climate with longer dry spells. Increased pervious/green area at the ground level and installing green roofs are two ways the Project is anticipated to help reduce area-wide elevated temperatures associated with Urban Heat Island Effect. Additionally, landscaping could be designed to create a positive and comfortable microclimate by segregating large areas of impervious, heat trapping materials, providing tree canopy cover for pedestrians and low level plants, and encouraging evaporative cooling with dense greenery and water features where practical. To increase resiliency to heat and drought, vegetation will predominantly be native species to minimize irrigation requirements, while efficient irrigation systems will be used to maintain landscape features during droughts. The practicality of rainwater harvesting for irrigation, xeriscaping (landscaping without irrigation), and incorporating green roofs will be explored as designs progress. Maximizing pervious and green space will simultaneously increase resiliency and aid the stormwater mitigation strategy on-site. Similarly, green roofs will be used to further increase the Project's resiliency by reducing the heat island effect, as well as mitigate stormwater runoff rates and volumes.

If required, the Proponent and/or Redeveloper could consider the use of portable flood protection systems as a final defense between excessive flooding on-site and the building, such as those presented in Figure 4.5. Technologies, such as the Flood Log, Portadam, and the Aquafence Flood Barrier System can be stored in the building and deployed on-site when extreme flooding events are predicted. These systems effectively raise the required flood level required to impact the building internally. They can be installed around the entirety of a site or limited to protecting vulnerable building elements, such as doors, low windows, and areaways. While these systems have been successfully installed in coastal cities for building owners conscious to make their buildings more resilient to current and potential future flooding, additional data on the potential for excessive flooding in the future once the Project Components come online is required before the Proponent and/or Redeveloper can commit to implementing such measures..

Potential Kendall Square MBTA Station Resiliency Measures

While the full extent of the potential future sea level rise impacts is not yet understood for the KSURP area, the MBTA Kendall Square station may be vulnerable to flooding in the future, which would affect the accessibility to public transit for the Project. Additionally, the MBTA recognizes that the Kendall Square Red Line station is currently susceptible to both heat stress and flooding, which is projected to be exacerbated in the future. Therefore, the Proponent and Redeveloper have begun to explore potential measures to assist the MBTA with making its transit facilities in the KSURP area more resilient to extreme heat events and inland flooding due to extreme precipitation.

Figure 4.6 shows conceptual, potential measures aimed at making the Kendall Square station more resilient to flooding. For example, trench drains with greater capacity than the existing systems could be installed at all entrances to the station to redirect more runoff from the area away from staircases to the station platforms. A more intensive, but effective means of flood protection would be mobile flood barriers. These walls can be stored by the MBTA on-site for use when flooding from extreme storm events are predicted. The flood barriers could be installed at station entrances around ground level utility vaults and adjacent to air intake/exhaust (Figure 4.6) to greatly minimize the potential for flooding to effect operations of the station. The most intensive resiliency measures that could be considered for the Kendall Square station are elevating power, HVAC, and other critical systems as well as installing pumping equipment to minimize the effects of flooding should the less intensive options fail. However, these more intensive resiliency measures require significate station construction.

The MBTA station can be made more resilient to heat stress by placing more, large fans on platforms to increase the circulation of air with the outdoor environment. A more intensive strategy would include installing HVAC systems/upgrade air

handling systems throughout the station to further increase air circulation. In total, these resiliency efforts would allow the MBTA red line to function at or near capacity during the more frequent and intensified heat waves, and prevent failure during extreme flooding events allowing normal function once conditions return to normal. All of these potential measures require significant coordination with the MBTA. Additionally, the Proponent and Redeveloper will continue to evaluate the City's climate-induced sea level rise predictions for East Cambridge in conjunction with the Project, and work closely with the MBTA to aid in making the Kendall Square station more resilient, given a full understanding of the potential KSURP area flooding events due to climate change.

The Proponent is also committed to working with the MBTA to improve Red Line resiliency to flooding more comprehensively throughout the KSURP area. This could potentially be accomplished by raising or protecting at-grade ventilation vents adjacent to the Whitehead Commercial Office site, and incorporating infrastructure resiliencies at the MBTA Electrical Facility at One Cambridge Center, such as mobile flood barriers and raising or relocating sensitive at-grade facility components. Also, the Proponent will work with MIT, which has proposed to explore a new headhouse location for the south side of Main Street.

Potential Building Design Measures

Although the full extent of sea level rise data was not made available, both the Proponent and Redeveloper are aware of precipitation-based inland flooding events. Potential building design resiliency measures include locating critical infrastructure above the first floor level (i.e. transformers, switchgear rooms, and mechanical rooms), limiting basement areas, and evaluating raised finish floor elevations and other improvements that may mitigate potential flooding.

Building finish floor elevations and necessary building utilities for all Project Components will be raised to the greatest practical extent to reduce the risk of flooding internally. Additionally, flood-resilient materials will be specified for first floor uses, where practicable. The Cambridge Center North Garage Office Buildings are proposed to be constructed over an existing garage structure minimizing the ground floor exposure to the effects of extreme weather events, such as flooding. Other flood prevention techniques could include: sealed wall penetrations for cable and electrical lines; watertight door barriers; septic line backflow prevention valves, sump pumps, and discharge pumps—all of which could be connected to auxiliary external generator connections or resilient backup power. In addition, the Project is anticipated to include green roofs/roof gardens and roofing membranes with high Solar Reflectance Index (SRI) to reduce the volume of stormwater runoff and reduce solar heat gain to minimize air conditioning loads, respectively. Additionally, high-performance curtain wall is being considered to maximize views and daylighting of interior spaces, thus reducing overall lighting loads and associated internal heat gains, which has a direct impact on the space cooling load. As the climate change

analysis shows, the rising temperature increases the space cooling demand in the Cambridge climate; therefore, any strategy that can reduce the space cooling demand is considered an adaptive strategy for climate change.

The Project's climate change mitigation includes the incorporation of several ECMs to reduce GHG emissions associated with energy use beyond what is required by Code. Some of these measures can also be considered adaptive design approaches to mitigate the potential impacts of climate change on the Project. These GHG emissions mitigation and climate change adaptation measures are considered mutually re-enforcing and, therefore, cannot be considered in isolation. As an example, the design team was conscious about reducing the window area in the residential setting as creating natural ventilation and mixed-mode design is an adaptive strategy in response to increases in temperature. Therefore, the window area was maintained at a ratio that can help in energy use reduction while it's still providing enough daylight and opening area for natural ventilation. Other climate change adaptive strategies considered in the conceptual design include improved envelope insulation and high performance glazing in response to increasing temperatures. The design team also investigated the deployment of several renewable energy sources and highly energy-efficient technologies, such as solar PV, wind, and co-generation plant. The design team is also aware that the extreme climate change is not only limited to temperature rise, but also may include flooding, intensified downpours, and/or hail evets. Therefore, the design team will continue to consider whether the design and architectural elements selected for the Project Components can reduce the vulnerability to these extreme events.

Other Potential Resiliency Measures

On-site renewable energy, a district energy network, and CHP systems also provide opportunities for added resiliency during periods of power loss during storms. While the KSURP area is served by underground utility power lines and gas mains, and as such, is not normally effected by storms that disrupt power or gas transmissions, according to DOER, the Kendall Square CHP district plant has been registered by the ISO-NE as a black start generation asset that can operate in island mode to provide both electricity to the Cambridge grid and thermal energy to the KSURP area in the event of a grid outage.

On-site CHP, or solar PV, generally will operate in phase with the incoming utility power, and needs incoming power to synchronize phase delivery. In "island mode", generators and CHP systems can be made to operate independently of the grid and self-synchronize power phasing with on-site solar. However, this approach is normally used in large-scale shelter locations only, when long-term operation may be needed to protect a group of people.

In most cases, the proposed commercial buildings will shut down and send occupants home in storm-related power failure scenarios. Any generators provided will most

likely be optional standby generators that are sized to maintain server room or process operations only. In the case of the residential components, the generators provided will be for life-safety uses only (stairway pressurization, egress elevators, fire pump, etc.) and cannot by Code be used for ordinary ongoing operations in a building. The capacity provided by solar PV, even if the available space is maximized, will not be more than 10 percent of the power needed by the building, and cannot provide all power needed for normal operations. A CHP system could be used to provide limited ongoing operation, but the economics of such a system when compared to the likelihood of repeated power outages in the Kendall Square area would not be favorable. Storm response actions and resiliency measures will be incorporated into leasing agreements or tenant guidelines, including guidance related to tenant fit-out of commercial space, particularly those located on the lower floors. Refer to Appendix E for the draft Tenant Design and Construction Guidelines.

Proposed Mitigation and Other Beneficial Measures Implementation Plan

Table 10-1 below presents the proposed mitigation implementation plan associated with anticipated implementation schedule and milestones as well as parties responsible for implementation.

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Table 10-1 Proposed Mitigation and Other Beneficial Measures Implementation Plan

Measure	Responsible Party[1]	Whitehead Institute	Phase 1A	Phase 1B	Phase 2
Transportation & Air Quality[2]					
Vehicular Access and Circulation Improvements					
Analyze and propose adjustments to signal timing and phasing for study area local intersections, as appropriate, in coordination with the City.	Redeveloper		X	X	X
Transportation Demand Management Plan[2]	Redeveloper/Future Employers		X	X	X
Transportation Monitoring Program[2]	Proponent	X	X	X	X
Public Transit Enhancements					
Establish the Kendal Square Transit Enhancement Program (KSTEP) in coordination with MassDOT, MBTA, and the City through the establishment of a Memorandum of Understanding (MOU).	Proponent & Redeveloper		X		
Implement the Project-related improvement projects, program, and/or service improvements identified as part of the KSTEP, in coordination with MassDOT, MBTA, and the City and consistent with the MOU.	Proponent & Redeveloper		X	X	X
Pedestrian Access, Safety & Streetscape Improvements					
Improve study area intersections to accommodate pedestrians (countdown timers, LPI programming).	Redeveloper/Other Developers	X	X	X	X
Incorporate a new mid-block pedestrian connection on Broadway between the Cambridge Center North Garage Office Buildings and Danny Lewin Park.	Redeveloper		X		
Improve the Sixth Street Connector.	Proponent & Other Developers		X		
Review all pedestrian crossings to assess their potential for bulb-outs, raised crossings, pedestrian refuge islands, Rectangular Rapid Flashing Beacons (RRFB′s), realigned non-apex ramps and/or other treatments to enhance the comfort and visibility of crosswalks.	Proponent & Redeveloper	X	X	X	X
Enhance the Main Street streetscape between Ames Street and Galileo Galilei Way.	Proponent & Redeveloper	X			
Pedestrian Access, Safety & Streetscape Improvements (Continued)					

Table 10-1 Proposed Mitigation and Other Beneficial Measures Implementation Plan

Measure	Responsible Party[1]	Whitehead Institute	Phase 1A	Phase 1B	Phase 2
Enhance the Broadway streetscape from Ames Street to Galileo Galilei Way.	Proponent & Redeveloper		X	X	
Enhance the Binney Street and Galileo Galilei Way streetscape from Sixth Street to Broadway.	Proponent & Redeveloper		X		
Improve pedestrian safety by enhancing lighting along sidewalks and pathways for safer pedestrian accommodations.	Proponent & Redeveloper	X	X	X	X
Enhance open spaces with multiple outdoor connection to buildings within the KSURP area.	Redeveloper		X	X	X
Support roadway and streetscape improvements along Galileo Galilei Way between Binney and Main Streets.	Proponent				X
Bicycle Facilities					
Enhance bicycle infrastructure at each Project Component and within the KSURP area by connecting this infrastructure with other area-wide improvements, in coordination with the City (Figure 2.7).	Proponent		X		
Provide approximately 800 long-term bicycle storage for tenants/residents and approximately 142 short-term bicycle exterior parking for visitors.	Redeveloper	X	X	X	X
Explore opportunities to create a full service bike station within the area.	Proponent		X		
Greenhouse Gas Emissions					
Incorporate key elements of sustainable and high performance building design to increase energy efficiency and reduce stationary source GHG emissions.	Redeveloper/Other Developers	X	X	X	X
Design, construct, and operate all Project Components in a sustainable manner; utilize LEED Green Building Rating Systems for incorporating sustainable elements.	Redeveloper/Other Developers	X	X	X	X
Provide Tenant Design and Construction Guidelines to potential office and retail tenants as a guide to use when fitting out their spaces to further ensure a sustainable development.	Redeveloper/		X	X	X
Reduction in air emissions (VOCs and NOx) and mobile source GHG emissions associated with vehicular traffic through the implementation of the above-referenced transportation-related mitigation measures, including site access and local roadway improvements, and implementation of a robust TDM Plan.	Redeveloper/Other Developers	X	X	X	X

Table 10-1 Proposed Mitigation and Other Beneficial Measures Implementation Plan

Measure	Responsible Party[1]	Whitehead Institute	Phase 1A	Phase 1B	Phase 2
Climate Change Resiliency					
Consider climate change impacts (i.e., potential sea level rise, extreme weather events) in site and building design, where applicable and feasible.	Redeveloper		X	X	X
Infrastructure					
Stormwater Management					
Install on-site stormwater management and treatment systems that will improve water quality, reduce runoff volume, and control peak rates of runoff in comparison to existing conditions, in compliance with current City requirements and MassDEP stormwater management standards.	Redeveloper/Other Developers	X	X	X	X
Coordinate with DPW to determine if support can be given to neighborhood-scale stormwater projects in lieu of some on-site stormwater mitigation infrastructure.	Proponent/Redeveloper		X	X	X
Water/Wastewater					
Implement 4:1 I/I removal through contribution to City′s I/I mitigation fund.	Redeveloper		X	X	X
Install low-flow and low-consumption plumbing fixtures to reduce overall water consumption by at least 20 percent.	Redeveloper/Other Developers	X	X	X	X
Hazardous Materials					
Develop a RAM Plan to manage contaminated soil and/ groundwater (if encountered) and implement measures as required to reduce the risk of exposure of contaminates at each Project Component.	Redeveloper		X	X	X
Construction Management					
Develop and implement a comprehensive Construction Management Plan (CMP) to mitigate temporary construction-related impacts	Construction Manager	X	X	X	X
Coordinate with other nearby private & public construction projects	Construction Manager	X	X	X	X

1 The Proponent is the CRA and the Redeveloper is Boston Properties. Other Developers represents the developers for the Whitehead Institute and Broad Institute Project Components.
2 Refer to Chapter 2, *Transportation and Parking* for additional details.

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GHG Self-Certification Statement

As required by the MEPA Scope in the NPC Certificate, this section in the form of a draft letter of commitment.

D R A F T O N L Y

September 15, 2015

Secretary Matthew A. Beaton
Executive Office of Energy & Environmental Affairs
100 Cambridge Street, Suite 900
Boston MA 02114

ATTN: Deirdre Buckley, Director, MEPA Office

Re: Letter of Commitment for Stationary Source Greenhouse Gas Emissions Self-Certification
Kendall Square Urban Renewal Project (KSURP) Amendment No. 10
Cambridge, MA (EEA No. 15169)

Dear Secretary Beaton and Director Buckley:

On behalf of the Cambridge Redevelopment Authority (the "CRA", or "Proponent") and Boston Properties (the "Redeveloper"), VHB has prepared a summary of the estimated reduction in overall energy use and stationary source Greenhouse Gas (GHG) emissions for Kendall Square Urban Renewal Project (KSURP) Amendment No. 10 in Cambridge (the "Project").

In accordance with the current the MEPA Greenhouse Gas Emissions Policy and Protocol (the "GHG Policy") dated May 2010, the stationary source GHG assessment was provided to the MEPA Office as part of the Single Environmental Impact Report (the "SEIR") filed on September 15, 2015. The Project has been designed to meet the requirements of the current Stretch Energy Code requirements for GHG emissions (compared to a base design compliant with ASHRAE 80.1-2007).[1] The design case assumed building design and system improvements that would result in energy reductions, in accordance with the GHG Policy. At the request of MEPA, the ASHRAE 90.1-2010 building improvement requirements are also presented to demonstrate how the Project would meet the future potential Stretch Energy Code. On *XXX*, a Certificate stating that the Project's SEIR, dated *XXX*, adequately and properly complied with the Massachusetts Environmental Policy Act and its implementing regulations was issued by the Secretary of Energy and Environmental Affairs.

The energy conservation measures proposed for the full build-out of the Project are estimated to reduce the overall energy use by 29.5 percent resulting in a 23.2 percent reduction in stationary source CO_2 emissions when compared to the baseline case. The following table presents the estimated energy savings and CO_2 emissions reductions for each Project Component.

▼

[1] Effective July 2010, the City adopted the Stretch Energy Code.

Project Component	Energy Consumption (MWh/yr)			CO_2 Emissions (tons/yr)[1]		
	Base Case	Design Case	Percent Savings	Base Case	Design Case[2]	Percent Reduction
Cambridge Center North Garage Office Buildings	38,937.0	27,553.9	29.2%	3,389.0	2,595.9	23.4%
Eleven Cambridge Center Residential Building	22,099.9	15,272.6	30.9%	1,712.8	1,305.3	23.8%
Three Cambridge Center Mixed Use Building	25,655.4	18,003.4	29.8%	2,057.4	1,596.3	22.4%
Whitehead Office Addition	15,645.5	11,340.5	27.5%	1,162.4	897.5	22.8%
Total	**102,337.9**	**72,170.4**	**29.5%**	**8,321.6**	**6,395.0**	**23.2%**

MWh/yr = million kilowatt-hour per year
tons/yr = short tons per year

The building energy model results/energy savings and resulted stationary source GHG emissions reductions are preliminary as none of the proposed buildings have progressed past a conceptual level of design. Following completion of construction of each element, the Proponent will submit a self-certification to the MEPA Office, signed by an appropriate professional, which identifies the as-built energy conservation measures and documents the stationary source GHG emissions reductions from the baseline case.

If you have any questions, please contact me at (617) 924-1770 or via e mail at ldevoe@vhb.com.

Very truly yours,

VANASSE HANGEN BRUSTLIN, INC.

Lauren DeVoe, AICP, LEED AP BD+C
Senior Environmental Planner

cc: Tom Evans, Cambridge Redevelopment Authority
Ben Lavery, Boston Properties
Douglas McGarrah, Foley and Hoag

11

Response to Comments

NOTE: This chapter is an entirely new section from the NPC, as required by the NPC Certificate.

Introduction

In accordance with the NPC Certificate, this chapter in its entirety represents new information to directly respond to agency and public review comments within MEPA jurisdiction. The following presents a copy of each comment letter received by the MEPA Office during the public review period of the NPC. Each comment letter is assigned a number, as listed in Table 11-1 below.

Each comment has been delineated and assigned a code appearing to the right of the individual comment. Preceding each comment letter is a section that provides a copy of the individual substantive comment with a direct narrative response. The enumerated comments/responses correlate with the code numbers that appear on the comment letters.

Table 11-1 NPC Comment Letters Index

Letter No.	Commenter	Affiliation	Date of Letter
C	Matthew A. Beaton, Secretary	Executive Office of Energy and Environmental Affairs	May 29, 2015
1	David J. Mohler, Executive Director	Massachusetts Department of Transportation, Office of Transportation Planning	May 26, 2015
2	Marianne Connolly, Senior Program Manager	Massachusetts Water Resources Authority	May 15, 2015
3	John D. Viola, Deputy Regional Director	Massachusetts Department of Environmental Protection, Northeast Regional Office	May 22, 2015
4	Paul Ormond	Massachusetts Department of Energy Resources	May 22, 2015
5	Bryan Dore, Rita Barron Fellow	Charles River Watershed Association	May 22, 2015
6	Richard C. Rossi, City Manager	City of Cambridge Executive Department	May 27, 2015
7	Stephen H. Kaiser, PhD	Resident	May 20, 2015

MEPA NPC Certificate

Comment C.1

"… the SEIR should clearly identify the subsequent process for addressing outstanding issues, including identification of specific mitigation to address impacts on transit service and capacity that may not be fully developed during the MEPA review process."

Response

As discussed in the *Project Summary* chapter, since the filing of the NPC, both the Proponent and Redeveloper have continued to coordinate closely with MassDOT, the MBTA, and the City on the development of the proposed Memorandum of Understanding (MOU) as a mechanism to identify, fund, and implement future transit improvements in support of the Project and to serve the broader Kendall Square area. The MOU process will ultimately lead to a plan, agreed upon by all involved parties, of mitigation measures the Proponent and Redeveloper will implement to improve the public transportation infrastructure and experience within the KSURP area.

Comment C.2

"I strongly urge the Proponent to work with the City, MassDOT, MBTA, and other stakeholder groups prior to the preparation of the SEIR to review and discuss both the content of their comments and potential mitigation measures. These collaborative efforts will assist the Proponent in identifying mitigation measures and presenting a project that meets applicable environmental performance standards."

Response

The Proponent and Redeveloper have been engaged directly with each of the stakeholder groups, as discussed in the 'Agency Coordination and Public Outreach' section on page 1-13 of Chapter 1, *Project Change Description*. This section has been updated to reflect the key agency coordination that has happened since the NPC.

Comment C.3

"The SEIR should provide a comprehensive description of project components, including potential off-site mitigation measures."

Response

Potential off-site mitigation measures and other beneficial measures as a result of the Project generally consist of local roadway intersection improvements, streetscape and public open space improvements, improved pedestrian and bicycle facilities, stormwater management upgrades. Potential off-site improvements also include proposed efficiency enhancements of the public realm surrounding the MBTA Kendall Square/MIT station and transit capacity and/or operations improvements (to be identified through the MOU). Refer to Chapter 10, *Summary of Proposed Mitigation and Other Beneficial Measures* for a comprehensive description of the off-site measures.

Comment C.4

"The SEIR should identify, describe, and assess the environmental impacts of any changes in the project that have occurred between the reviews of the NPC and the SEIR provide an update on what development has occurred to date within the KSURP."

Response

There are no major changes to the Project and no major new development has occurred within the KSURP area since the filing of the NPC.

Comment C.5

"The SEIR should include a table compares the maximum permitted development within the KSURP to the existing development and adds the development proposed in this NPC. The table should address GFA, number of housing units, vehicle trips, parking spaces, and water and wastewater use."

Response

Table S-2, presented in *Project Summary*, compares the currently allowed maximum permitted development (Gross Floor Area, or GFA, and housing units, parking spaces) to the as-built development and Project Change. Associated estimated impacts (vehicle trips, water/wastewater) are also presented.

Comment C.6

"The SEIR should include updated conceptual plans for existing and post-development conditions."

Response

The conceptual plans, as illustrated in Figure 1.1 through Figure 1.6, have not changed since the NPC filing. Refer to Figures S.6a thru S.6c for existing site conditions.

Comment C.7

"The SEIR should provide a brief description and analysis of applicable statutory and regulatory standard and requirements, and describe how the project will meet those standards."

Response

Refer to the 'Regulatory Controls, Approvals, and Permits' section of Chapter 1, *Project Change Description* for a brief description of applicable statutory and regulatory requirements and how the Project will comply with those requirements.

Comment C.8

"The SEIR should include a list of required State Agency Permits, Financial Assistance, and other State approvals, if applicable, and provide an updated status on each of these pending actions."

Response

Refer to Table 1-2 for a list of each pending federal, state, and local action required for the Project.

Comment C.9

"MassDOT has requested that the Proponent develop a MOU to address transportation and transit mitigation. The SEIR should include a draft MOU for review and comment."

Response

The Proponent together with the Redeveloper is developing a MOU with MassDOT, the MBTA, and the City. The Proponent is committed to filing the draft MOU with MEPA for review by July 1, 2016 following the completion of the Task Force's work and the initial efforts to create the KSTEP. The KSTEP will be based upon the recommendations of Task Force, which is anticipated to be completed in February 2016. Refer to the 'Proposed Transit Improvements' section of Chapter 2, *Transportation and Parking* starting on page 2-91 for a description of the intent of the MOU process as a mechanism for identifying transit improvements and funding (the KSTEP and KSETF, respectively).

Comment C.10

"The SEIR should explicitly note which transportation mitigation measures the Proponent has committed to implementing and those which have been accounted for in the traffic impact analysis. If the traffic impact analysis includes mitigation measures that the Proponent has not

committed to, the SEIR should identify alternative methods to demonstrate a similar LOS improvement."

Response

The 2024 Build Conditions analysis does not include any mitigation commitments. The analysis of proposed traffic mitigation analysis was done separately for each intersection where mitigation might provide some relief for vehicle LOS, as presented under the 'Proposed Transportation Mitigation and Other Beneficial Measures' of Chapter 2, *Transportation and Parking*.

No intersection improvements have been committed to, just presented, as conditions at the intersections could change before the Project Components are fully designed and ready for construction. As part of the local project review process established as part of the proposed zoning amendment, the Proponent is committed to evaluating and analyzing intersections affected by each Project Component when a more realistic construction schedule is identified and the analysis and improvements are more realistic to the future local traffic conditions. The City has one of the more thorough local transportation review and permitting processes in the Commonwealth, and the Proponent and Redeveloper both anticipate that will result in outcomes above and beyond typical MEPA review requirements, once the time comes for construction of each Project Component. Refer to the 'Infill Development Concept Plan' section on page 1-12 of Chapter 1, *Project Change Description* for further details on the proposed local review and permitting process.

Comment C.11

"The SEIR should provide tables that indicate the v/c, delay, LOS, and queues for all study area intersections under the Existing, 2024 No-Build, and 2024 Build Conditions."

Response

Detailed intersection LOS tables (Tables 2-16a-b) are presented in Chapter 2, *Transportation and Parking* under the 'Traffic Operation Analysis' section starting on page 2-37.

Comment C.12

"The SEIR should include a commitment for a long-term parking monitoring plan to evaluate strategies to increase efficient use of parking to minimize trip generation."

Response

A discussion on a long-term parking monitoring plan as well as other parking strategies to reduce single-occupancy vehicle trip generation has been added to

Chapter 2, *Transportation and Parking*. Refer to the 'Long-Term Parking Monitoring Program' section on page 2-72.

Comment C.13

"I refer the Proponent to comments from the City and note the SEIR should identify access points for the structured parking and incorporate this into the trip generation figures."

Response

A discussion of access points to structured parking have been expanded and incorporated into the trip generation figures, specifically Figures 2.13a and 2.13b.

Comment C.14

"The SEIR should address the City's comments regarding the provision of the minimum amount of parking, the proposed number of spaces per dwelling unit, and shared parking."

Response

See the responses to Comments 6.4 and 6.5 below.

Comment C.15

"Based on comments from MassDOT, the SEIR should include a roadway segment analysis for the Binney Street and Broadway corridors based on the latest methodology of the Highway Capacity manual or appropriate traffic software. This analysis should be performed on corridors currently utilized by some transit services in order to evaluate the impact of the project on transit travel times and help to identify mitigation measures to lessen the impacts of the project."

Response

A roadway segment analysis was conducted for the Binney Street and Broadway corridors using Synchro 8 analysis software following the 2000 Highway Capacity Manual methodology, consistent with the intersection LOS analysis. The discussion and analysis can be found in Chapter 2, *Transportation and Parking* under the 'Traffic Operations Analysis – Roadway Segment Analysis' section starting on page 2-59. In addition, refer to the response to Comment C.23 below for discussion of Project–related impacts on bus routes.

Comment C.16

"The SEIR should clarify whether any of the locations with crash rates above district average are considered Highway Safety Improvement Program (HSIP) clusters, and if so, a Road Safety Audit (RSA) should be prepared to help identify appropriate safety improvements that would be completed by the Proponent or by others."

Response

Study area intersections with crash rates above district average and are within Highway Safety Improvement Program (HSIP) clusters are subject to a Roadway Safety Audit (RSA), as requested by MassDOT comment letter on the NPC and the MEPA Certificate Scope.

Due to the Project schedule and multiple ongoing and planned roadway improvement projects in the area, the Proponent, as discussed with MEPA and MassDOT, will wait to conduct the RSA(s). The RSA(s) will be conducted as part of the MOU agreement, as discussed in Chapter 2, *Transportation and Parking* under the 'Traffic Operations Analysis - Roadway Safety Audit' starting on page 2-62 when a more realistic construction schedule is set and the outcomes of the Roadway Safety Audit are more current to the time when the improvements to these intersections could be made.

Comment C.17

"The NPC indicated the Proponent has committed to working with the City to identify areas for pedestrian access improvements and listed a number of measures that could be implemented. The SEIR should provide a more detailed level of commitment and explain how these measures would improve the pedestrian experience and encourage walking."

Response

The design of the pedestrian facilities/improvements will be proposed as part of the City's local permitting process as the individual Project Components are reviewed by the Planning Board and the CRA Board. The appropriate intersections for further study will be determined by the City. Per the comment letter received by MassDOT on the NPC, preliminary steps have been taken to identify possible intersections subject to a Roadway Safety Audit, or RSA. As discussed on page 2-62 of Chapter 2, *Transportation and Parking*, due to the Project schedule, and multiple ongoing and planned roadway improvement projects in the area, the Proponent, as discussed with MEPA and MassDOT, will wait to conduct the RSA(s). The RSA(s) will be conducted as part of the MOU agreement when a more realistic construction schedule is set and the outcomes of the RSA(s) are more current to the time when the improvements can be made.

Overall, Kendall Square is a highly walkable, bikeable, transit- and pedestrian-oriented district. It features increasing amounts of ground floor activity on the street,

which is key to a high quality pedestrian experience that encourages walking. The pedestrian experience on most streets includes wide sidewalks with a clearly defined planting, street furniture, and parking buffers that make for a pleasant walking experience as well as slow speed limits, narrow lane widths with refuge medians in some areas, countdown timers at every crosswalk with leading pedestrian indicator feature, an occasional mid-block crossing, and quiet tree-lined pedestrian-exclusive walkways in the interstitial spaces connecting inside and across blocks. By the end of 2015, nearly all pedestrian ramps will comply with the latest ADA standards. Several areas of possible improvement that could be implemented as part of the Project as mutually agreed upon with the City are listed in section 'Public Open Space Improvements' on page 1-6 of Chapter 1, *Project Change Description*.

Comment C.18

"The SEIR should address the City's comment regarding the proposed pedestrian crossing at Broadway."

Response

Chapter 2, *Transportation and Parking* discusses the proposed pedestrian crossing at Broadway under the 'Pedestrian Access, Safety and Streetscape Improvements – Broadway Mid-Block Crossing' section starting on page 2-103.

Comment C.19

"I encourage the Proponent to work with the City to gain a better understanding of bicycle parking demand and availability and to provide an update on this issue in the SEIR."

Response

Chapter 2, *Transportation and Parking* under the 'Bicycle and Pedestrian Facilities' section starting on page 2-22 provides a detailed analysis of bicycle parking, both long-term and short-term parking.

Comment C.20

"The SEIR should include a more detailed analysis of the project's impacts on bicycle travel within the KSURP and provide additional detail on the existing and proposed bicycle facilities. The analysis should provide measures of effectiveness for the No-Build and Future Build conditions and should clearly identify potential improvements where conditions may be negatively impacted based on vehicular travel or additional bicycle travel."

Response

See the response to Comment C.19 above.

Comment C.21

"… the SEIR should provide an analysis more consistent with the methodology of the MBTA Service Planning Department based on the most recent and most relevant ridership and operational statistics for the Red Line. The Proponent should consult with the MBTA regarding the scope and protocol for the analysis. I encourage the Proponent to coordinate this analysis with the City in addition to MassDOT and the MBTA"

Response

A detailed analysis of the MBTA Red Line was conducted. This analysis is presented under the 'Transit Operation – MBTA Red Line Analysis' section starting on page 2-75 of Chapter 2, *Transportation and Parking.*

Comment C.22

"The SEIR should also explain how the project will mitigate its impacts on the MBTA bus network as the additional ridership from the KSURP will likely result in several routes operating over capacity."

Response

See the response to Comment C.23 below.

Comment C.23

"The SEIR should also evaluate the project's likely impacts on MBTA bus travel times and the impacts of the proposed highway, pedestrian, and bicycle improvements to the bus system and routes. Specifically, as noted in MassDOT's comment letter, the SEIR should provide, in a tabular format, an assessment of which intersections are utilized by MBTA buses and how their timing or turning movements may be affected by the increased traffic and/or proposed roadway and pedestrian changes to be generated by the project."

Response

An analysis was conducted to understand impacts the Project could have on the travel times of each MBTA bus route that runs within the study area. This analysis is presented in Chapter 2, *Transportation and Parking* under the 'Transit Operation – MBTA Bus and EZRide Shuttle Route Analysis' section starting on page 2-83. For a tabular assessment, refer to Table 2-40 on page 2-84.

Page 2-94 presents of Chapter 2 includes a discussion of possible improvements that could help improve bus operations within the KSURP area.

Comment C.24

"The Proponent should work with the MBTA, MassDOT, and the City to develop the potential transit improvements to be included in the ETMP and to identify the appropriate mechanism for ensuring enforceable commitments for these improvements and incorporating the program elements into the transportation planning processes at the City and State levels. The SEIR should provide an update on these discussions and include an implementation schedule or MOU to guide the implementation of mitigation that is not specifically identified in the SEIR."

Response

Chapter 1, *Project Change Description* provides an updated discussion of city and state agency coordination for potential transit improvements to be included as part of the KSTEP (previously referred to as the "ETMP" in the NPC) to be executed through the proposed MOU. The MOU, which is being developed by the Proponent together with the Redeveloper and in coordination with the MBTA, MassDOT, and the City, will serve as a mechanism for implementing and funding a future proposed transit enhancement implementation plan (the KSTEP and KSETF).

Comment C.25

"The NPC notes that the Proponent will explore the viability of alternate water sources such as water reuse systems, rainwater harvesting, and xeriscaping. The SEIR should provide an update on this evaluation and contain a discussion of water conservation measures that the Proponent will commit to implementing in project design."

Response

As discussed in Chapter 6, *Water and Wastewater*, the Project will conserve water through a variety of methods, such as low-flow plumbing fixtures (to design plumbing systems to be at least 20 percent efficient) and efficient air conditioning systems. Additionally, water conserving landscape irrigation practices will be implemented, such as the use of native vegetation and minimal/efficient irrigation systems. The Proponent and Redeveloper will also continue to consider the viability of alternate water sources, such as water reuse systems or rainwater harvesting as well as the practicality of xeriscaping, which is landscaping that does not require irrigation.

Comment C.26

"The SEIR should provide an update on discussions with the City, MWRA, and/or MassDEP with respect to I/I mitigation and how the City's requirement to store 24 hours of wastewater flow on-site will be addressed. I encourage the Proponent to provide a detailed update (including a breakdown for each component) regarding how the project will provide requisite

I/I mitigation to offset project flows at the 4: l removal ratio as required by the City of Cambridge."

Response

The Proponent met with the Cambridge Department of Public Works (DPW), which is responsible for the operation and maintenance of wastewater infrastructure in the KSURP area, on July 21, 2015. The City agreed with the Proponent's commitment to remove I/I at rate of 4:1 with wastewater generated. The City is currently exploring the most effective I/I removal strategy with infrastructure consultants and requested the Proponent to reaffirm their commitment in the document and continue to coordinate I/I removal with the DPW as their overall strategy is defined. The DPW was also agreeable to offsetting additional I/I in lieu of retaining 24-hours of wastewater flow. See the 'Inflow/Infiltration Mitigation' section on page 6-6 of Chapter 6, *Water and Wastewater* for further information. Table 6-2 on page 6-6 provides a breakdown of the proposed I/I removal requirement for each Project Component.

Comment C.27

"I refer the Proponent to comments from the MWRA which indicate that the project 's wastewater flows should be fully offset via I/I removal or sewer separation to ensure that the additional wastewater flows from the project do not result in discharges of untreated CSO to the Charles River Basin at Cambridge Outfall CAMO 17 during large storms. The SEIR should also address MWRA comments regarding compliance with MWRA's Toxic Reduction and Control (TRAC) Discharge permitting."

Response

The Project will fully offset wastewater flows by a factor of 4 in the form of I/I as required, which will prevent the discharge of untreated CSO to the Charles River Basin during large storm events. See the 'Inflow/Infiltration Mitigation' section on page 6-6 of Chapter 6, *Water and Wastewater*. The Project will also comply with all MWRA requirements and obtain the relevant permits from the TRAC Group. See the 'MWRA Toxic Reduction and Control' section on page 6-7 of Chapter 6 for further discussion.

Comment C.28

"The SEIR should include a stormwater analysis that evaluates and compares proposed storm-event peak flow rates and volumes to existing conditions based upon conceptual designs for the project."

Response

The Proponent created a stormwater analysis with the HydroCAD model. This model defines the existing conditions for each Project Component and one conceptual design, which meets the stormwater requirements of the Cambridge DPW. Tables 5-1 and 5-2 in Chapter 5, *Stormwater Management* demonstrate how the Project will reduce the 25-year peak flow rates and volumes in the final condition to the levels of the 2-year existing rates and volumes.

Comment C.29

"The SEIR should include a description of and implementation schedule for LID measures the Proponent will commit to in order to encourage groundwater recharge and reduce the local heat island effect."

Response

The Proponent and Redeveloper have committed to meeting Cambridge's stringent Stormwater Regulations with infiltration tanks, to be complemented with site LIDs. Stormwater tanks will be designed promote the infiltration of significant portions of site runoff in extreme precipitation events, and the majority of more frequent precipitation events. The Project Component sites are small relative to the building footprint; therefore, the use of green roofs will be a key component of combatting urban heat island effect.

Comment C.30

"The NPC indicates that minor flooding occurs during severe, but unspecified, storm events at the stormwater outfall on Broad Canal Way. The SEIR should describe the extent of past flooding and consider the potential for increased flooding due to more frequent extreme storms resulting from climate change."

Response

Cambridge DPW has supplied the Proponent with inland flooding data, which shows the extent of surcharging in the KSURP area, including stormwater infrastructure discharging to the Broad Canal Way outfall, now and in the future due to climate change induced precipitation events. These events are predicted to becomes more sever and frequent in the future due to climate change. Refer to the 'Inland Flooding Due to Extreme Precipitation' section on page 4-45 of Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* and Chapter 5, *Stormwater Management* for a discussion of this flooding.

Comment C.31

"The NPC indicates that the Proponent may upgrade the stormwater system to address flooding, in lieu of complying with the City's stormwater management standards. The SEIR

should provide more information on the potential advantages and disadvantages of this option, discuss whether it can permitted, and evaluate the potential impacts on water quality if only flooding is controlled."

