G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\4-31C_Article_97_Lands_Kendall_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

- Preferred Route K5A (0.59-mi)
- Noticed Alternative Route K11 (0.61-mi)
- Candidate Route K6A (0.67-mi)
- Candidate Route K10 (0.63-mi)
- Candidate Route K12 (0.69-mi)
- Article 97 Lands

Scale 1:2,400
1 inch = 200 feet
0 100 200 Feet

Basemap: 2021 Aerial, Nearmap

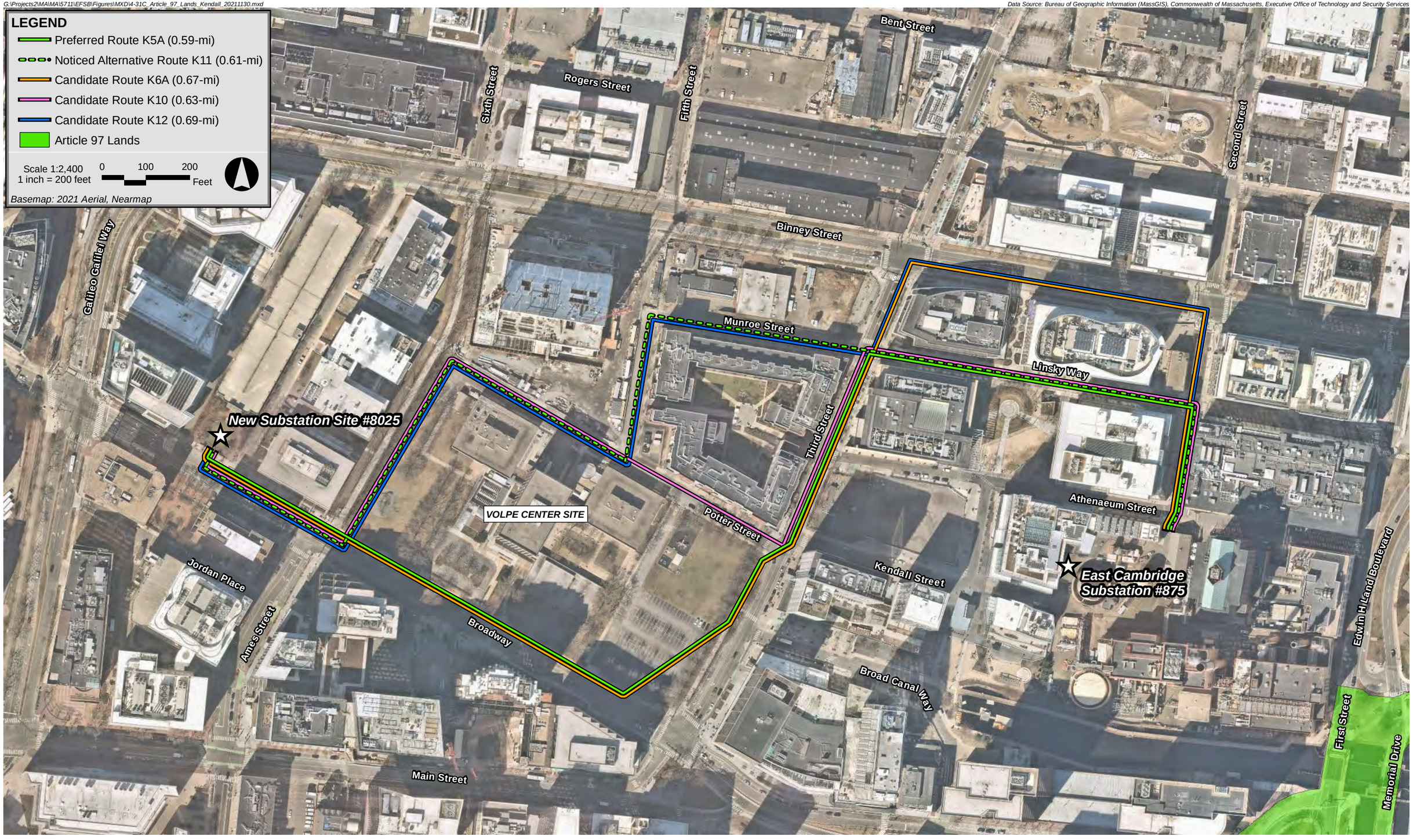

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Figure 4-31C

Article 97 Lands: Kendall Candidate Routes

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\4-31D_Article_97_Lands_Somerville_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

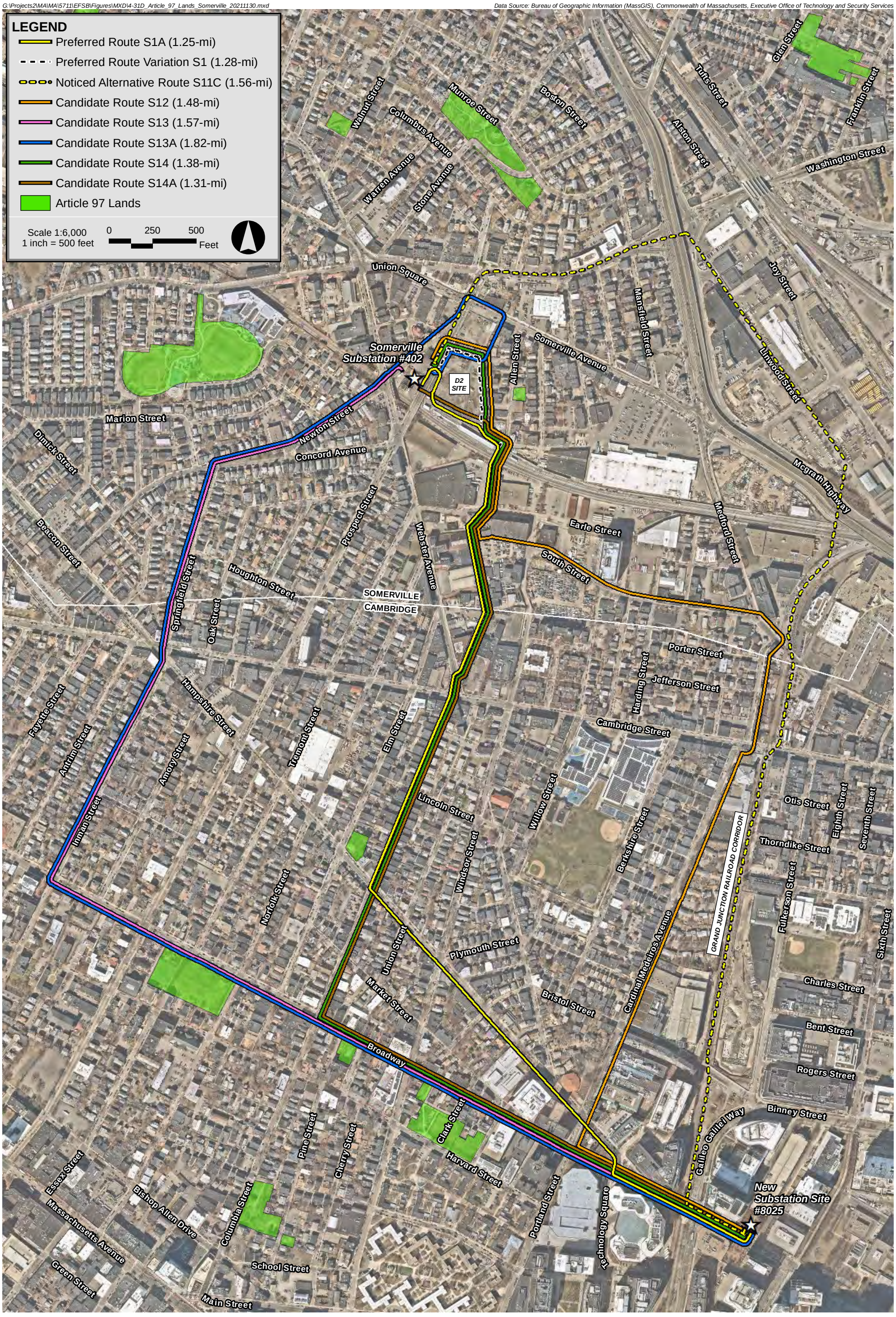

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Figure 4-31D

Article 97 Lands: Somerville Candidate Routes

Public Shade Trees

In consideration of the potential for cutting or affecting shade trees along the Candidate Routes during the construction process, public shade trees within the public way, as defined by M.G.L. Chapter 87, were counted along the Candidate Routes. A desktop analysis and field reconnaissance were conducted to count trees within the public way along the route (including off-road segments through public open spaces like Magazine Beach and Herter Park), regardless of diameter at breast height or distance from the proposed route centerlines. The scoring ratio for this criterion was calculated based on the total number of shade trees counted for each Candidate Route divided by the highest number of shade trees found along all candidate routes.

4.6.1.3 Technical/Constructability Criteria

Technical and constructability criteria compared route location and design factors that add complexity, schedule delays, reliability concerns or cost to the Project. Technical and constructability factors can also affect the magnitude and duration of impacts. The constructability criteria used in the scoring analysis for this Project, are:

- Existing Utility Density, and
- Complex Crossings.

These constructability factors are important construction considerations or impacts that allow the Company to identify measurable factors that differentiate between the duration and magnitude of impact to natural and built environmental considerations along each Candidate Route, as well as cost considerations.

Refer to the following sections for additional detail regarding constructability criteria analyzed by the Company.

Existing Utility Density

The number of identified existing underground pipelines, utility conduits and related features such as manholes and catch basins, and the depth of these facilities in the roadway, affect the available space below grade to physically install the proposed transmission conduits and manhole system. Extensive utility density can significantly constrain available space, complicate the construction process, and increase construction duration, traffic disruption and costs.

Utility density was assessed along Candidate Routes using survey data. The survey data were compiled from available records as provided by utility companies, municipal and institutional engineering departments. The score for Existing Utility Density was calculated based on the following three factors:

- Estimated Maximum Useable Corridor Width: the maximum available underground space that is potentially available to install the transmission line, measured horizontally between existing utilities in 100-foot-long stations/increments along each Candidate Route, as determined by Project Engineers. From this data, an "Average Useable Corridor Width Rating" was generated for each Candidate Route as a means of representing the average overall underground space that is potentially available to install the transmission line, based on ratings between 1 and 5. For example, Estimated Maximum Useable Corridor Widths greater than 15-feet were assigned a rating of 1 (most favorable because there is presumably more space along the route to install the line relative to other utilities); widths between 10 and 15-feet were assigned a rating of 2; widths between 6 and 9-feet were assigned a rating of 3; widths between 4 and 5 were assigned a rating of 4; and widths less than 3-feet were assigned a rating of 5 (least favorable because there is presumably minimal space to install the line relative to other utilities). These ratings were then averaged for each Candidate Route to generate an overall rating for each Candidate Route.

- Number of Utility Crossings: identified existing utilities (including heat generating sources, as discussed below) that are intersected by the approximate centerline of each Candidate Route, regardless of type, size, or depth.

- Number of Heat Generating Source(s): includes existing electric transmission and distribution lines and steam lines intersected by the approximate centerline of each Candidate Route, regardless of size or depth.

A ratio score was then generated for each of these three factors following the same methodology that was used for other scoring criteria, within each individual Study Area. The ratio scores for these factors were then added up for each Candidate Route to develop a single "Combined Existing Utility Density" score for each Candidate Route. Please refer to Appendix 4-4 for additional detail.

Complex Crossings

Complex Crossings are types of crossings requiring extended construction duration and greater potential for extended and severe construction impacts and expanded staging and laydown areas. In addition, depending on the crossing methodology, such crossings could cause a disruption to the public associated with construction noise, dust generation and the use of road shoulders to support construction.

For scoring purposes, Complex Crossings include crossings of the Charles River (trenchless crossings or bridge crossings), MBTA commuter rail tracks, Grand Junction Railroad tracks, I-90 ramps, and MBTA Red Line subway tunnel crossings.

The number of complex crossings was identified for each Candidate Route within each respective Study Area and a ratio score was calculated by dividing the number of complex crossings on the route by the greatest number of such crossings required for any individual Candidate Route within each individual Study Area. The complex crossings included in the scoring analysis are depicted on Figure 4-32A through D on the following pages.

4.7 Transmission Line Routing Criteria Evaluation Methods

Within each Study Area, the Company scored each Candidate Route based on the evaluating criteria presented in Section 4.6 above. After gathering data for each of the criteria, the Company identified the Candidate Route that had the largest data (number) for each criterion. All other routes/designs were then compared against this number to arrive at an unweighted "raw ratio score" for each Candidate Route on a scale of 0 to 1. For example, if Candidate Route X had 5 trees to be removed, Candidate Route Y had 10 trees, and Candidate Route Z had 15 trees, the unweighted raw ratio scores would be calculated as shown in the following table.

Candidate Route	Number of Trees	Unweighted Raw Ratio Score
Candidate Route X	5	5 ÷ 15 = **0.33**
Candidate Route Y	10	10 ÷ 15 = **0.66**
Candidate Route Z	15	15 ÷ 15 = **1.00**

The ratio scores for each criterion were then added to arrive at total raw ratio scores. The lowest total raw ratio score would equate to the lowest potential for impact at this stage of the analysis. This means that lower total raw scores are better in this analysis. Use of unweighted raw data to compare the Candidate Routes provides a meaningful comparison but does not consider the degree of importance of each criterion to the Project routing.

Accordingly, the Company then conducted a separate scoring analysis that applied weights to the evaluation criteria that were deemed to be of higher significance than other criteria. As was previously discussed, use of a 1-to-5 scale for weighting was considered appropriate to reflect the degree of importance of each criterion specific to this project, with 1 being the lowest weight and lesser importance and 5 being the highest weight and greater importance. Lower total weighted ratio scores are better in this analysis. The applied weight for each criterion is compiled on Table 4-11 on page 4-108.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

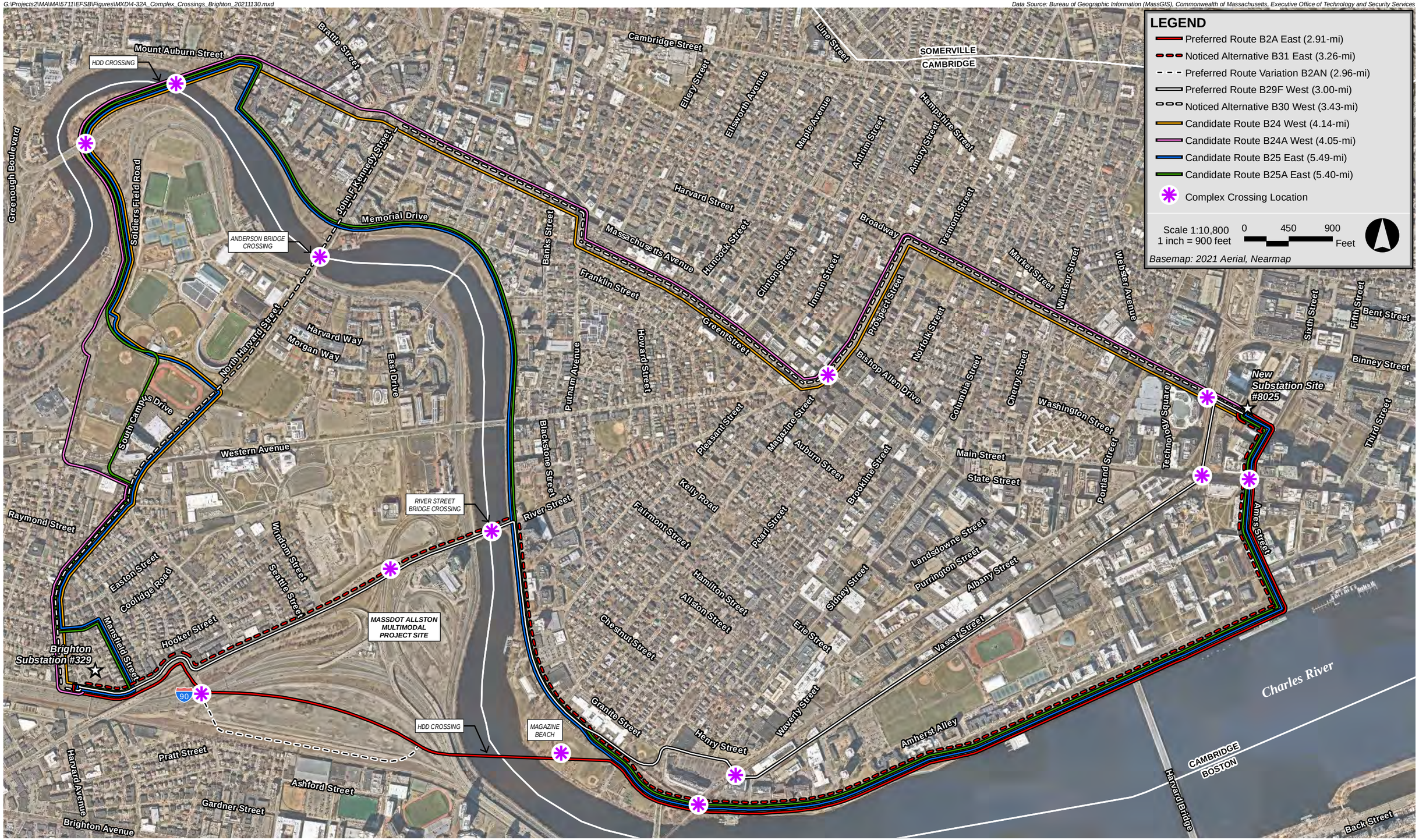

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Figure 4-32A

Complex Crossings: Brighton Candidate Routes

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\4-32B_Complex_Crossings_Putnam_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

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Figure 4-32B

Complex Crossings: Putnam Candidate Routes

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\4-32C_Complex_Crossings_Kendall_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

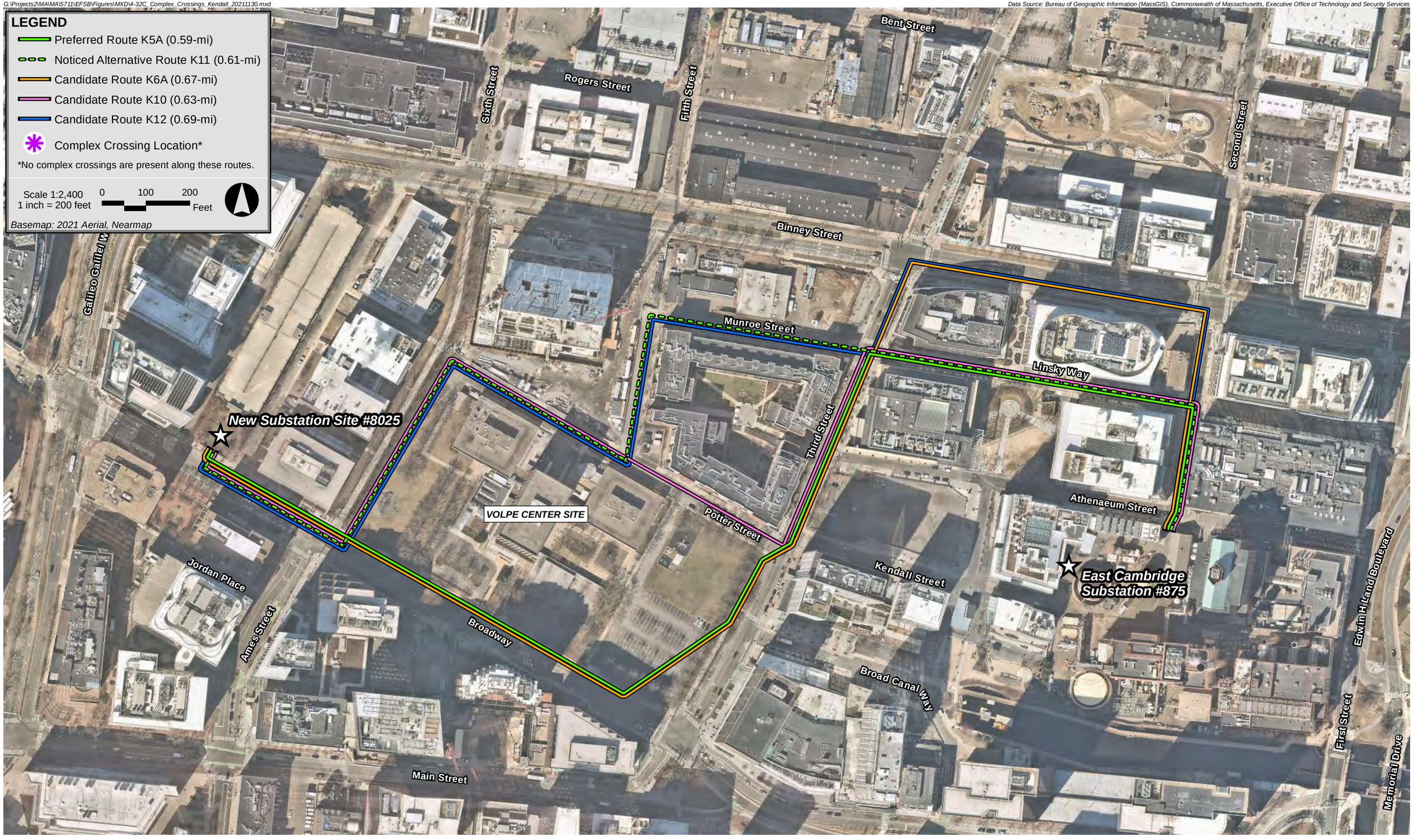

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Figure 4-32C

Complex Crossings: Kendall Candidate Routes

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

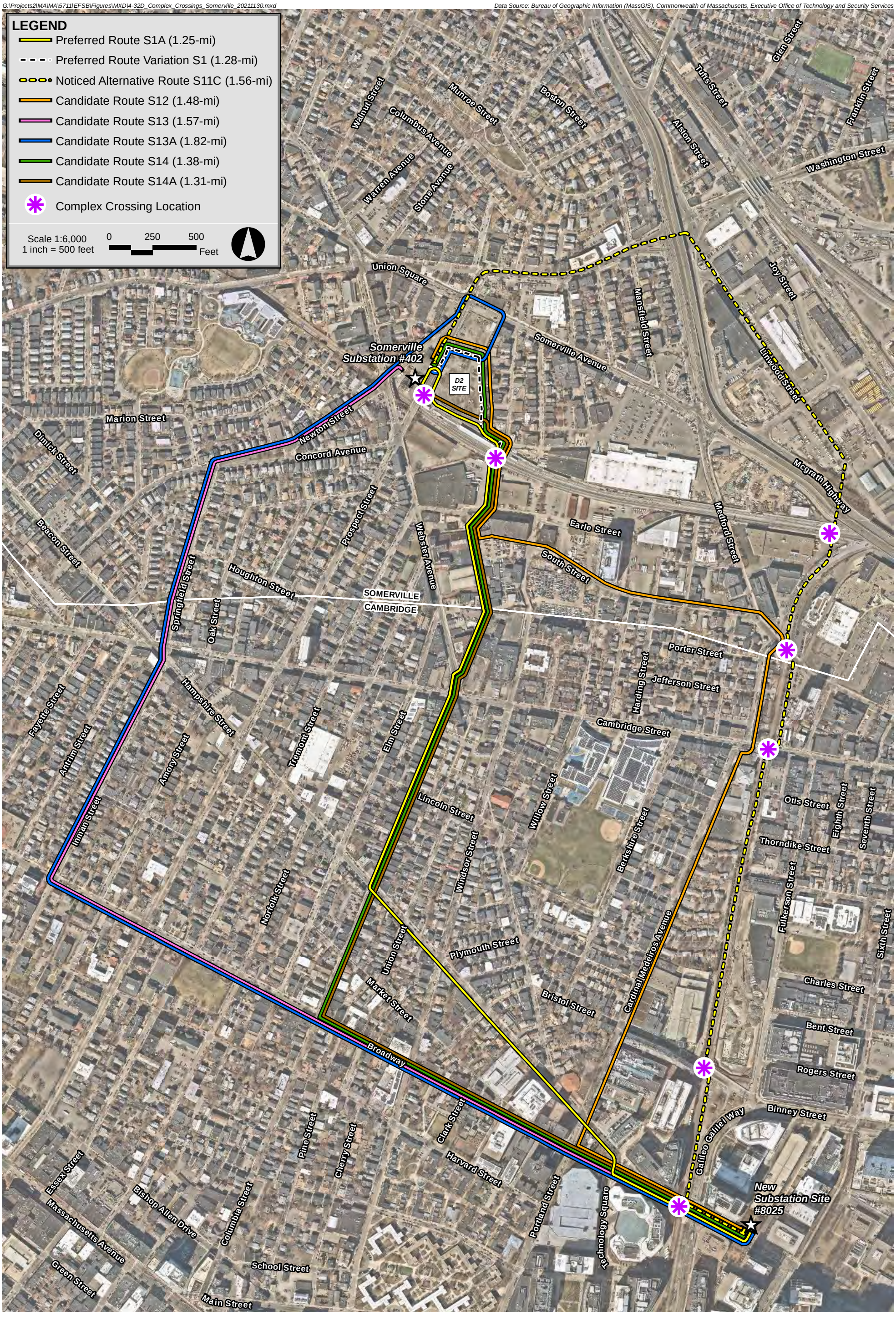

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Figure 4-32D

Complex Crossings: Somerville Candidate Routes

Table 4-11 Applied Weights for Scoring Criteria

	Scoring Criteria	Applied Weight
DEVELOPED ENVIRONMENT CRITERIA	Residential Land Use	5
	Sensitive Receptors	4
	Commercial / Industrial Land Use	1
	Transportation Impacts	5
	Historic and Archaeological Resources	2
	Potential to Encounter Subsurface Contamination	4
NATURAL ENVIRONMENT CRITERIA	Wetland Resource Areas, Buffer Zones and Tidelands	2
	Article 97 Authorization	5
	Public Shade Trees	3
TECHNICAL / CONSTRUCTABILITY CRITERIA	Existing Utility Density	5
	Complex Crossings	3

4.8 Transmission Line Routing Environmental Impact Analysis Results

Tables 4-12A and 4-12E on the following pages provides an overview of all raw data, total ratio scores and total weighted scores for each Candidate Route within each individual Study Area. The Candidate Route that has the lowest and highest potential for impact is highlighted in **GREEN** (lowest) and **RED** (highest), respectively.

Table 4-12A Brighton West Candidate Routes Scores

CANDIDATE ROUTES		HUMAN ENVIRONMENT CRITERIA					NATURAL ENVIRONMENT CRITERIA				CONSTRUCTABILITY & TECHNICAL CRITERIA		TOTAL SCORE	RANK
		Residential Land Uses	Commercial and Industrial Land Uses	Sensitive Receptors	Historic & Archaeological Resources	Transportation Impacts	Wetland Resource Area and Buffer Zone Crossings	Potential to Encounter Subsurface Contamination	Article 97 Lands	Public Shade Trees	Utility Density	Complex Crossings		
	Weight	5	1	4	2	5	2	4	5	3	5	3		
Candidate Route B-24 WEST	Raw Ratio Score	0.90	0.99	1.00	0.99	0.69	0.56	0.63	1.00	0.96	0.91	1.00	9.63	
	Weighted Ratio Score	**4.50**	**0.99**	**4.00**	**1.98**	**3.44**	**1.12**	**2.50**	**5.00**	**2.88**	**4.57**	**3.00**	**33.99**	3
Candidate Route B-24A WEST	Raw Ratio Score	0.90	1.00	1.00	0.98	0.68	0.56	0.58	1.00	1.00	1.00	1.00	9.71	
	Weighted Ratio Score	**4.51**	**1.00**	**4.00**	**1.96**	**3.42**	**1.12**	**2.33**	**5.00**	**3.00**	**5.00**	**3.00**	**34.35**	4
Candidate Route B-29F WEST	Raw Ratio Score	0.19	0.15	0.24	0.11	1.00	1.00	1.00	0.00	0.63	0.78	0.75	5.85	
	Weighted Ratio Score	**0.97**	**0.15**	**0.95**	**0.22**	**5.00**	**2.00**	**4.00**	**0.00**	**1.89**	**3.91**	**2.25**	**21.33**	1
Candidate Route B-30 WEST	Raw Ratio Score	1.00	0.77	1.00	1.00	0.95	0.28	0.63	0.00	0.80	1.00	0.75	8.17	
	Weighted Ratio Score	**5.00**	**0.77**	**4.00**	**2.00**	**4.73**	**0.57**	**2.50**	**0.00**	**2.41**	**5.00**	**2.25**	**29.22**	2

Table 4-12B Brighton East Candidate Routes Scores

CANDIDATE ROUTE		HUMAN ENVIRONMENT CRITERIA					NATURAL ENVIRONMENT CRITERIA				CONSTRUCTABILITY & TECHNICAL CRITERIA			
		Residential Land Uses	Commercial and Industrial Land Uses	Sensitive Receptors	Historic & Archaeological Resources	Transportation Impacts	Wetland Resource Area and Buffer Zone Crossings	Potential to Encounter Subsurface Contamination	Article 97 Lands	Public Shade Trees	Utility Density	Complex Crossings	TOTAL SCORE	RANK
Weight		**5**	**1**	**4**	**2**	**5**	**2**	**4**	**5**	**3**	**5**	**3**		
Candidate Route B-2A EAST	Raw Ratio Score	0.22	0.54	0.40	0.32	0.77	0.66	0.69	0.37	0.54	0.52	1.00	6.02	
	Weighted Ratio Score	**1.08**	**0.54**	**1.60**	**0.65**	**3.84**	**1.32**	**2.75**	**1.85**	**1.62**	**2.58**	**3.00**	**20.82**	1
Candidate Route B-25 EAST	Raw Ratio Score	1.00	1.00	1.00	1.00	0.90	1.00	1.00	1.00	1.00	1.00	1.00	10.90	
	Weighted Ratio Score	**5.00**	**1.00**	**4.00**	**2.00**	**4.51**	**2.00**	**4.00**	**5.00**	**3.00**	**5.00**	**3.00**	**38.51**	4
Candidate Route B-25A EAST	Raw Ratio Score	1.00	1.00	1.00	0.97	0.87	1.00	0.88	1.00	0.98	0.97	1.00	10.67	
	Weighted Ratio Score	**5.00**	**1.00**	**4.00**	**1.94**	**4.37**	**2.00**	**3.50**	**5.00**	**2.95**	**4.87**	**3.00**	**37.62**	3
Candidate Route B-31 EAST	Raw Ratio Score	0.47	0.81	0.60	0.40	1.00	0.68	0.88	0.00	0.62	0.76	1.00	7.22	
	Weighted Ratio Score	**2.34**	**0.81**	**2.40**	**0.81**	**5.00**	**1.36**	**3.50**	**0.00**	**1.87**	**3.82**	**3.00**	**24.90**	2

Table 4-12C Somerville Candidate Route Scores

CANDIDATE ROUTE		HUMAN ENVIRONMENT CRITERIA					NATURAL ENVIRONMENT CRITERIA				CONSTRUCTABILITY & TECHNICAL CRITERIA			
		Residential Land Uses	Commercial and Industrial Land Uses	Sensitive Receptors	Historic & Archaeological Resources	Transportation Impacts	Wetland Resource Areas, Buffer Zone and Tidelands	Potential to Encounter Subsurface Contamination	Article 97 Lands	Public Shade Trees	Existing Utility Density	Complex Crossings	TOTAL SCORE	RANK
	Weight	5	1	4	2	5	2	4	5	3	5	3		
Candidate Route S-1A	Raw Ratio Score	0.61	0.87	0.43	0.20	0.76	0.00	0.86	0.00	0.64	0.51	0.50	5.38	
	Weighted Ratio Score	**3.07**	**0.87**	**1.71**	**0.40**	**3.80**	**0.00**	**3.44**	**0.00**	**1.92**	**2.53**	**1.50**	**19.25**	1
Candidate Route S-11C	Raw Ratio Score	0.41	0.80	0.43	0.80	0.36	0.00	1.00	0.00	0.31	0.74	1.00	5.85	
	Weighted Ratio Score	**2.03**	**0.80**	**1.71**	**1.60**	**1.79**	**0.00**	**4.00**	**0.00**	**0.93**	**3.71**	**3.00**	**19.58**	2
Candidate Route S-12	Raw Ratio Score	0.37	0.85	0.71	0.30	0.62	0.00	1.00	0.00	0.84	0.95	0.50	6.13	
	Weighted Ratio Score	**1.84**	**0.85**	**2.86**	**0.60**	**3.08**	**0.00**	**4.00**	**0.00**	**2.51**	**4.73**	**1.50**	**21.96**	3
Candidate Route S-13	Raw Ratio Score	1.00	0.85	1.00	0.65	1.00	0.00	0.53	0.00	0.98	0.83	0.25	7.08	
	Weighted Ratio Score	**4.98**	**0.85**	**4.00**	**1.30**	**5.00**	**0.00**	**2.11**	**0.00**	**2.93**	**4.16**	**0.75**	**26.09**	5
Candidate Route S-13A	Raw Ratio Score	1.00	0.86	1.00	1.00	0.94	0.00	0.72	0.00	1.00	1.00	0.25	7.78	
	Weighted Ratio Score	**5.00**	**0.86**	**4.00**	**2.00**	**4.70**	**0.00**	**2.89**	**0.00**	**3.00**	**5.00**	**0.75**	**28.21**	6
Candidate Route S-14	Raw Ratio Score	0.79	1.00	0.71	0.15	0.70	0.00	0.89	0.00	0.79	0.67	0.50	6.20	
	Weighted Ratio Score	**3.94**	**1.00**	**2.86**	**0.30**	**3.52**	**0.00**	**3.56**	**0.00**	**2.37**	**3.35**	**1.50**	**22.39**	4

Table 4-12D Putnam Candidate Routes Scores

CANDIDATE ROUTE		HUMAN ENVIRONMENT CRITERIA					NATURAL ENVIRONMENT CRITERIA				CONSTRUCTABILITY & TECHNICAL CRITERIA			
		Residential Land Uses	Commercial and Industrial Land Uses	Sensitive Receptors	Historic & Archaeological Resources	Transportation Impacts	Wetland Resource Areas, Buffer Zone and Tidelands	Potential to Encounter Subsurface Contamination	Article 97 Lands	Public Shade Trees	Existing Utility Density	Complex Crossings	TOTAL SCORE	Rank
	Weight	5	1	4	2	5	2	4	5	3	5	3		
Candidate Route P-11	Raw Ratio Score	0.98	0.62	1.00	1.00	1.00	0.88	0.56	0.00	0.82	0.68	1.00	8.54	
	Weighted Ratio Score	**4.88**	**0.62**	**4.00**	**2.00**	**5.00**	**1.77**	**2.25**	**0.00**	**2.46**	**3.40**	**3.00**	**29.38**	2
Candidate Route P-12	Raw Ratio Score	1.00	1.00	1.00	0.50	0.97	1.00	1.00	0.00	1.00	1.00	1.00	9.47	
	Weighted Ratio Score	**5.00**	**1.00**	**4.00**	**1.00**	**4.85**	**2.00**	**4.00**	**0.00**	**3.00**	**5.00**	**3.00**	**32.85**	3
Candidate Route P-13	Raw Ratio Score	0.98	0.50	1.00	0.50	0.58	0.86	0.25	0.00	0.38	0.47	1.00	6.52	
	Weighted Ratio Score	**4.90**	**0.50**	**4.00**	**1.00**	**2.89**	**1.71**	**1.00**	**0.00**	**1.14**	**2.35**	**3.00**	**22.50**	1

Table 4-12E Kendall Candidate Routes Scores

CANDIDATE ROUTE		HUMAN ENVIRONMENT CRITERIA					NATURAL ENVIRONMENT CRITERIA				CONSTRUCTABILITY & TECHNICAL CRITERIA			
		Residential Land Uses	Commercial and Industrial Land Uses	Sensitive Receptors	Historic & Archaeological Resources	Transportation Impacts	Wetland Resource Areas, Buffer Zone and Tidelands	Potential to Encounter Subsurface Contamination	Article 97 Lands	Public Shade Trees	Existing Utility Density	Complex Crossings	TOTAL SCORE	Rank
	Weight	5	1	4	2	5	2	4	5	3	5	3		
Candidate Route K-5A	Raw Ratio Score	0.91	0.88	0.80	0.60	1.00	1.00	0.86	0.00	0.91	0.87	0.00	7.82	
	Weighted Ratio Score	**4.56**	**0.88**	**3.20**	**1.20**	**5.00**	**2.00**	**3.43**	**0.00**	**2.72**	**4.35**	**0.00**	**27.33**	3
Candidate Route K-6A	Raw Ratio Score	1.00	1.00	1.00	0.90	1.00	1.00	1.00	0.00	1.00	1.00	0.00	8.90	
	Weighted Ratio Score	**5.00**	**1.00**	**4.00**	**1.80**	**5.00**	**2.00**	**4.00**	**0.00**	**3.00**	**5.00**	**0.00**	**30.80**	5
Candidate Route K-10	Raw Ratio Score	0.91	0.58	0.80	0.70	0.81	1.00	0.81	0.00	0.71	0.83	0.00	7.16	
	Weighted Ratio Score	**4.56**	**0.58**	**3.20**	**1.40**	**4.04**	**2.00**	**3.24**	**0.00**	**2.14**	**4.17**	**0.00**	**25.32**	2
Candidate Route K-11	Raw Ratio Score	0.63	0.53	0.80	0.80	0.69	1.00	0.86	0.00	0.69	0.83	0.00	6.83	
	Weighted Ratio Score	**3.14**	**0.53**	**3.20**	**1.60**	**3.47**	**2.00**	**3.43**	**0.00**	**2.08**	**4.15**	**0.00**	**23.60**	1
Candidate Route K-12	Raw Ratio Score	0.72	0.65	1.00	1.00	0.75	1.00	1.00	0.00	0.92	0.95	0.00	7.99	
	Weighted Ratio Score	**3.58**	**0.65**	**4.00**	**2.00**	**3.76**	**2.00**	**4.00**	**0.00**	**2.76**	**4.75**	**0.00**	**27.50**	4

Tables 4-13 through 4-17 below presents a summary of the Candidate Routes ranked by a total weighted environmental score. The lowest score equates to the lowest potential for impact based on the criteria used in this analysis. As previously noted, the Candidate Route that has the lowest and highest potential for impact is highlighted in **GREEN** (lowest) and **RED** (highest), respectively.

Table 4-13 Environmental Rank by Total Weighted Scores (Brighton Study Area East)

Candidate Route	Route Length (miles)	Total Weighted Score	Rank
B2A East (Magazine Beach HDD)	2.91[85]	20.82	1
B25 East (Herter Park HDD and Memorial Drive)	5.49	38.51	4
B25A East (Herter Park HDD and Harvard Athletic Complex)	5.40	37.62	3
B31 East (River Street Bridge)	3.26	24.90	2

As shown in Table 4-13, Candidate Route B2A has the lowest weighted environmental score and would result in the lowest potential for impact of the four Candidate Routes evaluated within the Brighton East Study Area. It is also the shortest Candidate Route to construct within the Study Area. Candidate Route B31 East had the second lowest weighted environmental score and would result in fewer potential impacts relative to the remaining three Candidate Routes. This route is also a geographically distinct routing alternative to Candidate Route B2A. Candidate Route B25 East had the highest weighted environmental score and would result in the greatest potential for impacts of all the Candidate Routes. It is also the longest of these Candidate Routes.

Table 4-14 Environmental Rank by Total Weighted Scores (Brighton Study Area West)

Candidate Route	Route Length (miles)	Total Weighted Score	Rank
B24 West (Herter Park HDD and Mt. Auburn Street)	4.14	33.99	3
B24A West (Herter Park HDD and WBZ Site)	4.05	34.35	4
B29F West (River Street Bridge)	3.00	21.33	1
B30 West (Anderson Bridge)	3.43	29.22	2

[85] Route Variation B2AN is nominally longer at approximately 2.96 miles.

As shown in Table 4-14, Candidate Route B29F West has the lowest weighted environmental score and would result in the lowest potential for impact of the four Candidate Routes evaluated within the Brighton West Study Area. It is also the shortest Candidate Route to construct within the Study Area. Candidate Route B30 West had the second lowest weighted environmental score and would result in fewer potential impacts relative to the remaining three Candidate Routes. This route is also a geographically distinct routing alternative to Candidate Route B29F West. Candidate Route B24A West had the highest weighted environmental score and would result in the greatest potential for impacts of all the Candidate Routes. This route is also more than one mile longer than the top Route B29F West and more than ½ mile longer than Route B30 West.

Table 4-15 Environmental Rank by Total Weighted Scores (Putnam Study Area)

Candidate Route	Route Length (miles)	Total Weighted Score	Rank
P11 (Massachusetts Avenue)	0.87	29.38	2
P12 (Vassar Street)	1.44	32.85	3
P13 (Ames Street)	0.49	22.50	1

As shown in Table 4-15, Candidate Route P13 has the lowest weighted environmental score and would result in the lowest potential for impact of the three Candidate Routes evaluated within the Putnam Study Area. It is also the shortest Candidate Route to construct within the Study Area. Candidate Route P11 had the second lowest weighted environmental score and would result in fewer potential impacts relative to the remaining Candidate Route. This route is also a geographically distinct routing alternative to Candidate Route P13. Candidate Route P12 had the highest weighted environmental score and would result in the greatest potential for impacts of all the Candidate Routes. It is also the longest of these Candidate Routes.

Table 4-16 Environmental Rank by Total Weighted Scores (Kendall Study Area)

Candidate Route	Route Length (miles)	Total Weighted Score	Rank
K5A (Linskey Way)	0.59	27.33	3
K6A (Binney Street	0.67	30.80	5
K10 (Potter Street)	0.63	25.32	2
K11 (Fifth Street)	0.61	23.60	1
K12 (Munroe Street)	0.69	27.50	4

As shown in Table 4-16, Candidate Route K11 has the lowest weighted environmental score and would result in the lowest potential for impact of the five Candidate Routes evaluated within the Kendall Study Area. Candidate Route K10 had the second lowest weighted environmental score and would result in fewer potential impacts relative to the remaining four Candidate Routes. However, when compared to the top scoring Candidate Route K11, it only provides modest geographic diversity with the primary difference being about two city blocks before converging again with Candidate Route K11 on Linskey Way. Greater geographic diversity from Candidate

Route K11 is provided by Candidate Routes K5A and 6A, which follow Broadway and Third Street, across the Volpe Center Site's eastern corner, and to a lesser degree Candidate Route K12, which follows Binney Street in lieu of Linskey Way. Candidate Route K6A had the highest weighted environmental score and would result in the greatest potential for impacts of all the Candidate Routes. All these routes contain generally comparable lengths, with Candidate Route K5A being the shortest most direct route and Candidate Route K12 being the longest route.

Table 4-17 Environmental Rank by Total Weighted Scores (Somerville Study Area)

Candidate Route	Route Length (miles)	Total Weighted Score	Rank
S1A (Hampshire Street and D2 Site)	1.25[86]	19.25	1
S11C (Grand Junction RR Multi-Use Pathway)	1.56	19.58	2
S12 (Cardinal Medeiros Avenue)	1.48	21.96	3
S13 (Broadway)	1.57	26.09	5
S13A (D2 Site and Somerville Avenue)	1.82	28.21	6
S14 (Columbia Street)	1.38	22.39	4

As shown in Table 4-17, Candidate Route S1A has the lowest weighted environmental score and would result in the lowest potential for impact of the six Candidate Routes evaluated within the Somerville Study Area. It is also one of the shorter Candidate Route to construct within this Study Area. Candidate Route S11C had the second lowest weighted environmental score and of the remaining six routes, it would result in fewer potential impacts. This route is also a geographically distinct routing alternative to Candidate Route S1A. Candidate Route S13A had the highest weighted environmental score and would result in the greatest potential for impacts of all the Candidate Routes. It is also the longest of these Candidate Routes.

The following sections provide more detailed comparisons and observations of the environmental analysis results.

4.8.1 Environmental Scoring Criteria Overview Tables

The series of tables provided on the following pages provide an overview of how each Candidate Route scores with respect to the three distinct subcategories of the environmental criteria: Developed Environment, Natural Environment, and Technical and Constructability. The Candidate Route that has the lowest and highest potential for impact is highlighted in **GREEN** (lowest) and **RED** (highest), respectively.

[86] Route Variation S1 is nominally longer in length at approximately 1.28 miles.

4.8.1.1 Developed Environment

Table 4-18 Overview of Developed Environment Scores (Brighton Study Area East)

Candidate Route	Developed Environment	
	Weighted Score	Rank
B2A East (Magazine Beach HDD)	7.71	1
B25 East (Herter Park HDD and Memorial Drive)	16.51	4
B25A East (Herter Park HDD and Harvard Athletic Complex)	16.31	3
B31 East (River Street Bridge)	11.36	2

Table 4-19 Overview of Developed Environment Scores (Brighton Study Area West)

Candidate Route	Developed Environment	
	Weighted Score	Rank
B24 West (Herter Park HDD and Mt. Auburn Street)	14.91	3
B24A West (Herter Park HDD and WBZ Site)	14.89	2
B29F West (River Street Bridge)	7.29	1
B30 West (Anderson Bridge)	16.50	4

Table 4-20 Overview of Developed Environment Scores (Putnam Study Area)

Candidate Route	Developed Environment	
	Weighted Score	Rank
P11 (Massachusetts Avenue)	16.50	3
P12 (Vassar Street)	15.85	2
P13 (Ames Street)	13.29	1

Table 4-21 Overview of Developed Environment Scores (Kendall Study Area)

Candidate Route	Developed Environment	
	Weighted Score	Rank
K5A (Linskey Way)	14.83	4
K6A (Binney Street)	16.80	5
K10 (Potter Street)	13.78	2
K11 (Fifth Street)	11.94	1
K12 (Munroe Street)	13.99	3

Table 4-22 Overview of Developed Environment Scores (Somerville Study Area)

Candidate Route	Developed Environment	
	Weighted Score	Rank
S1A (Hampshire Street and D2 Site)	9.86	3
S11C (Grand Junction RR Multi-Use Pathway)	7.94	1
S12 (Cardinal Medeiros Avenue)	9.22	2
S13 (Broadway)	16.13	5
S13A (D2 Site and Somerville Avenue)	16.57	6
S14 (Columbia Street)	11.62	4

4.8.1.2 Natural Environment

Table 4-23 Overview of Natural Environment Scores (Brighton Study Area East)

Candidate Route	Natural Environment	
	Weighted Score	Rank
B2A East (Magazine Beach HDD)	7.54	2
B25 East (Herter Park HDD and Memorial Drive)	14.00	4
B25A East (Herter Park HDD and Harvard Athletic Complex)	13.45	3
B31 East (River Street Bridge)	6.73	1

Table 4-24 Overview of Natural Environment Scores (Brighton Study Area West)

Candidate Route	Natural Environment	
	Weighted Score	Rank
B24 West (Herter Park HDD and Mt. Auburn Street)	11.50	4
B24A West (Herter Park HDD and WBZ Site)	11.46	3
B29F West (River Street Bridge)	7.89	2
B30 West (Anderson Bridge)	5.47	1

Table 4-25 Overview of Natural Environment Scores (Putnam Study Area)

Candidate Route	Natural Environment	
	Weighted Score	Rank
P11 (Massachusetts Avenue)	6.47	2
P12 (Vassar Street)	9.00	3
P13 (Ames Street)	3.85	1

Table 4-26 Overview of Natural Environment Scores (Kendall Study Area)

Candidate Route	Natural Environment	
	Weighted Score	Rank
K5A (Linskey Way)	8.15	3
K6A (Binney Street)	9.00	5
K10 (Potter Street)	7.38	1
K11 (Fifth Street)	7.51	2
K12 (Munroe Street)	8.76	4

Table 4-27 Overview of Natural Environment Scores (Somerville Study Area)

Candidate Route	Natural Environment	
	Weighted Score	Rank
S1A (Hampshire Street and D2 Site)	5.37	3
S11C (Grand Junction RR Multi-Use Pathway)	4.93	1
S12 (Cardinal Medeiros Avenue)	6.51	6
S13 (Broadway)	5.04	2
S13A (D2 Site and Somerville Avenue)	5.89	4
S14 (Columbia Street)	5.92	5

4.8.1.3 Technical and Constructability

Table 4-28 Overview of Technical and Constructability Scores (Brighton Study Area East)

Candidate Route	Technical and Constructability	
	Weighted Score	Rank
B2A East (Magazine Beach HDD)	5.58	1
B25 East (Herter Park HDD and Memorial Drive)	8.00	4
B25A East (Herter Park HDD and Harvard Athletic Complex)	7.87	3
B31 East (River Street Bridge)	6.82	2

Table 4-29 Overview of Technical and Constructability Scores (Brighton Study Area West)

Candidate Route	Technical and Constructability	
	Weighted Score	Rank
B24 West (Herter Park HDD and Mt. Auburn Street)	7.57	3
B24A West (Herter Park HDD and WBZ Site)	8.00	4
B29F West (River Street Bridge)	6.16	1
B30 West (Anderson Bridge)	7.25	2

Table 4-30 Overview of Technical and Constructability Scores (Putnam Study Area)

Candidate Route	Technical and Constructability	
	Weighted Score	Rank
P11 (Massachusetts Avenue)	6.40	2
P12 (Vassar Street)	8.00	3
P13 (Ames Street)	5.35	1

Table 4-31 Overview of Technical and Constructability Scores (Kendall Study Area)

Candidate Route	Technical and Constructability	
	Weighted Score	Rank
K5A (Linskey Way)	4.35	3
K6A (Binney Street)	5.00	5
K10 (Potter Street)	4.17	2
K11 (Fifth Street)	4.15	1
K12 (Munroe Street)	4.75	4

Table 4-32 Overview of Technical and Constructability Scores (Somerville Study Area)

Candidate Route	Technical and Constructability	
	Weighted Score	Rank
S1A (Hampshire Street and D2 Site)	4.03	1
S11C (Grand Junction RR Multi-Use Pathway)	6.71	6
S12 (Cardinal Medeiros Avenue)	6.23	5
S13 (Broadway)	4.91	3
S13A (D2 Site and Somerville Avenue)	5.75	4
S14 (Columbia Street)	4.85	2

4.9 Cost Analysis

The Company evaluated cost estimates for each Candidate Route. Many factors can affect the cost of a transmission line project, including cost and availability of materials and equipment, labor, presence of contaminated soils and potential for work hour restrictions or time-of-year restrictions imposed by project permits, the local community, or other entities. Subsurface conditions such as the type and depth of soil and rock that must be excavated to place the duct bank could also significantly affect project cost. In addition, the cost is influenced by the proximity of existing distribution and transmission lines and the density of underground utilities. Waterbodies, like the Charles River, or other features that may need to be traversed by trenchless or other more complex crossing options, could also significantly affect project cost.

