Section 2.0 WETLANDS AND STORMWATER

2.0 WETLANDS AND STORMWATER

This section describes wetlands and stormwater management in the Project area vicinity and, in response to comments, specifies how the Project's stormwater management improvements will affect the realigned Town Brook.

2.1 Wetlands

The Project will not have any direct impacts on wetland resource areas. No Project work is proposed within resource areas, and only limited minor work is proposed in previously-developed areas within the 100-foot Buffer Zone to Inland Bank. An inventory of existing wetland resource areas was examined for the Project area and its surroundings, and detailed presentations were included in the EENF and Draft EIR.

As previously documented in the EENF and Draft EIR, Project construction is premised upon the earlier completion of several separate and distinct municipal undertakings to upgrade aged infrastructure in downtown Quincy which affect the nature and location of existing wetland resource areas within the Project area. One of these undertakings, currently under construction, involves realigning a section of Town Brook in accordance with plans for the Town Brook Enhancement Project (EEA #14725). As previously detailed, the former location of the Town Brook culvert that is being decommissioned and realigned under the Town Brook Enhancement Project will be redeveloped to include portions of the Project.

Consistent with the EENF and Draft EIR, for reference purposes, the present alignment of Town Brook within the Project area is shown on Figure 2.1; however, since the realignment of Town Brook necessarily precedes the Project, for purposes of this Final EIR the realigned location of Town Brook is reflected as an existing condition. Accordingly, the applicable wetland resource areas referenced in this document are those that will exist upon completion of the Town Brook Enhancement Project. Such treatment of the pre-development conditions of the Project is consistent with how the Secretary considered applicable wetland resource areas after designating a portion of Quincy Center as a Densely Developed Area (DDA #008) as described in the Draft EIR.

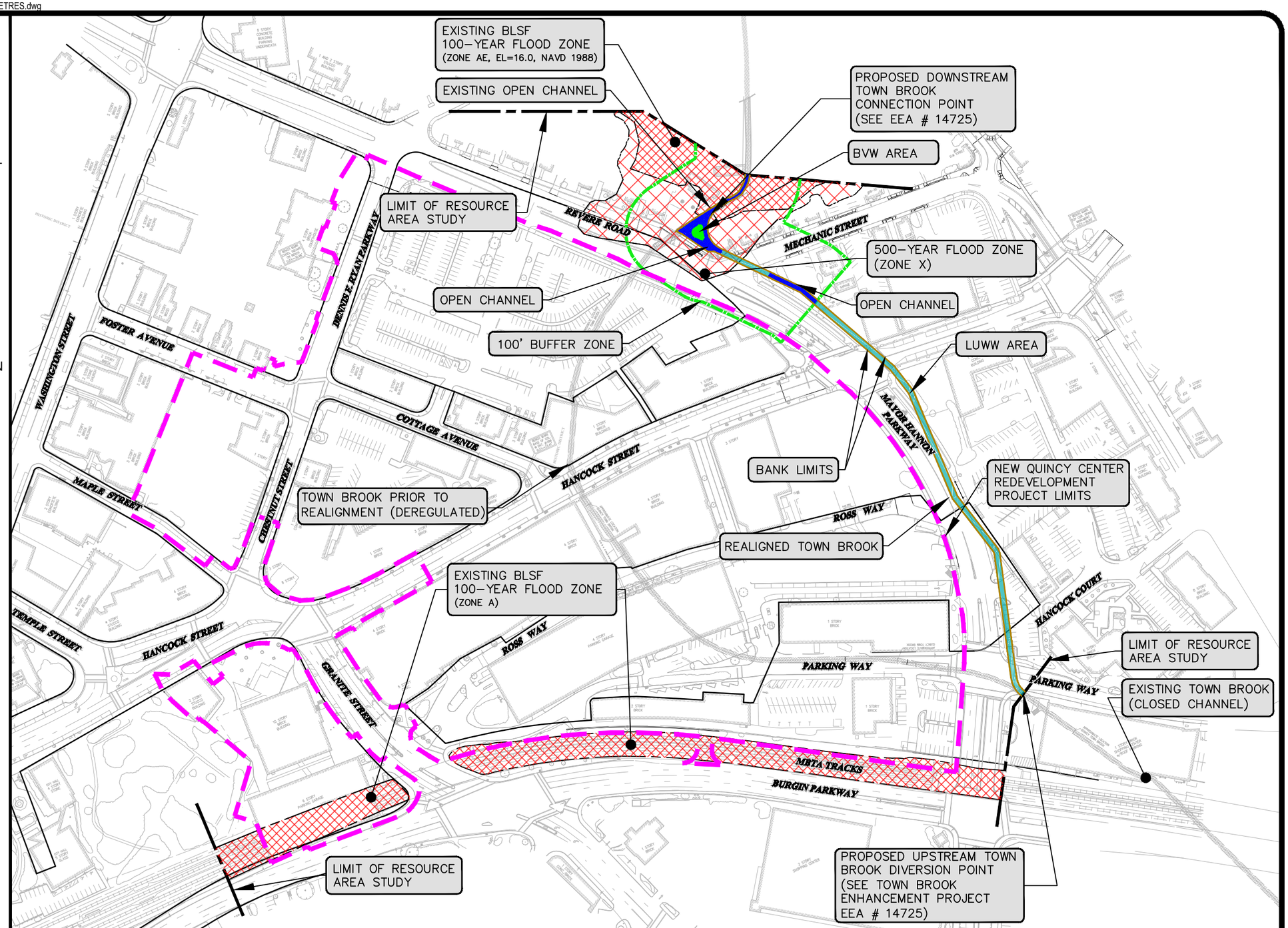
As noted, no work associated with the Project will occur within a regulated resource area. Minor work is proposed within the outer 100-foot Buffer Zone to the Inland Bank of Town Brook, within previously-developed areas. The limits of the Inland Bank and Land Under Water Bodies and Waterways (LUWW) will be contained within the channel of the realigned Town Brook as identified on Figures 2.1 and 2.2. The small pocket of Bordering Vegetated Wetlands (BVW) proposed as part of the Town Brook Enhancement Project will also be confined to the realigned Town Brook channel. These areas will all be located southeast of Revere Road, which is entirely outside the Project limits.

NOTES:

1. EXISTING WETLAND RESOURCE AREAS FIELD VERIFIED BY LUCAS ENVIRONMENTAL, LLC IN SEPTEMBER 2010.
2. 100-YEAR FLOOD PLAIN LIMITS (BLSF) AS DEPICTED ON THE FEMA FLOOD INSURANCE RATE MAPS 25021C0069E, 25021C0088E, 25021C0207E, AND 25021C0226E DATED JULY 17, 2012 NAVD 1988. OBTAINED FROM FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA). ZONE AE (EL. 16) LIMITS HAVE BEEN COMPILED BASED ON FIELD SURVEY AND INTERPOLATED/ASSUMED CONTOUR INFORMATION.
3. MASSGIS LIMITS SHOWN ALONG MBTA TRACKS SHOWN FOR REFERENCE ONLY. ACTUAL FLOOD ZONE LIMITS ARE CONTAINED WITHIN LIMITS OF WALLS. NO FILL OR IMPACTS ARE PROPOSED WITHIN THIS AREA.
4. PROJECT IMPACTS HAVE BEEN CALCULATED ASSUMING THE PROPOSED ALIGNMENT OF THE TOWN BOOK ENHANCEMENT PROJECT (EEA #14725) IS CONSTRUCTED PRIOR TO CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT.
5. PROPOSED TOWN BROOK ALIGNMENT AND RESOURCE AREAS SHOWN FOR REFERENCE ONLY. THE ENHANCEMENT OF TOWN BROOK IS NOT A PART OF THIS PROJECT.

LEGEND

- NEW QUINCY CENTER REDEVELOPMENT PROJECT LIMITS
- 100-YEAR FLOOD ZONE (BLSF)
- 500-YEAR FLOOD ZONE
- BANK LIMITS
- LAND UNDER WATER BODIES AND WATERWAYS TOWN BROOK CLOSED CHANNEL
- 100' BUFFER ZONE
- TOWN BROOK OPEN CHANNEL SEGMENT



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Stephenson Design Group
51 Sleeper Street
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Boston, MA 02210

Figure 2.1 October 31, 2012

Wetland Resource Areas
Existing Conditions
Final Environmental Impact Report
New Quincy Center Redevelopment
Quincy, Massachusetts

NOTES:

1. EXISTING WETLAND RESOURCE AREAS FIELD VERIFIED BY LUCAS ENVIRONMENTAL, LLC IN SEPTEMBER 2010.

2. 100-YEAR FLOOD PLAIN LIMITS (BLSF) AS DEPICTED ON THE FEMA FLOOD INSURANCE RATE MAPS 25021C0069E, 25021C0088E, 25021C0207E, AND 25021C0226E DATED JULY 17, 2012 NAVD 1988. OBTAINED FROM FEDERAL EMERGENCY MANAGEMENT AGENCY (FEMA). ZONE AE (EL. 16) LIMITS HAVE BEEN COMPILED BASED ON FIELD SURVEY AND INTERPOLATED/ASSUMED CONTOUR INFORMATION.

3. MASSGIS LIMITS SHOWN ALONG MBTA TRACKS SHOWN FOR REFERENCE ONLY. ACTUAL FLOOD ZONE LIMITS ARE CONTAINED WITHIN LIMITS OF WALLS. NO FILL OR IMPACTS ARE PROPOSED WITHIN THIS AREA.

4. PROJECT IMPACTS HAVE BEEN CALCULATED ASSUMING THE PROPOSED ALIGNMENT OF THE TOWN BOOK ENHANCEMENT PROJECT (EEA #14725) IS CONSTRUCTED PRIOR TO CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT.

5. PROPOSED TOWN BROOK ALIGNMENT AND RESOURCE AREAS SHOWN FOR REFERENCE ONLY. THE ENHANCEMENT OF TOWN BROOK IS NOT A PART OF THIS PROJECT.

LEGEND

- NEW QUINCY CENTER REDEVELOPMENT PROJECT LIMITS
- 100-YEAR FLOOD ZONE (BLSF)
- 500-YEAR FLOOD ZONE
- BANK LIMITS
- LAND UNDER WATER BODIES AND WATERWAYS TOWN BROOK CLOSED CHANNEL
- 100' BUFFER ZONE
- TOWN BROOK OPEN CHANNEL SEGMENT