Response

Implementing neighborhood-scale stormwater management projects would help local infrastructure and buildings be more resilient to flooding by compensating for developments not currently meeting the Cambridge stormwater standards. This would come at a localized cost to infrastructure adjacent to the Project Components with future climate change driven inland flooding, which will be worse than existing conditions. The Project Components would still be required to treat runoff associated with each individual site to improve stormwater quality, as required. Permitting would involve a discussion with relevant Cambridge, MassDEP, and Charles River Watershed representatives. See the 'Compliance with City of Cambridge Stormwater Management Regulations' section on page 5-8 of Chapter 5, *Stormwater Management* for further details.

Comment C.32

"The SEIR should provide a detailed discussion of stormwater conveyance from the KSURP to the Charles River and other sufficient information to demonstrate that the stormwater management system will be designed to address the water quality impairments covered by these TMDLs, as well as flooding conditions."

Response

Chapter 5, *Stormwater Management* includes additional information on the municipal stormwater conveyance systems. Figure 5.2 provides a conceptual stormwater management design, which will meet Cambridge's stringent stormwater improvement requirements for both quantity and quality control.

Comment C.33

"The GHG analysis should be updated based on the evolution of the master plan and specific mitigation measure commitments. The SEIR should address MassDEP and DOER comments. The SEIR should clearly state modeling assumptions, explicitly note which GHG reduction measures have been modeled and which have been accounted for in the mobile GHG evaluation, and identify whether certain building design or operational GHG reduction measures will be mandated by the Proponent to future occupants or merely encouraged for adoption and implementation."

Response

The building energy models for each Project Component have been revised and updated in response to MassDEP and DOER comments on the NPC. Chapter 4,

Sustainability and Greenhouse Gas Emissions Assessment presents the updated results and the energy modeling assumptions. Appendix D includes the energy modeling reports. Specifically, Tables 4-2, 4-4, 4-6 and 4-8 list the energy model assumptions, or modeled GHG reduction measures, above the Base Code requirements for the Project Components. Those additional beneficial measures that are not assumed in the building energy model, such as reduced plug loads from ENERGYSTAR equipment are discussed under 'Other Beneficial Stationary Source CO_2 Emissions Improvements' in Chapter 4 and are further specified in the draft Tenant Design and Construction Guidelines (Appendix E) prepared by the Redeveloper to encourage their adoption by the future tenants.

Comment C.34

"For those components that will be encouraged by the Proponent, the SEIR should include a draft tenant manual that identifies specific strategies to encourage their adoption (e.g. design assistance, financial incentives, providing a list of approved fit-out material performance standards, etc.). The draft tenant manual should build upon the outline presented in the NPC and provide information to advance energy efficient practices and optimization of energy efficient systems."

Response

Appendix E presents the draft Tenant Design and Construction Guidelines aimed at encouraging sustainable fit-out and operations of future commercial spaces as well as guidelines for residential tenants, including strategies for energy/water efficiency, alternative transportation, and waste reduction/recycling.

Comment C.35

"The SEIR should also identify components of the ETMP and the corresponding emission reductions expected."

Response

The air quality analysis presented in Chapter 3, *Air Quality* was used to quantify the estimated Project-related mobile source CO_2 emissions in Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment*. As part of the mobile source GHG emission assessment, the air quality analysis utilized the traffic projections for the Project developed as part of the traffic study. These traffic projections already took into account the aggressive transit mode share that is currently experienced and is projected to continue to be experienced in the future in the KSURP area. Because TDM strategies are based on human behavior, the quantification of specific measures is infeasible and is generally included in the mode share estimates for a development, as was done for the traffic and air quality studies.

The Proponent is current working with the Kendall Square Mobility Task Force, the City, MassDOT and the MBTA to develop a comprehensive effective plan for the transit enhancements for the Kendall Square area. The KSTEP (previously referred to as the "ETMP" in the NPC) will include immediate, mid-range, and long-term Kendall Square access and transit and mobility improvements which are expected to be beneficial in reducing mobile source GHG emissions.

Comment C.36

"If the stationary and/or mobile source GHG evaluation includes mitigation measures that the Proponent has not committed to, the SEIR should identify alternative methods to ensure a similar GHG reduction."

Response

The 'Stationary Source GHG Emissions Assessment' section of Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* presents the specific proposed building design improvements above the Base Energy Code, or stationary source GHG emissions mitigation measures, which are assumed to be included as part of the Project for the purposes of quantifying estimated energy savings and associated stationary source GHG emissions reductions. In addition, the Project is located in a Stretch Energy Code community, which includes code requirements to ensure the Project will achieve a certain level of energy savings (and associated stationary source GHG emissions reductions) compared to a conventional development. The preliminary energy modeling demonstrates the currently assumed building design improvements will result in an estimated 23.2 percent reduction in CO_2 emissions for the overall Project (updated from 17.2 percent reported in the NPC) as a result of an overall estimated energy use savings of 29.5 percent, which exceeds the current Stretch Energy Code requirement. As design progresses, there may be minor adjustments to the design; however, the Redeveloper is committed to meeting or exceeding the stationary source CO_2 emissions reduction goals set by the preliminary building energy model results through the use of equally effective design measures.

For the purposes of quantifying the estimated mobile source GHG emissions reductions, the GHG assessment assumed the local intersection operation improvements, bicycle and pedestrian enhancements, and TDM Plan, as described in Chapter 2, *Transportation and Parking*. Refer to the 'Mobile Source GHG Emissions Assessment' section of Chapter 4 for further details. Additionally, while the transit improvements proposed as part of the KSTEP cannot be fully identified at this time, mobile source GHG emissions reductions are anticipated through the reduction of vehicle traffic. The MOU will ensure the identification and implementation of appropriate transit improvements to support the Project and other development in the KSURP area in coordination with MassDOT, the MBTA, and the City.

Comment C.37

"The SEIR should evaluate and revise the Phase 1B energy model or explain Eleven Cambridge Center's low Energy Use Intensity (EUI) when compared to benchmark buildings."

Response

On June 12, 2015, the project MEP clarified with the DOER reviewer that they had mistakenly reported 27 kBtu/SF for the Phase 1B EUI when transferring data from their calculator to the NPC comment letter. The project MEP was advised to disregard this comment, and no revisions to the model were needed. The correct EUI is 56 kBtu/SF, which is consistent with DOER benchmarking.

Comment C.38

"The purpose of the GHG analysis is to identify feasible mitigation measures and assess the relative impacts of the Preferred Alternative. The MassDEP and DOER comment letter provide additional guidance regarding mitigation measures that should be explored as part of the GHG analysis, as well as resources to assist in preparing the analysis. Comments from MassDEP and DOER indicate that utilizing CHP, including the Dalkia plant to address the project's heating and cooling loads may yield additional GHG reduction benefits that should be evaluated by the Proponent. The SEIR should include an updated analysis that evaluates this issue and explains, in reasonable detail, why the Dalkia Plant and other CHP alternative were not selected -either because it is not applicable to the project or is considered technically or financially infeasible. I refer the Proponent to comments from DOER and encourage the Proponent to evaluate reducing the overall building envelope U-value by decreasing the window to wall area and/or by increasing the glazing performance and further reducing the lighting power density."

Response

Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* presents the revised building energy model results, which took into consideration DOER and MassDEP comments, specifically further reduction of window-to-wall ratios and interior lighting power density. The energy models for Phase 1A, 1B and Phase 2 were updated, which resulted in further reduction of stationary source GHG emissions (23.2 percent from 17.2 percent reported in the NPC).

Also, as recommended by DOER, the analysis of the Dalkia CHP plant was expanded so it considers the CHP for both heating and cooling using absorption chillers. The analysis shows that if steam is used to both heat and cool the building, the total source energy associated with four buildings would be reduced by approximately 90%. The generated electricity exceeds the Projects' need and it is equivalent to 990 home's energy use for one year. Revised energy modeling results and detailed calculations are provided in the energy modeling report in Appendix D. These calculations

demonstrate if steam is used to offset natural gas used for heating, the total source energy associated with the proposed buildings would be reduced by approximately 62 percent, thereby, significantly reducing stationary source GHG emissions, based on DOER formulas. However, there are several challenges to using the central plant steam approach economically feasible. Refer to the 'District Energy Opportunities' section on page 4-34 of Chapter 4 for the expanded analysis.

Comment C.39

"The SEIR should provide a feasibility analysis, including identification of payback periods, for installation of on-site PV systems. The analysis should consider Solar Carve-Out II/SREC II and rebate mechanisms. The EIR should also expand on the discussion of wind harvesting."

Response

Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* presents an expanded on-site renewable energy evaluation, which considers federal and state tax incentives that could be available to the Project, and presents an estimated simple payback calculation for solar PVs as well as expands on the applicability of wind harvesting based on the Redeveloper's experience.

Comment C.40

"Comment letters from MassDEP and the City indicate that additional GHG reductions can be achieved through recycling and source reduction efforts and water conservation measures. I encourage the Proponent to participate in the EPA WaterSense certification program and EnergyStar ratings in the selection of plumbing fixtures and appliances. Additional information on the WaterSense certification program is available on the following website: http://www. epa.gov/watersense/docs/home_finalspec508.pdf."

Response

The Design Case building energy models assume that low-flow plumbing fixtures are installed in all Project Components as part of the base building design (or core and shell/non-tenant fit-out). When compared to the Energy Policy Act of 1992 plumbing fixtures standards assumed in the Base Case, (per the methodology of the LEED Green Building Rating System), the water conservation measure also results in energy savings and stationary source GHG emissions. Additionally, energy savings associated with low-flow hot water fixtures is captured under the Design Case in the revised energy models. Through the Tenant Design and Construction Guidelines, the Redeveloper will encourage future tenants to install even more efficient WaterSense-certified fixtures as well as ENERGY STAR equipment/appliances when fitting out their spaces to further reduce stationary source GHG emissions.

Comment C.41

"Additional GHG reductions can be achieved through effective materials management during the design, construction, and operations phases of the project. The SEIR should describe how the Proponent will incorporate recycling initiatives into proposed construction and demolition activities and comply with the goals of the Massachusetts Solid Waste Master Plan. I strongly encourage the Proponent to set solid waste recycling/reuse target percentage goals. These measures will be considered when evaluating whether the project can mitigate its GHG emission to the greatest extent practicable."

Response

Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* provides an evaluation of additional GHG emissions reductions that could be achieved through effective waste reduction measures during construction and operations, including recycling initiatives and implementing a Construction Waste Management. The Redeveloper is committed to a target to divert at least 75 percent of construction and demolition waste from landfills.

Comment C.42

"I refer the Proponent to comments from the City which indicates the Interim Report on the Cambridge Climate Change Vulnerability Assessment will be issued imminently. The Interim Report will address the impacts of heat vulnerability and precipitation driven flooding for 2030 and 2070, the risks of sea level rise, and storm surge flooding through 2030. The SEIR should include an updated evaluation of the area's susceptibility to these risks based on the results of the Interim Cambridge Climate Change Vulnerability Assessment and the City's and MassDOT's ADCIRC model (as available). This updated analysis should consider the ADCIRC model in conjunction with inland flooding and inundation to further refine probabilistic flooding scenarios."

Response

As discussed in Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment*, the City has not completed extending the MassDOT ADCIRC Model results to Cambridge for the year 2070. The City has confirmed that there is less than a 0.1 percent chance that sea level rise will cause flooding in Cambridge for the year 2030. The Proponent has included an evaluation of inland flooding with data made available for this document, as well as updated the sea level rise section to reflect Project design life of 50 years roughly equating to the year 2075 for evaluation purposes.

Comment C.43

"The SEIR should include a specific focus on how the project has been designed to respond to projected sea level rise scenarios. Using the Office of Coastal Zone Management's (CZM) December 2013 report entitled, Sea Level Rise: Understanding and Applying Trends and Future Scenarios for Analysis and Planning in conjunction with the information identified above, and with consideration for the level of acceptable risk and the projected lifespan of the project, the Proponent should select a predicted sea level rise scenario and evaluate in the DEIR how the project may be directly or indirectly impacted. The SEIR should discuss why a specific scenario (or scenarios) was selected for evaluation, describe resulting sea level rise and storm surge elevations, identify the extent of inundation areas on-site, and indicate how the project will be designed to mitigate this impact or to facilitate adaptation responses. I encourage the Proponent to consult with the MEPA Office for additional clarification prior to undertaking this task."

Response

The results of the MassDOT ADCIRC model for eastern Cambridge could not be provided to update the sea level rise impact assessment for the Project. This model is an effective means of evaluating the Project in regards to sea level rise. However, in lieu of this data, sea level rise from the Highest Emission Scenario for the year 2075 from the CZM report was used, given the Project's 50 year design life. As a result of this timeframe, sea level rise is not projected to overtop the Charles River Dam, and therefore won't affect the KSURP area. Refer to Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* for further information.

Comment C.44

"The SEIR should demonstrate that the project includes ecosystem-based adaptation measures and proactive site design with regard to impacts related to predicted sea level rise, particularly given that the Kendall Square MBTA station may be vulnerable to flooding, which would affect the accessibility of the project via transit. I encourage the Proponent to work with the MBTA to review existing station vulnerabilities and identify improvements that could be undertaken in conjunction with the project. The SEIR should report on the results of this analysis and meetings with the MBTA and discuss what types of design improvements can or will be made to prevent or reduce impacts from extreme storms."

Response

The 'Potential Site Design Measures' section of Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* describes potential site design measures aimed at minimizing impacts associated with flooding. While these measures will be limited given the already dense nature of each Project Component, stormwater infiltration and green roofs will be integral parts of the site design measures to ensure resiliency to climate change impacts. The Proponent will also be working with the MBTA to provide transit resiliency by protecting the Kendall/MIT MBTA Red Line stop with

flooding protection. Refer to the 'Potential Kendall Square MBTA Station Improvements' section for a discussion of proactive site design and resiliency measures for the MBTA.

Comment C.45

"The Proponent should also consider impacts on the proposed structures, building entry and exit points, public roadways that traverse the site (e.g., Broadway, Main Street, Galileo Galilei Way), public and private on-site utilities, and first floor uses."

Response

Although the City's sea level rise model results were not yet available at the time of this filing, both the Proponent and Redeveloper are aware of the potential for precipitation-based inland flooding events. The Proponent and/or Redeveloper continues to plan to implement a comprehensive set of site and building design measures aimed at making each Project Component less vulnerable to climate change. Refer to the 'Climate Change Adaptation' section on page 4-41 of Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* for specific proposed measures.

Comment C.46

"The SEIR should identify site elements that have been incorporated into project design to reduce the impact of extreme heat waves and limit the potential impact of more frequent and intense storm precipitation."

Response

The Proponent will maximize vegetation in the limited areas on site not occupied by proposed buildings, as well as implement green roofs to reduce the impact of extreme heat waves. Green roofs, along with the required stormwater management systems will limit the impact of extreme precipitation events. Refer to Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* and Chapter 5, *Stormwater Management* for further discussion.

Comment C.47

"The Proponent should consider how on-site renewable energy, a district energy network, or CHP systems may provide added resiliency during periods of power loss during storms."

Response

The Kendall Square area is served by a robust network of power grid, with multiple supply points that can be switched on and off remotely by the utility. Winter storms, with heavy snow, or summer storms, with high winds, can disrupt above-ground

power transmission directly by knocking down poles or tearing wires loose, or indirectly by downing trees that tear down wires. Below ground wires are not subject to such hazards. Therefore, storm-related hazards to power transmission for the Project are limited to primary wires or above ground transformer stations that will effect large sections of the city. Refer to section 'Other Potential Resiliency Measures' of Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* for a discussion on the potential for on-site renewable energy, a district energy network and CHP systems to provide resiliency during extreme temperature events.

Comment C.48

"Storm response actions and resiliency measures should be incorporated into leasing agreements or Tenant Manuals and be considered part of guidance related to tenant fit-out of commercial space, particularly those located on the lower floors."

Response

Appendix E includes the draft Tenant Design and Construction Guidelines document, which includes extreme storm/flooding response actions and resilient design strategies for fitting out commercial space.

Comment C.49

"The SEIR should identify certification and/or permits that likely will be required for proposed on-site energy sources such as a cogeneration system, boilers, stationary turbines, emergency generators, etc. I remind the Proponent that, as advised by MassDEP, pre-installation approval from the MassDEP Division of Air Quality Control is required if the project will include the installation of any Fuel Utilization Facility that emits air contaminants (e.g., furnaces, fuel burning equipment, or certain boilers). Additional review by MassDEP may also be required if the building is to be equipped with emergency generators."

Response

Refer to the 'Regulatory Controls, Approvals, and Permits' section of Chapter 1, *Project Change Description* for a discussion on air quality permitting related to the Project.

Comment C.50

"The SEIR should include the results of any subsequent subsurface investigations, soil and/or groundwater sampling and testing, or Environmental Site Assessments specific to the project site to assist in the characterization of hazardous materials on-site, potential remediation requirements, and construction period or operational mitigation measures or include a commitment to engage an environmental consulting firm to assist during project design and construction to ensure that the project conforms to MCP regulatory requirements for

construction of buildings in contaminated areas and that all required submittals will be provided to MassDEP."

Response

Information reported herein is based on available data on soil and groundwater testing contained in MassDEP files as a majority of the proposed building sites are documented disposal sites that have been through the MCP regulatory process and achieved regulatory closure. No new subsurface investigations, soil and/or groundwater sampling and testing, or Environmental Site Assessments have been conducted since the NPC; however, a site-specific characterization of on-site hazardous materials and potential remediation requirements will be conducted in conformance with MCP regulatory requirements as the design of each Project Component progresses.

Comment C.51

"The SEIR should discuss the need for a vapor intrusion system and identify how it will be incorporated into design and whether it would result in design changes."

Response

The potential for vapor intrusion (VI) into the new buildings will be evaluated and assessed early in the building design phase to identify site conditions that may indicate when a VI pathway is probable. MassDEP Vapor Intrusion Guidance WSC #14-434 will be used as the basis for evaluation of the potential for vapor intrusion potential at sites where VOCs have been released into the environment. We have assumed that some level of VOCs are present in subsurface media within the limits of the KSURP area based on historical site usage. The VI assessment will consist of developing a Conceptual Site Model based on multiple lines of evidence including soil, groundwater and soil gas data, the presence of non-aqueous phase liquid (NAPL) in/on groundwater and the presence of preferential pathways through existing or future utility corridors will be considered. If a VI pathway is potentially complete based on the data collected a vapor mitigation system will be designed and incorporated into the new building design. The presence and use of planned below grade space will also be considered in the VI evaluation.

Comment C.52

"The SEIR should describe nature and total area of work that is proposed to occur within the tidelands. The SEIR should provide a narrative that explains the project's impact on the public's right to access, use, and enjoy the landlocked tidelands and describes the avoidance, minimization, and mitigation measures proposed to address said impacts. The narrative should describe the public benefits of the project as required in the Public Benefit Determination regulations (301 CMR 13.00). Additionally, the SEIR should identify whether the project is

located in an area of low groundwater and if so, should identify and commit to taking measures to avoid, minimize, or mitigate any adverse impacts on groundwater levels in accordance with 301 CMR 11.05(4)(b)."

Response

A portion of the KSURP area is located on landlocked tidelands associated with an approximately 100 foot-wide channel, the Broad Canal, constructed in the early/mid-19th century to provide ship access through the City of Cambridge. This area of the canal was filled in the middle of the 20th century and is, therefore, considered "filled tidelands" under M.G.L. Chapter 91. Such filled tidelands are not subject to licensing under M.G.L. Chapter 91. Refer to Figure 9.1 for the limits of the landlocked tidelands and portions of each Project Component that falls within this area.

Chapter 9, *Chapter 91 Public Benefits* provides a narrative explains the project's impact on the public's right to access, use, and enjoy the landlocked tidelands and describes measures proposed to address such impacts. The narrative also presents the public benefits of the Project, as required in the Public Benefit Determination regulations (301 CMR 13.00). Table 9-1 quantifies the total area and describes the nature of work proposed to occur within the tidelands.

The KSURP area is not in an area identified as having low groundwater by the City of Cambridge. The Project will provide a net positive benefit to local groundwater levels through the infiltration component of the stormwater management strategy, as discussed in the 'Protection of Groundwater' section of Chapter 9 (page 9-10).

Comment C.53

"The SEIR should include a separate chapter summarizing proposed mitigation measures. This chapter should also include draft Section 61 Findings for each State Agency that will issue permits for the project. The SEIR should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation (either funding design and construction or performing actual construction), and a schedule for implementation."

Response

Chapter 10, *Summary of Proposed Mitigation and Other Beneficial Measures* summarizes the proposed mitigation and other beneficial measures associated with the Project. Table 10-1 outlines these commitments and identifies parties responsible for implementation. Individual costs for each measure are difficult to estimate at this time as the Project Change is a zoning approval for additional development of which has not been fully designed. Additional coordination with MassDOT, MBTA, the City and other stakeholders is required to identify specific transit improvements and I/I mitigation will be identified by DPW through the local site plan review permit process.

There are no state agency actions that require a draft Section 61 Finding; however, the Proponent is committed to developing a MOU with MassDOT and the MBTA, together with the Redeveloper and the City, as a mechanism to identify and implement appropriate transit improvements consistent with the KSTEP. The MOU will be developed following completion of Task Force efforts, which are expected to identify appropriate transit improvements in the KSURP area.

Comment C.54

"Given the integration of transit system improvements into the project, the SEIR must provide a concise description and commitment to construct transportation or transit system improvements necessary to adequately mitigate project-related transportation demand. These mitigation commitments may be tied to overall project square footage or traffic generation rates, and/or addressed through a MOU with MassDOT, the MBTA, and/or the City of Cambridge."

Response

The Proponent is committed to developing a MOU with MassDOT and the MBTA, together with the Redeveloper and the City, as a mechanism to identify and implement appropriate transit improvements consistent with the KSTEP. The MOU will be developed following completion of Task Force efforts, which are expected to identify appropriate transit improvements in the KSURP area. The Proponent, in coordination with the City and the other parties to the MOU, will establish and maintain the KSETF for the purpose of establishing funding priorities and allocations for identified transit improvement projects.

The Proponent is committed to filing the draft MOU with MEPA for review by July 1, 2016 following the completion of the Task Force's work and the initial efforts to create the KSTEP. The KSTEP will be based upon the recommendations of Task Force, which is anticipated to be completed in February 2016. As a transit mitigation measure for the Project, an initial payment of the sum of not less than $6 million for transit improvements recommended by the KSTEP will be contributed to the KSETF as a "fair share" contribution. This one-time payment would be made at the time a Building Permit is obtained for the first major phase of the Project. Additionally, through a mechanism(s) to be determined by the terms of the MOU, the KSETF will receive additional funding to be provided by the Redeveloper, which will represent an allocation of funding under the KSURP supplemented by contributions from others. The MOU process will ultimately lead to a plan, agreed upon by all involved parties, of mitigation measures the Proponent and Redeveloper will implement to improve the public transportation infrastructure and experience within the KSURP area.

Comment C.55

"I hereby request that the Proponent affirm in the SEIR that, following completion of construction, the Proponent will provide a certification to the MEPA Office signed by an appropriate professional (e.g., engineer, architect, transportation planner, general contractor) indicating that all of the mitigation measures adopted by the Proponent as part of the Preferred Alternative have been implemented. Alternatively, this self-certification may confirm that equivalent emissions reduction measures that collectively are designed to reduce GHG emissions by the same percentage as the measures outlined in the Preferred Alternative, based on the same modeling assumptions, have been adopted. The certification should be supported by plans that clearly illustrate what type of GHG mitigation measures have been incorporated into the project. For those measures that are operational in nature (i.e. TDM, recycling, parking management) the Proponent should provide an updated plan identifying the measures, the schedule for implementation and how progress towards achieving the measures will be obtained. The commitment to provide this self certification in the manner outlined above should be incorporated into the updated draft Section 61 Findings included in the SEIR."

Response

As mentioned in Chapter 10, *Summary of Proposed Mitigation and Other Beneficial Measures*, post-construction the Proponent will submit a self-certification, signed by an appropriate professional, to the MEPA Office that identifies the as-built energy conservation measures and documents the estimated stationary source GHG emissions reductions from the baseline case for each Project Component, as required by the MEPA GHG Policy. The intent of this self-certification is to verify that the as-built energy conservation measures meet or exceed the stationary source CO_2 emissions reduction goals set by the preliminary building energy model results presented in Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment*. Additionally, the self-certification will report on the updated operational measures for potentially further reduce GHG emissions.

Comment C.56

"The SEIR should contain a copy of this Certificate and a copy of each comment letter received on the NPC. In order to ensure that the issues raised by commenters are addressed, the SEIR should include direct responses to these comments to the extent that they are within MEPA jurisdiction. This directive is not intended, and shall not be construed, to enlarge the scope of the SEIR beyond what has been expressly identified in this certificate. I recommend that the Proponent employ an indexed response to comments format, supplemented as appropriate with direct narrative response."

Response

Chapter 11, *Responses to Comments* of this SEIR provides direct responses to comments received on the NPC to the extent they are within MEPA jurisdiction.

Comment C.57

"In accordance with Section 1 1.16 of the MEPA Regulations and as modified by this Certificate, the Proponent should circulate a hard copy of the SEIR to each State and City Agency from which the Proponent will seek perm its. The Proponent must circulate a copy of the SEIR to all other parties that submitted individual written comments… A copy of the SEIR should be made available for review at the Cambridge Public Library."

Response

Appendix A of this SEIR includes a list of reviewers to which a copy of this document was provided.

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May 29, 2015

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
NOTICE OF PROJECT CHANGE

PROJECT NAME	: Kendall Square Urban Renewal Project (KSURP) - Amendment #10
PROJECT MUNICIPALITY	: Cambridge (Kendall Square)
PROJECT WATERSHED	: Boston Harbor (Charles River)
EEA NUMBER	: 1891
PROJECT PROPONENT	: Cambridge Redevelopment Authority
DATE NOTICED IN MONITOR	: April 22, 2015

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G. L. c. 30, ss. 61-62I) and Section 11.10 of the MEPA regulations (301 CMR 11.00), I have reviewed the Notice of Project Change (NPC) and hereby determine that this project **requires** a Mandatory Environmental Impact Report (EIR). The project proposes significant redevelopment, consisting of a mix of residential, office and retail uses, in a dense urban area in proximity to transit. The Cambridge Redevelopment Authority (CRA, "the Proponent") submitted an extensive and detailed Notice of Project Change (NPC) that included a comprehensive transportation analysis, a Greenhouse Gas (GHG) emissions analysis, mesoscale air quality analysis and identification of baseline environmental conditions in support of the request for a SEIR. Comment letters from the Massachusetts Department of Transportation (MassDOT) and the City of Cambridge note the constructive consultation that has occurred to date on traffic and transportation issues. Based on a review of the EENF, consultation with State Agencies and review of the EENF, I hereby determine that the Proponent may file a Single EIR.

I anticipate that the Proponent will continue to work closely with MassDOT, the Massachusetts Bay Transportation Authority (MBTA), the City of Cambridge, and other stakeholders to provide a comprehensive SEIR that addresses the Scope included in this Certificate. In addition, the SEIR should clearly identify the subsequent process for addressing outstanding issues, including identification of specific mitigation to address impacts on transit service and capacity, that may not be fully developed during the MEPA review process. If the SEIR does not adequately address the Scope and substantive issues remain to be addressed, I may require the Proponent to file a Final EIR (301 CMR 11.08 (8)(d)(2)). C.1

Original Project Description and Procedural History

The Kendall Square Urban Renewal Project (KSURP) was created by the Proponent in 1965.The KSURP regulates the level of development through a cap on aggregate Gross Floor Area (GFA) of all land uses in the KSURP area. The level of development is further restricted through land use controls, including identification of Floor Area Ratios (FAR). The KSURP initially consisted of construction of up to 14 buildings totaling approximately 2.77 million gross square feet, three parking garages, open space, and other public improvements. The project was the subject of previous review under MEPA beginning with an Environmental Notification Form (ENF) in 1975, and followed by Draft and Final EIRs in 1977 and 1978 respectively, both of which were found to be adequate. Five NPCs were filed since 1978. The NPCs adjusted the permitted mix of uses within the area, increased the maximum allowed GFA within the area, and extended the term of the KSURP. None of the NPCs required further MEPA review.

Project Site

The NPC identifies redevelopment within 24 acres of the 43-acre KSURP area. The 24-acre project site is coincident with the boundaries of the Cambridge Center Mixed-Use Development (MXD) Zoning District. The project site is generally bounded by Galileo Galilei Way to the west, Binney Street to the north, Loughrey Walkway and Broadway to the east, and Main Street to the south. The commercial and residential development is primarily proposed at the following three parcels within the existing Cambridge Center complex:

- Cambridge Center North Garage
- Eleven Cambridge Center
- Three Cambridge Center

The Cambridge Center North Garage is a six-story 92,000 square foot (sf) parking facility located at 121 Broadway and 280 Binney Street. Access to the garage is provided via roadways on either side that connect to Binney Street to the north and Broadway to the south. The Eleven Cambridge Center site consists of approximately 37,682 sf of land with an approximately 76,600 sf commercial office building located at the corner of Broadway and Galileo Galilei Way. Three Cambridge Center consists of approximately 28,822 sf of land with an approximately 105,100 sf office building located at 247 Main Street. An entrance to the Massachusetts Bay Transit Authority (MBTA) Red Line Kendall Square/MIT station is located south of the site and a full access headhouse is located in the adjacent courtyard area.

The NPC also describes minor redevelopment and expansion at the Whitehead Institute and Broad Institute sites. The Whitehead Institute is an existing approximately 20,000 sf commercial building with research and development uses located at Nine Cambridge Center at the corner of Main Street and Galileo Galilei Way. The Broad Institute Building is approximately 246,000 sf and is located at 75 Ames Street.

Project Change Description and Impacts

As described in the NPC, the primary change to the project is the addition of 1,034,000 sf of net new commercial and residential development to the KSURP area. The proposed amendment to the KSURP includes exemptions to the GFA cap intended to incentivize ground floor retail, require innovation space, and balance commercial and residential uses. According to the NPC, the analysis of environmental impacts is based on a total of 4,341,600 sf of development and includes increases in development beyond the GFA cap[1] that would be allowed based on proposed exemptions. As such, the analysis of environmental impacts is presented based on the maximum amount of development that could be permitted in the KSURP area under the GFA cap. The NPC also extends the completion date for the full build-out of the KSURP from 2020 to 2030.

Specifically, the project change consists of the following project components:

- **Cambridge Center North Garage:** Proposed commercial office (546,000 sf), innovation space (39,000 sf) and retail space (5,000 sf) over the existing Cambridge Center North Garage.
- **Eleven Cambridge Center:** Demolition of existing structure. Proposed 22-story residential building (up to 294 units) and ground floor retail space (25,000 sf) .
- **Three Cambridge Center**: Demolition of existing structure. Proposed mixed-use building consisting of a 19-story building with commercial office space (106,200 sf) on the lower floors, up to 266 residential units on the upper floors, and approximately 20,000 sf of ground-floor retail.

The project change also includes a 60,000sf commercial office addition at the existing Whitehead Institute building at Nine Cambridge Center and the conversion of 15,100 sf of mechanical space into commercial office space at the Broad Institute at 75 Ames Street.

As described in the NPC, the project will be constructed in two key phases. Phase 1 will be split into two sub-phases (Phase 1A and 1B). Phase 1A will consist of the redevelopment of the Cambridge Center North Garage and Phase 1B will include demolition of the existing Eleven Cambridge Center building and construction of the new residential building with ground-floor retail space and below-grade parking. Phase 2 will include demolition of the existing Three Cambridge Center commercial office building and construction of a new mixed-use building with commercial office space, ground-floor retail space, and residential units.

[1] The proposed GFA cap associated with this NPC is 4,302,100 square feet of development. This excludes the exempted 19,500 sf of Innovation Space and 20,000 sf of ground floor retail space; though this development is included in the analysis of environmental impact presented in the NPC.

According to the NPC, the project includes the following components and associated potential environmental impacts:

	Previously Reviewed	Net Change	Total
Housing Units	Up to 185 units	±560 units	745 units
Vehicle Trips Per Day (unadjusted)	26,845	10,512	37,357
Vehicle Trip Per Day (adjusted)	13,714	3,638	17,352
Parking Spaces	±3,545 spaces[2]	No Change[3]	No Change[3]
Water Use	±1.24 million gallons per day (mgd)	±118,740 gallons per day (gpd)	±1.35 mgd
Wastewater Generation	±0.93 mgd	±107,945 gpd	±1.04 mgd

Permitting and Jurisdiction

The project as previously reviewed was subject to a mandatory EIR pursuant to Sections 11.03(l)(a)(2) and 11.03(6)(a)(6) of the MEPA regulations because it required State Agency Action(s), and it was expected to create more than 10 acres of new impervious surface, and generate more than 3,000 new average daily vehicle trips.

The project, as currently proposed and described in the NPC, is subject to a mandatory EIR as a stand-alone project pursuant to Section 11.03(6)(a)(6) of the MEPA regulations because it requires a State Agency Action and, on its own, will generate greater than 3,000 new average daily trips (adt) on roadways providing access to a single location. Traffic generation will exceed the EIR threshold even when adjusted to account for mode share. The project requires an approval of an Urban Renewal Plan Amendment from the Massachusetts Department of Housing and Community Development. The project may also require an Air Quality Permit from the Massachusetts Department of Environmental Protection (MassDEP). The Urban Renewal Plan Amendment also requires approval by the CRA and Cambridge City Council. Components of the project will also require review and Special Permit Project Review Approval by the Cambridge Planning Board. The project is subject to review under the May 2010 MEPA GHG Emissions Policy and Protocol ("the Policy").

Because the project is not seeking Financial Assistance from the Commonwealth, MEPA jurisdiction is limited to those aspects of the project that are within the subject matter of required, or potentially required, State Agency Actions and that may cause Damage to the Environment as defined in the MEPA regulations. However, the subject matter of the Urban Renewal Plan

[2] KSURP Amendment No.3 reduced the maximum off-street parking supply from 4,300 spaces to 3,545 spaces.

[3] The project does not propose to increase the maximum number of parking spaces as approved via KSURP Amendment No. 3. The approximately 740 spaces proposed as part of this project to support the additional development would be in addition to the 2,667 existing as-built spaces for a potential future total of 3,407 spaces, which is under the previously approved maximum off-street parking.

implementing regulations (760 CMR 12.00) is sufficiently broad to confer the equivalent of broad scope jurisdiction over the potential environmental impacts of the project. Therefore, MEPA jurisdiction is broad in scope and extends to all aspects of a project that are likely, directly or indirectly, to cause Damage to the Environment, as defined in the MEPA regulations.

Review of the NPC

The NPC includes descriptions of the original project and the currently proposed project and project plans, describes potential environmental impacts, and provides a discussion of proposed mitigation measures. The NPC provided a greenhouse gas analysis, mesoscale analysis, and a Traffic Impact Assessment. It describes the planning process and proposed revisions to zoning that provides context for the proposed amendments to the KSURP. The planning process has included analysis of alternative development scenarios.

The projects identified in the NPC consist of redevelopment within a dense urban area with excellent access to transit. As a transit-oriented redevelopment, associated impacts, including traffic generation, land alteration, creation of impervious areas, are minimized compared to greenfield development or alternatives with reduced density. Impacts associated with the NPC are within the envelope of impacts identified in the most recent MEPA filing. The project is consistent with the Commonwealth's Sustainable Development Principles. In addition, I note that neither State Agencies nor the City of Cambridge have requested additional analysis of alternatives.

Traffic and Transportation

The NPC includes a Transportation Scoping Letter to MassDOT that confirmed the basic analytical approach, technical assumptions, and key transportation issues to be addressed in the Transportation Impact Assessment (TIA), as well as the TIA itself, prepared in accordance with the EEA/MassDOT Guidelines. The TIA evaluated the transportation impacts of the project based on trip generation estimates and future transportation demand. The Proponent has committed to implement a Transportation Demand Management (TDM) program to minimize single occupant vehicle use and to expand the existing monitoring program (described below) to the current program.

The Preferred Plan, as originally evaluated in the 1977 FEIR, projected traffic generation at full build-out to be 19,300 average daily trips (adt). The Secretary's Certificate for KSURP Amendment No. 3 (issued September 15, 1993) required that the Proponent provide an annual update of KSURP traffic counts, collect and analyze parking data, and review KSURP tenant surveys to compare traffic estimates with results of actual observations and to adjust the impact and mitigation analysis if significant discrepancies occur. The NPC provided a summary of this data and demonstrated that actual trip generation in Kendall Square is consistently lower than projections based on trip generation rates in the Institute of Transportation Engineers (ITE) Trip Generational Manual due to area-specific mode splits and vehicle occupancy rates.

According to the NPC, the proposed project change will generate approximately 10,512 unadjusted adt or 3,638 adjusted adt. The adjusted trip generation calculations reflect credits

allowed for pass-by trips and mode share based on rates derived from the Proponent's existing traffic monitoring program. When the adjusted trips are added to the expected future traffic as projected in 2010 when the project was last reviewed under MEPA (Amendment No.8), traffic generation is estimated at 17,352 adt, which is less than the originally projected 19,300 vehicle trips.

The TIA provided a comprehensive safety analysis and crash rates for all intersections within the study area and compared the average rates to the appropriate district and statewide average. According to the NPC, the following signalized intersections exceed the MassDOT Average Crash Rate:

- Cambridge Street/First Street
- Main Street at Galileo Galilei Way/Vasser Street
- Massachusetts Avenue/Vassar Street
- Massachusetts Avenue/Memorial Drive On-/Off-Ramps

Additionally, the intersection of Massachusetts Avenue at Vassar Street and the intersections of Massachusetts Avenue/Memorial Drive Westbound on/Off-Ramps and Massachusetts Avenue/memorial Drive Eastbound On/Off-Ramps have a calculated crash rate above the MassDOT District 6 average.