A summary of the cost estimates for the Candidate Routes is provided below in Tables 4-33 through 4-37. The cost estimates include transmission line design, substation connections, survey, environmental compliance, environmental mitigation, siting and permitting, construction management, public outreach, risk contingency, and other potential associated costs. The Candidate Route that has the lowest and highest cost is highlighted in **GREEN** (lowest) and **RED** (highest), respectively.

Table 4-33 Candidate Route Cost Estimates (Brighton Study Area East)

Candidate Route	Cost ($ millions)[87]	Cost Ranking within Study Area	Percent More than Lowest Cost Estimate within Study Area
B2A East (Magazine Beach HDD)	$194.0	1	0%
B25 East (Herter Park HDD and Memorial Drive)	$290.8	4	49.9%
B25A East (Herter Park HDD and Harvard Athletic Complex)	$288.4	3	48.6%
B31 East (River Street Bridge)	$199.6	2	2.9%

Table 4-34 Candidate Route Cost Estimates (Brighton Study Area West)

Candidate Route	Cost ($ millions)[88]	Cost Ranking within Study Area	Percent More than Lowest Cost Estimate within Study Area
B24 West (Herter Park HDD and Mt. Auburn Street)	$229.8	4	18.5%
B24A West (Herter Park HDD and WBZ Site)	$228.7	3	17.9%
B29F West (River Street Bridge)	$194.0	1	0%
B30 West (Anderson Bridge)	$215.4	2	11%

[87] Planning grade cost estimates (-25%/+25%) were developed for Routes B2A East and B31 East based on preliminary engineering drawings. Order of magnitude cost estimates (-50%/+200%) were developed for Routes B25 East and B25A East based on initial engineering drawings.

[88] Planning grade cost estimates (-25%/+25%) were developed for Routes B29F West and B30 West based on preliminary engineering drawings. Order of magnitude cost estimates (-50%/+200%) were developed for Routes B24 West and B24A West based on initial engineering drawings.

Table 4-35 Candidate Route Cost Estimates (Putnam Study Area)

Candidate Route	Cost ($ millions)[89]	Cost Ranking within Study Area	Percent More than Lowest Cost Estimate within Study Area
P11 (Massachusetts Avenue)	$56.7	2	50.8%
P12 (Vassar Street)	$80.5	3	114%
P13 (Ames Street)	$37.6	1	0%

Table 4-36 Candidate Route Cost Estimates (Kendall Study Area)

Candidate Route	Cost ($ millions)[90]	Cost Ranking within Study Area	Percent More than Lowest Cost Estimate within Study Area
K5A (Linskey Way)	$48.6	1	0%
K6A (Binney Street)	$59.2	2	21.8%
K10 (Potter Street)	$66.3	3	36.4%
K11 (Fifth Street)	$72.1	4	48.4%
K12 (Munroe Street	$80.0	5	64.6%

[89] Planning grade cost estimates (-25%/+25%) were developed for Routes P11 and P13 based on preliminary engineering drawings. An order of magnitude cost estimate (-50%/+200%) was developed for Route P12 based on initial engineering drawings.

[90] Planning grade cost estimates (-25%/+25%) were developed for Routes K5A and K11 based on preliminary engineering drawings. Conceptual cost estimates (-25%/+50%) were developed for Routes K6A, K10 and K12 based on conceptual engineering drawings.

Table 4-37 Candidate Route Cost Estimates (Somerville Study Area)

Candidate Route	Cost ($ millions)[91]	Cost Ranking within Study Area	Percent More than Lowest Cost Estimate within Study Area
S1A (Hampshire Street and D2 Site)	$98.6	1	0%
S11C (Grand Junction RR Multi-Use Pathway)	$130.0	6	31.8%
S12 (Cardinal Medeiros Avenue)	$111.0	4	12.6%
S13 (Broadway)	$99.4	3	0.8%
S13A (D2 Site and Somerville Avenue)	$113.8	5	15.4%
S14 (Columbia Street)	$99.3	2	0.7%

4.10 Reliability Analysis

The Company considered whether there was a difference in the Candidate Routes regarding the reliability of the proposed New Line. All Candidate Routes are underground and have relatively small differences in design that do not result in any substantial difference in the level of reliability risk. A new 115-kV transmission line constructed along any of the Candidate Routes would address the Project Need identified in Section 2 of this Analysis.

4.11 Selection of Top Two Routes within Each Study Area

Tables 4-38 through 4-41 provide a comprehensive summary of the Candidate Routes and their relative rankings with respect to the natural environment, developed environment, constructability, overall environmental score, reliability, and cost.

[91] Planning grade cost estimates (-25%/+25%) were developed for Routes S1A and S11C based on preliminary engineering drawings. Conceptual cost estimates (-25%/+50%) were developed for Routes S12, S13, S13A, and S14 based on conceptual engineering drawings.

Table 4-38 Ranking Summary of Transmission Line Candidate Routes/Designs (Brighton Study Area East)

Candidate Route	Developed Environment	Natural Environment	Technical & Constructability	Total Environmental	Estimated Cost	Route Ranking
B2A East (Magazine Beach HDD)	1	2	1	1	1	Preferred
B25 East (Herter Park HDD and Memorial Drive)	4	4	4	4	4	
B25A (Herter Park HDD and Harvard Athletic Complex)	3	3	3	3	3	
B31 East (River Street Bridge)	2	1	2	2	2	Noticed Alternative

Table 4-39 Ranking Summary of Transmission Line Candidate Routes/Designs (Brighton Study Area West)

Candidate Route	Developed Environment	Natural Environment	Technical & Constructability	Total Environmental	Estimated Cost	Route Ranking
B24 West (Herter Park HDD and Mt. Auburn Street)	3	4	3	3	4	
B24A West (Herter Park HDD and WBZ Site)	2	3	4	4	3	
B29F West (River Street Bridge)	1	2	1	1	1	Preferred
B30 West (Anderson Bridge)	4	1	2	2	2	Noticed Alternative

Table 4-40 Ranking Summary of Transmission Line Candidate Routes/Designs (Putnam Study Area)

Candidate Route	Developed Environment	Natural Environment	Technical & Constructability	Total Environmental	Estimated Cost	Route Ranking
P11 (Massachusetts Avenue)	3	2	2	2	2	Noticed Alternative
P12 (Vassar Street)	2	3	3	3	3	
P13 (Ames Street)	1	1	1	1	1	Preferred

Table 4-41 Ranking Summary of Transmission Line Candidate Routes/Designs (Kendall Study Area)

Candidate Route	Developed Environment	Natural Environment	Constructability	Total Environmental	Estimated Cost	Route Ranking
K5A (Linskey Way)	4	3	3	3	1	Preferred
K6A (Binney Street)	5	5	5	5	2	
K10 (Potter Street)	2	1	2	2	3	
K11 (Fifth Street)	1	2	1	1	4	Noticed Alternative
K12 (Munroe Street)	3	4	4	4	5	

Table 4-42 Ranking Summary of Transmission Line Candidate Routes/Designs (Somerville Study Area)

Candidate Route	Developed Environment	Natural Environment	Technical & Constructability	Total Environmental	Estimated Cost	Ranking
S1A (Hampshire Street and D2 Site)	3	3	1	1	1	Preferred
S11C (Grand Junction RR Multi-Use Pathway)	1	1	6	2	6	Noticed Alternative
S12 (Cardinal Medeiros Avenue)	2	6	5	3	4	
S13 (Broadway)	5	2	3	5	3	
S13A (D2 Site and Somerville Avenue)	6	4	4	6	5	
S14 (Columbia Street)	4	5	2	4	2	

In consideration of the above, the Company identified the top two routes within the Putnam, Kendall, and Somerville Study Areas and the top four routes within the Brighton Study Areas that best balance environmental impacts, costs, and reliability, provide some measure of geographic diversity, and enable the Company to meet the identified need. The top routes are summarized in further detail below.

As illustrated on Table 4-43 below, Candidate Routes P13 and P11 emerged as the top two routes in the Putnam Study Area. Candidate Route P13 is the best scoring, most direct, and lowest cost alternative in this Study Area. Similarly, Candidate Route P11 ranked second on overall scoring and cost estimates. Accordingly, given its overall superiority in the route selection process, Candidate Route P13 was identified as the Preferred Route and Candidate Route P11 was identified as the Noticed Alternative Route in the Putnam Study Area.

Table 4-43 Top Two Routes in the Putnam Study Area

Route Name	Length of Route (miles)	Communities Crossed by Routes
P13 (Ames Street)	0.49	Cambridge
P11 (Massachusetts Avenue)	0.87	Cambridge

For the Kendall Study Area, as illustrated on Table 4-44 below, Candidate Routes K5A and K11 emerged as the top two routes in the Kendall Study Area. Candidate Route K5A is the lowest cost route but ranks third overall from a scoring perspective. The final alignment of K5A was identified in close consultation and with the support of the owner of the development rights (MITIMCO) and the City of Cambridge to avoid and minimize potential impacts to future development plans on the Volpe Center Site, minimization of impacts to public shade trees, and in consideration of significant utility congestion and planned utility upgrades in Broadway and Third Street. Candidate Route K11 ranks first overall from a scoring perspective but is one of the more expensive routes to construct within the Kendall Study Area primarily because of the anticipated easement costs associated with obtaining rights to install and operate the transmission line in three private roads (Potter Street, Fifth Street, Munroe Street). While the Kendall Study Area is very compact, Candidate Route K11 does provide some measure of geographic diversity relative to Candidate Route K5A. In consideration of these factors, Candidate Routes K5A and K11 were identified as the top routes in the Kendall Study Area. More specifically, Candidate Route K5A was selected as the Preferred Route and Candidate Route K11 was selected as the Noticed Alternative Route in the Kendall Study Area.

Table 4-44 Top Two Routes in the Kendall Study Area

Route Name	Length of Route (miles)	Communities Crossed by Routes
K5A (Linskey Way)	0.59	Cambridge
K11 (Fifth Street)	0.61	Cambridge

For the Somerville Study Area, as illustrated on Table 4-45 below, Candidate Routes S1A and S11C emerged as the top two routes in the Somerville Study Area. Candidate Route S1A received the best overall score and is the second least expensive. Candidate Route S11C received the second-best overall score (within ½ point to Candidate Route S1A); however, it is the most expensive of all the routes considered. Candidate Route S11C was retained as one of the top two routes in this Study Area for its geographic diversity and utilization of off-road segments along the Grand Junction Railroad corridor including potentially collocating with a future municipal multiuse pathway project. For the foregoing reasons, considering its overall superiority in the route selection process, Candidate Route S1A is the Preferred Route (along with Route Variation S1) and Candidate Route S11C is the Noticed Alternative Route in the Somerville Study Area.

Table 4-45 Top Two Routes in the Somerville Study Area

Route Name	Length of Route (miles)	Communities Crossed by Routes
S1A (Hampshire Street and D2 Site)	1.25	Cambridge, Somerville
S11C (Grand Junction RR Multi-Use Pathway)	1.56	Cambridge, Somerville

In the Brighton Study Area, with respect to the eastern routes evaluated, as illustrated on Table 4-46 below, Candidate Routes B2A and B31 emerged as the top two routes. Candidate Route B2A received the best overall score, is the most direct, and is the least expensive option in the Study Area. Candidate Route B31 received the second-best overall score, is the second least expensive option in the Study Area and utilizes existing roadway corridors. Accordingly, given its overall superiority in the route selection process, Candidate Route B2A is the Preferred Route (along with Route Variation B2AN) and Candidate Route B31 is the Noticed Alternative Route in the eastern portion of the Brighton Study Area.

Table 4-46 Top Two Routes in the Brighton East Study Area

Route Name	Length of Route (miles)	Communities Crossed by Routes
B2A East (Magazine Beach HDD)	2.91	Cambridge, Somerville, Boston
B31 East (River Street Bridge)	3.26	Cambridge Somerville, Boston

For the western routes in the Brighton Study Area, as illustrated on Table 4-47 below, Candidate Routes B29F and B30 emerged as the top two routes. Candidate Route B29F received the best overall score and is the least expensive route option. Candidate Route B30 received the second-best overall score and is ranked second with respect to cost. Thus, based on its overall superiority in the route selection process, Candidate Route B29F is the Preferred Route and Candidate Route B30 is the Noticed Alternative Route in the western portion of the Brighton Study Area.

Table 4-47 Top Two Routes in the Brighton West Study Area

Route Name	Length of Route (miles)	Communities Crossed by Routes
B29F West (River Street Bridge)	3.00	Cambridge, Somerville, Boston
B30 West (Anderson Bridge)	3.43	Cambridge, Somerville, Boston

4.12 Conclusion

In accordance with the Siting Board's standard of review, the Company has objectively and comprehensively assessed a wide array of potential routes and route variations within the bounds of the Project Study Area and with extensive stakeholder input. At the conclusion of this process, the Company identified the top two routes within the Putnam, Kendall, and Somerville Study Areas and the top four routes within the Brighton Study Area that best balance environmental impacts, costs and reliability and enable the Company to meet the identified need. A more detailed examination and comparison of these top routes is presented in Section 5.

Section 5.0

Route Comparison

5.0 ROUTE COMPARISON

5.1 Introduction and Overview

As presented in Section 4, the Company objectively and comprehensively assessed a wide array of potential transmission line routes and route variations within the bounds of four separate Study Areas referred to as the Brighton, Putnam, Kendall, and Somerville Study Areas. At the conclusion of this process, the Company identified the top two transmission line routes within these Study Areas and the top four transmission line routes within the Brighton Study Area[92] that best balance environmental impacts, costs and reliability and enable the Company to meet the identified need. A more detailed examination and comparison of these top routes is presented in the balance of this section. The Preferred Routes within each respective Study Area are summarized on Table 5-1 below. Collectively, these Preferred Routes along with related substation work comprise the "Project".

Table 5-1 Preferred Project Routes

Study Area	Preferred Route Name	Communities Crossed by Routes
Putnam	P13 (Ames Street)	Cambridge
Kendall	K5A (Linskey Way)	Cambridge
Somerville	S1A (Hampshire Street/D2 Site)	Cambridge, Somerville
Brighton (East)	B2A (Magazine Beach HDD)	Cambridge, Boston
Brighton (West)	B29F (River Street Bridge)	Cambridge, Boston

[92] As was described in Section 4, the Brighton Study Area involves construction of two new transmission line duct banks, necessitating a separate evaluation of potential routes that head east or west from the New Substation onto Broadway to ensure geographic diversity as required by the Siting Board while being mindful of space and constructability constraints to install and operate the new transmission lines.

In addition to the Preferred Routes noted above, the Company also analyzed minor route variations to Preferred Routes S1A and B2A. As described in further detail in Section 5.2, Route Variation S1 provides an alternate route across the D-2 Block-Union Square Project development site ("D2 Site") in Somerville as it approaches the Somerville Substation.

Route Variation B2AN is a variation of route B2A to address the current options for the MassDOT Allston Multimodal Project Site (the "N" stands for "no-build"). Route Variation B2AN was designed with input from the present landowner (Harvard) to accommodate future development of the property.

Geographically distinct routing alternatives were also selected from each Study Area. Collectively these routes comprise the "Noticed Alternative." The Noticed Alternative routes include:

Table 5-2 Noticed Alternative Routes

Study Area	Noticed Alternative Route Name	Communities Crossed by Routes
Putnam	P11 (Massachusetts Avenue)	Cambridge
Kendall	K11 (Fifth Street)	Cambridge
Somerville	S11C (Grand Junction RR Multi-Use Pathway)	Cambridge, Somerville
Brighton (East)	B31 (River Street Bridge)	Cambridge, Boston
Brighton (West)	B30 (Anderson Bridge)	Cambridge, Boston

The balance of this Section provides an overview of the construction methodology and construction sequence for the overall Project and a detailed comparison of the potential environmental impacts and mitigation, cost and reliability associated with the construction and operation of the Project and the Noticed Alternative. This Section includes complete descriptions of the Project components; maps, construction methods and representative photographs of each of the transmission line routes; a description of the modifications needed at the Company's existing substation facilities where the New Lines will be interconnected; and impacts associated with construction of the New Substation. The construction methods and associated impacts described in this Section are based on preliminary engineering designs. More detailed engineering designs will be developed as part of the final design phase and will reflect continued input from stakeholders, such as input from the staff at the cities of Cambridge, Somerville, and Boston, as well as state and federal agencies. This Section also contains a description of the community engagement actions taken by the Company in its analysis of facility locations and development of the overall Project.

As described in further detail below, based on this detailed comparison, the Company determined that, while the Project and Noticed Alternative would offer comparable reliability, the Project, on balance, is superior to the Noticed Alternative with respect to environmental impacts and cost.

5.2 Route Descriptions

The Preferred Routes for the Project, Noticed Alternative and proposed route variations (collectively the "Routes") are depicted on the following pages in Figures 5-1 and 5-2. Representative photographs of existing locations along the Routes are provided in the Photographic Log, Appendix 5-1.

5.2.1 Preferred Project Routes

The Project includes a total of 8.3 miles of new underground electric transmission line duct banks to be located predominantly in public roadways. A detailed map set of the Preferred Routes is provided in Appendix 5-2. The five Preferred Routes of the Project were described in detail in Section 4. For ease of review and context, these routes are summarized again below.

Putnam Study Area: Preferred Route P13 (Ames Street)

The Preferred Route P13 is approximately 0.49-miles long, located entirely within Cambridge. This route heads east from the proposed New Substation facility in East Cambridge onto Broadway and south on Ames Street. The route follows Ames Street through the Main Street intersection, and the MBTA Red Line subway tunnel beneath it, to the intersection with Memorial Drive. At Memorial Drive, the route ends in a "T" configuration with the line being spliced into existing Eversource transmission line(s) to the east and west on Memorial Drive.

Kendall Study Area: Preferred Route K5A (Linskey Way)

The Preferred Route K5A is approximately 0.59-miles long, located entirely within Cambridge. This route heads east from the New Substation onto Broadway, then turns northeast the abutting U.S. Department of Transportation John A. Volpe National Transportation Systems Center ("Volpe Center Site") property and transitions onto Third Street near its intersection with Potter Street. The route crosses the Volpe Center Site to avoid utility congestion in parts of Third Street and specifically the Third Street/Broadway intersection. The route then turns east onto Linskey Way and south onto Second Street, where it connects into the East Cambridge Substation.

Somerville Study Area: Preferred Route S1A (Hampshire Street/D2 Site)

The Preferred Route S1A is approximately 1.25-miles long, located within Cambridge and Somerville. This route heads west from the New Substation Site onto Broadway for about one block before turning northwest onto Hampshire Street. From Hampshire Street, the route heads north on Columbia Street. The route follows Columbia Street into Somerville to its intersection with Windsor Place. The route crosses Windsor Place and heads north across a private commercial

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

- New Substation Site #8025
- Existing Substation
- Town/City Boundary
- Brighton Preferred Route B2A East (2.91-mi)
- Brighton Preferred Route B29F West (3.00-mi)
- Kendall Preferred Route K5A (0.59-mi)
- Putnam Preferred Route P13 (0.49-mi)
- Somerville Preferred Route S1A (1.25-mi)

Scale 1:19,200
1 inch = 1,600 feet

0 800 1,600 Feet

Basemap: 2021 Aerial, Nearmap

North Cambridge Substation #509
Somerville Substation #402
Route Variation S1
D2 SITE
Brighton Substation #329
Putnam Substation #831
New Substation Site #8025
VOLPE CENTER SITE
East Cambridge Substation #875
RIVER STREET BRIDGE CROSSING
MASSDOT ALLSTON MULTIMODAL PROJECT SITE
MAGAZINE BEACH
HDD CROSSING
Route Variation B2AN
Fresh Pond Parkway
Concord Avenue
Massachusetts Avenue
Elm Street
Highland Avenue
Summer Street
Medford Street
McGrath Highway
Somerville Avenue
Beacon Street
Washington Street
Craigie Street
Brattle Street
Garden Street
Kirkland Street
Quincy Street
Mount Auburn Street
Belmont Street
CAMBRIDGE
BELMONT
Cambridge Street
Prospect Street
Webster Avenue
Hampshire Street
Broadway
Inman Street
Cardinal Medeiros Avenue
Columbia Street
Portland Street
Third Street
Binney Street
Cambridge Parkway
Monsignor Obrien Highway
New Rutherford Avenue
SOMERVILLE
CAMBRIDGE
BOSTON
SOMERVILLE
Nashua Street
Charles Street
Charlesbank Road
Longfellow Bridge
First Street
Main Street
Albany Street
Vassar Street
Wavercly Street
Erie Street
Sidney Street
Brookline Street
Putnam Avenue
Memorial Drive
River Street
Western Avenue
Soldiers Field Road
Arsenal Street
WATERTOWN
BOSTON
North Harvard Street
WATERTOWN
CAMBRIDGE
North Beacon Street
Market Street
Brighton Avenue
Harvard Avenue
CAMBRIDGE
BOSTON
Commonwealth Avenue
Boylston Street
28
2
3
3
1
93
90
20

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Figure 5-1
Project with Route Variations

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

- New Substation Site #8025
- Existing Substation
- Town/City Boundary
- Brighton Noticed Alternative Route B31 East (3.26-mi)
- Brighton Noticed Alternative Route B30 West (3.43-mi)
- Kendall Noticed Alternative Route K11 (0.61-mi)
- Putnam Noticed Alternative Route P11 (0.87-mi)
- Somerville Noticed Alternative Route S11C (1.56-mi)

Scale 1:19,200
1 inch = 1,600 feet

0 800 1,600 Feet

Basemap: 2021 Aerial, Nearmap

North Cambridge Substation #509
Somerville Substation #402
D2 SITE
New Substation Site #8025
VOLPE CENTER SITE
East Cambridge Substation #875
Putnam Substation #831
Brighton Substation #329
ANDERSON BRIDGE CROSSING
RIVER STREET BRIDGE CROSSING
MASSDOT ALLSTON MULTIMODAL PROJECT SITE
MAGAZINE BEACH
GRAND JUNCTION RAILROAD CORRIDOR

Fresh Pond Parkway, Concord Avenue, Massachusetts Avenue, Elm Street, Highland Avenue, Summer Street, Somerville Avenue, Medford Street, Mcgrath Highway, Beacon Street, Washington Street, Craigie Street, Brattle Street, Garden Street, Kirkland Street, Belmont Street, Mount Auburn Street, Quincy Street, Prospect Street, Cambridge Street, Broadway, Inman Street, Hampshire Street, Cardinal Medeiros Avenue, Monsignor Obrien Highway, Atlantic Street, New Rutherford Avenue, Nashua Street, Cambridge Parkway, Charlesbank Road, Charles Street, Longfellow Bridge, First Street, Main Street, Portland Street, Columbia Street, River Street, Western Avenue, North Harvard Street, Soldiers Field Road, Arsenal Street, North Beacon Street, Market Street, Brighton Avenue, Harvard Avenue, Memorial Drive, Putnam Avenue, Brookline Street, Sidney Street, Albany Street, Vassar Street, Erie Street, Waverly Street, Commonwealth Avenue, Boylston Street

CAMBRIDGE, BELMONT, WATERTOWN, BOSTON, SOMERVILLE

1, 2, 3, 20, 28, 90, 93

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Figure 5-2
Noticed Alternative

parking lot towards the MBTA commuter rail tracks (Fitchburg Route Main Line). The railroad tracks would be crossed using a trenchless construction technique. After crossing the tracks, the route travels in a westerly direction across the D2 Site, parallel to the MBTA railroad tracks and the MBTA new Green Line train station platform, turning north running parallel to Prospect Street (and around the approximate limits of a building that is presently under construction on the D2 Site), and then west across Prospect Street where it enters the Somerville Substation property.

Route Variation S1 follows the same alignment described above for the Preferred Route S1A except that it travels in a northwesterly direction around the eastern edge of the site of the MBTA's new Union Square train station platform, across the D2 Site, generally following the approximate alignment of two future roadways associated with the development, identified as Milk Alley and Bennett Court. The route then crosses over Prospect Street and accesses the Somerville Substation from the east.

Brighton Study Area (East): Preferred Route B2A East (Magazine Beach HDD)

The Preferred Route B2A East is approximately 2.91-miles long, located in Cambridge and Boston. This route heads east from the New Substation Site in Cambridge onto Broadway before turning south onto Ames Street. The route follows Ames Street through the Main Street intersection, and the MBTA Red Line subway tunnel beneath it, to the intersection with Memorial Drive. At Memorial Drive, the route turns to the west following the east bound lanes to the MassDCR Magazine Beach property. Like Magazine Beach, the Memorial Drive segment is located within the Charles River Reservation and is under the care and custody of MassDCR. At the Magazine Beach property, the route crosses beneath the Charles River into Boston via HDD. After crossing beneath the Charles River, the route follows the general alignment of the anticipated new street, referred to as the Lincoln Street Connector, that is proposed to be constructed as part of MassDOT's Allston Multimodal Project. From there, the route goes onto Cambridge Street, following Cambridge Street to Empire Street and Lincoln Street where it terminates at the Brighton Substation.

The Company evaluated a route variation to Route B2A East associated with the orientation of the HDD path across the MassDOT Allston Multimodal Project Site. The Preferred Route B2A East generally follows the future alignment of the Lincoln Street Connector through the multimodal site and Route Variation B2AN East generally runs parallel with the southerly property line near the existing MBTA rail tracks. Route Variation B2AN provides routing flexibility if MassDOT's Allston Multimodal Project does not advance into construction as currently proposed, while also minimizing potential future development constraints by locating the transmission line and manhole infrastructure in areas of the site that will not negatively affect the present landowner's (Harvard) ability to develop the property in the future. This route variation does not add any appreciable length (approximately 0.05 miles) or costs relative to the Preferred Route B2A.

Brighton Study Area (West): Preferred Route B29F West (River Street Bridge)

The Preferred Route heading west from the New Substation in the Brighton Study Area is Route B29F West (River Street Bridge). This route is approximately 3.0-miles long, located in Cambridge and Boston. This route heads west from the New Substation Site in Cambridge onto Broadway before turning south onto Galileo Galilei Way to Vassar Street. The route follows Vassar Street before crossing northwest through a parking lot, a portion of which is owned by MIT and the MBTA. From the parking lot, the route crosses the Grand Junction Railroad using a pipe jacking or other similar trenchless crossing technique to reach a parking lot on a second parcel of land owned by MIT (referred to as #634 Memorial Drive). The route then follows Waverly Street to Brookline Street through the Reid Rotary at the B.U. Bridge, continuing west on Memorial Drive to the River Street Bridge. At this location, the route turns to the west across the River Street Bridge, over the Charles River, and onto Cambridge Street in Boston. The bridge crossing would be accomplished by installing the transmission cable in the bridge deck/roadway pavement.[93] On the Boston side of the Charles River, the route would cross over the I-90 ramps following the approximate location of Cambridge Street if it is reconstructed at-grade as part of MassDOT's Allston Multimodal Project (the route cannot be constructed along the existing elevated section of Cambridge Street that spans the I-90 ramps). After passing through a short stretch of wooded, undeveloped land (~500-feet) adjacent to the roadway shoulder(s) (where the future Cambridge Street will be constructed), the route transitions back onto existing Cambridge Street until it reaches Lincoln Street. The route follows Lincoln Street to the Brighton Substation.

5.2.2 Noticed Alternative

The Noticed Alternative design consists of a total of 9.7 miles of new underground electric transmission line located primarily in public roadways. A detailed map set of the Noticed Alternative is provided in Appendix 5-3. The five routes comprising the Noticed Alternative are summarized below.

Putnam Study Area: Noticed Alternative Route P11 (Massachusetts Avenue)

The Noticed Alternative Route P11 is approximately 0.87-miles long, located entirely within Cambridge. This route heads east from the New Substation Site onto Broadway and then south onto Ames Street to the intersection with Main Street. The route heads west on Main Street parallel to the MBTA Red Line subway tunnel before crossing over the tunnel onto Vassar Street. The route heads south on Vassar Street to Massachusetts Avenue, where it then turns towards

[93] MassDOT indicated to Eversource that it is moving forward with certain repairs and upgrades to the River Street bridge and confirmed there is sufficient space within the roadway deck to accommodate a new transmission line.

the southeast on Massachusetts Avenue to Memorial Drive. At Memorial Drive, the route ends in a "T" configuration with the line being spliced into existing Eversource transmission line(s) to the east and west on Memorial Drive.

Kendall Study Area: Noticed Alternative Route K11 (Fifth Street)

The Noticed Alternative Route K11 is approximately 0.61-miles long, located entirely within Cambridge. This route heads east from the New Substation Site onto Broadway before turning north across the abutting Volpe Center Site to Potter Street. The route alignment across the Volpe Center Site was identified in consultation with the owner of the development rights (MITIMCO) and Cambridge officials so as not to restrict future development activities at the site from the placement of the electrical infrastructure and to avoid impacts to mature public shade trees bordering the Loughrey Walkway and Bike Path west of the site. From Potter Street, the route heads north onto 5th Street and west onto Munroe Street before crossing over Third Street onto Linskey Way. Potter Street, 5th Street, and Munroe Street are private roads. The route follows Linskey Way in an easterly direction before turning south onto Second Street to its interconnection point within the East Cambridge Substation.

Somerville Study Area: Noticed Alternative Route S11C (Grand Junction RR Multi-Use Pathway)

The Noticed Alternative Route S11C is approximately 1.56-miles long, located in Cambridge and Somerville. This route heads west from the New Substation Site onto Broadway for about one block before turning north onto a parcel of land owned by the City of Cambridge abutting the east side of the MBTA Grand Junction Railroad corridor. The route continues north on the City of Cambridge owned properties parallel to the east side of the MBTA Grand Junction Railroad corridor. From Broadway to Medford Street in Somerville, the route collocates with the potential future alignment of Cambridge's Grand Junction Multi-Use Path, which requires crossing from City of Cambridge-owned land on the east side of the existing railroad corridor to City of Cambridge-owned land on the west side of the railroad corridor. These crossovers would occur at the following at-grade street crossings: Binney Street, Cambridge Street and Medford Street. The Cambridge/Somerville municipal boundary is located just south of Medford Street. After crossing Medford Street, Route S11C continues north along the western edge of the MBTA ROW up to the intersection of the Grand Junction railroad tracks and the MBTA commuter rail tracks (Fitchburg Route Main Line). The route would then cross beneath the MBTA commuter rail tracks and McGrath Highway (Route 28) using a trenchless construction technique, to reach an Eversource-owned parcel of land on Linwood Street. The transmission line would then transition back to conventional open-trench construction as it turns northwest onto Linwood Street, Washington Street and Prospect Street where it connects with the Somerville Substation.

Brighton Study Area (East): Noticed Alternative Route B31 East (River Street Bridge)

The Noticed Alternative Route B31 East is approximately 3.26-miles long, located in Cambridge and Boston. This route heads east from the New Substation Site onto Broadway before turning south onto Ames Street. The route follows Ames Street to the intersection with Memorial Drive.

At Memorial Drive, the route turns to the west (following the east bound lanes of Memorial Drive) to the Reid Rotary at the B.U. Bridge, continuing west on Memorial Drive to the River Street Bridge. At this location, the route turns to the west across the River Street Bridge, over the Charles River, and onto Cambridge Street in Boston. The bridge crossing would be accomplished by installing the cable in the bridge deck/roadway pavement.[94] On the Boston side of the Charles River, the route would cross over the I-90 ramps following the approximate location of Cambridge Street if it is reconstructed at-grade as part of MassDOT's Allston Multimodal Project (the route cannot be constructed along the existing elevated section of Cambridge Street that spans the I-90 ramps). After passing through a short stretch of wooded, undeveloped land (~500-feet) adjacent to the roadway shoulder(s), the route transitions back onto Cambridge Street until it reaches Lincoln Street. The route follows Lincoln Street to the Brighton Substation.

Brighton Study Area (West): Noticed Alternative Route B30 West (Anderson Street Bridge)

The Noticed Alternative Route heading west from the New Substation in the Brighton Study Area is Route B30 West (Anderson Street Bridge). This route is approximately 3.43-miles long, located in Cambridge and Boston. This route heads west from the New Substation Site onto Broadway before turning south onto Prospect Street and then west onto Green Street. The route follows Green Street to Putnam Avenue where it turns north and then west onto Mt. Auburn Street. The route follows Mt. Auburn Street to John F. Kennedy Street. The route then heads south along John F. Kennedy Street to the Anderson Memorial Bridge over the Charles River. The bridge crossing would be accomplished by installing the cable in the bridge deck/roadway pavement. On the Boston side of the Charles River, the route follows North Harvard Street to Franklin Street and Lincoln Street before terminating at the Brighton Substation.

5.3 General Construction Sequence and Best Management Practices for Underground Transmission Lines

The construction sequence for the underground transmission lines includes the following general steps, each of which is described in further detail below:

- Installation of erosion and sediment controls,
- Installation of manholes/splice vaults,
- Trenching and duct bank installation,
- Cable pulling, splicing, and testing, and
- Restoration.

[94] As was noted for Preferred Route B29F West, MassDOT indicated to Eversource that it is moving forward with certain repairs and upgrades to the River Street bridge and confirmed there is sufficient space within the roadway deck to accommodate a new transmission line.

5.3.1 Installation of Erosion and Sediment Controls

To minimize the potential for erosion and sediment migration during construction, temporary erosion and sediment control measures will be installed prior to the initiation of soil disturbing activities and will be inspected regularly and maintained during construction. Erosion and sediment controls such as straw bales, silt fence, compost filter tubes and/or straw wattles, and catch basin inlet protection will be installed in accordance with Eversource's Best Management Practices Manual for Massachusetts and Connecticut ("BMP manual") (see Appendix 5-7) and any applicable environmental permit requirements. These controls will be installed between the work areas and environmentally sensitive areas, including wetlands and waterbodies associated with the Charles River. Additionally, inlet protection will be installed in stormwater catch basins along the Project routes in the immediate vicinity of active trenching, excavation or other construction activities involving sediment disturbance.

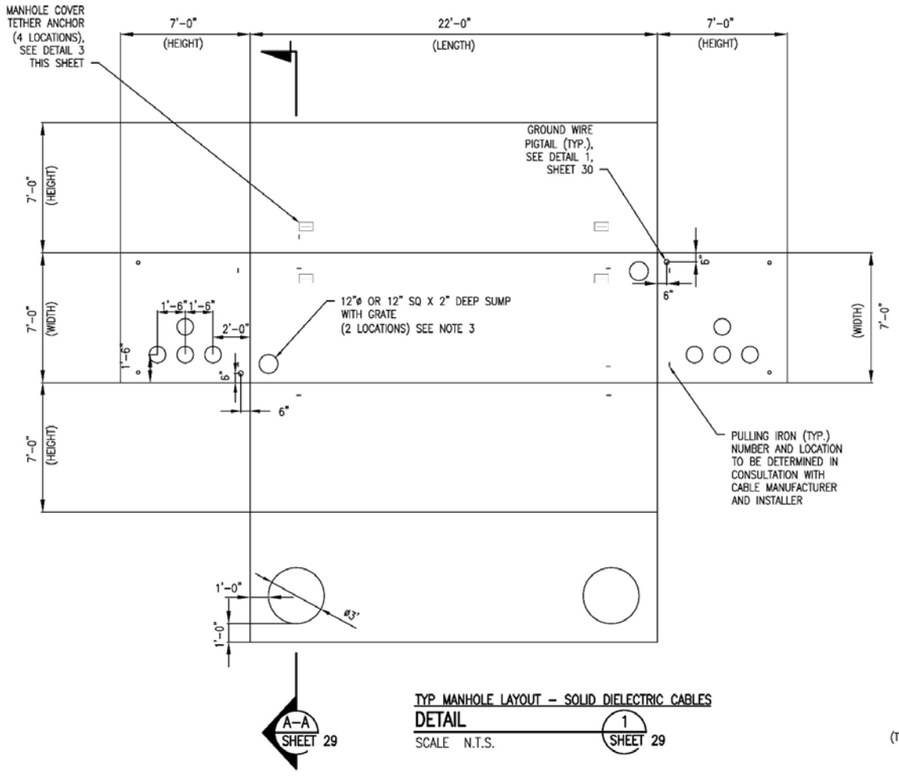
5.3.2 Installation of Manholes /Splice Vaults

Pre-cast or cast-in-place concrete splice vaults (also referred to as manholes), will be installed prior to or in parallel with trenching and installation of the duct bank. Splice vaults facilitate cable installation and splicing and provide access for future maintenance. Each splice vault is approximately 9-feet wide by 9-feet high by 24-feet long (outside diameter dimensions). The depth of the splice vault would vary by location and be located entirely underground with only the manhole cover and frame visible at ground level. A precast communication handhole measuring 5-feet by 5-feet by 5-feet (outside diameter dimensions) will typically be located at each splice vault. A typical manhole detail is provided on Figure 5-3.

Splice vaults are spaced approximately 1,500 to 1,800 feet apart, but sometimes could be closer, depending upon the physical aspects of the route and location of the duct bank. The factors contributing to final placement of the splice vaults include the maximum length of a cable that can be transported on the reel; allowable pulling tensions for the specific location; sidewall pressure on the cables as they are pulled around a bend; and accessibility. On average, each splice vault takes approximately seven to ten days to install.

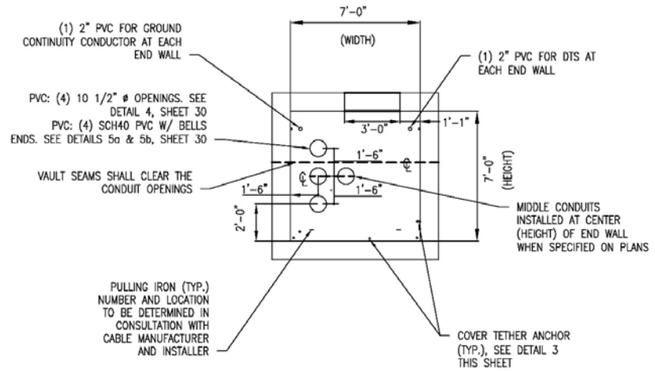
Existing utilities may need to be relocated to create space for the new splice vaults (this would be determined during detailed design). The Company would work with the local municipal officials and utility owners regarding these relocations on a case-by-case basis.

In the event contaminated soils, contaminated groundwater or other regulated materials are encountered during excavation of the splice vaults, soils/materials would be managed pursuant to the Utility-Related Abatement Measure ("URAM") provisions of the Massachusetts Contingency Plan ("MCP"). The Company would also contract with a Licensed Site Professional ("LSP") as necessitated by conditions encountered along the Project alignment, consistent with the requirements of the MCP at 310 C.M.R. 40.0460 et seq.



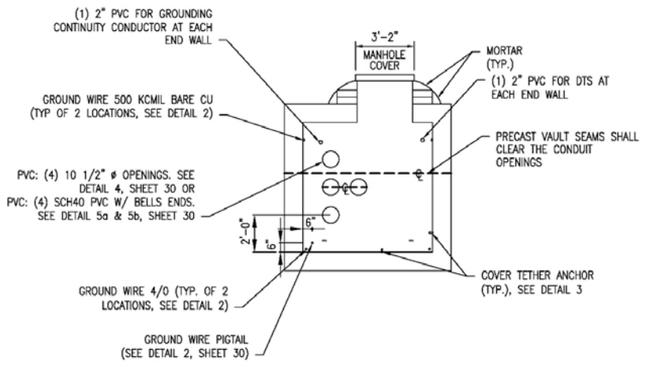
TYP MANHOLE LAYOUT – SOLID DIELECTRIC CABLES
DETAIL 1
SCALE N.T.S. SHEET 29

NOTES:
1. MANHOLE DIMENSIONS SHOWN ARE INSIDE DIMENSIONS.
2. ALL PULLING EYES SHALL BE DESIGNED FOR MULTIDIRECTIONAL CABLE PULLS.
3. TOP OF GRATE SHALL BE FLUSH WITH SURROUNDING FINISHED SURFACE.



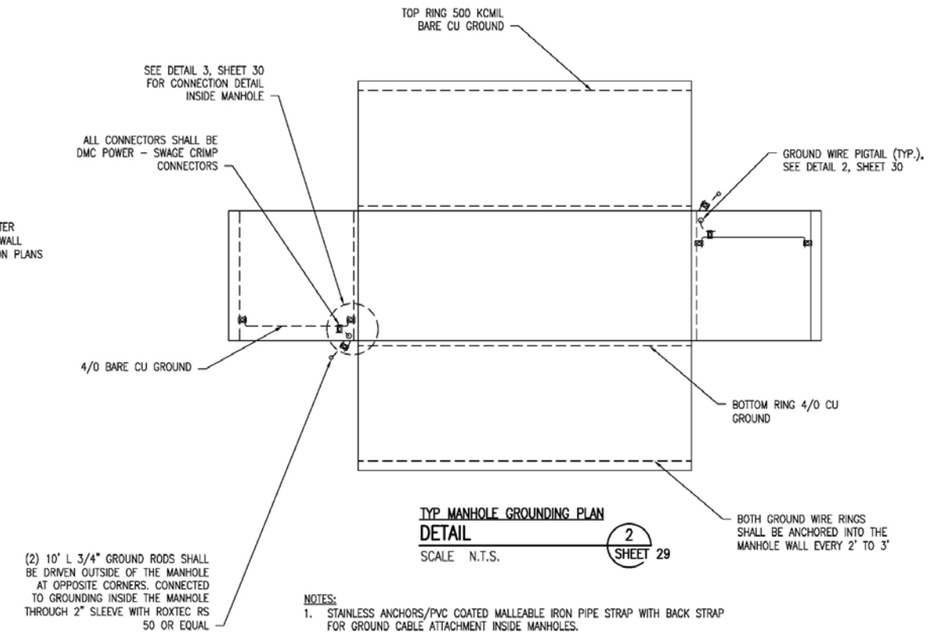
TYP MANHOLE END VIEW– SOLID DIELECTRIC CABLES
SECTION A-Aa
SCALE: N.T.S. SHEET 29

NOTES:
1. MANHOLE DIMENSIONS SHOWN ARE INSIDE DIMENSIONS.
2. ALL PULLING EYES SHALL BE DESIGNED FOR MULTIDIRECTIONAL CABLE PULLS.
3. ALL PIPE SIZES ARE NOMINAL.



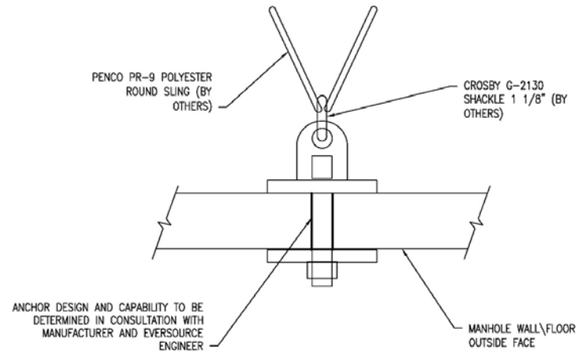
TYP MANHOLE END VIEW – SOLID DIELECTRIC CABLES
SECTION A-Ab
SCALE: N.T.S. SHEET 29

NOTES:
1. ALL PIPE SIZES ARE NOMINAL.
2. TOP OF MANHOLE FRAME/GATE SHALL BE FLUSH WITH SURROUNDING FINISHED SURFACE.



TYP MANHOLE GROUNDING PLAN
DETAIL 2
SCALE N.T.S. SHEET 29

NOTES:
1. STAINLESS ANCHORS/PVC COATED MALLEABLE IRON PIPE STRAP WITH BACK STRAP FOR GROUND CABLE ATTACHMENT INSIDE MANHOLES.



TYP MANHOLE COVER TETHER ANCHOR
DETAIL 3
SCALE N.T.S. SHEET 29

NOTES:
1. REQUIRED ONE ON THE FLOOR & ONE ON THE WALL PER MANHOLE COVER.

5.3.3 Trenching and Duct Bank Installation

Following or in parallel with installation of the splice vaults, the underground duct bank construction will begin. The underground line segment will consist of six (6) cross-linked polyethylene ("XLPE") insulated cables. The duct bank will contain a total of fourteen (14) conduits: six (6) polyvinyl chloride ("PVC") 8-inch-diameter conduits for the insulated XLPE cables, four (4) 2-inch-diameter PVC conduits for relay and communication cables and four 2-inch-diameter PVC conduits (two for ground continuity conductors (one per circuit) and two for possible future temperature-monitoring of each circuit). A common thermal concrete envelope encases the conduits to form the "duct bank." See Figure 5-4 for a depiction of the general arrangement in the duct bank.

The primary method for underground duct bank construction in roadways is open cut trenching. The trench will be approximately four feet wide and generally five and a half to eight feet deep, though on occasion it may need to be wider and/or deeper to avoid utilities or other obstacles, depending on the final design profile of the duct bank. For installation of the transmission line within roadways, the width of the trench would be marked on the street, Dig-Safe would be contacted, the location of existing utilities would be marked, and the pavement would be saw-cut. Saw cutting provides a clean break in the pavement and defines the parameters of the trench for asphalt removal and trench excavation.

Following saw cutting, the pavement would be removed with a backhoe/excavator and loaded into a dump truck and removed from the site. Pavement material would be handled separately from excavated soil and would be recycled at an asphalt batching plant. Subsequently, a backhoe/excavator would excavate the trench to the required depth. In some areas, excavation may be done by hand or vacuum excavation to avoid disturbing existing utility lines and/or service connections. Soil removal would likely be a "clean trench" or "live loading" method in which soil would be loaded directly into a dump truck and transported to an off-site facility for recycling, reuse, or disposal. Soil would not typically be stockpiled along the edge of the roadway, thus reducing the size of the required work area and the potential for sedimentation or the creation of nuisance dust. Any rock encountered during excavation would be removed by mechanical means and brought to an off-site facility for recycling, reuse, or disposal.

As with the splice vault excavation described above, if contaminated soils, contaminated groundwater, or other regulated materials are encountered during trenching for the duct banks, the contaminated soils/groundwater/materials would be managed pursuant to the URAM provisions of the MCP. The Company would also contract with a LSP as necessitated by conditions, consistent with the requirements of the MCP at 310 C.M.R. 40.0460 et seq.