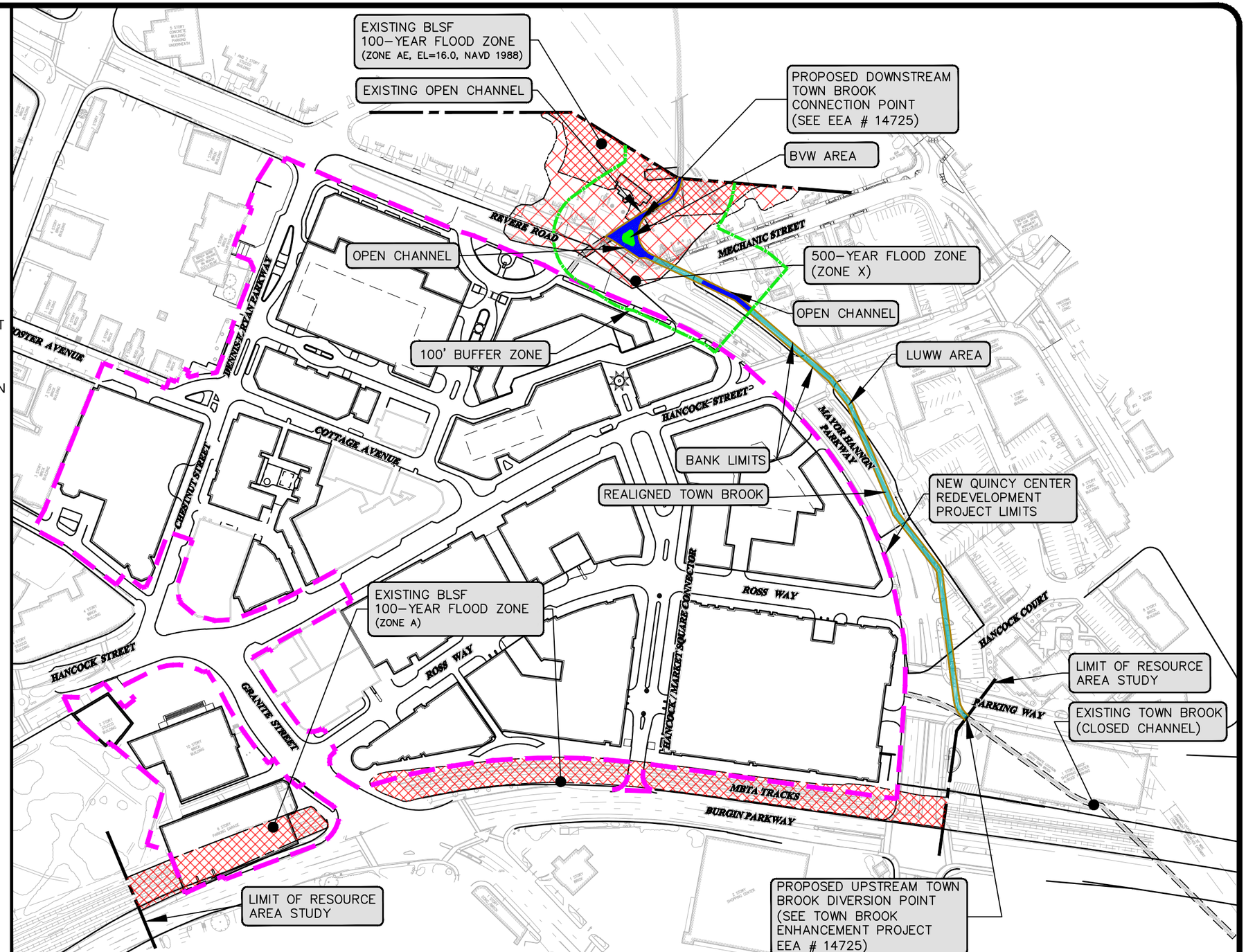

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Figure 2.2 October 31, 2012

Wetland Resource Areas
Proposed Conditions
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New Quincy Center Redevelopment
Quincy, Massachusetts

One area of Bordering Land Subject to Flooding (BLSF) is located southeast of Revere Road, and therefore outside the Project area. FEMA floodplain mapping in Quincy was updated on July 17, 2012, and the updated flood zones are shown on Figure 2.1; the elevation for the 100-year flood was unchanged. Another area of BLSF is located within the limits of the Massachusetts Bay Transportation Authority (MBTA) tracks west of the Project area, although the tracks are located below the existing grade of the Project area and no Project-related impacts are proposed to BLSF in this area.

2.1.1 Riverfront Area

To further clarify the limits of work in relation to the Project area, the existing Riverfront Area associated with Town Brook (i.e., post-Town Brook Enhancement Project) is depicted in Figure 2.3. Those portions of the Riverfront Area that are limited to a 25-foot width as a result of the DDA designation are shown. In addition, for reference purposes, the more expansive section of 200-foot-wide Riverfront Area is also demarcated for areas outside the DDA boundary and is clearly shown to be outside of the Project area.

Figure 2.4 illustrates the Riverfront Area conditions as modified by the Town Brook Enhancement Project, which is currently under construction. As requested in the Secretary's Certificate on the Draft EIR, Figure 2.4 definitively shows that the extent of the 25-foot Riverfront Area within Revere Road does not extend into the Project area, demonstrating with sufficient clarity that the Project will have no impact on the Riverfront Area as modified by the Town Brook Enhancement Project.

2.1.2 100-Foot Buffer Zone to Inland Bank

Any proposed work within the 100-foot Buffer Zone will be regulated by the Quincy Conservation Commission under a Notice of Intent, although work within this area will be limited and will only occur within previously-developed areas. Drainage improvements for the proposed redevelopment are discussed in Section 2.2.

2.2 Stormwater Management

2.2.1 Update from Draft EIR

As described in the Draft EIR, the Project area of approximately 31 acres is part of a larger direct tributary watershed (i.e., the Quincy Center Watershed, or the "Study Area") for which the Proponents have analyzed the hydrology relative to the Project. In addition to runoff from the Study Area, several stormwater infrastructure improvements constructed over the years regulate the conveyance of stormwater flow from outside the Project area into the stormwater system within Quincy Center. As noted in the Draft EIR, these structures consist of the Burgin Parkway Sediment Chamber located in Burgin Parkway west of the Project area, the MBTA Pump located in the MBTA right-of-way near Granite Street, and the Deep Rock Tunnel Diversion Structure west of the Project area. Subsequent to

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NOTES:

1. EXISTING WETLAND RESOURCE AREAS FIELD VERIFIED BY LUCAS ENVIRONMENTAL, LLC IN SEPTEMBER 2010.
2. PROJECT IMPACTS HAVE BEEN CALCULATED ASSUMING THE PROPOSED ALIGNMENT OF THE TOWN BOOK ENHANCEMENT PROJECT (EEA #14725) IS CONSTRUCTED PRIOR TO CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT.
3. PROPOSED TOWN BROOK ALIGNMENT AND RESOURCE AREAS SHOWN FOR REFERENCE ONLY. THE ENHANCEMENT OF TOWN BROOK IS NOT A PART OF THIS PROJECT.
4. 25' RIVERFRONT AREAS BASED ON DOWNTOWN QUINCY DENSELY DEVELOPED AREA (DDA #008) DESIGNATION APPROVED IN AUGUST 2011.
5. EXISTING RIVERFRONT AREA OUTSIDE PROPOSED DDA BOUNDARY TO REMAIN 200'.

LEGEND

- NEW QUINCY CENTER REDEVELOPMENT PROJECT LIMITS
- LIMIT OF DENSELY DEVELOPED AREA DESIGNATION
- TOWN BROOK OPEN CHANNEL SEGMENT
- RIVERFRONT AREA

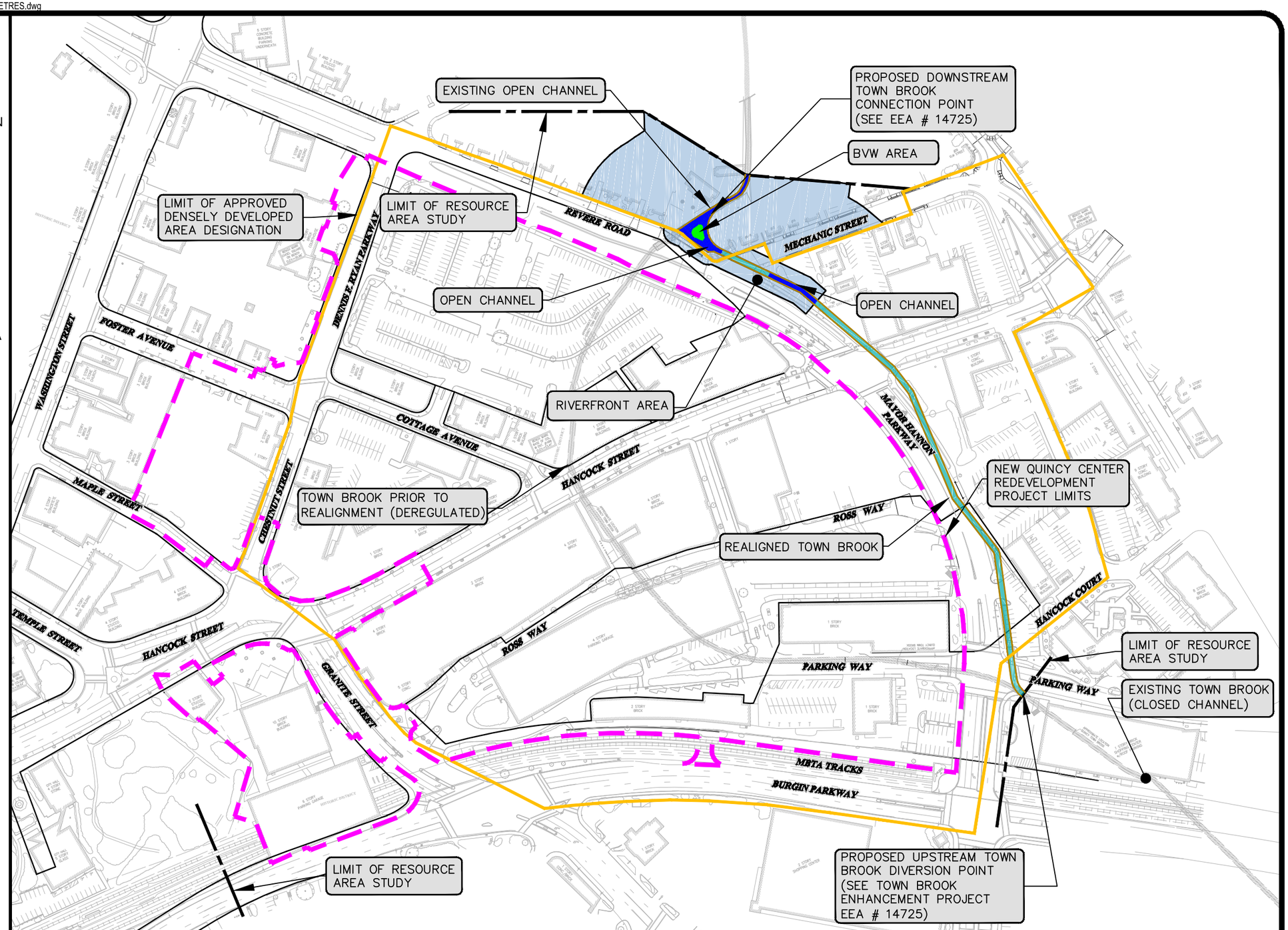

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Figure 2.3 October 31, 2012

Riverfront Areas
Existing Conditions
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Quincy, Massachusetts

NOTES:

1. EXISTING WETLAND RESOURCE AREAS FIELD VERIFIED BY LUCAS ENVIRONMENTAL, LLC IN SEPTEMBER 2010.
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5. EXISTING RIVERFRONT AREA OUTSIDE PROPOSED DDA BOUNDARY TO REMAIN 200'.

LEGEND

- LIMIT OF DENSELY DEVELOPED AREA DESIGNATION
- NEW QUINCY CENTER REDEVELOPMENT PROJECT LIMITS
- TOWN BROOK EXISTING OPEN CHANNEL SEGMENT
- TOWN BROOK OPEN CHANNEL SEGMENT
- RIVERFRONT AREA