The TIA presents a capacity analysis and a summary of average and 95th percentile vehicle queues for each intersection within the study area. Based on this data, there are approximately five of intersections within the study area that are expected to operate at or close to Level-of-Service (LOS) F during the weekday morning and afternoon peak hours. The majority of the impacted intersections are within the jurisdiction of the City of Cambridge, with the exception of those along the Route 28 (Monsignor O'Brien Highway) Corridor. The NPC identified potential improvements to mitigate traffic impacts at these intersections, including traffic signal timing and phasing improvements. I refer the Proponent to MassDOT's comments and expect the Proponent will coordinate with MassDOT and the City of Cambridge to ensure that improvements associated with relocation of the MBTA's Lechmere Station are in place as the project evolves.

The NPC proposes a comprehensive TDM Program to minimize new trip generation. In addition to its existing TDM Program, the Proponent has committed to a host of TDM measures that could include: a car sharing program, MBTA transit pass subsidy, free rides on some existing shuttle routes, parking pricing, Hubway pass subsidy, transportation coordinator, and provision of "real-time" transportation information in all new and renovated lobbies and at select public plazas on the project site. In addition, the Proponent will continue to participate in the Charles River Transportation Management Association.

The Proponent has also committed to developing an Expanded Transportation Mitigation Program (ETMP) in consultation with the MBTA, MassDOT, and the City that is intended to preserve the favorable mode share balance in Kendall Square and provide additional measures to minimize trip generation from the project. The ETMP is intended to supplement the proposed transportation mitigation measures outlined in the NPC. The NPC identifies a range of issues and potential improvements considered for inclusion in the ETMP. It indicates that the ETMP

will focus on transit and transit-related improvements, including both capital and operational investments that would result in service level improvements and capacity expansion in Kendall Square. The NPC indicates that the ETMP would be supported by immediate and long-term funding commitments facilitated by the Proponent in connection with the approvals for the Project but does not provide additional information regarding how to determine the amount of funding or a pathway to identify projects that could be funded.

The TIA provided detailed parking calculations based on the proposed development program and described the methodology and assumptions used to estimate parking demand. Based on this information, the project will add 740 parking spaces to the area. When added to the existing 2,667 parking spaces that have been built-out, this results in a total of 3,407 parking spaces. This is below the total maximum off-street parking (3,545 parking spaces) reviewed during KSURP Amendment No. 3. The project does not propose to increase the maximum number of parking spaces. All new parking will be located in parking structures and will be shared parking for all project components.

The TIA included a comprehensive analysis of existing service provided by the MBTA Red Line and the various MBTA bus routes within the KSURP area. Based on the project's mode spilt, the project change will increase activity at the MBTA Kendall Square Station by 15 percent inbound and six percent outbound during the morning peak hour and eight percent inbound and 15 percent outbound during the evening peak hour. The project is not anticipated to adversely impact the inbound and outbound volume-to-capacity (V/C) ratio. MassDOT comments indicate that the overall increase in ridership will be negligible. According to the TIA, the bus routes within the study are experiencing high V/C ratios and are currently operating at or near full capacity; the additional ridership generated by the project will impact several routes and cause them to operate over capacity. The NPC did not provide a specific plan to mitigate the impact of these additional trips on the MBTA bus system nor did it estimate impacts to bus travel times. Comments from MassDOT request additional analysis and identification of potential mitigation in the SEIR.

The KSURP is located within an area that is well served by pedestrian accommodations, including sidewalks and crosswalks at all study area intersections. The TIA provided a comprehensive inventory of all existing, planned, and proposed services, facilities, and routes for accessing the site on foot. The TIA also included a detailed inventory of the bicycle network, including on-street bike lanes, cycle tracks, and multi-use pathways. The Proponent has committed to continue working with the City to identify additional pedestrian and bicycle improvements. The NPC identified potential measures to improve bicycle and pedestrian safety and access.

Water Supply and Wastewater

According to the NPC, the project will require approximately 118,740 gpd of net new potable water demand. Domestic water and fire protection services will be supplied by local water mains to each of the project components. Based on information provided in the NPC, the City has indicated that capacity exists to serve the proposed project, though booster pumps may be required to provide sufficient pressure to the proposed buildings.

The NPC includes a discussion of the existing and projected wastewater flows for the project. The NPC indicates the Proponent will continue to evaluate the use of low-flow plumbing fixtures, efficient air conditioning systems, landscape irrigation practices, and possible use of grey water or rainwater harvesting systems, though it is unclear if the Proponent has committed to implement these measures. According to the NPC, there is sufficient capacity in the existing collection system to accommodate the estimated increase of 107,945 gpd of sanitary sewage to be generated by the project. With this additional flow, the total wastewater flow from the KSURP area will be approximately 1.04 million gallons per day (mgd). Wastewater flows from the project will travel northeasterly by gravity flow to the Massachusetts Water Resources Authority (MWRA) system located in Cardinal Medeiros Avenue (Cambridge Branch Sewer). The NPC indicates that individual service connections to the wastewater infrastructure will be designed in conjunction with the City as each project component moves forward.

The project will not require a Sewer Connection Permit from MassDEP. However, under the terms of the new Sewer System Extension and Connection Regulations (314 CMR 12.00), MassDEP requires that sewer authorities with permitted combined sewer overflows (CSOs), including Cambridge, require the removal of four gallons of infiltration and inflow (I/I) for each gallon of new wastewater flows generated by any new connection that would generate greater than 15,000 gpd. According to the NPC, the project will be required to remove approximately 431,780 gpd of (I/I) from the sewer system. The NPC indicates that this requirement will be addressed by coordinating with the City to either correct I/I issues within the KSURP area or by funding other I/I reduction projects. The City also requires that the project provide on-site sanitary holding capacity equivalent to 24 hours of sanitary flows (approximately 107,945 gallons of storage) to address significant combined sewer capacity issues that occur during large storms. The NPC indicates that this will be addressed by coordinating with the City and may include improvements to the sanitary sewer system in lieu of providing on-site storage capacity for sanitary flows.

Stormwater

According to the NPC, approximately 20 acres of the 24-acre project site are impervious and the project change will create an additional 0.27 acres of new impervious area. The NPC notes that the project will comply with the City's Low Impact Design (LID) standards but does not provide an explanation of the requirements nor identify specific LID measures that will be implemented.

The existing drainage system for the project site ultimately discharges to the City's drainage system and the Charles River through a 54-inch outfall at Broad Canal Way. Comments from MassDEP and the Charles River Watershed Association (CRWA) indicate that this portion of the Charles River is subject to water quality standards established in the applicable Total Maximum Daily Loads (TMDL). The NPC did not provide information on how the project will comply with these reduction targets within the Charles River. According to the NPC, stormwater management infrastructure for each project component will be designed in accordance with City and MassDEP stormwater standards as design for each project component progresses. The City's stormwater regulations require that the project mitigate stormwater effluent from the post-development 25-year design storm to the rates of the pre-development two-year design storm, as

well as reduce Total Suspended Solids (TSS) by 80 percent from the pre-development condition. The NPC did not provide a comprehensive discussion of drainage or runoff calculations for the project area.

Air Quality

In accordance with the State Implementation Plan (SIP) for ozone attainment, the NPC includes a mesoscale analysis for 2014 existing conditions, 2024 No-Build, and 2024 Build conditions. The analysis indicates that emissions of volatile organic compounds (VOCs) and nitrogen oxides (NO_x) for the 2024 Build scenario would be greater than the 2024 No-Build scenario. Because the project will increase emissions of VOCs, transportation mitigation is required, including a TDM program. Under the 2024 No-Build condition, VOC emissions are approximately 7,507.71 kilograms per day (kg/day) and NO_x emissions are approximately 9,257.12 kg/day. Under the 2024 Build condition, VOC emissions are 7,507.82 kg/day and the NO_x emissions are approximately 9,257.75 kg/day. The project is estimated to generate 0.11 kg of VOC and 0.63 kg of NO_x per day. The proposed mitigation, as previously described, will reduce VOCs by 0.04 kilograms per day (kg/day) and NO_x emissions by 0.08 kg/day under the 2024 Build scenario.

Greenhouse Gas Emissions

Because the project change requires an EIR, it is subject to review under the May 2010 MEPA Greenhouse Gas (GHG) Emissions Policy and Protocol ("the Policy"). The original project completed MEPA review prior to promulgation of the MEPA GHG Policy and thus did not require a GHG assessment. The NPC included an analysis of GHG emissions and mitigation measures in accordance with the standard requirements of the MEPA GHG Policy. The Policy requires projects to quantify carbon dioxide (CO_2) emissions and identify measures to avoid, minimize or mitigate such emissions. The analysis quantifies the direct and indirect CO_2 emissions associated with the project's energy use (stationary sources) and transportation-related emissions (mobile sources). The GHG analysis evaluated CO_2 emissions for two alternatives as required by the Policy including 1) a Base Case and 2) a Preferred Alternative. The analysis used the eQUEST, version 3.64, modeling software to perform the GHG analysis and included modeling assumptions and emissions rates (Appendix D).

At the time of the filing of this NPC, the building code is the Massachusetts Building Code 8th Edition; however, I note that the City of Cambridge is a designated Green Community. As such, the City has adopted the Commonwealth of Massachusetts' Stretch Energy Code ("Stretch Code"). The current Stretch Code requires energy efficiencies of 20 percent better than American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) 90.1-2007 and requires modeling of base and proposed cases based on the methodology as is defined in ASHRAE 90.1-2007 (Appendix G). Based on this, ASHRAE 90.1-2007 was applied to define the Base Case. The Preferred Alternative consists of a project that is expected to meet the current Stretch Energy Code.

I note that revisions to the Stretch Energy Code are being contemplated and would likely require energy use in new large buildings to be 12 to 15 percent below the baseline of IECC

2012 (ASHRAE 90.1-2010). The NPC voluntarily presented building improvement measures to demonstrate how the project would comply with ASHRAE 90.1-2010 and the future revised Stretch Energy Code.

Mobile GHG emissions were estimated using the standard methodology in the EEA/MassDOT Guidelines for EIR/EIS Traffic Impact Assessments and EPA's MOVES2014 emission factors. Potential project-related mobile GHG emissions were compared between the 2014 Existing Condition, the 2024 No-Build Condition, and the 2024 Build Condition (with physical and operational upgrades). Stationary GHG emissions were determined via modeling the energy usage for the project based on proposed building geometry, HVAC system type, usage, occupancy schedule, and ventilation rates for each of the following project components: Cambridge Center North Garage, Eleven Cambridge Center, Three Cambridge Center, and Whitehead Office Addition[4]. The NPC noted exceptions to the modeling for certain building elements whose design has yet to advance sufficiently for inclusion in the model. The analysis quantifies the direct and indirect GHG emissions associated with the project's energy use and transportation-related emissions. The analysis indicates that the Base Case for the entire project will generate approximately 9,368 tons per year (tpy) of GHG emissions, consisting of 8,322 tpy of stationary source emissions and 1,046 tpy of mobile source emissions. The Preferred Alternative will reduce stationary source emissions by 1,432 tpy, an approximate 17 percent reduction, and will reduce mobile source emissions by 102 tpd, a 10 percent reduction. Overall emissions will be reduced by 1,537 tpy for an approximate 16 percent reduction.

Measures to avoid, minimize, and mitigate GHG impacts are identified for the overall project and for specific uses (commercial office, residential, laboratory, and retail). The NPC identifies the following measures for the project as a whole:

- Creation of the ETMP in conjunction with MassDOT's Kendall Square Mobility Task Force, MBTA, and MassDOT;
- Provision of 800 long-term and 142 short-term bicycle spaces and implementation of a TDM program to minimize single occupancy vehicle trips;
- Creation of *Tenant Design and Construction Guidelines* to assist office and retail tenants in evaluating and incorporating energy efficiency and other sustainability measures;
- Constructing all new buildings to be "solar ready"; and
- Consideration of building orientation in designing exterior envelope and facades of buildings.

The following measures were proposed for evaluation in the GHG analysis to establish a reasonable Preferred Alternative: improved glazing properties, improved roof and exterior wall insulation, low-flow water fixtures, high-efficiency domestic water heater, variable volume condensing and chilled and hot water pumping, high-efficiency centrifugal chillers, variable frequency drive (VFD) on cooling tower fans, high-efficiency condensing hot water boilers,

[4] The proposed conversion of 15,100 sf of mechanical space into office space at the Broad Institute was not modeled given the de minimus energy usage and stationary source GHG emissions that would result from the change in use.

high-efficiency water source heat pumps, high-efficiency energy recovery ventilator (ERV), differential CO_2 based demand control ventilation for offices, and CO control and VFD for underground garage fans.

The NPC includes analysis of the viability of a roof-mounted solar PV system for the buildings. The Proponent has committed to constructing all new buildings to be "solar ready". The NPC also evaluated the purchase of energy from the Veolia (f/k/a Dalkia) Cambridge Combined Heat and Power (CHP) district steam network in compliance with the draft *Guidance for the Application of the MEPA GHG Policy and Protocol to the Use of the Dalkia Cambridge CHP District Steam* document. The NPC indicates that additional analysis of this option is needed.

Other sustainable design measures that will reduce the project's GHG emissions, but which are not modeled, are identified including commitments to replace inefficient lighting fixtures at the Cambridge Center North Garage, use of Energy Star appliances, water conservation measures to reduce water use and wastewater generation, consideration of independent building commissioning, consideration of LED lighting and/or efficient utility systems, and incorporation of green roofs/gardens. It is unclear as to whether the Proponent has committed to implement these measures or whether they will be evaluated as project design progresses.

Finally, the NPC includes a commitment that the Proponent will provide a self-certification to the MEPA Office at the completion of each building signed by an appropriate professional (e.g. engineer, architect, transportation planner, general contractor) indicating that all of the GHG mitigation measures, or equivalent measures that are designed to collectively achieve identified reductions in stationary source GHG emission and transportation-related measures, have been incorporated into the project.

Climate Change Adaptation and Resiliency

The NPC noted the importance of planning for climate change impacts and resiliency associated with sea level rise, increased storm frequency and duration, and extreme temperature events. The NPC indicated that the City is working with MassDOT to extend the scope of MassDOT's Advanced Circulation Model ("ADCIRC Model") for the Central Artery to the project area. The results of this model, in conjunction with the Cambridge Climate Change Vulnerability Assessment, will be used to assess risks to the KSURP area from flooding from precipitation, storm surges, and sea level rise. The City of Cambridge comments indicate that the Interim Report on the Cambridge Climate Change Vulnerability Assessment is scheduled to be released within the next several weeks.

The NPC contained the results of an initial assessment based on FEMA Flood Insurance Study for the KSURP area and CZM sea level rise estimates. The Charles River Basin elevation is set by sluice gate operations at the Charles River Dam located at the Museum of Science and pumping from the New Charles River Dam located adjacent to the Zakim Bridge. The NPC indicated that the KSURP area as a whole is not susceptible to the 100- or 500-year storm from the Charles River Basin; however the Charles River Dam is susceptible to sluice gate flooding from the 100-year coastal event combined with sea level rise. The NPC also notes that the

project is potentially susceptible to flooding from the Mystic River and overland flow downstream of the Amelia Earhart Dam. The NPC also identifies the Kendall Square MBTA station as vulnerable to flooding. The NPC indicates that the following design measure will be explored to mitigate the effects of sea level rise as project design advances:

- Locating critical infrastructure above the first floor level (i.e. transformers, switchgear rooms, and mechanical rooms);
- Limiting basement areas;
- Infiltrating stormwater on-site where possible;
- Sanitary sewer and stormwater infrastructure improvements to address I/I and capacity issues in the CSO system;
- Incorporation of green roof/roof gardens and roofing membrane with High Solar Reflectance Index to reduce the heat island effect;
- Utilizing native species to minimize irrigation requirements and efficient irrigation systems; and
- Evaluating raised finish floor elevations.

Hazardous Materials & Solid Waste

The NPC identifies 14 Release Tracking Numbers (RTN) in the project area and identifies the status of each RTN in accordance with the Massachusetts Contingency Plan (MCP). The properties subject to this NPC have achieved regulatory closure under the MCP or were developed prior to the adoption of the MCP. The project will require characterization of the soil and groundwater conditions for management of contaminated soil during construction and to evaluate the residential use exposure scenario. The NPC includes a summary of the anticipated assessment and remedial activities for each project component.

Landlocked Tidelands

The EENF did not identify that the site includes areas of landlocked tidelands; information provided on May 27, 2015 identified work within landlocked tidelands as defined by the Waterways Regulations (310 CMR 9.00) and indicated that it is subject to the Public Benefit Determination regulations (301 CMR 13.00). Additional information is required regarding impacts on the public's right to access, use, and enjoy tidelands and measures to avoid, minimize, and mitigate impacts. The timing of the disclosure limited input on this issue.

Construction Period Impacts

The NPC indentifies the construction period impacts of the project, including truck traffic, air quality (dust), noise, stormwater runoff, and construction waste. Mitigation measures identified in the NPC include development of Construction Management Plans (CMP) for each project component to address numerous temporary construction-related impacts, including mitigation measures, road closures, detours, and staging. Mitigation measures to be included in the CMP include: erosion and sedimentation control, identification of designated truck routes,

maintenance and protection of pedestrian and bicycle accommodations, dust suppression, covering trucks used for transportation of construction debris, daily cleaning of streets and sidewalks, construction noise mitigation measures. The NPC indicates that ultra-low-sulfur fuel will be used for construction vehicles to mitigate construction-related air pollution and commits to meeting the requirements of the MassDEP State Revolving Fund (SRF) for diesel construction equipment.

Conclusion

Based on a review of the NPC, consultation with State Agencies, and a review of comment letters, I have determined that the EENF meets the criteria for a SEIR (301 CMR 11.06 (8)). I note that one area that was not addressed in the EENF was the identification of landlocked tidelands and the provision of associated public benefits. The adequacy of the SEIR will be evaluated, in part, on the Proponent's ability to address the Scope for landlocked tidelands in a comprehensive manner and provide public benefits to support the public's right to access, use, and enjoy tidelands.

SCOPE

General

The SEIR should follow Section 11.07 of the MEPA regulations for outline and content, as modified by this Scope. I strongly urge the Proponent to work with the City, MassDOT, MBTA, and other stakeholder groups prior to the preparation of the SEIR to review and discuss both the content of their comments and potential mitigation measures. These collaborative efforts will assist the Proponent in identifying mitigation measures and presenting a project that meets applicable environmental performance standards. I note I have received numerous comments in support of the project and the Proponent's commitment to work with state agencies and stakeholders to maintain and improve transit service in Kendall Square. C.2

Project Description and Permitting

The SEIR should provide a comprehensive description of project components, including potential off-site mitigation measures. C.3 The SEIR should identify, describe, and assess the environmental impacts of any changes in the project that have occurred between the reviews of the NPC and the SEIR provide an update on what development has occurred to date within the KSURP. C.4 The SEIR should include a table compares the the maximum permitted development within the KSURP to the existing development and adds the development proposed in this NPC. C.5 The table should address GFA, number of housing units, vehicle trips, parking spaces, and water and wastewater use. The SEIR should include updated conceptual plans for existing and post-development conditions. C.6 The SEIR should provide a brief description and analysis of applicable statutory and regulatory standard and requirements, and describe how the project will meet those standards. C.7 The SEIR should include a list of required State Agency Permits, Financial Assistance, and other State approvals, if applicable, and provide an updated status on each of these pending actions. C.8

MassDOT has requested that the Proponent develop a MOU to address transportation and transit mitigation. The SEIR should include a draft MOU for review and comment. C.9

Traffic and Transportation

The SEIR should explicitly note which transportation mitigation measures the Proponent has committed to implementing and those which have been accounted for in the traffic impact analysis. If the traffic impact analysis includes mitigation measures that the Proponent has not committed to, the SEIR should identify alternative methods to demonstrate a similar LOS improvement. C.10 The SEIR should provide tables that indicate the v/c, delay, LOS, and queues for all study area intersections under the Existing, 2024 No-Build, and 2024 Build Conditions. C.11 The SEIR should include a commitment for a long-term parking monitoring plan to evaluate strategies to increase efficient use of parking to minimize trip generation. C.12 I refer the Proponent to comments from the City and note the SEIR should identify access points for the structured parking and incorporate this into the trip generation figures. C.13 The SEIR should address the City's comments regarding the provision of the minimum amount of parking, the proposed number of spaces per dwelling unit, and shared parking. C.14 Based on comments from MassDOT, the SEIR should include a roadway segment analysis for the Binney Street and Broadway corridors based on the latest methodology of the Highway Capacity manual or appropriate traffic software. C.15 This analysis should be performed on corridors currently utilized by some transit services in order to evaluate the impact of the project on transit travel times and help to identify mitigation measures to lessen the impacts of the project.

The SEIR should clarify whether any of the locations with crash rates above district average are considered Highway Safety Improvement Program (HSIP) clusters, and if so, a Road Safety Audit (RSA) should be prepared to help identify appropriate safety improvements that would be completed by the Proponent or by others. C.16 The NPC indicated the Proponent has committed to working with the City to identify areas for pedestrian access improvements and listed a number of measures that could be implemented. C.17 The SEIR should provide a more detailed level of commitment and explain how these measures would improve the pedestrian experience and encourage walking. The SEIR should address the City's comment regarding the proposed pedestrian crossing at Broadway. C.18 I encourage the Proponent to work with the City to gain a better understanding of bicycle parking demand and availability and to provide an update on this issue in the SEIR. C.19 The SEIR should include a more detailed analysis of the project's impacts on bicycle travel within the KSURP and provide additional detail on the existing and proposed bicycle facilities. The analysis should provide measures of effectiveness for the No-Build and Future Build conditions and should clearly identify potential improvements where conditions may be negatively impacted based on vehicular travel or additional bicycle travel. C.20

I applaud the Proponent's commitment to work with stakeholders to maintain and improve the transit system. Additionally, comments received from the City, MassDOT, and others acknowledge the systemic benefit that improving the transit system and mode shift provides to the region and the importance of a comprehensive capacity analysis of the transit system. I refer the Proponent to comments from MassDOT, the City, and others, and note the SEIR should provide an analysis more consistent with the methodology of the MBTA Service Planning Department based on the most recent and most relevant ridership and operational C.21

statistics for the Red Line. The Proponent should consult with the MBTA regarding the scope and protocol for the analysis. I encourage the Proponent to coordinate this analysis with the City in addition to MassDOT and the MBTA. The SEIR should also explain how the project will mitigate its impacts on the MBTA bus network as the additional ridership from the KSURP will likely result in several routes operating over capacity. The SEIR should also evaluate the project's likely impacts on MBTA bus travel times and the impacts of the proposed highway, pedestrian, and bicycle improvements to the bus system and routes. Specifically, as noted in MassDOT's comment letter, the SEIR should provide, in a tabular format, an assessment of which intersections are utilized by MBTA buses and how their timing or turning movements may be affected by the increased traffic and/or proposed roadway and pedestrian changes to be generated by the project. C.21 con't C.22 C.23

The Proponent should work with the MBTA, MassDOT, and the City to develop the potential transit improvements to be included in the ETMP and to identify the appropriate mechanism for ensuring enforceable commitments for these improvements and incorporating the program elements into the transportation planning processes at the City and State levels. The SEIR should provide an update on these discussions and include an implementation schedule or MOU to guide the implementation of mitigation that is not specifically identified in the SEIR. Comments from MassDOT indicate that they will continue to coordinate with the Proponent to ensure that a clear commitment and implementation schedule are in place prior to the project site occupancy. C.24

Water Supply and Wastewater

The NPC notes that the Proponent will explore the viability of alternate water sources such as water reuse systems, rainwater harvesting, and xeriscaping. The SEIR should provide an update on this evaluation and contain a discussion of water conservation measures that the Proponent will commit to implementing in project design. The SEIR should provide an update on discussions with the City, MWRA, and/or MassDEP with respect to I/I mitigation and how the City's requirement to store 24 hours of wastewater flow on-site will be addressed. I encourage the Proponent to provide a detailed update (including a breakdown for each component) regarding how the project will provide requisite I/I mitigation to offset project flows at the 4:1 removal ratio as required by the City of Cambridge. I refer the Proponent to comments from the MWRA which indicate that the project's wastewater flows should be fully offset via I/I removal or sewer separation to ensure that the additional wastewater flows from the project do not result in discharges of untreated CSO to the Charles River Basin at Cambridge Outfall CAM017 during large storms. The SEIR should also address MWRA comments regarding compliance with MWRA's Toxic Reduction and Control (TRAC) Discharge permitting. C.25 C.26 C.27

Stormwater

The SEIR should include a stormwater analysis that evaluates and compares proposed storm-event peak flow rates and volumes to existing conditions based upon conceptual designs for the project. The SEIR should include a description of and implementation schedule for LID measures the Proponent will commit to in order to encourage groundwater recharge and reduce the local heat island effect. C.28 C.29

The NPC indicates that minor flooding occurs during severe, but unspecified, storm events at the stormwater outfall on Broad Canal Way. The SEIR should describe the extent of past flooding and consider the potential for increased flooding due to more frequent extreme storms resulting from climate change. C.30 The NPC indicates that the Proponent may upgrade the stormwater system to address flooding, in lieu of complying with the City's stormwater management standards. The SEIR should provide more information on the potential advantages and disadvantages of this option, discuss whether it can permitted, and evaluate the potential impacts on water quality if only flooding is controlled. C.31

I refer the Proponent to comments from CRWA and MassDEP regarding the established water quality standards in the applicable Charles River TMDLs. The SEIR should provide a detailed discussion of stormwater conveyance from the KSURP to the Charles River and other sufficient information to demonstrate that the stormwater management system will be designed to address the water quality impairments covered by these TMDLs, as well as flooding conditions. C.32

Greenhouse Gas Emissions

I commend the Proponent's commitment to creating a sustainable Transit Oriented Development (TOD) and its efforts to address climate change impacts in coordination with the City and other stakeholder groups. The GHG analysis should be updated based on the evolution of the master plan and specific mitigation measure commitments. The SEIR should address MassDEP and DOER comments. The SEIR should clearly state modeling assumptions, explicitly note which GHG reduction measures have been modeled and which have been accounted for in the mobile GHG evaluation, and identify whether certain building design or operational GHG reduction measures will be mandated by the Proponent to future occupants or merely encouraged for adoption and implementation. C.33 For those components that will be encouraged by the Proponent, the SEIR should include a draft tenant manual that identifies specific strategies to encourage their adoption (e.g. design assistance, financial incentives, providing a list of approved fit-out material performance standards, etc.). C.34 The draft tenant manual should build upon the outline presented in the NPC and provide information to advance energy efficient practices and optimization of energy efficient systems. The SEIR should also identify components of the ETMP and the corresponding emission reductions expected. C.35 If the stationary and/or mobile source GHG evaluation includes mitigation measures that the Proponent has not committed to, the SEIR should identify alternative methods to ensure a similar GHG reduction. C.36 The SEIR should evaluate and revise the Phase 1B energy model or explain Eleven Cambridge Center's low Energy Use Intensity (EUI) when compared to benchmark buildings. C.37

The purpose of the GHG analysis is to identify feasible mitigation measures and assess the relative impacts of the Preferred Alternative. The MassDEP and DOER comment letter provide additional guidance regarding mitigation measures that should be explored as part of the GHG analysis, as well as resources to assist in preparing the analysis. Comments from MassDEP and DOER indicate that utilizing CHP, including the Dalkia plant to address the project's heating and cooling loads may yield additional GHG reduction benefits that should be evaluated by the Proponent. C.38 The SEIR should include an updated analysis that evaluates this issue and explains, in reasonable detail, why the Dalkia Plant and other CHP alternative were not

selected – either because it is not applicable to the project or is considered technically or financially infeasible. I refer the Proponent to comments from DOER and encourage the Proponent to evaluate reducing the overall building envelope U-value by decreasing the window to wall area and/or by increasing the glazing performance and further reducing the lighting power density. C.38 con't

The NPC provided a preliminary evaluation of installing solar PV systems and noted that the capacity of PV arrays is lower than the average power draw of the proposed buildings. Based on this analysis, a rooftop solar PV array has the potential to offset an additional 605 tpy of GHG emissions. The NPC does not include a commitment to install the solar PV array. The SEIR should provide a feasibility analysis, including identification of payback periods, for installation of on-site PV systems. The analysis should consider Solar Carve-Out II / SREC II and rebate mechanisms. The EIR should also expand on the discussion of wind harvesting. C.39

Comment letters from MassDEP and the City indicate that additional GHG reductions can be achieved through recycling and source reduction efforts and water conservation measures. I encourage the Proponent to participate in the EPA WaterSense certification program and EnergyStar ratings in the selection of plumbing fixtures and appliances. Additional information on the WaterSense certification program is available on the following website: http://www.epa.gov/watersense/docs/home_finalspec508.pdf. C.40 Additional GHG reductions can be achieved through effective materials management during the design, construction, and operations phases of the project. The SEIR should describe how the Proponent will incorporate recycling initiatives into proposed construction and demolition activities and comply with the goals of the Massachusetts Solid Waste Master Plan. I strongly encourage the Proponent to set solid waste recycling/reuse target percentage goals. These measures will be considered when evaluating whether the project can mitigate its GHG emission to the greatest extent practicable. C.41

Adaptation and Resiliency

I refer the Proponent to comments from the City which indicates the Interim Report on the Cambridge Climate Change Vulnerability Assessment will be issued imminently. The Interim Report will address the impacts of heat vulnerability and precipitation driven flooding for 2030 and 2070, the risks of sea level rise, and storm surge flooding through 2030. The SEIR should include an updated evaluation of the area's susceptibility to these risks based on the results of the Interim Cambridge *Climate Change Vulnerability Assessment* and the City's and MassDOT's ADCIRC model (as available). This updated analysis should consider the ADCIRC model in conjunction with inland flooding and inundation to further refine probabilistic flooding scenarios. C.42

The SEIR should include a specific focus on how the project has been designed to respond to projected sea level rise scenarios. Using the Office of Coastal Zone Management's (CZM) December 2013 report entitled, *Sea Level Rise: Understanding and Applying Trends and Future Scenarios for Analysis and Planning* in conjunction with the information identified above, and with consideration for the level of acceptable risk and the projected lisespan of the project, the Proponent should select a predicted sea level rise scenario and evaluate in the DEIR how the project may be directly or indirectly impacted. The SEIR should discuss why a specific C.43

scenario (or scenarios) was selected for evaluation, describe resulting sea level rise and storm surge elevations, identify the extent of inundation areas on-site, and indicate how the project will be designed to mitigate this impact or to facilitate adaptation responses. I encourage the Proponent to consult with the MEPA Office for additional clarification prior to undertaking this task. C.43

The SEIR should demonstrate that the project includes ecosystem-based adaptation measures and proactive site design with regard to impacts related to predicted sea level rise, particularly given that the Kendall Square MBTA station may be vulnerable to flooding, which would affect the accessibility of the project via transit. I encourage the Proponent to work with the MBTA to review existing station vulnerabilities and identify improvements that could be undertaken in conjunction with the project. The SEIR should report on the results of this analysis and meetings with the MBTA and discuss what types of design improvements can or will be made to prevent or reduce impacts from extreme storms. C.44

The Proponent should also consider impacts on the proposed structures, building entry and exit points, public roadways that traverse the site (e.g., Broadway, Main Street, Galileo Galilei Way), public and private on-site utilities, and first floor uses. The SEIR should identify site elements that have been incorporated into project design to reduce the impact of extreme heat waves and limit the potential impact of more frequent and intense storm precipitation. The Proponent should consider how on-site renewable energy, a district energy network, or CHP systems may provide added resiliency during periods of power loss during storms. Storm response actions and resiliency measures should be incorporated into leasing agreements or Tenant Manuals and be considered part of guidance related to tenant fit-out of commercial space, particularly those located on the lower floors. C.45 C.46 C.47 C.48

Air Quality

The SEIR should identify certification and/or permits that likely will be required for proposed on-site energy sources such as a cogeneration system, boilers, stationary turbines, emergency generators, etc. I remind the Proponent that, as advised by MassDEP, pre-installation approval from the MassDEP Division of Air Quality Control is required if the project will include the installation of any Fuel Utilization Facility that emits air contaminants (e.g., furnaces, fuel burning equipment, or certain boilers). Additional review by MassDEP may also be required if the building is to be equipped with emergency generators. C.49

Hazardous Materials

Comments from MassDEP identify measures necessary to comply with the MCP. The SEIR should include the results of any subsequent subsurface investigations, soil and/or groundwater sampling and testing, or Environmental Site Assessments specific to the project site to assist in the characterization of hazardous materials on-site, potential remediation requirements, and construction period or operational mitigation measures or include a commitment to engage an environmental consulting firm to assist during project design and construction to ensure that the project conforms to MCP regulatory requirements for construction C.50

of buildings in contaminated areas and that all required submittals will be provided to MassDEP. The SEIR should discuss the need for a vapor intrusion system and identify how it will be incorporated into design and whether it would result in design changes. C.50 con't C.51

Landlocked Tidelands

The SEIR should describe nature and total area of work that is proposed to occur within the tidelands. The SEIR should provide a narrative that explains the project's impact on the public's right to access, use, and enjoy the landlocked tidelands and describes the avoidance, minimization, and mitigation measures proposed to address said impacts. The narrative should describe the public benefits of the project as required in the Public Benefit Determination regulations (301 CMR 13.00). Additionally, the SEIR should identify whether the project is located in an area of low groundwater and if so, should identify and commit to taking measures to avoid, minimize, or mitigate any adverse impacts on groundwater levels in accordance with 301 CMR 11.05(4)(b). C.52

Construction Period

The project must comply with MassDEP's Solid Waste and Air Quality Control regulations, pursuant to M.G.L. Chapter 40, Section 54, during demolition and construction. Construction Management Plans (CMP) will be developed for each component of the project and will be reviewed and approved by the City. The NPC indicates that the Proponent has committed to complying with MassDEP requirements for diesel construction equipment including the use of construction equipment that meet Tier 3 or Tier 4 emissions standards for non-road construction equipment (rated 50 horsepower or greater) to reduce emissions of VOCs, carbon monoxide (CO) and particulate matter (PM) from diesel-powered equipment.

Mitigation/Draft Section 61 Findings

The SEIR should include a separate chapter summarizing proposed mitigation measures. This chapter should also include draft Section 61 Findings for each State Agency that will issue permits for the project. The SEIR should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation (either funding design and construction or performing actual construction), and a schedule for implementation. C.53

Given the integration of transit system improvements into the project, the SEIR must provide a concise description and commitment to construct transportation or transit system improvements necessary to adequately mitigate project-related transportation demand. These mitigation commitments may be tied to overall project square footage or traffic generation rates, and/or addressed through a MOU with MassDOT, the MBTA, and/or the City of Cambridge. C.54

In order to ensure that all GHG emissions reduction measures adopted by the Proponent in the Preferred Alternative are actually constructed or performed by the Proponent, I require Proponents to provide a self-certification to the MEPA Office indicating that all of the required mitigation measures, or their equivalent, have been completed. I hereby request that the C.55

Proponent affirm in the SEIR that, following completion of construction, the Proponent will provide a certification to the MEPA Office signed by an appropriate professional (e.g., engineer, architect, transportation planner, general contractor) indicating that all of the mitigation measures adopted by the Proponent as part of the Preferred Alternative have been implemented. Alternatively, this self-certification may confirm that equivalent emissions reduction measures that collectively are designed to reduce GHG emissions by the same percentage as the measures outlined in the Preferred Alternative, based on the same modeling assumptions, have been adopted. The certification should be supported by plans that clearly illustrate what type of GHG mitigation measures have been incorporated into the project. For those measures that are operational in nature (i.e. TDM, recycling, parking management) the Proponent should provide an updated plan identifying the measures, the schedule for implementation and how progress towards achieving the measures will be obtained. The commitment to provide this self-certification in the manner outlined above should be incorporated into the updated draft Section 61 Findings included in the SEIR.

C.55 con't

Responses to Comments

The SEIR should contain a copy of this Certificate and a copy of each comment letter received on the NPC. In order to ensure that the issues raised by commenters are addressed, the SEIR should include direct responses to these comments to the extent that they are within MEPA jurisdiction. This directive is not intended, and shall not be construed, to enlarge the scope of the SEIR beyond what has been expressly identified in this certificate. I recommend that the Proponent employ an indexed response to comments format, supplemented as appropriate with direct narrative response.

C.56

Circulation

In accordance with Section 11.16 of the MEPA Regulations and as modified by this Certificate, the Proponent should circulate a hard copy of the SEIR to each State and City Agency from which the Proponent will seek permits. The Proponent must circulate a copy of the SEIR to all other parties that submitted individual written comments. Per 301 CMR 11.16(5), the Proponent may circulate copies of the SEIR to these other parties in CD-ROM format or by directing commenters to a project website address. However, the Proponent should make available a reasonable number of hard copies to accommodate those without convenient access to a computer and distribute these upon request on a first-come, first-served basis. The Proponent should send correspondence accompanying the CD-ROM or website address indicating that hard copies are available upon request, noting relevant comment deadlines, and appropriate addresses for submission of comments. A CD-ROM copy of the filing should also be provided to the MEPA Office. A copy of the SEIR should be made available for review at the Cambridge Public Library.

C.57

May 29, 2015
Date

Matthew A. Beaton

Comments received:

05/15/2015	Massachusetts Water Resources Authority
05/20/2015	Stephen H. Kaiser
05/22/2015	Charles River Watershed Association (CRWA)
05/22/2015	Massachusetts Department of Environmental Protection – Northeast Regional Office
05/22/2015	Massachusetts Department of Energy Resources (DOER)
05/26/2015	Massachusetts Department of Transportation
05/27/2015	City of Cambridge

MAB/PC/pc

Letter 1
Massachusetts Department of Transportation

Comment 1.1

"The NPC has discussed an approach to the mitigation program that would need to be further refined in the SEIR."

Response

See the responses to Comments C.1 and C.9 above.

Comment 1.2

"The SEIR should clarify whether any of the locations with crash rates above district average are considered HSIP clusters, and if so, should be prepared a Road Safety Audit (RSA). The RSA would help identify appropriate safety improvements that would be completed by the Proponent or by others."

Response

See the response to Comment C.16 above.

Comment 1.3

"The TIA estimates that 64% of the office and retail transit trips and 79% of the residential transit trips would occur via the Red Line. This additional new ridership on the Red Line is not expected to have a significant impact on this segment of the system. According to a summary table for the 2024 Build Condition MBTA Subway Peak Hour Utilization, the volume to capacity ratio (V/C) for both entering and exiting the Kendall Square Station is expected to be within acceptable ranges, and the increase in ridership associated with the KSURP is for the most part negligible. The Proponent, however, should provide an analysis more consistent with the methodology of the MBTA Service Planning Department, based on the most recent and most relevant ridership and operational statistics for the Red Line."