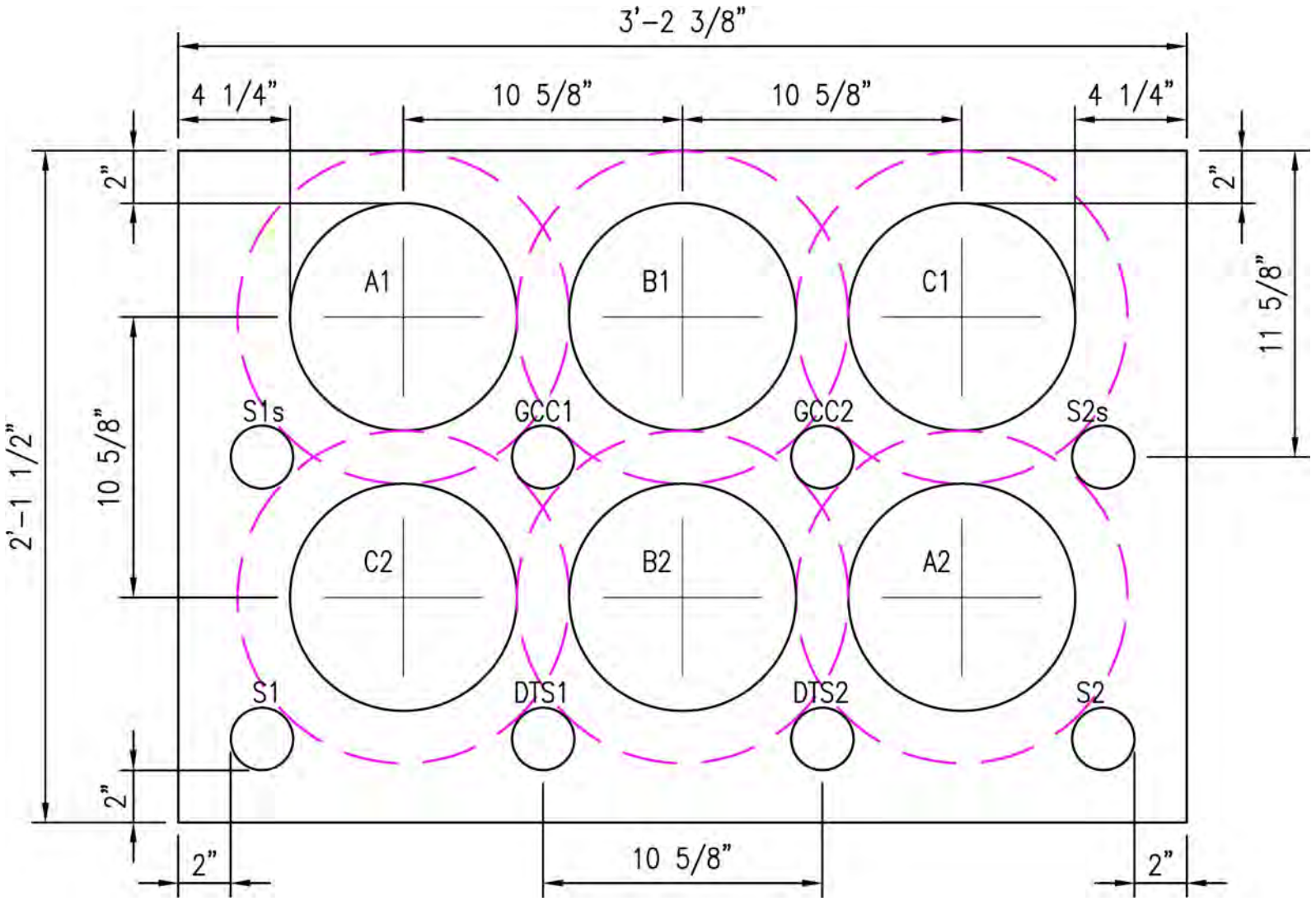


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Figure 5-4

Typical Transmission Line Duct Bank Detail

Once a section of the trench is prepared, each of the conduit sections would be assembled inside the trench or pre-assembled at the ground surface and then lowered into the trench. The area around the conduit sections would be filled and protected with high-strength thermal concrete (3,000 pounds per square inch ("psi") at 28 days cured) to create a duct bank around the conduits. The trench would then be backfilled with fluidized thermal backfill.[95]

The pace of trench construction may be slower in areas of higher existing utility density or where unanticipated obstructions exist (such as greater than anticipated ledge or rock), where an increase in the trench depth is needed, or where a roadway experiences higher traffic volume.

5.3.4 Trenchless Crossings

Trenchless crossing techniques are often required at crossing locations where there is some obstruction to open trenching such as a railroad, wetland, or waterbody. For purposes of this project, there are two types of trenchless construction techniques considered, HDD and pipe jacking. The proposed locations of the trenchless crossings that are known to the Project team at this time are depicted on the following pages on Figures 5-5A (Project) and 5-5B (Noticed Alternative). During the test pitting or during construction, the Company may encounter existing unmapped utilities at depths that require the proposed transmission line to be placed underneath them; in such cases, a trenchless crossing may also be considered beyond that identified herein. There may also be opportunities to use trenchless crossing techniques to increase the pace of construction on certain roads, and the Company would coordinate such work with the local municipality or state agency having jurisdiction. The HDD and pipe jacking methods are described in further detail below.

5.3.4.1 Horizontal Directional Drill Method

The HDD method is a common alternative to open-cut trenching to reduce surface disturbance in environmentally sensitive areas (e.g., protected cultural and natural resource areas, waterways, and wetlands), to avoid other existing infrastructure (e.g., roadways, railroads, and utilities), or when deep burial depths are required (for example, under federal navigation channels). Although land around the drill entry and exit locations is disturbed during HDD activities, it is restored to its pre-construction condition. Eversource will use the HDD method for a segment of the Preferred Route B2A East (Magazine Beach) to avoid and minimize impacts that would occur from conventional open-cut trench installation across Magazine Beach, the Charles River, and areas that border the river, including the Massachusetts Turnpike (I-90), Soldiers Field Road, Dr. Paul

[95] Engineered fluidized thermal backfill has distinct thermal characteristics, specifically with respect to thermal resistivity levels at low levels of moisture content, which native soils in this area may not possess. Limited use of native soils may be possible in certain locations around manholes where exceptional thermal performance is not required.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

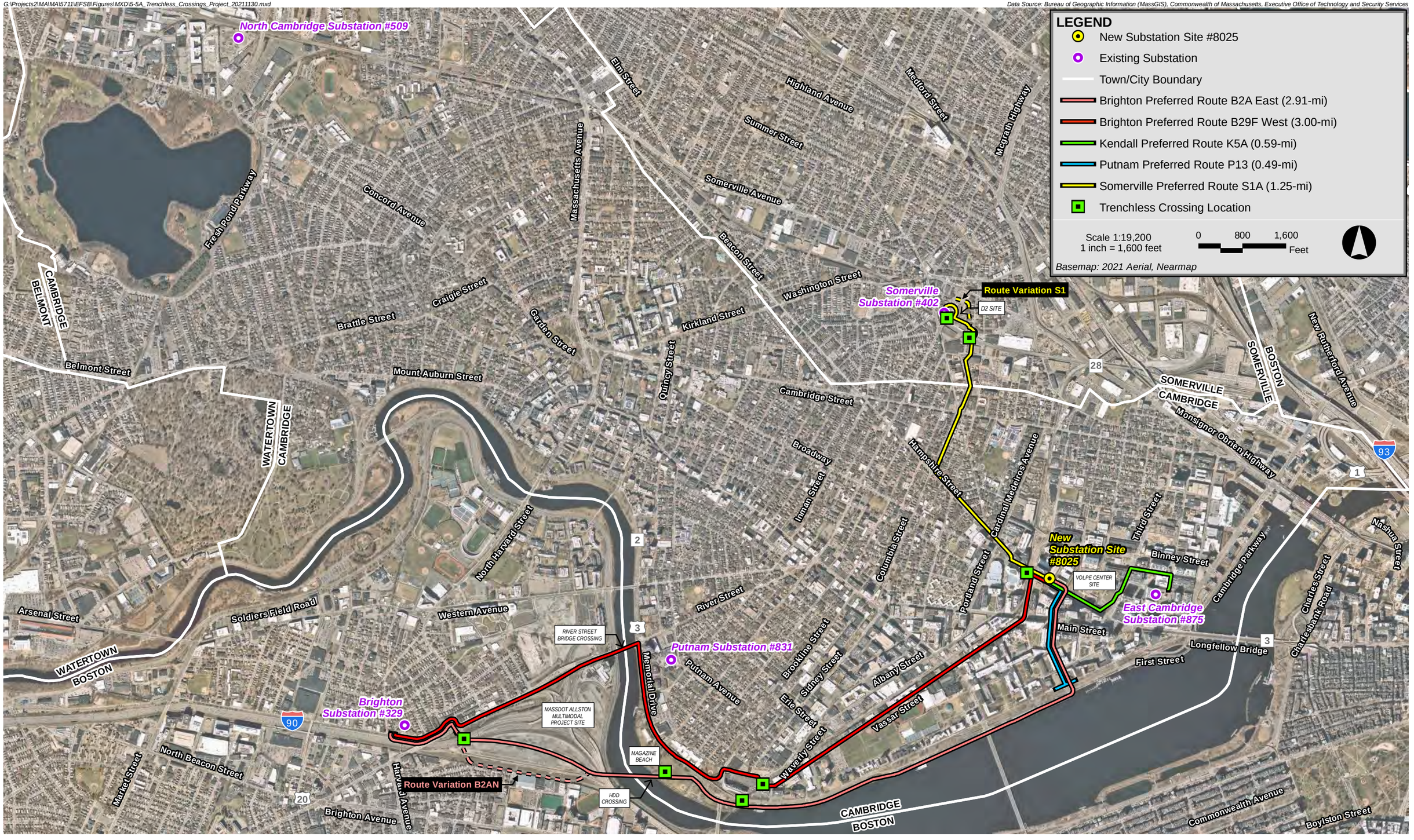

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Figure 5-5A

Trenchless Crossing Locations (Project)

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

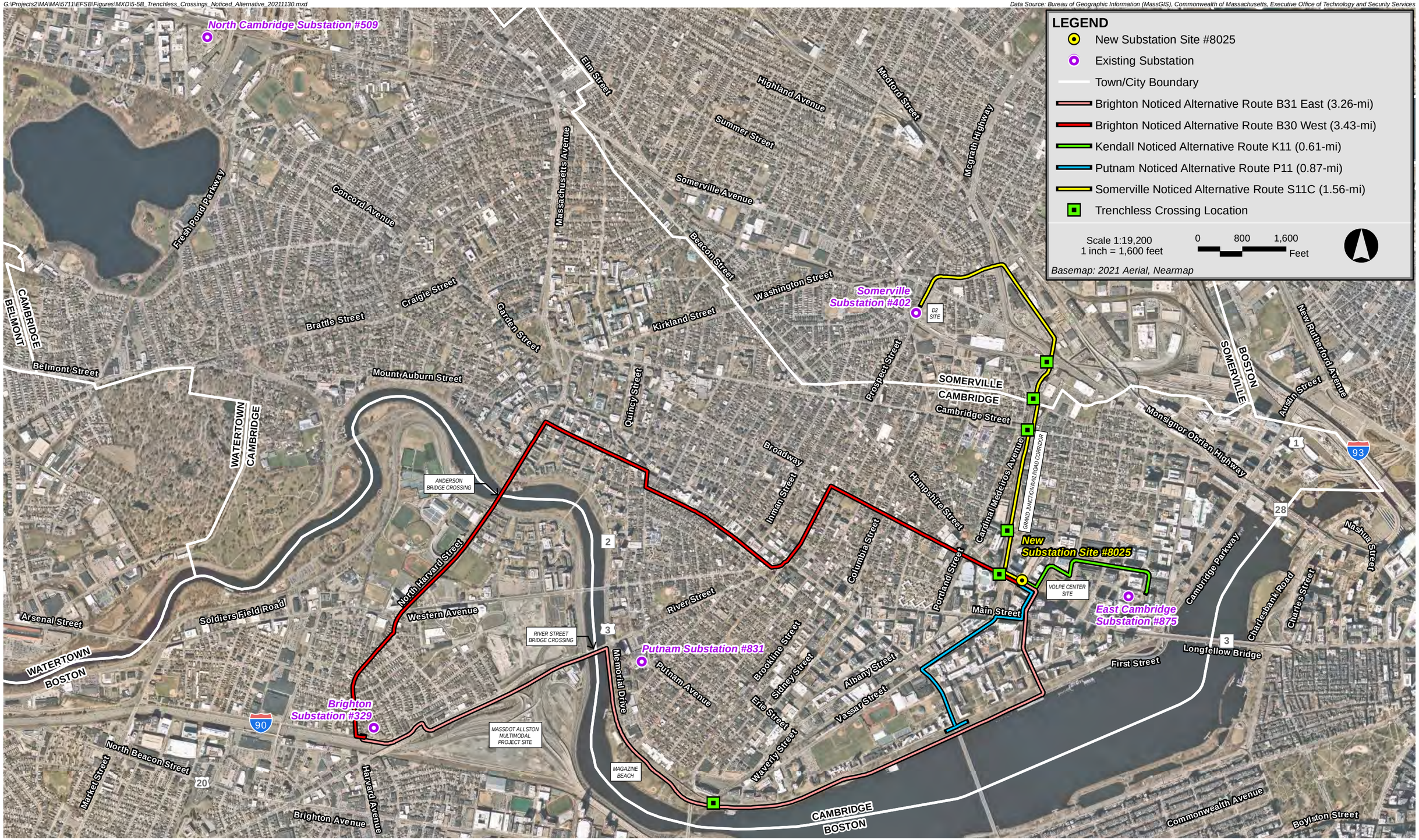

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Figure 5-5B

Trenchless Crossing Locations (Noticed Alternative)

Dudley White Bike Path and MassDCR's Magazine Beach property. For perspective, at its maximum depth, the new transmission line could be as much as 30-feet below the bed of the Charles River (see Figure 5-6).

The HDD cable installation method is comprised of five primary stages including establishment of temporary workspace areas (entry and exit sites), pilot bore, reaming, casing installation and demobilization/site restoration. With proper design and good HDD construction practices, the HDD method allows for the installation of underground utilities with no impacts to the crossing features. Construction stages associated with the HDD activity are described in more detail below.

Establishment of Temporary Workspace Areas (Entry and Exit Sites)

The HDD method requires the establishment of temporary workspace areas on either side of the crossing location. The entry site contains the drilling equipment and related ancillary facilities such as excavators, drill pipe skids, roll-off containers for soil storage, fractionization ("frac") tanks for decant water, pumps, generators, power supply, cutting bins, bentonite clay[96] stockpiles, and tool trailers. The exit site typically requires larger workspace to accommodate the drill pipe stringing process and other ancillary equipment. Both workspace areas would be sized appropriately to accommodate the equipment and surrounded by sediment control devices and construction fencing.

The limits of work on the northeast end of the HDD will be located on the edge of the Magazine Beach property as close to Memorial Drive as practicable to avoid impacts to existing trees and minimize impacts to athletic fields, public pathways, and the existing outdoor gym space. Please see Figure 5-7, which depicts the proposed extent of trenchless HDD workspace and a small section of open cut trenching on the Magazine Beach property by Memorial Drive. The total length of transmission line across Magazine Beach is about 728 feet, of which 646 feet would be installed via trenchless HDD and the balance (about 82 feet) would be installed via open cut trenching. Eversource is in the process of finalizing the temporary workspace to avoid or minimize impacts to any existing trees on Magazine Beach. In addition, altered grassed or paved areas would be restored to their preexisting condition following construction, as would the Dr. Paul Dudley White Bike Path and sidewalk along Memorial Drive.

On the southwest end of the HDD, the MassDOT Allston Multimodal Project Site presents an ideal work environment given its expansive open disturbed areas and space to not only support the drilling operation but for pre-assembly of the casing and conduits for pullback operations.

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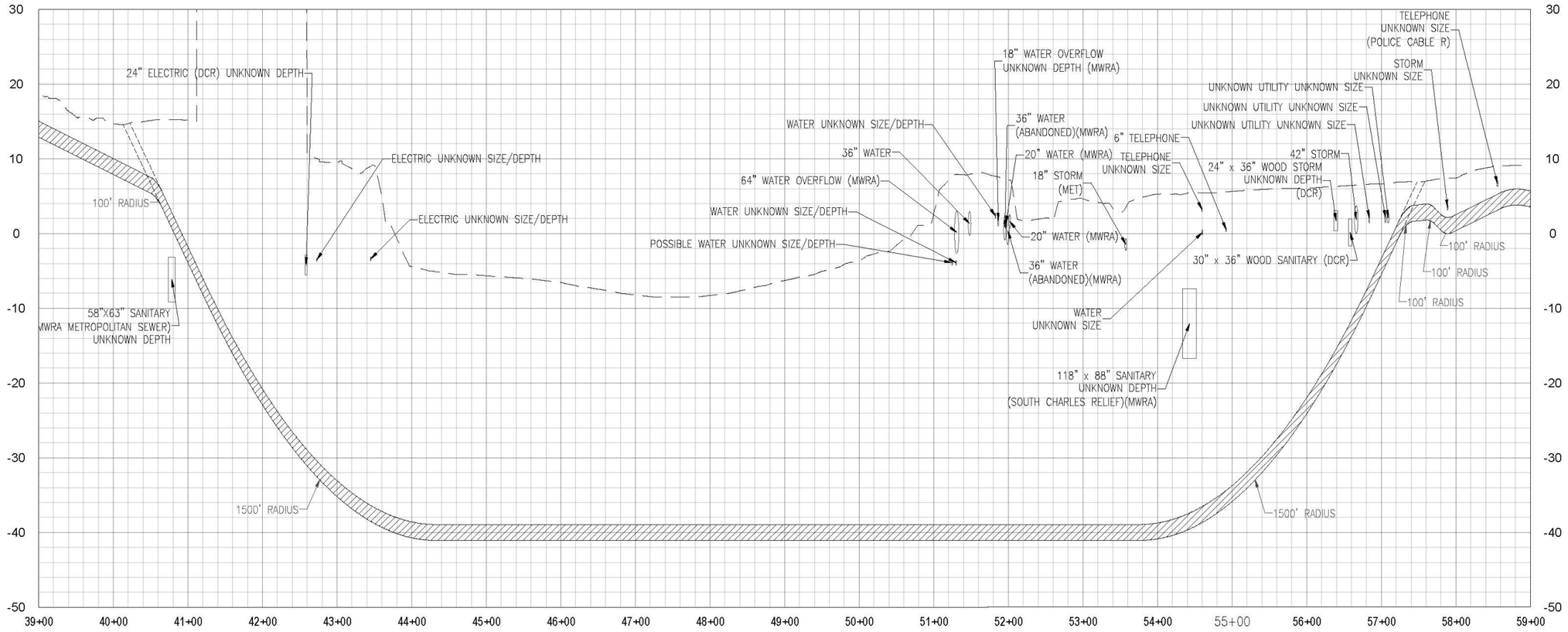
[96] Bentonite is a naturally occurring, nontoxic, colloidal clay. Bentonite swells in water by absorbing the water, thus providing a viscous fluid that facilitates the HDD drilling operation by maintaining the drill path integrity by filling the bore hole void while also transporting the drill cuttings back to the surface through the bore hole. While bentonite is non-toxic, if released to the environment it has the potential to cause water quality impacts related to turbidity.

BRIGHTON SUBSTATION

EAST CAMBRIDGE SUBSTATION



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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

Brighton Preferred Route B2A East (2.91-mi)

- Open Trench Segment
- Trenchless Segment
- 30' Permanent Easement
- Temporary Workspace and Laydown Area
- Constructed Stormwater Wetlands (Non-Jurisdictional)
- Bordering Vegetated Wetland
- Land Under Water
- 25-ft Riverfront Area
- 100-ft Wetland Buffer Zone
- Chapter 91 Jurisdiction
- Bordering Land Subject to Flooding

Scale 1:1,800
1 inch = 150 feet

0 75 150 Feet

Basemap: Nearmap Aerial, 2021

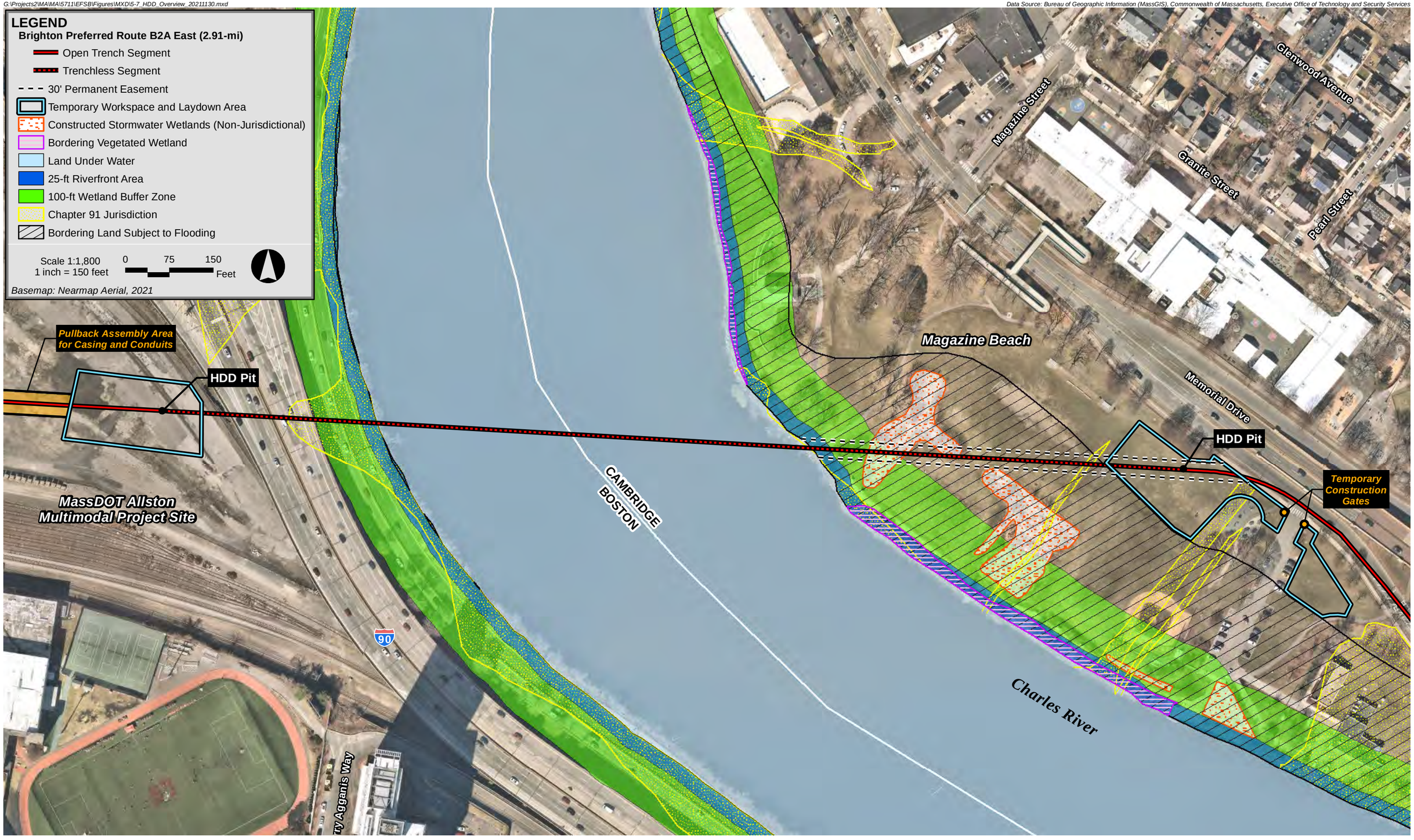

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Figure 5-7
HDD Overview

The drilling operations and pipe pullback would initiate on the Magazine Beach property, with pre-assembly of the pullback casing and conduits occurring on the exit site located on the MassDOT Allston Multimodal Project Site. To minimize impacts to the recreational fields on Magazine Beach, Eversource is proposing to split the temporary workspace areas on either side of the Magazine Beach entrance driveway. A shallow trench could be excavated across the entrance driveway to place conduits for power and drilling fluid transfer between the workspace areas, if needed, while maintaining access to the Massachusetts Water Resources Authority ("MWRA") treatment facility and MassDCR parking lot. The final configurations of the HDD operations will be developed in consultation with MassDCR, MWRA, Harvard, MassDOT, environmental permitting agencies and the selected HDD contractor. Work areas will be sized for flexibility to reposition location and orientation of equipment as needed during operations.

Pilot Bore

After the workspace areas are prepared, a temporary drill rig, likely mounted on a trailer, would be brought to the entry site, and positioned to drill at the desired angle. Drilling of the pilot bore(s) commences by pushing and rotating the drill pipe connected to the drill bit along a pre-determined path from the drill rig entry location towards the exit location. A tracking system is used to locate the position and orientation of the drill bit cutting head through the design alignment and crossing trajectory. A mixture of water and bentonite clay, referred to as drilling fluid, is continuously pumped through the drill pipe to the cutting head where it lubricates the cutting head and mixes with the soil or bedrock cuttings. This mixture flows back to the drill rig location carrying the cuttings where it is transferred to the separation equipment to remove the cuttings and recycle the fluid component for reuse downhole. The drilling fluid also serves to stabilize the bore(s), cool the cutting head, and lubricate the pipe string. When the drill bit exits the ground surface at the exit point for the HDD, the pilot bore stage of the installation process is complete.

Reaming

The pilot bore is then enlarged by pulling reaming tools of successively larger diameter from the exit location towards the entry site location on Magazine Beach. The purpose of the reaming passes is to enlarge the pilot hole to a diameter suitable for installation of the pullback casing carrying the bundled electric transmission and auxiliary ducts.

Upon completion of the reaming passes, the bore is swabbed with a smaller diameter reamer to stabilize the hole, help remove excess cuttings, and to confirm the hole is in a condition to accept the pipe casing.

Casing Installation

When the bore hole has reached the required size, the casing installation is accomplished by attaching the prefabricated bundle of high-density polyethylene ("HDPE") pipes, commonly referred to as the "pullback section", behind the reaming assembly at the exit site, then pulling

the reaming assembly through the reamed hole to the drilling rig located at the entry site. To minimize the risk of collapsing the borehole and/or losing momentum, the "pullback process" typically occurs without stopping.

Demobilization and Restoration

Upon completion of the HDD installation, the drilling equipment will be demobilized and the entry and exit sites will be restored to their preexisting condition, in consultation with the landowners. See Section 5.3.6.1 below for additional detail regarding restoration activities at Magazine Beach.

Inadvertent Returns Contingency Plan

Normally, the drilling mixture of water and bentonite clay remains within the bore hole, including the surface entry and exit points, as it circulates during drilling. As noted above, this maintains the bore hole's shape. However, the drilling fluid can sometimes surface elsewhere through natural cracks or voids in subsurface soils. This is an unintended release of drilling mud referred to as an inadvertent return. The drilling fluid itself is not considered toxic but if released to the surface or other sensitive environmental resource areas, the mud-like fluid can impact plants and less mobile benthic organisms, particularly in an aquatic environment like the Charles River. To address this issue, Eversource has prepared a "Preliminary Inadvertent Return Contingency Plan" ("IRCP") in the event this situation is encountered during construction (see Appendix 5-4). The general information within this document covers BMPs and a contingency and response plan for inadvertent returns for use during the installation of the HDD pipe. The IRCP is provided for information purposes only and will be updated upon selection of the HDD contractor and in consultation with the environmental permitting agencies.

5.3.4.2 Pipe Jacking Methods

The pipe jacking method is used to install a casing horizontally under a conflicting object where trenching cannot be easily accommodated.

This method is typically used for crossings of less than 200 feet such as for crossings under railroads, ditches, streams, streets and for crossing under shallower existing underground facilities. When crossing MBTA railroad facilities, such as the Grand Junction Railroad or commuter rail, the MBTA will likely require a casing due to concerns with potential settling.

In general, a pipe jacking installation is accomplished by digging a bore pit on one side of the feature to be crossed and a receiving pit on the other side. The bore pit houses the casing pipe, auger, or other equipment to remove the spoils from within the pipe, and jacking equipment, while the receiving pit receives the pipe on the other side of the feature being crossed.

The casing is then jacked (pushed) in the bore hole as it is being drilled under the feature. Once in place, the casing is cleaned out, and smaller HDPE or PVC pipes are installed inside the casing to contain the cables. When completed, the duct bank will mate up with the casing on each side of the crossing. Prior to cable installation, the casing is filled with thermally designed fluidized fill.

Tables 5-3 and 5-4 below identify the currently anticipated pipe jacking locations for the Project and Noticed Alternative. The timing of the railroad crossing work would be coordinated with the MBTA, MassDOT, municipal officials and landowners relative to access, traffic management during construction, and rail schedules.

Table 5-3 Project Routes - Anticipated Pipe Jacking Crossing Locations

Study Area	Preferred Route Name	Pipe Jacking Crossing Locations
Putnam	P13 (Ames Street)	• None Anticipated
Kendall	K5A (Linskey Way)	• None Anticipated
Brighton East	B2A (Magazine Beach HDD)	• Grand Junction Railroad crossing on Memorial Drive (Cambridge)
Brighton West	B29F (River Street Bridge)	• Grand Junction Railroad crossing between Vassar Street and Waverly Street (Cambridge)
Somerville	S1A (Hampshire Street/D2 site)	• Grand Junction Railroad crossing at intersection of Broadway and Galileo Galilei Way (Cambridge) • MBTA Commuter rail line to D2 Site (Somerville)

Table 5-4 Noticed Alternative Routes - Anticipated Pipe Jacking Crossing Locations

Study Area	Noticed Alternative Route Name	Pipe Jacking Crossing Locations
Putnam	P11 (Massachusetts Avenue)	• None Anticipated
Kendall	K11 (Fifth Street)	• None Anticipated
Brighton East	B31 (River Street Bridge)	• Grand Junction Railroad crossing on Memorial Drive (Cambridge)
Brighton West	B30 (Anderson Bridge)	• None Anticipated
Somerville	S11C (Grand Junction Railroad Multiuse Pathway)	• MBTA Grand Junction Railroad Crossing at Binney Street (Cambridge) • MBTA Grand Junction Railroad Crossing at Cambridge Street (Cambridge) • MBTA Grand Junction Railroad Crossing at Medford/Gore Street (Somerville) • MBTA Commuter Railroad Crossing and McGrath Highway Overpass to Linwood Street (Somerville)

5.3.5 Cable Installation and Testing

Each conduit is tested and cleaned by pulling a mandrel (a close-fitting cylinder designed to confirm a conduit's concentricity) and swab through each of the ducts, prior to cable installation. The cables are installed in sections between two sequential splice vaults. A cable reel is set up at the "pull-in" splice vault and a cable puller is set up at the "pull-out" splice vault. Once the mandrel and pulling line are pulled through each duct, a hydraulic cable winch and tensioner is used to pull

cables individually between the pull-in and pull-out splice vaults. Installation of transmission cable sections typically takes three 8-hour days for each set of three cables and is repeated until all cables are installed.

Adjacent cable sections are then spliced together inside the vaults over the course of several extended workdays. Splicing high-voltage solid-dielectric transmission cable is a time consuming, complex operation that typically requires 48 to 60 hours to splice all three cables at each vault. The splicing activities may be a continuous 24-hour process depending on location and other site-specific factors, but typically require four or five extended (12-hour) workdays at each splice vault location to complete the work. The splicing operation requires a specialized splicing van and a generator. The splicing van will contain all the equipment and material needed to make a complete splice. An air conditioning unit may be used to control the moisture content in the splice vaults during the splicing activity. A portable generator will provide the electrical power for the splicing van and air conditioning unit and will be muffled to minimize noise. Typically, the splicing van will be located over one splice vault access cover. The air conditioner will be located near the second splice vault access cover and the generator will be in a convenient area nearby out of the immediate work zone.

Once the cable is installed and the splicing completed, the communications fiber cable will be pulled and spliced in the communications handholes.

Since the communications fiber cable is a single cable and is much smaller than the electric cable, pulling it is a much faster operation. Up to three sections can be pulled per day.

After all the communications fiber cable sections are in place, they will be spliced together inside the communications handholes. Splicing the communications fiber cable typically requires three (10-hour) workdays to complete at each of the handholes.

Once the cable system installation is complete, the cables will be field-tested from the substations. At the completion of successful testing, the line is then capable of being energized.

5.3.6 Restoration

Upon Project completion, the affected roads will be restored in accordance with the Department's "Standards to be Employed by Public Utility Operators When Restoring and of the Streets, Lanes and Highways in Municipalities" (D.T.E. 98-22) ("Repaving Standards") and municipal standards. Off-road areas (e.g., Magazine Beach property, other public and private lands) will be restored to pre-construction conditions or better, in compliance with applicable state and local standards, permit requirements and landowner agreements. Additional information describing restoration plans for the off-road areas crossed by the Project are provided below. Eversource will work in close consultation with these landowners to ensure construction and restoration efforts meet their needs. Eversource will make every effort to minimize impacts by limiting the duration of construction, timing the construction in a manner that is least impactful to the landowner and users of the properties, and restoring the disturbed areas to their preexisting condition or better

as soon as practicable following construction. Eversource will also work closely with these landowners to refine the schedule, develop construction management plans, and prepare site specific restoration details prior to the start of construction.

5.3.6.1 Magazine Beach Site

Alterations at Magazine Beach from construction of Preferred Route B2A are generally limited to the temporary staging and laydown areas oriented around the HDD entry site (see Figure 5-7). The balance of the HDD installation will be sufficiently deep and will not otherwise affect the surface of the Magazine Beach property. The temporary workspace area is presently flat and comprised of turfgrass. Upon completion of the work, Eversource will restore the altered areas to their preexisting conditions with loam and an appropriate seed mix as approved by MassDCR. Where the transmission line duct bank transitions from Memorial Drive onto Magazine Beach, the adjacent Dr. Paul Dudley White Path (bituminous pavement), sidewalk, lighting, and grassed shoulder areas will also be restored to their preexisting condition in consultation with MassDCR. Please see Appendix 5-1, for representative photographs of these areas. The final restoration details will be advanced in consultation with MassDCR as part of the Construction Access Permit review process.

5.3.6.2 D2 Site

Approximately 700 linear feet of transmission line associated with Preferred Route S1A will cross the D2 Site (see Figure 5-1 and Figure 4-25 in Section 4). The D2 Site and adjacent MBTA Green Line extension Union Square Station train platform are presently under construction. The proposed restoration plans will be dictated, in part, by the status of work associated with these other projects at the time of installation. That said, Eversource will restore the affected areas to pre-construction conditions or better. The proposed restoration measures will likely include some combination of pavement and curbing restoration, landscaping, loam and seed, lighting, fencing, plaza hardscape restoration and pedestrian walkway restoration. The final restoration details will be advanced in consultation with the landowner and/or the MTBA, as appropriate, as part of the licensing process and written access agreements with the landowner.

5.3.6.3 Volpe Center Site

Approximately 423 linear feet of transmission line associated with Preferred Route K5A will cross the Volpe Center Site that is proposed to be redeveloped by MIT (see Figure 5-1 and Figure 4-16 in Section 4). The proposed restoration plans will be dictated, in part, by the status of work associated with the Volpe Center Site at the time of installation. The proposed crossing area depicted on the referenced figure was developed in close consultation with MIT and Cambridge officials, with the goal of minimizing impacts to existing public shade trees, utility infrastructure and not constraining future development plans for the site. The proposed crossing area is presently comprised of grass, paved parking areas and shade trees bordering the eastern property line. While the Volpe Center Site design details have not yet been finalized by the owner of the development rights and the City of Cambridge, a portion of the proposed crossing area will

ultimately be turned into public open space ("Third Street Park") and will be comprised primarily of manicured lawn areas with pedestrian walkways, seating areas and landscape plantings. Several of the trees within the property line will be removed to facilitate the proposed re-development project. Most of the public shade trees will remain, except those that have been determined to be in poor health. North of the proposed Third Street Park area approaching Potter Street, the Volpe Center Site development currently anticipates widening the existing sidewalk. The balance of the transmission route alignment proposed by Eversource will follow this sidewalk area for a short stretch towards Potter Street, before turning onto Third Street. As noted, the proposed restoration plans will be dictated, in part, by the status of work associated with these other Volpe Center Site project activities at the time of installation. Depending on the status of construction on the Volpe Center Site at the time of transmission line installation, the proposed restoration measures could include some combination of pavement, sidewalk and curbing restoration, landscaping, tree plantings, loam and seed, and pedestrian walkway restoration. The final restoration details will be advanced in consultation with the owner of the development rights and the City.

5.4 Construction Schedule and Hours

5.4.1 Schedule

Assuming timely receipt of all necessary permits and authorizations, construction of the New Lines and New Substation is anticipated to commence in 2024. Construction is anticipated to occur over a five-year period, with completion on a rolling basis beginning 2028 through 2029. Due to the complexities of managing traffic control in an urban environment, the sequence of when each route is constructed is somewhat dependent on the other transmission line routes. For example, it is anticipated that the shorter and more direct Kendall and Putnam Routes will likely need to be constructed in series due to their proximity to each other and the New Substation construction in Kendall Square. The longer and more complex Brighton and Somerville routes will take approximately 36 to 42 months to construct. The proposed schedule assumes that the selected site contractor(s) will simultaneously employ several active work zones associated with each of the routes, in consultation with the affected municipalities.

The transmission line component of the Noticed Alternative would follow a similar schedule as that identified above for the Project, although given its additional total length (9.7 miles versus 8.3 miles for the Project) and different crossing method over the Charles River (River Street Bridge crossing versus HDD crossing) it is anticipated to require additional work crews to maintain the same construction schedule.

5.4.2 Construction Hours

If approved by the affected municipalities, the typical construction work hours for the Project are anticipated to be from 7:00 AM to 7:00 PM Monday through Friday and from 9:00 AM to 6:00 PM on Saturdays, when daylight and weather conditions allow. The final agreed upon construction hours will be developed in accordance with local noise ordinances (copies of which are provided

in Appendix 5-5), as well as in coordination with MassDOT, MWRA, MassDCR and the MBTA. The Company will schedule optimum construction hours along the routes to minimize the adverse impacts to residents and businesses. Construction schedules (day, evening and/or early morning construction hours) will be coordinated to minimize adverse impacts to abutters and ensure optimal vehicle and truck traffic flow. The Company may be required to perform work at night to minimize daytime impacts to commuters and abutters. The Company will also coordinate with the municipalities and area stakeholders, as needed (such as universities and colleges) to determine areas where construction hours will be limited (e.g., in front of schools, student residence halls), public recreational areas like Magazine Beach, or active development sites like the Volpe Center Site in Cambridge, the D2 Site in Somerville and potentially the MassDOT Allston Multimodal Project site. Night work may be proposed to allow advancement of Project construction in areas that experience multimodal traffic congestion during daytime hours, or where other unrelated construction projects are being advanced simultaneously. Some work tasks, once started, may require continuous operation until completion. Work requiring scheduled outages and work that requires continuous operation until completed may need to be performed on a limited basis outside of normal work hours, including evenings, Sundays, and holidays.

5.5 Construction Mitigation, Compliance and Monitoring

Construction mitigation measures will help minimize the potential for temporary impacts to the human and natural environments. Typical mitigation for stormwater runoff and associated erosion and sedimentation, fugitive dust, construction vehicle emissions and soils and solid waste management are discussed below for underground line construction. Specific discussions of mitigation measures for other environmental impacts, such as Article 97, are provided in subsequent subsections.

5.5.1 Stormwater Runoff, Erosion Prevention Measures, and Sediment Control

The Company will develop and maintain a Stormwater Pollution Prevention Plan ("SWPPP") for the Project that will identify controls to be implemented to mitigate the potential for erosion and sedimentation from soil disturbance during construction. The SWPPP will include a construction personnel contact list, a description of the proposed work, stormwater controls and spill prevention measures, and inspection practices to be implemented for the management of construction-related storm water discharges from the Project. The SWPPP will be adhered to by the contractor during all phases of Project construction in accordance with the general conditions prescribed in the Project's U.S. Environmental Protection Agency ("USEPA") Stormwater Construction General Permit ("CGP").

The Company will require that the construction contractor designate construction supervisor(s) or equivalent to conduct daily inspections, as well as coordinate with Eversource's environmental monitor(s), and be responsible for compliance with permit requirements. The construction

contractor(s) designee will be responsible for providing appropriate training and direction to the other members of the construction crew regarding any aspect of the work as it relates to compliance with Project permits and approvals and construction mitigation commitments.

Additionally, construction personnel will undergo pre-construction training on appropriate environmental protection and compliance obligations prior to the start of construction of the Project. Regular construction progress meetings will be held to reinforce contractor awareness of these mitigation measures.

Periodically, an Eversource environmental monitor(s) will independently conduct inspections of erosion prevention measures and sediment controls and ensure compliance with federal, state, and local permit requirements and conditions and with the Company's construction procedures and environmental policies. Documentation identifying deficiencies of erosion control measures and other permit compliance matters will be immediately brought to the attention of the contractor for implementation of corrective measures.

A copy of the Final Decision issued by the Siting Board, and copies of all other permits and approvals, will be provided to and reviewed by the Company's project managers and construction supervisors. These documents will also be provided to all contractors prior to construction as part of the contract documents. Contractors are required, through their contracts with the Company, to understand and comply with Siting Board and/or Department Orders and conditions, along with requirements for any other applicable Project permits and approvals. The Company also requires contractors to keep copies of these documents on site and available to all Project personnel during construction. These documents and associated conditions applicable to the work will also be reviewed during the construction kick-off meeting between Company representatives and contractor personnel and thereafter again in project meetings, as appropriate, for upcoming scheduled work activities subject to the conditions.

In roads where work is to be performed adjacent to storm drains the Company will install and maintain catch basin inlet protection (typically silt sacks) to prevent sediment from entering the storm drain system. The silt sacks will be installed beneath the catch basin grates, with about 6-inches of the sack outside the frame to accommodate the lifting straps. The grates will hold the silt sacks in place. The silt sacks or other catch basin inlet protection measures will be inspected for sediment build up and replaced or cleaned out as necessary. When construction is complete at each location, the catch basin inlet protection will be removed.

Other measures to mitigate soil erosion will include the prompt removal of soils from the excavated trench. Soils will not be stockpiled along the road(s) but instead will be loaded directly into trucks to be hauled to an offsite disposal/re-use area, or to a temporary construction laydown area. This construction method will also limit nuisance dust and the potential for soils to be washed with stormwater into nearby storm drains.

In addition to the measures discussed above, the applicable conditions and provisions of the Final Order and other permits and approvals will be reviewed during Project meetings and will be discussed as needed during tailboard meetings, where construction personnel are briefed by their construction supervisor on the upcoming day's work and at that time will be reminded by Company representatives and the supervisor of any related specific compliance conditions.

5.5.2 Air Quality

Fugitive dust will be controlled at the construction sites by use of appropriate methods, including the use of covered dump trucks to move soil out of the construction zone, and by covering temporary soil stockpiles at offsite staging and laydown areas, as applicable.

There also will be installation of anti-tracking pads and regular sweeping of the pavement of adjacent roadway surfaces during the construction period to minimize the potential for construction traffic to kick up dust and particulate matter. The anti-tracking pads would typically be installed at all points of egress to public roads such as off-road work zones with disturbed or exposed soils including Magazine Beach, Volpe Center Site, D2 Site, MassDOT Allston Multimodal Project Site, and the New Substation Site. Water trucks may also be used to reduce fugitive dust in combination with regular sweeping within the roadway construction areas affected by the Project.

In addition, the Company will direct its contractors to retrofit any diesel-powered non-road construction equipment rated 50 horsepower or above to be used for 30 or more days over the course of the Project with USEPA-verified (or equivalent) emission control devices (e.g., oxidation catalysts or other comparable technologies). The Company uses ultra-low sulfur diesel ("ULSD") fuel in its own diesel-powered construction equipment. ULSD has a maximum sulfur content of 15 parts per million as opposed to low sulfur diesel fuel, which has a maximum sulfur content of 500 parts per million. By using ULSD fuel, there is a 97 percent reduction in the sulfur content as compared to low sulfur diesel fuel.

The Company and its contractors will also comply with state law (G.L. c. 90, § 16A) and MassDEP regulations (310 C.M.R. 7.11(1)(b)), which limit vehicle idling to no more than five minutes. There are exceptions for vehicles being serviced, vehicles making deliveries that need to keep their engines running and vehicles that need to run their engines to operate accessory equipment. There may be other times when idling is permitted if the idling is necessary (e.g., as a matter of safety).

With respect to enforcement of the idling restrictions, it is the responsibility of every person on a job site to be in full compliance with all safety and environmental rules and policies. Supervisors and foremen at job sites are responsible for enforcement of these rules on a continuous basis.

5.5.3 Construction Wastes

Waste materials excavated along the routes during installation of the transmission duct banks and manholes will be promptly removed and re-used or properly managed at a suitable permitted facility. The largest quantity of construction waste will likely be from soils excavated from the trench and locations where manholes are installed. This material will be removed from the trench and hauled to an appropriate off-site disposal/re-use location or to a temporary construction laydown area for on-site re-use. Concrete and asphalt will be recycled at a local asphalt plant.

As previously noted, in the event there are contaminated soil, contaminated groundwater or other regulated materials encountered along the route, soils/groundwater will be managed pursuant to the URAM provisions of the MCP. The Company will contract with a LSP as necessitated by conditions encountered along the Project alignment, consistent with the requirements of the MCP at 310 C.M.R. 40.0460 et seq.

5.5.4 Dewatering Protocols

Groundwater can be encountered when constructing underground utility facilities. If feasible, based on site-specific conditions, the least costly method when dewatering will typically be to recharge the groundwater back into the adjacent subsurface. This can be done either by discharging back within the open excavation/trench associated with the project/pipe installation or discharging to the nearby ground surface via a filter bag or dewatering corral (if necessary), allowing groundwater to infiltrate back into the subsurface.

At locations where on-site recharge of groundwater is not an option and manageable amounts of groundwater (<50,000 gallons per day) are expected to be generated, a vacuum truck can be used to pump out and appropriately dispose/recycle groundwater encountered. The water would be tested to ensure proper disposal/recycling.

At locations where larger amounts of groundwater (>50,000 gallons per day) are encountered and on-site recharge and off-site disposal are not feasible options, discharging into the municipal stormwater and/or sewerage systems may be used. However, this activity must be coordinated with the municipality, the MWRA and the USEPA beforehand and would not occur without written consent from the municipality, the MWRA and the USEPA.

For discharges of uncontaminated groundwater to surface water, coverage under the USEPA NPDES CGP will be obtained.

Coverage under the USEPA General Permit for Remediation Activity Discharges ("Remediation General Permit" or "RGP") will be required for discharge of contaminated groundwater to surface water. Permits will also be required for discharges to either municipal separate storm sewer systems ("MS4s"), or sanitary/combined sewers (such as municipality and/or MWRA territory).

5.5.5 Climate Adaptation and Resiliency Considerations

As described in further detail below, the proposed improvements to the transmission system in the Project Area will have no adverse climate change impacts or negative effects on sea levels.

The field of climate change study is constantly evolving, and the Massachusetts State Hazard Mitigation and Climate Adaptation Plan (https://resilientma.org/shmcap-portal/#/) currently identifies the following four primary climate change interactions: changes in precipitation, sea level rise, extreme weather, and rising temperatures.

Potential climate related impacts are particularly relevant to communities located near the coast, such as Boston, Somerville, and Cambridge, and specifically to the Project area, which includes work near the Charles River. The Company focused its assessment of potential vulnerabilities to the transmission line infrastructure on changes in precipitation and extreme weather events, including the potential exposure of the Project area to flooding due to the changing climate conditions.

Generally, climate change research indicates an expectation of more frequent and intense storm events. Within the Project Area, climate models suggest there will be an increase in precipitation, with an estimated 2 to 5-inch increase in total annual precipitation between the 2030s and 2090s (https://resilientma.org/map/). More frequent and intense storm events, and increased annual precipitation, could result in more localized flooding in the Project area. For perspective, the Charles River occasionally experiences flooding from intense weather events producing heavy rains. River flooding occurs when river levels rise and overflow their banks and inundate areas that are normally dry. The Charles River dam, located east of the Project Area near the North Washington Street Bridge in Cambridge and Boston, releases water in a controlled manner from the Charles River into Boston Harbor. The operation of the dam during severe weather events provides flood protection as it lowers the elevation of the river by pumping water through to the Boston Harbor.

The Federal Emergency Management Agency ("FEMA") mapped flood zone is defined as the 100-year flood event which represents a flood event that has a 1% probability of occurring in any given year. FEMA has determined that the Charles River in the Project vicinity will rise to elevation 4.0 feet, North American Vertical Datum 1988 (NAVD88) during the 100-year event. According to the FEMA Flood Insurance Study for Suffolk County, flood damage along the Charles River occurs when the water elevation approaches 3.8 feet. During the 100-year flood event, the Charles River dam operates pumps which maintain the water elevation at 3.5 feet, approximately 0.5 feet below the 100-year flood and 0.3 feet below the elevation which could cause potential damage to adjacent properties. The extent of the 100-year flood zone is largely confined within the riverbanks and does not extend onto adjacent areas, except for lower elevations on and adjacent to MassDCR's Magazine Beach property. The balance of the Project area is not located in the 100-year floodplain. Please see Figures 5-8A (Project) and 5-8B (Noticed Alternative) for additional detail.