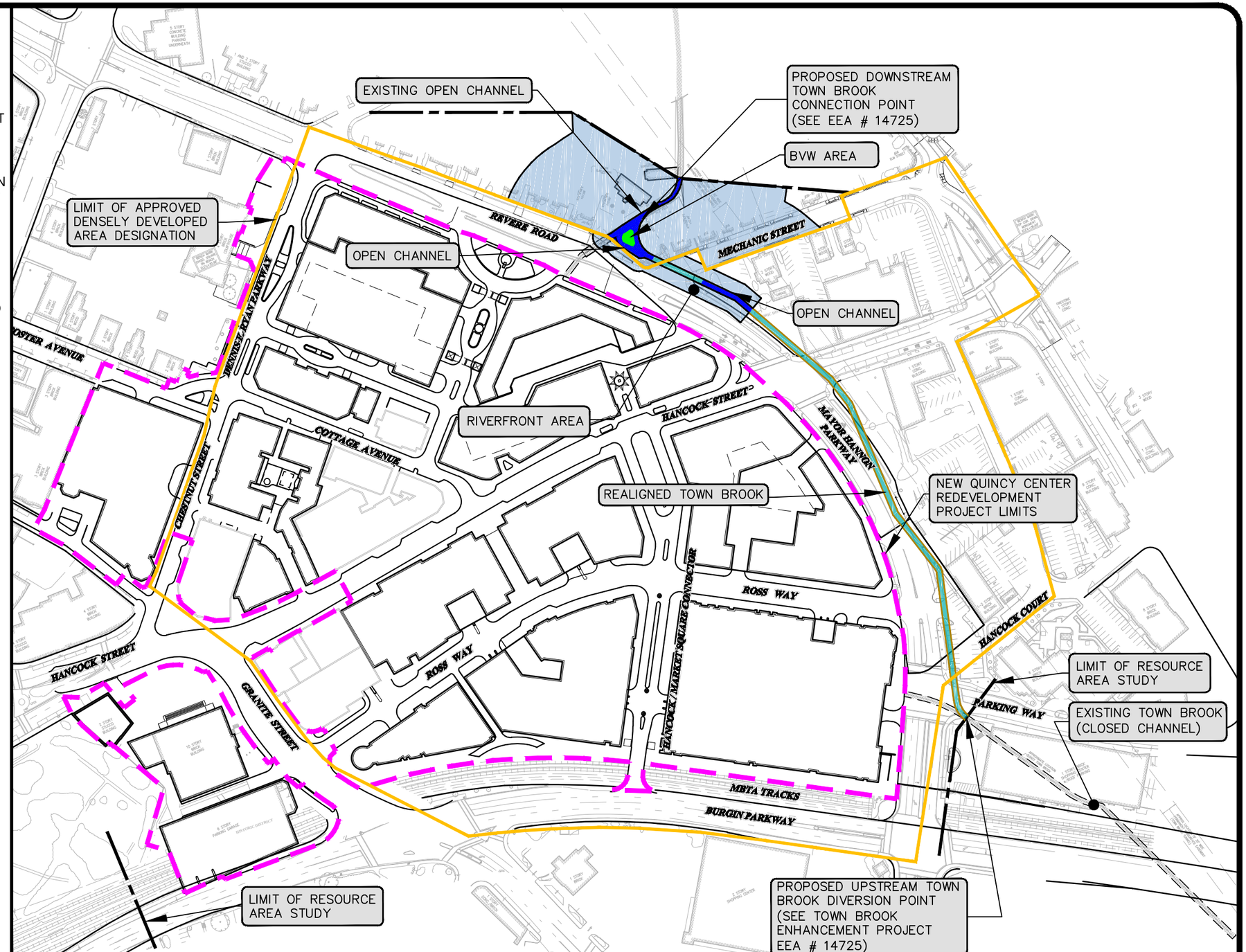

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Figure 2.4 October 31, 2012

Riverfront Areas
Proposed Conditions
Final Environmental Impact Report
New Quincy Center Redevelopment
Quincy, Massachusetts

filing the Draft EIR, through additional discussions and research with the Department of Conservation and Recreation (DCR), formerly the Massachusetts District Commission (MDC), the Proponents discovered a previously-unidentified stormwater structure that was constructed as part of the Local Flood Control Project in 1987. This structure diverts flows away from the Project area; previously this area had been assessed as tributary to the stormwater system within Project area. This structure was constructed by MDC to divert stormwater flows from an existing 48-inch stormwater culvert located within the MBTA right-of-way to the Burgin Parkway Culvert which, in turn, flows to the Deep Rock Tunnel, thereby bypassing the Project area completely.

Due to this recently-uncovered information, the direct local watershed tributary to the Project area has been revised and refined to reflect this existing stormwater flow diversion. For purposes of this Final EIR, the result of this revised analysis is a reduction in the size of the Study Area from the previously-delineated 84-acre direct local tributary watershed to a smaller 58-acre direct local tributary watershed. Figure 2.5 illustrates the watershed area described above, which is diverted to the Burgin Parkway Drainage Culvert bypassing the Project area, and also illustrates the watershed areas tributary to the Burgin Parkway Sediment Chamber and MBTA pump that convey stormwater flow into the Project area.

2.2.2 Town Brook

As set forth in the EENF and Draft EIR, the Project is premised upon the earlier completion of the realignment of a section of Town Brook in accordance with plans for the separate Town Brook Enhancement Project, which is currently under construction (description, analysis, and discussion of mitigation associated with the realignment of Town Brook are contained in the Final EIR for the Town Brook Enhancement Project [EEA #14725]).

At the request of MassDEP, an additional analysis has been prepared comparing stormwater conditions for the Project area prior to completion of the Town Brook Enhancement Project and conditions as they will exist following completion of that project. Figure 2.6 illustrates the existing delineated drainage areas prior to completion of the Town Brook Enhancement Project within the Study Area; Figure 2.7 illustrates the stormwater drainage and infrastructure under conditions as they will exist following completion of the Town Brook Enhancement Project, which is a prerequisite of Project construction. Stormwater drainage areas under proposed conditions, following Project construction, are shown on Figure 2.8. Figure 2.9 shows stormwater infrastructure that will exist until the Town Brook Enhancement Project, which is currently under construction, is completed. Figure 2.10 illustrates the stormwater infrastructure system that will exist following completion of the Town Brook Enhancement Project. Finally, Figure 2.11 illustrates the proposed new stormwater infrastructure system that will be in place following Project construction.

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LEGEND

- UPSTREAM REACHES TRIBUTARY TO BURGIN PARKWAY SEDIMENT CHAMBER
- UPSTREAM REACHES TRIBUTARY TO MBTA LIFT STATION
- UPSTREAM REACHES DIVERTED TO FLOW DIVERSION STRUCTURE
- STUDY AREA
- FLOOD CONTROL FEATURES

NOTES:

1. WATERSHED DELINEATION BASED ON GIS AND TOPOGRAPHIC INFORMATION PROVIDED BY THE CITY OF QUINCY, RECORD DRAWINGS AND TOPOGRAPHIC SURVEY PERFORMED WITHIN THE STUDY AREA.
2. PROJECT IMPACTS HAVE BEEN CALCULATED ASSUMING THE PROPOSED ALIGNMENT OF THE TOWN BOOK ENHANCEMENT PROJECT (EEA #14725) IS CONSTRUCTED PRIOR TO CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT. SEE THE TOWN BROOK ENHANCEMENT PROJECT FOR ADDITIONAL DETAIL REGARDING THE COMPLETE TOWN BROOK WATERSHED
3. REALIGNED TOWN BROOK AND RESOURCE AREAS SHOWN FOR REFERENCE ONLY. THE TOWN BROOK ENHANCEMENT PROJECT IS A SEPERATE AND DISTINCT PROJECT.

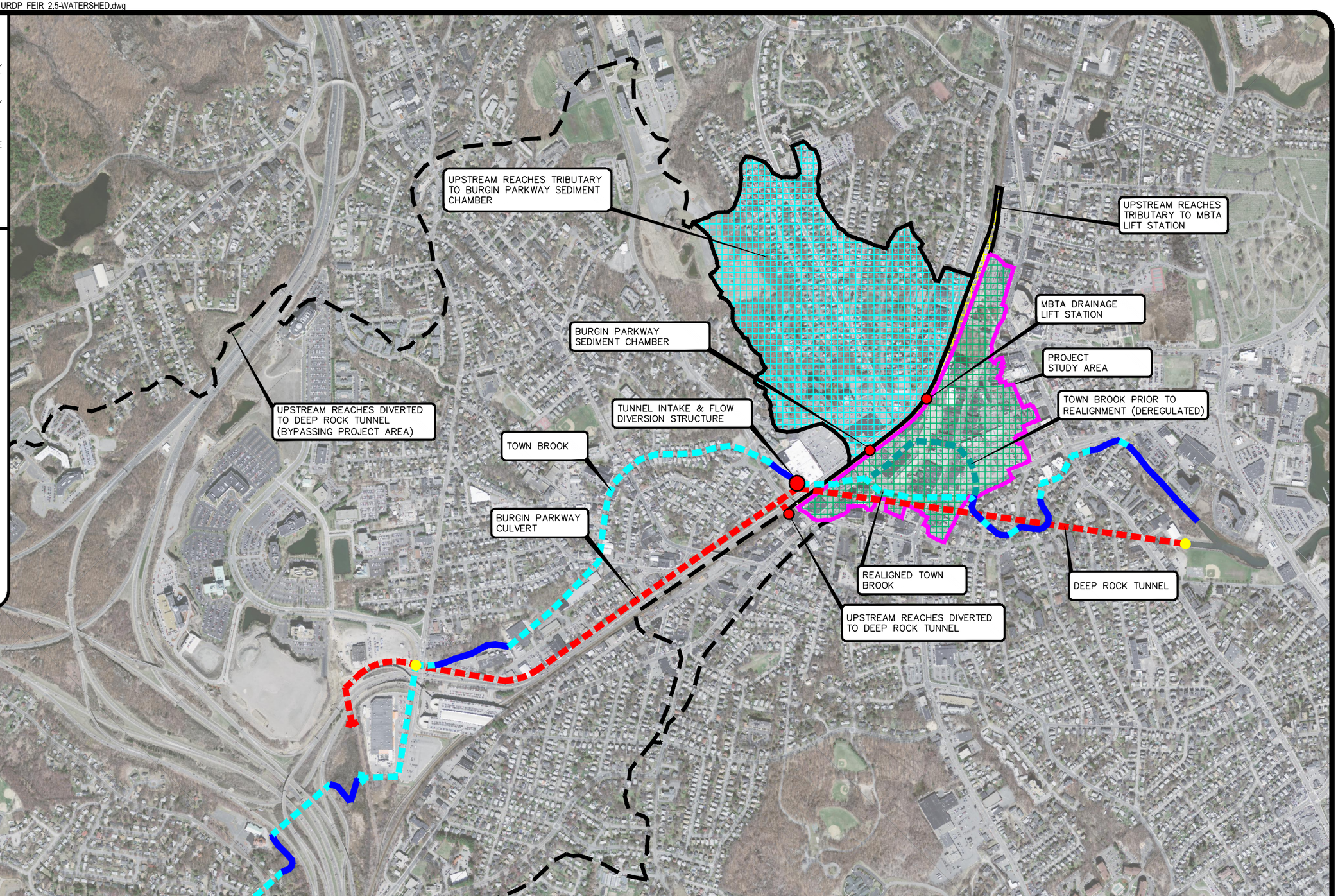

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Figure 2.5 October 31, 2012

Project Area
Local Drainage Basin Watershed
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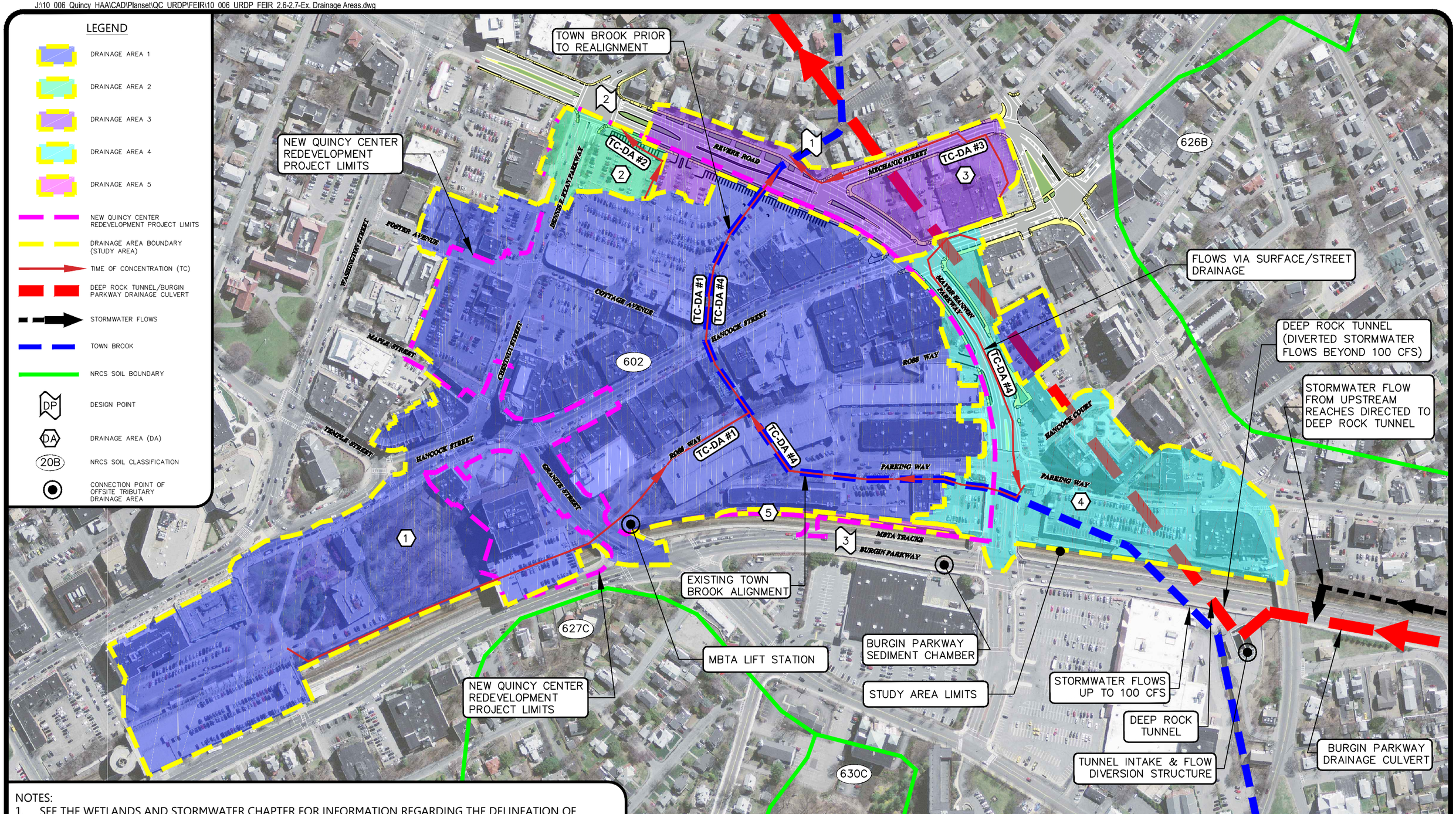