Response

A detailed analysis of the MBTA Red Line was conducted. This analysis is presented under the 'Transit Operation – MBTA Red Line Analysis' section starting on page 2-75 of Chapter 2, *Transportation and Parking.*

Comment 1.4

"The TIA presents a summary table for the anticipated demand in terms of MBTA Service Standards for bus volumes, capacity, etc. According to the summary table, many of the bus routes are experiencing high v/c ratios and are operating at or around full capacity. The additional ridership associated with the KUSRP would have a significant impact over existing conditions, and several routes are expected to operate over capacity. The NPC is not specific on how the Proponent is expected to assist the MBTA in remediating these conditions."

Response

A discussion of possible public transit enhancement strategies to support the Project-related transit trips as well as future ridership within the district is presented on page 2-91 of the 'Proposed Public Transit Improvements' section of Chapter 2, *Transportation and Parking*.

Comment 1.5

"The NPC did not address what the impacts to MBTA bus travel times would be due to the additional traffic generated by the project or the impacts of the proposed highway, pedestrian, and bicycle improvements to the bus system. The MBTA requests that the SEIR present, in a tabular format, an assessment of which intersections are utilized by MBTA buses and how their timing or turning movements may be affected by the increased traffic and/or proposed roadway and pedestrian changes generated by the project."

Response

An analysis was conducted to understand impacts the Project could have on the travel times of each MBTA bus route that runs within the study area. This analysis is presented in Chapter 2, *Transportation and Parking* under the 'Transit Operation – MBTA Bus and EZRide Shuttle Route Analysis' section starting on page 2-83.

Comment 1.6

"The Proponent has committed to continue working with the City to identify areas of improvement, and listed a number of measures that could be implemented. The SEIR should provide a more detailed level of commitment and should address how these measures would improve the pedestrian experience and induce more demand."

Response

Refer to the response to Comment C.17 above.

Comment 1.7

"The analysis should provide measures of effectiveness for No-Build and Future Build conditions and should clearly identify potential improvements where conditions are expected to worsen based on vehicular travel or additional bicycle travel. The TIA also includes a detailed inventory of the bicycle network to include on-street bike lanes, cycle tracks, and multi-use pathways. The SEIR should include a more detailed analysis of the project's impacts on bicycle travel within the KSURP."

Response

A Multimodal Level of Service (MMLOS) analysis was conducted to evaluate the interaction between each of the major modes of transportation, vehicle, pedestrian, bicycle, and transit modes. This analysis, starting on page 2-51, was conducted for three specified study area intersections, per the *2010 Highway Capacity Manual* methodology for determining signalized intersections for MMLOS analysis. The MMLOS analysis included a bike LOS for Existing, No-Build, and Build Conditions. Potential improvements for intersections that are expected to worsen are discussed in Chapter 2, *Transportation and Parking* under the 'Proposed Transportation Mitigation and Other Beneficial Measures' section on page 2-90.

A detailed existing conditions analysis and future bicycle parking analysis had been conducted and is illustrated in Figure 2.7. This evaluation identifies existing deficiencies and future bicycle parking needs for the Project. Refer to the 'Bicycle and Pedestrian Facilities section of Chapter 2 (page 2-22).

Comment 1.8

"The Proponent has also committed to work with the City to continue to enhance bicycle infrastructure as the project evolves within the KSURP, and has listed a number of proposed bicycle improvements within the area. The Proponent should use the Future Build analysis in the SEIR to assist the City in prioritizing the needed improvements, and where appropriate to implement the needed bicycle infrastructure."

Response

See the response to Comment 1.7 above.

Comment 1.9

"MassDOT is currently undertaking a transportation improvement along Route 28. The intersection improvements are needed to accommodate the relocation of the MBTA's Lechmere Station to the north side of O'Brien Highway. This project will provide improved pedestrian and bicycle access across O'Brien Highway to the new station and reduce congestion and queuing along O'Brien Highway. The Proponent has listed the intersections along the corridor that would be impacted by the KSURP project and listed MassDOT as the Proponent for these improvements. The Proponent should coordinate with MassDOT and the City of Cambridge to ensure that these improvements are in place as the project evolves."

Response

The Proponent will monitor the progress of the O'Brien Highway improvements as the Project schedule continues to be finalized. As each Project Component moves through the design and construction phases, the progress of the O'Brien Highway Improvements project will be clearly documented and the impacts will be identified.

Comment 1.10

"In addition, the Proponent should provide roadway segment analyses for the Binney Street and Broadway corridors based on the latest methodology of the Highway Capacity Manual or appropriate traffic software analysis to be discussed and approved by MassDOT. These should be provided on corridor currently being used by some of the transit services to evaluate the impacts of the project on transit travel times and to help identify physical and/or non-physical mitigation measures to lessen the impacts associated with the project. The SEIR should include this additional analysis."

Response

See the response to Comment C.15 above.

Comment 1.11

"The Proponent has indicated that a revenue control system will be implemented at the parking garages and pricing strategies would be implemented to manage parking. This would help reduce single-occupancy vehicle trips and encourage the use of alternative transportation modes. The Proponent should commit to monitor the effectiveness of the pricing strategies and adjust prices as needed to meet the goals of site trip reduction and efficient site access and circulation."

Response

See the response to Comments C.12 and C.15 above.

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, MassDOT Secretary & CEO

massDOT
Massachusetts Department of Transportation

May 26, 2015

Matthew Beaton, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114-2150

RE: Cambridge: Kendall Square Urban Renewal Plan – NPC
(EEA #1891)

ATTN: MEPA Unit
Page Czepiga

Dear Secretary Beaton:

On behalf of the Massachusetts Department of Transportation, I am submitting comments on the Notice of Project Change (NPC) for the Kendall Square Urban Renewal Plan in the City of Cambridge, as prepared by the Office of Transportation Planning. If you have any questions regarding these comments, please call J. Lionel Lucien, P.E., Manager of the Public/Private Development Unit at (857) 368-8862.

Sincerely,

David J. Mohler
Executive Director
Office of Transportation Planning

DJM/jll

Ten Park Plaza, Suite 4160, Boston, MA 02116
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www.mass.gov/massdot

cc: Thomas J. Tinlin, Acting Administrator, Highway Division
Patricia Leavenworth, P.E., Chief Engineer, Highway Division
Neil Boudreau, State Traffic Engineer
Walter Heller, P.E., District 6 Highway Director
Andrew Brennan, MBTA
City of Cambridge, Planning Department
Thomas Evans, Director, Cambridge Redevelopment Authority
Kristin Slaton, Director, MassRides
PPDU Files

Charles D. Baker, Governor
Karyn E. Polito, Lieutenant Governor
Stephanie Pollack, MassDOT Secretary & CEO

massDOT
Massachusetts Department of Transportation

MEMORANDUM

TO: David J. Mohler, Executive Director
Office of Transportation Planning

FROM: J. Lionel Lucien, P.E, Manager, Public/Private Development Unit
Office of Transportation Planning

DATE: May 26, 2015

RE: Cambridge: Kendall Square Urban Renewal Plan Amendment – NPC

The Public/Private Development Unit has reviewed the Notice of Project Change (NPC) for the Kendall Square Urban Renewal Plan (KSURP) and Mixed Use Development (MXD) zoning to facilitate a proposed Mixed-Use Development in the Kendall Square area in Cambridge. The project would consist of approximately 1.04 million gross square feet (GSF) of new development to include 600,000 GSF of office and research and development/innovation space; 400,000 GSF of residential space, totaling approximately 500 residential units; and ancillary space totaling approximately 40,000 GSF of space.

The project is located in the Kendall Square area, and is bounded by Main Street, the Boston and Albany Branch Railroad, Binney Street, and Third Street. The project will also trigger the mandatory filing of an Environmental Impact Report because it will generate in excess of 3,000 new daily vehicle trips.

The Proponent has previously consulted with MassDOT regarding the transportation study for the project by submitting a Transportation Scoping Letter (TSL). MassDOT has reviewed and commented on the TSL, which provided guidance to advance the transportation study.

The NPC includes a transportation study prepared in conformance with the latest MassDOT/EOEEA Guidelines for Transportation Impact Assessments (TIA). The study includes a comprehensive assessment of the transportation conditions in the KSURP study area based on a thorough analysis of existing and future conditions. The NPC has evaluated the transportation impacts of the proposed project based on the adjusted trip generation estimates along with future transportation demands due to projected traffic growth, independent of the proposed development. The NPC has discussed an approach to the mitigation program that would need to be further refined in the SEIR. The mitigation program is a multimodal approach consisting of highway, transit, bicycle, and pedestrian improvements. The proponent has also committed to a transportation demand management (TDM) program to reduce automobile trips and to expand the existing monitoring program to include the current project. 1.

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www.mass.gov/massdot

The Proponent has requested a waiver for the preparation of a Single EIR for the project. MassDOT does not object the Secretary of EEA granting the waiver request; however, the Proponent should work closely with MassDOT and the MBTA to adequately address the following remaining comments in the SEIR:

Trip Generation

The Proponent proposes the use of Institute of Transportation Engineers (ITE) Land Use Codes 220 (Apartments), LUC 820 (Shopping Center), and LUC 710 (Office) to estimate site-generated traffic attributed to the project. Based on ITE unadjusted calculations, the project is expected to generate 10,512 vehicle trips on an average weekday. Upon applying mode share adjustment credits, the project is expected to generate the following trips via different modes of transportation: 3,638 net vehicle trips on an average weekday, including 390 net vehicle trips during the weekday AM peak hour and 444 net vehicle trips during the weekday PM peak hour; 4,440 transit trips on an average weekday, including 639 trips in the weekday AM peak and 716 trips in the weekday PM peak hour; 1,544 walking trips, including 169 trips during the weekday AM peak hour and 195 trips during the weekday PM peak hour; 1,184 bicycle trips on an average weekday, including 165 trips during the weekday AM peak hour and 185 trips during the weekday PM peak hour; and 1,324 other trips on an average weekday including, 126 trips during the weekday AM peak hour and 240 trips during the weekday PM peak hour.

The Proponent has consulted with MassDOT regarding the methodology used to estimate person trips for the project. The trip generation calculations reflect credits allowed for pass-by trips and mode share based on rates derived from the existing counting program within the KSURP. Given the project's proximity to existing MBTA transit services, improvements to existing pedestrian and bicycle networks, an existing TDM program, and the commitment to monitor the program, MassDOT concurs with the credits taken to calculate net trip generation.

Mode Split Assumptions

The Proponent has identified the different modes within the study area and presented a table of the percentage split for each mode. These percentages are based on both national and local data. The TIA includes sufficiently detailed information on bicycle facilities, pedestrian facilities, and the transit service, both public and private, within the study area to support these estimates.

Safety

The TIA includes a comprehensive safety analysis and crash rates provided for all intersections with the study area. These rates are compared with average rates for the appropriate district and statewide average. The SEIR should clarify whether any of the locations with crash rates above district average are considered HSIP clusters, and if so, should be prepared a Road Safety Audit (RSA). The RSA would help identify appropriate safety improvements that would be completed by the Proponent or by others. 1.

Transportation Analysis

Transit:

The MBTA currently operates extensive rapid transit near the site and bus service directly to the site. The TIA includes a comprehensive analysis of existing service provided by the MBTA Red line and the various MBTA bus routes with the KSURP. Based on the mode split associated with the project, the MBTA Red Line is expected to see a significant share of transit ridership entering and exiting the system at the Kendall Square Station. The TIA estimates that 64% of the office and retail transit trips and 79% of the residential transit trips would occur via the Red Line. This additional new ridership on the Red Line is not expected to have a significant impact on this segment of the system. According to a summary table for the 2024 Build Condition MBTA Subway Peak Hour Utilization, the volume to capacity ratio (V/C) for both entering and exiting the Kendall Square Station is expected to be within acceptable ranges, and the increase in ridership associated with the KSURP is for the most part negligible. The Proponent, however, should provide an analysis more consistent with the methodology of the MBTA Service Planning Department, based on the most recent and most relevant ridership and operational statistics for the Red Line. 1.

In addition to the Red Line service, the area is also served by a series of MBTA bus routes, including Route 64 (Oak Street-University Park, Cambridge), Route 68 (Harvard/Holyoke Gate-Kendall/MIT via Broadway), Route 85 (Spring Hill-Kendall/MIT Station via Union Square & Summer Street), and Route CT2 (Sullivan Square-Ruggles Station via Kendall/MIT). A series of other routes run through the travel area but do not currently stop near the proposed KSURP.

The TIA includes a detailed presentation of the impact to the MBTA bus network. The TIA presents a summary table for the anticipated demand in terms of MBTA Service Standards for bus volumes, capacity, *etc.* According to the summary table, many of the bus routes are experiencing high v/c ratios and are operating at or around full capacity. The additional ridership associated with the KUSRP would have a significant impact over existing conditions, and several routes are expected to operate over capacity. The NPC is not specific on how the Proponent is expected to assist the MBTA in remediating these conditions. 1.

The NPC did not address what the impacts to MBTA bus travel times would be due to the additional traffic generated by the project or the impacts of the proposed highway, pedestrian, and bicycle improvements to the bus system. The MBTA requests that the DEIR present, in a tabular format, an assessment of which intersections are utilized by MBTA buses and how their timing or turning movements may be affected by the increased traffic and/or proposed roadway and pedestrian changes generated by the project. This particular concern was not specifically addressed; however, based on the increase of pedestrians, bicyclists, and vehicle traffic, travel times for MBTA buses would most likely be adversely impacted. 1.

Pedestrian Access

The TIA provides a comprehensive inventory of all existing, planned, and proposed services, facilities, and routes for accessing the site. As indicated in the NPC, the KUSRP is located within an area that already includes excellent pedestrian accommodations with a robust

network of sidewalks, with crosswalks at all study area intersections. Most intersections are equipped with the latest technology in terms of pedestrian countdown timers.

The Proponent has committed to continue working with the City to identify areas of improvement, and listed a number of measures that could be implemented. The SEIR should provide a more detailed level of commitment and should address how these measures would improve the pedestrian experience and induce more demand. We note that proposed pedestrian improvements at a number of locations include features such as streetscape, open spaces with multiple outdoor connections to buildings, and enhanced lighting along sidewalks and pathways for safer pedestrian accommodations. 1.

Bicycle Access

The TIA also includes a detailed inventory of the bicycle network to include on-street bike lanes, cycle tracks, and multi-use pathways. The SEIR should include a more detailed analysis of the project's impacts on bicycle travel within the KSURP. The analysis should provide measures of effectiveness for No-Build and Future Build conditions and should clearly identify potential improvements where conditions are expected to worsen based on vehicular travel or additional bicycle travel. 1.

The Proponent has also committed to work with the City to continue to enhance bicycle infrastructure as the project evolves within the KSURP, and has listed a number of proposed bicycle improvements within the area. The Proponent should use the Future Build analysis in the SEIR to assist the City in prioritizing the needed improvements, and where appropriate to implement the needed bicycle infrastructure. 1.

Vehicular

The TIA presents capacity analyses and a summary of average and 95th percentile vehicle queues for each intersection within the study area. According to the capacity analysis included in the NPC, a number of intersections within the study area are expected to operate at close or level of service F during the weekday morning and afternoon peak hour. In some instances, both queues and delay would create congested conditions within the study area. Most of the impacted intersections are within the jurisdiction of the City of Cambridge, except for the Route 28 (Monsignor O'Brien Highway) corridor. The Proponent has identified and listed in the NPC a series of improvements to reduce the traffic impacts of the project on these already congested intersections. These improvements consist for the most part of traffic signal timing and phasing improvements, which in some instances would result in operation similar or slightly better than No-Build conditions.

MassDOT is currently undertaking a transportation improvement along Route 28. The intersection improvements are needed to accommodate the relocation of the MBTA's Lechmere Station to the north side of O'Brien Highway. This project will provide improved pedestrian and bicycle access across O'Brien Highway to the new station and reduce congestion and queuing along O'Brien Highway. The Proponent has listed the intersections along the corridor that would be impacted by the KSURP project and listed MassDOT as the Proponent for these improvements. The Proponent should coordinate with MassDOT and the City of Cambridge to ensure that these improvements are in place as the project evolves. 1.

In addition, the Proponent should provide roadway segment analyses for the Binney Street and Broadway corridors based on the latest methodology of the Highway Capacity Manual or appropriate traffic software analysis to be discussed and approved by MassDOT. These should be provided on corridor currently being used by some of the transit services to evaluate the impacts of the project on transit travel times and to help identify physical and/or non-physical mitigation measures to lessen the impacts associated with the project. The SEIR should include this additional analysis. 1.1

Transportation Demand Management

The TIA includes a comprehensive transportation demand management (TDM) plan to reduce site trip generation. The plan is built upon an existing TDM program under implementation in the area for many years. The program has been successful in reducing trip generation as the monitoring program results over the past many years seem to indicate that site trip generation is well below ITE trig generation projections. In addition, the monitoring program has identified a significant mode shift for the different uses in the area. The mode shift assumptions used in the NPC are derived for the data from the monitoring program. In addition to the existing TDM program, the Proponent has committed to a host of TDM measures that could include a carsharing program, MBTA transit pass subsidy, free ride on some of the existing shuttles, parking pricing, Hubway pass subsidies, and a Transportation Coordinator. The Proponent should ensure that the Transportation Coordinator work closely with the future tenants to refine and tailor the TDM program to the specific uses. The Proponent should coordinate with local transit operators, transportation management associations, and MassRIDES in facilitating the provision of transportation options on site.

Parking

The Proponent has detailed their parking need calculations based on the development program. The analysis includes more detailed information on the methodology and assumptions used to derive the parking demand for the project. Based on this assessment, the project will add approximately 740 parking spaces for a KSURP total of and now provide 3,448 parking spaces to accommodate office, retail, and residential uses. The parking spaces would be generally distributed within three locations.

MassDOT is generally comfortable with the methodology, the assumptions, and the resulting parking demand. The Proponent should monitor usage of these spaces and evaluate strategies to increase efficient use of the parking spaces to reduce site trip generation.

The Proponent has indicated that a revenue control system will be implemented at the parking garages and pricing strategies would be implemented to manage parking. This would help reduce single-occupancy vehicle trips and encourage the use of alternative transportation modes. The Proponent should commit to monitor the effectiveness of the pricing strategies and adjust prices as needed to meet the goals of site trip reduction and efficient site access and circulation. 1.1

In summary, the SEIR should address the above comments and the Proponent should continue to work with MassDOT and the MBTA to ensure that adequate mitigation are implemented over time as the KSURP continues to develop. In particular, the Proponent has previously met with MassDOT and the MBTA to discuss a mechanism to assist the MBTA in improving overall transit services in the area in light of the projected transit usage associated with the project. Currently, MassDOT is undertaking a planning study for the Kendall Square area that would identify alternatives or solutions to address mobility within the area. The MBTA, the City of Cambridge, bicycle and pedestrian advocates are part of a task force recently created for the study. MassDOT believes that the study would better informed the types of service improvements that would benefit the MBTA, and the Proponent could fund or implement some of these improvements as mitigation for the KSURP. During previous discussions with MassDOT, the Proponent has discussed the possibility of establishing a Memorandum of Understanding to guide the implementation of future mitigation. MassDOT would continue these discussions to ensure that a clear commitment and implementation schedule are in place prior to the project site occupancy.

MassDOT looks forward to continue reviewing this project though the MEPA process. If you have any questions regarding these comments, please contact me at (857) 368-8862.

Letter 2
Massachusetts Water Resources Authority

Comment 2.1

"To ensure that the Project' s new wastewater flow does not increase surcharging and overflows in large storms, the Proponent should fully offset the Project's wastewater flows with I/I removal or sewer separation in accordance with City of Cambridge 's policies and state regulation. If not offset, the new flows to MWRA's system could compromise the environmental benefits of MWRA's $892 million CSO Control Program, including water quality improvement in the Charles River."

Response

The Redeveloper is committed to complying with Cambridge DPW's requirements to repair I/I at a rate of four (4) times the wastewater generation to reduce flow to MWRA's Combined Sewer.

Comment 2.2

"The MWRA prohibits the discharge of groundwater to the sanitary sewer system, pursuant to 360 C.M.R. 10.023(1) except in a combined sewer area when permitted by the Authority and the municipality. The proposed Project site has access to storm drains and it is not located in a combined sewer area; therefore, the discharge of groundwater to the sanitary sewer system associated with this Project is prohibited. The Proponent must secure a USEPA-NPDES General Permit for Storm Water Discharges from its construction activities."

Response

The Proponent does not propose groundwater discharge to the sanitary sewer system and will obtain the required NPDES for construction activities.

Comment 2.3

"… if a commercial company intends to move to the 43-acre site and proposes to discharge process and/or laboratory wastewater to the sanitary sewer system, it must apply for a MWRA Sewer Use Discharge Permit. For assistance in obtaining this permit, the Proponent should

contact Walter Schultz, Industrial Coordinator in the TRAC Group at (617) 305-5665. If required, the Proponent must have the MWRA Sewer Use Discharge Permit prior to discharging process and/or laboratory wastewater into the MWRA sanitary sewer system."

Response

The Proponent will apply for required MWRA Sewer Use Discharge Permits for each Project Component as design progresses.

Comment 2.4

"…the proponent(s) must also comply with 360 C.M.R. 10.016, if it intends to install gas/oil separator(s) in enclosed parking garages planned for the project site. In addition to complying with 360 C.M.R. 10.000, the proponent(s) shall conform to the regulations of the Board of State Examiners of Plumbers and Gas Fitters, 248 C.M.R. 2.00 (State Plumbing Code), and all other applicable laws. The installation of proposed gas/oil separator(s) will require MWRA approval and may not be back filled until inspected and approved by the MWRA and the Local Plumbing Inspector. For assistance in obtaining an inspection for each facility the proponent(s) of each facility should contact Stephen Howard , Source Coordinator in the TRAC Group at (617) 305-5675."

Response

The Proponent will comply with all applicable laws including 360 CMR 10.000 and will coordinate the design and inspection of gas/oil separators with the MWRA as the design of each Project Component progresses.

MASSACHUSETTS WATER RESOURCES AUTHORITY

Charlestown Navy Yard
100 First Avenue, Building 39
Boston, MA 02129

Frederick A. Laskey
Executive Director

Telephone: (617) 242-6000
Fax: (617) 788-4899
TTY: (617) 788-4971

May 15, 2015

Matthew Beaton, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge St, Suite 900
Attn: MEPA Office, Page Czepiga
Boston, MA 02114

Subject: EOEEA # 1891 Expanded Notice of Project Change
Kendall Square Urban Renewal Project Amendment #10

Dear Secretary Beaton:

The Massachusetts Water Resources Authority (MWRA) appreciates the opportunity to comment on the Kendal Square Urban Renewal Project Amendment #10 (Expanded Notice of Project Change) filed by

The approximately 43-acre Kendall Square Urban Renewal Project (KSURP) area has been undergoing redevelopment since 1965 when the KSURP was originally approved. In 1977, the KSURP was amended to create a Mixed Use District (MXD) that has since been transformed into Cambridge Center - a major urban mixed-use project reviewed by MEPA at that time. Boston Properties (the "Redeveloper") was selected by the Cambridge Redevelopment Authority (the "Proponent") in 1979, to take on the Cambridge Center project, and most of the property is now owned and managed by the Redeveloper. The current Project Change consists of new commercial office/innovation space development over the Cambridge Center North garage, a new residential building at Eleven Cambridge Center, and a new mixed-use building at Three Cambridge Center. New parking will be created in a combination of ways including an additional level to the existing Garage and in a separate new below-grade garage under new construction buildings. Additionally, the Project Change includes an approximately 60,000-square foot commercial office/lab expansion of the existing Whitehead Institute building at Nine Cambridge center and the conversion of approximately 15,100 square feet of mechanical space into commercial office space at the Broad Institute at 75 Ames Street. These latter components of the KSURP expansion will be undertaken by other parties in coordination with the Proponent, separate from the Redeveloper.

MWRA comments focus on issues related to wastewater flows and permitting within the Toxic Reduction and Control (TRAC) Group.

Wastewater Flows

The Expanded NPC reports that each project component will be designed in accordance with City and MassDEP stormwater standards. As the limits of the developments have not been

set, stormwater control measures will be investigated as each Project Component undergoes their respective design process. The proponent will consider several stormwater quality and quantity control measures as part of this process. The Expanded NPC also reports that in addition to complying with the relevant DEP stormwater policies, the Project will meet the requirements set forth by the City. The project will be required to mitigate stormwater effluent from the post development 25-year design storm to the rates of the pre-development 2-year design storm, as well as reduce Total Suspended Solids (TTS) by 80 percent from the pre-development condition. While the Proponent intends to meet these base requirements, it will also seek to replace some of the on-site stormwater mitigation strategies through supporting efforts by the City to increase stormwater capacity in the overall Kendall Square area. In discussion with the DPW on March 13, 2015, the Proponent was informed of two planned ventures to refurbish and expand two large stormwater storage tanks near the KSURP area.

The Expanded NPC reports that the Project will increase wastewater flow from the site by a total of 1,037,945 gallon per day (1.04 mgd), including an increase of 107,945 gpd with the current project change. The Expanded NPC also reports that wastewater flows from the Project area will travel northeasterly by gravity flow to the MWRA system located in Cardinal Medeiros Avenue (MWRA's "Cambridge Branch Sewer"). The Cambridge Branch Sewer conveys flows to MWRA's DeLauri Pump Station in Charlestown, which in turn pumps flows into MWRA's North Metropolitan Sewer for transport to the Deer Island Treatment Plant. The Cambridge Branch Sewer also serves combined sewer areas in parts of Cambridge, Somerville and Boston. The combination of sanitary flow and stormwater can exceed the capacity of the Cambridge Branch Sewer, which can overflow into Cambridge's Binney Street combined sewer overflow conduit. The Binney Street overflow conduit drains to MWRA's Cambridge Marginal Conduit and Prison Point CSO Treatment Facility in most storms. In large storms, the Binney Street overflows can exceed the hydraulic capacity of MWRA's overflow system, contributing to discharges of untreated CSO to the Charles River Basin at Cambridge's Outfall CAM017. To ensure that the Project's new wastewater flow does not increase surcharging and overflows in large storms, the Proponent should fully offset the Project's wastewater flows with I/I removal or sewer separation in accordance with City of Cambridge's policies and state regulation. If not offset, the new flows to MWRA's system could compromise the environmental benefits of MWRA's $892 million CSO Control Program, including water quality improvement in the Charles River. 2.1

The Expanded NPC reports that the Proponent will be required to remove stormwater or infiltration/inflow (I/I) to the sanitary infrastructure equivalent to the volume of four (4) times the project-related estimated wastewater generation. At this stage of the design, it is anticipated that the Proponent will be required to remove 437,780 gpd of stormwater from sewer system. The Expanded NPC reports that this I/I reduction will be accomplished by coordinating with the City to either correct I/I issues within the KSURP area or pay for projects the City is performing in an effort to reduce I/I. The Proponent will coordinate with the City to determine the most effective strategy for accomplishing the wastewater flow mitigation, including improvements that may be recommended in lieu of the City's requirement that projects be able to store 24 hours of sanitary flow on-site during a surcharge condition.

TRAC Permitting

The MWRA prohibits the discharge of groundwater to the sanitary sewer system, pursuant to 360 C.M.R. 10.023(1) except in a combined sewer area when permitted by the Authority and the municipality. The proposed Project site has access to storm drains and it is not located in a combined sewer area; therefore, the discharge of groundwater to the sanitary sewer system associated with this Project is prohibited. The Proponent must secure a USEPA-NPDES General Permit for Storm Water Discharges from its construction activities. 2.2

Collectively, if a commercial company intends to move to the 43-acre site and proposes to discharge process and/or laboratory wastewater to the sanitary sewer system, it must apply for a MWRA Sewer Use Discharge Permit. For assistance in obtaining this permit, the Proponent should contact Walter Schultz, Industrial Coordinator in the TRAC Group at (617) 305-5665. If required, the Proponent must have the MWRA Sewer Use Discharge Permit prior to discharging process and/or laboratory wastewater into the MWRA sanitary sewer system. 2.3

Lastly, the proponent(s) must also comply with 360 C.M.R. 10.016, if it intends to install gas/oil separator(s) in enclosed parking garages planned for the project site. In addition to complying with 360 C.M.R. 10.000, the proponent(s) shall conform to the regulations of the Board of State Examiners of Plumbers and Gas Fitters, 248 C.M.R. 2.00 (State Plumbing Code), and all other applicable laws. The installation of proposed gas/oil separator(s) will require MWRA approval and may not be back filled until inspected and approved by the MWRA and the Local Plumbing Inspector. For assistance in obtaining an inspection for each facility the proponent(s) of each facility should contact Stephen Howard, Source Coordinator in the TRAC Group at (617) 305-5675. 2.4

Sincerely,

Marianne Connolly

Marianne Connolly
Senior Program Manager,
Environmental Review and Compliance

cc: Kattia Thomas, MWRA TRAC
David Kubiak, MWRA Engineering and Construction
Solomon Wondimu, MWRA Engineering and Construction
Kevin Brander, DEP
Owen O'Riordan, Commissioner, Cambridge DPW

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Letter 3
Massachusetts Department of Environmental Protection

Comment 3.1

"Under the terms of the new regulations at 314 CMR 12.04(2)(d), MassDEP requires sewer authorities with permitted combined sewer overflows, including the City of Cambridge, to require removal of four gallons of infiltration and inflow (I/I) for each gallon of new wastewater flows generated for any new connection where greater than 15,000 gallons per day of new wastewater flows will be generated. Accordingly, the proponents should work with Cambridge on meeting this requirement."

Response

The Redeveloper will work with Cambridge DPW on meeting 4:1 I/I removal as required for each Project Component exceeding 15,000 gallons of wastewater generation. In a meeting July 21, 2015, the DPW could not suggest options for I/I removal. As requested, the Redeveloper will coordinate with the DPW as it develops its I/I mitigation over the coming 3-6 months.

Comment 3.2

"The EIR should explain the wastewater system serving the project site, as well as the infiltration and inflow program that will be completed as mitigation to satisfy the I/I removal requirements."

Response

Chapter 6, *Water and Wastewater* further describes the wastewater system serving each Project Component.

Comment 3.3

"The existing drainage system for the proposed redevelopment project ultimately discharges runoff to the City's drainage system and the Charles River through a 54-inch outfall at Broad Canal Way. The NPC reports that there is minor flooding in the area of the project due to storm drain surcharging during severe, but unspecified, storm events. The EIR should describe

the extent of flooding in context with historical flooding events, and take into consideration the potential for increased flooding due to more frequent extreme storm events associated with climate change."

Response

The Proponent has obtained flood modelling data for the storm drainage system in the Kendall neighborhood as well as flooding projections for extreme precipitation events with climate change. A discussion of these new data are included in Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* and Chapter 6, *Water and Wastewater*.

Comment 3.4

"The NPC alludes to the possibility that the proponent would upgrade the stormwater system to address the flooding situation, in lieu of meeting the City of Cambridge stormwater management standards (page 5-3). This issue should be evaluated in greater detail in the EIR to understand the advantages and disadvantages and permitability of this approach, with particular attention given to the potential adverse impacts on water quality if only flooding is controlled."

Response

The Proponent will further coordinate with the DPW regarding system improvements for stormwater infrastructure, as the DPW has not prepared The Proponent will still treat runoff from the Project to meet the 80 percent TSS removal as required by Cambridge stormwater standards. It's worth noting, this Project will not produce additional stormwater contamination over the existing condition, given that the net imperviousness will be less than the existing condition with similar ground covers. See Chapter 5, *Stormwater Management* for further discussion.

Comment 3.5

"… the stormwater discharge to the Charles River needs to be consistent with the established water quality standards in the applicable total maximum daily loads (TMDLs). Accordingly, the EIR should provide sufficient information to demonstrate that the stormwater management system will need to be designed to address the water quality impairments covered by these TMDLs, as well as flooding conditions."

Response

The Proponent has included an evaluation of a conceptual stormwater management design for the Project to further demonstrate commit to meeting the Lower Charles River Basin TMDL, as well as reduce runoff rate and volume. See Chapter 5, *Stormwater Management* for further discussion.

Comment 3.6

"Installation of photovoltaics (PV) was evaluated for the building rooftop areas of the North Garage, Eleven Cambridge Center, and Three Cambridge Center. Although an analysis of the potential for PV reported a potential to reduce GHG emissions by an additional 605 tons per year, the NPC does not include a commitment to install this renewable energy. To better understand the proponents' decision on PV, the EIR should identify a pathway for making a commitment to install PV, and identify any barriers or limitations."

Response

The Redeveloper cannot commit to installing solar PV systems on the rooftops of the proposed buildings at this time due to lack of final building design and understanding of competing rooftop space needs (for mechanical systems and green roofs/rooftop open space). However, the Proponent is committed to constructing all new buildings to be "solar ready," including designing the roof structure to support the weight and wind loads associated with solar energy collectors as well as providing space to accommodate associated infrastructure, including conduit to the roof and space in the electrical room for an inverter. Refer to the 'Evaluation of Alternative Energy Sources' section on page 4-31 of Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment*.

The Redeveloper has a strong working relationship with service providers and currently engages them to explore utility incentives and rebates for expanding energy efficiency measures for new construction projects. As indicated by the following list of projects, the Redeveloper has been successful in incorporating (or is currently in progress of incorporating) rooftop solar PV into their development projects and plans to use this same approach to exploring utility incentives for the Project.

Fully Commissioned:

Weston Corporate Center
133 Boston Post Road, Weston
110 kW Solar Photovoltaic Ground Mounted System

Bay Colony
950 Winter Street, Waltham
842 kW Solar Photovoltaic Garage Mounted Canopy

Under Construction:

1265 Main Street, Waltham
175 kW Solar Photovoltaic Roof Mounted System

888 Boylston Street, Boston
114 kW Solar Photovoltaic Roof Mounted System

888 Boylston Street, Boston
14 kW Vertical Axis Wind System (14x1kW Turbines)

Comment 3.7

"The EIR also should expand on the discussion of wind harvesting in the NPC."

Response

Refer to the response to Comment C.39 above.

Comment 3.8

"In addition, combined heat and power (CHP) has potential from off-site sources including Dalkia Cambridge CHP District Steam and the Kendall Square EcoDistrict. As the discourse on this topic in the NPC is limited, it is requested that the EIR provide sufficient additional information to justify a decision on incorporating CHP into this project."

Response

Refer to the response to Comment C.38 above.

Comment 3.9

"The project includes significant demolition and construction, which will generate tons of demolition and construction waste. MassDEP strongly recommends that the proponent require the construction contractor to make a commitment to reprocessing and recycling construction waste, with the goal of recycling at least 75 percent of demolition and construction waste materials, consistent with comparable projects."

Response

The Redeveloper will commit to a goal of diverting at least 75 percent of the construction waste from each Project Component. This goal will be met by adhering to state requirements and by using the LEED Green Building Rating System.

Comment 3.10

"<u>Contaminated Soil and Groundwater:</u> The NPC indicates that the project site has been regulated under the MCP/c.21E but has not provided information on prior records of site contamination or the release tracking numbers. This information should be included in the EIR."

Response

The KSURP area includes multiple RTNs, which are subject to regulations under the MCP/ch.21E. A description of the releases are summarized in Chapter 7, *Hazardous Materials* and the locations of the RTNs are shown on Figure 7.1.

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Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Northeast Regional Office • 205B Lowell Street, Wilmington MA 01887 • 978-694-3200

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

May 22, 2015

Matthew A. Beaton, Secretary
Executive Office of
Energy & Environmental Affairs
100 Cambridge Street
Boston MA, 02114

Attn: MEPA Unit

RE: Cambridge
Kendall Square Urban
Renewal Project (KSURP)
Amendment 10
Cambridge Center
EEA # 1891

Dear Secretary Beaton:

The Department of Environmental Protection Northeast Regional Office (MassDEP, NERO) has reviewed the expanded Notice of Project Change (NPC) submitted by the Cambridge Redevelopment Authority and Boston Properties to increase the size of the Kendall Square Urban Renewal Project (KSURP) by adding 1,034,600 square feet (sf) of commercial and residential space. The expanded project will add 584,600 sf of office space, 50,000 sf of retail space, and 400,000 sf of residential space (560 units). As proposed, the development would total of 4,336,700 sf within the 43 acre redevelopment area in Cambridge (EEA #1891). Revised plans for the area include the Cambridge Center North garage office buildings (590,000 sf), the Eleven Cambridge Center residential building (748,400 sf), and the Three Cambridge Center mixed-use building (211,100 sf). A 60,000 sf expansion of the Whitehead Institute building and the conversion of 15,100 sf of space in the Broad Institute for commercial office space also are considered in this NPC, and an additional 740 parking spaces are proposed for a total of about 3,813 parking spaces.

As explained in greater detail in the NPC, the project site has been undergoing redevelopment since 1965. The Amendment 10 project is categorically included for the preparation of an environmental impact report (EIR), and the proponents are requesting a single EIR review. The Department (MassDEP) provides the following comments.

Wastewater

The NPC states that there is sufficient capacity in the existing collection system to accommodate the estimated increase of 107,945 gallons per day (gpd) of sanitary sewage of wastewater flow that would be generated by the project. The total wastewater flow from the

Kendall Square Redevelopment Area, including Cambridge Center is estimated to be about 1.04 million gallons per day. As of April 25, 2014, the sewer regulations changed and the requirements for self-certification or a sewer connection/extension permit from MassDEP were eliminated. Under the terms of the new regulations at 314 CMR 12.04(2)(d), MassDEP requires sewer authorities with permitted combined sewer overflows, including the City of Cambridge, to require removal of four gallons of infiltration and inflow (I/I) for each gallon of new wastewater flows generated for any new connection where greater than 15,000 gallons per day of new wastewater flows will be generated. Accordingly, the proponents should work with Cambridge on meeting this requirement. The EIR should explain the wastewater system serving the project site, as well as the infiltration and inflow program that will be completed as mitigation to satisfy the I/I removal requirements. 3. 3.