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

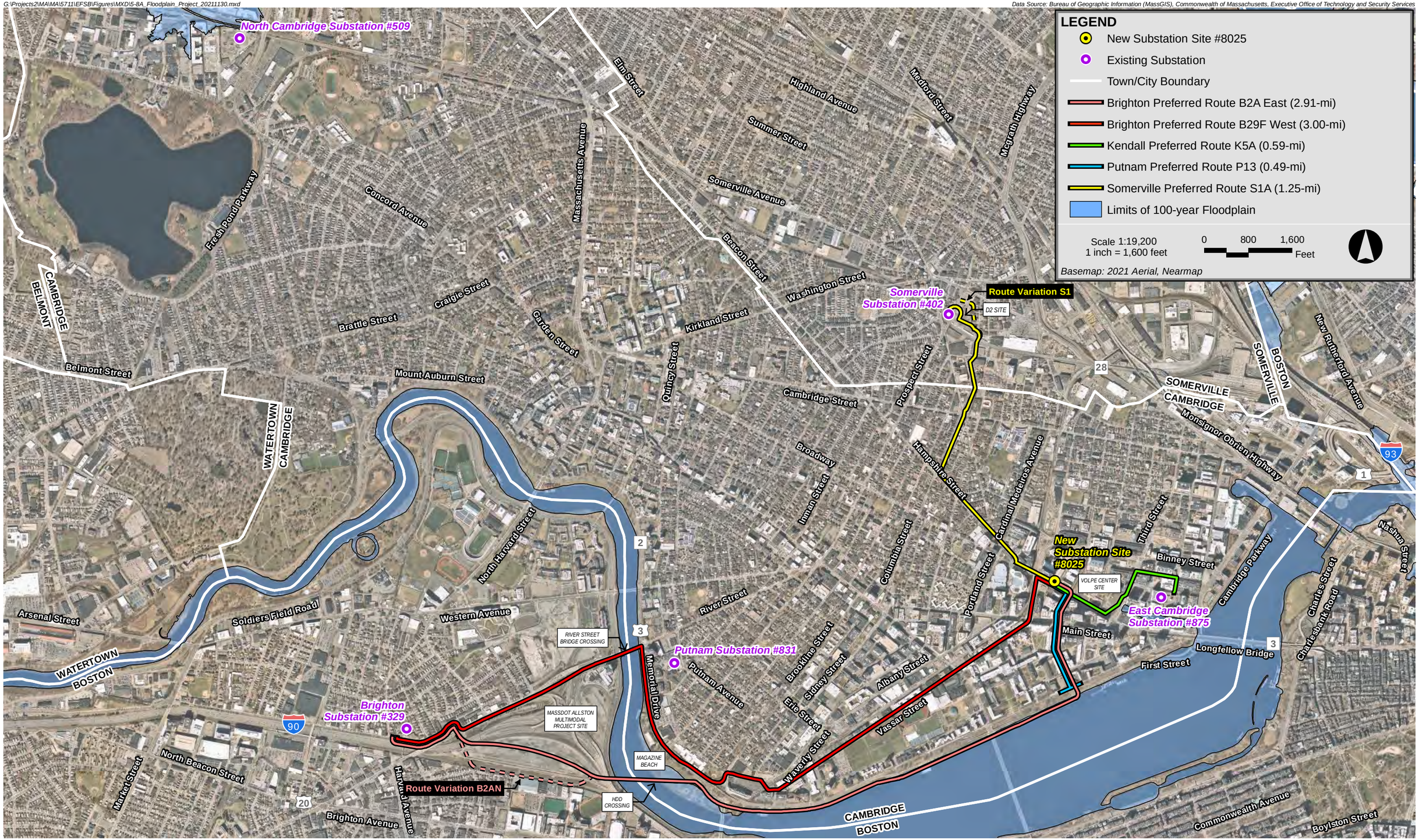

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Figure 5-8A

Limits of 100-year Floodplain (Project)

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Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

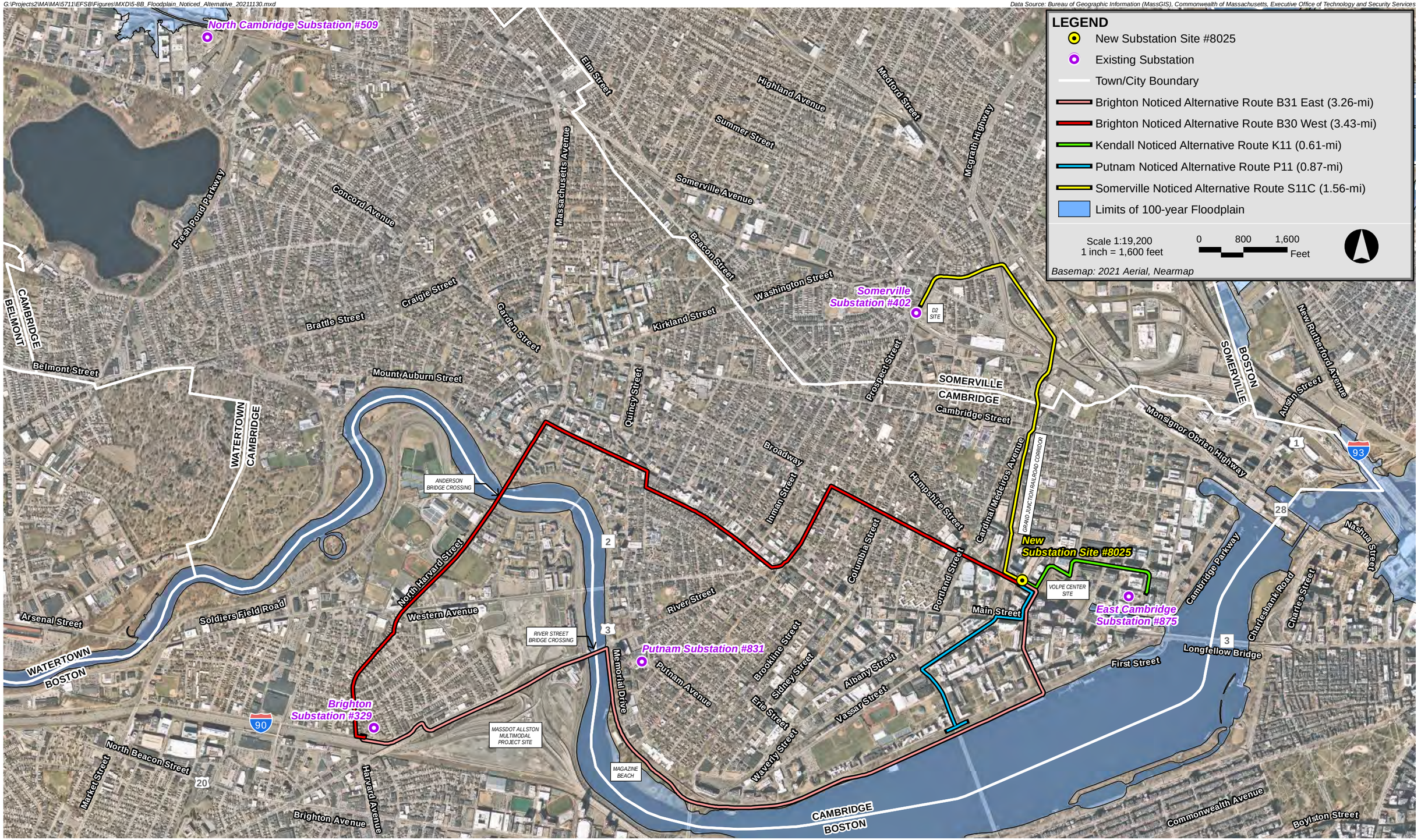

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Figure 5-8B

Limits of 100-year Floodplain (Noticed Alternative)

In addition to the above, the Company also reviewed the following sources of data to assess the potential future effects of flooding (due to sea level rise and increased precipitation) to the Project:

- Cambridge Flood Viewer Tool;[97]
- Somerville Flood Risk Explorer Tool;[98]
- Climate Ready Boston Map Explorer;[99]
- Massachusetts Office of Coastal Zone Management ("CZM") Sea Level Rise and Coastal Flooding Viewer;[100]
- Resilient MA Climate Change Clearinghouse for the Commonwealth.[101]

These educational tools provide interactive mapping applications that allow users to explore the potential impacts of several different design storms and the potential effects of flooding and sea level rise.[102] These tools have been developed as an information and planning tool for municipalities to assess climate change threats and vulnerabilities from flooding and to prepare for it by implementing specific strategies. Please see Figures 5-9A through 5-9C (Project), and Figures 5-10A through 5-10C (Noticed Alternative) for additional detail.

These educational tools consider different factors and assumptions but in general they predict that portions of the Project area (particularly in Cambridge and Somerville) could experience greater frequency and duration of flooding because of climate change and sea level rise under certain scenarios, depending on the extent of sea level rise over time.

That said, underground transmission line design and installation is inherently adaptive and resilient to the potential effects of climate change. For example, most of the adverse weather conditions that traditional overhead transmission line infrastructures are exposed to above-ground can be avoided (e.g., wind and precipitation). While an overhead line typically takes less time to repair than an underground line in the event of an outage (days rather than weeks), an underground transmission line generally alleviates the need for more frequent investments in transmission infrastructure maintenance and repairs. The expected benefits would include a more secure energy supply with fewer instances of weather-related power outages.

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97 See https://www.arcgis.com/apps/webappviewer/index.html?id=1d30c73456d246f48daf8489405c6629

98 See https://floodfactor.com/city/somerville-massachusetts/2562535_fsid#flood_risk_explorer

99 See https://www.boston.gov/departments/environment/climate-ready-boston-map-explorer

100 See https://www.mass.gov/service-details/massachusetts-sea-level-rise-and-coastal-flooding-viewer

101 See https://resilientma.org/map/

102 Sea level rise refers to the increase in mean sea level over time.

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-9A_Cambridge_SLR_Flood_Project_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), City of Cambridge Flood Viewer

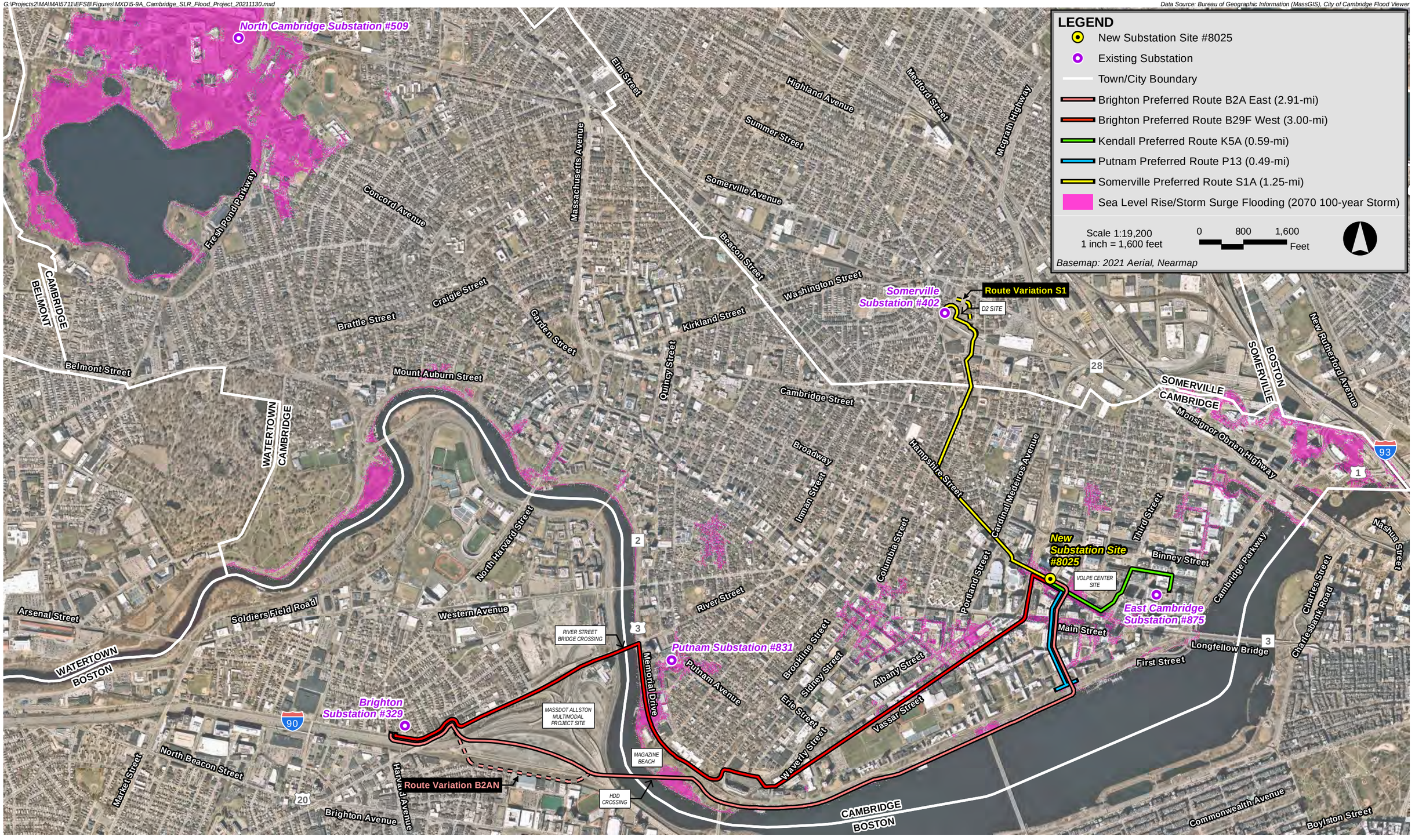

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Figure 5-9A

Cambridge Flood Viewer Maps (Project) - Sea Level Rise/Storm Surge Flooding (2070 100-year Storm)

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-9B_Cambridge_Precip_Flood_Project_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), City of Cambridge Flood Viewer

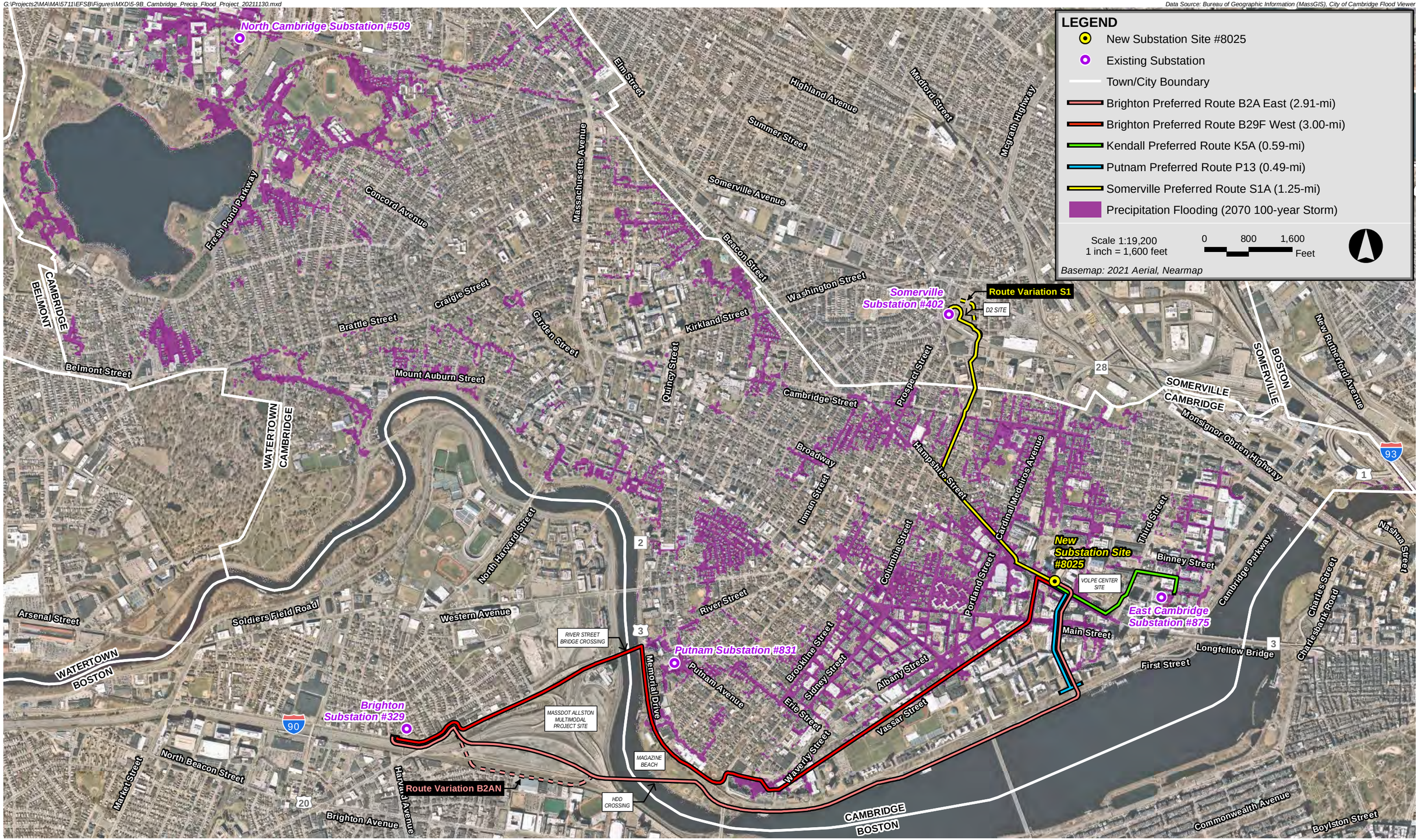

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Figure 5-9B

Cambridge Flood Viewer Maps (Project) - Precipitation Flooding (2070 100-year Storm)

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-9C_CZM_SLR_Project_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Massachusetts Sea Level Rise and Coastal Flooding Viewer (MassCZM)

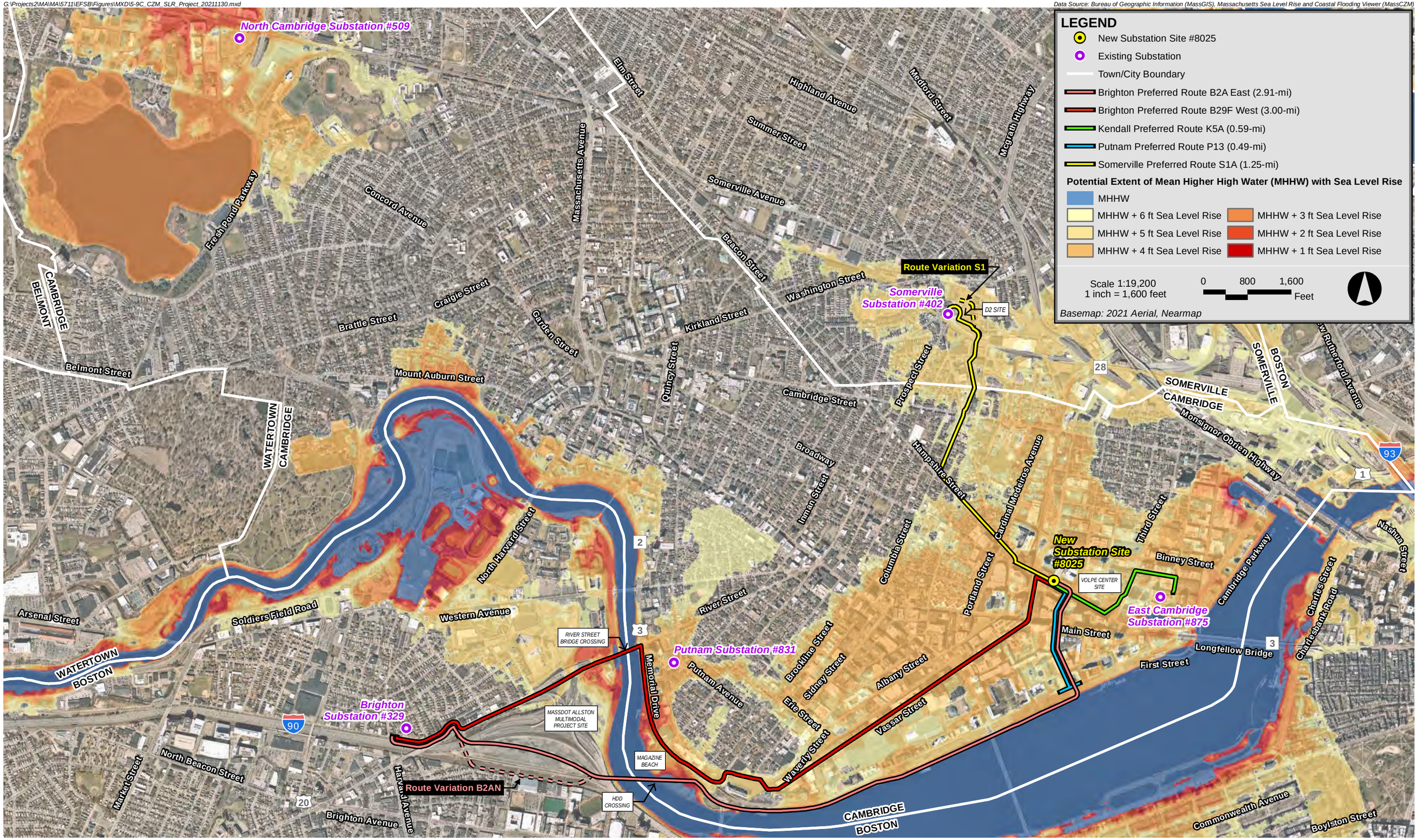

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Figure 5-9C

MassCZM Sea Level Rise and Coastal Flooding Viewer Maps (Project)

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-10A_Cambridge_SLR_Flood_Noticed_Alternative_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

- New Substation Site #8025
- Existing Substation
- Town/City Boundary
- Brighton Noticed Alternative Route B31 East (3.26-mi)
- Brighton Noticed Alternative Route B30 West (3.43-mi)
- Kendall Noticed Alternative Route K11 (0.61-mi)
- Putnam Noticed Alternative Route P11 (0.87-mi)
- Somerville Noticed Alternative Route S11C (1.56-mi)
- Sea Level Rise/Storm Surge Flooding (2070 100-year Storm)

Scale 1:19,200
1 inch = 1,600 feet

0 800 1,600 Feet

Basemap: 2021 Aerial, Nearmap

North Cambridge Substation #509
Somerville Substation #402
D2 SITE
New Substation Site #8025
VOLPE CENTER SITE
East Cambridge Substation #875
Putnam Substation #831
Brighton Substation #329
ANDERSON BRIDGE CROSSING
RIVER STREET BRIDGE CROSSING
MASSDOT ALLSTON MULTIMODAL PROJECT SITE
MAGAZINE BEACH
GRAND JUNCTION RAILROAD CORRIDOR
Fresh Pond Parkway
Concord Avenue
Massachusetts Avenue
Elm Street
Highland Avenue
Medford Street
Summer Street
Somerville Avenue
Beacon Street
Washington Street
Mystic River
Craigie Street
Brattle Street
Garden Street
Kirkland Street
Mount Auburn Street
Quincy Street
Prospect Street
Cambridge Street
Broadway
Inman Street
Hampshire Street
Cardinal Medeiros Avenue
Monsignor O'Brien Highway
Austin Street
New Rutherford Avenue
Nashua Street
Cambridge Parkway
Charlesbank Road
Charles Street
Longfellow Bridge
First Street
Main Street
Portland Street
Columbia Street
Brookline Street
Sidney Street
Albany Street
Vassar Street
Erie Street
Waverly Street
Memorial Drive
River Street
Western Avenue
North Harvard Street
Soldiers Field Road
Arsenal Street
North Beacon Street
Market Street
Harvard Avenue
Brighton Avenue
Commonwealth Avenue
Boylston Street
Belmont Street
CAMBRIDGE
BELMONT
WATERTOWN
BOSTON
SOMERVILLE
CAMBRIDGE
WATERTOWN
CAMBRIDGE
BOSTON
CAMBRIDGE
BOSTON
SOMERVILLE
1
2
3
20
28
90
93

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Figure 5-10A

Cambridge Flood Viewer Maps (Noticed Alternative) - Sea Level Rise/Storm Surge Flooding (2070 100-year Storm)

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-10B_Cambridge_Precip_Flood_Noticed_Alternative_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

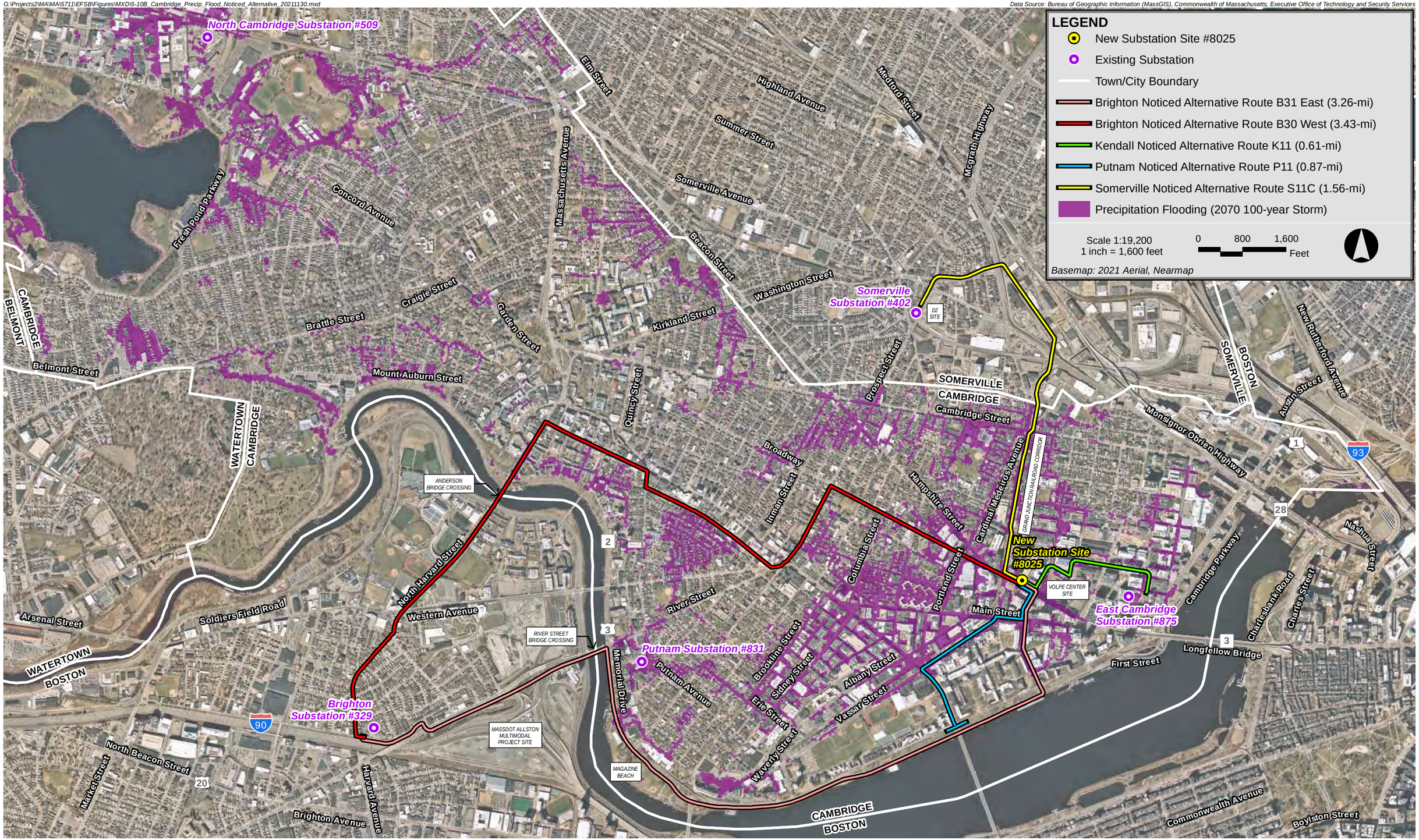

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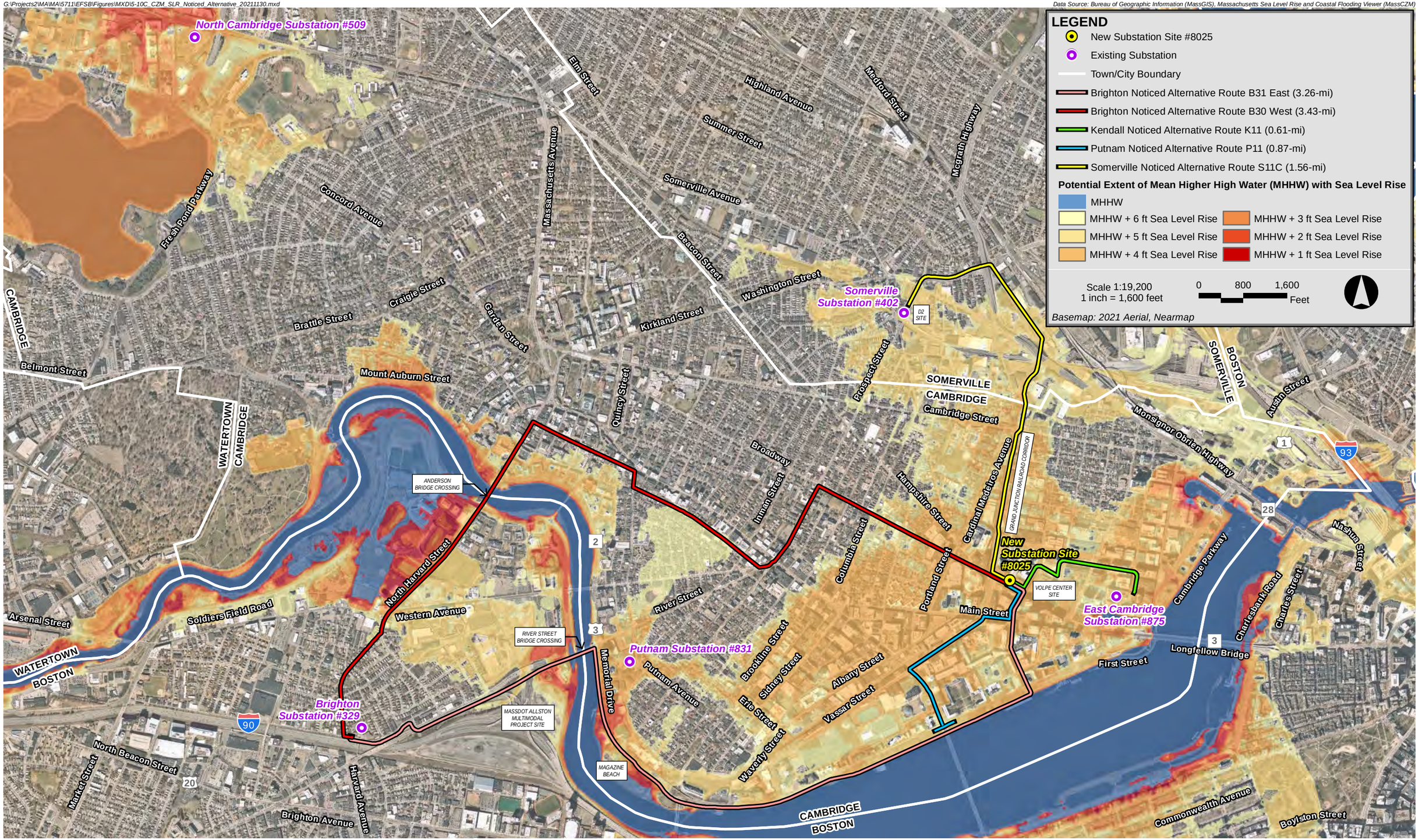
Figure 5-10B

Cambridge Flood Viewer Maps (Noticed Alternative) - Precipitation Flooding (2070 100-year Storm)

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-10C_CZM_SLR_Noticed_Alternative_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Massachusetts Sea Level Rise and Coastal Flooding Viewer (MassCZM)



LEGEND

- New Substation Site #8025
- Existing Substation
- Town/City Boundary
- Brighton Noticed Alternative Route B31 East (3.26-mi)
- Brighton Noticed Alternative Route B30 West (3.43-mi)
- Kendall Noticed Alternative Route K11 (0.61-mi)
- Putnam Noticed Alternative Route P11 (0.87-mi)
- Somerville Noticed Alternative Route S11C (1.56-mi)

Potential Extent of Mean Higher High Water (MHHW) with Sea Level Rise

- MHHW
- MHHW + 6 ft Sea Level Rise
- MHHW + 5 ft Sea Level Rise
- MHHW + 4 ft Sea Level Rise
- MHHW + 3 ft Sea Level Rise
- MHHW + 2 ft Sea Level Rise
- MHHW + 1 ft Sea Level Rise

Scale 1:19,200
1 inch = 1,600 feet

0 800 1,600 Feet

Basemap: 2021 Aerial, Nearmap

Greater Cambridge Energy Program

EVERSOURCE

Figure 5-10C

MassCZM Sea Level Rise and Coastal Flooding Viewer Maps (Noticed Alternative)

In addition to the above, the underground transmission line facilities are not affected by flooding and will not cause flooding or exacerbate any existing flooding situations. The Project does not involve any fill or permanent aboveground structures in the 100-year floodplain, and the use of HDD technology to install the transmission line beneath the Charles River and most of Magazine Beach (including the mapped 100-year floodplain limits) avoids changes to surface grades where flood storage is presently provided. Further, the splice vaults (manholes) will include damp-proofing on the exterior surfaces and sealant will be placed between precast concrete joints. However, these measures will not fully waterproof the splice vaults. It is expected that water will be able to enter the splice vaults especially rainwater via the covers during the life of these structures. In the event a splice vault becomes filled with water, before any maintenance or routine inspection of the splice vault can be completed, the splice vault would have to be drained prior to entering, which is a typical practice. Further, all the equipment to be installed inside the splice vaults is designed to operate and withstand being fully submersed in water, including salt water. Corrosion control measures will be included in the splice vaults to mitigate corrosion of any exposed metal structures.

See Section 5.6.1.3 below for a description of the resiliency measures Eversource has taken to ensure that the New Substation and the improvements and upgrades to the existing substation facilities are resistant to the potential effects from sea level rise and climate change.

5.5.6 Electric and Magnetic Fields

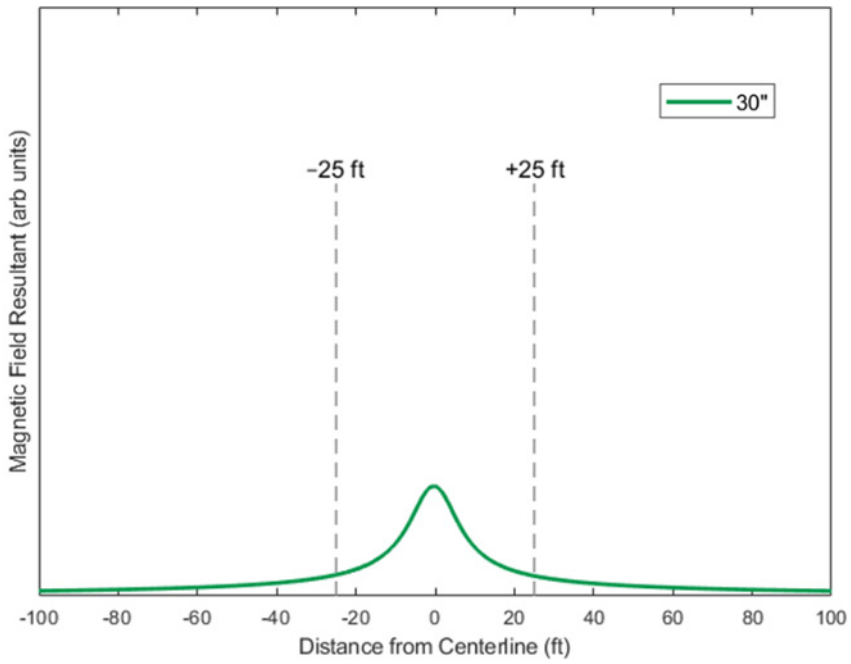
The Company's EMF consultant, Exponent™, measured 60-Hz magnetic fields around the proposed New Substation Site and calculated magnetic fields associated with the new and existing 115-kV underground transmission lines under streets on the Preferred and Noticed Alternative Routes, at average and peak loading conditions. Electric fields from the underground transmission lines will be blocked by the cable construction and so were not assessed. The report provided in Appendix 5-6 describes the modeling methodology and results in detail.

The average of magnetic fields from existing sources measured in the immediate vicinity of the proposed New Substation range from 0.3 to 1.1 milligauss ("mG"). Measured magnetic-field levels along the routes of the proposed underground transmission lines varied from 0.01 mG to 32 mG, with the average along the routes ranging from 0.8 to 2.0 mG. These background magnetic-field levels were not considered significant enough to add to calculated post-project magnetic-field levels.

Five proposed transmission line duct bank configurations (containing eight transmission lines) were modeled to describe the anticipated magnetic-field levels along the proposed transmission line routes between the proposed New Substation and the existing substations.

The modeled magnetic field from each of the transmission line duct bank configurations was highest directly above the duct bank and decreased rapidly with distance as illustrated in Figure 5-11 below which shows an example profile of the calculated magnetic-field levels for a duct bank at a height of 3.3 feet (1 meter) above ground under a typical loading scenario and the rate at which the magnetic field diminishes with distance from a duct bank.

Figure 5-11 Example Profile of Calculated Magnetic-Field Levels Showing the Rate at Which Calculated Magnetic-Field Levels Diminish with Distance



At average loading with the duct banks installed at Eversource's standard minimum burial depth of 30 inches, the magnetic-field level (in four segments of the proposed routes) directly above the duct bank was 49 mG or less, decreasing to 3.4 mG or less at 25 feet from the duct bank centerline. In the remaining duct bank segment between the New Substation and the existing East Cambridge Substation (Preferred Route K5A and Noticed Alternative Route K11) in Table 5-5 below, the loading of the transmission lines is forecast to be greater than for other segments of the route and so the calculated magnetic field at average loading was also greater, 121 mG,[103] decreasing to 8.4 mG at 25 feet from the duct bank centerline. Calculated magnetic-field levels at peak loading for all duct banks were approximately 50% higher.

[103] The higher calculated magnetic field along this line is driven largely from a scenario in which the Vicinity Energy facility is operating at its maximum output, which has been an infrequent occurrence in recent years. In the hours of the year when that generating facility is not operating at full output, the loading of the transmission line in this area would be proportionally lower, resulting in a modeled magnetic-field level more comparable to the calculated mG fields for other portions of the route

The Exponent report further indicated that magnetic fields associated with the Project would be similar along both the Preferred Routes and Noticed Alternative Routes.

Table 5-5 below summarizes the calculated magnetic-field levels for each of the transmission line duct bank configurations.

Table 5-5 Calculated Magnetic Field Levels at 3.3 feet (1 meter) Above Ground for Buried Duct Banks at Average Loading.

	Highest Magnetic Field at Average Loading (mG)	
Duct Bank Route	**At +/- 25 feet[104]**	**Above Duct Bank**
Junction (Routes P11/P13)	1.3	6.5
Kendall #800 or East Cambridge #875 (Routes K5A/K11)	8.4	121
Somerville #402 (S1A/S11C)	0.4	2.1
Brighton #329 (Routes B29F/B30)	1.5	6.0
Brighton #329 (Routes B2A/B31)	1.5	6.0

At bridge crossings associated with Preferred Route B29F West (River Street Bridge) and Noticed Alternative Route B30 West (Anderson Bridge), where the cables will be closer to the road surface, the magnetic fields were calculated to be about 50% percent higher above the duct bank with a smaller change <10% beyond about 10 feet from the duct bank.

Even directly above the underground transmission lines at minimum burial depth and peak loading the calculated magnetic fields will be far below international exposure limits for 60-Hz magnetic fields of 9,040 mG established by the International Committee on Electromagnetic Safety (ICES, 2019) and 2,000 mG recommended by the International Council on Non-Ionizing Radiation Protection (ICNIRP, 2010). Please refer to Appendix 5-6 for additional details.

[104] These distances are referenced to the duct bank centerline.

5.6 Substation Facilities

In addition to the proposed transmission lines, the Project also involves construction of a New Substation facility in East Cambridge and modifications to five existing substation facilities located in Cambridge, Boston, and Somerville. As was described in Section 4, the New Substation facility provides for both a new interconnection to the existing 115-kV electric transmission system and provides for the high voltage power from the transmission system to be "stepped down" (i.e., the voltage will be decreased) for distribution to Eversource's residential, commercial, institutional, and industrial customers. A description of the work that is necessary to construct the New Substation and the work that is necessary to implement the improvements at the existing substation facilities is provided below.

5.6.1 New Substation

The New Substation will be constructed underground on a parcel of land that is currently occupied by the Kendall Center Blue Garage at #290 Binney Street in East Cambridge (see locus map provided in Figure 4-2 in Section 4). The New Substation site is bordered by Binney Street to the north; to the east exists the access driveway into the existing garage facility; Broadway borders the site to the south; and Galileo Galilei Way borders the site to the west.

Land use adjacent to the New Substation site includes predominantly pharmaceutical companies, biotechnology laboratories and office space. A hotel (Residence Inn by Marriot) is located to the south on the opposite side of Broadway, along with a small public park (Danny Lewin Park) and two parking garages (Kendall Center Yellow and Green Garages). The Loughrey Walkway and Bike Path exists east of the site between Broadway and Binney Street.

For the site to be developed for the New Substation, the landowner BXP will demolish the existing Blue Garage and replace it with underground parking in roughly the same location. Following demolition of the existing parking garage facility, the New Substation Site will occupy roughly one-third of the parcel, or approximately 0.8 acres. The total footprint of the New Substation facility is approximately 35,000 s.f. The balance of the site will ultimately be re-developed by BXP. The developer's plans include adequate space within the parcel to install all the Eversource electrical substation infrastructure and associated power line duct banks to their property line and to ensure the ongoing safe operation and maintenance of such equipment.

The New Substation will be constructed to a depth of approximately 110-feet below grade. Except for vent stacks, freight elevator headhouse and stair access headhouse, after construction the New Substation will be completely underground and the above ground space will be designed and finished as public open space, integrated into the larger BXP development project.

To minimize the size and footprint of the New Substation, GIS[105] will be used. GIS technology allows the placement of the New Substation using a fraction of the land area that would ordinarily be required for a conventional open-air substation. The design includes twenty-two 115-kV circuit breakers in a breaker-and-a-half configuration; six 115-kV series reactors, control rooms that will contain protective relay and control equipment, communication equipment and control batteries; three 90-MVA, 115/14-kV transformers; distribution switchgear; and six 14-kV, 9.6-MVAR capacitor banks. There will be room reserved for an additional future transformer, switchgear, capacitor bank, and shunt reactor.

The general construction sequence for the underground enclosure and associated infrastructure that will contain the New Substation is as follows:[106]

- Following site preparation work by BXP, BXP will construct an underground structure consisting of concrete slurry walls, floors, stairwells, elevator, fire suppression system infrastructure, and minimal lighting systems. That underground structure will form part of BXP's redevelopment project.

- Upon receipt of all necessary approvals from the Siting Board and other regulatory agencies specific to the Project, Eversource has an agreement with BXP that grants Eversource the option to purchase the underground vault and associated easements. If Eversource does not exercise its option, the vault will be utilized by BXP for its own purposes.

If Eversource has exercised its option and purchased the underground structures and associated easements it will then construct the substation, including the building support systems inclusive of ventilation, fire protection systems, oil spill containment systems for the transformers, circuit breakers, relay and control equipment, communication equipment and batteries, switchgear, and any necessary grounding equipment and lighting. The New Substation will take approximately 5 years to construct after purchase of the underground structures and associated easements.

5.6.1.1 Sound

The Company evaluated potential sound associated with the operation of the New Substation. The assessment, conducted by the Company's acoustics consultant, AKRF, Inc., included ambient base line sound level data collected in the vicinity of the New Substation; sound level modeling to predict the operational sound from the substation; a comparison of modeled sound levels with applicable noise criteria; and design considerations for mitigation. The New Substation is

[105] With GIS, the switchgear is enclosed in an inert gas, called sulfur hexafluoride (SF6), which allows the phase spacing of the electronic components to be very close and protects the components from outside contamination.

[106] Demolition and initial site preparation work of a vault to accommodate the later construction of the New Substation is the responsibility of BXP as part of its overall redevelopment project.

proposed to be located substantially underground; thus, the operational sound is expected to be minimal. The primary sources of noise generation are the proposed air intake and exhaust systems. Through a combination of project fan selections (quieter fans) and intake/exhaust shaft sound attenuator bank design, predicted operational sound levels of the New Substation will comply with the Cambridge Noise Ordinance.

5.6.1.2 Visual Analysis

The New Substation will not result in any significant visual impacts because it is proposed to be located predominantly underground. The above-ground components are limited to vent stacks, freight elevator headhouse, stair access headhouse, and a fuel fill pipe and exhaust stack associated with a below grade generator. The New Substation's above-ground components have been integrated into BXP's overall design. At grade, above the substation facility, the public park surface treatment is to be constructed by BXP. The open space program has not been finalized but is expected to consist of hardscape, landscape, public amenities such as benches, and light recreation. The City of Cambridge Redevelopment Authority and Planning Board will ultimately be responsible for reviewing and approving the final public park design details and surface treatments as part of BXP's local permit application process.

5.6.1.3 Climate Adaptation and Resiliency

Risk to electrical infrastructure facilities can be minimized through careful substation design. To evaluate the potential for future flood risk at the New Substation Site, Eversource considered existing conditions based on FEMA data. The projected extent of future coastal flooding in the area around the New Substation Site was studied using the Cambridge Flood Viewer Tool v2.1 and MassCZM's Sea Level Rise and Coastal Flooding Viewer. The Cambridge Flood Viewer Tool assesses potential flooding under several scenarios, including present day precipitation flooding from the 10-year and 100-year storm events, precipitation flooding from the Year 2030 10-year and 100-year storm events, precipitation flooding from the Year 2070 10-year and 100-year storm events, and Sea Level Rise and Storm Surge Flooding from the Year 2070 10-year and 100-year storm events. According to this data set, the New Substation would not experience precipitation flooding under the present-day modeling scenarios. The New Substation site is also not presently located in the 100-year floodplain, as mapped by FEMA. Regarding future conditions, discrete portions of the BXP development site, but not specifically the location of the New Substation, are within areas modeled as having flooding potential from precipitation events under the 2030 and 2070 100-year storm events and flooding from sea level rise/storm surge flooding in the 2070 100-year storm event.

According to MassCZM's Sea Level Rise and Coastal Flooding Viewer, the New Substation site could potentially experience coastal flooding above mean higher high water (the average height of daily highest tide) from the most extreme predictions (year 2100) of sea level rise (5-foot to 6-foot increases above mean higher high water). This projection does not account for storm surge, waves, erosion, and other dynamic factors.

Please see Figures 5-12 and 5-13 for additional detail.

In consideration of the above potential sea level rise and coastal flooding scenarios, Eversource has incorporated several resiliency measures into the design of the New Substation to mitigate impacts due to the potential for more frequent flooding and adverse consequences associated with increasing sea level rise. The below grade substation will be protected such that flood waters cannot penetrate to critical areas. These protective measures include placing all openings to the surface above projected flood levels, sealing conduits with plugs intended to withstand projected hydrostatic pressures and directing storm water flows from the open space above the station away from the station. Furthermore, there will be nothing in the design that will prevent the use of deployable flood barriers in the future should they become necessary.

5.6.1.4 Electric and Magnetic Fields

Exponent™ assessed electric and magnetic fields associated with the New Substation and the underground transmission lines, distribution lines and related buswork. The modeling of these sources indicated that magnetic-field levels around the substation itself will be primarily determined by the transmission lines, distribution lines, and buswork within the substation and will decrease rapidly with distance from these sources.

The magnetic fields from underground transmission lines were calculated above city streets as discussed above in Section 5.5.6. The closest residential area to the proposed substation is where a new residential tower is proposed to be constructed immediately south of the substation. Here, the transmission lines connecting to the substation will transit through the basement level of this building and the residential area closest to the lines will be on the 2nd floor, approximately 18 feet above ground level (about 33 feet above the transmission lines. The magnetic field level at 3.28 ft (1 m) above the second floor of the proposed residential tower was calculated to be approximately 2.8 mG at average loading (as shown in Figure 5-13A). At peak loading, which may only apply for a few hours or a few days in a year, the magnetic field was calculated to be approximately 35% higher. These values fall within the typical range of background magnetic field levels (away from any appliances) in American homes (EPA, 1992).