NOTES:

1. SEE THE WETLANDS AND STORMWATER CHAPTER FOR INFORMATION REGARDING THE DELINEATION OF DRAINAGE AREAS.
2. SEE FIGURE 2.11 FOR OFFSITE TRIBUTARY DRAINAGE AREAS.
3. SEE EXISTING PRIOR TO TOWN BROOK REALIGNMENT, EXISTING POST TOWN BROOK REALIGNMENT AND PROPOSED FIGURES 2.8, 2.9 AND 2.10 FOR THE CONFIGURATION OF THE CLOSED PIPE DRAINAGE SYSTEM AND ASSOCIATED STORMWATER FEATURES.
4. STORMWATER FLOWS OUTSIDE OF THE STUDY AREA (MBTA LIFT STATION, BURGIN PARKWAY SEDIMENT CHAMBER AND DEEP ROCK TUNNEL DIVERSION STRUCTURE), BUT TRIBUTARY TO THE QUINCY CENTER STORMWATER CONVEYANCE SYSTEM REMAIN UNCHANGED AND ARE NOT INCLUDED IN THE HYDROLOGIC ANALYSIS.

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Figure 2.6 October 31, 2012

Existing Conditions Drainage Areas
Prior to Town Brook Realignment
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New Quincy Center Redevelopment
Quincy, Massachusetts

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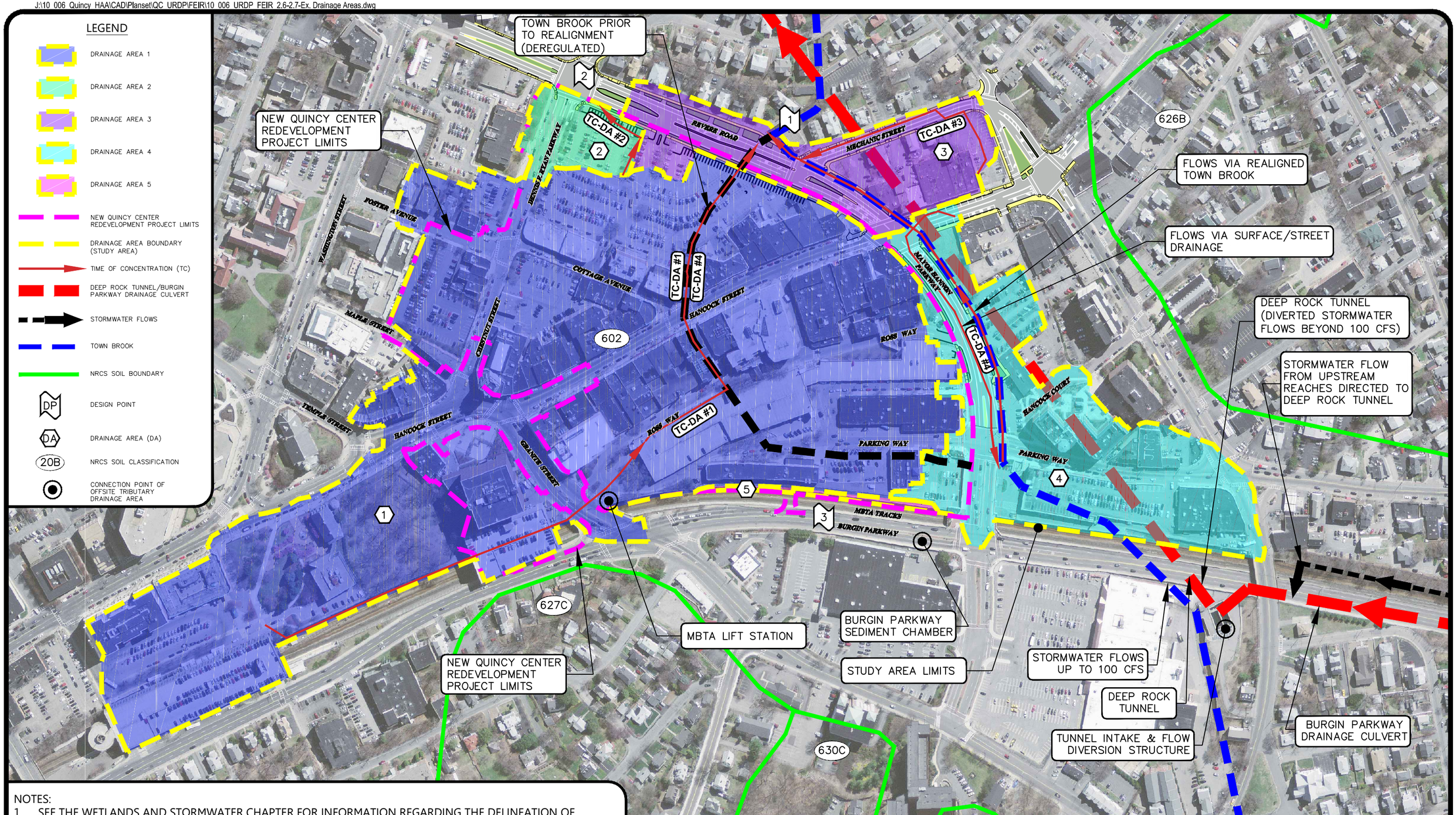

NOTES:

1. SEE THE WETLANDS AND STORMWATER CHAPTER FOR INFORMATION REGARDING THE DELINEATION OF DRAINAGE AREAS.
2. SEE FIGURE 2.11 FOR OFFSITE TRIBUTARY DRAINAGE AREAS.
3. SEE EXISTING PRIOR TO TOWN BROOK REALIGNMENT, EXISTING POST TOWN BROOK REALIGNMENT AND PROPOSED FIGURES 2.8, 2.9 AND 2.10 FOR THE CONFIGURATION OF THE CLOSED PIPE DRAINAGE SYSTEM AND ASSOCIATED STORMWATER FEATURES
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Figure 2.7 October 31, 2012

Existing Conditions Drainage Areas
Post Town Brook Realignment
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New Quincy Center Redevelopment
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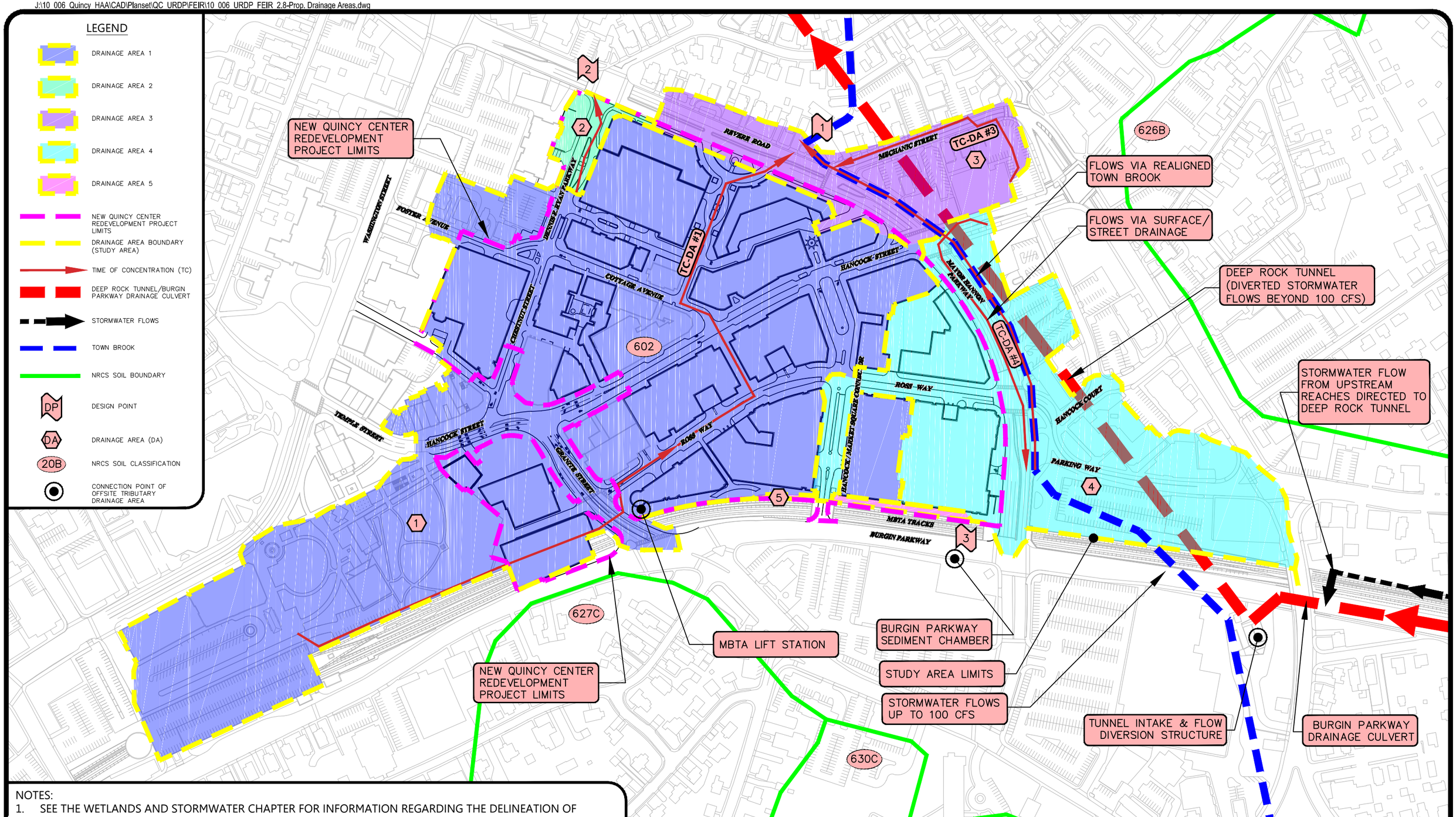

NOTES:

1. SEE THE WETLANDS AND STORMWATER CHAPTER FOR INFORMATION REGARDING THE DELINEATION OF DRAINAGE AREAS.
2. SEE FIGURE 2.11 FOR OFFSITE TRIBUTARY DRAINAGE AREAS.
3. SEE EXISTING PRIOR TO TOWN BROOK REALIGNMENT, EXISTING POST TOWN BROOK REALIGNMENT AND PROPOSED FIGURES 2.8, 2.9 AND 2.10 FOR THE CONFIGURATION OF THE CLOSED PIPE DRAINAGE SYSTEM AND ASSOCIATED STORMWATER FEATURES
4. STORMWATER FLOWS OUTSIDE OF THE STUDY AREA (MBTA LIFT STATION, BURGIN PARKWAY SEDIMENT CHAMBER AND DEEP ROCK TUNNEL DIVERSION STRUCTURE), BUT TRIBUTARY TO THE QUINCY CENTER STORMWATER CONVEYANCE SYSTEM REMAIN UNCHANGED AND ARE NOT INCLUDED IN THE HYDROLOGIC ANALYSIS.