Stormwater

The NPC reports that almost 20 acres of the 24 acre project site are impervious. Although there is discussion of additional open space, the reduction in imperviousness appears to be negligible from the information provided. Low impact development (LID) stormwater controls offer an opportunity to restore some pre-development characteristics such as groundwater recharge and evapotranspiration to this highly urbanized area. MassDEP advises the proponent to make commitments to stormwater management that will ameliorate the effects of an 80 percent impervious site, such as removing imperviousness, using pervious/porous ground cover materials on sidewalks and surface parking, and by adding green rooftops. The NPC notes that the City of Cambridge also has LID design measure standards that are applicable to the project. However, those requirements are not explained, and the proponent has not made a commitment to LID measures, such as green roofs and/or rainwater harvesting which are mentioned in the NPC (page 5-2).

The existing drainage system for the proposed redevelopment project ultimately discharges runoff to the City's drainage system and the Charles River through a 54-inch outfall at Broad Canal Way. The NPC reports that there is minor flooding in the area of the project due to storm drain surcharging during severe, but unspecified, storm events. The EIR should describe the extent of flooding in context with historical flooding events, and take into consideration the potential for increased flooding due to more frequent extreme storm events associated with climate change. The NPC alludes to the possibility that the proponent would upgrade the stormwater system to address the flooding situation, in lieu of meeting the City of Cambridge stormwater management standards (page 5-3). This issue should be evaluated in greater detail in the EIR to understand the advantages and disadvantages and permitability of this approach, with particular attention given to the potential adverse impacts on water quality if only flooding is controlled. 3. 3.

Although not mentioned in the NPC, the stormwater discharge to the Charles River needs to be consistent with the established water quality standards in the applicable total maximum daily loads (TMDLs). Accordingly, the EIR should provide sufficient information to demonstrate that the stormwater management system will need to be designed to address the water quality impairments covered by these TMDLs, as well as flooding conditions. The NPC equivocates on whether the stormwater system would be designed for the components of the project or district-wide. 3.

Greenhouse Gas (GHG)

The GHG emissions analysis in the NPC generally follows the *MEPA Greenhouse Gas Emissions Policy and Protocol*, and the measures planned to mitigate the project's stationary and mobile source carbon footprints are identified. Stationary source GHG emissions are reported to conform to the Stretch Energy Code which mandates a 20 percent reduction in energy use from the baseline energy consumption scenario, which is defined by ASHRAE 90.1-2007. The eQuest model 3.64 was used (Appendix G of ASHRAE 90.1-2007) in the direct and indirect stationary source greenhouse gas analysis to predict the build alternative with improvements, which was compared with the annual CO_2 emissions for a baseline alternative. The energy modeling was undertaken for Cambridge Center North Garage, Eleven Cambridge Center, Three Cambridge Center, and the Whitehead Office addition. The GHG modeling results in the NPC indicate that the proposed project with energy efficiency measures would reduce CO_2 emissions from stationary sources by about 17.2 percent (1,431.8 tpy).

Generally, the stationary source GHG emissions reductions are attributable to higher efficiency building materials, high efficiency HVAC systems, higher efficiency boilers and cooling systems, and higher efficiency lighting. The modeling also has taken a 10 percent reduction for the use of EnergyStar appliances and equipment, under miscellaneous equipment. The reduction is estimated to reduce stationary sources of CO2 emissions by 141.5 tons, which increases the total stationary source emissions by 18.9 percent. The NPC also has provided an outline of the information which would be provided in a tenant manual to advance energy efficient practices and optimization of energy efficient systems.

It is requested that refinements to the energy efficient designs and equipment be thoughtfully considered in the EIR to demonstrate that the GHG emissions have been avoided and minimized. The proponent is encouraged to consider USEPA's WaterSense certification program and EnergyStar ratings, in the selection of plumbing fixtures and appliances to reduce water and energy demands associated with the building's uses. Water conserving plumbing fixtures, equipment, and appliances also have reduced power demands because pumping and treating drinking water and wastewater are energy-intensive processes. Additional information on the WaterSense certification program is available on the following website: http://www.epa.gov/watersense/docs/home_finalspec508.pdf.

Installation of photovoltaics (PV) was evaluated for the building rooftop areas of the North Garage, Eleven Cambridge Center, and Three Cambridge Center. Although an analysis of the potential for PV reported a potential to reduce GHG emissions by an additional 605 tons per year, the NPC does not include a commitment to install this renewable energy. To better understand the proponents' decision on PV, the EIR should identify a pathway for making a commitment to install PV, and identify any barriers or limitations. The EIR also should expand on the discussion of wind harvesting in the NPC. 3. 3.

In addition, combined heat and power (CHP) has potential from off-site sources including Dalkia Cambridge CHP District Steam and the Kendall Square EcoDistrict. As the discourse on this topic in the NPC is limited, it is requested that the EIR provide sufficient additional information to justify a decision on incorporating CHP into this project. 3.

Recycling Issues

The project includes significant demolition and construction, which will generate tons of demolition and construction waste. MassDEP strongly recommends that the proponent require the construction contractor to make a commitment to reprocessing and recycling construction waste, with the goal of recycling at least 75 percent of demolition and construction waste materials, consistent with comparable projects. 3.

Facilitating future waste reduction and recycling and integrating recycled materials into the project are necessary to minimize or mitigate the long-term solid waste impacts of this type of development. The Commonwealth's waste diversion strategy is part of an integrated solid waste management plan, contained in The Solid Waste Master Plan that places a priority on source reduction and recycling. Efforts to reduce waste generation and promote recycling have yielded significant environmental and economic benefits to Massachusetts' residents, businesses and municipal governments over the last ten years. Waste diversion will become even more important in the future as the key means to conserve the state's declining supply of disposal capacity and stabilize waste disposal costs.

As the lead state agencies responsible for helping the Commonwealth achieve its waste diversion goals, MassDEP and EEA have strongly supported voluntary initiatives by the private sector to institutionalize source reduction and recycling into their operations. Adapting the design, infrastructure, and contractual requirements necessary to incorporate reduction, recycling and recycled products into existing large-scale developments has presented significant challenges to recycling proponents. Integrating those components into developments such as the Kendall Square Urban Renewal Project, Amendment 10 at the planning and design stage enables the project's management and occupants to establish and maintain effective waste diversion programs. For example, facilities with minimal obstructions to trash receptacles and easy access to main recycling areas and trash chutes allow for implementation of recycling programs and have been proven to reduce cleaning costs by 20 percent to 50 percent. Other designs that provide sufficient space and electrical services will support consolidating and compacting recyclable material and truck access for recycling material collection.

By incorporating recycling and source reduction into the design, the proponent has the opportunity to join a national movement toward sustainable design. Sustainable design was endorsed in 1993 by the American Institute of Architects with the signing of its *Declaration of Interdependence for a Sustainable Future.* The project proponent should be aware there are several organizations that provide additional information and technical assistance, including WasteCap, the Chelsea Center for Recycling and Economic Development, and MassRecycle.

Massachusetts Contingency Plan (MCP)/M.G.L. c.21E

Contaminated Soil and Groundwater: The NPC indicates that the project site has been regulated under the MCP/c.21E but has not provided information on prior records of site contamination or the release tracking numbers. This information should be included in the EIR. The project proponent is advised that excavating, removing and/or disposing of contaminated soil, pumping of contaminated groundwater, or working in contaminated media must be done under the provisions of MGL c.21E (and, potentially, c.21C) and OSHA. If permits and 3.1

approvals under these provisions are not obtained beforehand, considerable delays in the project can occur. The project proponent cannot manage contaminated media without prior submittal of appropriate plans to MassDEP, which describe the proposed contaminated soil and groundwater handling and disposal approach, and health and safety precautions. If contamination at the site is known or suspected, the appropriate tests should be conducted well in advance of the start of construction and professional environmental consulting services should be readily available to provide technical guidance to facilitate any necessary permits. If dewatering activities are to occur at a site with contaminated groundwater, or in proximity to contaminated groundwater where dewatering can draw in the contamination, a plan must be in place to properly manage the groundwater and ensure site conditions are not exacerbated by these activities. Dust and/or vapor monitoring and controls are often necessary for large-scale projects in contaminated areas. The need to conduct real-time air monitoring for contaminated dust and to implement dust suppression must be determined prior to excavation of soils, especially those contaminated with compounds such as metals and PCBs. An evaluation of contaminant concentrations in soil should be completed to determine the concentration of contaminated dust that could pose a risk to health of on-site workers and nearby human receptors. If this dust concentration, or action level, is reached during excavation, dust suppression should be implemented as needed, or earthwork should be halted.

Potential Indoor Air Impacts: Parties constructing and/or renovating buildings in contaminated areas should consider whether chemical or petroleum vapors in subsurface soils and/or groundwater could impact the indoor air quality of the buildings. All relevant site data, such as contaminant concentrations in soil and groundwater, depth to groundwater, and soil gas concentrations should be evaluated to determine the potential for indoor air impacts to existing or proposed building structures. Particular attention should be paid to the vapor intrusion pathway for sites with elevated levels of chlorinated volatile organic compounds such as tetrachloroethylene (PCE) and trichloroethylene (TCE). MassDEP has additional information about the vapor intrusion pathway on its website at http://www.mass.gov/dep/cleanup/laws/vifs.htm.

New Structures and Utilities: Construction activities conducted at a disposal site shall not prevent or impede the implementation of likely assessment or remedial response actions at the site. Construction of structures at a contaminated site may be conducted as a Release Abatement Measure if assessment and remedial activities prescribed at 310 CMR 40.0442(3) are completed within and adjacent to the footprint of the proposed structure prior to or concurrent with the construction activities. Excavation of contaminated soils to construct clean utility corridors should be conducted for all new utility installations.

Air Quality

Pre-installation approval from MassDEP, pursuant to regulation 310 CMR 7.02, is required if the project will include any boiler regulated under 310 CMR 7.26(30)-(37), inclusive. Natural gas or distillate fuel oil-fired boilers with an energy input capacity less than 10,000,000 British thermal units per hour (Btu/hr) are exempt from the above listed regulations. In addition, if the project will be equipped with emergency generators equal to or greater than 37 kW, then each of those emission units must comply with the regulatory requirements in 310 CMR 7.26(42).

The MassDEP Northeast Regional Office appreciates the opportunity to comment on this proposed project. Please contact Kevin.Brander@state.ma.us at (978) 694-3236 for further information on the wastewater issues. If you have any general questions regarding these comments, please contact Nancy.Baker@state.ma.us , MEPA Review Coordinator at (978) 694-3338.

Sincerely,

John D. Viola
Deputy Regional Director

cc: Brona Simon, Massachusetts Historical Commission
Kevin Brander, Heidi Davis, MassDEP-NERO
Margaret Van Deusen, Charles River Watershed Association
City of Cambridge, Department of Public Works

Letter 4
Massachusetts Department of Energy Resources

Comment 4.1

"Phase 1B building appears to differ significantly from a benchmark building, for the EUI based on conditioned space (37 and 27 kBtus/sf for the baseline and proposed buildings, respectively). Additional review of the building models is warranted given this relatively low EUI."

Response

On June 12, 2015, the project MEP clarified with the DOER reviewer that they had mistakenly reported 27 kBtu/SF for the Phase 1B EUI (for conditioned spaces) when transferring data from their calculator to the NPC comment letter. The project MEP was advised to disregard this comment, and no revisions to the model were needed. The updated EUI (for conditioned spaces) is 56 kBtu/SF, which is consistent with DOER benchmarking. The following table shows the correct calculated EUIs for both the baseline and proposed cases.

Phase 1B	11 Cambridge Center			Original Model			
Area (all spaces)	348,377	Conditioned Area			276,377		
Site Energy	All Spaces				Garage	EUI	
	Electric		Gas	Combined	Electric	Conditioned Spaces	All Spaces
	MWh/yr	kBtu/hr	kBtu/hr	kBtu/hr	kBtu/hr	kBtu/sf	kBtu/sf
Baseline	2,536	8,651,385	13,448,600	22,099,985	723,600	77	63
Proposed	2,708	9,239,901	6,741,500	15,981,401	560,400	56	46
% Proposed vs Baseline		*-7%*	*50%*	*28%*		*28%*	*28%*

Comment 4.2

"Because the GHG emission factor for grid supplied electricity is more than twice as much as for natural gas, to be in alignment with the overall goal of mitigating both energy consumption and GHG emissions, the DOER urges the project in the subsequent submittal to identify in the as- proposed design additional measures that will significantly reduce the consumption of electricity. These could include:

- *Further decreasing the overall building envelop U-value by decreasing the window to wall area and/or by increasing glazing performance*

- *Further decrease lighting power density target beyond the 10% reduction currently proposed. Reductions of 20% or more are potentially possible with LED lighting."*

Response

As suggested, the building energy models for Phase 1A (the Cambridge Center North Garage Office Buildings), Phase 1B (Eleven Cambridge Center Residential Building), and Phase 2 (Three Cambridge Center Mixed Use Building) were revised so that the overall electric power consumption reduces as compared to the AHSRAE 90.1-2007 baseline models. As described further in Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment*, the overall window-to-wall ratios were decreased and the lighting power densities in the office and retail spaces were reduced by 20 percent. These changes result in the space cooling demand reduction and, therefore, a decrease in an annual electricity use.

As presented in Table 4-11 of Chapter 4, the EUIs (for all spaces) associated with revised models decreased because the electric power consumption was reduced for all the proposed buildings over the baseline, however, they are still close to the DOER benchmarks.

As noted by DOER, because the GHG emission factor for grid supplied electricity is more than twice as much as far natural gas, the design team implemented the suggested design measures to lower the potential stationary source GHG emissions associated with the buildings on a source-energy basis. Both suggested design measures, vision glass area and interior lighting density, are in direct relation with grid electricity demand and, therefore, any reduction in these measures result in an improved electricity demand. The revised energy models show a 29.5 percent reduction in energy use on a site-energy basis and 19.2 percent reduction in energy use on a source-energy basis, as detailed in the tables below.

Site Energy

Project	Baseline			Design			Percentage Savings		
	Site Electricity (kWh)	Site Gas (Therm)	Total Site Energy (MMBtu)	Site Electricity (kWh)	Site Gas (Therm)	Total Site Energy (MMBtu)	Electricity (%)	Gas (%)	Total Energy (%)
North Garage and Office	6,714,283	160,279	38,937	5,947,290	72,617	27,554	11.4%	54.7%	**29.2%**
11 Cambridge Center	2,535,576	134,485	22,100	2,488,195	67,829	15,273	1.9%	49.6%	**30.9%**
3 Cambridge Center	3,361,737	141,852	25,655	3,282,180	68,046	18,003	2.4%	52.0%	**29.8%**
Whitehead Office Expansion	1,491,467	105,560	15,645	1,413,934	65,150	11,339	5.2%	38.3%	**27.5%**
Total	14,103,063	542,176	102,337	13,131,599	273,642	72,169			

Reduction	30,169	MMBtu
	29.5%	

Source Energy

Project	Baseline			Design			Percentage Savings		
	Source Electricity (kWh)	Source Gas (Therm)	Total Source Energy (MMBtu)	Source Electricity (kWh)	Source Gas (Therm)	Total Source Energy (MMBtu)	Electricity (%)	Gas (%)	Total Energy (%)
North Garage and Office	20,209,992	174,704	86,447	17,901,343	79,153	69,013	11.4%	54.7%	**20.2%**
11 Cambridge Center	7,632,084	146,589	40,707	7,489,467	73,934	32,955	1.9%	49.6%	**19.0%**
3 Cambridge Center	10,118,828	154,619	49,997	9,879,362	74,170	41,135	2.4%	52.0%	**17.7%**
Whitehead Office Expansion	4,489,316	115,060	26,828	4,255,941	71,014	21,627	5.2%	38.3%	**19.4%**
Total	42,450,220	590,972	203,980	39,526,113	298,270	164,730			

Reduction	39,250	MMBtu
	19.2%	

Comment 4.3

"The DOER recommends that the proponent consider use of the local combined heat and power district (CHP) from the Dalkia plant (now Veolia, we understand) for use on the project. The impact to energy efficiency could be potentially transformative, consistent with the vision of the Kendall Square Eco-district…"

Response

Refer to Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* for an expanded discussion on the application of CHP district Dalkia plant. The potential connection to the local Kendall CHP district plant was investigated in the NPC following the site path energy modeling for heating energy only. As recommended by DOER, the analysis has been expanded so it consider the CHP for both heating and cooling, using absorption chillers. The analysis has been updated based on the revised models and the detailed results are presented in the following table based on formula furnished by DOER "Guidance for the Application of the MEPA GHG Policy and Protocol to the use of the Dalkia CHP District Steam."

The detailed calculations provided in Appendix D demonstrate if steam is used to offset natural gas used for heating, the total source energy associated with the proposed buildings would be reduced by approximately 62 percent and, thereby, reducing stationary source GHG emissions significantly, based on DOER formulas.

Comment 4.4

"Solar PV

- *We've reviewed the solar PV estimates and are in general agreement with the output estimates. We encourage the proponent to prepare a pro forma, including the beneficial effects of tax credits and incentives as part of their continued review of this possible mitigation strategy."*

Response

Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* provides an expanded evaluation of installing solar PV, including a simple payback calculation. In summary, when assuming the initial cost of $3.50 per Wdc, the estimated simple payback for installed PV on 4 buildings would be close to 12 years.

Comment 4.5

"For those committed mitigation measures that require tenant compliance (e.g. hours of operation, lighting intensities, etc), the Chapter 61 should contain requirements which obligate tenants to conform. We recommend, also, that the tenant manual and tenant commitments require the use of Energy Star appliances, as the use of Energy Star appears to be another effective efficiency strategy for this project."

Response

Refer to Appendix F for a copy of the proposed Tenant Design and Construction Guidelines, which includes encouraging tenants to install EnergyStar appliances and equipment.

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Kendall KSURP; 1891
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It is the intent of this review to: (a) ensure that the analysis submitted conforms to the application of the MEPA GHG Policy and Protocol (the Policy) as have been agreed upon for this project, and (b) point out potential opportunities for further reductions in both site and source energy usage and GHG emissions. Where these opportunities appear to exist, these comments also suggest measures and/or approaches that the DOER hopes will be considered for adoption in achieving further reductions in both energy and source GHG emissions.

The proponent's submission is noted for thoroughness and detail. The project is also recognized for the numerous energy and GHG reduction measures either adopted or discussed in the submission.

Project Building Data

The following presents project data for the conditioned spaces, as reported by the proponent:

Conditioned Space		
Building	**SF**	**Space Description**
Phase 1A	600,700	(Garden, Lobby, Office, and Innovation Space)
Phase 1B	276,377	(Lobby, Retail, Total Res)
Phase 2	322,130	(Office, Lobby, Retail, Total Res)
Whitehead	68,100	(Retail, Lobby, Mezz, Lab, Office, Mech)
Total Condition SF	**1,267,307**	

Results of Energy Modeling:

The following summarizes the results of energy modeling for the four proposed buildings:

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Conditioned Space			EUI (kBtus/sf)				
Phase	**Portion**	**SF**	**% Total of Phase**	**Benchmark**	**Weighted by Area**	**Benchmark Source/Label**	**Weighted Benchmark**
Phase IA: North Garage and Office	Garden	10,000	1.7%	71	1.2	None available - CBECs "service" shown	69.0
	Lobby	7,200	1.2%	69	0.8	Recent Survey (Note 1)	
	Office	544,500	90.6%	69	62.5	Recent Survey (Note 1)	
	Innovation Space	39,000	6.5%	69	4.5	Recent Survey (Note 1)	
Phase 1B: 11 Cambridge Center	Service	7,400	2.7%	71	1.9	CBCS "Service"	66.4
	Lobby	2,000	0.7%	69	0.5	Recent Survey (Note 1)	
	Retail	10,000	3.6%	73	2.6	CBECS "Retail"	
	Residential	256,977	93.0%	66	61.4	CBECS residential "4 or more rented units in building"	
Phase 2: 3 Cambridge Center	Office	106,800	33.2%	69	22.9	Recent Survey (Note 1)	67.5
	Lobby	2,000	0.6%	69	0.4	Recent Survey (Note 1)	
	Retail	20,800	6.5%	73	4.7	CBECS "Retail"	
	Residential	192,530	59.8%	66	39.4	CBECS residential "4 or more rented units in building"	
Whitehead Office Expansion	Retail	7,300	10.7%	73	7.8	CBECS "Retail"	184.8
	Lobby	2,000	2.9%	69	2.0	Recent Survey (Note 1)	
	Mezzanine	3,000	4.4%	69	3.0	Recent Survey (Note 1)	
	Lab	27,900	41.0%	350	143.4	Labs 21 - (Note 2)	
	Office	18,600	27.3%	69	18.8	Recent Survey (Note 1)	
	Mechanical	9,300	13.7%	71	9.7	CBECS "Service"	
Total Condition SF		**1,267,307**					

1 Benchmark taken from average EUI performance for typical well-performing Boston area office building (survey to be published)
2 Benchmark EUI is taken from measured results from the Labs 21 program using measured EUIs from 9 labs in similar climate.
See http://www.i2sl.org/documents/toolkit/bench_aceee_508.pdf

Phase 1A 600,700 sq ft

Site Energy	Electric		Gas	Combined	EUI (kBtu/sf), conditioned space only	EUI (kBtu/sf), all space	Benchmark EUI (kBtus/sf)	?% Model conditioned only .vs. benchmark
	MWh/yr	kBTU/yr	kBTU/yr	kBTU/yr				
Baseline	6,714	22,908,168	16,027,000	38,935,168	65	50.9	69	-6%
Proposed	6,910	23,576,920	6,689,000	30,265,920	50	40		-27%
%? (proposed .vs	3%		-58%	-22%	-22%			

Site Path GHG Emissions	Indirect (Electric)	Direct (Gas)	Combined
Baseline	2414	938	3351
Proposed	2484	391	2875
%? (proposed .vs	3%	-58%	-14%

"All space" refers to both conditioned and unconditioned space such as parking garages. This is the EUI reported in the proponents submission

Phase 1B 276,377 sq ft

Site Energy	Electric		Gas	Combined	EUI (kBtu/sf), conditioned space only	EUI (kBtu/sf), all space	Benchmark EUI (kBtus/sf)	?% Model conditioned only .vs. benchmark
	MWh/yr	kBTU/yr	kBTU/yr	kBTU/yr				
Baseline	2,535	8,649,420	13,448,000	22,097,420	37	63	66	-45%
Proposed	2,708	9,239,696	6,741,500	15,981,196	27	45		-60%
%? (proposed .vs	7%		-50%	-28%	-28%			

Phase 2	322,130	sq ft						
Site Energy	Electric		Gas	Combined	EUI (kBtu/sf), conditioned space only		Benchmark EUI (kBtus/sf)	Δ% Model conditioned only .vs. benchmark
	MWh/yr	kBTU/yr	kBTU/yr	kBTU/yr				
Baseline	3,361	11,467,732	14,180,000	25,647,732	80		67	18%
Proposed	3,500	11,942,000	6,792,000	18,734,000	58			-14%
%Δ (proposed .vs	4%		-52%	-27%	-27%			

Site Path GHG Emissions	Indirect (Electric)	Direct (Gas)	Combined
Baseline	1208	830	2038
Proposed	1258	397	1656
%Δ (proposed .vs	4%	-52%	-19%

Whitehead	68,100	sq ft						
Site Energy	Electric		Gas	Combined	EUI (kBtu/sf), conditioned space only		Benchmark EUI (kBtus/sf)	Δ% Model conditioned only .vs. benchmark
	MWh/yr	kBTU/yr	kBTU/yr	kBTU/yr				
Baseline	1,491	5,087,292	10,556,000	15,643,292	230		185	24%
Proposed	1,413	4,821,156	6,516,000	11,337,156	166			-10%
%Δ (proposed .vs	-5%		-38%	-28%	-28%			

Site Path GHG Emissions	Indirect (Electric)	Direct (Gas)	Combined
Baseline	536	618	1154
Proposed	508	381	889
%Δ (proposed .vs	-5%	-38%	-23%

Note that for Phases 1A and 1B, two EUIs are presented: one based on the conditioned space only and one based on both conditioned and unconditioned (parking garage) space. The project proponent presented EUIs for the later in the GHG report.

The proponent is including a package of mitigation for the four buildings. These are extensively documented in the "Energy Modeling Assumptions" including low E fenestration, higher efficiency equipment, improved envelop, and reduced lighting power densities.

The proponent is also considering on-site solar and potential connection to the local Kendal combined heat and power plant (Dalkia Plant) and has provided supporting calculations for both.

Discussion

Benchmarks

Phases 1A, 2, and the Whitehead building models yielded results consistent with benchmarks. Note that for office space, we are using a benchmark of 69 kBtus/sf, taken from a recent survey of Boston-area office buildings which used actual in-operation data (to be published), rather than the CBECs office benchmark. For a lab use, we have used a benchmark based on measured northeast-location laboratories, taken from the study shown.

Phase 1B building appears to differ significantly from a benchmark building, for the EUI based on conditioned space (37 and 27 kBtus/sf for the baseline and proposed buildings, respectively). Additional review of the building models is warranted given this relatively low EUI. 4.1

Use of the ASHRAE 90.1 Appendix G Standard (Site energy only):

Cambridge has adopted the Mass. Stretch Energy Code (SC). The proponent included equest model inputs, outputs, and summary results to demonstrate compliance with 2007 ASHRAE 90.1 Appendix G (energy only), as required. We have the following comments:

- As noted above, the Phase 1B building appears to have an unusually low EUI, warranting another review of the model. (Note that this does not appear to affect the finding that the proponent has met the intent of the stretch code when put in terms of relative percent improvement.)

Extensive Use of Glass and Impact to Electricity Consumption

- The DOER notes that the proposed buildings make extensive use of glass (approximately 70% window to wall ratio, for example, in Phase 1A). This appears to disproportionally increase cooling, and thus electric power consumption. In fact, with the exception of the Whitehead addition, the electric power consumption is actually *increased* for the proposed buildings over the baseline. (The DOER does recognize that the transition to water source heat pumps in Phase 1B also contributes to this trend, as well.)

- Although the proposed buildings' EUIs achieve a reduction that meets the stretch building energy code, the DOER notes that the as-proposed consumption of grid electricity exceeds the consumption for the base case. Because the GHG emission factor for grid supplied electricity is more than twice as much as for natural gas, to be in alignment with the overall goal of mitigating both energy consumption and GHG emissions, the DOER urges the project in the subsequent submittal to identify in the as-proposed design additional measures that will significantly reduce the consumption of electricity. These could include: 4.2

    - Further decreasing the overall building envelop U-value by decreasing the window to wall area and/or by increasing glazing performance

    - Further decrease lighting power density target beyond the 10% reduction currently proposed. Reductions of 20% or more are potentially possible with LED lighting.

- The tables below illustrate affect described above further. The upper table summarizes site energy, while the lower table summarizes the source energy. On a site energy bases, the project achieves a 25% reduction in energy use between the

baseline and the as-designed scenario. However, on a source-energy basis, the project achieves only a 12% reduction in energy use, less than half of the targeted gains.

	Baseline			As Designed		
	Site Electricity (kWhrs)	Site Gas (MMBtu)	Total (Mmbtu)	Site Electricity (kWhrs)	Site Gas (Mmbtu)	Total (Mmbtu)
North Garage and Office	6,714,283	16,027	38,936	6,910,426	6,987	30,565
11 Cambridge Center	2,535,576	13,448	22,099	2,708,061	6,741	15,981
3 Cambridge Center	3,361,737	14,185	25,655	3,500,934	6,792	18,737
Whitehead Office Expansion	1,491,467	10,556	15,645	1,413,934	6,515	11,339
	14,103,063	*54,216*	***102,336***	*14,533,355*	*27,035*	***76,623***
				Reduction	25,713	MMBtu
					25%	

	Baseline			As Designed		
	Source Electricity (kWhrs)	Source Gas (MMBtu)	Total (Mmbtu)	Source Electricity (kWhrs)	Source Gas (Mmbtu)	Total (Mmbtu)
North Garage and Office	20,209,992	17,469	86,426	20,800,382	7,616	78,587
11 Cambridge Center	7,632,084	14,658	40,699	8,151,264	7,348	35,160
3 Cambridge Center	10,118,828	15,462	49,987	10,537,811	7,403	43,358
Whitehead Office Expansion	4,489,316	11,506	26,824	4,255,941	7,101	21,623
	42,450,220	*59,095*	***203,936***	*43,745,399*	*29,468*	***178,727***
				Reduction	25,208	MMBtu
					12%	

(Note that the DOER uses the convention of MMBtu to be 1,000,000 Btus)

Additional Considerations for use of Dalkia District Steam

- The DOER recommends that the proponent consider use of the local combined heat and power district (CHP) from the Dalkia plant (now Veolia, we understand) for use on the project. The impact to energy efficiency could be potentially transformative, consistent with the vision of the Kendall Square Eco-district, as shown on the table below. 4.1

- This occurs because of the following factors:

    - The Dalkia (Veolia) CHP plant recovers the heat that is a by-product of a portion of the electricity generated and which is delivered to the project in the form of district steam. Because of this increased efficiency, less fuel is needed to meet the energy demand of the as-proposed project than would be the case if the building were to meet the demand using grid supplied electricity and heat from a gas fired boiler.
    - The CHP plant's primary fuel is natural gas which emits less GHG per unit consumed than the mix of fuels used by the central stations which supply electricity to the grid.
    - The plant is located in Cambridge. Consequently, electricity which is congenerated is used locally, greatly reducing transmission losses which would otherwise occur.

- The table below presents some possible scenarios for CHP utilization.

	Total Site Energy (MMBtu)	Source Energy (MMBtu)	Percent Improvement from No CHP	Number of Homes Equivalent Heated and Powered
No CHP	76,624	178,729	0%	none
CHP - heating	76,624	77,909	56%	none
CHP - heat and cool	76,624	(124,977)	170%	969

- Referencing above, the proposed project (all 4 buildings in aggregate) has a total site energy footprint of approximately 76,000 MMbtus and a total source energy footprint of 178,000 Mmbtu. The following is possible, making use of the Dalkia (Veolia) steam:

    - If steam is used to offset natural gas heating, the total project source energy would be reduced by over half. Greenhouse gas emissions would be signficanty reduced.

    - If steam is used to both heat and cool the building, using absorption chillers, the above affect is even more dramatic. The offset transmission losses enabled by local, Cambridge area electricity generation, coupled with the lower GHG fuel mix of the CHP and higher performance, would greatly exceed the project's (all 4 buildings) total energy. We estimate the offset transmission losses would exceed total project energy plus the equivalent energy use of approximately 1,000 local homes, provide a significant positive benefit to greenhouse gas emissions reduction.

Energy Resiliency:

- The Dalkia (Veolia) CHP plant has been registered by the ISO-NE as a black start generation asset that can operate in island mode to provide both electricity to the Cambridge grid and thermal energy to the project in the event of a grid outage.

Solar PV

- We've reviewed the solar PV estimates and are in general agreement with the output estimates. We encourage the proponent to prepare a pro forma, including the beneficial effects of tax credits and incentives as part of their continued review of this possible mitigation strategy. 4.4

Closing Summary

The project is proposing a variety of efficiency measures and has included various summary information designed to demonstrate conformance with MEPA energy requirements. We recommend the following be addressed in the next submission:

- Consideration of Dalkia (Veolia) for both heating and cooling, especially considering the improved resiliency and transformative sustainability measure this would represent;
- Thorough solar PV pro forma;
- Reduction in glass to wall ratio and/or other envelop improvements;
- Further reduced lighting power densities;
- Review of Phase IB model, given the unusually low EUI.
- Committed mitigation measures need to be articulated to a similar level of detail as contained in the submission in the Chapter 61;
- For those committed mitigation measures that require tenant compliance (e.g. hours of operation, lighting intensities, etc), the Chapter 61 should contain requirements which obligate tenants to conform. We recommend, also, that the tenant manual and tenant commitments require the use of Energy Star appliances, as the use of Energy Star appears to be another effective efficiency strategy for this project.

4.5

Letter 5
Charles River Watershed Association

Comment 5.1

"CRWA is concerned with the segmented analysis of the KSURP and the lack of a comprehensive framework for analyzing the cumulative impacts of the various stages of projects on the site."

Response

The KSURP, as it has continued to evolve, has long been subject to a unique history of MEPA review, specifically traffic impacts for which the Proponent has implemented a traffic monitoring program for over ten years. As described in the *Project Summary* chapter, this review includes numerous NPC submissions for Plan Amendments and FST traffic reporting. This filing for Plan Amendment No. 10 represents a cumulative analysis by comparing and building on previously reported impacts, as demonstrated in Tables S-1 and S-2.

Comment 5.2

"… the NPC lacks important details and discussion to effectively enable public comment on whether or not the project is using all feasible means to avoid damage to the environment, or whether damage to the environment has been minimized and mitigated to the maximum extent practicable."

Response

In accordance with MEPA regulations, the NPC and SEIR filings provide a comprehensive evaluation of potential environmental impacts. Specifically, Chapter 10, *Summary of Proposed Mitigation and Other Beneficial Measures* presents a comprehensive discussion of all feasible measures to avoid, minimize, and/or mitigate the identified impacts.

Comment 5.3

"While CRWA appreciates that the proponent's statements that agree to comply with City of Cambridge and MassDEP stormwater standards, the NPC lacks a comprehensive discussion of drainage or runoff calculations for the entire project area and provides no indication regarding its compliance with the TMDL requirements."

Response

A comprehensive drainage analysis was performed, and the commitment to comply with TMDL requirements was reinforced in the document. See the Drainage Analysis and Phosphorus Loading Calculations sections of Chapter 5, *Stormwater Management*.

Comment 5.4

"… CRWA is concerned that the projects might not comply with the reduction targets for phosphorous and bacteria loading in the Charles.

We are particularly concerned with the potential for phosphorous loading because the existing drainage and combined sewer systems serving the KSURP will drain directly to the stormwater outfall in the Charles River at Broad Canal."

Response

A phosphorus loading analysis was performed, as discussed in the 'Phosphorus Loading Calculations' section on page 5-10 and 5-11 of Chapter 5, *Stormwater Management*. The detailed calculations are provided in Appendix G. The Proponent has developed a conceptual drainage scenario for the Project, which exceeds the TMDL requirements of the Lower Charles River Basin and MassDEP.

Comment 5.5

"We believe that the proponent should incorporate regional green infrastructure strategies within the public realm (neighborhood streets and open spaces) to treat stormwater runoff in the Kendall Square area, thereby improving local water quality while reducing the local heat island effect. The existing site is over 80% impervious, and though some low impact development (LID) techniques are mentioned as control measures that will be considered, including green roofs and permeable pavements, the proponent should commit to planning and implementing them to comply with the TMDL in the EIR. Given the amount of hardscape area proposed the project should consider permeable pavement for any plazas, sidewalks, pedestrian paths and limited access roadways throughout the project area."

Response

The Proponent has committed to exceeding TMDL requirements with structural stormwater BMPs, and will explore the feasibility of LIDs for on-site use in the limited

external spaces as complementary strategies to meeting requirements. See the 'Drainage Analysis' section of Chapter 5 *Stormwater Management*.

Comment 5.6

"CRWA appreciates the proponent's willingness to coordinate with the City to explore creative solutions to stormwater management that go beyond the scope of individual Project Components to provide more district-wide solutions. One obvious opportunity to do so would be to coordinate closely with City's Community Development Department on the implementation of the winning proposal for the East Cambridge / Kendall Square Open Space Study and design competition ..."

Response

The Proponent will coordinate with the City to implement and design initiatives that ultimately result from the winning design. The open space provisions are proposed to be revised as part of the KSURP Amendment No. 10 to provide opportunities to implement concepts of the open space study.

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CRWA
Saving the Charles River since 1965

May 22, 2015

Matthew A. Beaton, Secretary
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: Expanded Notice of Project Change, Kendall Square Urban Renewal Project (KSURP), Amendment No. 10 Cambridge, MA – EEA No. 1891

Dear Secretary Beaton:

The Charles River Watershed Association (CRWA) has reviewed the Expanded Notice of Project Change (NPC) submitted by Vanasse Hangen Brustlin (VHB) on behalf of the Cambridge Redevelopment Authority (CRA) (proponent) and Boston Properties (redeveloper) and submits the following comments.

CRWA is concerned with the segmented analysis of the KSURP and the lack of a comprehensive framework for analyzing the cumulative impacts of the various stages of projects on the site. The KSURP was first underwent MEPA review in 1975, and this NPC will be the tenth plan amendment and the largest. The original completion date was to be 2020; however it was extended in Amendment 8 to 2030. Because further development of the KSURP is assured, future plans should be considered for cumulative impacts when evaluating the total environmental impact of redevelopment. An example of this is the lack of stormwater discharge rates for the KSURP because the limits of the proposed development are not yet defined. 5.1

As such, the NPC lacks important details and discussion to effectively enable public comment on whether or not the project is using all feasible means to avoid damage to the environment, or whether damage to the environment has been minimized and mitigated to the maximum extent practicable. 5.2

Due to the location, size, and imperviousness of the project site, stormwater management is a key concern of CRWA. Polluted stormwater runoff is the leading cause of water quality impairments in the Charles River, which is impaired for, among other impairments, Chlorophyll-a, Escherichia coli, Nutrient/Eutrophication Biological Indicators, dissolved oxygen and Phosphorus (total). All impervious surfaces in the urban environment carry high volumes of stormwater runoff and generate significant loads of major stormwater-related pollutants, including phosphorus. The segment of the Charles River that the Project is situated near and to which it directly drains is within the segment of river that is

subject to the Lower Charles River Nutrient Total Maximum Daily Load (TMDL), and the Bacteria TMDL.[1,2] The phosphorous TMDL requires a 62% reduction in phosphorus loading for this segment of the river.