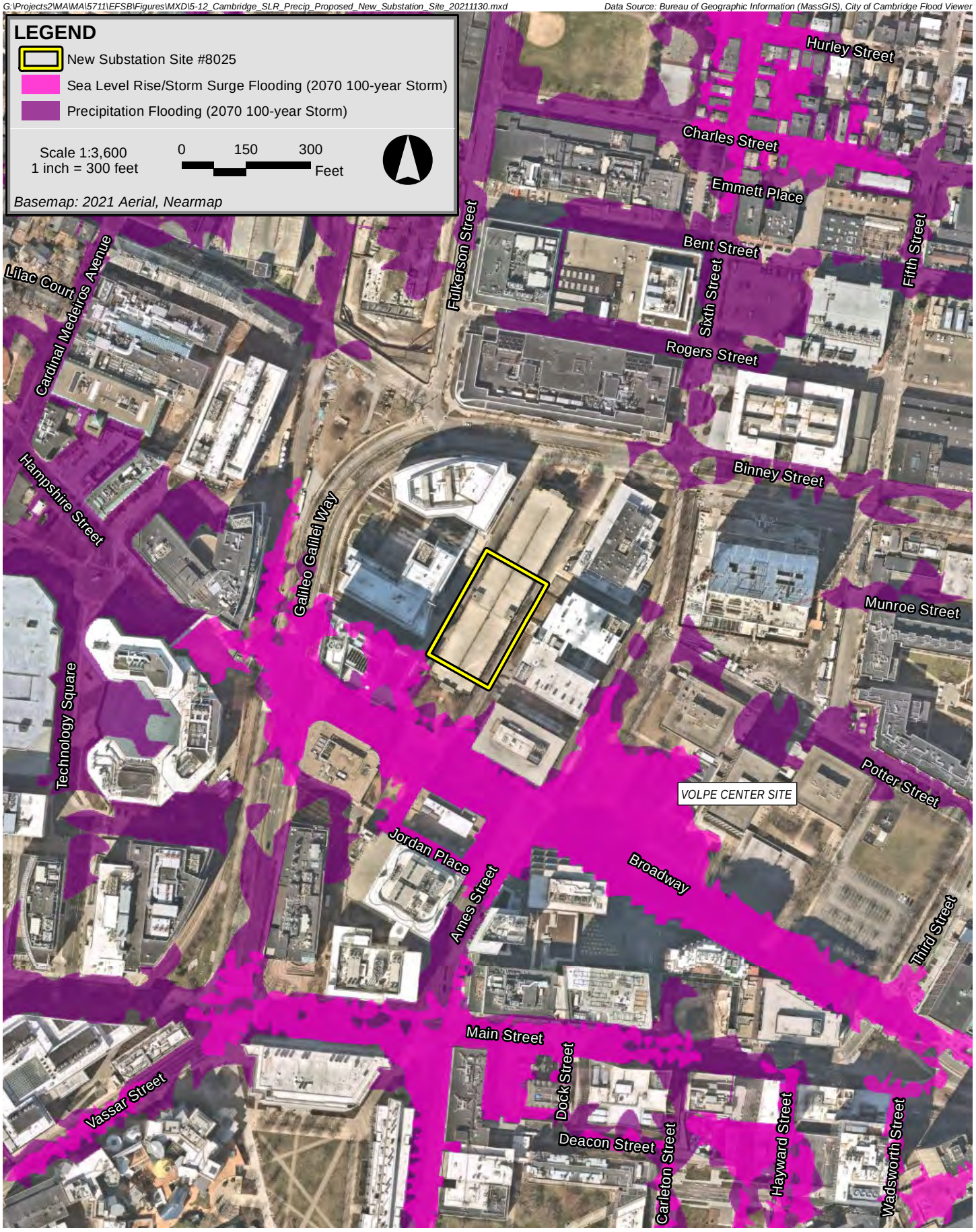


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Figure 5-12

Cambridge Flood Viewer Map (New Substation Site)
Sea Level Rise/Storm Surge Flooding and Precipitation Flooding (2070 100-year Storm)

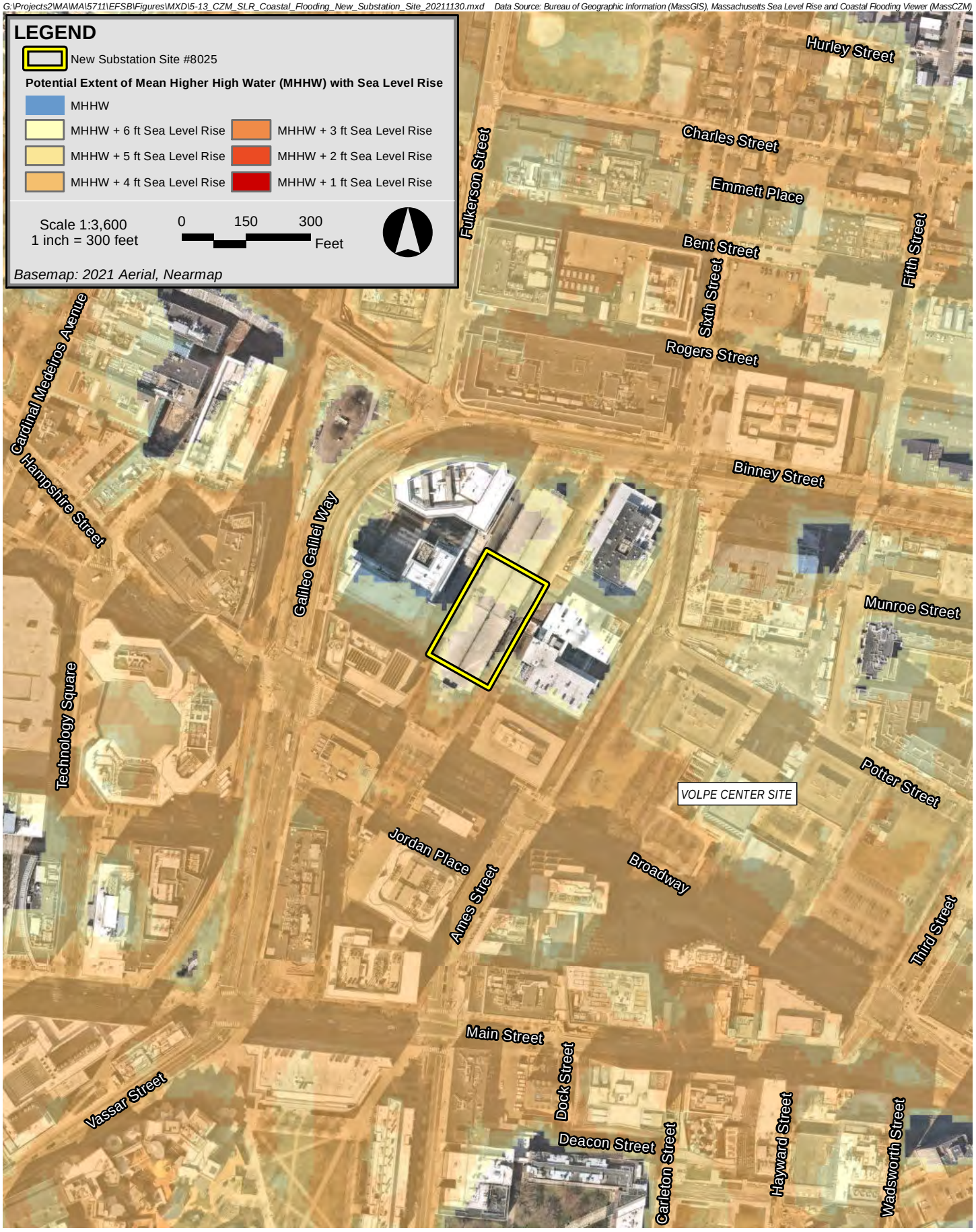

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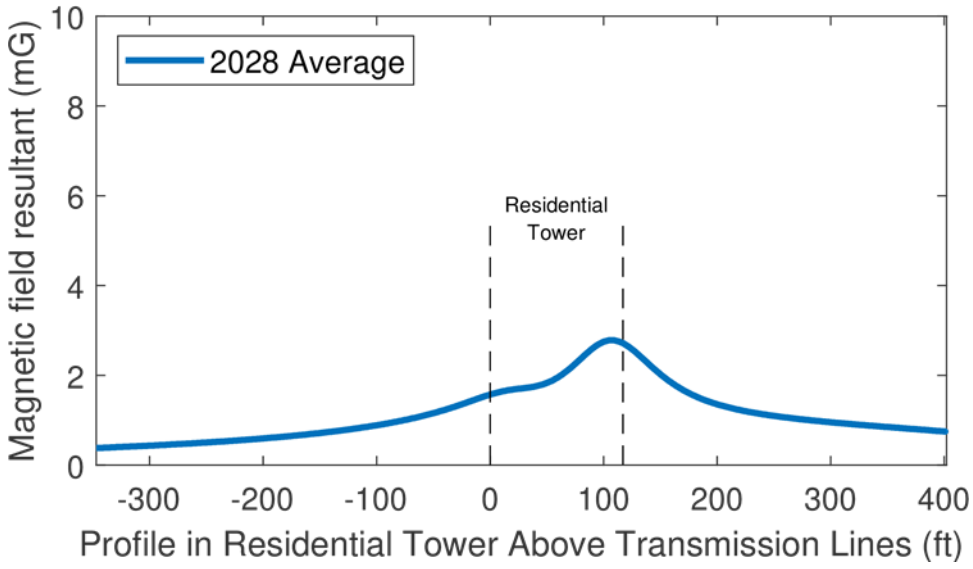
Figure 5-13

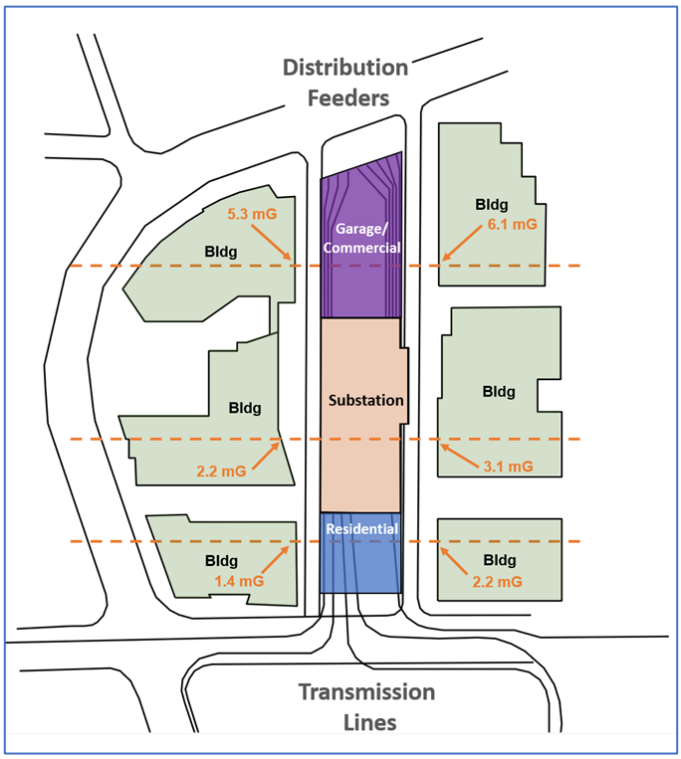
MassCZM Sea Level Rise and Coastal Flooding Viewer Maps (New Substation Site)

Figure 5-13A Calculated Magnetic-Field Levels along East-West Profile in Residential Area on 2nd floor.



In non-residential areas surrounding the substation, such as where the distribution lines exit into a parking garage north of the substation, the magnetic field levels at a height of 1m (3.28 ft) above ground range from about 3.8 mG to 26 mG at average loading. Directly above the substation in the space between the new residential building to the south and the new commercial building to the north, the magnetic field from bus work in the substation will vary a good deal across the space. At average loading and at 3.28 ft (1m) above ground the calculated estimate of magnetic field levels varies from 2.3 and 42 mG with an overall spatial average of about 12 mG. Magnetic-field levels at representative locations of adjacent buildings are shown in Figure 5-13B and were calculated to be 6.1 mG or less. Calculated magnetic-field levels at peak loading for all above scenarios were approximately 50% higher.

Figure 5-13B Calculated Magnetic-Field Levels at 3.28 ft above Ground at Adjacent Buildings.



The calculated magnetic fields summarized above were all far below the international exposure reference value for the general public to 60-Hz magnetic fields recommended by ICES (2019) – 9,040 mG and ICNIRP (2010) – 2,000 mG.

5.6.2 Work at Existing Substation Facilities

5.6.2.1 Putnam Bulk Substation #831 Improvements

The 115-kV lines supplying the Putman Bulk Substation #831 (Preferred Route P13 or Noticed Alternative Route P11) are proposed to be reconfigured at a location outside of the station footprint on Memorial Drive. Work at this facility will consist of protection and control changes. All work will be confined to the interior of the 115-kV relay room.

5.6.2.2 East Cambridge Substation #875 Improvements

The 115-kV bus at the East Substation #875 is the terminal for the output cable of the adjacent Vicinity Energy Generating Unit and two supply cables that connect to the existing transmission system. To integrate the New Substation into the transmission system, the output cable of the Vicinity Energy Generating Unit will be disconnected from the 115-kV bus and connected to a proposed new line connecting directly to the New Substation. A new 115-kV line proposed from the New Substation (Preferred Route K5A or Noticed Alternative Route K11) will be connected to

the switching position formerly utilized by the Vicinity Energy Generating Unit. Work will consist of reconfiguring duct banks in the station yard, cable pulling/termination, and control and protection changes.

5.6.2.3 Brighton Substation #329 Improvements

The existing Brighton – Mystic lines are proposed to be connected to the New Substation. As part of the Project, a segment of the existing high-pressure fluid-filled ("HPFF") lines will be replaced with solid dielectric lines with two cables per phase (Preferred Routes B2A East and B29F West or Noticed Alternative Routes B31 East and B30 West). Work at the Brighton Substation #329 will consist of installing new below-grade duct banks, above-grade cable terminations (in the location of the existing terminators), cable pulling/termination, and control and protection changes.

5.6.2.4 Somerville Substation #402 Improvements

The existing Brighton – Mystic lines routes through Station #402. As part of the Project, the Somerville – New Substation segment of the existing HPFF lines will be replaced with solid dielectric lines (Preferred Route S1A or Noticed Alternative Route S11C). Work at Station #402 will consist of installing new below-grade duct banks, above-grade cable terminations (in the location of the existing terminators), cable pulling/termination, and control and protection changes.

5.6.2.5 North Cambridge #509 Substation Improvements

The 115-kV bus at North Cambridge Substation #509 is the source of the two 115-kV supply lines to Putnam Bulk Substation #831.To balance flows on the transmission system, air-core current limiting reactors ("CLRs") will be installed at Station #509 near the location of the existing line terminations towards the center of the site. In addition to the installation of the CLRs and their associated foundations, a small section of air-insulated bus will be replaced with gas-insulated bus to achieve required electrical clearances. There will also be work associated with required modifications to protection and control equipment. The substation is bordered on all sides by developed areas including the MBTA railroad tracks to the north; Alewife Brook Parkway to the east; a shopping center and medical offices to the south; and residential apartments to the west. Given the developed nature and current use of the property and adjacent properties, the equipment modifications described above should not result in significant environmental impacts. CLR's do have the potential to create sound during operation. However, in this instance the CLRs will be located within the boundaries of the existing station and obscured by existing equipment. As a result, the installation and operation of the CLRs is not expected to have a significant effect on existing sound levels emanating from Station #509.

5.7 Underground Distribution Feeders

In addition to the jurisdictional components of the Project, the Company proposes to install 36 new distribution feeders (circuits)[107] from the New Substation to manholes located on Binney Street. From these manholes, the distribution feeders will be connected to the existing distribution infrastructure in the public roads in the Kendall Square area.

Eversource will install the distribution feeders in concrete duct banks. The duct banks will be sized to accommodate conduits of up to 6-inches in diameter.

The underground construction process for the distribution feeders is not dissimilar from underground transmission line work, although the work zones are generally more compact, and the concrete duct banks and manholes are smaller. Prior to the start of work, catch basin inlets would be protected with silt sacks to prevent silt and sediment from entering the municipal drainage system. Pre-cast or cast-in-place concrete manholes would then be installed prior to or in parallel with trenching and installation of the distribution duct banks. Like transmission line work, the distribution manholes facilitate cable installation and splicing and provide access for future maintenance. The primary method for underground distribution duct bank construction in roadways is open cut trenching. Once a section of the trench is prepared, each of the conduits would be assembled inside the trench or pre-assembled at the ground surface and then lowered into the trench. The area around the conduit sections would be filled and protected with high-strength thermal concrete that creates a duct bank around the conduits. The trench would then be backfilled with fluidized thermal backfill. Like transmission line work, cable pulling activities typically occur at manhole locations and the line terminals. Splicing will occur only at the manhole and line terminal locations. When the work is complete, the road will be restored in accordance with the Department's Road Restoration Standards and municipal standards.

5.8 Comparison of Potential Environmental Impacts Between the Preferred Routes and Noticed Alternative Routes within Each Study Area

This section builds upon the scoring and route selection analysis provided in Section 4 and presents a more detailed comparative analysis of potential impacts along the top underground transmission line routes (Preferred Routes and Noticed Alternative Routes or "Routes") within each Study Area (i.e., Brighton, Putnam, Kendall, and Somerville). The analysis represents a reasonable attempt to identify and characterize the differences in potential for environmental impacts between the top routes. In addition, the overview of mitigation measures presented herein includes those typically implemented by the Company or that may be required by applicable local, state, or federal regulations.

[107] Sufficient distribution infrastructure will be installed to accommodate up to 48 distribution feeders exiting the station as development comes to fruition.

Categories of potential impacts analyzed by the Company include:

Transportation Impacts

The Company evaluated the potential for multimodal transportation impacts during transmission line construction along the Routes within each Study Area, including parking, pedestrian access, bicycle access, public transit, and motorists. Traffic count data was obtained along the proposed transmission line routes by the Company in August, September, and October 2021 (see Appendix 4-3 for additional detail).

Land Use

Land uses near the transmission line routes could potentially experience temporary disruptions during construction associated with noise, dust, and site access impacts. The existing use of properties adjacent to the Routes within each Study Area were determined using current Massachusetts Geographical Information System ("MassGIS") Land Use mapping data (2021). The mapped land uses were tabulated in acres within approximately 100 feet of each route.

Sensitive Receptors

Sensitive receptors adjacent to the Routes within each Study Area were evaluated, including police and fire stations, hospitals, schools (including colleges and universities), nursing homes and elder care facilities, funeral homes, places of worship, daycare facilities, district court buildings, libraries and parks and recreational facilities. Depending on their location, these types of facilities could be affected by temporary construction impacts such as traffic disruption, property access, noise, and dust. These sensitive receptors may be more susceptible to potential impacts from a project and can require extra consideration when developing potential mitigation measures to minimize these impacts. Appendix 4-5 includes the data collected during the route scoring process.

Public Shade Trees

G.L. Chapter 87 defines public shade trees as all trees within a public way or within the boundaries thereof. Construction activities located within the limits of existing paved roadways should not require the removal of public shade trees; however, potential temporary impacts could include trimming of branches and exposure or cutting of roots. Construction activities in the roadway median, along sidewalks or landscaped areas of the public way could require the removal of public shade trees. A field reconnaissance and desktop assessment were conducted by the Company to quantify and assess potential impacts to public shade trees along the Routes within each Study Area. Appendix 4-5 includes the data collected during the route scoring process.

Sound Impacts

Sound impacts associated with the underground transmission line construction are generally limited to temporary construction noise that varies with the proximity of specific receptors along the routes as well as the equipment used and the proposed hours of operation. Typical sound from construction activities includes truck movements, heavy equipment and drilling operations, backhoe excavation, dump truck loading, concrete truck deliveries and general construction work.

Table 5-6 below summarizes the municipal ordinances/regulations governing construction work hours. Copies of the noise ordinances are provided in Appendix 5-5. As discussed in Section 5.4.1, if approved by the affected municipalities or the Siting Board, Eversource would propose to construct the Project from 7:00 AM to 7:00 PM Monday through Friday and from 9:00 AM to 6:00 PM on Saturdays, when daylight and weather conditions allow. Further, as may be dictated by MassDOT, MassDCR, MBTA or the local authority, the Company may be required to perform work at night to minimize daytime impacts to commuters and abutters. In addition, certain construction activities (for example, trenchless crossings, cable splicing) may require continuous 24-hour work.

Table 5-6 Summary of Local Noise Ordinance Work Hour Restrictions

Municipality	Allowed Construction Hours (Weekday)	Allowed Construction Hours (Weekend)	Other Restrictions or Exceptions
Boston	7:00 a.m. to 6:00 p.m.	Same as weekdays for Saturdays and not allowed for Sundays unless prior approval from Inspectional Services Department.	Construction equipment noise levels should not exceed 86 dBA at a distance of 50-feet. After hours construction may be permitted by Inspectional Services on a weekly basis.
Cambridge	7:00 a.m. to 6:00 p.m.	9:00 a.m. to 6:00 p.m.	Construction equipment noise levels should not exceed 86 dBA at a distance of 50-feet.
Somerville	7:00 a.m. to 7:00 p.m.	9:00 a.m. to 7:00 p.m.	Construction equipment is not subject to noise level durations identified in Section 9.117 of the ordinance.

Subsurface Contamination

Subsurface excavation has the potential to encounter contaminated soils and/or groundwater from historical releases and/or urban/historic fill in the vicinity of the routes. A review of the MassDEP waste site list on-line database was performed to determine the likelihood of encountering subsurface contamination along the Routes within each Study Area.

Wetlands and Water Resources

The Company assessed wetland resource areas, buffer zones and filled and flowed tidelands subject to Chapter 91 regulatory jurisdiction (310 CMR 9.00) that would be crossed by the Routes within each Study Area. The evaluation of wetland and waterbody crossings involved reviewing MassGIS data and conducting field reconnaissance to determine the number of wetlands resource areas, as defined in the Massachusetts Wetlands Protection Act regulations (310 CMR 10.00 et seq.). These resource areas included Bordering Vegetated Wetlands ("BVW"), Land Under Waterways and Waterbodies ("LUW") and Inland Bank, and their associated 100-foot Buffer Zones, Bordering Land Subject to Flooding ("BLSF") (100-year floodplain) and 25-foot Riverfront Area, that the proposed routes would potentially cross. Most of these resource areas are associated with the Charles River in Cambridge and Boston. The evaluation of Chapter 91 jurisdictional areas involved reviewing MassGIS data layers developed under the Chapter 91 regulatory program.

Cultural Resources

For purposes of this analysis, cultural resources include buried archaeological sites, standing historic structures (including bridges), or thematically related groups of structures. While in-street underground transmission line construction is unlikely to result in potential impacts to cultural resources, off-road construction can potentially affect archaeological resources when earth movement disturbs subsurface artifacts, such as during grading and excavation. Accordingly, the Company undertook a cultural resource investigation to identify cultural resources adjacent to the Routes within each Study Area. To be considered significant and eligible for listing on the State or National Registers of Historic Places, a cultural resource must exhibit physical integrity and contribute to American history, architecture, archaeology, technology, or culture. According to the Massachusetts Cultural Resource Information System ("MACRIS"), portions of the proposed Routes intersect the boundary of or run alongside the boundary of one or more Inventory Areas and Inventory Points, this includes properties listed as historic and/or listed or eligible for listing in the State and National Registers of Historic Places and are included in the Inventory of Historic and Archaeological Assets of the Commonwealth.[108]

Article 97

Article 97 lands have been acquired for conservation purposes and are protected under Article 97 of the Amendments to the Massachusetts Constitution, the Public Lands Protection Act. Article 97 lands along the Routes could potentially be affected by temporary construction impacts such as vegetation clearing, soil grading, trench excavation, noise, fugitive dust, and site access. The

[108] More specifically, "Inventory Areas" include areas designated as Inventoried Areas, Local Historic Districts and National Register Listed Districts. "Inventory Points" includes properties designated as Inventoried Properties, Local Historic District properties or features, National Register individually listed properties, and properties or features listed in National Register districts. National Register properties are also listed in the State Register.

length of Article 97 lands crossed by the Routes within each Study Area was identified using MassGIS data, aerial photography, state agency and municipal property records, and field reconnaissance.

5.8.1 Environmental Justice Considerations

Eversource is committed to being a strong environmental partner and a responsible steward in the communities it serves. This commitment requires the Company to provide meaningful opportunities for members of EJ communities to be informed about and participate in community discussions of Company projects, especially where those members are burdened with existing negative environmental circumstances and justice disparities. The Company also understands that reliable electric service is vital to public safety, the health and welfare of the Commonwealth's citizens, and sustainable economic development opportunities. The Company believes these justice and reliability goals can be accomplished simultaneously. To promote a more robust transmission system and to properly plan for and address the Commonwealth's energy needs, including further integration of clean energy supply sources, in a timely way, the Company is developing and implementing this Project consistent with the Commonwealth's environmental and resource use laws and policies, including recent Commonwealth enactments of laws and regulations aimed at supporting EJ communities. The Company has taken proactive steps to promote community involvement during the planning of the Project, including:

- Inclusive outreach expanded to specifically provide information to and gather feedback from EJ communities affected by the Project;
- Appropriate mitigation planning; and
- Detailed analyses and action plans to ensure that the proposed Project appropriately avoids and minimizes impacts.

Background

On March 26, 2021, Governor Baker signed bill S.9., "An Act Creating a Next Generation Roadmap for Massachusetts Climate Policy" (c. 8 of the Acts of 2021) (the "Climate Act"). Among other things, the Climate Act defines environmental justice populations, environmental burdens and, environmental benefits, and directed Commonwealth agencies to develop processes and standards that would ensure participation by members of EJ communities and agency consideration of concerns related to EJ communities.[109] The Climate Act is based on the principle

[109] Section 56 of the Climate Act defines an "Environmental Justice Population" as a neighborhood that meets one or more of the following criteria: (i) the annual median household income is not more than 65% of the statewide annual median household income; (ii) minorities comprise 40% or more of the population; (iii) 25% or more of households lack English language proficiency; or (iv) minorities comprise 25% or more of the population and the annual median household income of the municipality in which the neighborhood is located does not exceed 150% of the statewide annual median household income.

that all people have a right to be protected from environmental pollution and to live in and enjoy a clean and healthful environment. This legislation expands and builds upon prior EJ policies, state agency transition rules and interim protocols, and initiatives including the "Environmental Justice Policy of the Executive Office of Energy and Environmental Affairs," dated January 31, 2017, as applicable. The legislation specifically directs the Secretary of the Executive Office of Energy and Environmental Affairs ("EEA") to provide opportunities for meaningful public involvement by EJ populations during certain review processes, including the Massachusetts Environmental Policy Act ("MEPA").

As depicted on Figure 5-14 (Project) and Figure 5-15 (Noticed Alternative), most of the Project Area in which the New Lines are proposed to be located is within neighborhoods inhabited by EJ populations as defined by minority status, English isolation, income status, and/or combinations thereof, as defined under the Climate Act. The data depicted on Figures 5-14 and 5-15 is derived from the Massachusetts Executive Office of Energy and Environmental Affairs ("EEA") "EJ Mapping Tool" (see https://mass-eoeea.maps.arcgis.com/apps/webappviewer/index.html?id=1d6f63e7762a48e5930de84ed4849212)[110]. The following table 5-7 provides a description of the referenced EJ block groups located in the Project area and communities surrounding the Transmission line routes. The maps in Figures 5-14 and 5-15 graphically depicts the EJ populations within a one-mile radius of the transmission substation and transmission lines.

Table 5-7 Massachusetts Environmental Justice Block Groups Potentially Impacted by Project Infrastructure

EJ Block Group	Description
Minority	Refers to individuals who identify themselves Latino/Hispanic, Black/African American, Asian, Indigenous people, and people who otherwise identify as non-white.
Minority & Income	Minority is as described above. Income means median annual household income at or below 65% of the statewide median income for Massachusetts, $85,843 according to current federal census data integrated into the EJ Mapping Tool.
Minority & English Isolation	Minority is as described above. English Isolation refers to households that are English Language Isolated[111] according to federal census forms, or do not have an adult over the age of 14 that speaks only English or English very well.
Minority, Income & English Isolation	See above descriptions for Minority, Income and English Isolation.

[110] The EJ Mapping Tool includes relevant Federal block group census data.

[111] U.S. Census Bureau. Census 2000 summary file technical documentation. Washington (DC): U.S. Census Bureau; 2004.

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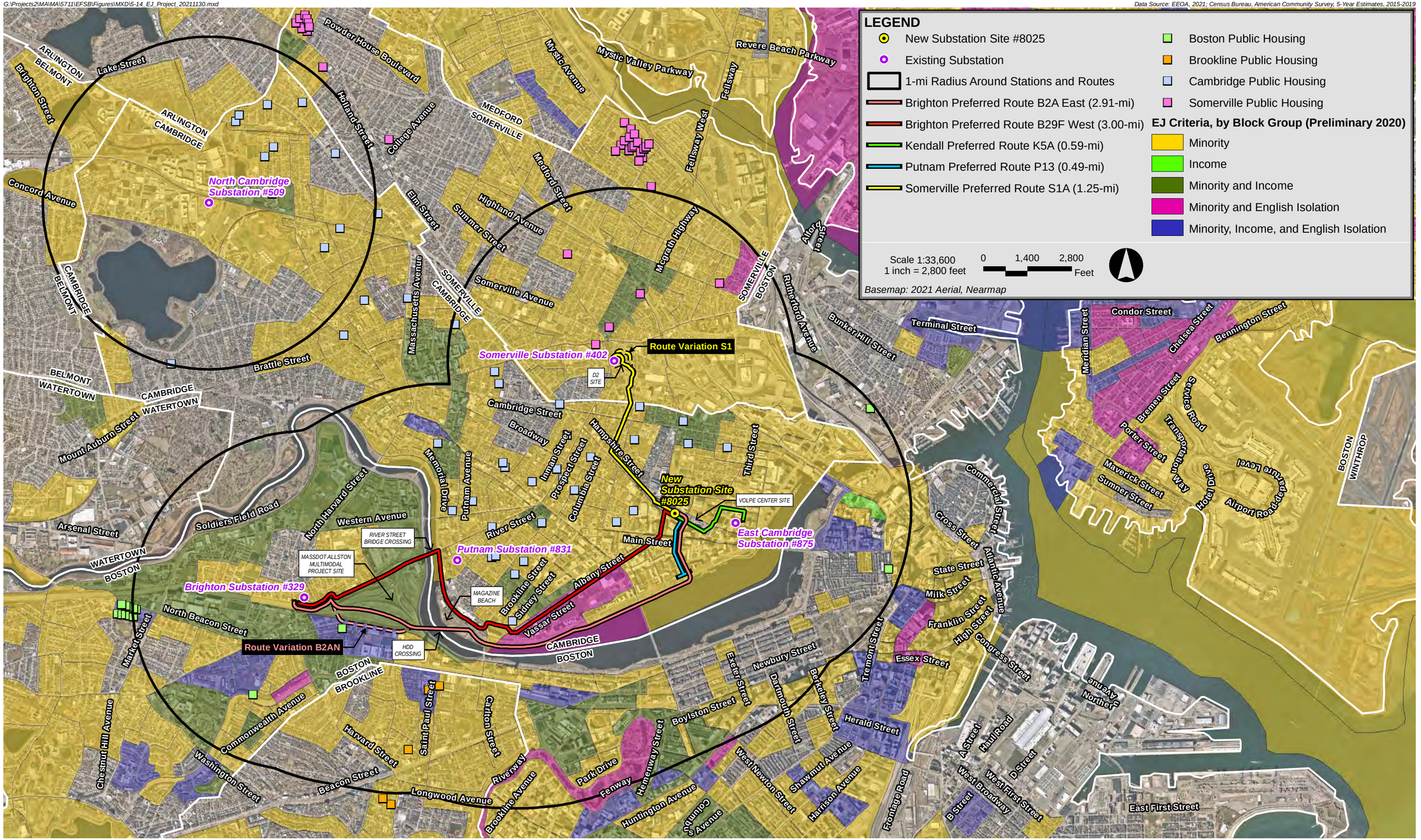
Data Source: EEOA, 2021; Census Bureau, American Community Survey, 5-Year Estimates, 2015-2019



Greater Cambridge Energy Program

EVERSOURCE

Figure 5-14

Environmental Justice Populations (Project)

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Data Source: EEOA, 2021; Census Bureau, American Community Survey, 5-Year Estimates, 2015-2019

LEGEND

- New Substation Site #8025
- Existing Substation
- 1-mi Radius Around Stations and Routes
- Brighton Noticed Alternative Route B31 East (3.26-mi)
- Brighton Noticed Alternative Route B30 West (3.43-mi)
- Kendall Noticed Alternative Route K11 (0.61-mi)
- Putnam Noticed Alternative Route P11 (0.87-mi)
- Somerville Noticed Alternative Route S11C (1.56-mi)

- Boston Public Housing
- Brookline Public Housing
- Cambridge Public Housing
- Somerville Public Housing

EJ Criteria, by Block Group (Preliminary 2020)

- Minority
- Income
- Minority and Income
- Minority and English Isolation
- Minority, Income, and English Isolation

Scale 1:33,600
1 inch = 2,800 feet

0 1,400 2,800 Feet

Basemap: 2021 Aerial, Nearmap

North Cambridge Substation #509

Somerville Substation #402

New Substation Site #8025

East Cambridge Substation #875

Putnam Substation #831

Brighton Substation #329

D2 SITE

VOLPE CENTER SITE

ANDERSON BRIDGE CROSSING

MAGAZINE BEACH

MASSDOT ALLSTON MULTIMODAL PROJECT SITE

Greater Cambridge Energy Program

EVERSOURCE

Figure 5-15

Environmental Justice Populations (Noticed Alternative)

As described below, the Company's analyses of Project impacts, and the Company's approach to mitigation of such impacts, conform to the Commonwealth's EJ requirements and demonstrate the means to minimize the Project's impacts to all populations, including EJ populations. In determining the needed mitigation measures the Company has engaged in extensive outreach to community, civic, municipal, governmental, and other stakeholders that has created the opportunity for public involvement by EJ communities throughout the Project planning process. The Company will continue and expand its outreach to EJ community members during the permitting and development phases of the Project to ensure participation by EJ community members in discussions of the Project, its impacts, and appropriate mitigation measures.

Public Participation

From the outset the Company recognized that most of the Project would potentially impact EJ neighborhoods with sizable Spanish, Portuguese, Mandarin, and Haitian Creole speaking populations and took several early steps to request community involvement, consistent with the Commonwealth and Siting Board public participation requirements and recommendations. To facilitate the meaningful participation of residents of the proximate EJ communities, the Company employed additional outreach strategies including providing notifications of the Project and Project open houses in the following five (5) languages: English, Spanish, Mandarin, Portuguese, and Haitian Creole. The Company has to date held several in-person and virtual community events to encourage participation by members of EJ communities in and adjacent to the Project area, to solicit feedback from a diverse cross-section of the neighborhoods the Project will traverse. At these events, Eversource had a table and/or tent with Company representatives and live interpreters present to respond to questions, provide updates regarding the Project, distribute Project Fact Sheets, and enable people to scan a QR code to keep apprised of upcoming meetings. Additionally, a total of ten (10) print ads ran in the weeks prior to the open houses in English (6 ads), Portuguese (2 ads) and Spanish (2 ads) languages. Public Open Houses were conducted virtually via Zoom™ and held at various days of the week and times of day (evening and lunch hours) to offer residents multiple opportunities to participate including October 4, 2021 (Cambridge), October 5, 2021 (Somerville), October 7, 2021 (Allston/Brighton), October 12, 2021 (Allston/Brighton), October 13, 2021 (Cambridge), and October 14, 2021 (Somerville). At the Open Houses, the Company provided information on the need for and benefits of the Project, described the siting process and how interested persons could participate, explained the route selection process, and provided detail on Project design and location, schedule, and construction activities. The presentation material was narrated in English with live, simultaneous interpretation being available at each open house in the four (4) other languages. The presentation print material was also made available via the Company website as well as the presentation print material available via the Company website were similarly provided in English and the four (4) non-English languages.

Regarding the necessary substation improvements, early discussions with municipal stakeholders eliminated a potential substation expansion location at Prospect Street in Cambridge as a viable option. Similarly, municipal and community conversations at the original New Substation Site on

Fulkerson Street indicated substantial opposition to such use of this parcel. Ensuing discussions with Cambridge officials, community stakeholders, private parcel owners, and area developers led the Company to the proposed location of the New Substation on Binney Street at the Blue Garage parcel.

As discussed in Section 4.34, the Company engaged stakeholders on the transmission line routes; those stakeholder inputs led to the identification of the Preferred Routes and Noticed Alternative Routes presented in this petition. Extensive iterative discussions were held with municipal, agency and stakeholders to craft constructable solutions that were further vetted by community representatives.

In addition to the above, both the substation location and top transmission line routes were presented publicly in local community events (described more fully in Section 1.7) to ensure the public was aware of the Project, the location of the proposed line routes, and to introduce Project website, hotline and other communication tools to community members that would facilitate continued community engagement.

Eversource will continue its commitment to engaging EJ communities through proactive and sustained outreach throughout the siting, permitting and construction processes. Efforts are underway to establish a multi-faceted, multi-channel Communications Plan to reach and further engage local EJ communities. This Plan will be designed to complement Eversource's existing robust community-based, grassroots outreach efforts, ensuring that the EJ community residents are heard, their questions answered, and their concerns mitigated.

Assessment of Potential Impacts to EJ Populations

In practical terms, the Commonwealth's EJ Policies have historically focused on certain types of projects (e.g., power plants and other large sources of air emissions, solid waste facilities, etc.), and not the type of underground utility infrastructure projects, such as the proposed Project, that are ubiquitous throughout the Commonwealth. These kinds of underground utility infrastructure facilities exist in essentially every city and town in the state (including specifically within the Project Area). Further, as previously noted, reliable electric service is vital to public safety, the health, and welfare of the Commonwealth's citizens and to orderly and sustainable economic development. The increased capacity and reliable power supply provided by the Project would support future development opportunities and will result in long-term economic benefits to the area. Additionally, the new substation and transmission lines will permit the further integration of clean energy generating sources and support electrification through the Greater Cambridge Area, all of which will benefit the communities, including EJ Communities. As the Company continues and broadens its outreach and communications with EJ communities, to the extent those conversations result in new ideas regarding EJ Community-specific mitigations, or changes to the Company's approach to mitigation (described below), the Company will respond.

The Project is not generating any energy, nor is it manufacturing any products or emitting any industrial discharges that could potentially be point sources of pollution. Nonetheless, the Company is mindful of the potential impacts caused by the Project to all abutters, including EJ populations, particularly during construction of the underground transmission lines and related ancillary work (e.g., the remote substation work). The Company accordingly considered such potential impacts as part of its overall analyses. For example:

- Construction Air Emissions - As described in Section 5.5.2 above, the Company will take measures to minimize and mitigate temporary influences on air quality from construction vehicles and equipment exhaust, and dust generated by construction activities. Given the limited duration of these activities at any one location, influences on overall air quality will be minimized.

- Construction Sound – As described in further detail in Section 5.7 below, the construction equipment used with underground transmission line construction is like that used during typical public works projects (e.g., road resurfacing, storm sewer installation, water line installation). The timing and sequencing of the work will be coordinated to minimize potential noise impacts consistent with applicable local regulations and ordinances. Noise from cable splicing operations would be minimized through use of specialized low-sound equipment such as low-noise generators, and by reducing or eliminating the use of motorized equipment during evening and overnight work. Other potential mitigation measures include working with the municipalities and state agencies to coordinate work, use of a low noise/muffled generator, and portable sound walls (temporary noise barriers) as needed, blocking the path of generators. Please see Section 5.7 for additional information.

- Construction Traffic Management - As described in further detail in Section 5.8, the Company will take measures during construction to minimize and mitigate potential impacts to traffic during construction, including specifically multimodal forms of transportation (bikes, pedestrian access, public transit, etc.). The Company will implement TMPs that consider the routing and protection of pedestrian, vehicular, and bicycle traffic; maintaining public transit services (MBTA buses, Transportation Management Association ("TMA") shuttles, etc.); adherence to reasonable work hours; maintaining access to homes and businesses throughout construction; limiting the occupancy of the street layout and on-street parking, always maintaining emergency access; avoiding impacts to school bus routes; and clear and regular communications to the community during construction.

- Land Use - No displacement of residences or businesses would occur because of construction or operation of the Project. Additionally, locating the New Substation underground will permit the property developer to construct a public use park above the roof of the substation.

- Visual Impacts - Installing the New Substation underground within the separate BXP development project avoids potential visual impacts that might be experienced with above ground substation construction.

- Public Recreational Areas - The Company minimizes impacts to important urban recreational land like MassDCR's Magazine Beach property by using specialized trenchless construction techniques and coordinating the work during periods of time when user activities within the park are expected to be low. Temporarily altered areas would be restored to their current condition or better following construction.

- Collocation Opportunities - Both the Preferred Route S1A and Noticed Alternative Route S11C present opportunities to partner with and/or facilitate construction of multimodal transportation projects in Cambridge. For example, the Hampshire Street segment of Preferred Route S1A between Broadway and Columbia Street would be restored by Eversource following construction to accommodate greater separation of bicycle facilities as outlined in the City of Cambridge Bicycle Network Vision,[112] and related improvements to sidewalks and on-street parking areas. The Noticed Alternative Route S11C would collocate with a future multi-use pathway to be constructed by the City of Cambridge along the Grand Junction Railroad Corridor. The detailed design details for either of these routes would be advanced in consultation with the Cambridge officials.

- Existing Substation Facilities - The Company is scheduling community conversations for 2022 to determine what mitigation for existing substation construction activities associated with the Project might be desired by community members and is committed to working collaboratively with communities to mitigate the impact of such activities.

  Underground Transmission Line Routing - Apart from a few discrete residential neighborhood pockets or street segments, most of the Project area is in or abuts EJ neighborhoods. Given the extent of the EJ neighborhoods in the Project Area, it is not possible to locate the proposed electric infrastructure entirely outside of these areas. The need and the location of the proposed electric infrastructure is driven, in part, by the rapid expansion and economic growth in the immediate Project area, including from Cambridge's robust electrification programs designed to minimize use of fossil fuels. The Company's transmission line routing criteria were designed not only to identify and weigh impacts, but also to do so in a manner that was even handed and non-discriminatory toward EJ populations. For example, as summarized in Section 4, the Company assigned the highest weights to certain routing criteria like residential land use, sensitive receptors

[112] See https://www.cambridgema.gov/Departments/communitydevelopment/2020bikeplanupdate/2020bicyclenetworkvision

(churches, schools, hospitals, libraries), Article 97 lands, and multimodal transportation. The effect of this weighting is to route the Project towards the existing and future non-residential uses that are partially driving the project need and away from these other areas.

In summary, there will be no disparate impacts to EJ populations because of the Project. Any potential impacts associated with the Project for both EJ and non-EJ populations are anticipated to be minimal and predominantly limited to temporary impacts associated with construction activities. The Company has identified mitigation measures for unavoidable impacts during construction. All persons, regardless of race or income, would experience these same impacts associated with the Project. The type of facilities proposed by the Company exist in virtually every community in the state, including within the Project area. For these reasons, none of the impacts of the Project will result in disproportionately high and adverse human health or environmental effects to EJ populations in the area.

5.8.2 Putnam Routes

The Putnam Routes analyzed by the Company, described in further detail below, include the Preferred Route P13 (Ames Street) and the Noticed Alternative Route P11 (Massachusetts Avenue).

5.8.2.1 Transportation Impacts

To compare potential transportation impacts during construction of the Preferred Route P13 (Ames Street) and the Noticed Alternative Route P11 (Massachusetts Avenue), the Company reviewed existing traffic and parking conditions, roadway widths, travel lanes, bicycle lanes, pedestrian use, and the presence of public transit service along each route, as well as the options for general traffic mitigation along each route.

Preferred Route P13 (Ames Street)

The total length of the Preferred Route P13 is approximately 0.46 miles, all of which is located within public roads in Cambridge (Broadway, Ames Street and Memorial Drive). The route follows Broadway for approximately 300-feet before turning south onto Ames Street. This segment of Broadway accommodates two-way traffic via three lanes separated by a landscaped median in

the middle. This section of Broadway is separated by a median and is about 22 to 24-feet wide in this location. There are dedicated bike lanes and sidewalks on both sides of the road. MassDOT's functional classification of Broadway is urban principal arterial roadway.[113]

Most of the Preferred Route P13 is located on Ames Street (approximately 0.34 miles). Ames Street is approximately 34-feet wide along this segment. Ames Street accommodates two-way vehicular traffic with on-street parking and sidewalks throughout much of its length. There is a dedicated two-way bike lane on the wider section between Broadway and Main Street. Ames Street is classified by MassDOT as an urban collector roadway.

The balance of the Preferred Route P13 (approximately 400-feet) is located on Memorial Drive, a state-controlled roadway under the jurisdiction of MassDCR. At Memorial Drive, the route ends in a "T" configuration with the proposed transmission line being spliced into existing Eversource transmission line(s) to the east and west on the west bound lanes of Memorial Drive (there is a landscaped median separating the west bound and east bound lanes of Memorial Drive in this section). The west bound section of Memorial Drive is about 28-feet wide. There are sidewalks and pedestrian crosswalks on this stretch of Memorial Drive, along with on-street parking. Memorial Drive is classified by MassDOT as a principal arterial roadway.

Local public transit opportunities along this route includes MBTA bus routes 64, 68, 85 & CT2 along Broadway and Ames Street between Broadway and Main Street. The Charles River Transportation Management Association ("TMA") EZRide Shuttle Route operates along all roadway segments of this route. Each of the bus routes has stops on both sides of Broadway at Galileo Galilei Way, Ames Street between Broadway and Main Street and Ames Street at Amherst Street (EZRide only). There is also the MBTA Red Line Subway station located on Main Street, just east of Ames Street.

[113] Functional classifications are used by MassDOT and the Federal Highway Administration. Classifications are determined by the road type and characteristics of the vehicles using the road (see https://gis.massdot.state.ma.us/roadinventory/). An arterial road is a high-capacity road. The primary function of an arterial road is to deliver traffic from collector roads to freeways, and between urban centers at the highest level of service possible. As such, many arterials are limited-access roads, or feature restrictions on private access.

Table 5-8 Description of Road Segments Along the Preferred Route P13 (Ames Street)

Road Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Bus Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Broadway	24	• Sidewalks on both sides • Limited on-street parking on one side • Median present • Dedicated Bike Lanes on both sides	Yes	336
Ames Street	34	• Sidewalks on both sides • On-street parking on both sides • Dedicated Bike Lane on one side	Yes	318
Memorial Drive	28	• Sidewalk on west bound side • On-street parking on west bound side west of Ames Street • Median present (separating west bound from east bound travel lanes)	Yes	985

Noticed Alternative Route P11 (Massachusetts Avenue)

The total length of the Noticed Alternative Route P11 is approximately 0.82 miles, all of which is located within public roads in Cambridge (Broadway, Ames Street, Main Street, Vassar Street, Massachusetts Avenue and Memorial Drive). Like the Preferred Route P13 above, the Noticed Alternative Route P11 follows Broadway for approximately 300-feet before turning south onto Ames Street. The Broadway segment is the same as that described above for the Preferred Route P13.

Approximately 550-linear feet of this route follows Ames Street to Main Street. The Ames Street segment is as described above for the Preferred Route P13, including the presence of a dedicated two-way bike lane on the east side of the road.

Approximately 450-linear feet of this route follows Main Street to Vassar Street. Main Street is on average approximately 24-feet wide in each direction, with a raised brick-lined median separating the east and west bound traffic lanes. Main Street includes on-street parking and sidewalks throughout this segment. There are dedicated bike lanes on both sides of Main Street up to Vassar Street. Main Street is classified by MassDOT as an urban principal arterial roadway.

The Vassar Street segment of the Noticed Alternative Route P11 is about 0.31 miles. Vassar Street is on average about 24-feet wide. Vassar Street accommodates two-way vehicular traffic with on-street parking and sidewalks throughout much of its length. There are dedicated bike lanes and some sections of cycle track along both sides of the road. Vassar Street is classified by MassDOT as an urban minor arterial roadway.

From Vassar Street, the route transitions onto Massachusetts Avenue. The Massachusetts Avenue route segment is about 0.23 miles (1,200 linear feet). On average, Massachusetts Avenue is approximately 60-feet wide. Massachusetts Avenue accommodates two-way vehicular traffic with sidewalks on both sides and on-street parking in select locations. There are dedicated bike lanes along both sides of the road. Massachusetts Avenue is classified by MassDOT as an urban principal arterial roadway.

The balance of the Noticed Alternative Route P11 (approximately 400 feet) is located on Memorial Drive, a state-controlled roadway under the jurisdiction of MassDCR. Like the Preferred Route P13 above, the Noticed Alternative Route P11 terminates in a "T" configuration with the proposed transmission line being spliced into existing Eversource transmission line(s) to the east and west on the west bound side of Memorial Drive. The splice locations for the Noticed Alternative Route P11 are located on the grade-separated interchange ramps of Memorial Drive at Massachusetts Avenue. The Memorial Drive entrance and exit ramps in this section are approximately 18-feet wide.