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Figure 2.8 October 31, 2012

Proposed Conditions Drainage Areas
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Quincy, Massachusetts

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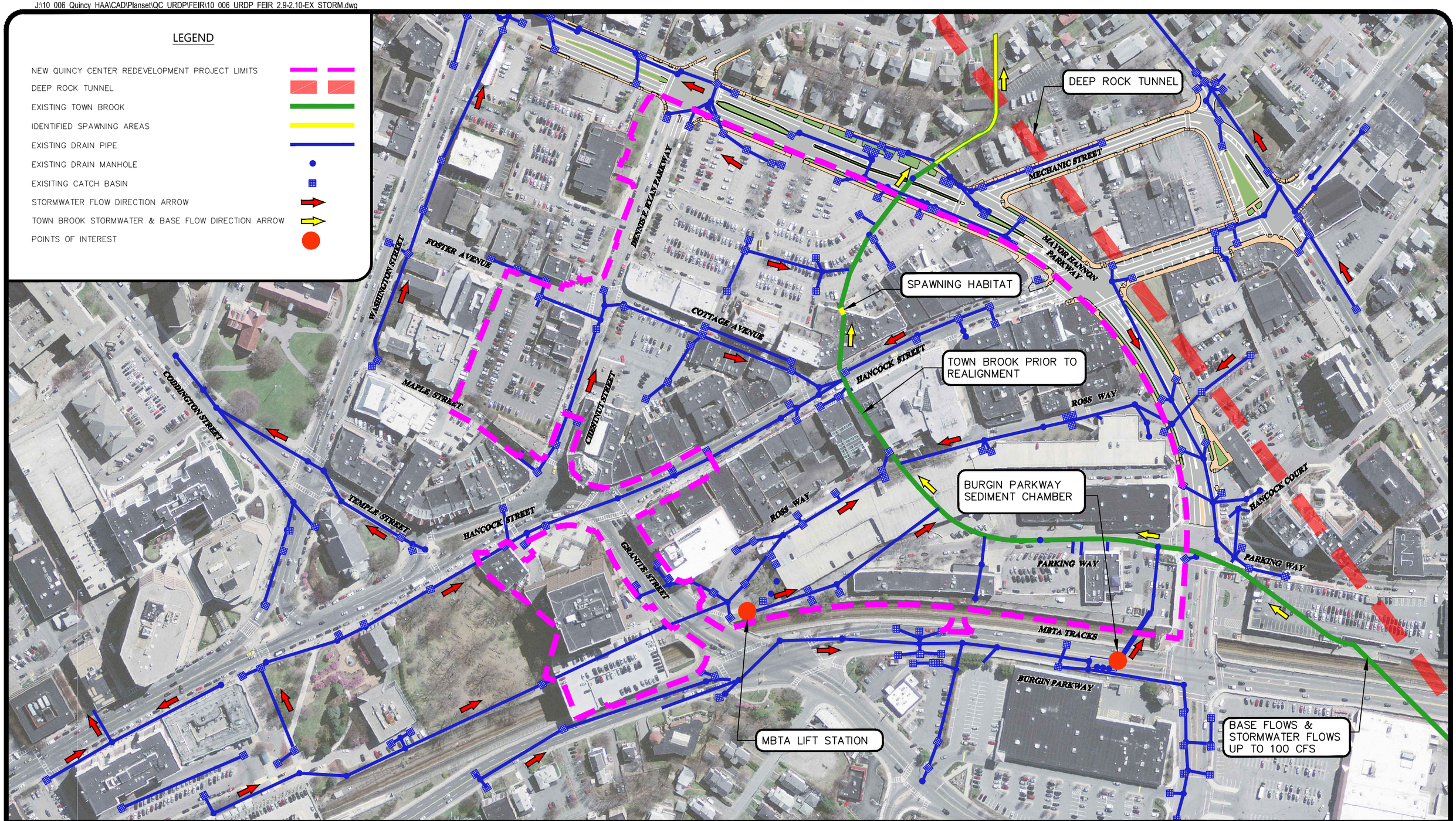

NOTES:

1. EXISTING DRAINAGE CONFIGURATION COMPILED FROM AVAILABLE RECORD INFORMATION, CITY OF QUINCY GIS INFORMATION, DISCUSSIONS WITH CITY OF QUINCY STAFF, AND IN THE FIELD SURVEY.
2. EXISTING TOWN BROOK PRIOR TO REALIGNMENT AND RESOURCE AREAS SHOWN FOR REFERENCE ONLY. PROJECT IMPACTS HAVE BEEN CALCULATED ASSUMING THE PROPOSED REALIGNMENT OF TOWN BROOK IS CONSTRUCTED PRIOR TO CONSTRUCTION ACTIVITIES ASSOCIATED WITH THIS PROJECT.

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Figure 2.9 October 31, 2012

Existing Storm Drainage System
Prior to Town Brook Realignment
Final Environmental Impact Report
New Quincy Center Redevelopment
Quincy, Massachusetts

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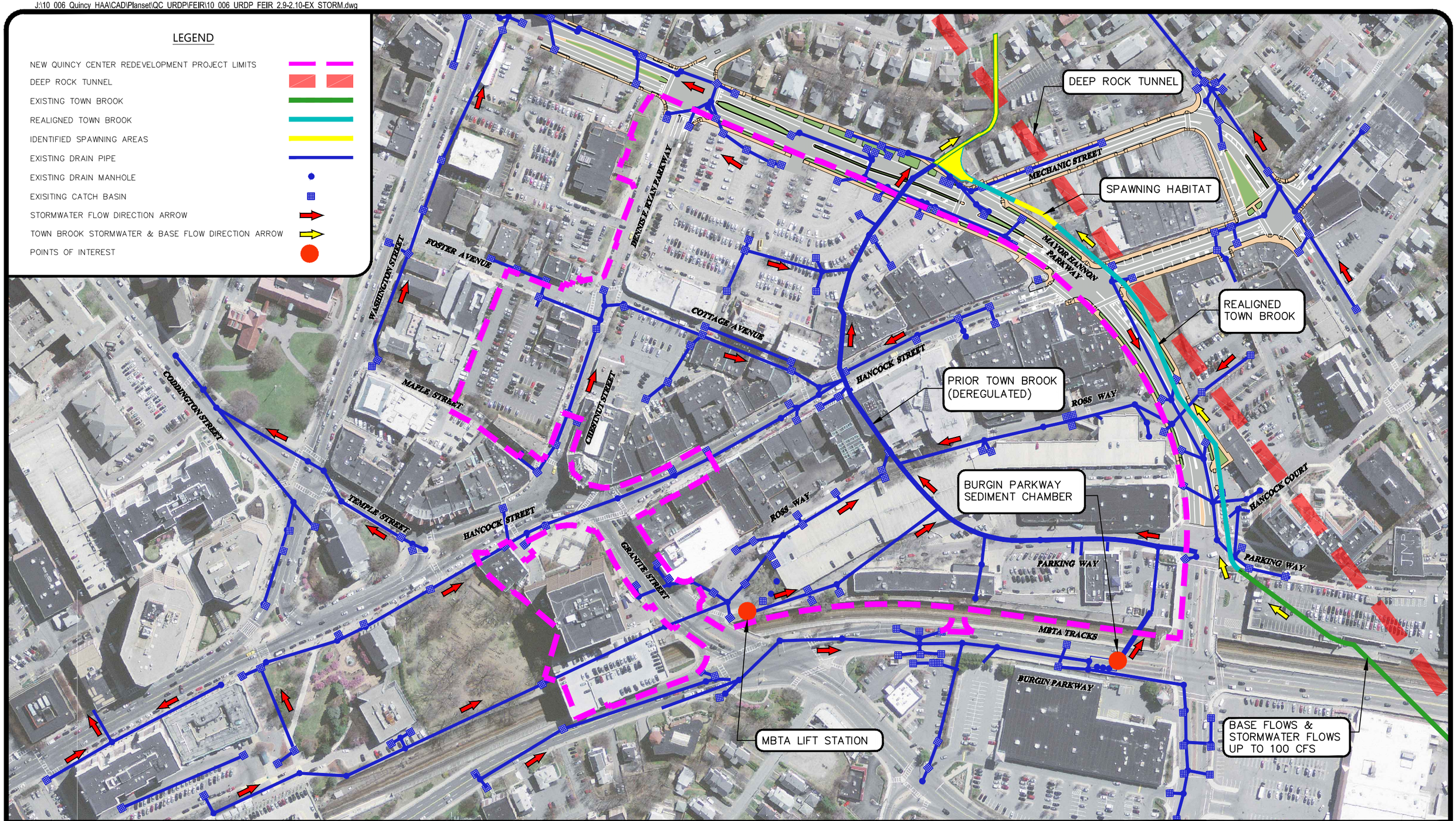

NOTES:

1. EXISTING DRAINAGE CONFIGURATION COMPILED FROM AVAILABLE RECORD INFORMATION, CITY OF QUINCY GIS INFORMATION, DISCUSSIONS WITH CITY OF QUINCY STAFF, AND IN THE FIELD SURVEY.
2. EXISTING RIVERFRONT AREA OUTSIDE PROPOSED DDA BOUNDARY TO REMAIN 200'
3. 25' RIVERFRONT AREAS BASED ON DOWNTOWN QUINCY DENSELY DEVELOPED AREA (DDA #008) DESIGNATION APPROVED IN AUGUST 2011.

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Figure 2.10 October 31, 2012

Existing Storm Drainage System
Post Town Brook Realignment
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New Quincy Center Redevelopment
Quincy, Massachusetts

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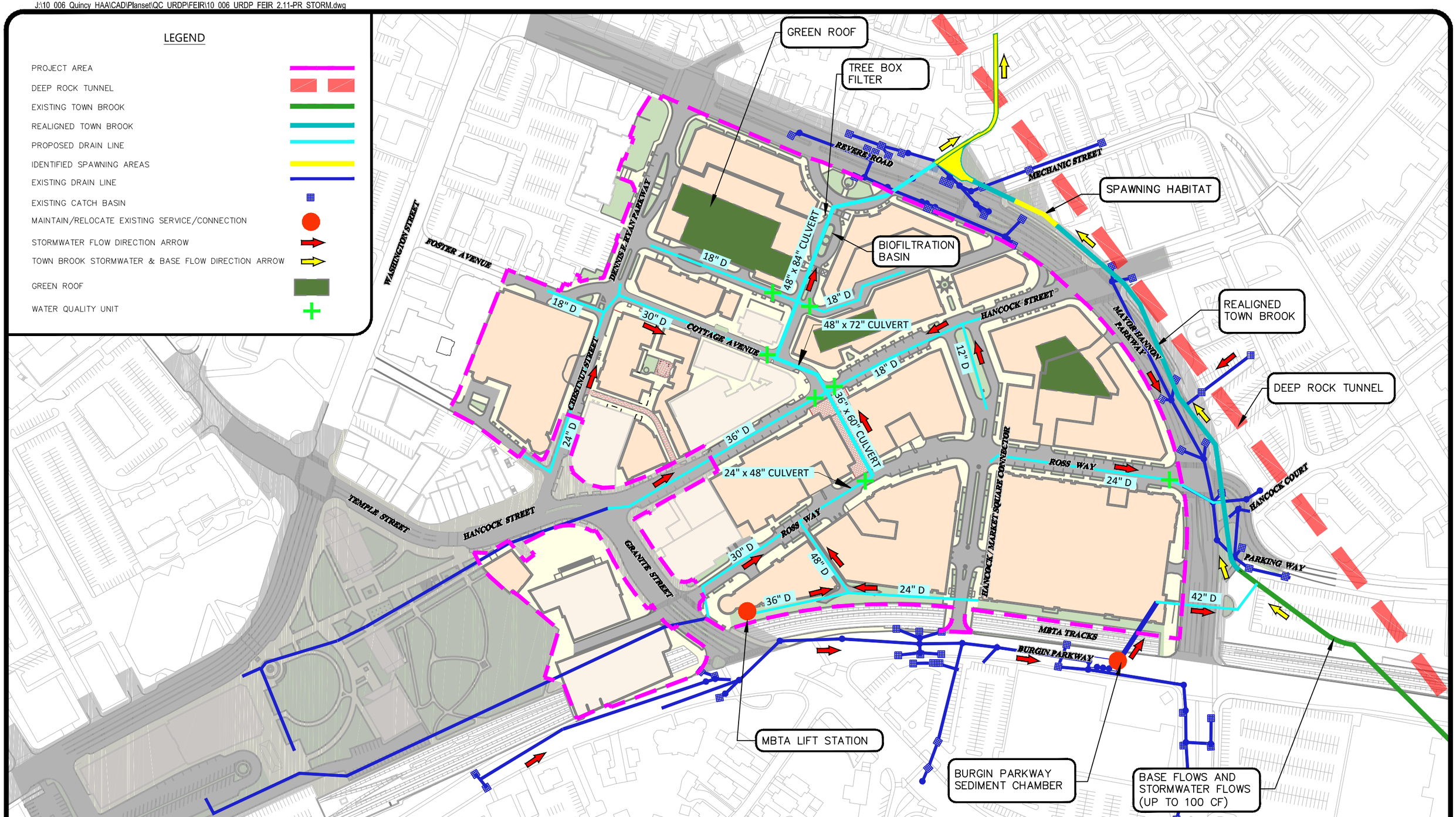