While CRWA appreciates that the proponent's statements that agree to comply with City of Cambridge and MassDEP stormwater standards, the NPC lacks a comprehensive discussion of drainage or runoff calculations for the entire project area and provides no indication regarding its compliance with the TMDL requirements. 5.3

We note that under the draft NPDES Phase II Stormwater General Permit, Cambridge will be required to develop a phosphorus control plan. As MassDEP has stated, Cambridge's current Municipal Separate Storm Sewer System (MS4) general permit includes provisions for compliance with the TMDL loading reduction for phosphorous in the Charles River.[3] However, without a comprehensive discussion of stormwater conveyance from the KSURP to the Charles River in the NPC, CRWA is concerned that the projects might not comply with the reduction targets for phosphorous and bacteria loading in the Charles. 5.4

We are particularly concerned with the potential for phosphorous loading because the existing drainage and combined sewer systems serving the KSURP will drain directly to the stormwater outfall in the Charles River at Broad Canal. Nutrient loading, especially phosphorous loading, contribute to harmful algal blooms (HABs), a problem that the Charles River and Broad Canal have been impacted by. In July of 2014, Massachusetts Department of Public Health and the Health Department of Cambridge alerted the public to a high level of cyanobacteria in the Broad Canal at the outfall identified by the proponent. As such, a detailed discussion of how the proponent will comply with the TMDL should be included in the Environmental Impact Report (EIR) for the project.

We believe that the proponent should incorporate regional green infrastructure strategies within the public realm (neighborhood streets and open spaces) to treat stormwater runoff in the Kendall Square area, thereby improving local water quality while reducing the local heat island effect. The existing site is over 80% impervious, and though some low impact development (LID) techniques are mentioned as control measures that will be considered, including green roofs and permeable pavements, the proponent should commit to planning and implementing them to comply with the TMDL in the EIR. Given the amount of hardscape area proposed the project should consider permeable pavement for any plazas, sidewalks, pedestrian paths and limited access roadways throughout the project area. 5.5

CRWA appreciates the proponent's willingness to coordinate with the City to explore creative solutions to stormwater management that go beyond the scope of individual Project Components to provide more district-wide solutions.[4] One obvious opportunity to do so would be to coordinate closely with City's Community Development Department on the implementation of the winning proposal for the East Cambridge / Kendall Square Open Space Study and design competition 5.6

[1] *Total Maximum Daily Load for Nutrients* in the Lower Charles River, Massachusetts (DEP 2007)

[2] *Total Maximum Daily Load for Bacteria* in the Lower Charles River, Massachusetts (DEP 2007)

[3] EEA #15259 Environmental Notification Form Response from Massachusetts Department of Environmental Protection, September 16, 2014.

[4] Pg. S-18 NPC

http://www.connectkendallsquare.com/2015/02/richard-burck-associates-inc-competition-submission/ which provides a framework for incorporating regional stormwater management strategies through open space design.

Please feel free to contact me should you have any questions at (781) 788-0007 ext. 228.

Sincerely,

Bryan Dore,

Rita Barron Fellow

Letter 6
City of Cambridge

Comment 6.1

"Trip Distribution and Assignments are acceptable, however, going forward, we encourage the CRA and Boston Properties to utilize the most up-to-date census data and tools available to understand and monitor employee trip distributions patterns such as Census Transportation Planning Products (CTTP), GPS technology, etc. Detailed employee surveys and more exactly defined distribution and assignments should be collected and monitored, such as where employees live, how they commute to work, what times they leave home, times they leave work, travel times, and vehicle miles traveled. Any notable patterns should be documented. The information will be very useful in determining transportation needs, such as where new bus routes would be best located to shift more employees from driving to using transit."

Response

As part of the proposed Infill Development Concept Plan approval process, a full Traffic Impact Study, or TIS, will be developed in coordination with City staff. In addition, the Proponent and Redeveloper will work with the City to include this data collection and analysis within the Traffic Monitoring Program already in place under KSURP Amendment No. 3 and to be expanded under Amendment No. 10. Refer to page 2-107 of Chapter 2, *Transportation and Parking* for further details on the proposed Traffic Monitoring Program.

Comment 6.2

"The Proponent should clearly document where access will be for the 320 space underground garage at 11 Cambridge Center, and the 100 new spaces at 3 Cambridge Center. The location of the garage driveways and number of peak hour ins and outs should be shown in Figures 2.13a and 2.13b."

Response

See the response to Comment C.13 above.

Comment 6.3

"The NPC discussed incorporating a new mid-block pedestrian crossing at Broadway between Ames Street and Galileo Galilei Way, however, there was no information to support a pedestrian crossing there, such as existing pedestrian counts that demonstrate a desire line, or an analysis on why it's not safer to cross Broadway at the existing signalized intersections at Broadway/Ames or Broadway/Galileo Galilei Way?"

Response

Chapter 2, *Transportation and Parking* discusses the proposed pedestrian crossing at Broadway under the 'Pedestrian Access, Safety and Streetscape Improvements – Broadway Mid-Block Crossing' section starting on page 2-103.

Comment 6.4

"The Project proposes an overall parking ratio of 0.7 spaces per 1,000 square feet (including residential uses). It's stated that 740 spaces is the maximum number of new parking spaces but fewer spaces may be built. No additional parking spaces should be created than are needed. It would be useful if the proponent indicates what is believed to be the minimum amount of parking needed and why."

Response

Page 2-63 of Chapter 2, *Transportation and Parking* provides a detailed parking analysis, which shows the need for the additional parking. This analysis assumes a residential parking ratio of 0.75 spaces per dwelling unit, which is the maximum allowable parking per zoning regulations. The minimum residential parking ratio for residential is 0.25. Based minimum and maximum residential parking ratios the residential parking being built to support the Project could range from 420 spaces (maximum parking ratio) to 120 spaces (minimum parking ratio) for the proposed 560 total dwelling units.

Comment 6.5

"Page 2-41 indicated the Project proposes 1.1 parking spaces per dwelling unit, but then indicated it is considering 0.25 parking spaces per dwelling unit. The study should explain what they propose more clearly."

Response

The parking ratio of 1.1 parking spaces per dwelling unit refers to the proposed 370 space parking garage being proposed under the proposed Eleven Cambridge Center residential building. The parking spaces being built with Eleven Cambridge Center will be shared parking and therefore only a 0.75 spaces per residential unit will be available for residential use, per maximum zoning regulations. This equates to a

maximum of approximately 221 spaces for residential with the additional spaces being shared with the parking needs of the area. The minimum zoning requirements require 0.25 spaces per dwelling unit, equating to approximately 74 spaces. A parking analysis was conducted, starting on page 2-65 of Chapter 2, using the maximum zoning requirement for residential of 0.75 spaces per dwelling unit.
Refer also to the response to Comment 6.4 above.

Comment 6.6

"Page 2-42 stated that based on a shared parking approach the parking supply is adequate, but provided no details on how shared parking was calculated. Additional information on how shared parking would operate for the Project should be provided. The City strongly recommends employing shared parking strategies."

Response

See the response to Comment 6.4 above.

Comment 6.7

"It would be useful if the parking demand analysis indicated the total number of employees and residents, and what percentage are expected to drive to work (and have a vehicle for residents)."

Response

An annual mode share survey of all Boston Properties KSURP Area tenant employees is conducted through the Kendall Square Urban Renewal area Annual Traffic Update. There is no current data on residential mode shares within the KSURP area.
The future parking analysis provided in Chapter 2, *Transportation and Parking* (starting on page 2-65) is based on existing parking garage occupancies and the Project-generated trips. A more detailed study, including the feasibility of shared parking between commercial and residential uses will be conducted as part of the proposed Infill Development Concept Plan approval process.

Comment 6.8

"The NPC stated that the Kendall Square Urban Renewal Area has 2,667 spaces, however, Figure 2.8 showed 2,748 spaces."

Response

The text is correct in stating that approximately 2,667 off-street parking spaces exist in the KSURP area. The table on Figure 2.8 has been corrected.

Comment 6.9

"Parking: Since these garages were constructed after 1980 they were subject to the previous zoning requirements for bicycle parking and are not in compliance. To be in compliance, 10% of the current spaces to be bicycle spaces, i.e., there should be 268 rather than the current 215. There are also issues regarding some of the bicycle parking itself not meeting even the older standard. This is an opportunity to upgrade the entire bicycle parking throughout the area."

Response

After a more comprehensive documentation of current bicycle parking in the KSURP area, there are currently 460 long-term bicycle parking spaces provided within the three Cambridge Center garages. The number stated in the NPC has been corrected. The current number of bicycle parking spaces does comply with the original 1981 bicycle parking requirement.

Comment 6.10

"As the Project is built-out, parking supply should be provided at parking ratios no greater than the final approved ratios and contemplated in the K2C2 Study."

Response

The Project is providing an office parking ratio of approximately 0.6 spaces per 1,000 square feet (370 spaces in the North Garage for 584,600 square feet of office), under the maximum parking space ratio for office under the K2C2 zoning recommendations. The residential component of the Project has a parking ratio of approximately 0.7 spaces per dwelling unit (370 spaces in the Eleven Cambridge Center Garage for 560 dwelling unit), between the K2C2 zoning recommendations of a 0.5 space per dwelling unit minimum and a 0.75 space per dwelling unit maximum.

Comment 6.11

"More detailed information should be provided on the existing and proposed bicycle facilities, including number of bicycle spaces and layout by location for all short- and long-term bicycle parking as well as the potential for also creating a centrally located bike station with related services."

Response

Page 2-65 of Chapter 2, *Transportation and Parking* provides a detailed parking analysis, which shows the need for the additional parking, but also provides multiple parking mitigation strategies that demonstrate the ability to reduce single-occupancy vehicle trips and, therefore, aims to justify providing the minimum amount of parking for the Project.

Comment 6.12

"… the project should bring the amount of bicycle parking in the area up to current requirements especially as the bike mode split is anticipated at that level (p. 2-30)."

Response

The total number of bicycle parking spaces for the existing KSURP was calculated based on the current City's Bicycle Parking Guide. Table 11-2 below presents the current approved land uses within the KSURP area and the required bicycle parking ratios for each land use.

Table 11-2 KSURP Land Use and Bicycle Parking Ratios

	Minimum Long-Term Parking		Minimum Short-Term Parking	
Land Use	**Category**	**Rate**	**Category**	**Rate**
Biotech Manufacturing	N.5	0.08 per 1,000 SF	N.5	0.06 per 1,000 SF
General and Technical Office	N.1	0.30 per 1,000 SF	N.5	0.06 per 1,000 SF
Research and Development	N.2	0.22 per 1,000 SF	N.5	0.06 per 1,000 SF
Retail	N.4	0.10 per 1,000 SF	N.2	0.60 per 1,000 SF
Hotel	R.5	0.02 per sleeping room	R.5	0.05 per sleeping room

Source: Bicycle Parking Guide Amendment June 3, 2013

Table 11-3 below shows existing KSURP area square footage by land use and the required number of bicycle parking spaces based on previously presented ratios.

Table 11-3 KSURP Total Development Bicycle Parking Zoning Requirements

		Existing	
Land Use	**Square Footage**	**Minimum Long-Term Parking**	**Minimum Short-Term Parking**
Biotech Manufacturing (Industrial)	64,576	5	4
General and Technical Office	1,341,227	402	80
Research and Development	1,068,129	235	65
Retail	121,560	12	73
Multi-Family Residential	-	-	-
Hotel	475,169 (652 rooms)	13	33
Total	**3,070,661**	**668**	**254**

This analysis indicates that in order for the existing KSURP area development to meet current City's bicycle parking requirements a total of 668 long-term spaces and 254 short-term spaces need to be provided. As indicated in the existing bicycle count and occupancy study in Chapter 2, there are a total of 264 short-term bicycle spaces provided in the area, more than the minimum number of spaces required by current City guidelines. The existing long-term parking supply indicates that there are only 460 spaces provided, this is well below the 668 spaces required under the current City guidelines.

The previously presented existing conditions bicycle parking and occupancy study shows that although City bicycle parking rates indicate there is a need for approximately 208 more long-term bicycle parking space, it appears from observations that the current supply meets the demand. The Proponent and Redeveloper recognize the City's desire to provide additional long-term bicycle parking to further encourage ridership. Current short-term supply meets the bicycle parking requirements although observations indicate that there are certain areas within the KSURP area that could provide more bicycle parking to eliminate bicycle parking on meters, signs, trees and other non-bike parking appropriate objects. These streets include Main Street, Ames Street and Third Street. As discussed on page 2-23 in Chapter 2 under the 'Bicycle Parking Evaluation' section, most of these bicycle parking deficient areas will be improved by other ongoing and planned developments in the area and provide the additional bicycle parking needed.

The existing development is in compliance with the 1981 City of Cambridge bicycle parking ordinance (see the response to Comment 6.9 above). However, retrofitting the existing three-block Cambridge Center development to retroactively meet the 2013 bicycle ordinance is not required by zoning and is considered not feasible by the redeveloper. The Proponent and Redeveloper will work to find alternatives to parking a larger number of bikes to comply with the goal of the 2013 ordinance which was to encourage bicycle usage and make bicycle parking simpler. For example this may include ideas such as using a bicycle valet system in a more compact space, which the Redeveloper has experience doing in New York City. The Redeveloper has also recently upgraded and replaced the bicycle racks within the East Garage (Green Garage) to new hoop racks which allow for two attachment points for bike frames.

Comment 6.13

"The City supports the creation of multiple additional bicycle stations in Kendall Square. Additional analysis and information about how KSURP can provide space for bicycle station(s) would be useful, as well as space for additional Hubway stations."

Response

See response to Comment C.19 above.

Comment 6.14

"It would be helpful if the NPC included tables that showed the volume to capacity (v/c), delay, level of service (LOS) and queues for all study area interactions under the Existing, 2024 No Build and 2024 Build conditions. Only a portion of that information was provided for 5 of the 24 intersections studied."

Response

An LOS summary table (Table 2-10) was included in the NPC Chapter 2, *Transportation and Parking*. A more detailed LOS table was included in the NPC in Appendix C. The detailed LOS tables have been inserted into Chapter 2 (Table 2-16a and 2-16b).

Comment 6.15

"Page 2-36 stated that the Binney Street/Galileo Way/Fulkerson Street intersection will have a decrease in delay of 1.8 seconds under the 2024 Build condition. However, it is unclear how that could happen given the project will add additional trips."

Response

The Binney Street/Galileo Galilei Way/Fulkerson Street is an actuated-coordinated signal and with this type of signal, sometimes more vehicles added to a given approach causes more time to be allocated to this approach and therefore improves the approach LOS and overall LOS of the intersection. In particular the Binney Street WB through movement decreases in delay, due to more time being allocated to this movements and phase, and therefore the overall intersection delay decreases.

It is also important to note that the Binney Street (Alexandria) Project is retiming the Binney Street corridor intersections and this will also affect the timings at each intersection, as well as the Binney Street/Galileo Galilei Way/Fulkerson Street intersection causing the flow of east and west bound traffic to improve.

Comment 6.16

"Beginning on Page 2-51, the NPC discussed potential vehicle access and circulation mitigation at 5 intersections under a 2024 future condition, however it was not clear what mitigation the Project is actually committing. For example, is the Project committing that 10 years from now, new studies, new traffic counts, new/updated signal equipment, and implementation of traffic signal changes will be implemented by the Proponent, if appropriate and approved by the City?"

Response

See the response to Comment C.10 above.

Comment 6.17

"It is was not clear why, as stated in the NPC, the vehicle access and circulation analysis was done from a vehicular operations standpoint, and did not include pedestrian and bicycle users at the intersections. Any intersection analysis that does not consider all modes should not be included."

Response

A MMLOS analysis was conducted for three critical intersections within the KSURP area. Refer to the 'Traffic Operation Analysis' section of Chapter 2, *Transportation and Parking* starting on page 2-51. Initially, this statement was made in the NPC to emphasize that the proposed mitigation presented focused on improving vehicular operations at intersections where vehicular LOS was impacted by Project-generated trips. The mitigation analysis that was conducted maintained minimum pedestrian and bicycle operations while focusing on vehicular operations.

Comment 6.18

"It would be helpful if the NPC included multi-modal Level of Service (MMLOS) analysis for intersections as discussed in the MassDOT TIA Guidelines. We would be interested in successful demonstration of procedures and performance measures for MMLOS, even if only for a small handful of intersections to test."

Response

Refer to the response to Comment 6.17 above.

Comment 6.19

"The NPC indicated that the analysis of the Red Line capacity did not take into account the peak of the peak conditions. To provide a complete assessment of these impacts, this analysis should be conducted, either at this point or for future approvals. We would appreciate working with the CRA and Boston Properties to identify methodology and data needs for such an analysis."

Response

See response to comment C.21 above.

Comment 6.20

"The NPC indicated that many times the Red Line operates at a v/c ratio over capacity. This comment should be justified with appropriate data and analysis."

Response

This statement was referring to the users' experience, not data driven analysis, during the "peak of the peak" when many users express experiencing overcrowding and longer waits for trains.

Comment 6.21

"The NPC indicated that the new passengers in at the MBTA Kendall Square Station can be accommodated in the physical capacity of the station. How was the analysis done? The analysis should be provided."

Response

A Kendall Square Station capacity analysis was performed based on the methodology in the Transit Capacity and Quality of Service Manual, 3rd Edition. The transit analysis is provided in Chapter 2, *Transportation and Parking* in the' Transit Operations' section starting on page 2-73.

Comment 6.22

"We recommend that capital and operational investment for enhanced bus service be studied. The EZRide should be included this analysis. To this point, according to the NPC, three bus routes will be operating over capacity in the future because of the additional Project trips (Bus routes #64, #85, #CT2). Each of those bus routes are already near or over capacity and the Project will add 29 new AM peak hour inbound riders and 33 new PM peak hour outbound riders."

Response

As part of the proposed MOU, improvements to public transit within Kendall Square will be addressed, studied, and improved.

Comment 6.23

"There is also a bullet indicating "incorporation of bike paths ….. within the MXD District" and a later incorporation of the Bicycle Network Plan that includes this path, so these need to be tied together."

Response

The Proponent and/or Redeveloper will incorporate of bike paths, routes, and infrastructure throughout the KSURP area that are prioritized on the City's Bicycle Network Plan, including, but not limited to, the extension of the Grand Junction Multi-Use Path (which the CRA has already begun constructing on the edge of the KSURP) as well as the extension of the existing Binney Street Cycle Track from 3rd Street to Vassar and Main Streets. Refer to the updated Figure 2.7 for identification of the bicycle facilities proposed as part of the Project in the context of the existing facilities and the City's planned facilities.

Comment 6.24

"Also positive is the desire to increase and enhance pedestrian permeability in the larger blocks. The proponent should include bicycle access in these designs and access considerations as well."

Response

Both the Proponent and Redeveloper are focused on improving pedestrian permeability within the MXD District, as described in Chapter 1, *Project Change Description* under the 'Public Open Space Improvements' section and illustrated in Figure 1.4. As design progresses, bicycle accommodations will also be incorporated into the area in conjunction with the Project as discussed in Chapter 2, *Transportation and Parking* under the 'Proposed Transportation Mitigation and Other Beneficial Measures' section (the 'Bicycle Facilities' sub-section) and illustrated in Figure 2.7.

Comment 6.25

"Project Consistency
Some key references for local, regional and state policies are missing and listed below:

- *GreenDOT Goals: Policy/Planning*
  - *Design a multi-modal transportation system*
  - *Promote healthy transportation + livable communities*
  - *Triple mode share of bicycling, transit + walking*
- *City of Cambridge:*
  - *Cambridge Vehicle Trip Reduction Ordinance*
  - *Cambridge Growth Policy Document*
  - *City Of Cambridge Climate Protection Goals & Objectives*
  - *Cambridge Zoning Ordinance And Parking And Transportation Demand Management Ordinance"*

Response

Refer to Chapter 1, *Project Change Description* for a discussion of project consistency with these additional policies/plans.

Comment 6.26

"Major Mitigation/Public Contribution
The Proponent should consider the following additional mitigation measures:

- *Reconstruction of Broadway from Portland to Ames Street*
- *Reconstruction of Binney, 3rd to Galileo Galilei Way, and Galileo Galilei Way from Binney – Main Street, to include cycle tracks and possible road diet."*

Response

The Proponent is considering streetscape improvements, including along Broadway from Ames Street to Galileo Galilei Way and construction of the planned cycle track along Galileo Galilei Way from Main Street to 6th Street, as illustrated on Figure 2.7. A better understanding of the proposed Volpe Center Redevelopment project is required before committing to the continuation of the cycle track along Binney Street. Additional improvements beyond the KSURP area will be discussed with the City.

Comment 6.27

"Sustainability & GHG Emissions Assessment
It would be useful if the Proponent would summarize the stationary and mobile source GHG emissions for the baseline and proposed conditions. For stationary GHG emissions, the NPC indicates that a 17.2 percent reduction in CO2 emission could be achieved. Our experience is that MEPA typically seeks a 20 percent reduction in total emissions. The Proponent should clarify what is happening with the combined stationary and mobile emissions and assess the level of effort to achieve at least a 20 percent total reduction."

Response

Table 4-10 of this SEIR summarizes the estimated stationary source GHG emissions for the Base Case and Design Case, which has been revised to show an overall energy savings of 29.5 percent and stationary source CO_2 emissions reduction of 23.2 percent. It should be noted that the "typical 20 percent reduction" applies to the energy savings, not GHG reductions, and typically applies to Stretch Energy Code communities.

Table 4-14, summarizes the mobile source GHG emissions estimated for the Existing, No-Build, and Build Conditions consistent with the traffic analysis. The percent reduction in GHG emissions for mobile and stationary sources (direct and indirect emissions) are measured against different baselines and, therefore, are not reported as a combined percent reduction. In addition, the Stretch Energy Code applies to energy savings of the stationary source GHG emissions from building energy use only and are kept separate from the mobile source GHG emissions, which are regional or part of a different, larger study area.

The current Stretch Energy Code requires an energy use savings of at least 20 percent for commercial and large residential buildings where the MEPA GHG Policy requires a project to demonstrate a reduction in GHG emissions associated with projected energy (electricity and gas) usage. These percent reductions are not equivalent because different conversion rates are used to convert electricity and gas to CO_2 emissions. Therefore, the estimated 23.2 percent reduction in CO_2 emissions for the overall Project (updated from 17.2 percent reported in the NPC) is a result of a 29.5 percent energy use savings, which exceeds the current Stretch Energy Code requirement.

Comment 6.28

"In the energy modeling, the proponent has accounted for the possibility that the Stretch Energy Code will be updated and possibly reflect a 15 improvement over the IECC 2012. We believe the current Stretch Energy Code is roughly equivalent to the current base energy code (IECC 2012). On p. 4-11, the NPC states that energy conservation measures were chosen to achieve energy savings in the 25 to 30 percent range compared to the ASHRAE 90.1-2007 base case. If the updated Stretch Energy Code will be 15 percent more efficient, then the selected ECMs may be insufficient to achieve the stated goal."

Response

The updated building energy model results presented in Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* show an overall energy savings of approximately 30% compared to ASHRAE 90.1-2007. The project MEP see no linear correlation between the current Stretch Energy Code and Base Energy Code after evaluating the impacts of changes to the Energy Code for several projects. The percentage energy savings changes are different from one project to another given the many variables. That being said, the project MEP hasn't seen a 15% difference in energy savings to date. In one recent Cambridge project, the proposed Lab/ Office design was compared to both IECC 2009 and IECC 2012 baselines and the percentage difference in the overall energy savings was less than five percent. Also in this project, the proposed high-efficiency systems exceeded the IECC 2012 minimum requirements. Finally, not all Energy Code requirements become more stringent under IECC 2012. Some requirements, such as boiler minimum efficiency stay the same and some, such as the interior lighting power density for a research laboratory increased from 1.4 W/SF to 1.8 W/SF. In conclusion, the impacts of the Energy Code change differs significantly from one project to another.

Comment 6.29

"The energy modeling should also account for future climate. Changes in temperature and humidity will occur during the life cycle of the proposed buildings. These changes may affect the energy performance of the buildings in the future. The buildings should not be designed and constructed assuming that climate conditions will remain stable."

Response

Refer to the expanded 'Extreme Temperature Events' section of Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment* for how the energy modeling accounts for future predicted changes in temperature. In summary, the analysis shows that the net change to annual energy use due to climate change will be positive for all buildings because the decrease in the space heating energy use is much larger than the increase in the space cooling energy use. However, when comparing the annual energy cost shows that the operating cost for all buildings, except the Whitehead Institute Addition, increases even if the utility rates stay the same between

2016 and 2050; and by implementing the utility rates fluctuations, the annual energy cost of each building in 2050 is almost double of the cost in 2016.

As discussed in Chapter 4, the buildings are designed following and/or exceeding the building/energy code requirements, with engineering judgement applied, knowing that the nature of weather events is unlikely to remain the same throughout a building's lifetime.

Comment 6.30

"Regarding district energy opportunities (pages 4-27 & 28), the discussion appears to be a little confusing. Veolia owns and operates a district steam system in eastern Cambridge. The NPC states that 'the Project would be able to capture only the GHG reduction for electricity that corresponds to amount of steam purchased …' The Veolia steam, which is produced from waste heat generated in the Kendall Station co-generation plant, can be used to offset natural gas use for heating as well as process purposes. It can also be used to drive chillers instead of using electric-based systems. The Proponent should provide a clear assessment of the district energy opportunities. It should also be noted that the Kendall Square Ecodistrict will soon start a district energy study for the area."

Response

Refer to the response to Comment C.38 above.

Comment 6.31

"<u>Recycling</u>
It is important that buildings are designed to facilitate effective recycling and composting.

- *Ensure adequate storage space for recycling toters and trash barrels.*
- *Store trash and recycling units side-by-side for equal access.*
- *Ensure adequate under counter storage space for bins for recycling, trash and food scraps.*
- *As of 10/1/14, Massachusetts bans commercial food scraps for locations that generate > 1 ton / week. The City is currently expanding its curbside collection of food scraps. Commercial and residential composting is increasing and is a key component of the City's Waste Reduction Goals. The proposed buildings should be designed to ensure they facilitate effective food scrap collection."*

Response

Currently, the Redeveloper implements significant recycling programs within the MXD District. All of the current buildings have Single Stream Recycling programs as well as opportunities for composting. It is typical for the Redeveloper to design buildings that can accommodate each of these activities.

Comment 6.32

"The City is nearing completion of the Interim Report on the Cambridge Climate Change Vulnerability Assessment. The Interim Report will cover the impacts of heat vulnerability and precipitation driven flooding for 2030 and 2070, and the risks of sea level rise and storm surge flooding through 2030. A public presentation was made in March 2015 to present these results and gather feedback. The City anticipates issuing the Interim Report in the next few weeks. The City can share detailed data based on flood and heat modeling. We look forward to working with the proponent to incorporate resilience measures into the project."

Response

The Proponent has obtained data from the Cambridge Climate Change Vulnerability Assessment and has included a discussion of the data under the 'Future Potential Sea Level Rise/Flooding' section of Chapter 4, *Sustainability and Greenhouse Gas Emissions Assessment*.

Comment 6.33

"Construction Impacts

- *Construction Mitigation Plan needs to prioritize minimizing the impacts on the adjacent residential neighborhood.*
- *Ensure effective truck route that does not impact the East Cambridge residential streets.*
- *Effective and convenient pedestrian and bicycle access around the sites is critical."*

Response

Refer to Chapter 8, *Construction* for a description of the proposed measures to minimize temporary construction impacts on the community. Such impacts will be managed to minimize disruption to the surrounding neighborhood through the preparation of Construction Management Plans (CMPs) for each Project Component. The CMPs will address numerous temporary construction-related impacts, such as mitigation measures, road closures, detours, and staging. Cambridge TP&T will review and approve each CMP and the Redeveloper will work closely with the City throughout the construction of each Project Component.

As each Project Component progresses in design and moves into construction, the General Contractor will identify specific truck routes and changes required in any bicycle and/or pedestrian routes as part of each CMP for TP&T review and approval.

Comment 6.34

"Stormwater
The City strongly supports commitment to:

- *Working with the City to implement the most effective district-wide stormwater improvements.*
- *Meeting state and City regulations and standards.*
    - *In addition to the stormwater standards listed, the projects will also need to address phosphorous. Under the Draft NPEDES Stormwater Permit, the Charles River has a TMDL for phosphorous. As such, projects must reduce phosphorus in stormwater by 65%."*

Response

In a meeting held on July 21, 2015, the Proponent and DPW agreed to coordinate neighborhood-scale infrastructure work associated with the Project over the next three to six months as the DPW develops infrastructure improvement strategies with their consultant team.
The Project will meet state and City regulations and standards, including phosphorous removal. A phosphorus loading analysis was performed, as discussed in the 'Phosphorus Loading Calculations' section on page 5-10 and 5-11 of Chapter 5, *Stormwater Management*. The detailed calculations are provided in Appendix G. The Proponent has developed a conceptual drainage scenario for the Project, which exceeds the TMDL requirements of the Lower Charles River Basin.

Comment 6.35

"A dry weather capacity analysis needs to be conducted to confirm that there is adequate capacity within the existing sewer system."

Response

Cambridge DPW stated in a meeting on July 21, 2015 that a dry weather capacity analysis would not be required for this SEIR filing. The Proponent will improve sanitary system capacity by mitigating for I/I at a ratio of 4:1 with the wastewater generated as well as hold 24 hours of flow on site in surcharge conditions.

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City of Cambridge
Richard C. Rossi • City Manager

Executive Department
Lisa C. Peterson • Deputy City Manager

May 27, 2015

Matthew A. Beaton
Secretary of Energy and Environmental Affairs
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office, Page Czepiga, EEA No. 1891
100 Cambridge Street, Suite 900
Boston MA 02114

Dear Secretary Beaton:

The City of Cambridge submits the attached comments on the Notice of Project Change for the Kendall Square Urban Renewal Project submitted by the Cambridge Redevelopment Authority. The proposed developments in Kendall Square are very significant to our economy. Our comments are intended to address the anticipated impacts to ensure that Cambridge can reap the benefits of the development while ensuring that the community's quality of life and environment are protected.

If your agency has any questions about the comments, please contact John Bolduc of my staff at jbolduc@cambridgema.gov or 617-349-4628. We appreciate your consideration of these comments.

Yours very truly,

Richard C. Rossi
City Manager

Cc: Tom Evans, Cambridge Redevelopment Authority

City of Cambridge Comments

Expanded Notice of Project Change (EEA No. 1891)
Kendall Square Urban Renewal Project (KSURP) Amendment No. 10

The amendment to the Kendall Square Urban Renewal Project (KSURP) proposed by the Cambridge Redevelopment Authority (CRA) and Boston Properties involves construction of approximately 1 million square feet of development, including: 584,600 sf office, 50,000 sf retail, and 400,000 sf residential (560 units). The project proposes to create up to 740 net new parking spaces.

KSURP currently contains approximately 3 million square feet of development, and recently received approval for the 88 Ames Street residential project (approximately 216,000 square feet, 280 units). KSURP has 3 parking garages with approximately 2,700 total parking spaces.

The CRA has been working to align KSURP with the zoning proposal developed as part of the Kendall Square/Central Square (K2C2) study. In addition to the MEPA process, individual development Projects within KSURA will require a Special Permit from the City of Cambridge. When Projects move forward with seeking a Planning Board Special Permit, a Traffic Impact Study, based on a scope provided by the City's Traffic, Parking and Transportation Department, will be required and appropriate mitigation strategies will condition the Special Permit. Many of the comments listed below are expected to be addressed through the traffic study and mitigation requirements.

Traffic Impact Analysis

The Notice of Project Change (NPC) provides an acceptable trip generation analysis. The project's vehicle trip mode share rates will be 32% Residential, 34% Office and 34% Retail use. The mode share assumptions are consistent with the K2C2 assumptions and employee surveys from approximately 3,466 employees currently working in the Kendall Square Urban Renewal area. The Project is estimated to generate the following trip generation by mode:

Vehicle trips: 3,639 daily, 390 AM/444 PM Peak hour trips
Transit trips: 4,410 daily, 639 AM/716 PM Peak hour trips
Walking trips: 1,544 daily, 169 AM/195 PM Peak hour trips
Biking trips: 1,184 daily, 165 AM/185 PM Peak hour trips
Other: 1,324 daily, 216 AM/240 PM Peak hour trips

Development in Kendall Square is appropriate because it is well served by transit and excellent pedestrian and bicycle facilities. In order to achieve the lowest auto mode share possible and create no more vehicle trips than estimated, the Project must implement robust transportation demand management measures, provide no more parking spaces that absolutely needed, and mitigate the transportation system impacts from the trips it will create.

If Kendall Square is to continue to be a job creator for the City, region and state, investments are needed to maintain and improve transit service in Kendall Square. The CRA and Boston Properties cannot solve all

the transportation issues, but as major property owners and stakeholders, they should take on a leading role in developing and implementing recommendations, including mechanisms for funding. The City appreciates CRA and Boston Properties working with MassDOT and the City on the Kendall Square Mobility Task Force, which will study mobility in Kendall Square. However, they should not solely rely on that process because approvals and mitigation for KSURP may need to be determined before completion of the MassDOT Kendall Square Mobility Task Force Study.

Trip Generation/Distribution and Assignments

- The Project's trip generation analysis is acceptable.
- Trip Distribution and Assignments are acceptable, however, going forward, we encourage the CRA and Boston Properties to utilize the most up-to-date census data and tools available to understand and monitor employee trip distributions patterns such as Census Transportation Planning Products (CTTP), GPS technology, etc. Detailed employee surveys and more exactly defined distribution and assignments should be collected and monitored, such as where employees live, how they commute to work, what times they leave home, times they leave work, travel times, and vehicle miles traveled. Any notable patterns should be documented. The information will be very useful in determining transportation needs, such as where new bus routes would be best located to shift more employees from driving to using transit. 6.1

Site Circulation

- The Proponent should clearly document where access will be for the 320 space underground garage at 11 Cambridge Center, and the 100 new spaces at 3 Cambridge Center. The location of the garage driveways and number of peak hour ins and outs should be shown in Figures 2.13a and 2.13b. 6.2
- The NPC discussed incorporating a new mid-block pedestrian crossing at Broadway between Ames Street and Galileo Galilei Way, however, there was no information to support a pedestrian crossing there, such as existing pedestrian counts that demonstrate a desire line, or an analysis on why it's not safer to cross Broadway at the existing signalized intersections at Broadway/Ames or Broadway/Galileo Galilei Way? 6.3

Parking

- The Project proposes an overall parking ratio of 0.7 spaces per 1,000 square feet (including residential uses). It's stated that 740 spaces is the maximum number of new parking spaces but fewer spaces may be built. No additional parking spaces should be created than are needed. It would be useful if the proponent indicates what is believed to be the minimum amount of parking needed and why. 6.4
- Page 2-41 indicated the Project proposes 1.1 parking spaces per dwelling unit, but then indicated it is considering 0.25 parking spaces per dwelling unit. The study should explain what they propose more clearly. 6.5
- Page 2-42 stated that based on a shared parking approach the parking supply is adequate, but provided no details on how shared parking was calculated. Additional information on how shared parking would operate for the Project should be provided. The City strongly recommends employing shared parking strategies. 6.6
- It would be useful if the parking demand analysis indicated the total number of employees and residents, and what percentage are expected to drive to work (and have a vehicle for residents). 6.7

- The NPC stated that the Kendall Square Urban Renewal Area has 2,667 spaces, however, Figure 2.8 showed 2,748 spaces. 6.8
- Parking: Since these garages were constructed after 1980 they were subject to the previous zoning requirements for bicycle parking and are not in compliance. To be in compliance, 10% of the current spaces to be bicycle spaces, i.e., there should be 268 rather than the current 215. There are also issues regarding some of the bicycle parking itself not meeting even the older standard. This is an opportunity to upgrade the entire bicycle parking throughout the area. 6.9
- As the Project is built-out, parking supply should be provided at parking ratios no greater than the final approved ratios and contemplated in the K2C2 Study. 6.10

Bicycle Facilities

- More detailed information should be provided on the existing and proposed bicycle facilities, including number of bicycle spaces and layout by location for all short- and long-term bicycle parking as well as the potential for also creating a centrally located bike station with related services 6.11
- p. 2-19-20 Bicycle and Pedestrian Facilities - The claim that "the Project Component sites offer ample bicycle parking" is incorrect, as an assessment of conditions in Kendall Square would reveal. The project should do a full analysis of bicycle parking demand and availability for Kendall Square. In any case, the project should bring the amount of bicycle parking in the area up to current requirements especially as the bike mode split is anticipated at that level (p. 2-30). 6.12
- The City supports the creation of multiple additional bicycle stations in Kendall Square. Additional analysis and information about how KSURP can provide space for bicycle station(s) would be useful, as well as space for additional Hubway stations. 6.13

Traffic Signals

- It would be helpful if the NPC included tables that showed the volume to capacity (v/c), delay, level of service (LOS) and queues for all study area interactions under the Existing, 2024 No Build and 2024 Build conditions. Only a portion of that information was provided for 5 of the 24 intersections studied. 6.14
- Page 2-36 stated that the Binney Street/Galileo Way/Fulkerson Street intersection will have a decrease in delay of 1.8 seconds under the 2024 Build condition. However, it is unclear how that could happen given the project will add additional trips. 6.15
- Beginning on Page 2-51, the NPC discussed potential vehicle access and circulation mitigation at 5 intersections under a 2024 future condition, however it was not clear what mitigation the Project is actually committing. For example, is the Project committing that 10 years from now, new studies, new traffic counts, new/updated signal equipment, and implementation of traffic signal changes will be implemented by the Proponent, if appropriate and approved by the City? 6.16
- It is was not clear why, as stated in the NPC, the vehicle access and circulation analysis was done from a vehicular operations standpoint, and did not include pedestrian and bicycle users at the intersections. Any intersection analysis that does not consider all modes should not be included. 6.17
- It would be helpful if the NPC included multi-modal Level of Service (MMLOS) analysis for intersections as discussed in the MassDOT TIA Guidelines. We would be interested in successful demonstration of procedures and performance measures for MMLOS, even if only for a small handful of intersections to test. 6.18

Transit Operations:

- The NPC indicated that the analysis of the Red Line capacity did not take into account the peak of the peak conditions. To provide a complete assessment of these impacts, this analysis should be conducted, either at this point or for future approvals. We would appreciate working with the CRA and Boston Properties to identify methodology and data needs for such an analysis. 6.19
- The NPC indicated that many times the Red Line operates at a v/c ratio over capacity. This comment should be justified with appropriate data and analysis. 6.20
- The NPC indicated that the new passengers in at the MBTA Kendall Square Station can be accommodated in the physical capacity of the station. How was the analysis done? The analysis should be provided. 6.21

Transportation Mitigation

- The City appreciates the comments in the NPC that the Proponent and Redeveloper are committed to developing an expanded program of transportation mitigation and enhancements, with a focus on transit and transit related improvements options, including both capital and operational investments.
- The City's expectation is that the Project will implement TDM measures that are at least as robust as the TDM commitments associated with the 88 Ames Street development project.
- We recommend that capital and operational investment for enhanced bus service be studied. The EZRide should be included this analysis. To this point, according to the NPC, three bus routes will be operating over capacity in the future because of the additional Project trips (Bus routes #64, #85, #CT2). Each of those bus routes are already near or over capacity and the Project will add 29 new AM peak hour inbound riders and 33 new PM peak hour outbound riders. 6.22

Public and Open Space Improvements & Urban Design

The City supports the project's focus on enhancing open space within the KSURP area. The City recognizes that open space planning and design will be an important component of the future local planning process. Consideration should be given to the benefits and costs of enclosing public open space and creating rooftop gardens, and how these spaces contribute to the City's open space planning goals, including environmental benefits, recreation and placemaking opportunities. In addition, the City will review the positioning, massing and height of new buildings cognizant of impacts on existing and future public open space and streetscapes in terms of shadows, wind, sky views and the pedestrian scale. These urban design issues will be considered as part of the development review process with the Community Development Department, Planning Board and Cambridge Redevelopment Authority.