Local public transit opportunities along this route includes MBTA bus routes 64, 68, 85 & CT2 along Broadway and Ames Street between Broadway and Main Street, and Bus Route 1 which operates along Massachusetts Avenue. The CT2 Bus Route continues from Main Street along Vassar Street and the TMA EZRide Shuttle Route operates along all roadway segments of this route, except for Vassar Street. There are bus stops located on both sides of the roadway for MBTA bus routes 64, 68, 85 and CT2 located at Broadway at Galileo Galilei Way and Ames Street between Broadway and Main Street. The CT2 has a stop on Vassar Street at Massachusetts Avenue and the EZRide Shuttle and Bus Route 1 have no stops along Massachusetts Avenue. There is also the MBTA Red Line Subway station located on Main Street just east of Ames Street.

Table 5-9 Description of Road Segments Along the Noticed Alternative Route P11 (Massachusetts Avenue)

Roadway Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Bus Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Broadway	24	• Sidewalks on both sides • On-street parking on one side • Median present • Dedicated Bike Lanes on both sides	Yes	336
Ames Street	48	• Sidewalks on both sides • On-street parking on both sides • Dedicated Bike Lane on one side	Yes	297
Main Street	24	• Sidewalks on both sides • On-street parking on both sides • Median present • Dedicated Bike Lanes on both sides	Yes	342
Vassar Street	24	• Sidewalks on both sides • On-street parking on both sides • Median present (define bike lanes) • Dedicated Bike Lanes on both sides	Yes	480
Massachusetts Avenue	60	• Sidewalks on both sides • On-street parking on both sides • Dedicated Bike Lanes on both sides • Dedicated Bus Lane on southbound side	Yes	200
Memorial Drive	18	• Sidewalk on west bound side • Landscaped strip between sidewalk and west bound entrance and exit ramp lanes and between the ramp lanes and the west bound lanes (grade separated)	Yes (between Ames and Memorial Drive Only)	140, 136[114]

[114] ATR data was collected from two locations on Memorial Drive, between Massachusetts Avenue to the Memorial Drive off-ramp and between Massachusetts Avenue to the Memorial Drive on-ramp.

Comparison of Potential Impacts

Each of the Routes would require implementation of TMPs and close coordination with the City of Cambridge and MassDCR, to ensure that transportation impacts are minimized. Traffic management measures, including use of police details, temporary roadway closures and detours and temporary lane closures or shifts, would be required regardless of the route selected. The following additional factors were considered when comparing the potential impacts between these two routes:

- Number and size of pedestrian crossings;
- Dedicated bicycle facility;
- On-street parking;
- Need for roadway closure & detour and availability of detour routes; and
- Width of roadway from curb to curb (usable space).

The Preferred Route P13 is substantially more direct and shorter in length and in this instance has less potential for impacts during construction to bicycle facilities, pedestrian facilities, and public transit facilities. The primary differentiator between these two routes is the potential impact at Memorial Drive during construction. Specifically, the Preferred Route P13 can likely be constructed with temporary lane closures and curb use restrictions on Memorial Drive and Ames Street. Contrast this with the Noticed Alternative Route P11, which will likely require the temporary closure and detour of the entrance and exit ramps to and from Memorial Drive at Massachusetts Avenue. This could potentially disrupt public transit service for the EZRide Shuttle and present challenges to over-height vehicles that find themselves on this section of roadway given the low clearance under Massachusetts Avenue. Further, based on the route evaluation and scoring analysis provided in Section 4 (see Table 4-12D), the Preferred Route P13 scored more favorably overall for this category than the Noticed Alternative Route P11. This was primarily due to its shorter length, number and size of intersection crossings and less potential impacts to pedestrians and cyclists during construction.

In consideration of the above, the Company determined that the Preferred Route P13 is superior to the Noticed Alternative Route P11 relative to this criterion.

Impact Mitigation

Upon completion of the detailed design work and prior to the start of construction, the Company will work closely with City of Cambridge officials and MassDCR (for work on Memorial Drive) to develop a TMP. Temporary Traffic Control Plans ("TTCP's") will also be developed consistent with the Federal Highway Administration ("FHWA") Manual of Uniform Traffic Control Devices for

Streets and Highways and the MassDOT "Work Zone Safety" publication for Temporary Traffic Control Standards. The Company will also closely coordinate with local officials and abutting property owners and businesses. Topics to be addressed in the TMP will likely include:

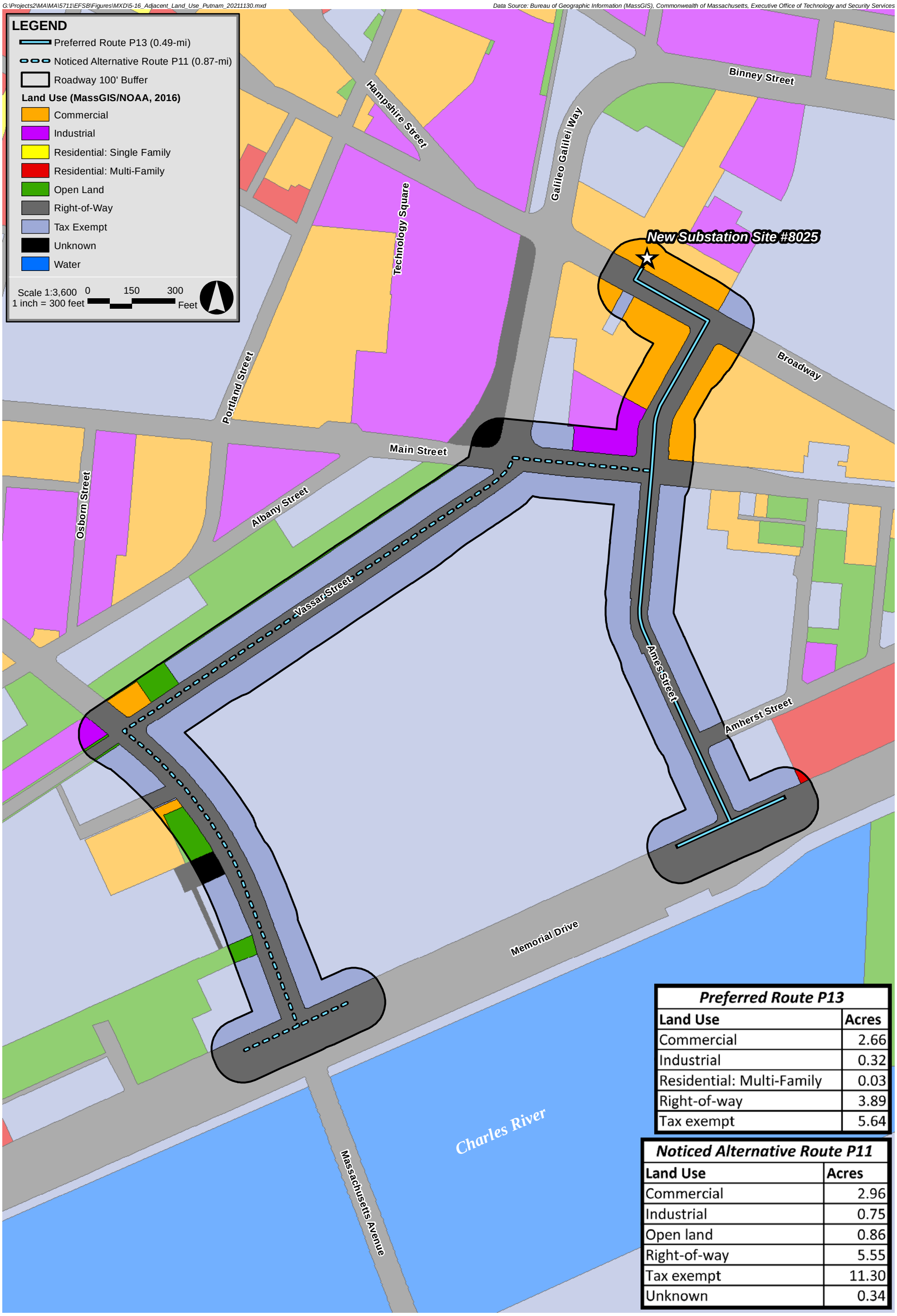
- Width and location of the work zone to minimize impacts to all roadway users;
- Work schedule and duration of lane closures, road closures, or detours (where applicable) and details of notification to abutters, including posting on the Project website and use of fliers to notify local abutters of traffic routes and the expected duration;
- The use of traffic-control devices such as advance warning signs, traffic regulation signs, reflectorized drums and cones, sequential flashers, detour signs, and other protective devices to be placed as shown on plans and as approved by the City of Cambridge and MassDCR;
- Locations where temporary provisions may be made to maintain access to homes and businesses, including specific arrangements made to avoid affecting abutter activities;
- Routing and protection of pedestrian and bicycle traffic;
- Maintenance of public transit service (MBTA buses, TMA shuttles etc.);
- Communication with adjacent businesses and property owners, to limit impacts such as critical product deliveries or access;
- Notification to Cambridge officials, MassDCR, local businesses, and the public of the timing and duration of closed curbside parking spaces and travel way restrictions; and
- Coordination between the Company and police and fire departments to ensure that emergency access through the route is always provided. In most cases, travel past the work zone will be open to one-way alternating travel under police control. In this circumstance, the police officer(s) will stop all traffic, thereby providing passage of the emergency vehicle. In the rare instance that a roadway is closed temporarily to traffic (i.e., for the installation of a splice vault / manhole), emergency vehicles would still be permitted to pass through the work zone as all construction activity would cease temporarily and a section of roadway would be cleared of all contractor vehicles and equipment.

5.8.2.2 Land Use

The following table summarizes the major land uses within 100 feet of the Preferred Route P13 and the Noticed Alternative Route P11. The corresponding MassGIS mapped land-use categories are depicted on Figure 5-16.

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-16_Adjacent_Land_Use_Putnam_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Preferred Route P13	
Land Use	**Acres**
Commercial	2.66
Industrial	0.32
Residential: Multi-Family	0.03
Right-of-way	3.89
Tax exempt	5.64

Noticed Alternative Route P11	
Land Use	**Acres**
Commercial	2.96
Industrial	0.75
Open land	0.86
Right-of-way	5.55
Tax exempt	11.30
Unknown	0.34

Figure 5-16

Adjacent Land Use: Preferred Route P13 and Noticed Alternative Route P11

Table 5-10 Summary of MassGIS Land Use Mapping within 100 feet of the Preferred Route P13 (Ames Street) and the Noticed Alternative Route P11 (Vassar Street)

MassGIS Land Use Mapping	Preferred Route P13 - Ames Street (acres)	Noticed Alternative Route P11 - Vassar Street (acres)
Commercial	2.66	2.97
Industrial	0.32	0.75
Residential (multi-family)	0.03	--
Right-of-Way (roads, railroads, sidewalk areas, etc.)[115]	3.89	5.55
Tax-Exempt Lands (religious institutions, schools, etc.)[116]	5.64	11.30
Open Land (greenspace and landscaped areas, etc.)[117]	--	0.86
Unknown	--	0.34

Preferred Route P13 (Ames Street)

The predominant mapped land use associated with the Preferred Route P13 include tax-exempt facilities, specifically the campus of MIT located on either side of Ames Street between Main Street and Memorial Drive. The other dominant mapped land uses include right-of-way facilities (3.89 acres) such as the adjacent pedestrian sidewalk areas and public roads, and adjacent commercial land uses (2.66 acres) located along portions of Broadway and Ames Street (e.g., restaurants, bank(s), parking facilities, Broad Institute, etc.). There is also a discrete area of mapped multi-family residential land use (0.03 acres) located east of the route's termination on Memorial Drive (apartment building located at 100 Memorial Drive).

Noticed Alternative Route P11 (Massachusetts Avenue)

The predominant mapped land use associated with the Noticed Alternative Route P11 are similar to the Preferred Route P13. Tax-exempt properties are located near a significant portion of the route (11.30 acres), primarily the campus of MIT located on either side of Vassar Street and Massachusetts Avenue up to Memorial Drive. The other dominant mapped land uses include adjacent right-of-way facilities such as sidewalks and public roadways (5.55 acres), commercial land uses (2.97 acres) and pockets of industrial land use areas (0.75 acres) located along portions of Broadway, Ames Street and Main Street (e.g., Whitehead Institute, bank(s), laboratory, and

[115] The MassGIS land use data set describes "Right-of-Way" as roadways, railroad corridors, sidewalk areas, and other developed space that is not otherwise identified as commercial/industrial/residential, etc.

[116] The MassGIS land use data set describes "Tax Exempt" land uses as religious institutions, certain public lands, cultural institutions, schools, and so forth.

[117] The MassGIS land use data set describes "Open Land" as greenspace areas such as parks or strips of manicured grasses and landscaped tree areas, etc.

research space, etc.). While MassGIS does not identify any mapped residential land uses within 100-feet of the Noticed Alternative Route P11, the more detailed scoring analysis described in Section 4 indicates a comparable number of residential units directly abutting this route and the Preferred Route P13 (297 units versus 298 units). A constructed segment of Cambridge's Grand Junction Multi-Use Pathway exists at the corner of Main Street and Galileo Galilei Way intersection.

Comparison of Potential Impacts

Mapped land uses within 100 feet of the Preferred Route P13 and the Noticed Alternative Route P11 are generally comparable, including commercial, residential, open (undeveloped/recreational) land and industrial (laboratory and research) uses. The Noticed Alternative Route P11 does, however, contain nearly twice as much mapped tax-exempt land when compared to the Preferred Route P13, occupied primarily by the campus of MIT.

The differentiating factor between these two routes is the route length and the corresponding duration and extent of transmission line construction that would occur near the identified land uses. For perspective, the Noticed Alternative Route P11 is approximately 0.82 miles long, nearly twice as long as the Preferred Route P13, which is approximately 0.46 miles. In this case, the shorter route should result in fewer potential impacts during construction because it involves less trenching and backfilling and potentially fewer splice vault installations near the identified land uses, including specifically the campus of MIT. Accordingly, the Preferred Route P13 was determined to be superior to the Noticed Alternative Route P11 with respect to potential land use impacts.

Impact Mitigation

Neither the Preferred Route P13 nor the Noticed Alternative Route P11 will permanently affect adjacent land uses as the transmission line will be installed entirely underground. Temporary impacts to residences, businesses and sensitive receptors may include traffic disruption, including road closings and construction noise. These types of impacts will be minimized with proper construction BMPs, TMPs, and restricted work hours to reduce noise, traffic, and air quality impacts during construction.

5.8.2.3 Sensitive Receptors

Sensitive receptors directly abutting the Preferred Route P13 and the Noticed Alternative Route P11 are summarized in the following table. The locations of the sensitive receptors included in the scoring analysis are depicted on Figure 4-27B provided in Section 4.

Table 5-11 Number of Sensitive Receptors Directly Abutting the Preferred Route P13 (Ames Street) and the Noticed Alternative Route P11 (Massachusetts Avenue)

Sensitive Receptors	Preferred Route P13 (Ames Street)	Noticed Alternative Route P11 (Massachusetts Avenue)
Police Stations	0	0
Fire Stations	0	0
Hospitals	0	0
Schools (including colleges and universities)	1	1
Nursing Homes/Elder Care Facilities	0	0
Funeral Homes	0	0
Places of Worship	0	0
Daycare Facilities	0	0
District Courts	0	0
Parks and Recreation Facilities	1	1
TOTAL	**2**	**2**

Preferred Route P13 (Ames Street)

The Preferred Route P13 passes by two sensitive receptors, including the MIT campus and the Loughrey Walkway and Bike Path along Broadway and Ames Street.

Noticed Alternative Route P11 (Massachusetts Avenue)

The Noticed Alternative Route P11 passes by the same two sensitive receptors described above for the Preferred Route P13.

Comparison of Potential Impacts

Both Routes pass by the same two sensitive receptors. However, like the land use criterion described above, the key difference between these two routes, is the route length and thus the duration and extent of transmission line construction that would occur near sensitive receptors. Because the Noticed Alternative Route P11 is nearly twice as long as the Preferred Route P13, it is reasonable to assume that this route would have greater potential for impacts during construction. Specifically, the Noticed Alternative Route P11 would involve more trenching and backfilling and potentially more splice vault installations, including approximately 1,600 linear feet of additional transmission line work along Vassar Street bordering MIT's campus facilities.

In consideration of the above, the Company determined that the Preferred Route P13 is superior to the Noticed Alternative Route P11 relative to this criterion.

Impact Mitigation

Depending on their location, sensitive receptors could be affected by temporary construction impacts such as traffic disruption, property access, noise, and dust. Potential mitigation measures for these types of impacts are discussed separately in the noise and transportation impacts criteria. Section 5.5.2 describes air quality mitigation measures, including dust control. Regarding preserving site access to each sensitive receptor, the Company will develop TMPs that will detail how access will be maintained. Prior to finalization of those TMPs, the Company will meet with Cambridge municipal officials, MIT representatives and other abutters along the route to understand their access requirements and will modify each TMP as necessary. During and after work hours, the Company will take appropriate measures to allow safe and unencumbered access to the abutting properties.

5.8.2.4 Public Shade Trees

Table 5-12 below identifies the number of public shade trees located within the public way of the Preferred Route P13 and the Noticed Alternative Route P11.

Table 5-12 Number of Public Shade Trees within the Public Way of the Preferred Route P13 (Ames Street) and the Noticed Alternative Route P11 (Massachusetts Avenue).

Route	Number of Public Shade Trees within the Public Way
Preferred Route P13 (Ames Street)	115
Noticed Alternative Route P11 (Massachusetts Avenue)	248

Preferred Route P13 (Ames Street)

The Preferred Route P13 passes by 115 public shade trees. Public shade trees along this route consist of a mix of shorter and smaller diameter plantings along Ames Street and taller and larger diameter trees along Memorial Drive at the Charles River.

Noticed Alternative Route P11 (Massachusetts Avenue)

The Noticed Alternative Route P11 passes by 248 public shade trees. Like the Preferred Route P13 above, public shade trees along this route consist of shorter and smaller diameter plantings along Vassar Street, as well as older and larger diameter trees along Massachusetts Avenue and Memorial Drive at the Charles River.

Comparison of Potential Impacts

The Company will avoid public shade tree removal to the maximum extent practicable by locating the infrastructure within the roadway limits. However, while the potential for impacts to public shade trees is considered low for either route, the Noticed Alternative Route P11 contains more

than twice as many public shade trees along the route when compared to the Preferred Route P13, and thus has greater potential for impacts to roots, limbs, and potential tree removal during construction. The Company therefore determined that the Preferred Route P13 is superior to the Noticed Alternative Route P11 relative to this criterion.

Impact Mitigation

The Company would implement the same practice to protect public shade trees regardless of the route selected. Typical mitigation measures to protect public shade trees during construction include:

- Prior to construction, the Company will meet with the City of Cambridge Tree Warden to confirm the location and condition of public shade trees and other trees along the route relative to construction work areas. The Company will review BMPs and finalize a monitoring and mitigation plan for the protection of public shade trees and applicable regulated trees during construction.

- Where trees are encountered within 15 feet of trench edges, they will be protected from bark and limb damage by surrounding them with wire-bound 2x4 lumber to an appropriate height depending on the tree. Alternative tree protection may be used if accepted in advance by the property owner(s)/Tree Warden. Where tree roots are encountered during excavation, mechanical excavation will cease, roots will be exposed by hand (to the least extent possible, see discussion below), and will be kept moist and covered with wet burlap or plastic throughout the exposure period. Thermal backfill will be placed in the trench in a manner to avoid affecting tree roots.

- Erect and maintain a temporary fence around the perimeter of individual tree pits (typically the area between the curb and sidewalk). The temporary fence will remain in place for the duration of construction and will serve to prohibit the storage of construction materials, debris, or excavated material within the tree pit area or on any sidewalks; and prohibit vehicles, equipment, or foot traffic within the tree pit area. Although unlikely, if excavation for new construction is required within the tree pit area and/or sidewalk, the Tree Warden will be contacted before any work begins. The Tree Warden will determine whether the contractor on site may commence with the work, or if a qualified arborist must be hired to conduct root pruning. If permission is granted to the contractor to commence with root pruning, the following practices will be implemented: (1) narrow-tine spading forks or compressed air will be used to comb soil to expose roots; (2) roots will be cut cleanly after excavation with clean, sharp tools, to promote callus formation and wound closure; (3) tree routing will be dressed with a hormone compound; (4) the excavation will be backfilled as soon as possible and the soil around the roots will be watered to avoid leaving air pockets. If backfilling immediately is not possible, the exposed roots will be covered with wet burlap and watered regularly to prevent roots from drying out and backfilling with soil will occur as soon as possible.

- If impacts to trees and vegetation cannot be reasonably avoided, they will be replaced in a manner approved by the property owner(s)/Tree Warden.

5.8.2.5 Sound

The construction equipment used with underground transmission line construction is like that used during typical public works projects (e.g., road resurfacing, storm sewer installation, water line installation). The equipment typically involves jackhammers, excavators, dump trucks, pavement saws, and road resurfacing vehicles. Construction activities will result in localized, short-term increases in ambient noise levels near the work sites. Manhole/splice vault installation, trench excavation and final pavement restoration typically are the loudest activities associated with underground transmission line construction. Under typical trenching conditions (e.g., no ledge, no excessive underground utilities), excavation and conduit installation typically take approximately 7 days at any one location. For manhole installation, the duration of construction typically takes 7 to 10 days per location and may take longer if underground utility relocation is necessary. If ledge is encountered during construction, equipment such as a hoe ram will be used, which would temporarily increase noise levels and potentially prolong the activity at any specific location.

Generators, portable HVAC units and cable pulling motors associated with the splicing van are often the loudest noise sources for cable pulling and splicing work. Splicing activities typically require 48 to 60 hours to complete. The splicing activities could be continuous but will ordinarily take place over 4 or 5 extended 12-hour workdays at each manhole location.

In general, the sound levels from construction activity will be dominated by the loudest piece of equipment operating at the time. Therefore, at any given construction site, the loudest piece of equipment will be the most representative of the expected sound levels in the area. Maximum sound levels from typical equipment that will be used during construction of the underground transmission line is listed in Table 5-13 on the following page at a typical reference distance of 50 feet. These typical sound levels at 50 feet are based on actual field measurements previously recorded by Eversource noise consultants at similar construction projects. The sound levels provided are the calculated contribution from the construction equipment/activities based on approximations of sound propagation. Because sound levels from a point source drop off due to geometric divergence (hemispherical spreading) at a rate of 6 dB per doubling of distance, the reference sound levels at 50 feet in the following tables will *decrease* by 6 dBA for locations 100 feet back from the edge of construction. In a more urbanized area such as that found within the Project Area, setbacks may be only 25 feet from construction activity, thus *increasing* the sound levels from each piece of equipment by 6 dBA. However, construction equipment is generally not operated continuously, with significant variation in power and usage. Sound levels would fluctuate, depending on the construction activity, equipment type, and separation distances between source and receiver. Other factors, such as vegetation, terrain, and noise attenuating features, such as buildings, will act to further reduce construction noise impacts. For example, a building or residence will provide significant attenuation of associated construction sound levels. Typical outdoor-to-indoor sound level reductions of 27 dBA can be expected during the winter

(windows closed), with reductions of 17 dBA during the summer (windows open). These deductions are factored into the ranges of adjusted estimated sound levels for each activity identified in the table below.

Table 5-13 Reference Sound Levels of Construction Equipment at 50 feet.

Activity	Type of Equipment	50-feet		Familiar Sounds with Similar Sound Levels[118]
		Typical Sound Levels (dBA)[119]	Typical Sound Levels w/in Residence or Other Building Structure (dBA)	
Trench Excavation Pile Install, and Pavement Patching	Pavement Saw Pneumatic Hammer Mounted Impact Hammer (hoe ram) Excavator Dump truck Pipe Crane Welding Machine/Generator Concrete Batch Truck	57 to 83	Windows Closed: 30 to 56 Windows Open: 40 to 66	Lawn Mower: 90 Snow Blower: 85 Garbage Disposal: 80 Air Conditioner: 60
Manhole Installation	Pavement Saw Excavator Manhole Crane Dump Truck Asphalt Paver	57 to 83	Windows Closed: 30 to 56 Windows Open: 40 to 66	
Cable Pulling, Splicing and Testing	Generator Splicing Van	60 to 67	Windows Closed: 33 to 40 Windows Open: 43 to 50	
Final Pavement Restoration	Asphalt Paver	63 to 83	Windows Closed: 36 to 56 Windows Open: 46 to 66	

[118] Thalheimer, E, "Construction Noise Control Program and Mitigation Strategy at the Central Artery/Tunnel Project," Noise Control Eng. Journal 48 (5), 2000 Sep-Oct.2 US EPA, Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances, prepared by Bolt, Baranek and Newman, Report No. NTID300.1, December 31, 1971.

[119] TRC Environmental Corporation (TRC) conducted noise measurements during the months of October and November 2015 on behalf of the Company during several construction activities associated with underground transmission line installation work. The measurements were primarily taken using a Quest Model 1700 Type II sound level meter equipped with an octave band analyzer and several measurements were taken using a Svantek Model 971 Type I sound level meter. The measurements were hand-recorded in the field. Numbers round up or down to the nearest whole decibel.

Preferred Route P13 (Ames Street)

There are approximately 298 residential units located within 50 feet of the roadways comprising the Preferred Route P13. There are also two sensitive receptors that are adjacent to this route, including the campus of MIT and the Loughrey Walkway and Bike Path along Broadway and Ames Street.

Noticed Alternative Route P11 (Massachusetts Avenue)

The Noticed Alternative Route P11 is like the Preferred Route P13 in that it contains a comparable number of residential units (297 versus 298) within 50 feet of the roadways comprising the Route and the same two sensitive receptors.

Comparison of Potential Impacts

Both routes contain a comparable number of residential structures within 50 feet and the same number of sensitive receptors. However, the Noticed Alternative Route P11 is nearly twice as long as the Preferred Route P13 (.87 miles versus .49 miles) and involves an additional approximately 1,600 linear feet of transmission line duct bank installation on Vassar Street, all of which is bordered by MIT campus properties on either side of the road. Given its length, the Noticed Alternative Route P11 may also require the installation of additional manholes/splice vaults, resulting in additional noise impacts during construction. Because the Noticed Alternative Route P11 has a greater potential to disrupt sensitive receptors (MIT campus) from noise during construction from both a construction duration and limit of work perspective, the Company determined that the Preferred Route P13 is superior to the Noticed Alternative Route P11 relative to the noise criterion.

Impact Mitigation

The timing and sequencing of the work will be coordinated with local and state officials and MIT representatives to minimize potential noise impacts consistent with applicable local regulations and ordinances. Noise from cable splicing operations would be minimized through use of specialized low-sound equipment such as low-noise generators, and by reducing or eliminating the use of motorized equipment during evening and overnight work. Other potential mitigation measures include working with the Cambridge municipal officials and state agencies to coordinate work, use of a low noise/muffled generator, and portable sound walls (temporary noise barriers) as needed, blocking the path of generators. However, the use of physical noise barriers are not

typically the Company's first response to addressing a claim of excessive noise.[120] The Company would first explore other opportunities to reduce noise, including requiring the use of newer, lower noise equipment.

5.8.2.6 Subsurface Contamination

Subsurface excavation has the potential to encounter contaminated soils and/or groundwater from historical releases and/or urban/historic fill in the vicinity of the Preferred Route P13 and the Noticed Alternative Route P11. A review of the MassDEP waste site list on-line database was performed to determine the potential to encounter subsurface contamination directly abutting each route.

Preferred Route P13 (Ames Street)

There are two MassDEP-listed sites directly abutting the Preferred Route P13, as described in Table 5-14.

Table 5-14 MassDEP-Listed Sites Directly Abutting the Preferred Route P13 (Ames Street)

Release Tracking Number (RTN)	Location	Description / Status
3-0028604	71 Amherst Street, Cambridge MA	RAO Class 3; AUL date 7/27/2010
3-0033330	80 Ames Street, Cambridge MA	Tier II; AUL date 1/26/2021

Noticed Alternative Route P11 (Massachusetts Avenue)

There are three MassDEP-listed sites directly abutting the Noticed Alternative Route P11, as described in Table 5-15 below.

[120] Types of temporary noise barriers could include free-standing frames with either acoustical dampening blankets (also called curtains) or rigid walls attached to them. The barriers are positioned to block the line-of-sight from nearby residences. The rigid walls block more noise than the blankets but are large and can be difficult to move. Both curtains and rigid walls can substantially restrict movement within the work zone and can slow the pace of construction, which will increase the amount of time construction occurs at a particular location. The use of such equipment may introduce additional safety considerations into the work environment that could pose hazards to workers and the public, such as difficulty in anchoring these types of systems (i.e., subject to wind loads) and reduced line of sight and adequate visibility both from outside of and within the work zone. Installation may also require expansion of required work along the roadways for installation and anchoring of such systems, and potentially requiring the need for extended road closures. Efficacy of the types of noise barriers noted above as applied to typical urban street construction is also considered to be minimal.

Table 5-15 MassDEP-Listed Sites Directly Abutting the Noticed Alternative Route P11 (Massachusetts Avenue)

Release Tracking Number (RTN)	Location	Description / Status
3-0028604	71 Amherst Street, Cambridge MA	RAO Class 3; AUL date 7/27/2010
3-0032166	59 Vassar Street, Cambridge MA	Tier II; AUL notification date 5/12/2014
3-0033330	80 Ames Street, Cambridge MA	Tier II; AUL date 1/26/2021

Comparison of Potential Impacts

Both routes pass by a comparable number of MassDEP-listed sites (the Noticed Alternative Route P11 passes by one additional AUL site on Vassar Street). The other two MassDEP-listed sites overlap both routes. Accordingly, the Company determined that the Preferred Route P13 and the Noticed Alternative Route P11 result in generally equivalent impacts for this criterion.

Impact Mitigation

If contaminated soils and/or groundwater are encountered, they will be managed pursuant to URAM provisions of the MCP. The Company will prepare a soil and groundwater management plan and will contract with a LSP as necessitated by conditions encountered along the underground transmission line alignment, consistent with the requirements of the MCP at 310 C.M.R. 40.0460 et seq. All excess soil and groundwater will be managed in accordance with local, State and Federal regulations.

5.8.2.7 Wetland Resource Areas, Buffer Zones and Tidelands

Preferred Route P13 (Ames Street)

The Preferred Route P13 is located entirely in previously developed areas and does not involve any alterations to wetland resource areas. Regarding Chapter 91 jurisdictional areas, this route involves work in filled tidelands (474 linear feet) presently occupied by existing roadways and other utilities along Memorial Drive.

Noticed Alternative Route P11 (Massachusetts Avenue)

The Noticed Alternative Route P11 is also located entirely in previously developed areas and does not involve any alterations to wetland resource areas. Like the Preferred Route P13, the Chapter 91 jurisdictional areas crossed by this route are limited to filled tidelands (489 linear feet) presently occupied by existing roadways and other utilities along Memorial Drive.

Comparison of Potential Impacts

Both the Preferred Route P13 and the Noticed Alternative Route P11 avoid any work in wetland resource areas and cross comparable Chapter 91 jurisdictional areas within the paved sections of Memorial Drive. Accordingly, the Company determined that the Preferred Route P13 and the Noticed Alternative Route P11 result in generally equivalent impacts for this criterion.

Impact Mitigation

The proposed underground transmission line construction along these routes is confined to existing paved roadways, no permanent impacts to wetlands or waterbodies are anticipated. Sediment controls and erosion prevention measures will be employed as work approaches the Charles River, located south of Memorial Drive, including installation of compost filter tubes and silt fencing and catch basin inlet protection, as appropriate.

5.8.2.8 Cultural Resources

The Project is subject to review by the Massachusetts Historical Commission ("MHC") in compliance with G.L. c. 9, §§ 26-27C, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00). The Company undertook a cultural resource investigation to identify historic and archaeological resources adjacent to the Preferred Route P13 and the Noticed Alternative Route P11.

Table 5-16 Number of Cultural Resource Sites Near the Preferred Route P13 (Ames Street) and the Noticed Alternative Route P11 (Massachusetts Avenue)

Cultural Resources	Number of Cultural Resources	
	Preferred Route P13 (Ames Street)	Noticed Alternative Route P11 (Massachusetts Avenue)
Inventory Points Adjacent to Route	2	7
Inventory Points Intersected by Route	2	1
Archaeological Sites within 0.25 miles of Route	0	0
Archaeological Sites Intersected by Route	0	0
TOTAL	**4**	**8**

Preferred Route P13 (Ames Street)

The two historic inventory properties located adjacent to the Preferred Route P13 (Ames Street) include:

- MIT Senior House at Memorial Drive; and
- MIT President's House at Memorial Drive.

The two historic inventory properties crossed by the Preferred Route P13 (Ames Street) include:

- MIT Campus at Massachusetts Avenue and Memorial Drive; and
- Charles River Basin Historic District along Memorial Drive and Charles River.

Noticed Alternative Route P11 (Massachusetts Avenue)

The seven historic inventory properties located adjacent to the Noticed Alternative Route P11 (Massachusetts Avenue) include:

- Metropolitan Storage Warehouse at #134 Massachusetts Avenue;
- Cambridge Armory at #120 Massachusetts Avenue;
- MIT Campus at Massachusetts Avenue and Memorial Drive;
- Barton Building (MIT Campus) at Massachusetts Avenue and Memorial Drive;
- Pratt School of Naval Architecture (MIT Campus) at Massachusetts Avenue and Memorial Drive;
- Engineering Laboratory (MIT Campus) at Massachusetts Avenue and Memorial Drive; and
- Riverbank Court Hotel at #305 Memorial Drive.

The one historic inventory property crossed by the Noticed Alternative Route P11 (Massachusetts Avenue) includes:

- Charles River Basin Historic District along Memorial Drive and Charles River.

Comparison of Potential Impacts

The Preferred Route P13 (Ames Street) passes by fewer historic properties compared to the Noticed Alternative Route P11 (4 resources versus 8 resources). The inventoried areas crossed by the routes include the campus of MIT (work on Vassar Street and Massachusetts Avenue) and the Charles River Basin Historic District that overlays Memorial Drive. These inventoried areas generally overlay portions of both routes. However, as the Project involves the underground installation of transmission line within the existing paved limits of roadways and sidewalks that will be restored to their pre-existing condition following construction, neither route is anticipated to result in impacts to cultural resources. Accordingly, the Company determined that the Preferred Route P13 and the Noticed Alternative Route P11 are equivalent relative to this criterion.

Impact Mitigation

While the need for mitigation to cultural resource impacts associated with these routes is not anticipated, the MHC will be consulted regarding a determination of the effect. Potential effects, if any, to historic and archaeological resources will be addressed with the MHC through Section 106 of the National Historic Preservation Act and the State Register Review processes.

5.8.2.9 Article 97

Neither the Preferred Route P13 or the Noticed Alternative Route P11 involve work on Article 97 land. Accordingly, the Company concludes that there will be no impact to this criterion from construction using either Route.

5.8.2.10 Summary of Environmental Impacts

Based upon the above comparisons, the Preferred Route P13 and the Noticed Alternative Route P11 have relatively minimal environmental effects, and most of those effects would be temporary and can be minimized using the proposed mitigation measures. Table 5-17 below provides a comparison of the routes based on the criteria evaluated.

Overall, the Preferred Route P13 was determined to be superior to the Noticed Alternative Route P11 on four criteria: transportation impacts, land use, public shade trees and noise. For the balance of the criteria analyzed, the Routes were determined to be comparable from an environmental impact perspective (sensitive receptors, subsurface contamination, wetland resource areas, cultural resources, and Article 97).

Table 5-17 Comparison of the Preferred Route P13 (Ames Street) and the Noticed Alternative Route P11 (Massachusetts Avenue)

Evaluation Criteria	Preferred Route P13 (Ames Street)	Noticed Alternative Route P11 (Vassar Street)
Transportation Impacts	+	-
Land Use	+	-
Sensitive Receptors	=	=
Public Shade Trees	+	-
Sound	+	-
Subsurface Contamination	=	=
Wetland Resource Areas, Buffer Zones and Tidelands	=	=
Cultural Resources	=	=
Article 97	=	=
NOTES: + Indicates less potential for impact, which means superior for use. - Indicates more potential for impact, which means inferior for use. = Indicates comparable impacts.		

5.8.2.11 Comparison of Costs

The Planning Grade estimates (-25%/+25%) of the Preferred Route P13 and the Noticed Alternative Route P11 are provided below in Table 5-18.

Table 5-18 Cost Estimate for the Preferred Route P13 (Ames Street) and the Noticed Alternative Route P11 (Massachusetts Avenue)

Route	Cost ($ Millions)
Preferred Route P13 (Ames Street)	$37.6
Noticed Alternative Route P11 (Massachusetts Avenue)	$56.7

5.8.2.12 Comparison of Reliability

To improve reliability, where possible, the Company designs the transmission system in such a way to reduce the risk of one single event being the cause of multiple element failures. Although not always feasible, routing a new line in a location where there are not existing (or proposed) electric transmission lines provides an improvement in the reliability of transmission supply to substations. Accordingly, whenever practical, the Company works to minimize the length of parallel underground transmission lines. In this instance, the Preferred Route P13 would be installed parallel to the Preferred Route B2A East for its entire length along Broadway, Ames Street and Memorial Drive. A portion of the Noticed Alternative Route P11 would be installed parallel to the Preferred Route B29F West for a portion of its length along Broadway and Vassar Street.[121] Future physical road construction, including saw cutting the road or the installation of other gas/sewer/water facilities on these streets, could compromise and breach the integrity of the electric transmission infrastructure, resulting in the simultaneous outage of multiple 115-kV underground transmission lines. The Company has considered this in their design for the referenced routes and determined that based on existing utility data it can provide adequate separation (at least 10-feet) between the new transmission lines on these streets to minimize such risks. Accordingly, the Preferred Route P13 and the Noticed Alternative Route P11 are each reliable means for providing a transmission line connection between the New Substation and the existing Putnam Substation.

[121] This extent of parallel transmission lines is unique to the Putnam routes where they overlap the Brighton routes. Notably, all the new transmission lines coming out of the New Substation onto Broadway necessarily parallel each other for varying lengths before they split off towards the east and west and their termination points at the existing Eversource substation facilities in Somerville, Cambridge, and the Allston/Brighton section of Boston. This is unavoidable given the space constraints and access limitations at the New Substation site. The Company has minimized this situation as part of its routing analysis and considered it as part of the design work, including providing as much separation as possible between the transmission lines as the routes exit the New Substation.

5.8.2.13 Overall Comparison

Overall, the Preferred Route P13 was determined to be superior to the Noticed Alternative Route P11 on most of the environmental criteria analyzed. That said, the potential environmental effects from construction are expected to be minimal, and most of those effects will be temporary and can be further minimized using appropriate mitigation measures.

The Preferred Route P13 was determined to be superior to the Noticed Alternative Route P11 based on cost. Both routes are each a reliable means for providing a transmission line connection between the New Substation and existing Putnam Substation.

The Company will work closely with the City of Cambridge, MassDCR, abutters to the Project and area neighborhoods to ensure that temporary construction impacts are minimized, and that the new transmission line is installed in the least impactful way possible.

5.8.3 Kendall Routes

5.8.3.1 Transportation Impacts

To compare potential transportation impacts during construction of the Preferred Route K5A (Linskey Way) and the Noticed Alternative Route K11 (Fifth Street), the Company reviewed existing traffic and parking conditions, roadway widths, travel lanes, bicycle lanes, pedestrian use, and the presence of public transit service along each route, as well as the options for general traffic mitigation along each route.

Preferred Route K5A (Linskey Way)

The total length of the Preferred Route K5A is approximately 0.62 miles, most of which is located within public roads in Cambridge (Broadway, Third Street, Linskey Way and Second Street). This route heads east from the New Substation onto Broadway for about 1,000-feet before turning in a northeasterly direction across the existing sidewalk onto the Volpe Center property. Broadway accommodates two-way traffic via two lanes on each side of a landscaped median. At its narrowest point on the Volpe Center Site side of the median, Broadway is about 20-feet wide. There are dedicated bike lanes and sidewalks on both sides of the road. MassDOT's functional classification of Broadway is urban principal arterial roadway.

After crossing through the Volpe Center Site, the Preferred Route K5A crosses over a sidewalk and follows Third Street for about three blocks before heading east on Linskey Way. Third Street is on average approximately 30-feet wide. There is no median separating two-way traffic heading north or south. Third Street includes on-street parking and sidewalks on both sides of the road throughout this segment. There are dedicated bike lanes (and a short section of cycle track at Broadway) on both sides of Third Street up to Linskey Way and several pedestrian crosswalk areas. Third Street is classified by MassDOT as an urban minor arterial roadway.

From Third Street, the Preferred Route K5A follows Linksey Way for approximately 750-feet up to its intersection with Second Street. Linskey Way is on average approximately 28-feet wide and is one-way eastbound from Broadway to the 42-72 Linskey Way Parking Garage and two-way eastbound from the parking garage to Second Street. Linskey Way includes a limited area of on-street parking near the Third Street intersection. There are sidewalks present on both sides of Linskey Way throughout this segment with dedicated bike lanes on both sides. Linskey Way is classified by MassDOT as a local roadway.

The balance of the Preferred Route K5A includes approximately 300-feet of Second Street up to the East Cambridge #875 Substation facility. Second Street is on average approximately 32-feet wide and is two-way traffic. Second Street does not have on-street parking or dedicated bike lanes. There are sidewalks present on both sides of the road. Second Street is classified by MassDOT as a local roadway.

Local public transit opportunities along the Preferred Route K5A includes MBTA bus routes 64, 68, 85, 747 & CT2 along Broadway up to Third Street. The EZ Ride shuttle follows Broadway to Galileo Galilei Way to Binney Street. There are no public transit opportunities along the Linskey Way or Second Street sections. The MBTA Red Line Subway station on Main Street is located just south of Broadway. There are MBTA bus stops located on both sides of Broadway for the referenced bus routes.

Table 5-19 Description of Road Segments Along the Preferred Route K5A (Linskey Way)

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Broadway	20	• Sidewalks on both sides • On-street parking on both sides in select areas • Median present • Dedicated Bike Lanes on both sides	Yes (at Broadway intersection to the south and Binney Street intersection to the north)	396
Third Street	30	• Sidewalks on both sides • On-street parking on both sides • Dedicated Bike Lanes on both sides	Yes	695
Linskey Way	28	• Sidewalks on both sides • Limited on-street parking on one side near Third Street intersection • Dedicated Bike Lanes on both sides	No	124
Second Street	32	• Sidewalks on both sides	No	120

Noticed Alternative Route K11 (Fifth Street)

The total length of the Noticed Alternative Route K11 is approximately 0.62 miles, most of which is located within private or public roads in Cambridge (Broadway, Potter Street, Fifth Street, Munroe Street, Third Street, Linskey Way and Second Street). The route follows Broadway for approximately 400-feet before crossing over a sidewalk onto the Volpe Center Site. The segment across the Volpe Center Site is about 450-feet. After crossing through the Volpe Center Site, the route turns east onto Potter Street. Potter Street is a private road that accommodates two way-traffic (although the western half is presently blocked off for construction projects in the area). It is approximately 36-feet wide, has sidewalks on both sides and there is no on-street parking.

From Potter Street, the route follows Fifth Street for about 350-feet. Like Potter Street, Fifth Street is a private road. It is approximately 36-feet wide with sidewalks located on one side. There is limited on-street parking on one side of the road. There are no dedicated bicycle lanes or markings on Fifth Street.

From Fifth Street, the route follows Munroe Street for about 500-feet to the intersection with Third Street. Munroe Street is also a local road. It is approximately 26-feet wide with sidewalks located on both sides for much of its length. There is metered parking on one side of the road. There are no dedicated bicycle lanes or markings on Munroe Street.

After crossing through the Third Street intersection onto Linskey Way and then Second Street, the balance of the Noticed Alternative Route K11 is as described above for Preferred Route K5A.

Local public transit opportunities along the Noticed Alternative Route K11 are the same as Preferred Route K5A, including MBTA bus routes 64, 68, 85, 747 & CT2 along Broadway up to Third Street. The EZ Ride shuttle follows Broadway to Galileo Galilei Way to Binney Street. There are no public transit opportunities along the Potter Street, Fifth Street, Munroe Street, Third Street, Linskey Way or Second Street sections of the route. The MBTA Red Line Subway station is located on Main Street just south of Broadway. There are MBTA bus stops located on both sides of Broadway for the referenced bus routes.

Table 5-20 Description of Road Segments Along the Noticed Alternative Route K11 (Fifth Street)

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Broadway	20	• Sidewalks on both sides • On-street parking on both sides in select areas • Median present • Dedicated Bike Lanes on both sides	Yes	396
Potter Street (private road)	36	• Sidewalks on both sides	No	25
Fifth Street (private road)	36	• Sidewalks on one side • On-street parking on one side	No	35
Munroe Street (private road)	26	• Sidewalks on both sides for most of its length • On-street parking on one side	No	35
Third Street (intersection crossing)	42	• Sidewalks on both sides • Dedicated Bike Lanes on both sides	Yes (Broadway intersection to the south and Binney Street intersection to the north)	N/A
Linskey Way	28	• Sidewalks on both sides • Limited on-street parking on one side near Third Street intersection • Dedicated Bike Lanes on both sides	No	124
Second Street	32	• Sidewalks on both sides	No	120

Comparison of Potential Impacts

Each route would require implementation of TMPs and close coordination with the City of Cambridge and private landowners to ensure that transportation impacts are minimized. Traffic management measures, including use of police details, temporary roadway closures and detours and temporary lane closures or shifts, would be required regardless of the route selected. The following additional factors were considered when comparing the potential construction impacts between these two routes:

- Number and size of pedestrian crossings impacted;
- Dedicated bicycle facility impacts;
- On-street parking impacts;

- Need for roadway closure & detour and availability of detour routes; and
- Width of roadway from curb to curb (usable space).

Both routes have the potential to temporarily affect motorists, bicycle, and pedestrian facilities during construction. However, the Noticed Alternative Route K11 involves less work on Broadway and Third Street (two major multimodal transportation corridors) and follows three less utilized private road segments (Fifth Street, Potter Street, Munroe Street). The balance of the routes shares common segments on Linskey Way and Second Street. Thus, the key differentiator is the amount of work on the Broadway and Third Street segments. These two roads carry higher traffic volumes than the private and local roads, are more utilized by bicyclists and pedestrians, and contain public bus routes and bus stops. Construction on these roadway segments would therefore potentially result in greater impacts to transportation during construction.

In consideration of the above, the Company determined that Noticed Alternative Route K11 is superior to the Preferred Route K5A relative to this criterion.

Impact Mitigation

Upon completion of the detailed design work and prior to the start of construction, the Company will work closely with the City of Cambridge and private landowners to develop a TMP. The TMP will be submitted for review and approval by municipal authorities with jurisdiction over the impacted facility prior to construction. The Company will also closely coordinate with local officials and abutting property owners and businesses. Please refer to Section 5.8.2.1 for a description of the topics to be addressed in the TMP.

5.8.3.2 Land Use

The following table summarizes the general land uses within 100 feet of the Preferred Route K5A and the Noticed Alternative Route K11 corridors. The corresponding MassGIS mapped land-use areas are depicted on Figure 5-17.

Table 5-21 Summary of MassGIS Land Use Mapping within 100 feet of the Preferred Route K5A (Linskey Way) and the Noticed Alternative Route K11 (Fifth Street)

MassGIS Land Use Mapping	Preferred Route K5A (Linskey Way) (acres)	Noticed Alternative Route K11 (Fifth Street) (acres)
Commercial	5.65	3.62
Industrial	3.13	2.63
Mixed use (primarily residential)	0.33	--
Residential (multi-family)	0.95	1.48
Right-of-Way (roads, railroads, sidewalk areas, etc.)	1.73	1.40
Tax-Exempt Lands (religious institutions, schools, etc.)	2.90	5.85
Open Land (greenspace and landscaped areas, etc.)	1.28	0.63

Preferred Route K5A (Linskey Way)

The predominant MassGIS mapped land use associated with the Preferred Route K5A is commercial use totaling 5.65 acres, followed by industrial (3.13 acres), tax-exempt land (2.90 acres) (Volpe Center Site, presently owned by the U.S. Government), and right-of-way (1.73 acres). Residential land use (multi-family) is limited to about 0.95 acres, comprised of the Third Square Apartments generally situated between Fifth Street and Third Street and the Watermark Kendall West apartments located across Third Street approaching Broad Canal Way. The Volpe Center Site occupies a significant portion of the Kendall Study Area. Much of the Volpe Center Site is proposed to be redeveloped in the future by MIT as a mixed-use project comprised of residential, office and lab space, along with retail components and public open space.