NOTES:

1. EXISTING DRAINAGE CONFIGURATION COMPILED FROM AVAILABLE RECORD INFORMATION, CITY OF QUINCY GIS INFORMATION AND DISCUSSIONS WITH CITY OF QUINCY STAFF.
2. SEE THE WETLANDS AND STORMWATER CHAPTER FOR DETAILED INFORMATION REGARDING THE PROPOSED STORM DRAIN SYSTEM AND FLOW QUANTITIES.
3. LOCATIONS AND TYPES OF STORMWATER BMPS SHOWN IN THIS FIGURE ARE CONCEPTUAL AND ARE SUBJECT TO REVIEW, FINAL DESIGN, AND FEASIBILITY.
4. STORMWATER FLOWS FROM THE MBTA LIFT STATION, BURGIN PARKWAY SEDIMENT CHAMBER, AND DEEP ROCK TUNNEL DIVERSION STRUCTURE HAVE BEEN INCORPORATED INTO THE HYDRAULIC CAPACITY PIPE DESIGN FOR THE DESIGN STORM.

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Figure 2.11 October 31, 2012

Proposed Storm Drainage System
Final Environmental Impact Report
New Quincy Center Redevelopment
Quincy, Massachusetts

2.2.3 MBTA Pump Alternative

As described above, a segment of Town Brook is currently being realigned in accordance with plans for the Town Brook Enhancement Project. Following completion of the Town Brook realignment, the existing Town Brook channel and culvert within the Project area will be decommissioned and no longer convey base flows from upstream reaches of Town Brook. The decommissioned channel and culvert will continue to convey limited stormwater flows from the local tributary watershed that will discharge into the realigned Town Brook at Revere Road (see Figure 2.10). As described in the filings associated with the Town Brook Enhancement Project, a significant component of this work involves establishing enhanced smelt spawning habitat areas within the realigned section of Town Brook.

Until the work associated with realignment of Town Brook is completed, base flows will continue to be conveyed through Quincy Center in the existing degraded stormwater closed pipe drainage system that, as documented in filings associated with the Town Brook Enhancement Project, also conveys untreated stormwater (see Figure 2.9). These base flows are conveyed from upstream reaches of Town Brook that bypass the Deep Rock Tunnel Diversion Structure, and are supplemented by sporadic pumped groundwater flows from a lift station owned, maintained, and operated by the MBTA located south of the Granite Street Bridge (see Figure 2.5).

The elevation of the MBTA railroad tracks is more than 15 feet below the adjacent Project area, and therefore this pump station is required to discharge stormwater to the existing drainage system in the Project area constructed at higher elevations. Based on available information, it is likely that although the pump may have been originally intended to prevent stormwater generated from rainfall events from affecting train operations, the low elevation of the railroad track stormwater conveyance system also leaves it susceptible to groundwater infiltration, and as a result the pump also pumps groundwater, reducing the potential for groundwater to negatively impact the function of the MBTA facilities.

It is generally accepted that the condition of periodic pumping-induced spikes of flow followed by an ebb period is not optimal for sustaining velocities for smelt spawning habitat due to fluctuating water depths. In an attempt to reduce the intensity of flow spikes, at the request of the Massachusetts Division of Marine Fisheries (DMF), the pump was modified to increase the frequency and reduce intensity of the spikes associated with pumping activity. This request came after a 2005 water chemistry analysis by DMF that demonstrated that water quality characteristics of discharges from the pumping activity, although at generally acceptable levels, should be modified to improve conditions for the spawning habitat (see Attachment D). The existing NPDES Permit (No. MA0033987) provides the MBTA with effluent limitations and monitoring requirements and allows for a greater number of pumping events. Based on the analysis provided at the U.S. Geological Survey (USGS) gauging station at Miller Stile Road, the MBTA pumping activity currently appears to result in spikes of up to 1 cubic foot per second (cfs) for a duration of approximately 15 minutes,

with dormant periods lasting approximately 45 minutes between pumping events (see Attachment D). As noted in the correspondence between DMF and MBTA, past efforts have modified the duration of pumping-induced spikes of flow in an attempt to improve the frequency of this pumping to have some beneficial impact on smelt spawning.

Completion of the Town Brook Enhancement Project will redirect base flows from upstream reaches of Town Brook to the realigned Town Brook across 171 net new feet of identified enhanced smelt spawning habitat that will include resting pools and spawning riffles with a low-flow channel with cracked stone spawning substrate, additional shade trees along the bank, as well as a constructed BVW with additional wetland plantings to mitigate temperature.

The proposed redevelopment Project will not modify base flows tributary to Town Brook. However, as requested by DMF and MassDEP, the Proponents have evaluated an alternative for routing the MBTA pumped flow to reaches of Town Brook farther upstream of the current outfall to Town Brook (see Figure 2.12). The evaluation of this alternative has identified several practical and engineering challenges that would need to be overcome in order to implement this alternative, if it is ultimately determined desirable to do so. The elevation change from the existing lift station outlet invert elevation to the potential farthest-upstream reach of Town Brook is approximately 2.1 feet; with a reach over 1,175 feet, the resulting slope would be approximately 0.1%. To adequately convey the sporadic spikes of pumped groundwater flow from the pump estimated at approximately 1.0 cfs (see Attachment D for USGS Record Stream Flow Data), a 12-inch drainage pipe with a maximum capacity of approximately 1.2 cfs at that slope would have sufficient capacity to convey those sporadic groundwater flows. If the potential rerouted pipe was to be designed to convey the full flow capacity of the existing discharge pipe at the limited slope, as opposed to the limited flow spikes resulting from groundwater pumping, the size of the culvert would need to be increased as shown on Figure 2.12. At this slope, velocities would be less than 2 feet per second (fps), which is less than optimal and may result in sediment deposition that could, absent regular maintenance, reduce capacity or cause blockage. Such additional potential operation and maintenance concerns are not as prevalent in the proposed routing due to the preferable increased slope.

Before any further evaluation of the physical limitations, site constraints, elevation and slope challenges presented by this alternative, a water quality sampling protocol must be submitted to and approved by MassDEP and DMF in accordance with the Water Quality Certificate for the Town Brook Enhancement Project (MassDEP Project #59-1261) for the purpose of *"determining whether introduction of groundwater flows from the MBTA pump station can be tied into the realigned Town Brook without causing an adverse effect on the fish run and degradation of the smelt spawning substrate."*

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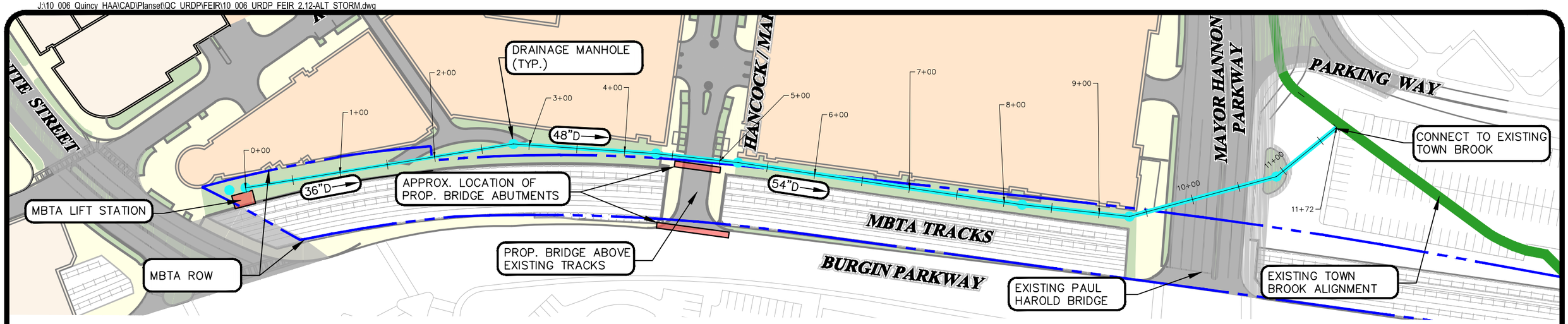
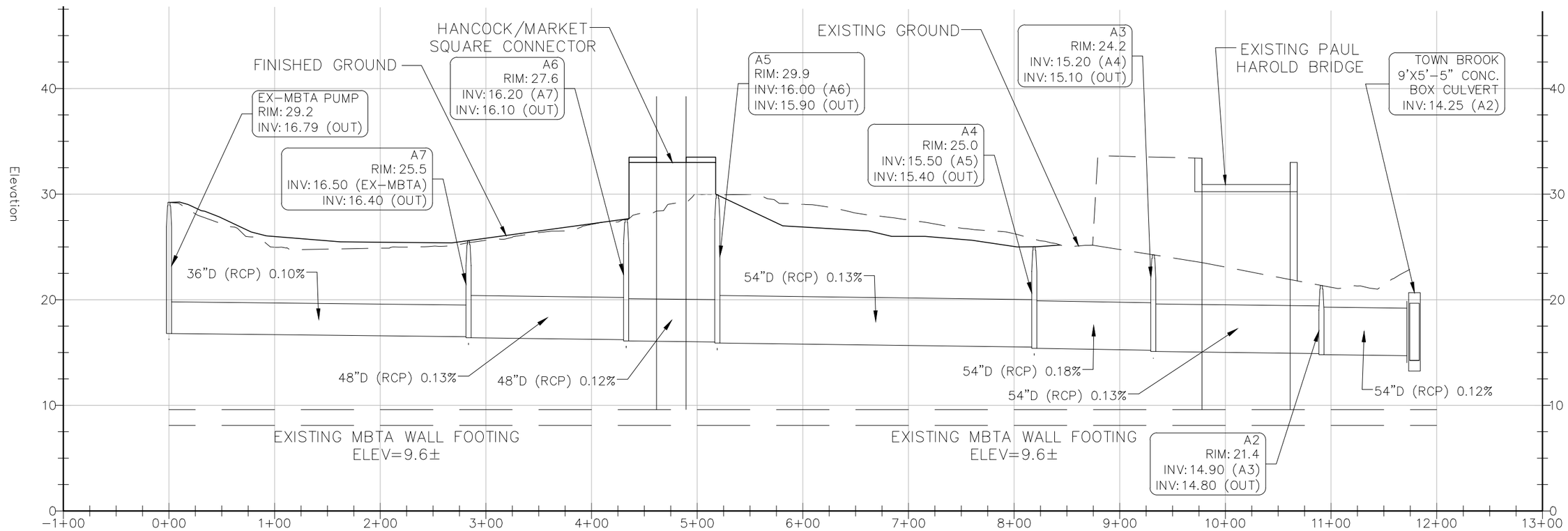


PROPOSED ALTERNATE DRAINAGE - PLAN VIEW

1"=100'



PROPOSED ALTERNATE DRAINAGE- PROFILE VIEW

1"=100' H
1"=10' V

NOTES:

1. SEE SECTION 2 FOR DETAILED INFORMATION REGARDING THE ALTERNATIVE STORM DRAIN SYSTEM ROUTING FROM MBTA PUMP STATION.
2. PIPE SIZE AND ALIGNMENT ARE SHOWN FOR REFERENCE ONLY AND ARE SUBJECT TO COORDINATION WITH MBTA AND OTHERS. SEE SECTION 2.2 FOR ADDITIONAL INFORMATION.