- The proponent proposes "Improvements to the Sixth Street Connector, including new hardscapes, seating, lighting and accessibility for food trucks." Given that this is the primary walking and bicycling route from the East Cambridge neighborhood to Kendall Square, it needs to first and foremost work well as a multi-use path, or as a separated walking and bicycling path system. This is a critical issue. There may be more flexibility for doing this when the Volpe site is redeveloped, but that is a separate project. It would be dysfunctional to use this space at its current width for food trucks and similar uses. More work needs to be put into this concept.
- There is also a bullet indicating "incorporation of bike paths ….. within the MXD District" and a later incorporation of the Bicycle Network Plan that includes this path, so these need to be tied together. 6.23

- There is a commitment to advancing the construction of the Grand Junction Path which the City strongly supports.
- Also positive is the desire to increase and enhance pedestrian permeability in the larger blocks. The proponent should include bicycle access in these designs and access considerations as well. 6.24

Project Consistency

Some key references for local, regional and state policies are missing and listed below:

- GreenDOT Goals: Policy/Planning
  - Design a multi-modal transportation system
  - Promote healthy transportation + livable communities
  - Triple mode share of bicycling, transit + walking
- City of Cambridge:
  - Cambridge Vehicle Trip Reduction Ordinance
  - Cambridge Growth Policy Document
  - City Of Cambridge Climate Protection Goals & Objectives
  - Cambridge Zoning Ordinance And Parking And Transportation Demand Management Ordinance

6.25

Major Mitigation/Public Contribution

The Proponent should consider the following additional mitigation measures:

- Reconstruction of Broadway from Portland to Ames Street
- Reconstruction of Binney, 3rd to Galileo Galilei Way, and Galileo Galilei Way from Binney – Main Street, to include cycle tracks and possible road diet.

6.26

Sustainability & GHG Emissions Assessment

It would be useful if the Proponent would summarize the stationary and mobile source GHG emissions for the baseline and proposed conditions. For stationary GHG emissions, the NPC indicates that a 17.2 percent reduction in CO2 emission could be achieved. Our experience is that MEPA typically seeks a 20 percent reduction in total emissions. The Proponent should clarify what his happening with the combined stationary and mobile emissions and assess the level of effort to achieve at least a 20 percent total reduction. 6.27

In the energy modeling, the proponent has accounted for the possibility that the Stretch Energy Code will be updated and possibly reflect a 15 improvement over the IECC 2012. We believe the current Stretch Energy Code is roughly equivalent to the current base energy code (IECC 2012). On p. 4-11, the NPC states that energy conservation measures were chosen to achieve energy savings in the 25 to 30 percent range compared to the ASHRAE 90.1-2007 base case. If the updated Stretch Energy Code will be 15 percent more efficient, then the selected ECMs may be insufficient to achieve the stated goal. 6.28

The energy modeling should also account for future climate. Changes in temperature and humidity will occur during the life cycle of the proposed buildings. These changes may affect the energy performance 6.29

of the buildings in the future. The buildings should not be designed and constructed assuming that climate conditions will remain stable. 6.29 con't

Regarding district energy opportunities (pages 4-27 & 28), the discussion appears to be a little confusing. Veolia owns and operates a district steam system in eastern Cambridge. The NPC states that "the Project would be able to capture only the GHG reduction for electricity that corresponds to amount of steam purchased …" The Veolia steam, which is produced from waste heat generated in the Kendall Station co-generation plant, can be used to offset natural gas use for heating as well as process purposes. It can also be used to drive chillers instead of using electric-based systems. The Proponent should provide a clear assessment of the district energy opportunities. It should also be noted that the Kendall Square Ecodistrict will soon start a district energy study for the area. 6.30

Regarding the 2002 Cambridge Climate Protection Plan (on page 4-8), it should be noted that the 2002 plan is effectively defunct. In 2014, the City Council adopted a new set of Climate Protection Goals and Objectives. It is still appropriate to cite the goal of reducing emissions by 80 percent by 2050. In addition, the Getting to Net Zero Task Force Recommendations, which are currently under consideration by the City Council, lays out a 25-year plan to achieve a 70 percent reduction in emissions from building operations.

Recycling

It is important that buildings are designed to facilitate effective recycling and composting.

- Ensure adequate storage space for recycling toters and trash barrels.
- Store trash and recycling units side-by-side for equal access.
- Ensure adequate under counter storage space for bins for recycling, trash and food scraps.
- As of 10/1/14, Massachusetts bans commercial food scraps for locations that generate > 1 ton / week. The City is currently expanding its curbside collection of food scraps. Commercial and residential composting is increasing and is a key component of the City's Waste Reduction Goals. The proposed buildings should be designed to ensure they facilitate effective food scrap collection. 6.31

Climate Change Adaptation

While the MEPA Climate Change Adaptation Policy is not yet final, it is prudent for the Proponent to start incorporating measures to prepare for climate change impacts. The City is nearing completion of the Interim Report on the Cambridge Climate Change Vulnerability Assessment. The Interim Report will cover the impacts of heat vulnerability and precipitation driven flooding for 2030 and 2070, and the risks of sea level rise and storm surge flooding through 2030. A public presentation was made in March 2015 to present these results and gather feedback. The City anticipates issuing the Interim Report in the next few weeks. The City can share detailed data based on flood and heat modeling. We look forward to working with the proponent to incorporate resilience measures into the project. 6.32

Construction Impacts

- Construction Mitigation Plan needs to prioritize minimizing the impacts on the adjacent residential neighborhood. 6.33

    - Ensure effective truck route that does not impact the East Cambridge residential streets.
- Effective and convenient pedestrian and bicycle access around the sites is critical.

6.33 con't

Stormwater

The City strongly supports commitment to:

- Working with the City to implement the most effective district-wide stormwater improvements.
- Meeting state and City regulations and standards.
    - In addition to the stormwater standards listed, the projects will also need to address phosphorous. Under the Draft NPEDES Stormwater Permit, the Charles River has a TMDL for phosphorous. As such, projects must reduce phosphorus in stormwater by 65%.

6.34

Sanitary Sewer

- A dry weather capacity analysis needs to be conducted to confirm that there is adequate capacity within the existing sewer system.
- The City will work with the project team on the 4:1 I/I removal. It is critical that the I/I be removed in a manner that benefits the segment of the system affected by the new flows.

6.35

Addressing

The Cambridge Redevelopment Authority has been working to successfully integrate Cambridge Center development in to the fabric of Kendall Square. Addressing is an important component of that effort. The City strongly supports completing the addressing for previous buildings and ensuring that new buildings use standard street addresses.

Letter 7
Stephen H. Kaiser

Comment 7.1

"Ideally, improvements in transit service would serve the entirety of the Kendall Square area. Overloaded road intersections would benefit from a mode shift to transit. Mode shifts could be considered as mitigation for the total background traffic growth projected over the next ten years, not simply the increment from the CRA project. The EIR could investigate the feasibility of such major mode shifts, as the Red Line adjusts to carry more passengers in both the short term and long term. In other words, a full capacity analysis is needed for the Red Line."

Response

The intent of the proposed MOU is to provide a vehicle for state and local collaboration on transit improvements and facilitate coordination with other property owners and developers in the Kendall Square area. In order to identify specific improvements, an analysis of the MBTA Red Line capacity and operations would likely be required.

Comment 7.2

"It becomes the challenge of the EIR to demonstrate that change to Red Line and bus operations -- in combination with enhanced all-weather bicycle access and good pedestrian circulation -- will meet the total transportation needs of Kendall Square. MassDOT has recently established a Kendall Square Task Force to consider the demands and potentials of all modes, using a funded consultant. The single EIR would be a joint product of the Redevelopment Authority and Boston Properties. MIT can also contribute important data on measurements and design potentials of transit. Finally, the Volpe Transportation Center is in a position to suggest feasible solutions based on its access to information on national and international experience with modern optimized transit systems.

I propose that the single EIR for Kendall Square be seen as the first major step in a series of transportation studies by cooperating parties at the Federal, state and local level."

Response

The intent of the Kendall Square Mobility Task Force and, ultimately, the proposed KSTEP is to provide a vehicle for state and local collaboration on transit

improvements and facilitate coordination with other property owners and developers in the Kendall Square area on transit issues.

Comment 7.3

"HISTORY OF GROWTH AND CHANGE AT KENDALL SQUARE, INCLUDING EMPLOYMENT, RETAIL AND RESIDENTS

Why Kendall Square? What is special about Kendall Square that suggests intergovernmental cooperation to achieve potentials and average likely problems? The EIR should provide a useful historical context."

Response

Refer to the 'Site Context and Redevelopment Background' section on page S-10 of the *Project Summary* chapter for a historical context and background for redevelopment in the KSURP area. In the past 40 years, Kendall Square has developed into one of the Commonwealth's most important economic development engines and a major center for academic, technological, and biomedical innovation nationally. This reality has influenced the amount of attention given to nurturing Kendall's success through unprecedented intergovernmental cooperation. Kendall Square has had a long history of intergovernmental cooperation. In the 60s, 70s and 80s, the KSURP received millions of federal dollars through HUD for the clearing, assembly and public improvements to many acres of land in order to set the stage for the private investment that would come later. Currently, the Kendall Square Association (KSA), a membership association of academic and research institutions, global and local businesses, restaurants and property owners throughout Kendall Square has emerged as a convener, influencer and unified voice advocating for collaborative solutions to Kendall Square's most critical issues. The Proponent manages the KSURP area within the Kendall Square neighborhood, which is the only current Urban Renewal District in the City, adding a vital layer of detailed attentiveness and expert guidance, to accelerate urban planning, project implementation and accountability for Kendall's urban development in a way that does not exist in the same manner in the rest of Cambridge. Most recently, at a cost of several hundred thousand dollars, MassDOT, a state-level agency, has convened a district-wide task force to address the intractable transportation issues facing Kendall Square to enable it to continue to be a key driver of the state economy.

Comment 7.4

"COMPILATION OF DEVELOPMENT COMPLETED SINCE THE YEAR 2000, BUILDINGS NOW UNDER CONSTRUCTION AND CURRENTLY PLANNED NEW DEVELOPMENT

The EIR would expand upon the listing of projects I provided above, as well as indicate the growth rates for building construction in East Cambridge in recent decades."

Response

The 'Site Context and Redevelopment Background' section of the *Project Summary* chapter provides a historical timeline of development within the KSURP area pre- and post-2000. Table S-2 provides a summary of existing development in the KSURP area.

The CRA has managed the KSURP portion of Kendall Square since the 1960s and, therefore, has kept detailed records of building development within the KSURP. Based on the City's data, prior to the 2000 approximately 2.31 million gross square feet of building area was constructed within the MXD District/Cambridge Center. Areas outside of Cambridge Center, such as Technology Square experienced similar dramatic growth patterns in the 1980s, 1990s and 2000's totaling approximately 2.65 gross square feet of building area. Since the year 2000, an additional approximately 1 million gross square feet has been constructed in the MXD District.,

Growth was also evident during these decades not only directly adjacent to the KSURP on all sides, but in a discontinuous manner throughout East Cambridge along the waterfront, Land Boulevard, Cambridgeside Galleria, Lechmere and North Point. While much of this development shares clear economic, social, and transportation linkages, the CRA was not involved in projects beyond the KSURP area boundary and, therefore, does not have a complete record of all of the development adjacent to or beyond the KSURP through the years and cannot accurately summarize the overall growth rate of development in East Cambridge beyond the KSURP borders.

Comment 7.5

"POSSIBLE BUS CIRCULATION AND SERVICE IMPROVEMENTS TO THE KENDALL SQUARE AREA

Historically, Kendall Square has not been well designed for bus circulation, especially to provide feeder service to the Red Line. More of the street system may need to be dedicated to bus and bike circulation, with improved quality of pedestrian crossings. These quality pedestrian services should include both concurrent and exclusive pedestrian crossing phases in traffic signals."

Response

Potential bus, bicycle, and pedestrian improvements are discussed under Chapter 2, *Transportation and Parking* under the 'Proposed Transportation Mitigation and Other Beneficial Measures' section starting on page 2-94. Detailed recommendations for improving bus services touching Kendall Square must be viewed in the context of all transit enhancements being considered, especially the MBTA Red Line and Grand Junction services. Therefore, as discussed in Chapter 2, the Proponent defers to the

current MassDOT Kendall Square Mobility Task Force for recommendations on bus service improvements based on the complete universe of transit improvements recommended by the Task Force. This holistic planning exercise funded by MassDOT will conclude in February 2016.

In recent discussions with MassDOT, a variety of ways bus service could be improved in Kendall Square and Boston/Cambridge have generally been explored. Some form of Bus Rapid Transit has recently been emerging as a MassDOT priority and is fully supported by the City, who may be able to assist with the implementation of such service on local streets and intersections. Discussions regarding extending bus services that currently terminate at Central to terminate at Kendall have been advanced by the City as well as opportunities to review bus routes in the area when the Green Line Extension into Somerville is completed. Normal bus routing has been severely disrupted and lengthened due to the 2015 construction and partial closure of Main Street, but will resume by the end of the year.

Comment 7.6

"The EIR should provide introductory thoughts on all-season bicycle commuting, with specific reference to the new path systems and the heavy bicycling corridors of Broadway and Hampshire Street."

Response

Bicycling within the KSUR area has rapidly increased over the past few years and it is important to provide sufficient infrastructure to support the growing demand. The Proponent is committed to supporting and promoting this alternative mode of transportation and will provide sufficient bicycle storage for employees, tenants, residents, and visitors to the Project. The Proponent will also engage in discussions with the City on how to better improve bicycle infrastructure along roads, including the Broadway and Hampshire Street corridors, within the KSUR area.

Comment 7.7

"By even-spacing of trains and adding more trains in the peak hour, the potential for increased capacity from the two-track Red Line tunnel could be as high as an increase of 300 percent, so there is no apparent need to add new tracks or tunnels. The EIR should document the effectiveness of various actions to increase capacity of the two-track Red Line system."

Response

The transit analysis shows that there is current MBTA Red Line capacity when the train is running under standard operations, 4.5 minutes headways during peak hours. It is the goal of the proposed KSTEP to identify possible MBA Red Line capacity and operational improvements as well as funding mechanisms to make sure the MBTA

Red Line can consistently provide these standard operations and have the ability to potentially add more service and capacity in the future, as demand increases. Refer to Chapter 2, *Transportation and Parking* under the 'Transit Operations' section for a detailed analysis of potential transit impacts associated with the Project.

Comment 7.8

"The EIR should investigate the causes of bunching in Red Line and bus service to Kendall. Bunching is the grouping of trains or buses into an uneven sequence, with a mixture of long headways and delays followed by grouping of trains and buses with short headways, and inefficient operations…The EIR should provide a preliminary estimate of monitoring costs to hold trains to schedules and adjust for any variations in train spacing when those variations are still small and manageable."

Response

A study into the causes of bunching of MBTA Red Line and MBTA bus service to the Kendall Square area would provide insight into where transit enhancements could be focused. This investigation could be conducted with the cooperation of the MBTA. Discussions are already underway as to how the Project could assist in identifying potential bus and Red Line improvements.

Comment 7.9

"The goal must be to have even-spacing of trains and achieve even-loading, with far less waste. The result is more consistent and predictable service, with fewer delays, as well as full utilization of train capacity. Such an arrangement would mean it is possible to consider a no-cost solution, whereby any costs of monitoring equipment and personnel are offset by increased fare revenues from the added ridership. The EIR should investigate these costs and revenues to determine how many added riders would be necessary to create a net zero-cost solution."

Response

This idea is very intriguing and is one possible way to address the needs for MBTA Red Line improvements. The purpose of the proposed MOU is to identify possible funding strategies needed to improved MBTA Red Line service to employees, residents, and visitors to the Kendall Square area.

Comment 7.10

"We should anticipate capacity increases of at least 50 percent on the Red Line. The MBTA today lacks good performance measures on its subway system: the EIR should suggest practical definitions of transit level of service, its measurement, and management with respect to train bunching."

Response

Chapter 2, *Transportation and Parking*, under 'Transit Operations – MBTA Red Line Analysis – MBTA Planned Improvements to Red Line Service' starting on page 2-82 discusses improvement projects MassDOT and the MBTA will be conducting in the future to increase reliability and reduce bunching of trains.

Comment 7.11

"The EIR should include a more extensive literature search, as well as identification of any original research sources dealing with capacity, delay and modeling of bunching."

Response

See response to comment 7.10 above.

Comment 7.12

"The EIR should include a brief investigation into possible capacity improvements to increase transit capacity by adding more trains (plus operating personnel and enhanced power and signalizing systems)."

Response

See the response to Comment 7.10 above.

Comment 7.13

"State officials have not announced targeted schedules for improving transit service on the MBTA. This EIR and subsequent transit studies should contribute significantly to the identification of the capacity and reliability potentials that could be sought at various guideposts in the future."

Response

Identifying specific improvements and developing targeted schedules for improving transit service is the goal of the proposed KSTEP.

Stephen H. Kaiser
191 Hamilton St.
Cambridge Mass. 02139

To : Secretary Mathew Beaton, Executive Office of Energy and Environmental Affairs
Attention : Page Czepiga, MEPA Unit

From : Stephen H. Kaiser

Kendall Square Urban Renewal, Amendment #10
Notice of Project Change EEA No. 1891

The original EIR for the Kendall Square EIR of the Cambridge Redevelopment Authority was submitted in 1977. The current amendment significantly expands development within the MXD zoning district, with one million s.f. additional construction proposed at Kendall Square by the Authority, working in combination with its designated developer, Boston Properties.

In addition, numerous other development are either currently under construction or are proposed for sites within or near Kendall Square. These include :

(1) Expansion of the Education First office campus at North Point, including an EIR for Building #3 adjacent to the Gilmore Bridge.

(2) Additional mixed use buildings in the designated North Point area bordering on Boston and Cambridge, and adjacent to the MBTA commuter rail yards.

(3) Additional buildings in the Binney Street by the Alexandria Company.

(4) The MIT plan for 1.2 million s.f. of new construction near Kendall Square.

(5) The CRA proposal for 1 million s.f. of new buildings at Kendall Square.

(6) The public-private partnership plan for the Volpe site, with a total of 3.4 million square feet of development.

The total development proposed in the area could amount to about ten million square feet, or the equivalent of eight Prudential towers. It is perfectly legitimate to ask of the developers and planners : how will people get to and from these new buildings? The question becomes one of availability of basic infrastructure, and the element of infrastructure seemingly most unresolved is transportation -- and in particular transit oriented development or TOD. Prior to the winter of 2015, TOD was primarily an advertising buzzword for indicated proximity to transit.

Since the winter collapse of the MBTA, the practical aspects of TOD have risen to the forefront. How can the MBTA provide everyday service to urban areas already limited by traffic congestion and parking? How can transit service once again be seen as more reliable that road travel during winter storms? The proposed EIR at Kendall Square provides the ideal opportunity to investigate these questions in a thoughtful, rational, and imaginative manner.

The proponent has requested to submit a single EIR pursuant to MEPA regulations 301 CMR 11.06(8), rather than a draft and final EIR as is normally applicable under MEPA. The requirements under MEPA regulations to allow a single EIR are contained in 310 CMR 11.06(8) (a), (b) and (c). A decision by the Secretary in favor of a single EIR is enhanced if there is a lack of controversy about the proposal, and there is adequate existing infrastructure to service the proposed project.

The request before the Secretary is to accept the Notice of Project Change document as equivalent to a Draft EIR, with the single EIR being equivalent to a final EIR. The primary technical issue before us is outlining the scope for such an EIR and how the resulting document can be most useful within and outside the MEPA process.

The traffic analysis (including the 1100 pages of traffic calculations contained in the CD-ROM appendix) clearly demonstrates that there is insufficient traffic capacity infrastructure to handle either today's traffic flows or the higher volumes projects for the year 2024. In contrast, the transit analysis shows that there is significant unutilized capacity on the Red Line at peak load points in the morning and afternoon peak hour. It is quite reasonable to ask how this unused capacity can be put to good use to increase the ability of the Red Line to serve both existing and new riders.

The MBTA by its own data in Table 2-16 of the NPC indicates that the Red Line has ¼ unused capacity in the morning peak hour and 1/3 unused capacity in the afternoon peak hour.

Ideally, improvements in transit service would serve the entirety of the Kendall Square area. Overloaded road intersections would benefit from a mode shift to transit. Mode shifts could be considered as mitigation for the total background traffic growth projected over the next ten years, not simply the increment from the CRA project. The EIR could investigate the feasibility of such major mode shifts, as the Red Line adjusts to carry more passengers in both the short term and long term. 7.21

In other words, a full capacity analysis is needed for the Red Line. The options include "making the trains run on time" by the even-spacing of trains to be done this year .... or adding more trains and reducing headways as a way to increase capacity in the period 2020 and thereafter. Could overloaded street systems be mitigated to the point of being at capacity, rather than over-capacity? How much improvement in Red Line Capacity would be needed to achieve this goal? This approach would be designed to provide for all of the people-moving needs of the Kendall Square area by using every all mode and avoiding the traffic congestion overloads that are common today and will simply get worse unless productive action is taken.

It becomes the challenge of the EIR to demonstrate that change to Red Line and bus operations -- in combination with enhanced all-weather bicycle access and good pedestrian circulation -- will meet the total transportation needs of Kendall Square. MassDOT has recently established a Kendall Square Task Force to consider the demands and potentials of all modes, using a funded consultant. The single EIR would be a joint product of the Redevelopment Authority and Boston Properties. MIT can also contribute important data on measurements and design potentials of transit. Finally, the Volpe Transportation Center is in a position to suggest feasible solutions based on its access to information on national and international experience with modern optimized transit systems. 7.2

I propose that the single EIR for Kendall Square be seen as the first major step in a series of transportation studies by cooperating parties at the Federal, state and local level. The MEPA scope should understand that the level of expertise in transit planning and analysis is far more primitive than the elaborate methods of the Highway Capacity Manual,

so that a step-by-step sequence of creating new methodologies and understandings can arise through a set of inter-related studies, of which this EIR will be the first. I can conceive of the CRA/Boston Properties effort would be a very good Master's Thesis, while the end game by the Volpe Center could be a PhD thesis.

HISTORY OF GROWTH AND CHANGE AT KENDALL SQUARE, INCLUDING EMPLOYMENT, RETAIL AND RESIDENTS

Why Kendall Square? What is special about Kendall Square that suggests intergovernmental cooperation to achieve potentials and average likely problems? The EIR should provide a useful historical context. 7.3

COMPILATION OF DEVELOPMENT COMPLETED SINCE THE YEAR 2000, BUILDINGS NOW UNDER CONSTRUCTION AND CURRENTLY PLANNED NEW DEVELOPMENT

The EIR would expand upon the listing of projects I provided above, as well as indicate the growth rates for building construction in East Cambridge in recent decades. 7.4

POSSIBLE BUS CIRCULATION AND SERVICE IMPROVEMENTS TO THE KENDALL SQUARE AREA

Historically, Kendall Square has not been well designed for bus circulation, especially to provide feeder service to the Red Line. More of the street system may need to be dedicated to bus and bike circulation, with improved quality of pedestrian crossings. These quality pedestrian services should include both concurrent and exclusive pedestrian crossing phases in traffic signals. 7.5

IMPROVED BICYCLE CIRCULATION WITHIN AND ACCESS TO KENDALL SQUARE

The MBTA Green Line Extension has been planned for inclusion of the community path in Somerville and Cambridge to provide better connectivity from the Minuteman Path to the DCR path system at the Charles River. The CRA, MIT and the City of Cambridge have begun the initial phases of a Grand Junction path with possible connections to Somerville and Allston.

Snow plowing of walkways by MIT around its campus illustrates the way to achieve year-round quality bike and pedestrian access on the Grand Junction path. We need not presume that bicycle use will automatically be cut during wintertime. Usage of Hubway service during the winter has shown the potential for all-weather bicycling activity. The ability of bicycle service to supplement and feed into mass transit greatly increases the range of service offered by non-auto modes. The type of planning necessary to understand bicycles as a major transportation model at Kendall Square is a relatively new phenomenon and has not been investigated with the detail found in many traffic and transit studies.

The combination of cold, snow and ice has traditionally been a primary deterrent to bicycle use in winter. However, well-plowed paths and bike lanes could enhance the utility of year-round bicycle travel, either separate from or in combination with mass transit. The future goal would be public announcements during winter storms with the public being advised to leave their cars at home and instead use reliable mass transit and bicycle routes. The EIR should provide introductory thoughts on all-season bicycle commuting, with specific reference to the new path systems and the heavy bicycling corridors of Broadway and Hampshire Street. 7.6

FUNCTIONAL BALANCE OF AUTO AND TRANSIT POTENTIAL FOR IMPROVED SERVICE

The existing highway system has a long history of congestion, traffic queues, and delays. The Big Dig has shifted much new traffic congestion to nearby Boston locations such as Leverett Circle and Charles Circle. As a result, traffic volumes on the Cambridge site of the Charles River have been dropping over the past 15 years due to the

Level-of-Service F consequences of these traffic bottlenecks. In essence, there is no evident way of finding traffic solutions in the East Cambridge area.

By contrast, it is transit that offers possible capacity improvements, at least in part because the existing operations of the Red Line are so highly inefficient. Significant improvements are possible early on at low cost. However, after simple operating improvements have been made, any further improvements in capacity will require more expensive solutions, such as the purchase of more subway cars and buses, with added operating personnel.

By even-spacing of trains and adding more trains in the peak hour, the potential for increased capacity from the two-track Red Line tunnel could be as high as an increase of 300 percent, so there is no apparent need to add new tracks or tunnels. The EIR should document the effectiveness of various actions to increase capacity of the two-track Red Line system. 7.7

BENEFITS FROM INITIAL TRANSIT IMPROVEMENTS

The EIR should investigate the causes of bunching in Red Line and bus service to Kendall. Bunching is the grouping of trains or buses into an uneven sequence, with a mixture of long headways and delays followed by grouping of trains and buses with short headways, and inefficient operations. Bunching is an international problem which afflicts almost every transit operator. The Japanese appear to have solved the bunching problem by rigorous adherence to even-spacing of trains, with close monitoring of the times for train movements and stoppage at stations. The EIR should provide a preliminary estimate of monitoring costs to hold trains to schedules and adjust for any variations in train spacing when those variations are still small and manageable. 7.8 7.8 con't

Today, the Red Line headways range from one minute and fifty seconds up to 17 minutes. Damage to train operations can be seen in a sequence of four trains. The first train arrives after a long delay and is jammed to crush capacity. A second train arrives shortly thereafter but quickly becomes jammed.

The first train cannot serve all passengers, so many people must wait for the second train, which now becomes filled. The next two trains come in quickly and are virtually empty. The result is that there are two full trains and two almost empty trains. Overall, the average condition of the four trains is to be little more than half full. It is the "emptiness" of some trains which accounts for the unused capacity -- in effect wasted capacity.

The goal must be to have even-spacing of trains and achieve even-loading, with far less waste. The result is more consistent and predictable service, with fewer delays, as well as full utilization of train capacity. Such an arrangement would mean it is possible to consider a no-cost solution, whereby any costs of monitoring equipment and personnel are offset by increased fare revenues from the added ridership. The EIR should investigate these costs and revenues to determine how many added riders would be necessary to create a net zero-cost solution. 7.9

We should anticipate capacity increases of at least 50 percent on the Red Line. The MBTA today lacks good performance measures on the its subsway system : the EIR should suggest practical definitions of transit level of service, its measurement, and management with respect to train bunching. Public transit is also subject to variation and disturbances. There can be health emergencies or train breakdowns that are very significant events. Everyday variations can include passenger surges from the Orange and Green Lines, extra time to load wheelchairs or bicycles, any uneven loading of cars on a train, and so forth. 7.10

ENHANCEMENT OF TRANSIT RELIABILITY,
ESPECIALLY DURING WINTER STORMS

This past winter has educated all of us into the disabling effects of large snow storms. While road crews did an excellent job keeping travel lanes open, the snow accumulation worsened parking conditions and crippled the MBTA as service was entirely shut down for a day at a time. In past years, authorities would frequently warn citizens facing the imminent arrival of a large storm. The public would be advised to leave their cars at home and take transit. The Winter of 2015 put the lie to that advice, as the MBTA transit system collapsed more severely than automobile transportation.

Ideally, reliable transit service should again become a feature of the MBTA system, so that in inclement winter weather, drivers can credibly be urged to leave their cars at home and instead take mass transit. Improved capacity of Red Line trains would mean improved ability to withstand storm damage and to maintain quality service. The MBTA will need to take other actions to provide snowplowing and third rail deicing, so that this coming winter need not be a repeat of the past.

LITERATURE REVIEW OF TRANSIT CAPACITY AND BUNCHING

My search of the Internet uncovered very little documentation of the effect of bunching on transit capacity and delay. The EIR should include a more extensive literature search, as well as identification of any original research sources dealing with capacity, delay and modeling of bunching. 7.11

ADDED CAPACITY DUE TO OPERATION OF MORE TRAINS DURING PEAK PERIODS, WITH SHORTER HEADWAYS.

The EIR should include a brief investigation into possible capacity improvements to increase transit capacity by adding more trains (plus operating personnel and enhanced power and signalizing systems). This longer-term goal would replace current 4.5 minute headways with reduced headways as short as two minutes. Two-minute headways are currently offered in peak hours by both the New York and Chicago Transit Authorities. In Boston, the Harvard Line in 1926 had two-minute scheduled headways. Tokyo has two-minute headways today. 7.12

REASONABLE BEST CASE SCHEDULES FOR IMPLEMENTATION

At this early stage of transit analysis, details of program implementation and costing need not be provided in the EIR. Other interested developers and analysts in the Kendall Square area can expand on those details in the near future.

State officials have not announced targeted schedules for improving transit service on the MBTA. This EIR and subsequent transit studies should contribute significantly to the identification of the capacity and reliability potentials that could be sought at various 7.13

guideposts in the future. Moreover, the work derived from the EIR could have more than simple regional implications for Boston transit. The analysisw and recommendations could be of use to other cities and states, as well as having international applications. 7.13

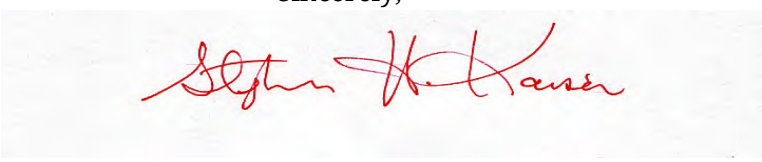
POSSIBLE DISTRIBUTION OF TASKS
AMONG INTERESTED PARTIES ART KENDALL SQUARE

Several different entities have been active in the Kendall Square area in recent months, each with an interest in improving service on the Red Line. MassDOT has established its Kendall Square mobility task force with a funded consultant and a broad mandate to investigate transportation improvements in the Kendall area. This task force has representation from state agencies (including the MBTA) as well as residents, Cambridge city staff, local developers, universities, and business organizations. Transit users and advocacy groups are not specifically represented, but it is reasonable to presume that all members of the Task Force are Boston area transit users and thus have practical experience with MBTA service.

I would not expect that the CRA effort would be able to go beyond limited sampling of train arrivals and loadings at Red Line stations. However, other members of the Kendall Square transit coalition have reportedly made detailed measurements. This data in combination with the daily MBTA reports on trains arrivals and departures at Red Line stations could provide a sampling of how train headways vary and how large individual headways between trains can grow as delayed trains travel from one terminal to another.

I support a finding that a single EIR is the appropriate procedure to follow as requested by the proponent, since it includes a commitment to expand the transit analysis beyond the level of detail provided in the NPC.

Sincerely,



Stephen H. Kaiser, PhD

Appendix A
Distribution List

Distribution List

In accordance with Section 11.10(7) and 11.16(b) of the MEPA regulations, the Proponent has distributed copies of the "expanded" Notice of Project Change (NPC) and Single Environmental Impact Report (SEIR) to the following state and local agencies as well as other interested parties. Additionally, per the NPC Certificate, a copy of the SEIR has also been made available to the local library for public review.

It is anticipated that this SEIR will be noticed in the next edition of the *Environmental Monitor* published on or about October 19, 2015 commencing the 30-day public review period, in accordance with Section 11.06(3) of the MEPA regulations. Thus, comments on this SEIR are due to the MEPA Office no later than November 18, 2015. To request a copy of this document, please contact Lauren DeVoe at (617) 728-7777 or email at ldevoe@vhb.com.

Comments on this SEIR can be submitted to the MEPA Office at the following address:

Secretary Matthew A. Beaton
Executive Office of Energy and Environmental Affairs
Attention: MEPA Office re: EEA No. 1891
100 Cambridge Street, Suite 900
Boston, MA 02114

State Agencies

Secretary Matthew A. Beaton (submitted herein)
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

Department of Environmental Protection
Commissioner's Office
One Winter Street
Boston, MA 02108

DEP/Northeast Regional Office
Attn: MEPA Coordinator
205B Lowell Street
Wilmington, MA 01887

Massachusetts Department of Transportation
Public/Private Development Unit
Attn: Lionel Lucian
10 Park Plaza
Boston, MA 02116

Massachusetts Department of Transportation - District #6
Attn: MEPA Coordinator
185 Kneeland Street
Boston, MA 02111

Massachusetts Historical Commission
The MA Archives Building
220 Morrissey Boulevard
Boston, MA 02125

Metropolitan Area Planning Commission
60 Temple Place, 6th Floor
Boston, MA 02111

Massachusetts Department of Housing & Community Development
Attn: Carol Wolfe, Community Revitalization Coordinator
100 Cambridge Street, Suite 300
Boston, MA 02114

Massachusetts Water Resource Authority
Attn: Marianne Connolly
Charlestown Navy Yard
100 First Avenue, Building 39
Boston, MA 02129

Massachusetts Department of Energy Resources
Attn: MEPA Coordinator
100 Cambridge Street, 10th Floor
Boston, MA 02114

Massachusetts Bay Transit Authority
Attn: Andrew Bennan
10 Park Plaza, 6th Fl.
Boston, MA 02116-3966

Massachusetts Department of Conservation and Recreation
Attn: MEPA Coordinator
251 Causeway St. Suite 600
Boston MA 02114

City of Cambridge

Cambridge City Council
Attn: City Clerk
795 Massachusetts Ave
Cambridge MA 02139

Cambridge Community Development Department
Attn: Iram Farooq, Acting Assistant City Manager
344 Broadway
Cambridge, MA 02139

Cambridge Conservation Commission
Attn: Jennifer Letourneau, Director
344 Broadway
Cambridge, MA 02139

Cambridge Public Health Department
119 Windsor Street, Ground Level
Cambridge, MA 02139

Richard C. Rossi, City Manager
City Manager's Office
Cambridge City Hall
795 Massachusetts Avenue
Cambridge, MA 02139

Cambridge Traffic, Parking & Transportation Department
Attn: Joe Barr, Director
344 Broadway
Cambridge MA 02139

Cambridge Community Development Department
Environmental and Transportation Planning Division
Attn: Susanne Rasmussen
344 Broadway
Cambridge, MA 02139

Cambridge Public Works Department
Attn: Owen O'Riordan, Commissioner
147 Hampshire St
Cambridge MA 02139

Cambridge Water Department
Attn: Sam Corda, Managing Director
250 Fresh Pond Parkway
Cambridge MA 02138

Cambridge Redevelopment Authority
Attn: Kathleen Born, Chair of CRA Board
255 Main Street, 4th floor,
Cambridge, MA 02142

Cambridge Public Library
Main Library
449 Broadway
Cambridge, MA 02138

Other Reviewers

Congressman Michael E. Capuano
110 First Street
Cambridge, MA 02141

Central Transportation Planning/ Boston Region Metropolitan Planning Organization
State Transportation Building
10 Park Plaza, Suite 2150
Boston, MA 02116

Whitehead Institute
Attn: Martin Mullins, Vice President
Nine Cambridge Center
Cambridge, MA 02142

Broad Institute
Attn: Alan Fein, Executive Vice President
77 Ames Street
Cambridge, MA 02142

Biogen
Attn: Ed Dondero, Director of Facilities
14 Cambridge Center
Cambridge, MA 02142

Robert Johns, Director
Volpe, The National Transportation Systems Center
55 Broadway
Cambridge, MA 02142

Xenia Hotels
Attn: John Wilmoth, General Manager
120 Broadway
Cambridge, MA 02142

Brian Dacey
Cambridge Innovation Center
1 Broadway, 14th Floor
Cambridge, MA 02142

Stephen Kaiser
191 Hamilton Street
Cambridge, MA 02139

Charles River Watershed Association
190 Park Road
Weston, MA 02493

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Appendix B
Most Recent Previous MEPA Certificate

The Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Deval L. Patrick
GOVERNOR

Timothy P. Murray
LIEUTENANT
GOVERNOR

Ian A. Bowles
SECRETARY

Tel: (617) 626-1000
Fax: (617) 626-1181
http://www.mass.gov/envir

June 25, 2010

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
NOTICE OF PROJECT CHANGE

PROJECT NAME	: Kendall Square Urban Renewal Area
PROJECT MUNICIPALITY	: Cambridge
PROJECT WATERSHED	: Boston Harbor (Charles River)
EOEA NUMBER	: 1891
PROJECT PROPONENT	: Cambridge Redevelopment Authority
DATE NOTICED IN MONITOR	: N/A

Pursuant to the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62I) and Section 11.06 of the MEPA regulations (301 CMR 11.00), I hereby determine that this project change is insignificant and does not require the preparation of an Environmental Impact Report.