Noticed Alternative Route K11 (Fifth Street)

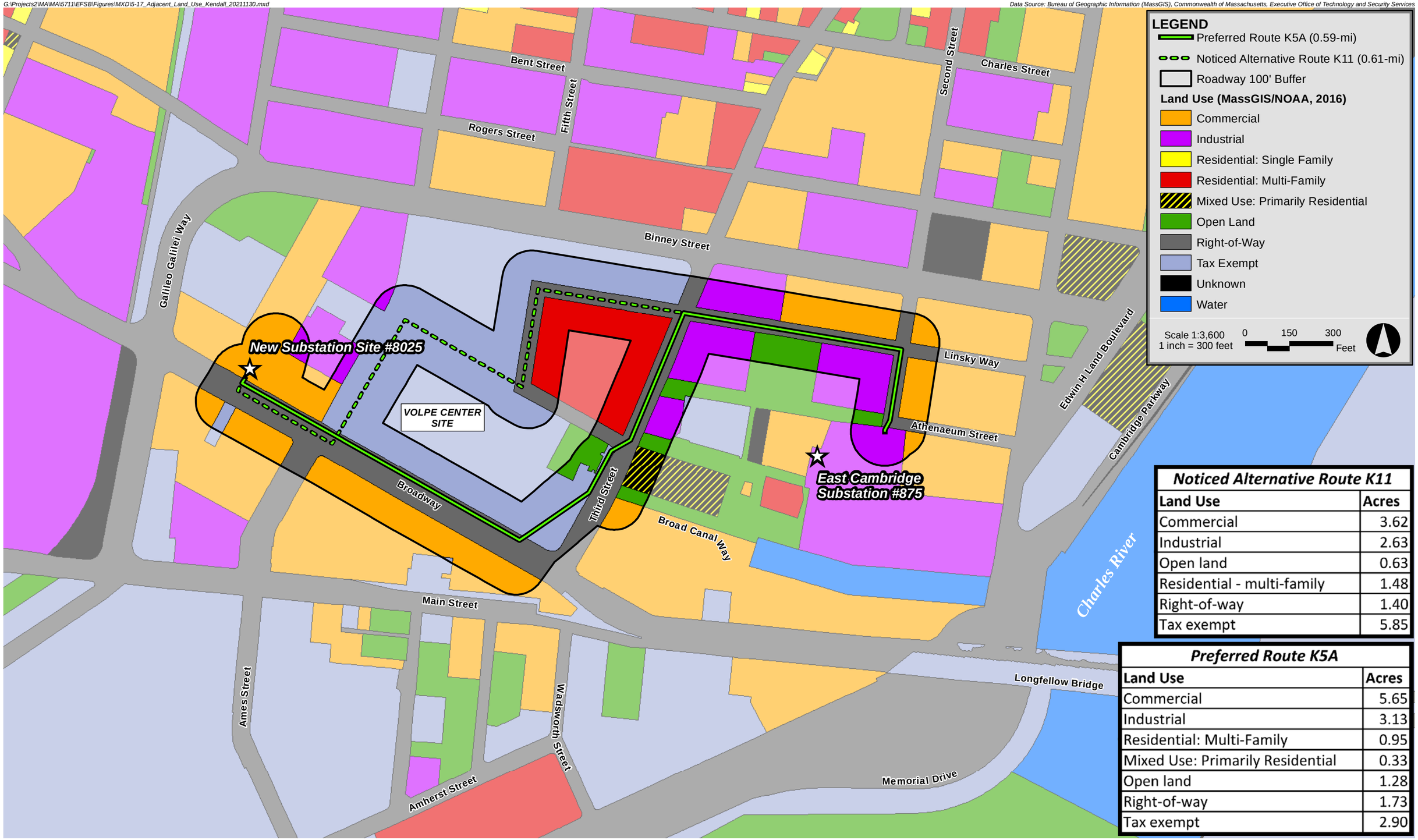
The predominant mapped land use associated with the Noticed Alternative Route K11 is tax-exempt land (5.85 acres) (Volpe Center Site, presently owned by the U.S. Government, and other buildings associated with MIT), followed by commercial (3.62 acres), industrial (2.63 acres), and multi-family residential (1.48 acres). While this route avoids large residential high-rise buildings on Broadway and Third Street, the Third Square Apartments are located along the route on 5th Street and Munroe Street. As described above, the Volpe Center Site is proposed to be redeveloped in the future by MIT as a mixed-use project.

Comparison of Potential Impacts

Overall, mapped land uses within 100-feet of the Preferred Route K5A and the Noticed Alternative Route K11 are generally comparable. Both routes propose to cross the Volpe Center Site, which occupies a significant portion of the Study Area in the middle of Kendall Square. The Preferred Route K5A passes by approximately 2 additional acres of mapped commercial land use; however, the Noticed Alternative Route K11 would also pass the new headquarters for the U.S. DOT Volpe Center that are presently under construction on approximately four acres of former paved parking lots located north of the Volpe Center Site on Potter Street and west of 5th Street and the Third Square Apartments. The new facility will consolidate operations that are currently carried out in six different buildings on the Volpe Center Site.

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-17_Adjacent_Land_Use_Kendall_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services



Noticed Alternative Route K11

Land Use	Acres
Commercial	3.62
Industrial	2.63
Open land	0.63
Residential - multi-family	1.48
Right-of-way	1.40
Tax exempt	5.85

Preferred Route K5A

Land Use	Acres
Commercial	5.65
Industrial	3.13
Residential: Multi-Family	0.95
Mixed Use: Primarily Residential	0.33
Open land	1.28
Right-of-way	1.73
Tax exempt	2.90

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Figure 5-17

Adjacent Land Use: Preferred Route K5A and Noticed Alternative Route K11

The residential land use area is also comparable between each route (1.28 acres for the Preferred Route K5A, 1.48 acres for the Noticed Alternative Route K11). Both routes pass by residential apartment buildings including the Watermark Kendall West complex on Third Street and the Third Square Apartments located on the corner of Third Street and Munroe Street. The Noticed Alternative Route K5A involves construction on two roads bordering the north and west sides of the Third Square Apartment building as well as the Third Street intersection crossing. The Preferred Route K11 involves work on Third Street near each of the referenced apartment complexes.

In consideration of the above, the Company determined that the Preferred Route K5A and the Noticed Alternative Route K11 are comparable in impacts to land uses.

Impact Mitigation

Neither the Preferred Route K5A nor the Noticed Alternative Route K11 will permanently affect adjacent land uses because the Project will be installed entirely underground. Temporary impacts to residences, businesses and sensitive receptors may include traffic disruption, including road closings and construction noise. These types of temporary impacts will be minimized using proper construction BMPs, TMPs, and restricted work hours to reduce noise, traffic, and air quality impacts during construction.

5.8.3.3 Sensitive Receptors

Sensitive receptors directly abutting the Preferred Route K5A and the Noticed Alternative Route K11 are summarized in the following table. The locations of the sensitive receptors included in the scoring analysis are depicted on Figure 4-27C provided in Section 4.

Table 5-22 Number of Sensitive Receptors Directly Abutting the Preferred Route K5A (Linskey Way) and the Noticed Alternative Route K11 (Fifth Street)

Sensitive Receptors	Preferred Route K5A (Linskey Way)	Noticed Alternative Route K11 (Fifth Street)
Police Stations	0	0
Fire Stations	0	0
Hospitals	0	0
Schools (including colleges and universities)	2	2
Nursing Homes/Elder Care Facilities	0	0
Funeral Homes	0	0
Places of Worship	0	0
Daycare Facilities	1	1
District Courts	0	0
Parks and Recreation Facilities	1	1
TOTAL	**4**	**4**

Preferred Route K5A (Linskey Way)

The Preferred Route K5A passes by four sensitive receptors, including the MIT campus, the Loughrey Walkway and Bike Path, the Pine Village Preschool and the TSC Child Care Center.

Noticed Alternative Route K11 (Fifth Street)

Noticed Alternative Route K11 passes by the same four sensitive receptors as the Preferred Route K5A, including the MIT campus, the Loughrey Walkway and Bike Path, the Pine Village Preschool, and TSC Child Care Center.

Comparison of Potential Impacts

The Preferred Route K5A and Noticed Alternative Route K11 are determined to be comparable in impacts to sensitive receptors.

Impact Mitigation

Depending on their location, sensitive receptors could be affected by temporary construction impacts such as traffic disruption, property access, noise, and dust. Potential mitigation measures for these types of impacts are discussed separately in the noise and multimodal transportation impacts criteria. Section 5.5.2 describes air quality mitigation measures, including dust control. Regarding site access to these properties, the Company will develop TMPs that will detail how access will be maintained. Prior to finalization of those TMPs, the Company will meet with City of Cambridge officials and the landowners along the route to understand their access requirements and will modify the plans, as necessary. During and after work hours, the Company will take appropriate measures to allow safe and unencumbered access to the abutting properties.

5.8.3.4 Public Shade Trees

Table 5-23 below provides a tally of the public shade trees located within the public way of the Preferred Route K5A and Noticed Alternative Route K11.

Table 5-23 Number of Public Shade Trees within the Public Way of the Preferred Route K5A (Linskey Way) and the Noticed Alternative Route K11 (Fifth Street)

Route	Number of Public Shade Trees within the Public Way
Preferred Route K5A (Linskey Way)	136
Noticed Alternative Route K11 (Fifth Street)	104

Preferred Route K5 (Linskey Way)

The Preferred Route KA passes by 136 public shade trees, including newer plantings along Third Street, landscaping associated with newer commercial development areas, and within sidewalks or small strips of grass. The largest shade trees are located within and adjacent to the Volpe Center Site and within the median on Broadway. Several existing trees within the Volpe Center Site are proposed to be removed by others as part of the separate overall redevelopment project.

Noticed Alternative Route K11 (Fifth Street)

The Noticed Alternative Route K11 passes by 32 fewer public shade trees than the Preferred Route K5A. Like the Preferred Route K5A above, several existing trees within the Volpe Center Site are proposed to be removed by others as part of the separate overall redevelopment project.

Comparison of Potential Impacts

The Company has worked closely with Cambridge engineering and DPW officials and the future landowner of the Volpe Center Site (MITIMCO) to identify transmission alignments across the property that avoid and minimize impacts to public shade trees to the maximum extent practicable. Both routes may require the removal of 1 or 2 shade trees as they transition from Broadway or Third Street onto the Volpe Center Site. There is a mature row of deciduous trees bordering the Loughrey Walkway and Bike Path along the western property line of the Volpe Center Site that Noticed Alternative Route K11 will avoid and setback from the canopy drip line to avoid damaging the root system, as it crosses the Volpe Center Site between Broadway and Potter Street. As noted above, several existing trees within the Volpe Center Site are scheduled to be removed by others and no additional shade tree removal on the property is contemplated by either route. The potential for additional shade tree impacts along the roadway segments of both routes, including the common segments along Linskey Way and Second Street, is considered low and comparable for both routes.

The Preferred Route K5A and Noticed Alternative Route K11 are determined to be comparable in impacts to public shade trees

Impact Mitigation

The Company would implement the same practice to protect public shade trees regardless of the route selected. Please refer to Section 5.8.2.4 for a description of typical mitigation measures that would be employed by the Company to protect public shade trees during construction.

5.8.3.5 Sound

As was previously described for the Putnam Study Area (see Section 5.7.1.5), the construction equipment used with underground transmission line construction is like that used during typical public works projects (e.g., road resurfacing, storm sewer installation, water line installation). Table 5-13 in Section 5.7.1.5 includes maximum sound levels from typical equipment that will be used during construction of the underground cable at a typical reference distance of 50 feet.

Preferred Route K5A (Linskey Way)

There are approximately 1,008 residential units located within 50-feet of the roadways comprising the Preferred Route K5A. There are also four sensitive receptors directly abutting the route, including the MIT campus, the Loughrey Walkway and Bike Path, the Pine Village Preschool and the TSC Child Care Center

Noticed Alternative Route K11 (Fifth Street)

There are approximately 401 residential units located within 50-feet of the roadways comprising the Noticed Alternative Route K11. There are also four sensitive receptors directly abutting the route, including the MIT campus, the Loughrey Walkway and Bike Path, the Pine Village Preschool and the TSC Child Care Center.

Comparison of Potential Impacts

The Preferred Route K5A involves work near 607 additional residential units when compared to the Noticed Alternative Route K11. Because the Preferred Route K5A has a greater potential to disrupt residences from sound generated during construction, the Company determined that the Noticed Alternative Route K11 is superior to the Preferred Route K5A relative to the sound criterion.

Impact Mitigation

The timing and sequencing of the work will be coordinated with local and state officials to minimize potential sound impacts consistent with applicable local regulations and ordinances. Sound from cable splicing operations would be minimized through use of specialized low-sound equipment such as low-sound generators, and by reducing or eliminating the use of motorized equipment during evening and overnight work. Other potential mitigation measures include working with the municipalities and state agencies to coordinate work, use of a low sound/muffled generator, and portable sound walls (temporary sound barriers) as needed, blocking the path of generators. However, as previously noted, the use of physical sound barriers is not typically the Company's first response to addressing a claim of excessive sound. The Company would first explore other opportunities to reduce sound, including requiring the use of newer, lower sound equipment.

5.8.3.6 Subsurface Contamination

Subsurface excavation has the potential to encounter contaminated soils and/or groundwater from historical releases and/or urban/historic fill in the vicinity of the Preferred Route K5A and the Noticed Alternative Route K11. A review of the MassDEP waste site list on-line database was performed to determine the potential to encounter subsurface contamination directly abutting each route. In addition, both routes involve work within the limits of the former Cambridge Gas and Light Company Manufactured Gas Plant ("MGP") in Kendall Square.

Preferred Route K5A (Linskey Way)

There are 12 MassDEP-listed sites directly abutting the Preferred Route K5A, as described in Table 5-24.

Table 5-24 MassDEP-Listed Sites Directly Abutting the Preferred Route K5A (Linskey Way)

Release Tracking Number (RTN)	Location	Description / Status
3-0004570	364 Third Street, Cambridge MA	RAO Class C1; AUL date 5/5/2004
3-0015243	265 First Street, Cambridge MA	RAO Class A3; AUL date 11/27/1998, amended 5/13/2003
3-0015754	265 First Street, Cambridge MA	RAO Class B2; AUL date 11/27/1998, amended 5/13/2003
3-0024835	354 Third Street, Cambridge MA	RAO Class A3; AUL date 4/27/2006
3-0026067	55 Broadway, Cambridge MA	RAO Class A3; AUL date 1/30/2009; amended 10/30/2019
3-0026562	Third Street and Binney Street (no specific address listed)	RAO Class B2; AUL date 2/9/2010
3-0033330	88 Ames Street, Cambridge MA	PSC, Phase III, PA; AUL date 1/26/2021
3-0033540	41 Linskey Way, Cambridge MA	TMPS, Phase IV, TN; notification date 4/20/2016
3-0033603	55 Broadway, Cambridge MA	PSC, Phase II, PA; AUL date 6/12/2020
3-0033952	55 Broadway, Cambridge MA	Tier II, Phase III; notification date 11/21/2016
3-0033954	55 Broadway, Cambridge MA	PSNC, Phase II, PN; notification date 11/21/2016
3-0034321	55 Broadway, Cambridge MA	PSC, PN; AUL date 7/2/2018

Noticed Alternative Route K11 (Fifth Street)

There are 10 MassDEP-listed sites directly abutting the Noticed Alternative Route K11, as described in Table 5-25.

Table 5-25 MassDEP-Listed Sites Directly Abutting Noticed Alternative Route K11 (Fifth Street)

Release Tracking Number (RTN)	Location	Description / Status
3-0033330	88 Ames Street, Cambridge	Chapter 21E, Tier II notification date 12-23-2015
3-0033952	Volpe Transportation Systems Center, 55 Broadway, Cambridge	Chapter 21E, Tier II notification date 11/21/2016
3-0004570	364 Third Street, Cambridge	RAO Class C1; AUL date 5/28/2014
3-0015243	265 First Street, Cambridge	RAO Class A3; AUL date 11/27/1998
3-0015754	265 First Street, Cambridge	RAO Class B2; AUL date 11/27/1998
3-0024835	354 Third Street, Cambridge	RAO Class A3; AUL date 4/27/2006
3-0026067	55 Broadway, Cambridge	RAO Class A3; AUL date 10-30-2019
3-0026562	Third Street and Binney Street, Cambridge	RAO Class B2; AUL date 2/11/2010
3-0033603	55 Broadway, Cambridge	PSC Class PA; AUL date 7/9/2020
3-0034321	55 Broadway, Cambridge	PSC Class PN; AUL date 9/10/2019

Comparison of Potential Impacts

Both routes involve work near a comparable number of MassDEP-listed sites. Further, nine of the MassDEP-listed sites overlap both routes and or involve the same property (55 Broadway). The Volpe Center Site is also scheduled to be redeveloped by MIT. Accordingly, the two routes were determined to be equal for this criterion.

Impact Mitigation

If contaminated soils and/or groundwater are encountered, they will be managed pursuant to URAM provisions of the MCP. The Company will prepare a soil and groundwater management plan, and will contract with a LSP as necessitated by conditions encountered along the underground transmission line alignment, consistent with the requirements of the MCP at 310 C.M.R. 40.0460 et seq. All excess soil and groundwater will be managed in accordance with local, State and Federal regulations.

5.8.3.7 Wetland Resource Areas, Buffer Zones and Tidelands

Preferred Route K5A (Linskey Way)

The Preferred Route K5A is located entirely in previously developed areas and does not involve any alterations to wetland resource areas. Approximately 10 linear feet of this route involves work in Chapter 91 jurisdictional areas that are presently occupied by existing pavement and other utilities near the East Cambridge Substation.

Noticed Alternative Route K11 (Fifth Street)

The Noticed Alternative Route K11 is also located entirely in previously developed areas and does not involve any alterations to wetland resource areas. In addition, the Noticed Alternative Route K11 crosses the same Chapter 91 jurisdictional areas as the Preferred Route K5A (about 10 linear feet of filled tidelands presently occupied by existing pavement and other utilities near the East Cambridge Substation).

Comparison of Potential Impacts

Both the Preferred Route K5A and the Noticed Alternative Route K11 avoid any work in wetland resource areas and cross the same Chapter 91 jurisdictional areas exiting the East Cambridge Substation. Accordingly, the Company determined that the Preferred Route K5A and the Noticed Alternative Route K11 result in equivalent impacts for this criterion.

Impact Mitigation

The proposed underground cable construction along these routes is confined to existing paved roadways or other previously developed areas, no permanent impacts to wetlands or waterbodies are anticipated. Catch basin inlets will be protected with silt sacks during construction.

5.8.3.8 Cultural Resources

The Project is subject to review by the MHC in compliance with G.L. c. 9, §§ 26-27C, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00). The Company undertook a cultural resource investigation to identify historic and archaeological resources adjacent to the Preferred Route K5 and the Noticed Alternative Route K6. The following Table 5-26 summarizes the results of the investigations.

Table 5-26 Number of Cultural Resource Sites Adjacent to the Preferred Route K5A (Linskey Way) and the Noticed Alternative Route K11 (Fifth Street)

Cultural Resources	Number of Cultural Resources	
	Preferred Route K5A (Linskey Way)	Noticed Alternative Route K11 (Fifth Street)
Inventory Points Adjacent to Route	5	7
Inventory Points Intersected by Route	1	1
Archaeological Sites within 0.25 miles of Route	0	0
Archaeological Sites Intersected by Route	0	0
TOTAL	**6**	**8**

Preferred Route K5A (Linskey Way)

The five historic inventory properties located adjacent to the Preferred Route K5A include:

- Volpe Center Auditorium at #33 Broadway;
- Volpe Center High Rise at #2 Potter Street;
- Volpe Center Space Guidance Building at #2 Potter Street;
- Volpe Center Laboratory at #182 Binney Street; and
- Athenaeum Press Building at #215 First Street.

The one inventory property intersected by the Preferred Route K5A is the Volpe Center property on Broadway.

Noticed Alternative Route K11 (Fifth Street)

The seven historic inventory properties located adjacent to the Noticed Alternative Route K11 include:

- Volpe Center Auditorium at #33 Broadway;
- Volpe Center High Rise at #2 Potter Street;
- Volpe Center Space Guidance Building at #2 Potter Street;
- Volpe Center Space Optics Building at #2 Potter Street;
- Volpe Center Shipping and Receiving at #2 Potter Street;
- Volpe Center Laboratory at #182 Binney Street; and
- Athenaeum Press Building at #215 First Street.

The one inventory property intersected by the Noticed Alternative Route K11 is the Volpe Center Site on Broadway.

Comparison of Potential Impacts

While the Preferred Route K5A passes by fewer historic properties compared to the Noticed Alternative Route K11 (6 resource versus 8 resources), most of these properties are common to both routes. Similarly, both routes cross the same inventory property (Volpe Center Site on Broadway) that is scheduled to be redeveloped by MIT. As the Project involves the underground installation of transmission line within the existing paved limits of roadways and sidewalks (or areas proposed for development by others on the Volpe Center Site) that will be restored to their pre-existing condition or better following construction, neither route is anticipated to result in impacts to cultural resources. Accordingly, the Company determined that the Preferred Route K5A and the Noticed Alternative Route K11 are equivalent relative to this criterion.

Impact Mitigation

While the need for mitigation to cultural resource impacts associated with these routes is not anticipated, the MHC will be consulted regarding a determination of the effect. Potential effects, if any, to historic and archaeological resources will be addressed with the MHC through Section 106 of the National Historic Preservation Act and the State Register Review processes.

5.8.3.9 Article 97

Neither the Preferred Route K5A nor the Noticed Alternative Route K11 involves work on Article 97 lands. Accordingly, the Company concludes that there will be no impact to this criterion from construction using either Route.

5.8.3.10 Summary of Environmental Impacts

Based upon the above comparisons, the Preferred Route K5A and the Noticed Alternative Route K11 have relatively minimal environmental effects, and most of those effects would be temporary and can be further minimized using the proposed mitigation measures. Table 5-27 below provides a comparison of the routes based on the criteria evaluated.

The Noticed Alternative Route K11 was determined to be superior to the Preferred Route K5A on two criteria: transportation impacts and sound. For the balance of the criteria analyzed, the Routes were determined to be comparable from an environmental impact perspective (land use, sensitive receptors, public shade trees, subsurface contamination, wetland resource areas, cultural resources, and Article 97).

Table 5-27 Comparison of the Preferred Route K5A (Linskey Way) and the Noticed Alternative Route K11 (Fifth Street)

Evaluation Criteria	Preferred Route K5A (Linskey Way)	Noticed Alternative Route K11 (Fifth Street)
Transportation Impacts	-	+
Land Use	=	=
Sensitive Receptors	=	=
Public Shade Trees	=	=
Sound	-	+
Subsurface Contamination	=	=
Wetland Resource Areas, Buffer Zones and Tidelands	=	=
Cultural Resources	=	=
Article 97	=	=

NOTES:
+ Indicates less potential for impact, which means superior for use.
- Indicates more potential for impact, which means inferior for use.
= Indicates comparable impacts.

5.8.3.11 Comparison of Costs

The planning grade cost estimates (-25%/+25%) of the Preferred Route K5A and the Noticed Alternative Route K11 are provided below in Table 5-28.

Table 5-28 Cost Estimate for Preferred Route K5A (Linskey Way) and Noticed Alternative Route K11 (Fifth Street)

Route	Cost ($ millions)
Preferred Route K5A (Linskey Way)	$48.6
Noticed Alternative Route K11 (Fifth Street)	$72.1

5.8.3.12 Comparison of Reliability

The Preferred Route K5A and the Noticed Alternative Route K11 are each reliable means for providing a transmission line connection between the New Substation and the existing East Cambridge Substation.

5.8.3.13 Overall Comparison

Overall, both routes were generally comparable from an environmental impact perspective. That said, the Noticed Alternative Route K11 was determined to be superior to the Preferred Route K5A on two of the environmental criteria analyzed (transportation and sound impacts), or

otherwise determined to be equal for the balance of the criteria analyzed. The potential environmental effects from construction are expected to be minimal for either route, and most of those effects will be temporary and can be minimized using appropriate mitigation measures.

The Preferred Route K5A was determined to be superior to the Noticed Alternative Route K11 based on cost (it is approximately $24 million dollars less expensive to construct). The additional costs are primarily associated with obtaining rights to install and operate the new transmission line on the three private road segments (Fifth Street, Potter Street, Munroe Street).

Both routes are reliable means for providing a transmission line connection between the New Substation and existing East Cambridge Substation.

Notably, the alignment of K5A across the Volpe Center Site was identified after extensive coordination and with the support of the future landowner and Cambridge officials to avoid and minimize potential impacts to future development plans on the Volpe Center Site, minimization of impacts to public shade trees, and in consideration of significant utility congestion and planned utility upgrades in Broadway and Third Street. The future landowner has indicated to Eversource that it strongly prefers the Preferred Route K5A over Noticed Alternative Route K11 because it results in less potential impacts and constraints to its future development plans and avoids potential impacts during construction to the mature deciduous trees bordering the Loughery Walkway and Bike Path. Eversource concurs with this assessment and anticipates entering into a written agreement with the future landowner to locate the Preferred Route K5A across the Volpe Center Site.

The Company will work closely with the City of Cambridge, the future landowner of the Volpe Center Site, other landowners, abutters to the Project and area neighborhoods to ensure that temporary construction impacts are minimized, and that the new transmission line is installed in the least impactful way possible.

5.8.4 Brighton Routes (East)

The Brighton East Routes analyzed by the Company in further detail below include the Preferred Route B2A East (Magazine Beach HDD) and the Noticed Alternative Route B31 East (River Street Bridge). As was described in Section 5.2.1, the Preferred Route B2A East includes a potential Route Variation referred to as B2AN. The “N” stands for “no-build” and represents a potential workaround route across the MassDOT Multimodal Project site should that separate project not be advanced to construction. This route variation does not add any appreciable length (approximately 0.05 miles) or costs relative to the Preferred Route B2A.

5.8.4.1 Transportation Impacts

To compare potential transportation impacts during construction of the Preferred Route B2A East (Magazine Beach HDD) and the Noticed Alternative Route B31 East (River Street Bridge), the Company reviewed existing traffic and parking conditions, roadway widths, travel lanes, bicycle lanes, pedestrian use, and the presence of public transit service along each route, as well as the options for general traffic mitigation along each route.

Preferred Route B2A East (Magazine Beach HDD)

The total length of the Preferred Route B2A East is approximately 2.91 miles, most of which is located within public roads in Cambridge (Broadway, Ames Street, Memorial Drive) and Boston (Cambridge Street, Lincoln Street). A portion of the route is located off-road where it crosses beneath MassDCR's Magazine Beach property and the Charles River using an HDD or micro tunneling technique, prior to reaching MassDOT's Allston Multimodal Project site in Boston.

The Preferred Route B2A East follows Broadway for approximately 300-feet before turning south onto Ames Street. This segment of Broadway accommodates two-way traffic via three lanes separated by a landscaped median in the middle. Broadway is about 22 to 24-feet wide in this location (one or two lanes separated by median, about 65-feet wide total). There are dedicated bike lanes and sidewalks on both sides of the road. MassDOT's functional classification of Broadway is urban principal arterial roadway.

Approximately 2,000-linear feet of the Preferred Route B2A East follows Ames Street before heading west onto Memorial Drive. Ames Street is on average between approximately 26-feet wide and 30-feet wide between Broadway and Memorial Drive. Ames Street accommodates two-way vehicular traffic with on-street parking and sidewalks throughout much of its length. There is a dedicated two-way bike lane on the wider section between Broadway and Main Street. There are several pedestrian crosswalk areas. Ames Street is classified by MassDOT as an urban collector roadway.

From Ames Street, the Preferred Route B2A East follows the east bound lanes of Memorial Drive for approximately 7,400 feet to Magazine Beach. Memorial Drive is state-controlled roadway under the jurisdiction of MassDCR. A portion of Memorial Drive along the route is separated by a landscaped median generally between Ames Street and Fowler Street. Memorial Drive's width varies but in general it ranges from 18 feet to 40 feet. Portions of Memorial Drive are limited to one-way traffic. There are marked bike lanes present in discrete locations, sidewalks located on both sides and several pedestrian crosswalk areas. The Dr. Paul Dudley White Bike Path is located on the south side. Memorial Drive is classified by MassDOT as an urban principal arterial roadway.

The HDD crossing of the Charles River from Magazine Beach through the presently undeveloped MassDOT Multimodal Project Site (generally in the location of the future Lincoln Connector roadway) does not involve work in local roadways that would in turn have a potential to cause transportation impacts during construction (notwithstanding the transition from Memorial Drive

across the Dr. Paul Dudley White Bike Path and sidewalk onto Magazine Beach). After crossing through the MassDOT Allston Multimodal Project site and beneath the present location of the Massachusetts Turnpike and Soldiers Field Road (that would be reconfigured with MassDOT's Multimodal Project), the route transitions back onto public roads for about 1,400-feet on Lincoln Street in Boston. Lincoln Street is about 26-feet wide in this location, accommodates two-way traffic and has sidewalks on both sides. Lincoln Street does not have any dedicated bike lanes. There are pedestrian crosswalks present at the Cambridge Street intersection and where the road approaches Mansfield Street. Lincoln Street is classified by MassDOT as an urban collector roadway.

Local public transit opportunities along and/or near the Preferred Route B2A East in Cambridge and Boston includes MBTA bus routes 47, 64, 66, 68, 85, 503, 504, and 747. There is also the MBTA Red Line Subway tunnel where the route crosses over Main Street from Ames Street in Cambridge. Except for Memorial Drive, there are MBTA bus stops located in several locations along the route. The TMA EZRide Shuttle Route operates along Broadway, Ames Street, and portions of Memorial Drive in Cambridge.

Table 5-29 Description of Road Segments Along the Preferred Route B2A East (Magazine Beach HDD)

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Broadway	22 to 65	• Sidewalks on both sides • Limited on-street parking on one side • Median present • Dedicated Bike Lanes on both sides	Yes	336
Ames Street	26 to 30	• Sidewalks on both sides • On-street parking on both sides • Dedicated Bike Lane on one side	Yes	297,318[122]

[122] ATR data was collected from two locations on Ames Street, including: Broadway to Main Street and from Main Street to Memorial Drive.

Table 5-29 Description of Road Segments Along the Preferred Route B2A East (Magazine Beach HDD) (Continued)

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Memorial Drive	18 to 40	• Partial sidewalk on west bound side • Dr. Paul Dudley White Bike Path on east bound side • On-street parking on west bound side west of Ames Street • Median present (separating west bound from east bound travel lanes)	Yes	318, 668, 1062, 1733, 1236, 1833[123]
Magazine Beach & MassDOT Multimodal Project Site	N/A	N/A	N/A	N/A
Lincoln Street	26	• Sidewalks on both sides • Limited on-street parking on one side	No	366

Noticed Alternative Route B31 East (River Street Bridge)

The total length of the Noticed Alternative Route B31 East is approximately 3.26 miles, all of which is located within public roads in Cambridge (Broadway, Ames Street, Memorial Drive and River Street) and Boston (Cambridge Street, Lincoln Street).

Like the Preferred Route B2A East, the Noticed Alternative Route B31 East follows Broadway for approximately 300 feet before turning south onto Ames Street. This segment of Broadway accommodates two-way traffic via three lanes separated by a landscaped median in the middle. Broadway is about 65-feet wide in total in this location, with each bound separated by the median

[123] ATR data was collected from six locations on Memorial Drive, including: Memorial Drive eastbound to Ames Street, Memorial Drive eastbound to Massachusetts Avenue intersection, Memorial Drive (undivided section) to Vassar Street, Vassar Street to Memorial Drive eastbound/B.U. Bridge entrance ramp from Reid Rotary, Memorial Drive eastbound/B.U. Bridge entrance ramp from Reid Rotary to Memorial Drive eastbound exit ramp to Reid Rotary, Memorial Drive eastbound exit ramp to Reid Rotary to Magazine Beach.

approximately 22 to 24-feet wide depending on location. There are dedicated bike lanes and sidewalks on both sides of the road. MassDOT's functional classification of Broadway is urban principal arterial roadway.

Approximately 2,000 linear feet of the Noticed Alternative Route B31 East follows Ames Street before heading west onto Memorial Drive. Ames Street is on average between approximately 26-feet wide and 30-feet wide between Broadway and Memorial Drive. Ames Street accommodates two-way vehicular traffic with on-street parking and sidewalks throughout much of its length. There is a dedicated two-way bike lane on the wider section between Broadway and Main Street. There are several pedestrian crosswalk areas. Ames Street is classified by MassDOT as an urban collector roadway.

From Ames Street, the route follows the east bound lanes of Memorial Drive for about 2 miles to the River Street Bridge over the Charles River. As noted above, Memorial Drive is state-controlled roadway under the jurisdiction of MassDCR. A portion of Memorial Drive along the route is separated by a landscaped median generally between Ames Street and Fowler Street. Memorial Drive's width varies but in general it ranges from 18 feet to 40 feet. Portions of Memorial Drive are limited to one-way traffic. There are marked bike lanes present in discrete locations, sidewalks located on both sides and several pedestrian crosswalk areas. The Dr. Paul Dudley White Bike Path is located on the south side. Memorial Drive is classified by MassDOT as an urban principal arterial roadway.

The River Street Bridge is approximately 35 feet wide, comprised of three lanes, with sidewalks on both sides. The River Street Bridge is classified by MassDOT as an urban principal roadway.

After crossing over the Charles River via the River Street Bridge, the route follows Cambridge Street and crosses over the I-90 ramps. Cambridge Street varies in width but on average is about 34 feet wide. Cambridge Street has between 4 and 6 lanes of two-way traffic (depending on location), separated by a median (70 feet total width in some areas), sidewalks on both sides and dedicated bike lanes and multi-use pathways. Cambridge Street is classified by MassDOT as an urban principal arterial roadway.

The Lincoln Street segment is about 26 feet wide. Lincoln Street accommodates two-way traffic and has sidewalks on both sides. Lincoln Street does not have any dedicated bike lanes. There are pedestrian crosswalks present at the Cambridge Street intersection and where the road approaches Mansfield Street. Lincoln Street is classified by MassDOT as an urban collector roadway.

Local public transit opportunities along and/or near the Noticed Alternative Route B31 East in Cambridge and Boston includes MBTA bus routes 47, 64, 66, 68, 85, 503, and 747. There is also the MBTA Red Line Subway tunnel where the route crosses over Main Street from Ames Street in Cambridge. Except for Memorial Drive, there are MBTA bus stops located in several locations along the route. The TMA EZRide Shuttle Route operates along Broadway, Ames Street, and portions of Memorial Drive in Cambridge.

Table 5-30 Description of Road Segments Along the Noticed Alternative Route B31 East (River Street Bridge)

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Broadway	22 to 65	• Sidewalks on both sides • Limited on-street parking on one side • Median present • Dedicated Bike Lanes on both sides	Yes	336
Ames Street	26 to 30	• Sidewalks on both sides • On-street parking on both sides • Dedicated Bike Lane on one side	Yes	297,318[124]
Memorial Drive	18 to 40	• Partial sidewalk on west bound side • Dr. Paul Dudley White Bike Path on east bound side • On-street parking on west bound side west of Ames Street • Median present (separating west bound from east bound travel lanes)	Yes	318, 668, 1062, 1733, 1236, 1833[125]
River Street Bridge	35	• Sidewalks on both sides • Limited on-street parking on one side • Multi-use path crossing	Yes	N/A
Cambridge Street	34	• Sidewalks on both sides • Multi-use path, cycle track, bike lanes	Yes	1519, 2327[126]
Lincoln Street	26	• Sidewalks on both sides • Limited on-street parking on one side	No	335

[124] ATR data was collected from two locations on Ames Street (from Broadway to Main Street and from Main Street to Memorial Drive).

[125] ATR data was collected from six locations on Memorial Drive, including: Memorial Drive eastbound to Ames Street, Memorial Drive eastbound to Massachusetts Avenue intersection, Memorial Drive (undivided section) to Vassar Street, Vassar Street to Memorial Drive eastbound/B.U. Bridge entrance ramp from Reid Rotary, Memorial Drive eastbound/B.U. Bridge entrance ramp from Reid Rotary to Memorial Drive eastbound exit ramp to Reid Rotary, Memorial Drive eastbound exit ramp to Reid Rotary to Magazine Beach.

[126] ATR data was collected from two locations on Cambridge Street (from Broadway to private property and from private property to Lincoln Street).

Comparison of Potential Impacts

Each of the Routes would require implementation of TMPs and close coordination with the City of Cambridge, City of Boston, MassDOT and MassDCR, to ensure that transportation impacts are minimized. Traffic management measures, including use of police details, temporary roadway closures and detours and temporary lane closures or shifts, would be required regardless of the route selected. The following additional factors were considered when comparing the potential construction impacts between these two routes:

- Number and size of pedestrian crossings affected;
- Dedicated bicycle facility impacts and multi-use pathways;
- On-street parking impacts;
- Need for roadway closure & detour and availability of detour routes; and
- Width of roadway from curb to curb (usable space).

By using the HDD crossing of the Charles River and Magazine Beach onto the presently undeveloped MassDOT Allston Multimodal Project site, the Preferred Route B2A East avoids work on the River Street Bridge and adjacent I-90 ramps and about 0.5 miles less work on Memorial Drive and about 0.4 miles less work on Cambridge Street. These impacts are not avoided with the Noticed Alternative Route B31 East. The HDD crossing and related off-road work is the primary differentiating factor from a multimodal traffic impact comparison perspective. Further, based on the route evaluation and scoring analysis provided in Section 4 of the Petition (see Table 4-12), the Preferred Route B2A East scored more favorably overall for this category than the Noticed Alternative Route B31 East. This was primarily due to its shorter length, less work on public roadways (including Memorial Drive, River Street Bridge, Cambridge Street, and I-90 ramps) and potential impacts to pedestrians and bicycle use during construction.

In consideration of the above, the Company determined that the Preferred Route B2A East is superior to the Noticed Alternative Route B31 East relative to this criterion.

Impact Mitigation

Upon completion of the detailed design work and prior to the start of construction, the Company will work closely with the Cities of Boston and Cambridge and state transportation agencies (MassDOT, MassDCR) to develop a TMP. The TMP will be submitted for review and approval by state and municipal authorities with jurisdiction over the impacted facility prior to construction. The Company will also closely coordinate with local officials and abutting property owners and businesses. Please refer to Section 5.8.2.1 for a description of the topics to be addressed in the TMP.

In addition, the Company will coordinate closely with MassDCR, MassDOT and Harvard regarding the HDD work proposed on Magazine Beach and the Allston Multimodal Project site, including construction setups and sequencing near the adjacent Dr. Paul Dudley White Bike Path where

work transitions from Memorial Drive. Relative to the Noticed Alternative Route B31 East, the Company will also coordinate with MassDOT and MassDCR regarding planned repairs and improvements to the River Street Bridge.

5.8.4.2 Land Use

The following table summarizes the general land uses within 100 feet of the Preferred Route B2A East and the Noticed Alternative Route B31 East. The corresponding MassGIS mapped land-use areas are depicted on Figure 5-18.

Table 5-31 Summary of MassGIS Land Use Mapping within 100 feet of the Preferred Route B2A East and Noticed Alternative Route B31 East

MassGIS Land Use Mapping	Preferred Route B2A East (acres)	Noticed Alternative Route B31 East (acres)
Commercial	5.13	10.01
Industrial	10.79	2.28
Open Land (greenspace and landscaped areas, etc.)	2.62	7.30
Residential (multi-family)	1.07	2.08
Residential (single family)	0.11	0.46
Right-of-Way (roads, railroads, sidewalk areas, etc.)	20.91	51.48
Tax-Exempt Lands (religious institutions, schools, etc.)	21.4	23.21
Unknown	3.20	3.52
Water	6.51	6.81

Preferred Route B2A East

The predominant mapped land use associated with the Preferred Route B2A East is tax exempt land totaling 21.4 acres, followed by right-of-way (20.91 acres). The right-of-way land use is associated with roadways, railroad corridors, sidewalk areas, and other developed space that is not otherwise identified by MassGIS as commercial/industrial/residential. The mapped tax-exempt land consists primarily of land owned by MassDCR or MassDOT along Memorial Drive and the Charles River Reservation as wells as MIT properties. The mapped commercial and industrial land uses total approximately 15.92 acres. These mapped land uses include the presently undeveloped MassDOT Allston Multimodal Project site and business areas near the Brighton Substation, Kendall Square area and along Memorial Drive. Mapped open land areas total approximately 2.6 acres, primarily located between I-90 and Lincoln Street in Boston. However, this estimate is a little misleading because MassGIS mapping includes certain developed land in Brighton and excludes MassDCR's Magazine Beach property (identified by MassGIS as "unknown"). The mapped residential land use associated with this route is relatively low (1.18 acres) and concentrated primarily around the Brighton Substation area.

G:\Projects2\MA\MA\5711\EFSB\Figures\MXD\5-18_Adjacent_Land_Use_Brighton_B2A_B31_20211130.mxd

Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

LEGEND

- Preferred Route B2A East (2.91-mi)
- Noticed Alternative Route B31 East (3.26-mi)
- Preferred Route B2AN Variation (2.96-mi)
- Roadway 100' Buffer

Land Use (MassGIS/NOAA, 2016)

- Commercial
- Industrial
- Residential: Single Family
- Residential: Multi-Family
- Residential: Other
- Mixed Use: Primarily Residential
- Mixed Use: Other
- Open Land
- Right-of-Way
- Tax Exempt
- Unknown
- Water

Scale 1:12,000
1 inch = 1,000 feet
0 500 1,000 Feet

Preferred Route B2A East	
Land Use	**Acres**
Commercial	5.13
Industrial	10.79
Open land	2.62
Residential: Single Family	0.11
Residential: Multi-Family	1.07
Right-of-way	20.91
Tax exempt	21.40
Unknown	3.20
Water	6.51

Noticed Alternative Route B31 East	
Land Use	**Acres**
Commercial	9.95
Industrial	2.25
Open land	6.84
Residential: Single Family	0.45
Residential: Multi-Family	2.04
Right-of-way	25.66
Tax exempt	22.81
Unknown	3.52
Water	6.80

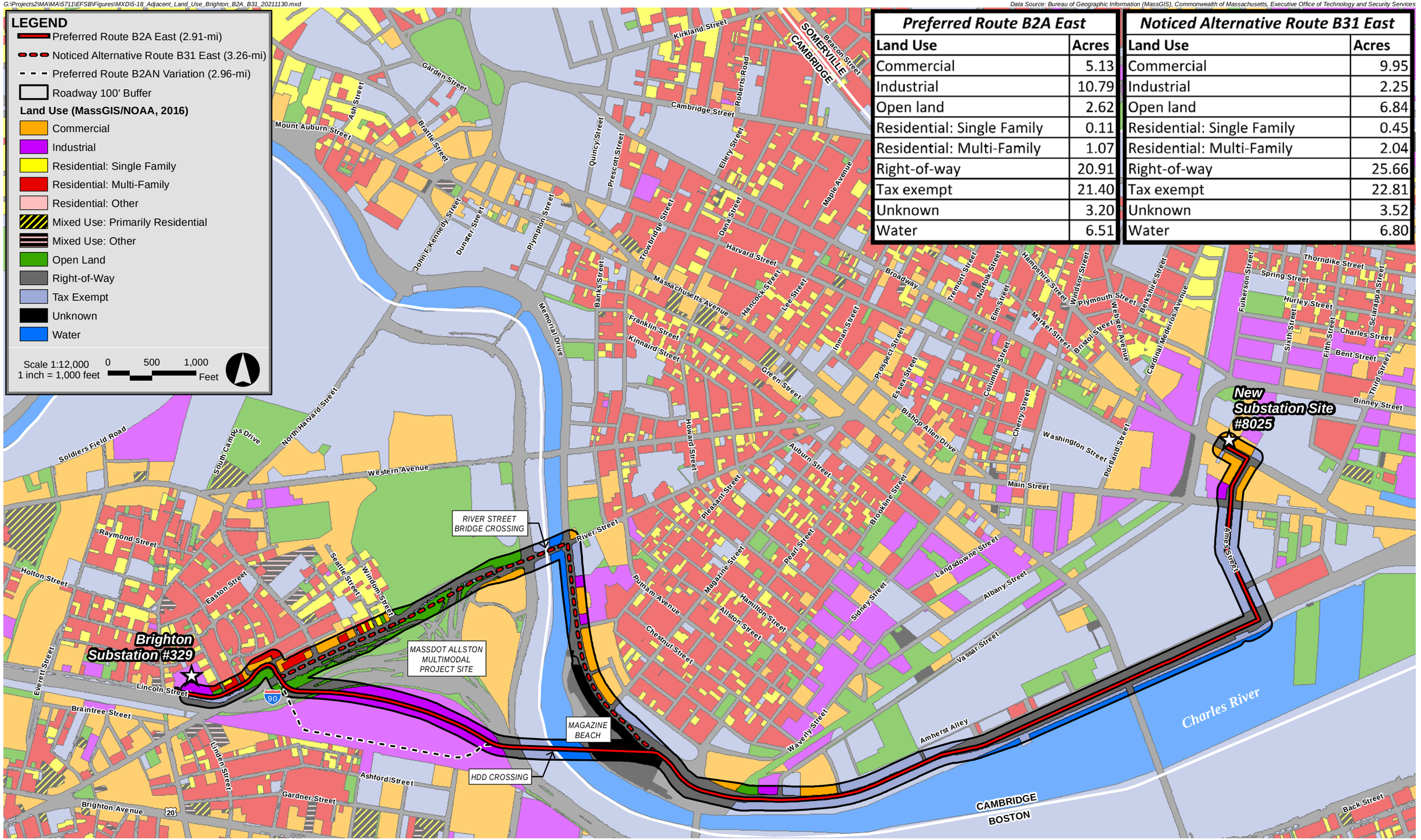

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Figure 5-18

Adjacent Land Use: Preferred Route B2A East and Noticed Alternative Route B31 East

Noticed Alternative Route B31 East

The predominant mapped land use associated with the Noticed Alternative Route B31 East is right-of-way land use (51.48 acres). This land use type is associated with roadways, railroad corridors, sidewalk areas, and other developed space that is not otherwise identified by MassGIS as commercial/industrial/residential. The areas mapped by MassGIS under this category also include a portion of the MWRA wastewater treatment facility adjacent to Magazine Beach, portions of Memorial Drive, I-90, and Cambridge Street and the Riverside Boat Club property. The next largest mapped land use type is tax-exempt land at 23.21 acres. The tax-exempt land consists primarily of land owned by MassDCR or MassDOT along Memorial Drive and the Charles River Reservation as well as MIT properties bordering Memorial Drive and Ames Street in Cambridge. It also includes the Morse Elementary School property. The mapped commercial and industrial land uses total approximately 12.29 acres. These land uses include the undeveloped business areas near the Brighton Substation and Cambridge Street in Boston, and the Kendall Square area and Memorial Drive in Cambridge. The mapped residential land use associated with this route is also relatively low (2.54 acres) and concentrated primarily around the Brighton Substation area.

Comparison of Potential Impacts

These routes share a common segment (and thus common land uses) from the New Substation site in Cambridge to MassDCR's Magazine Beach property, and again near the Brighton Substation on Lincoln Street. Where the routes diverge, the predominant mapped land use associated with the Preferred Route B2A East consists of Magazine Beach, the Charles River and MassDOT's Allston Multimodal Project site. The Preferred Route B2A East avoids and minimizes impacts to these mapped land uses by employing HDD construction beneath the Magazine Beach parcel and Charles River. The MassDOT Allston Multimodal Project site is presently undeveloped and heavily disturbed industrial land devoid of any major facilities situated between existing rail lines and major public roadways.

The predominant mapped land uses associated with the divergent section of the Noticed Alternative Route B31 East are developed areas along Memorial Drive to the River Street bridge. These developed areas include commercial and industrial areas and tax-exempt land like the Morse Elementary School property. These types of land uses are more likely to be affected during transmission line construction on Memorial Drive, the River Street Bridge and Cambridge Street when compared to the Preferred Route B2A East which avoids these properties and relies upon HDD construction to avoid and minimize impacts to the Magazine Beach recreational facility and Charles River. The Preferred Route B2A East also involves work on the undeveloped and heavily disturbed MassDOT Allston Multimodal Project site, thereby further minimizing impacts to land uses.

In consideration of the above, the Preferred Route B2A East was determined to be superior to the Noticed Alternative Route B31 East with respect to potential land use impacts.