0 50 100 Feet

This Figure Prepared in Coordination With:

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Figure 2.12 October 31, 2012

MBTA Pump Station Drainage Alternative
Plan and Profile
Final Environmental Impact Report
New Quincy Center Redevelopment
Quincy, Massachusetts

As summarized above, the alternative of rerouting the sporadic spikes of pumped groundwater flow from the MBTA lift station pump so they discharge into Town Brook farther upstream presents certain practical and engineering challenges that would need to be addressed to ensure such an alternative is feasible. As a threshold matter, the required water quality sampling protocol will be submitted to MassDEP and DMF for approval. In conjunction with review of this protocol, the Proponents anticipate that DMF will also revisit the pumping frequency to determine conclusively whether the introduction of such sporadic discharges farther upstream would have clear scientific benefits to smelt spawning habitat, notwithstanding that these pump discharges are inevitably followed by "dry" periods when the pump is inactive. Because of this limitation, the Proponents, with the support of DMF, DCR, and other agencies, have focused on the carefully-evaluated flow restoration efforts being undertaken in connection with the Town Brook Enhancement Project, where well-established evidence indicates that meaningful efforts can restore certain previously-diverted and continual base flows with clear benefits anticipated to the smelt spawning habitat. Assuming DMF can confirm that similar benefits can be expected to result from relocating the MBTA pump discharge, it is important to recognize that the MBTA, which owns the subject property and pump, is ultimately responsible for discharges from the pump as currently permitted under the existing Environmental Protection Agency (EPA) NPDES permit. Accordingly, upon a determination by DMF, the Proponents are fully prepared to further evaluate the design and implementation of an alternative routing of MBTA pump discharges, to the extent practicable, should the MBTA confirm their willingness to: (1) accept any additional maintenance responsibilities that may result to their facilities or infrastructure; and (2) allow the routing of such a discharge pipe across portions of MBTA property.

2.2.4 Revere Road Stormwater Confluence

As described above, stormwater infrastructure improvements associated with the Project will have immediate benefits to smelt habitat where stormwater flows from the Project area converge with Town Brook at the Revere Road outfall. The Project does not include modifying the stormwater routing or characteristics of the open channel area at this outfall as approved per the Town Brook Enhancement Project. The quality of stormwater flows from the Project area will be significantly improved through pre-treatment (where currently none exists) in accordance with applicable MassDEP Stormwater Management Standards and the City of Quincy Stormwater Ordinance. The Project as described herein and in the Draft EIR, will decrease both the peak discharge rates and volumes for the 2-, 10-, 25-, and 100-year storm events. Furthermore, at the confluence with Town Brook, and as part of the Town Brook Enhancement Project, rip rap protection sized appropriately to prevent scour and erosion based on expected velocities is being provided at the location where stormwater discharge enters from the Project area. As previously documented with MassDEP, this flow will also discharge to a submerged tailwater at the open channel feature of Town Brook at the confluence location, which will reduce discharge velocities and potential scour. The tailwater condition at the Revere Road outfall has been factored into

the design of the Quincy Center stormwater system, which is designed to convey the 25-year storm in accordance with the City of Quincy's engineering department's design directive and is also sized to provide in-line storage where appropriate. Also, following completion of the Town Brook Enhancement project, stormwater flow from the upstream reaches of Town Brook bypassing the Deep Rock Tunnel Intake and Diversion Structure and stormwater runoff from Drainage Area 4 (10.1 acres) will be conveyed in the realigned Town Brook, resulting in a significant reduction in the stormwater flow conveyed by the deregulated former Town Brook Culvert through the Project area in both existing and proposed conditions. This reduction in stormwater flow within the deregulated culvert following realignment of Town Brook will improve overall hydraulic performance of the existing Quincy Center stormwater system that will remain until construction of the redevelopment Project.

In addition, the Town Brook Enhancement Project, currently under construction, will feature a geogrid membrane with stone and vegetated infill designed to withstand expected flow velocities to further minimize potential erosion and scouring at this location. As an added feature to allow for continued monitoring of both scour and sedimentation, staff gauges will also be installed along the banks of the channel as conditioned in the Final Order of Conditions for the Town Brook Enhancement Project.

2.2.5 Stormwater Hydrology

The Project area is primarily impervious and consists of rooftops, paved roads, and paved parking lots. Under existing conditions, there is no stormwater management for the Project area. Untreated stormwater runoff from impervious surfaces is collected in catch basins, routed into a network of drainage conveyance pipes, and ultimately discharged, without pre-treatment, into the Town Brook drainage channel. The existing stormwater conveyance system within the Project area consists of an aged and undersized stormwater collection system that contains little to no water quality enhancements or infiltration. The main trunk lines within the existing stormwater conveyance system surcharge during storm events and contain illicit sanitary sewer connections.

2.2.5.1 Existing Conditions Prior to Realignment of Town Brook

For the hydrologic analysis of existing conditions prior to the realignment of Town Brook, the Study Area was divided into five drainage areas that contribute to three design points. Based on NRCS soil characterizations adjacent to the Project area, the underlying soil is assumed to be classified as Hydrologic Soil Group (HSG) C. The 58-acre Study Area includes the Project area and surrounding contributing areas. Outside of the noted Study Area, the Burgin Parkway sediment chamber, MBTA stormwater lift station, and flows bypassing the Deep Rock Tunnel Intake and Flow Diversion structure have not been included in the hydrologic analysis as they remain unchanged and are connected to the

Project area only by special conditions (described below). These flows have, however, been included in the hydraulic analysis to properly consider potential effects on the existing and proposed stormwater conveyance infrastructure.

The existing Burgin Parkway connection to Project area stormwater system consists of a 65-foot by 25-foot sedimentation basin in Burgin Parkway with two 36-inch reinforced concrete outlet pipes (RCP). These pipes convey stormwater beneath the MBTA rail tracks to a vault located east of the tracks before discharging to a 42-inch RCP culvert ultimately connecting to the existing Town Brook drainage culvert. Due to the difference in invert elevations from the high to low side of the MBTA tracks, this system is head-driven and only flows when enough pressure builds to move the stormwater through. Approximately 113 acres is tributary to the Burgin Parkway sediment chamber. For hydraulic analysis of the stormwater systems, flows from the Burgin Parkway sediment chamber are conservatively estimated based on the existing capacity of the downstream pipes determined by Manning's Equation for full-flow capacity, and are considered to be constant flows. More detailed flow characteristics of the sediment chamber are being researched and may be revised. The existing Burgin Parkway stormwater system and conveyance will be maintained during the Project redevelopment.

The MBTA lift station is located near the intersection of Granite Street and Ross Way, consisting of a wet well and three pumps that discharge into a 36-inch RCP, which ultimately connects to the existing Town Brook culvert. Approximately 5 acres is tributary to the MBTA lift station. For hydraulic analysis of the stormwater systems, flows from the MBTA lift station were conservatively estimated based on the existing capacity of the downstream pipes determined by Manning's Equation for full-flow capacity, and are considered to be constant flows. More detailed flow characteristics of the lift station are being researched and may be revised. The MBTA lift station and conveyance will be maintained during Project redevelopment.

The Deep Rock Tunnel Intake and Flow Diversion Structure is located west of the Project area near the intersection of Burgin Parkway and School Street. Constructed as part of the Town Brook Local Flood Control Project, the structure is designed to divert stormwater flows above 100 cfs to the Deep Rock Tunnel which bypasses the Project area completely. Stormwater flows are controlled by a baffle and side overflow weir at the Tunnel Intake and Flow Diversion structure that allows base flows to continue to downstream reaches of Town Brook while limiting stormwater flows to downstream reaches of Town Brook. For hydraulic analysis of the stormwater systems, flows from the Deep Rock Tunnel Intake and Flow Diversion structure were limited to 100 cfs and are considered to be constant flows.

The three design points for the Study Area are: (1) the confluence point of the existing Town Brook and the proposed Town Brook (at the intersection of Revere Road and Mechanic Street); (2) the Revere Road stormwater system, which ultimately drains to Town Brook further downstream of the confluence point (outside of the Study Area); and (3) the MBTA track drainage system.

Drainage Area 1 – This 41.5-acre portion of the Study Area consists of existing rooftops, pavement, and landscaping north of the Mayor Hannon Parkway. Stormwater runoff is collected in catch basins and conveyed through an aging and undersized drainage system before ultimately discharging untreated directly into the existing Town Brook drainage culvert (Design Point 1).

Drainage Area 2 – This 1.4-acre portion of the Study Area is an existing parking lot and roadway pavement located at the corner of Revere Road and the Dennis Ryan Parkway. This area consists of pavement and small areas of landscaping that discharge to the public stormwater system in Revere Road, ultimately draining to Town Brook outside of the Study Area (Design Point 2).

Drainage Area 3 – This 5.1-acre portion of the Study Area consists of existing rooftops, pavement, and landscaping within the Mayor Hannon Parkway and surrounding area east of Hancock Street. Stormwater runoff is collected in catch basins and conveyed through a mostly updated drainage pipe network before discharging directly into Town Brook, where flows will confluence with runoff from Drainage Area 1 at Design Point 1.

Drainage Area 4 – This 9.4-acre portion of the Study Area consists of existing rooftops, pavement, and landscaping within the Mayor Hannon Parkway and surrounding area west of the Hancock Street. Stormwater runoff is collected in catch basins and conveyed through a partly updated drainage pipe network before discharging into the upstream reach of Town Brook within the Study Area. Flows are then conveyed in Town Brook through the Study Area and confluence with runoff from Drainage Areas 1 and 3 at the Revere Road outfall (Design Point 1).

Drainage Area 5 – This 0.3-acre portion of the Study Area is located within or adjacent to the MBTA train track right-of-way and consists of existing gravel sloping down from the rear of the existing buildings. Stormwater runoff infiltrates behind the existing MBTA retaining wall to the MBTA drainage system within the tracks below (Design Point 3). Stormwater runoff from this area is ultimately conveyed to the MBTA lift station via a closed drainage system.

Table 2-1 contains a summary of the existing hydrologic conditions in the Project area as they will exist until completion of the Town Brook Enhancement Project. Runoff coefficients shown in Table 2-1 were determined using Natural Resources Conservation Service (NRCS) Technical Release 55 (TR-55) methodology as provided in HydroCAD.

Table 2-1 Existing Hydrologic Conditions in the Project Area (pending completion of Town Brook realignment per the ongoing Town Brook Enhancement Project)

Description (Drainage Area #)	*Discharge Location*	*Design Point*	*Area (acres)*	*Curve Number*	*Time of Concentration (min)*
1	Town Brook (Confluence)	1	41.5	95	20.8
2	Revere Road (Public Stormwater System)	2	1.4	94	5.0
3	Town Brook (Confluence)	1	5.1	94	4.7
4	Town Brook (Upstream)	1	9.4	96	8.4
5	MBTA Drainage System	3	0.3	96	5.0

2.2.5.2 Existing Conditions Following Realignment of Town Brook

For the hydrologic analysis of existing conditions following the realignment of Town Brook, the Study Area was divided into five drainage areas that contribute to the three design points identified in the analysis of existing conditions prior to the realignment of Town Brook. The soil characterizations, overall Study Area, and the hydraulic performance of the Burgin Parkway sediment chamber, MBTA stormwater lift station, and Deep Rock Tunnel Intake and Flow Diversion structure remain unchanged.

The existing Burgin Parkway Sediment Chamber and conveyance will remain unchanged and will be maintained. Flow from the existing Burgin Parkway Sediment Chamber will continue to discharge to a 42-inch RCP culvert which connects to the deregulated former Town Brook culvert and ultimately discharges to Town Brook at the Revere Road Confluence.

The MBTA lift station and conveyance will remain unchanged and will be maintained. Flow from the MBTA lift station will continue to discharge into the existing 36-inch RCP which connects to the deregulated former Town Brook culvert and ultimately discharges to Town Brook at the Revere Road Confluence.

The existing Deep Rock Tunnel Intake and Flow Diversion Structure will remain unchanged and will be maintained. Base flows from upstream reaches of Town Brook as well as stormwater bypassing the diversion weir will be conveyed in the realigned Town Brook through the enhanced smelt habitat to downstream reaches of Town Brook. By routing the

stormwater flow from the upstream reaches of Town Brook in the realigned Town Brook, a significant amount of stormwater flow will be removed from the deregulated former Town Brook culvert.