MEPA History and Jurisdiction

The project was the subject of previous review under MEPA, beginning with an Environmental Notification Form (ENF) in 1975, and including both Draft and Final Environmental Impact Reports (EIRs) in 1977 and 1978 respectively, both of which were found to be adequate. The project was also the subject of four Notices of Project change (NPCs), none of which required further review under MEPA. As of the last NPC, the project entailed the redevelopment of 24 acres in the Kendall Square Urban Renewal Area with 3,077,000 square feet (sf) of space, including 171 to 232 housing units.

The project as previously reviewed was subject to a mandatory EIR pursuant to Sections 11.03(l)(a)(2) and 11.03(6)(a)(6) of the MEPA regulations because it required State Agency Action(s), created more than 10 acres of new impervious surface and generated more than 3,000 new average daily vehicle trips.

Project Change Description

The current NPC describes a plan amendment entailing the addition of 300,000 sf of research and development space to, and the reduction of 75,000 sf of high-rise multi-family residential space from, the overall project. According to the traffic impact analysis submitted with the NPC, this change is not projected to result in a significant change to traffic generation and no new parking spaces are proposed. In fact, the analysis concluded that the proposed plan amendment would result in decreased average daily and peak hour trips. The project change is also expected to result in a decrease in projected water use and wastewater generation of approximately 2,250 gallons per day.

Conclusion

After a review of the NPC, I find that the proposed project change is insignificant, in accordance with the MEPA regulations at 301 CMR 11.10(6). No further review of the project is required as a result of the proposed change.

June 25, 2010
Date

Alicia McDevitt, Assistant Secretary,
for Ian A. Bowles
Secretary

IAB/RB/rb

Appendix E
Draft Tenant Design and Construction Guidelines

Appendix E
Draft Tenant Design and Construction Guidelines

Boston Properties Tenant Improvement Design and Construction Guidelines

Project Name
June 8, 2015

Purpose

These guidelines have been developed by Boston Properties to support sustainable design and construction of Tenant improvements and to strengthen a more sustainable Tenant-Landlord relationship. By following these guidelines during the design and construction process both Tenant and Landlord will align goals to create workspaces that reduce environmental impact, improve indoor environmental quality, and promote occupant health, wellness, and productivity.

The sustainability attributes of the base building alone support, but do not guaranty, high performance Tenant workspaces. In order to achieve whole-building sustainability performance - throughout common areas and Tenant spaces - goals and targets should be established for the Tenant's improvements. Boston Properties recommends that Tenants follow the LEED for Commercial Interiors rating system (LEED-CI) to inform design and construction decisions. The intent of LEED-CI is to assist in the creation of high-performance, healthy, durable, affordable and environmentally sound commercial interiors.

Project Name will be certified under the Rating System Name which prequalifies tenants for many of the points required for LEED-CI certification. A LEED Commercial Interiors rating system checklist (Exhibit A) has been prepared which identifies the points that are automatically earned. A copy of the LEED-CI reference guide (Exhibit B) is included as an appendix for reference by tenants who wish to explore more information on timing and detailed strategies. Additional information, including updates to the rating systems can be found on the USGBC website: http://www.usgbc.org.

Base Building (Core & Shell) Sustainable Design Summary:

- Energy efficient systems that collectively achieve and energy cost savings of _TBD% compared to an ASHRAE 90.1-2004 Appendix G baseline
- Alternative transportation and commuting mode choices are supported by onsite bike storage, availability of bus service, a public transportation shuttle, and preferred parking for low-emission vehicles and carpoolers.
- Stormwater management strategies that limit storm water run-off and improve stormwater quality
- Water-efficiency strategies that include the installation of low-flow fixtures (Core and Shell Water Use Reduction (20%) - TBD
- Comprehensive construction waste management that will divert more that 75% of construction waste from landfills
- Material selections that maximize recycled content and regional sourcing
- Finish selections that reduce and/or eliminate volatile organic compounds (VOCs), including: low/no VOC paint, coatings, adhesives, sealants and carpet
- Green cleaning policies and procedures

Recommended Goals and Targets for Tenant Improvements

ENERGY CONSERVATION

Optimize Energy Performance, Lighting Power

- Tenant installed lighting power density is required to be a minimum of 25% lower than the lighting power density listed in ASHRAE 90.1-2007 TBD for that space type.
- Future tenants are encouraged to locate staff within day-lighting and view zones. Research has shown that employee productivity and health is improved if they have access to daylight and a view outside
- Future tenants are further encouraged to use high efficiency fixtures and lamps for reduced lighting power density.

Resources:

Utility rebates are available for density reductions beyond 15-20% (information on utility incentives can be found at the Mass Save website.)

Optimize Energy Performance, Lighting Controls

- The lighting in the core areas, such as the stairways, is controlled with a timed program
- Occupancy sensors will be installed in all the restrooms and common spaces (meeting rooms, kitchen) which will dim or turn lights automatically when no one is in the space
- Tenants are encouraged to use day-lighting controls in all spaces within fifteen feet of windows
- The use of task lighting is encourage in Tenant Designs.

Optimize HVAC Energy Performance/Outdoor Air Delivery Monitoring/Increased Ventilation

- High performance glazing has been used to improve the thermal performance of the overall building envelope
- The ventilation system allows for outdoor air to be delivered to occupied spaces at rates that exceed ASHRAE 62.1-2007 by more that 30%
- Mechanical ventilation systems installed in the space as a function of the Tenant fit-out shall be compatible with the Building's base systems and meet or exceed the minimum requirements of ASHRAE 62.1-2007.

- All outside air delivered to the building is monitored and filtered by MERV 13 filtration devices. Any additional air conditioning units installed by the Tenant must have filtration media with MERV rating of 13 or higher.
- Base building dedicated outside air systems are equipped with outdoor airflow monitoring stations and are designed to operate with CO2 monitoring sensors, should tenant wish to install them. Any additional outside air systems provided by tenants must be equipped with outdoor airflow monitoring devices.

Optimize Energy Performance, Plug Load

- The use of ENERGY STAR-qualified appliances and equipment has proven to result in a reduction in overall energy use by 30 to 75 percent compared to using standard office equipment and home appliances (non-ENERGY STAR- rated).

  ENERGY STAR-rated Products Look-Up
  http://www.energystar.gov/index.cfm?fuseaction=find_a_product.&s=mega

  Massachusetts Rebate Programs for Energy Conservation

Refrigerant Management

- Office Tenants: Office tenants have the ability to install up to 15 tons of water-cooled air conditioning equipment to serve supplemental cooling needs for process/mission critical equipment. All equipment must use refrigerant HFC-410A. Refrigerant charge for each AC unit must be limited to 1.5 lbs/ton of air conditioning.
- Tenant-installed supplemental fire suppression systems must use zero ozone depleting substances.

WATER CONSERVATION

Potable Water Use Reduction

Efficient base building plumbing fixtures have been selected that reduce potable water by >TBD%. Any additional water fixtures (including toilets, urinals, lavatories, showers, and kitchen sinks) must meet minimum performance requirements in order to achieve the LEED project certification.

Maximum Flow Rates
Water Closets – 1.6 gpf
Urinal – 1.0 gpf
Public Lavatory Faucet - 0.5 gpm at 60 psi
Shower - 2.5 gpm at 80 psi
Office Tenant Kitchen Sink – 1.5 gpm at 60 psi
Retail Tenant Kitchen Sink – 2.2 gpm at 60 psi

Resources:

WaterSense Products Look-Up
http://www.epa.gov/watersense/product_search.html

WaterSense Tips for Office Buildings
http://www.epa.gov/WaterSense/commercial/types.html#tabs-office

WaterSense Tips for Restaurants
http://www.epa.gov/WaterSense/commercial/types.html#tabs-office

WaterSense CI Program
http://www.epa.gov/watersense/commercial/watersense_ci.html

Massachusetts Rebate Programs for Water Conservation

COMMISSIONING/ONGOING RESOURCE USE TRACKING & MONITORING

Commissioning

- Name third party commissioning authority appointed to oversee whole building commissioning activities, including commissioning of all base building systems and emergency equipment
- Building operators will participate in comprehensive and ongoing training activities to ensure that they have a good knowledge of operation and maintenance procedures
- Tenants are encouraged to commission the individual systems that are installed as part of the Tenant Improvements

Energy Use and Metering

- A comprehensive building management systems controls and monitors base building equipment, and further provides performance metrics for the building operator to analyze and adjust systems.
- Base building systems are sub-metered to measure and record energy use, allowing the building operator to apportion base building energy use to future tenants as requested
- Tenants are encouraged to provide check meters and sub meters within their spaces to further understand and minimize energy by end use
- Tenants are required to provide the total wattage of installed computer equipment and peripheral equipment in Server Rooms as required by the EPA for Energy Star Reporting.

Cambridge Building Energy Use Disclosure Ordinance

Building owners are required to track their energy (i.e., electricity, natural gas, steam, and fuel oil) and water use and report it to the Community Development Department annually through the U.S. EPA's Energy Star Portfolio Manager tool. The web-based tool requires the user to input monthly energy and water data and building information. The tool processes the information to show energy use intensity (i. e., energy use per square foot), greenhouse gas emissions, and other metrics.

The Tenant may be responsible for providing monthly energy and water data, and other building resource use information, as required by the Ordinance.

INDOOR AIR QUALITY

Indoor Air Quality Management

- An IAQ Management Plan for use during construction was developed and implemented for the base building construction and concurrent tenant construction
- The IAQ Management Plan is comprehensive and addresses the following example areas: absorptive materials are to be protected from moisture damage, and air handling units used during construction are to be equipped with MERV 8 filtration media, which is to be replaced immediately prior to occupancy
- After construction is complete and the space has been cleaned, Tenants are encouraged flush out the space with the required amount of fresh air (as defined by OPTION 1 of LEED-CI EQc3.2) or provide air quality testing (as defined by OPTION 2 of LEED-CI EQc3.2).
- Tenants are encouraged to use low-emitting materials. Tenants should work project teams to specify and procure low/no volatile organic compound (VOC) adhesives and sealants, paints and coatings, and flooring systems. Composite Wood and Agrifiber Products should also contain no added urea-formaldehyde resins. For allowable VOC concentration levels and additional guidance refer to LEED-CI rating system (Exhibit B) EQ credits 4.1, 4.2, 4.3, and 4.4).

Controllability of Systems

- Tenants are encouraged to design their lighting and thermal systems so that employees have control of their personal and multi-use spaces. The base building systems are designed to support such end use

Thermal Comfort

- A comprehensive building management system controls and monitors base building equipment and conditions, and further provides performance metrics for the building operator to analyze and adjust systems. Tenants are required to install heating, cooling, ventilation, fans, and HVAC equipment that is compatible with the base building automation system (BAS)
- Thermal comfort set points are programmed so that the building operator is notified by alarm if thermal conditions or ventilation rates fall outside the range. When alarmed, building operators have standard operating procedures for corrective actions
- Tenant is not allowed to use space heaters without the written consent of the Landlord.

Control of Environmental Tobacco Smoke and Pollutants

- No smoking is allowed in the building
- Boston Properties has established a comprehensive smoking plan indicating that smoking is prohibited within twenty-five feet of all building entries and air intakes
- Walk-off mats will be installed by the Owner for the tenant space in all regularly used entryways from the exterior. Walk-off mats must be at least 10 feet long in the primary direction of travel at all regular building entry points from the exterior.
- If there are any areas for hazardous gas and chemical use within the tenant space (such as housekeeping, and high volume copy rooms), all of the below measures must be met:
    - Designated exhaust to create negative pressure, with an exhaust rate of 0.5 CFM/SF
    - Self-closing doors
    - Deck-to-deck partitions or hard-lid ceilings

Green Cleaning

Boston Properties employs a comprehensive green cleaning program. Should Tenant decide not to use the cleaning company provided by the base building, Tenant must employ a qualified cleaning contractor and utilize a cleaning program based on the same environmental standards as Landlord's cleaning program (Exhibit C), and must be preapproved by Landlord.

BUILDING MATERIALS & WASTE MANAGEMENT

Waste Management/Recycling

- Tenants are encouraged to prepare a Construction Waste Management plan targeting a 75% or better construction and demolition debris waste diversion rate.
- Tenants must provide recycling areas in the Leased Premises to facilitate the storage and collection of the recyclable materials. This space must facilitate effective food scrap collection for composting.

Building Materials

- Use materials, including furniture and furnishings, with recycled content such that the sum of postconsumer recycled content plus ½ of the pre-consumer content constitutes at least 10% based on cost of the total value of the materials in the project.
- Tenant's lighting design must accommodate light bulbs that have a weighted average mercury content below 90 picograms per lumen-hour. Landlord can provide spreadsheets and resources to support in this calculation
-

COMMUTING

Transportation Demand Management

- Encourage employees to take alternative modes of transportation, such as carpooling/vanpooling, biking, or public transit by providing transportation benefits paid to all employees for commuter expenses regardless of mode, or 100 percent transit subsidy.
- Conduct an employee survey annually to understand commuting routines to continue to encourage alternative modes of transportation.

Exhibits *(potential to include)*

Exhibit A: LEED-CI Checklist
Exhibit B: LEED-CI Rating System
Exhibit C: Boston Properties Green Cleaning Policy
Exhibit D: WaterSense Guidance for Office and Restaurants

Boston Properties Tenant Improvement Design and Construction Guidelines

Project Name
June 8, 2015

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Indoor Air Quality Management

- An IAQ Management Plan for use during construction was developed and implemented for the base building construction and concurrent tenant construction
- The IAQ Management Plan is comprehensive and addresses the following example areas: absorptive materials are to be protected from moisture damage, and air handling units used during construction are to be equipped with MERV 8 filtration media, which is to be replaced immediately prior to occupancy
- After construction is complete and the space has been cleaned, Tenants are encouraged flush out the space with the required amount of fresh air (as defined by OPTION 1 of LEED-CI EQc3.2) or provide air quality testing (as defined by OPTION 2 of LEED-CI EQc3.2).
- Tenants are encouraged to use low-emitting materials. Tenants should work project teams to specify and procure low/no volatile organic compound (VOC) adhesives and sealants, paints and coatings, and flooring systems. Composite Wood and Agrifiber Products should also contain no added urea-formaldehyde resins. For allowable VOC concentration levels and additional guidance refer to LEED-CI rating system (Exhibit B) EQ credits 4.1, 4.2, 4.3, and 4.4).

Controllability of Systems

- Tenants are encouraged to design their lighting and thermal systems so that employees have control of their personal and multi-use spaces. The base building systems are designed to support such end use

Thermal Comfort

- A comprehensive building management system controls and monitors base building equipment and conditions, and further provides performance metrics for the building operator to analyze and adjust systems. Tenants are required to install heating, cooling, ventilation, fans, and HVAC equipment that is compatible with the base building automation system (BAS)
- Thermal comfort set points are programmed so that the building operator is notified by alarm if thermal conditions or ventilation rates fall outside the range. When alarmed, building operators have standard operating procedures for corrective actions
- Tenant is not allowed to use space heaters without the written consent of the Landlord.

Control of Environmental Tobacco Smoke and Pollutants

- No smoking is allowed in the building
- Boston Properties has established a comprehensive smoking plan indicating that smoking is prohibited within twenty-five feet of all building entries and air intakes
- Walk-off mats will be installed by the Owner for the tenant space in all regularly used entryways from the exterior. Walk-off mats must be at least 10 feet long in the primary direction of travel at all regular building entry points from the exterior.
- If there are any areas for hazardous gas and chemical use within the tenant space (such as housekeeping, and high volume copy rooms), all of the below measures must be met:
    - Designated exhaust to create negative pressure, with an exhaust rate of 0.5 CFM/SF
    - Self-closing doors
    - Deck-to-deck partitions or hard-lid ceilings

Green Cleaning

Boston Properties employs a comprehensive green cleaning program. Should Tenant decide not to use the cleaning company provided by the base building, Tenant must employ a qualified cleaning contractor and utilize a cleaning program based on the same environmental standards as Landlord's cleaning program (Exhibit C), and must be preapproved by Landlord.

BUILDING MATERIALS & WASTE MANAGEMENT

Waste Management/Recycling

- Tenants are encouraged to prepare a Construction Waste Management plan targeting a 75% or better construction and demolition debris waste diversion rate.
- Tenants must provide recycling areas in the Leased Premises to facilitate the storage and collection of the recyclable materials. This space must facilitate effective food scrap collection for composting.

Building Materials

- Use materials, including furniture and furnishings, with recycled content such that the sum of postconsumer recycled content plus ½ of the pre-consumer content constitutes at least 10% based on cost of the total value of the materials in the project.
- Tenant's lighting design must accommodate light bulbs that have a weighted average mercury content below 90 picograms per lumen-hour. Landlord can provide spreadsheets and resources to support in this calculation
-

COMMUTING

Transportation Demand Management

- Encourage employees to take alternative modes of transportation, such as carpooling/vanpooling, biking, or public transit by providing transportation benefits paid to all employees for commuter expenses regardless of mode, or 100 percent transit subsidy.
- Conduct an employee survey annually to understand commuting routines to continue to encourage alternative modes of transportation.

Exhibits *(potential to include)*

Exhibit A: LEED-CI Checklist
Exhibit B: LEED-CI Rating System
Exhibit C: Boston Properties Green Cleaning Policy
Exhibit D: WaterSense Guidance for Office and Restaurants

Appendix F

Stormwater Management Supporting Documentation

MA MS4 Draft General Permit Phosphorus Load Reduction Evaluation

The following is an evaluation of the phosphorus load reductions for structural stormwater BMPs, as outlined in the MA MS4 Draft General Permit Appendix F Attachment 3 document. Specifically, Method 4 was used to determine the percentage removal of phosphorus by the conceptual stormwater mitigation strategy including 50% green roofs and infiltration systems designed to reduce the post-development 25-year design storm peak rate and runoff volume to the level of the pre-development 2-year storm, as required by the City of Cambridge. This percentage was then applied to the total phosphorus loadings in the final condition.

Step 1. Phosphorus Loading to the System

The first step is to calculate annual phosphorus load delivered to the BMP. Calculations are detailed below by step as laid out in the draft permit.

1. **Determine the total drainage area to the BMP.**
   The contributing drainage area was determined to be approximately 173,528 square feet.

2. **Distribute the total drainage area into impervious and pervious subareas by land use category.**
   The entire drainage area is classified as High Density Residential Land Use and 99,021 square feet are impervious based on the previously described potential drainage scenario where 50% of roof areas are dedicated to green roofs.

3. **Calculate the phosphorus load for each land use-based impervious and pervious subarea by multiplying the subarea by the appropriate phosphorus load export rate. Determine the total annual phosphorus load to the BMP by summing the calculated impervious and pervious subarea phosphorus loads.**

   Existing Impervious:
   Area (acres) x P export rate (lb/acre/year) = Annual Load (lbs/year)
   3.498 acres x 2.32 lb/acre/year = 8.11 lb/year

Existing Pervious (assuming Soil Group C):
Area (acres) x P export rate (lb/acre/year) = Annual Load (lbs/year)
.486 acres x 0.21 lb/acre/year = 0.10 lb/year

Proposed Impervious:
Area (acres) x P export rate (lb/acre/year) = Annual Load (lbs/year)
2.273 acres x 2.32 lb/acre/year = 5.27 lb/year

Proposed Pervious (assuming Soil Group C):
Area (acres) x P export rate (lb/acre/year) = Annual Load (lbs/year)
1.710 acres x 0.21 lb/acre/year = 0.36 lb/year

Step 2. Phosphorus Removal by the System

The Proponent employed method (4) Method to determine the phosphorus load reduction for a structural BMP with a known design volume when the contributing drainage area has impervious and pervious area. Calculations are detailed below by step as laid out in the draft permit.

1) **Identify the structural BMP type and characterize contributing drainage area both impervious (IA) and pervious area (PA).**

The Proponent will use both proprietary pretreatment devices sized for the expected effluent stormwater flows from each Project Component, as well as infiltration systems which are required to meet the stormwater rate and volume mitigation standards set forth by the City of Cambridge. The infiltration systems were evaluated in this exercise for simplicity, and the Proponent would like to highlight that pretreatment devices designed for stormwater treatment will be used in concert with infiltration to meet required pollutant reductions where infiltration is insufficient or not feasible.

2) **Determine the available storage volume (ft3) of the structural BMP (BMP-Volume ft3) using the BMP dimensions and design specifications (e.g., maximum storage depth, filter media porosity);**

The volume of the storage used in the conceptual stormwater mitigation strategy is equivalent to 19,440 ft3, as identified in the conceptual stormwater mitigation strategy in Table 5-2.

3) **To estimate the phosphorus load reduction of a BMP with a known storage volume capacity, it is first necessary to determine the portion of available BMP storage capacity (BMP-Volume ft 3) that would treat the runoff volume generated from the contributing impervious area (IA) for a rainfall event with a depth of i inches (in). This will require knowing the corresponding amount of runoff volume that would be generated from the contributing pervious area (PA) for the same rainfall event (depth of i inches). Using equation 3-6a below, solve for the BMP capacity that would**

be available to treat runoff from the contributing impervious area for the unknown rainfall depth of i inches (see equation 3-6b).

For the first iteration (1), convert the BMP-Volume ft 3 determined in step 2 into inches of runoff from the contributing impervious area (BMP Volume (IA-in)1) using equation 3-7a.

Solution Iteration 1:
BMP Volume (IA-in)1 = (19,440 ft3 / 2.273 acre) x (12 in/ft /43,560 ft2 /acre) = 2.36 in.

4-1) For 1 to n iterations, use the pervious runoff depth information from Table 3-3 and equation 3-8 to determine the total volume of runoff (ft3) from the contributing PA (BMP Volume PA-ft3) for a rainfall size equal to the sum of BMP-Volume (IA-in)1, determined in step 3. The runoff volume for each distinct pervious area must be determined.

The total volume of runoff (ft3) from the contributing PA (BMP Volume PA-ft3) for a rainfall size equal to the sum of BMP Volume (IA-in)1 determined in step 3 is determined for each distinct pervious area identified in Table Example 3-4-B using the information from Table 3-3 and equation 3-5. Interpolation was used to determine runoff depths.

BMP Volume (PA-ft3)1 = ((1.710 acre x (0..80 in)) x 3,630 ft3 /acre-in = 4,966 ft3

5-1) For iteration 1, estimate the portion of BMP Volume that is available to treat runoff from only the IA by subtracting BMP-Volume PA-ft3 , determined in step 4, from BMP-Volume ft 3 , determined in step 2, and convert to inches of runoff from IA (see equations 3-9a and 3-9b):

BMP Volume (IA-ft3) 2 = 19,440 ft3 – 4,966 ft3 = 14,474 ft3

BMP Volume (IA-in) 2 = (14,474 ft3 /2.273 acre) x (12 in/ft x 1 acre/43,560 ft2) = 1.75 in

6-1) For iteration a (an iteration between 1 and n+1), compare BMP Volume (IA-in)a to BMP Volume (IA-in)a-1 determined from the previous iteration (a-1). If the difference in these values is greater than 5% of BMP Volume (IA-in)a then repeat steps 4 and 5, using BMP Volume (IA-in)a as the new starting value for the next iteration (a+1). If the difference is less than or equal to 5 % of BMP Volume (IA-in)a then the permittee may proceed to step 7;

% Difference = ((2.36 in – 1.75 in)/1.75 in) x 100 = 35% Therefore, steps 4 through 6 are repeated starting with BMP Volume (IA-in) 2 = 1.75 in

4-2)

BMP Volume (PA-ft3)1 = ((1.710 acre x (0.54 in)) x 3,630 ft3 /acre-in = 3,352 ft3

5-2)

BMP Volume (IA-ft3) 2 = 19,440 ft3 – 3,352 ft3 = 16,088 ft3

BMP Volume (IA-in) 2 = (16,088 ft3 /2.273 acre) x (12 in/ft x 1 acre/43,560 ft2) = 1.95 in

6-2)

% Difference = ((1.75 in – 1.95 in)/1.95 in) x 100 = 10% Therefore, steps 4 through 6 are repeated starting with BMP Volume (IA-in) 2 = 1.95 in

4-3)

BMP Volume (PA-ft3)1 = ((1.710 acre x (0.66 in)) x 3,630 ft3 /acre-in = 4,097 ft3

5-3)

BMP Volume (IA-ft3) 2 = 19,440 ft3 – 4,097 ft3 = 15,343 ft3

BMP Volume (IA-in) 2 = (15,343 ft3 /2.273 acre) x (12 in/ft x 1 acre/43,560 ft2) = 1.86 in

6-3)

% Difference = ((1.95 in – 1.86 in)/1.86 in) x 100 = 5%

7) Determine the % phosphorus load reduction for the structural BMP (BMP Reduction %-P) using the appropriate BMP performance curve and the BMP-Volume (IA-in)n calculated in the final iteration of step 5; and

The infiltration rate used for recent design projects by the Proponent range from 1-4 inches per hour. For this analysis, the BMP performance Curve for an Infiltration Basin with infiltration rate of 1.02 inches per hour was used. The estimated Total Phosphorus removal at a BMP storage capacity of 1.86 inches is between 99%-100%, as determined from BMP Performance Table 3-13. Even if geotechnical exploration of the proposed Project Components reveal an infiltration of 0.17 in/hour (the minimum design infiltration rate BMP performance table), the phosphorus reduction will be between 97%-99% for the 1.86 inch design storm.

8) Calculate the cumulative phosphorus load reduction in pounds of phosphorus for the structural BMP (BMP Reduction lbs-P) using the BMP

Load as calculated from the procedure in Attachment 1 to Appendix F and the percent phosphorus load reduction (BMP Reduction %-P) determined in step 7 by using equation 3-4:

BMP Load == (2.273 acre x 2.32 lbs/acre/yr) + (1.710 acre x 0.26 lbs/acre/yr) = 5.63 lbs/yr

BMP-Reduction lbs-P = 5.63 lbs/yr x 99/100 = 5.57 lbs/yr

Appendix G
Notice of Project Change Form

Commonwealth of Massachusetts

Executive Office of Energy and Environmental Affairs ■ MEPA Office

For Office Use Only *Executive Office of Environmental Affairs*
MEPA Analyst:
Phone: 617-626-

Notice of Project Change

The information requested on this form must be completed to begin MEPA Review of a NPC in accordance with the provisions of the Massachusetts Environmental Policy Act and its implementing regulations (see 301 CMR 11.10(1)).

EEA # **1891**		
Project Name: **Kendall Square Urban Renewal Project (KSURP) Amendment No. 10**		
Street Address: **Cambridge Center**		
Municipality: **Cambridge**	Watershed: **Boston Harbor (Charles River)**	
Universal Transverse Mercator Coordinates: **UTM 19, 46 60 991 N, 3 11 269 E**	Latitude: **42° 04′ 49″ N** Longitude: **71° 16′ 52″ W**	
Estimated commencement date: **2016**	Estimated completion date: **2024**	
Project Type: **Mixed Use**	Status of project design: **Conceptual/Master Plan**	
Proponent: **Cambridge Redevelopment Authority**		
Street Address: **255 Main Street, 4th Floor**		
Municipality: **Cambridge**	State: **MA**	Zip Code: **02142**
Name of Contact Person: **Thomas L. Evans**		
Firm/Agency: **Cambridge Redevelopment Authority (CRA)**	Street Address: **255 Main Street, 4th Floor**	
Municipality: **Cambridge**	State: **MA**	Zip Code: **02142**
Phone: **617-492-6800**	Fax: **617-492-6804**	E-mail: **tevans@cambridgeredevelopment.org**

With this Notice of Project Change, are you requesting:

a Single EIR? (see 301 CMR 11.06(8)) ☒Yes ☐**No**
a Special Review Procedure? (see 301CMR 11.09) ☐Yes ☒**No**
a Waiver of mandatory EIR? (see 301 CMR 11.11) ☐Yes ☒**No**
a Phase I Waiver? (see 301 CMR 11.11) ☐Yes ☒**No**

Which MEPA review threshold(s) does the project meet or exceed (see 301 CMR 11.03)?

--301 CMR 11.03(1)(b)(7): Approval in accordance with M.G.L. c. 121B of a New urban renewal plan or a major modification of an existing urban renewal plan.
--301 CMR 11.03(5)(b)(4)(a): New discharge or expansion in discharge to a sewer system of 100,000 or more gallons per day of sewage, industrial wastewater, or untreated stormwater.
--301 CMR 11.03(6)(a)(6): Generation of 3,000 or more New adt (unadjusted) on roadways providing access to a single location.
--301 CMR 11.03(6)(b)(15): Construction of 300 or more New parking spaces at a single location.

Which State Agency Permits will the project require?

The proposed amendment to the KSURP requires approval by the Massachusetts Department of Housing

and Community Development (DHCD).

Identify any financial assistance or land transfer from an Agency of the Commonwealth, including the Agency name and the amount of funding or land area in acres:

The Project Change does not require any Financial Assistance or Land Transfer from the Commonwealth.

PROJECT INFORMATION

In 25 words or less, what is the project change? The project change involves . . .
The Project Change involves an amendment to the Kendall Square Urban Renewal Plan (KSURP) to allow an additional approximately 1,034,000 square feet of commercial and residential development.

See full project change description beginning on page 3.

Date of publication of availability of the ENF in the Environmental Monitor: (Date: **06/09/1975**)

Was an EIR required? ☒Yes ☐No; if yes,
was a Draft EIR filed? ☒Yes ☐No
was a Final EIR filed? ☒Yes (Date: **3/15/1977**) ☐No
was a Single EIR filed? ☐Yes ☒No

Have other NPCs been filed? ☒Yes (Date(s): **07/23/92; 08/10/93; 06/24/97; 08/08/01; 01/28/05; 06/15/10**) ☐No

If this is a NPC solely for lapse of time (see 301 CMR 11.10(2)) proceed directly to **ATTACHMENTS & SIGNATURES**.

PERMITS / FINANCIAL ASSISTANCE / LAND TRANSFER

List or describe all new or modified state permits, financial assistance, or land transfers not previously reviewed: **dd w/ list of State Agency Actions (e.g., Agency Project, Financial Assistance, Land Transfer, List of Permits)**

The Project Change requires approval of revision to an urban renewal plan by the Massachusetts Department of Housing and Community Development (DHCD). The Project Change does not require any Financial Assistance or Land Transfer from the Commonwealth.

Are you requesting a finding that this project change is insignificant? A change in a Project is ordinarily insignificant if it results solely in an increase in square footage, linear footage, height, depth or other relevant measures of the physical dimensions of the Project of less than 10% over estimates previously reviewed, provided the increase does not meet or exceed any review thresholds. A change in a Project is also ordinarily insignificant if it results solely in an increase in impacts of less than 25% of the level specified in any review threshold, provided that cumulative impacts of the Project do not meet or exceed any review thresholds that were not previously met or exceeded. (see 301 CMR 11.10(6))
☐**Yes** ☒**No; if yes, provide an explanation of this request in the Project Change Description below.**

The Proponent requests that the Secretary of Energy and Environmental Affairs (EEA) make a finding that the Project Change incorporates measures that adequately minimize or mitigate environmental impacts such that if further MEPA review is required that the filing of a Single Environmental Impact Report (EIR) be acceptable.

FOR PROJECTS SUBJECT TO AN EIR

If the project requires the submission of an EIR, are you requesting that a Scope in a previously issued Certificate be rescinded?
☐**Yes** ☒ **No; if yes, provide an explanation of this request_____.**

If the project requires the submission of an EIR, are you requesting a change to a Scope in a previously issued Certificate?
☐**Yes** ☒**No; if yes, provide an explanation of this request_____.**

SUMMARY OF PROJECT CHANGE PARAMETERS AND IMPACTS

Summary of Project Size & Environmental Impacts	Previously reviewed	Net Change	Currently Proposed
LAND			
Total site acreage	**24 ac.**	**-0-**	**24 ac.**
Acres of land altered	**24 ac.**	**-0-**	**24 ac.**
Acres of impervious area	**19.78 ac.**	**-0-**[1]	**19.78 ac.**
Square feet of bordering vegetated wetlands alteration	**-0-**	**-0-**	**-0-**
Square feet of other wetland alteration	**-0-**	**-0-**	**-0-**
Acres of non-water dependent use of tidelands or waterways	**-0-**	**-0-**	**-0-**
STRUCTURES			
Gross square footage	**3,302,100 GSF**	**+1,034,600 GSF**	**4,336,700 GSF**
Number of housing units	**Up to 185 units**	**+560 units**	**745 units**
Maximum height (in feet)	**249 feet**	**Negligible**	**Up to 250 feet**
TRANSPORTATION			
Vehicle trips per day (unadjusted)[2]	**26,845**[3]	**10,512**	**37,357**
Vehicle trips per day (adjusted)[4]	**13,714**[5]	**3,638**	**17,352**
Parking spaces	**+3,073**	**+740 spaces**	**+3,813**
WATER/WASTEWATER			
Gallons/day (GPD) of water use	**+1.24 mgd**[6]	**+118,740 gpd**	**+1.36 mgd**
GPD water withdrawal	**NA**	**NA**	**NA**
GPD wastewater generation/ treatment	**+0.93 mgd**[6]	**+107,945 gpd**	**+1.04 mgd**
Length of water/sewer mains (in miles)	**NA**	**NA**	**NA**

mgd million gallons daily

1 The Project Change includes redevelopment of approximately 0.27 acres of pervious area to create a new public winter garden as part of the Cambridge Center North Garage Office Buildings, however, efforts to incorporate landscaping and other pervious areas, such as roof gardens throughout the Project Components (in accordance with Plan Amendment open space requirements) are expected to result in a de minimis change in impervious area throughout the KSURP area.

2 The estimated Unadjusted vehicle trips are based on ITE vehicle trip generation rates, which largely overstate traffic impacts associated with KSURP development, as demonstrated by the FST reporting over the last decade (refer to Figure 2.1).

3 Represents a correction to the numbers reported in the initial April 2015 Notice of Project Change (NPC) filing in response to the MEPA Reviewer comments. Historically starting with the 1977 FEIR, the MEPA files report the Adjusted traffic and referring back to the 2010 NPC form for Amendment No. 8, it does not specify if it is reporting Unadjusted or Adjusted. Adjusted trips have been used because the Unadjusted number grossly overstates as demonstrated by the FST reporting over the last decade.

4 Accounts for mode splits and vehicle occupancy rates in order to drive down the actual number of vehicle trips generated by the Project. Based on FST annual reporting projections. The approach to traffic adjustments was based on direction from Cambridge Traffic, Parking & Transportation Department and approved by the Massachusetts Department of Transportation according to their Transportation Scoping Letter (TSL) issued December 4, 2014. Refer to Appendix C for a copy of the TSL.

5 Represents a correction to the numbers reported in the initial April 2015 Notice of Project Change (NPC) filing in response to the MEPA Reviewer comments and as is correctly described in Ch. 2, *Transportation and Parking*. The original NPC form incorrectly referred to 10,819 total adjusted associated with Amendment No. 8 (the most recent previously reviewed project); however, this number represents the FST Report ITE Adjusted projection based on as-built, not the full build-out for Amendment No. 8.

6 Based on the 1977 FEIR estimates. These estimates were based on the original build-out and do not account for actual water usage and sewage flow or the use of more efficient plumbing fixtures and other water conservation measures implemented over the last 20 years.

Does the project change involve any new or modified:

1. conversion of public parkland or other Article 97 public natural resources to any purpose not in accordance with Article 97? ☐**Yes** ☒**No**

2. release of any conservation restriction, preservation restriction, agricultural preservation restriction, or watershed preservation restriction? ☐**Yes** ☒**No**

3. impacts on Rare Species**?** ☐**Yes** ☒**No**

4. demolition of all or part of any structure, site or district listed in the State Register of Historic Place or the inventory of Historic and Archaeological Assets of the Commonwealth? ☐**Yes** ☒**No**

5. impact upon an Area of Critical Environmental Concern? ☐**Yes** ☒**No**

If you answered 'Yes' to any of these 5 questions, explain below:

PROJECT CHANGE DESCRIPTION (attach additional pages as necessary). The project change description should include:

(a) a brief description of the project as most recently reviewed

(b) a description of material changes to the project as previously reviewed,

(c) if applicable, the significance of the proposed changes, with specific reference to the factors listed 301 CMR 11.10(6), and

(d) measures that the project is taking to avoid damage to the environment or to minimize and mitigate unavoidable environmental impacts. If the change will involve modification of any previously issued Section 61 Finding, include a draft of the modified Section 61 Finding (or it will be required in a Supplemental EIR).

Refer to the *Notice of Project Change Form Narrative/Project Summary* section attached.

ATTACHMENTS & SIGNATURES

Attachments:

1. Secretary's most recent Certificate on this project **Refer to Appendix B.**
2. Plan showing most recent previously-reviewed proposed build condition **Refer to Appendix C.**
3. Plan showing currently proposed build condition **Refer to Figures S.4, 1.1, 1.3, 1.5 and 1.6.**
4. Original U.S.G.S. map or good quality color copy (8-1/2 x 11 inches or larger) indicating the project location and boundaries **Refer to Figure S.1.**
5. List of all agencies and persons to whom the proponent circulated the NPC, in accordance with 301 CMR 11.10(7) **Refer to Appendix A.**

Signatures:

4/8/15		4/8/15	
Date	Signature of Responsible Officer or Proponent	Date	Signature of person preparing NPC (if different from above)
Tom L. Evans, Executive Director		**Lauren DeVoe, Senior Environmental Planner**	
Name (print or type)		Name (print or type)	
Cambridge Redevelopment Authority		**VHB, Inc.**	
Firm/Agency		Firm/Agency	
255 Main Street, 4th Floor		**101 Walnut Street**	
Street		Street	
Cambridge, MA 02142		**Watertown, MA 02472**	
Municipality/State/Zip		Municipality/State/Zip	
617-492-6800		**617-607-0091**	
Phone		Phone	