The three design points for the Study Area are: (1) the confluence point of the existing Town Brook and the proposed Town Brook (at the intersection of Revere Road and Mechanic Street); (2) the Revere Road stormwater system, which ultimately drains to Town Brook further downstream of the confluence point (outside of the Study Area); and (3) the MBTA track drainage system.

Drainage Area 1 – This 40.8-acre portion of the Study Area consists of existing rooftops, pavement, and landscaping north of the Mayor Hannon Parkway. Stormwater runoff is collected in catch basins and conveyed through an aging and undersized drainage system before discharging to the deregulated former Town Brook culvert, which ultimately discharges to the realigned Town Brook at the Revere Road Confluence (Design Point 1). Approximately 0.7 acres of Drainage Area 1 as delineated in the existing conditions prior to Town Brook realignment analysis will drain directly to the realigned Town Brook, effectively becoming part of Drainage Area 4, which will increase by a proportionate amount.

Drainage Area 2 – This 1.4-acre portion of the Study Area will remain unchanged relative to the analysis of existing conditions prior to Town Brook realignment.

Drainage Area 3 – This 5.1-acre portion of the Study Area consists of existing rooftops, pavement, and landscaping within the Mayor Hannon Parkway and surrounding area east of Hancock Street, and will remain largely unchanged. However, this area will include additional pervious landscaping constructed as part of the Town Brook Enhancement Project. Stormwater runoff is collected in catch basins and conveyed through a mostly updated drainage pipe network with some water quality improvements before discharging into the realigned Town Brook, where flows will confluence with runoff from Drainage Area 1 at Design Point 1.

Drainage Area 4 – This 10.1-acre portion of the Study Area consists of existing rooftops, pavement, and landscaping within the Mayor Hannon Parkway and surrounding area west of the Hancock Street. Stormwater runoff is collected in catch basins and conveyed through a partly updated drainage pipe network with some water quality improvements before discharging into the upstream reach of the realigned Town Brook within the Study Area. Flows are then conveyed in the realigned Town Brook through the enhanced smelt spawning habitat and confluence with runoff from Drainage Areas 1 and 3 at the Revere Road confluence (Design Point 1). As noted above, Drainage Area 4 will increase by approximately 0.7 acres, increasing the surface area draining to the upstream reaches of the realigned Town Brook.

Drainage Area 5 – This 0.3-acre portion of the Study Area will remain unchanged relative to the analysis of existing conditions prior to Town Brook realignment.

Table 2-2 contains a summary of the hydrologic conditions that will exist in the Project area following completion of the separate Town Brook Enhancement Project, which is currently under construction. Runoff coefficients shown in Table 2-2 were determined using TR-55 methodology as provided in HydroCAD.

Table 2-2 Existing Hydrologic Conditions in the Project Area (post-Town Brook Enhancement Project).

Description (Drainage Area #)	*Discharge Location*	*Design Point*	*Area (acres)*	*Curve Number*	*Time of Concentration (min)*
1	Town Brook (Confluence)	1	40.8	95	20.8
2	Revere Road (Public Stormwater System)	2	1.4	94	5.0
3	Town Brook (Confluence)	1	5.1	94	4.7
4	Town Brook (Upstream)	1	10.1	96	8.0
5	MBTA Drainage System	3	0.3	96	5.0

Through the completion of the Town Brook Enhancement project, stormwater flow from the upstream reaches of Town Brook bypassing the Deep Rock Tunnel Intake and Diversion Structure, as well as stormwater runoff from Drainage Area 4 (10.1 acres), will be conveyed in the realigned Town Brook thus resulting in a significant reduction in stormwater flow conveyed by the deregulated former Town Brook culvert.

2.2.5.3 Proposed Conditions

Under proposed conditions, the Project's stormwater infrastructure improvements will result in documented improvements in both the quality and quantity of stormwater runoff. The Project will maintain existing drainage and grading patterns while providing the required reduction in peak rates and volumes of stormwater runoff. As part of the stormwater improvements proposed for the Project, the undersized and degraded existing stormwater infrastructure will be decommissioned and the existing illicit sanitary sewer connections within the Project area will be removed. New stormwater infrastructure will conform to the

MassDEP Stormwater Management Standards and the City of Quincy Stormwater Ordinance; the Draft EIR contained a detailed discussion of compliance with the standards and ordinance.

The proposed stormwater management system will include LID techniques and a system of decentralized stormwater BMPs that will improve the overall water quality of runoff within the Project area. These techniques and practices, discussed in detail in the Draft EIR, may include water quality units, subsurface infiltration structures, deep sump catch basins with oil debris traps, bioretention basins, porous surfaces, street sweeping, tree filter boxes, and green roofs.

The existing Burgin Parkway Sediment Chamber and conveyance will remain unchanged and will be maintained. Flow from the existing Burgin Parkway Sediment Chamber will continue to discharge to a 42-inch RCP culvert. However, in conjunction with the redevelopment, this pipe will be routed to connect to the upstream reaches of the realigned Town Brook, and will be conveyed through the enhanced smelt habitat to downstream reaches of Town Brook.

The MBTA lift station and conveyance will remain unchanged and will be maintained. Flow from the MBTA lift station will continue to discharge into the existing 36-inch RCP. However, this flow will be routed through the proposed stormwater management system, including additional water quality treatment, and will ultimately discharge to Town Brook at the Revere Road Confluence. See Section 2.2.3 for a discussion regarding alternate routing of MBTA pump flow.

The existing Deep Rock Tunnel Intake and Flow Diversion Structure will remain unchanged and will be maintained. Base flows from upstream reaches of Town Brook as well as stormwater bypassing the diversion weir will be conveyed in the realigned Town Brook through the enhanced smelt habitat to downstream reaches of Town Brook.

For the proposed conditions hydrologic analysis, the Project area was divided into five drainage areas (see Figure 2.8). These areas discharge to the same design points where peak discharge rates were evaluated for both existing conditions analyses. The soil characterizations, overall Study Area, and the hydraulic performance of the Burgin Parkway sediment chamber, MBTA stormwater lift station, and Deep Rock Tunnel Intake and Flow Diversion structure remain unchanged.

Drainage Area 1 – This 38.1-acre portion of the Study Area consists of rooftops, pavement, and landscaping north of the Mayor Hannon Parkway. Areas within the Project area will have new buildings, pavement, streetscape and landscaping. Stormwater runoff within the Project area will be collected in a new drainage system with water quality improvements before discharging, treated, into the realigned Town Brook at the Revere Road Confluence (Design Point 1). Stormwater drainage infrastructure outside of the Project area will remain unchanged.

Drainage Area 2 – This 0.8-acre portion of the Study Area consists of new roadway pavement and adjacent sidewalks located at the corner of Mayor Hannon Parkway and the Dennis Ryan Parkway. Stormwater from this area will continue to discharge to the existing Revere Road Stormwater system, which ultimately drains to Town Brook outside the Study Area (Design Point 2).

Drainage Area 3 – This 5.0-acre portion of the Study Area consists of rooftops, pavement, and landscaping within the Mayor Hannon Parkway and surrounding area east of the Hancock Street. Areas within the Project area will have new buildings, pavement, streetscape and landscaping. Stormwater runoff will be collected in catch basins and conveyed through a recently updated drainage pipe network with water quality improvements before ultimately discharging directly into the realigned Town Brook drainage culvert (Design Point 1). Stormwater drainage infrastructure outside of the Project area will remain unchanged.

Drainage Area 4 – This 13.7-acre portion of the Study Area consists of rooftops, pavement, and landscaping within the Mayor Hannon Parkway and surrounding area west of the Hancock Street. Areas within the Study Area will have new buildings, pavement, streetscape and landscaping. Stormwater runoff will be collected in catch basins and conveyed through a recently updated drainage pipe network with water quality improvements before discharging to the most upstream reach of the realigned Town Brook. This flow will be conveyed within the realigned Town Brook through the enhanced smelt habitat, and will ultimately confluence with the flow from Drainage Areas 1 and 3 at Design Point 1. Stormwater drainage infrastructure outside of the Project area will remain unchanged.

Drainage Area 5 – This 0.2-acre portion of the Study Area is located within the MBTA train track right of way and consists of gravel, landscaping, and pavement sloping down from the rear of the existing buildings. Due to physical constraints and the existing MBTA retaining wall to be maintained in this area, stormwater runoff will continue to drain as it does under existing conditions by infiltrating behind the existing MBTA retaining wall to the MBTA drainage system within the tracks below (Design Point 3). Stormwater runoff from this area will ultimately be conveyed to the MBTA lift station via a closed drainage system.

Runoff coefficients for the post-development condition shown in Table 2-3 were determined using NRCS TR-55 methodology as provided in HydroCAD.

Table 2-3 Proposed Conditions Hydrologic Data.

Description (Drainage Area #)	*Discharge Location*	*Design Point*	*Area (acres)*	*Curve Number*	*Time of Concentration (min)*
1	Town Brook (Confluence)	1	38.1	94	21.3
2	Revere Road (Public Stormwater System)	2	0.8	88	5.0
3	Town Brook (Confluence)	1	5.0	94	4.7
4	Town Brook (Upstream)	1	13.7	96	8.0
5	MBTA Drainage System	3	0.2	93	5.0

The Proponents have evaluated the rainfall-runoff response of the Project area based on the updated Study Area for the existing and proposed conditions associated with 2-, 10-, 25-, and 100-year storm events. Rainfall runoff for this analysis was calculated using the NRCS Type III (SCS) 24-hour storm event for Middlesex County. Table 2-4 contains the rainfall data used for the hydrologic analysis.

Table 2-4 Rainfall Data for the Hydrologic Analysis.

Storm Event	*2-year*	*10-year*	*25-year*	*100-year*
Precipitation (inches)	3.2	4.7	5.5	6.7

Drainage areas used in the analysis are shown on Figures 2.7 and 2.8. The HydroCAD output model is based on the NRCS Technical Release 20 (TR-20) Model for Project Formulation Hydrology. Detailed printouts of the HydroCAD analysis are provided in Attachment D. Table 2-5 summarizes the existing and proposed peak discharge rates, and Table 2-6 contains runoff volumes.

Table 2-5 Runoff Peak Discharge Rates (cfs)*

Design Point		*2-year*	*10-year*	*25-year*	*100-year*
DP 1: Town Brook (Confluence Point)	Pre-realignment	102.6	156.0	184.3	226.4
	Post-realignment	102.0	155.1	183.1	225.0
	Proposed	100.1	153.5	181.7	223.8
DP 2: Revere Road (Public Stormwater System)	Pre-realignment	4.2	6.5	7.7	9.5
	Post-realignment	4.2	6.5	7.7	9.5
	Proposed	1.9	3.1	3.8	4.8
DP 3: MBTA ROW	Pre-realignment	0.8	1.2	1.4	1.7
	Post-realignment	0.8	1.2	1.4	1.7
	Proposed	0.7	1.1	1.3	1.6

*Only surface runoff peak discharge rates resulting from the local tributary watershed within the Study Area are shown.

Table 2-6 Runoff Volumes (acre-feet)*

Design Point		*2-year*	*10-year*	*25-year*	*100-year*
DP 1: Town Brook (Confluence Point)	Pre-realignment	12.4	19.3	23.0	28.6
	Post-realignment	12.4	19.3	23.0	28.6
	Proposed	12.3	19.2	23.0	28.6
DP 2: Revere Road (Public Stormwater System)	Pre-realignment	0.3	0.5	0.6	0.7
	Post-realignment	0.3	0.5	0.6	0.7
	Proposed	0.1	0.2	0.3	0.3
DP 3: MBTA ROW	Pre-realignment	0.1	0.1	0.1	0.1
	Post-realignment	0.1	0.1	0.1	0.1
	Proposed	0.1	0.1	0.1	0.1

* Only surface runoff volumes resulting from the local tributary watershed within the Study Area are shown.

As documented above, in accordance with MassDEP Stormwater Regulations and City of Quincy Stormwater Ordinance, the Project will decrease both the peak discharge rates and volumes for the 2-, 10-, 25-, and 100-year storm events, and will significantly improve stormwater management and treatment.