Impact Mitigation

Neither the Preferred Route B2A East nor the Noticed Alternative Route B31 East will permanently affect adjacent land uses as the Project will be installed entirely underground. Temporary impacts to residences, businesses, and sensitive receptors (e.g., Morse Elementary School, MIT) may include traffic disruption, including road closings and construction sound. These types of temporary impacts will be minimized using proper construction BMPs, TMPs, and restricted work hours to reduce sound, traffic, and air quality impacts during construction. The Company will also coordinate closely with MassDOT and MassDCR regarding the timing of work on the Multimodal Project Site, Memorial Drive, crossings of the Dr. Paul Dudley White Bike Path, and the HDD work beneath Magazine Beach to minimize impacts to users of these facilities. As was described in Section 5.3.6.1, the Company will also restore those portions of Magazine Beach temporarily altered during construction to their preexisting condition or better following completion of the work (see also separate Article 97 discussion below for additional detail).

5.8.4.3 Sensitive Receptors

Sensitive receptors directly abutting the Preferred Route B2A East and the Noticed Alternative Route B31 East are summarized in the following table. The locations of the sensitive receptors included in the scoring analysis are depicted on Figure 4-27A provided in Section 4.

Table 5-32 Number of Sensitive Receptors Directly Abutting the Preferred Route B2A East and the Noticed Alternative Route B31 East

Sensitive Receptors	Preferred Route B2A East	Noticed Alternative Route B31 East
Police Stations	0	0
Fire Stations	0	0
Hospitals	0	0
Schools (including colleges and universities)	2	4
Nursing Homes/Elder Care Facilities	0	0
Funeral Homes	0	0
Places of Worship	0	0
Daycare Facilities	0	0
District Courts	0	0
Parks and Recreation Facilities	2	2
TOTAL	**4**	**6**

Preferred Route B2A East

The Preferred Route B2A East passes by four sensitive receptors in Cambridge, including the MIT campus and related campus facilities, Morse Elementary School, City of Cambridge public playground (Lindstrom Field), and the Loughrey Walkway and Bike Path.

Noticed Alternative Route B31 East

The Noticed Alternative Route B31 East passes by the same sensitive receptors identified above for the Preferred Route B2A East plus the Malik Academy/Al Bustan Preschool and Morse Elementary School, both on Memorial Drive.

Comparison of Potential Impacts

While both routes are generally comparable for this criterion, the Preferred Route B2A East does avoid work near the Malik/Al Bustan Pre-school located near the River Street Bridge on Memorial Drive where work would likely occur at a slower pace given the bridge crossing. Accordingly, Preferred Route B2A East was determined to be superior to the Noticed Alternative Route B31 East for this criterion.

Impact Mitigation

Depending on their location, sensitive receptors could be affected by temporary construction impacts such as traffic disruption, property access, sound, and dust. Potential mitigation measures for these types of impacts are discussed separately in the sound and multimodal transportation impacts criteria. Section 5.5.2 describes air quality mitigation measures, including dust control. Regarding site access to these properties, the Company will develop TMPs that will detail how access will be maintained. Prior to finalization of those TMPs, the Company will meet with local officials and the landowners along the route to understand their access requirements and will modify the plans, as necessary. During and after work hours, the Company will take appropriate measures to allow safe and unencumbered access to the abutting properties.

5.8.4.4 Public Shade Trees

Table 5-33 below provides a tally of the public shade trees located within the public way of the Preferred Route B2A East and Noticed Alternative Route B31 East.

Table 5-33 Number of Public Shade Trees within the Public Way to the Preferred Route B2A East and the Noticed Alternative Route B31 East

Route	Number of Public Shade Trees within the Public Way
Preferred Route B2A East	524
Noticed Alternative Route B31 East	606

Preferred Route B2A East

The Preferred Route B2A East passes by 524 public shade trees, including plantings along Broadway, Ames Street, landscaped median of Memorial Drive, along the Dr. Paul Dudley White Bike Path, Magazine Beach, and the Reid Rotary at the Boston University Bridge. Most of these plantings (351) are associated with Memorial Drive.

Noticed Alternative Route B31 East

The Noticed Alternative Route B31 East passes by 606 public shade trees, including those areas identified above for the Preferred Route B2A East plus additional trees bordering Memorial Drive to the River Street Bridge. Most of these plantings (419) are associated with Memorial Drive.

Comparison of Potential Impacts

The Company will avoid public shade tree removal to the maximum extent practicable. The Noticed Alternative Route B31 East could potentially require the removal of 2 or 3 public shade trees located near the shoulder of Cambridge Street (to be determined during detailed design). The off-road segment of the route would follow the future alignment of Cambridge Street as part of the MassDOT Allston Multimodal Project. The Preferred Route B2A East is not anticipated to require the removal of any public shade trees, but this will also be confirmed during the detailed design phase.

Because the Noticed Alternative Route B31 East contains 82 more public shade trees along the route when compared to the Preferred Route B2A East, it has greater potential for impacts to roots, limbs, and potential tree removal during construction. The Company therefore determined that the Preferred Route B2A East is superior to the Noticed Alternative Route B31 East relative to this criterion.

Impact Mitigation

The Company would implement the same practice to protect public shade trees regardless of the route selected. Please refer to Section 5.8.2.4 for a description of typical mitigation measures that would be employed by the Company to protect public shade trees during construction.

Regarding the HDD work on Magazine Beach associated with the Preferred Route B2A, the Company does not anticipate any impacts to the mature deciduous trees on this property and will work closely with MassDCR's arborists to ensure that the work is sufficiently setback from the trees to avoid impacts to roots, limbs, and branches.

5.8.4.5 Sound

As was previously described for the Putnam Study Area (see Section 5.8.2.5), the construction equipment used with underground transmission line construction is like that used during typical public works projects (e.g., road resurfacing, storm sewer installation, water line installation).

Table 5-13 in Section 5.8.2.5 includes sound levels ranging from 57 and 83 dBA from typical equipment that will be used during construction of the underground cable at a typical reference distance of 50 feet.

Preferred Route B2A East

There are approximately 311 residential units located within 50 feet of the roadways comprising the Preferred Route B2A East. There are also 4 sensitive receptors that are adjacent to this route, including the MIT campus, Morse Elementary School, City of Cambridge public playground (Lindstrom Field, and the Loughrey Walkway and Kitty Knox Bike Path.

Noticed Alternative Route B31 East

There are approximately 388 residential units located within 50 feet of the roadways comprising the Noticed Alternative Route B31 East. This route also passes by the same four sensitive receptors identified above for the Preferred Route B2A East plus the Malik Academy/Al Bustan Pre-school located on Memorial Drive in Cambridge, for a total of five sensitive receptors.

Comparison of Potential Impacts

The Noticed Alternative Route B31 East involves work near 388 residential units relative to the Preferred Route B2A East, which involves work near 311 residential units (a difference of 77 residential units). The Noticed Alternative Route also passes by one additional sensitive receptor (Malik Academy/Al Bustan Pre-School) in Cambridge.

The Preferred Route B2A East involves HDD construction on MassDCR's Magazine Beach property. The Noticed Alternative Route does not involve any HDD construction. Sound generated from the HDD equipment is generally comparable to the transmission line construction equipment, although the drilling rig exhaust is typically the loudest piece of equipment. To the maximum extent practicable, Eversource will seek to minimize sound impacts from the HDD work by conducting work on Magazine Beach during the off-season (winter months) when recreational activity on Magazine Beach is expected to be lower. The final details of the HDD work and the timing of activities on Magazine Beach will be developed in consultation with MassDCR during the Construction Access Permit review process.

In consideration of the above and recognizing that the Noticed Alternative Route B31 East has a greater potential to disrupt 77 additional residences and one additional sensitive receptor (school) from sound generated during construction, the Company determined that the Preferred Route B2A East is superior to the Noticed Alternative Route B31 East relative to the sound criterion.

Impact Mitigation

The timing and sequencing of the work will be coordinated with local and state officials to minimize potential sound impacts consistent with applicable local regulations and ordinances. As noted above, the Company will coordinate with the MassDCR regarding work hours and scheduling of HDD work on Magazine Beach to minimize sound impacts to users of this recreational facility. Sound from cable splicing operations would be minimized through use of specialized low-sound equipment such as low-sound generators, and by reducing or eliminating the use of motorized equipment during evening and overnight work. Other potential mitigation measures include working with the municipalities and state agencies to coordinate work, use of a low sound/muffled generator, and portable sound walls (temporary sound barriers) as needed, blocking the path of generators.

5.8.4.6 Subsurface Contamination

Subsurface excavation has the potential to encounter contaminated soils and/or groundwater from historical releases and/or urban/historic fill in the vicinity of the Preferred Route B2A East and the Noticed Alternative Route B31 East. A review of the MassDEP waste site list on-line database was performed to determine the potential to encounter subsurface contamination directly abutting each route.

Preferred Route B2A East

There are 6 MassDEP-listed sites directly abutting the Preferred Route B2A East, as described in Table 5-34.

Table 5-34 MassDEP-Listed Sites Directly Abutting the Preferred Route B2A East

Release Tracking Number (RTN)	Location	Description / Status
3-0004495	170 Cambridge Street, Boston	RAO Class C1; AUL date 10/23/2019
3-0015067	170 Cambridge Street, Boston	RAO Class PA; AUL date 11/30/2016
3-0027735	600 Memorial Drive, Cambridge	RAO Class TF; AUL date 12/23/2009
3-0028604	71 Amherst Street, Cambridge	RAO Class A3; AUL date 7/27/2010
3-0030413	100 Cambridge Street, Boston	PSC Class PA; AUL date 11/30/2016
3-0033330	88 Ames Street, Cambridge	Chapter 21E, Tier II

Noticed Alternative Route B31 East

There are 9 MassDEP-listed sites directly abutting the Preferred Route B31 East, as described in Table 5-35.

Table 5-35 MassDEP-Listed Sites Directly Abutting the Noticed Alternative Route B31 East

Release Tracking Number (RTN)	Location	Description / Status
3-0015067	170 Cambridge Street, Boston	RAO Class PA; AUL date 11/30/2016
3-0027735	600 Memorial Drive, Cambridge	RAO Class TF; AUL date 12/23/2009
3-0028604	71 Amherst Street, Cambridge	RAO Class A3; AUL date 7/27/2010
3-0003081	207 Magazine Street, Cambridge	RAO Class A3; AUL date 6/18/2003
3-0013868	12 Western Avenue, Boston	RAO Class A3; AUL Date 8/28/1998
3-0013933	812 Memorial Drive, Cambridge	RAO Class A3; AUL date 6/13/2002
3-0032806	820 Memorial Drive, Cambridge	PSC Class PA; AUL date 5/13/2019
3-0019635	Cambridge Street and Soldiers Field Road, Boston	Chapter 21E Tier II
3-0033330	88 Ames Street, Cambridge	Chapter 21E, Tier II

Comparison of Potential Impacts

Four of the six MassDEP-listed sites associated with the Preferred Route B2A East are also associated with the Noticed Alternative Route B31 East (RTN Nos. 3-0015067, 3-0027735, 3-0028604 and 3-0033330). Another four (RTN Nos. 3-0004494, 3-0033825, 3-0030413, and 3-0015067) are located within the MassDOT Allston Multimodal Project Site. Overall, the Preferred Route B2A East involves work near fewer MassDEP-listed sites and was determined to be superior to the Noticed Alternative Route B31 East relative to this criterion.

Impact Mitigation

If contaminated soils and/or groundwater are encountered, they will be managed pursuant to URAM provisions of the MCP. The Company will prepare a soil and groundwater management plan, and will contract with a LSP as necessitated by conditions encountered along the underground transmission line alignment, consistent with the requirements of the MCP at 310 C.M.R. 40.0460 et seq. All excess soil and groundwater will be managed in accordance with local, State and Federal regulations.

5.8.4.7 Wetland Resource Areas, Buffer Zones and Tidelands

Wetland resource areas and Chapter 91 jurisdictional areas are depicted on Figure 4-30A in Section 4 and described in further detail below.

Preferred Route B2A East

Wetland resource areas and Chapter 91 jurisdictional tidelands associated with the Preferred Route B2A East are associated with the Charles River and the HDD crossing from MassDCR's Magazine Beach property in Cambridge to MassDOT's Allston Multimodal Project site in Boston. These jurisdictional wetland resource areas include Riverfront Area (62 linear feet) and the 100-

foot Buffer Zone (6,358 linear feet) to Inland Bank, and Bordering Land Subject to Flooding (508 linear feet). Portions of Memorial Drive also contain filled tidelands subject to jurisdiction under Chapter 91 (7,038 linear feet).

Noticed Alternative Route B31 East

Wetland resource areas and Chapter 91 jurisdictional tidelands associated with the Noticed Alternative Route B31 East are associated with the Charles River. These jurisdictional wetland resource areas include Riverfront Area (410 linear feet), the 100-foot Buffer Zone (7,744 linear feet) to Inland Bank, and Bordering Land Subject to Flooding (9 linear feet). Portions of Memorial Drive also contain filled tidelands subject to jurisdiction under Chapter 91 (7,949 linear feet).

Comparison of Potential Impacts

The Preferred Route B2A East avoids and minimizes impacts to most wetland resource areas by using HDD construction to install the new transmission line beneath the Charles River and wetland resources located on either shoreline, including a freshwater Bordering Vegetated Wetland ("BVW") located along the shoreline of Magazine Beach. The HDD installation does require alterations to Land Under Water to install the transmission line beneath the Charles River; however, at its deepest point the HDD installation could be as much as 30 feet below the river bottom. The HDD entry and exit pits would be located outside the 100-foot Buffer Zone to wetland resource areas, Riverfront Area and the 100-year floodplain. Work in the 100-foot Buffer Zone (6,358 linear feet) and Chapter 91 jurisdictional tidelands (7,038 linear feet) is limited to the transmission line installation work in Memorial Drive.

The Noticed Alternative Route B31 East avoids wetland resource areas associated with the Charles River by crossing over the river on the River Street Bridge, within the roadway deck. Work in the 100-foot Buffer Zone (7,774 linear feet) and Chapter 91 jurisdictional tidelands (7,949 linear feet) is limited to the bridge crossing and transmission line installation work in Memorial Drive.

While the HDD method associated with the Preferred Route B2A East will not result in any surface impacts to wetland resource areas, it will result in a below ground alteration to Land Under Water that is otherwise avoided with the Noticed Alternative Route B31 East crossing using the River Street Bridge, within the roadway deck. Accordingly, the Company determined that the Noticed Alternative Route B31 East is superior to the Preferred Route B2A East relative to this criterion.

Impact Mitigation

As described in Section 5.3.1, to minimize the potential for erosion and sediment migration during construction, temporary erosion and sediment control measures will be installed prior to the initiation of soil disturbing activities and will be inspected regularly and maintained during construction. Erosion and sediment controls such as straw bales, silt fence, compost filter tubes and/or straw wattles and catch basin inlet protection will be installed in accordance with Eversource's BMP Manual and any applicable environmental permit requirements. These controls

will be installed between the work areas and environmentally sensitive areas, including wetlands and waterbodies associated with the Charles River.

For the HDD work associated with the Preferred Route B2A East, Eversource has prepared a preliminary IRCP that includes typical monitoring and response actions that Eversource anticipates implementing during construction to avoid or minimize impacts associated with an inadvertent return (see Appendix 5-4).

5.8.4.8 Cultural Resources

The Project is subject to review by the MHC in compliance with G.L. c. 9, §§ 26-27C, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00). The Company undertook a cultural resource investigation to identify historic and archaeological resources adjacent to the Preferred Route B2A East and the Noticed Alternative Route B31 East. The following Table 5-36 summarizes the results of the investigations.

Table 5-36 Number of Cultural Resource Sites Near the Preferred Route B2A East and the Noticed Alternative Route B31 East

Cultural Resources	Number of Cultural Resources	
	Preferred Route B2A East	Noticed Alternative Route B31 East
Inventory Points Adjacent to Route	16	20
Inventory Points Intersected by Route	3	4
Archaeological Sites within 0.25 miles of Route[127]	1	2
Archaeological Sites Intersected by Route	1	1

Preferred Route B2A East

The sixteen inventory points located adjacent to the Preferred Route B2A East include:

- Volpe Center at Broadway;
- MIT Senior House at Ames Street and Amherst Street;
- MIT President's House at Ames Street and Memorial Drive;
- MIT Walker Memorial at Memorial Drive;
- MIT Hayden Library at Memorial Drive;
- MIT Buildings #2 and #8 at Memorial Drive;

[127] The referenced archaeological sites are not described herein due to confidentiality restrictions required by the Massachusetts Historical Commission.

- MIT Engineering Laboratory at Massachusetts Avenue and Memorial Drive;
- MIT Wood Sailing Pavilion at Memorial Drive;
- MIT Underpass at Memorial Drive;
- MIT Pierce Boat House at Memorial Drive;
- Riverbank Court Hotel at 305 Memorial Drive;
- Baker House at Memorial Drive;
- BU Boat House at 619 Memorial Drive;
- William Reid Overpass at Memorial Drive;
- MDC Chlorination Plant at Memorial Drive; and
- MassDCR Magazine Beach Bath House at Memorial Drive.

The three inventory points intersected by the Preferred Route B2A East include:

- MIT Campus at Massachusetts Avenue and Memorial Drive;
- Charles River Basin Historic District; and
- Memorial Drive.

Noticed Alternative Route B31 East

The twenty inventory points located adjacent to the Noticed Alternative Route B31 East include:

- Volpe Center at Broadway;
- MIT Senior House at Ames Street and Amherst Street;
- MIT President's House at Ames Street and Memorial Drive;
- MIT Walker Memorial at Memorial Drive;
- MIT Hayden Library at Memorial Drive;
- MIT Buildings #2 and #8 at Memorial Drive;
- MIT Engineering Laboratory at Massachusetts Avenue and Memorial Drive;
- MIT Wood Sailing Pavilion at Memorial Drive;
- MIT Underpass at Memorial Drive;
- MIT Pierce Boat House at Memorial Drive;
- Riverbank Court Hotel at 305 Memorial Drive;
- Baker House at Memorial Drive;
- BU Boat House at 619 Memorial Drive;

- William Reid Overpass at Memorial Drive;
- MDC Chlorination Plant at Memorial Drive;
- MassDCR Magazine Beach Bath House at Memorial Drive;
- MDC Swimming Pool at Memorial Drive;
- Riverside Boat Club at Memorial Drive;
- Shell Sign at 187 Magazine Street; and
- B&B Chemical Company at 780 Memorial Drive.

The four inventory points intersected by the Noticed Alternative Route B31 East include:

- MIT Campus at Massachusetts Avenue and Memorial Drive;
- Charles River Basin Historic District;
- Memorial Drive; and
- River Street Bridge.

Comparison of Potential Impacts

Except for the HDD work and some limited trenching and backfilling work on the Magazine Beach property and the MassDOT Allston Multimodal Project site, the majority of the Preferred Route B2A East involves the underground installation of transmission line duct banks within the existing paved limits of roadways and sidewalks, and the potential for impacts to the cultural resources identified above is, therefore, considered low. Further, the Magazine Beach property presently contains several underground utility lines throughout its limits including MWRA water and sewer lines and drain lines (see Figure 5-19).

The Noticed Alternative Route B31 is located entirely within the existing paved limits of roadways and sidewalks except for a small stretch of off-road work from the River Street Bridge to Cambridge Street in Boston. The River Street Bridge is on the MHC's inventory list. However, the transmission line work on the River Street Bridge will likely be conducted within the roadway deck of the bridge and will not result in any alterations or modifications to the façade of the bridge. The River Street Bridge is also scheduled to be rehabbed by MassDOT and Eversource is coordinating directly with MassDOT engineers to ensure that a slot is available to accommodate

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Data Source: Utility information provided by Eversource surveyors

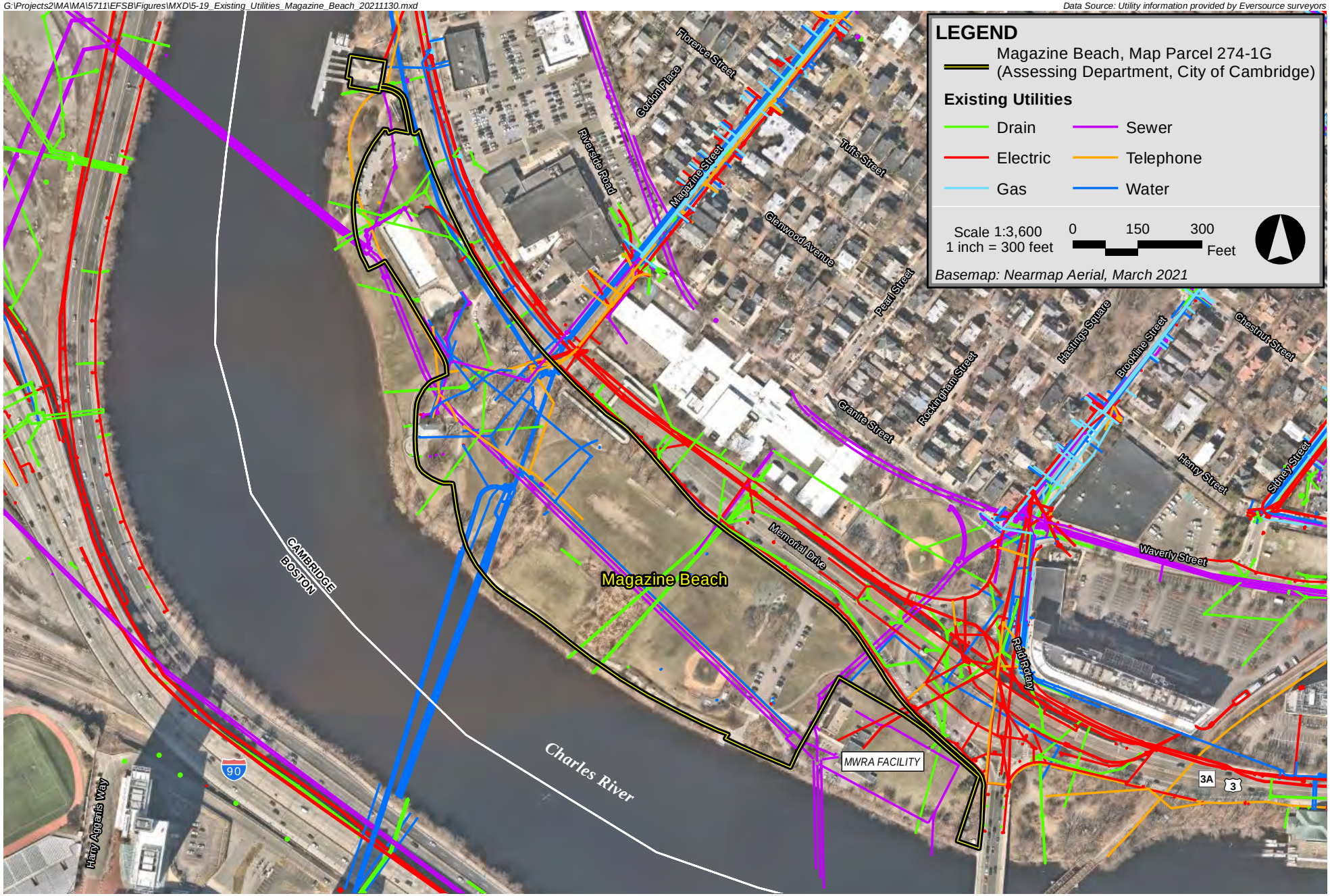

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Figure 5-19

Existing Utilities - Magazine Beach

the new transmission line relative to other existing utility infrastructure. The potential for impacts to cultural resources associated with the Noticed Alternative Route B31 East is also considered low.

While the Preferred Route B2A East passes by fewer historic properties compared to the Noticed Alternative Route B31 East, most of the work near these areas involves the underground installation of transmission line within the existing paved limits of roadways and sidewalks that will be restored to their pre-existing condition or better following construction. The key differentiator between these two routes is the off-road HDD work on Magazine Beach. While Magazine Beach has a history of disturbance from past filling and utility installation work, it nonetheless has greater potential for cultural resource impacts when compared to work in public roadways. Accordingly, the Company determined that the Noticed Alternative Route B31 East is superior to the Preferred Route B2A East relative to this criterion.

Impact Mitigation

While the need for mitigation to cultural resource impacts associated with these routes is not anticipated, the MHC will be consulted regarding a determination of the effect. Potential effects, if any, to historic and archaeological resources will be addressed with the MHC through Section 106 of the National Historic Preservation Act and the State Register Review processes.

5.8.4.9 Article 97

Preferred Route B2A East

The Preferred Route B2A East involves work on Article 97 lands (Magazine Beach) and requires an easement from MassDCR for such work (approximately 0.87 acres).

Noticed Alternative Route B31 East

The Noticed Alternative Route B31 East does not require Article 97 approval.

Comparison of Potential Impacts

Because the Noticed Alternative Route does not require Article 97 approval, the Company concludes that it is superior to the Preferred Route B2A East relative to this criterion.

Impact Mitigation

As described in Appendix 6-1, which is the Company's MEPA Environmental Notification Form ("ENF"), the proposed work associated with the Preferred Route B2A East on MassDCR's Magazine Beach property is consistent with the Article 97 Land Disposition Policy (the "Policy") and will not result in the loss of Article 97 lands under the ownership and control of the Commonwealth and its political subdivisions. In addition,

- HDD minimizes land disturbance on Magazine Beach, the athletic field, public pathways, and wetlands, and avoids the 1818 Powder Magazine building, vegetation along the banks of the Charles River, tree removal, and the Charles River.

- Adding the new transmission line duct bank will not permanently change the character of the property and the affected areas will be restored to their preexisting condition or better, in consultation with MassDCR. Further, there are already existing underground utilities present throughout the Magazine Beach property and beneath portions of the Dr. Paul Dudley White Bike Path (e.g., water, drainage, electric, sewer, etc.) (see Figure 5-19).

- The timing and schedule of the installation will be coordinated with MassDCR to ensure that impacts to users of these recreational facilities are minimized to the extent practicable. Following construction, the use of the Magazine Beach property will remain entirely consistent with its current land use, including no loss of public recreational open space or natural resources.

- Eversource has ensured that the extent of the Article 97 land disposition is minimized to that which is necessary to safely construct, operate and maintain the new transmission lines. While the size of the easement has not yet been finalized with MassDCR, for planning purposes it is estimated to be between 0.5 acre and 1 acre based on Eversource's minimum requirements to install and maintain the underground transmission line.

- Eversource anticipates addressing the "no-net loss" goal of the Policy through providing MassDCR with compensatory land of equal value. Eversource thoroughly researched and investigated the Project vicinity to identify land for an exchange. Unfortunately, there is no readily available land currently owned or available for purchase by Eversource in the Project vicinity. However, Eversource has identified seven parcels of land it owns adjacent to MassDCR properties in the western part of Massachusetts that could potentially be exchanged with the MassDCR (see Figure 5-20). The MassDCR's review of these parcels is ongoing, as well as other potentially suitable parcels not yet identified by Eversource or MassDCR. Please refer to the MEPA ENF provided in Appendix 6-1 for additional detail.

- Eversource and MassDCR have also had preliminary discussions regarding other mitigation opportunities that could potentially be implemented at Magazine Beach, including but not limited proposed improvements to the recreational facilities (athletic fields, pool area, spray deck, bike path, etc.). Eversource is committed to working with the MassDCR to identify and implement a meaningful mitigation package in exchange for the easement rights and to comply with the no-net loss goal of the Policy.

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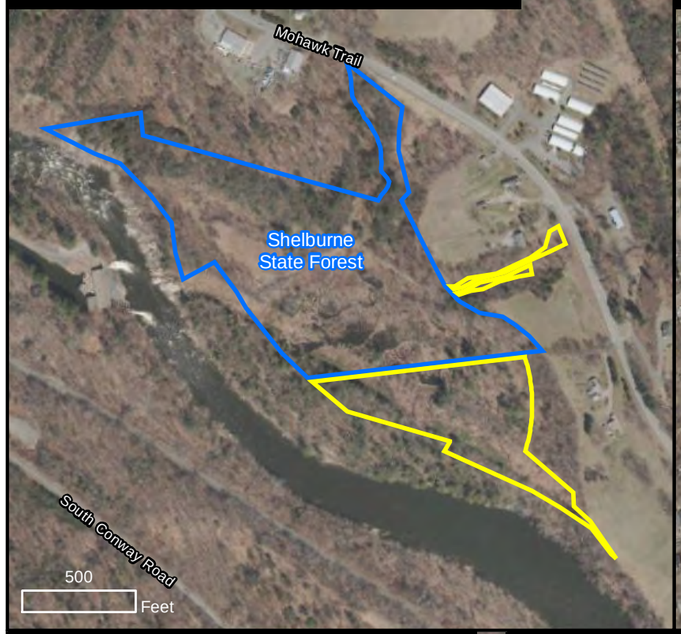
Data Source: Bureau of Geographic Information (MassGIS), Commonwealth of Massachusetts, Executive Office of Technology and Security Services

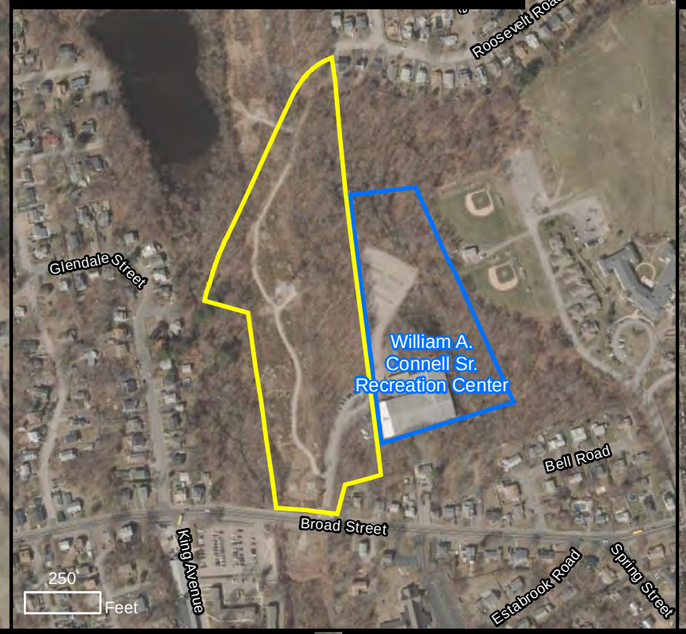
Potential Land Exchange Parcel 1

Eversource parcels (9.06 acres):
0 Mohawk Trail, Shelburne, MA 01370
DCR parcel (28.75 acres):
Shelburne State Forest



Potential Land Exchange Parcel 2

Eversource parcel (9.8 acres):
0 Broad Street, Weymouth, MA 02188
DCR parcel (6.49 acres):
William A. Connell Sr. Recreation Center

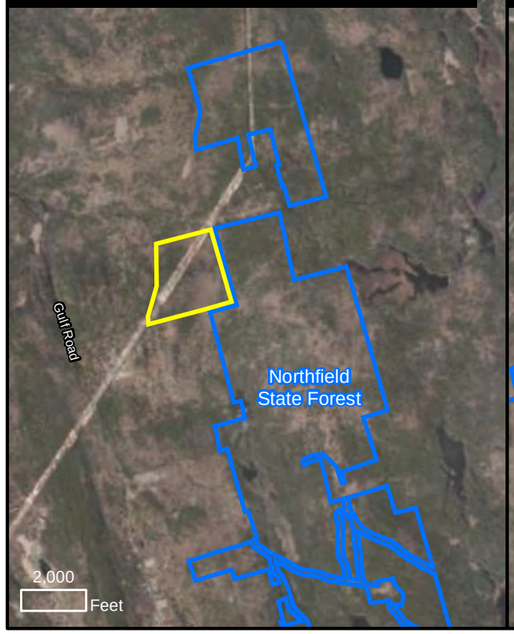


Potential Land Exchange Parcel 3

Eversource parcel (28.76 acres):
0 N. Quincy Street, Brockton, MA 02031
DCR parcel (556.88 acres):
Ames Nowell State Park

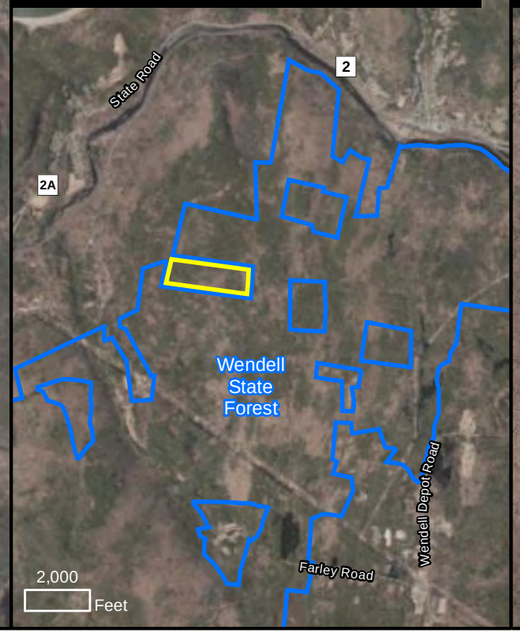
Potential Land Exchange Parcel 4

Eversource parcel (127.94 acres):
0 Gulf Road, Northfield, MA 01360
DCR parcel (909 acres):
Northfield State Forest



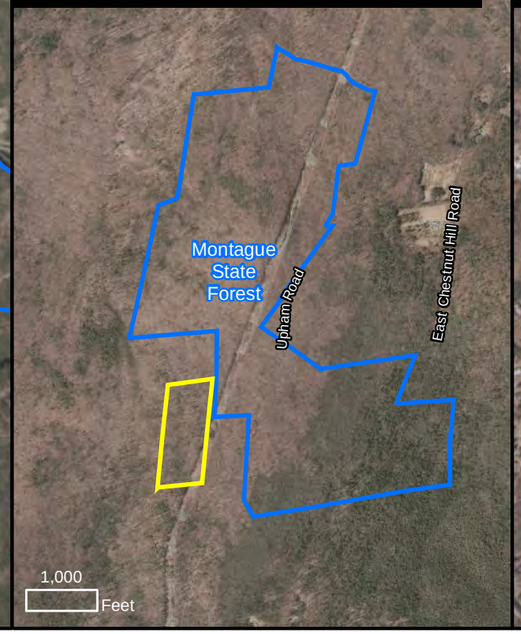
Potential Land Exchange Parcel 5

Eversource parcel (51.25 acres):
0 Thompson Road, Wendell, MA 01379
DCR parcel (6571 acres):
Wendell State Forest



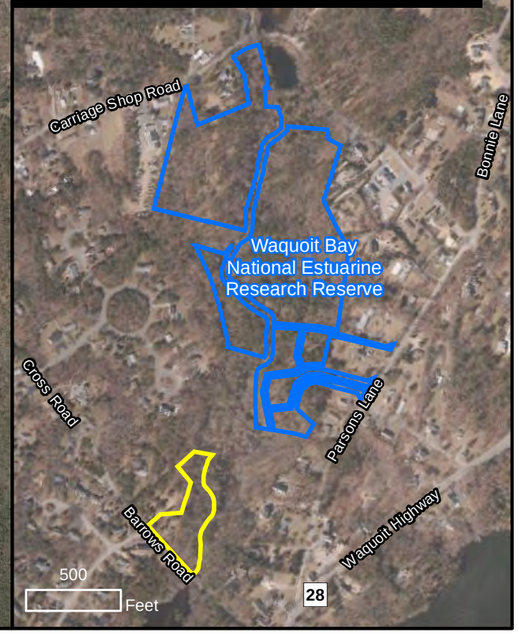
Potential Land Exchange Parcel 6

Eversource parcel (26.91 acres):
Rear E. Chestnut Hill Road, Montague, MA 01376
DCR parcel (342.42 acres):
Montague State Forest



Potential Land Exchange Parcel 7

Eversource parcel (3.58 acres):
0 Barrows Road, Falmouth, MA 02536
DCR parcel (27.14 acres):
Waquoit Bay National Estuarine Research Reserve



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- Eversource Parcel
- DCR Parcel

Figure 5-20
Potential Article 97 Land Swap Parcels

5.8.4.10 Summary of Environmental Impacts

Table 5-37 below provides a comparison of the routes based on the criteria evaluated. Overall, the Preferred Route B2A East was determined to be superior to the Noticed Alternative Route B31 East on six criteria: transportation impacts, land use, sensitive receptors, public shade trees, sound, and subsurface contamination. The Noticed Alternative Route B31 East was determined to be superior to the Preferred Route B2A East on three criteria: wetlands, cultural resources, and Article 97. Therefore, based on this environmental impact assessment, the Preferred Route B2A East is superior to the Noticed Alternative Route B31 East. Most of the environmental impacts associated with construction of the underground transmission line are temporary and can be minimized using the proposed mitigation measures.

Table 5-37 Comparison of the Preferred Route B2A East and the Noticed Alternative Route B31 East

Evaluation Criteria	Preferred Route B2A East	Noticed Alternative Route B31 East
Transportation Impacts	+	-
Land Use	+	-
Sensitive Receptors	+	-
Public Shade Trees	+	-
Sound	+	-
Subsurface Contamination	+	-
Wetland Resource Areas, Buffer Zones and Tidelands	-	+
Cultural Resources	-	+
Article 97	-	+
NOTES: + Indicates less potential for impact, which means superior for use. - Indicates more potential for impact, which means inferior for use. = Indicates comparable impacts.		

5.8.4.11 Comparison of Costs

The planning grade cost estimates (-25%/+25%) of the Preferred Route B2A East and the Noticed Alternative Route B31 East are provided below in Table 5-38.

Table 5-38 Cost Estimate for the Preferred Route B2A East and the Noticed Alternative Route B31 East

Route	Cost ($ millions)
Preferred Route B2A East	$194.0
Noticed Alternative Route B31 East	$199.6

5.8.4.12 Comparison of Reliability

The Preferred Route B2A East and the Noticed Alternative Route B31 East are each reliable means for providing a transmission line connection between the New Substation and the existing Brighton Substation.

5.8.4.13 Overall Comparison

Overall, the Preferred Route B2A East was determined to be superior to the Noticed Alternative Route B31 East on most of the environmental criteria analyzed.

The Preferred Route B2A East was determined to be superior to the Noticed Alternative Route B31 East based on cost (it is approximately $6 million dollars less expensive to construct).

Both routes are reliable means for providing a transmission line connection between the New Substation and existing Brighton Substation.

The Company will work closely with the City of Cambridge, City of Boston, state agencies, abutters to the Project and area neighborhoods to ensure that temporary construction impacts are minimized, and that the new transmission line is installed in the least impactful way possible.

5.8.5 Brighton Routes (West)

5.8.5.1 Transportation Impacts

To compare potential transportation impacts during construction of the Preferred Route B29F West (River Street Bridge) and the Noticed Alternative Route B30 West (Anderson Street Bridge), the Company reviewed existing traffic and parking conditions, roadway widths, travel lanes, bicycle lanes, pedestrian use, and the presence of public transit service along each route, as well as the options for general traffic mitigation along each route.

Preferred Route B29F West (River Street Bridge)

The total length of the Preferred Route B29F West is approximately 3 miles, most of which is located within public roads in Cambridge (Broadway, Galileo Galilei Way, Vassar Street, Waverly Street, Brookline Street, Memorial Drive and River Street Bridge) and Boston (Cambridge Street, Lincoln Street). Portions of the route are located off-road where the route crosses over the Grand Junction Railroad between Vassar Street and Waverly Street and a short segment (about 500 feet) west of the River Street Bridge crossing where the route transitions onto Cambridge Street in Boston.

Heading west from the New Substation Site in Cambridge, the Preferred Route B29F West follows Broadway for about 300 feet before turning south onto Galileo Galilei Way. In this location, Broadway accommodates two-way traffic and is between 55-feet and 70-feet wide depending on

location (including bike lanes and on-street parking). There are dedicated bike lanes and sidewalks on both sides of the road. There is on-street parking on the south side of the road. MassDOT's functional classification of Broadway is urban principal arterial roadway.

The route continues along Galileo Galilei Way for about 750 feet until it crosses Main Street (and the MBTA Red Line Subway tunnel beneath it) and transitions onto Vassar Street. This segment of Galileo Galilei Way is approximately 26-feet wide in each direction separated by a planted median (approximate 65-foot total width), accommodating two lanes of traffic in each direction, sidewalks on both sides and a dedicated bike lane on one side. There is no on-street parking. There are pedestrian crossings at Main Street. MassDOT's functional classification of Galileo Galilei Way is as an urban collector.

The route then follows Vassar Street for about 5,000 feet before turning northwest across the Grand Junction Railroad tracks. Vassar Street is about 22 to 24-feet wide along this stretch, accommodating two lanes of traffic, sidewalks on both sides and bicycle lanes/cycle tracks on both sides of the road. There are pedestrian crossings at the Galileo Galilei Way intersection and the Massachusetts Avenue intersection and several locations along Vassar Street. MassDOT's functional classification of Vassar Street is as an urban minor arterial.

From Vassar Street, the route turns northwest across a parcel of land owned by MIT and the MassDOT Rail, under the Grand Junction Railroad tracks using a trenchless construction technique onto the parking lot of a second parcel of land owned by MIT and eventually Waverly Street. Waverly Street is approximately 30-feet wide, accommodating one lane of traffic (one way street) for a portion of the route, sidewalks on both sides, and a bicycle lane on the southwest side. There are four pedestrian crossings up to the point when Waverly Street transitions to Brookline Street. MassDOT's functional classification of Waverly Street is as an urban minor arterial.

The route then follows Brookline Street for approximately 250 feet to the Reid Rotary and Memorial Drive. Brookline Street is about 30-feet wide with a landscaped median in the middle. It contains several lanes of traffic turning onto and from the Reid Rotary at Memorial Drive. Brookline Street has sidewalks on both sides and pedestrian crossings at the Waverly Street and Granite Street intersection. The Morse Elementary School is located just west of Brookline Street on Granite Street. There are marked bicycle lanes on Brookline Street. MassDOT's functional classification of Brookline Street is an urban principal arterial.

From the Reid Rotary, the route follows Memorial Drive for about 3,100 feet to the River Street Bridge. Memorial Drive's width varies but in general it ranges from 22 feet at its narrowest point to 40 feet at its widest point (just west of the Reid Rotary). This stretch of Memorial Drive is comprised of 4 lanes accommodating two-way traffic. There are sidewalks and multi-use pathways on both sides of the road. Pedestrian crosswalks exist in a few locations near Magazine Street, Pleasant Street Extension, and River Street. There is also a pedestrian bridge/walkway that spans Memorial Drive from MassDCR's Magazine Beach property. The Dr. Paul Dudley White Bike Path is located on the south side. Memorial Drive is classified by MassDOT as an urban principal arterial roadway.

The River Street Bridge is approximately 35 feet wide, comprised of three lanes, with sidewalks on both sides. The River Street Bridge is classified by MassDOT as an urban principal roadway.

After crossing over the Charles River via the River Street Bridge, the route follows Cambridge Street and crosses over the I-90 ramps. Cambridge Street varies in width but is about 34-feet to 70-feet wide along the route segment. Cambridge Street has several lanes of two-way traffic separated by a median, sidewalks on both sides and dedicated bike lanes and multi-use pathways. Cambridge Street is classified by MassDOT as an urban principal arterial roadway.

The Lincoln Street segment is about 26-feet wide. Lincoln Street accommodates two-way traffic and has sidewalks on both sides. Lincoln Street does not have any dedicated bike lanes. There are pedestrian crosswalks present at the Cambridge Street intersection and where the road approaches Mansfield Street. Lincoln Street is classified by MassDOT as an urban collector roadway.

Local public transit opportunities along and/or near the Preferred Route B29F West in Cambridge and Boston includes MBTA bus routes 47, 64, 68, 70, and 503. There is also the MBTA Red Line Subway tunnel where the route crosses over Main Street from Galileo Galilei Way in Cambridge. Except for Memorial Drive, there are MBTA bus stops located in several locations along the route. The TMA EZRide Shuttle Route operates along Broadway, Ames Street, and portions of Memorial Drive in Cambridge.

Table 5-39 Description of Road Segments Along the Preferred Route B29F West

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Broadway	55 to 70	• Sidewalks on both sides • Limited on-street parking on one side • Median present in front of New Substation Site • Dedicated Bike Lanes on both sides	Yes	336
Galileo Galilei Way	26 to 65	• Sidewalks on both sides • Median between bounds • Dedicated Bike Lane on one side	Yes	152
Vassar Street	22 to 24	• Sidewalks on both sides • Bicycle lanes/cycle tracks on both sides • On-street parking on north side for much of its length, on-street parking on south side as it approaches Memorial Drive	Yes	480

Table 5-39 Description of Road Segments Along the Preferred Route B29F West (Continued)

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
MIT Parcels and Grand Junction Railroad Crossing	N/A	N/A	N/A	N/A
Waverly Street	30	• Sidewalks on both sides • Bicycle lane on one side	No	326
Brookline Street	30	• Sidewalks on both sides • Bicycle lanes on both sides	No	463
Memorial Drive	22 to 40	• Sidewalks on both sides • Dr. Paul Dudley White Bike Path on east bound side	Yes	400, 1833, 1833[128]
River Street Bridge	35	• Sidewalks on both sides • Limited on-street parking on one side • Multi-use path crossing	Yes	1337
Cambridge Street	34 to 70	• Sidewalks on both sides • Median between bounds • Multi-use path, cycle track, bike lanes	Yes	1874, 2327[129]
Lincoln Street	26	• Sidewalks on both sides • Limited on-street parking on one side	No	366

Noticed Alternative Route B30 West

The total length of the Noticed Alternative Route B30 West is approximately 3.43 miles, all of which is located within public roads in Cambridge (Broadway, Prospect Street, Western Avenue, Green Street, Putnam Avenue, Mt. Auburn Street, JFK Street, and the Anderson Bridge) and Boston (North Harvard Street, Franklin Street, and Lincoln Street).

Heading west from the New Substation Site in Cambridge, the Noticed Alternative Route B30 West follows Broadway for about 4,000 feet to Prospect Street. This segment of Broadway ranges from 32 to 70-feet wide. There are dedicated bike lanes and sidewalks on both sides of

[128] ATR data was collected from three locations on Memorial Drive, including: Brookline Street to Magazine Street, Magazine Street to Pleasant Street, Pleasant Street to River Street.

[129] ATR data was collected from two locations on Cambridge Street, including: Windom Street to North Harvard Street and North Harvard Street to Lincoln Street.

the road. There is on-street parking on both sides of Broadway for much of its length. There are numerous pedestrian crossings along Broadway, including at all major intersections. MassDOT's functional classification of Broadway is urban principal arterial roadway.

From Broadway, the route turns south onto Prospect Street for approximately 1,600 feet. Prospect Street is about 32-feet wide. There are no dedicated bike lanes on this segment of Prospect Street, however, there are sidewalks on both sides of the road. There is no on-street parking. There are numerous pedestrian crossings along Prospect Street, including at all major intersections. MassDOT's functional classification of Prospect Street is urban principal arterial.

The route then crosses through the Massachusetts Avenue intersection onto Western Avenue for about 200 feet before turning towards the northwest onto Green Street. Green Street is approximately 20-feet wide and a one-way street up to its intersection with Putnam Avenue. There are no dedicated bike lanes on this segment of Green Street, however, there are sidewalks on both sides of the road. There is on-street parking along one side of the road. There are numerous pedestrian crossings along Green Street, including at all major intersections. MassDOT's functional classification of Prospect Street is local roadway.

From Green Street, the route turns north onto Putnam Avenue for a short stretch (about 250 feet). This segment of Putnam Avenue is about 24-feet wide. Putnam avenue accommodates two-way traffic. There are no dedicated bike lanes on Putnam Avenue, however, there are sidewalks on both sides of the road. There is on-street parking in select locations along both sides of the road. There are pedestrian crossings at the two major intersections (Green Street and Mt. Auburn Street). MassDOT's functional classification of Putnam Avenue is local roadway.

The route then turns west onto Mt. Auburn Street for approximately 2,100 feet until its intersection with JFK Street. Mt. Auburn Street is a one-way street approximately 24-feet wide. There is on-street parking on one side of the road. There are sidewalks on both sides of the road and a dedicated bike lane on the southwest side. There are pedestrian crossings at all major intersections. MassDOT's functional classification of Mt. Auburn Street is urban principal arterial.

From Mt. Auburn Street, the route turns south onto JFK Street for approximately 1,800 feet to Memorial Drive and the Anderson Bridge. This segment of JFK Street is approximately 36-feet wide and is a one-way street. It has sidewalks and on-street parking on both sides of the road and dedicated bike lanes. There are pedestrian crosswalks at all major intersections. MassDOT's functional classification of JFK Street is urban principal arterial.

The route crosses over the Charles River via the Anderson Bridge. The Anderson Bridge is under the jurisdiction of MassDOT but the roadways leading to it from Memorial Drive and Soldiers Field Road are under the jurisdiction of the MassDCR. The Anderson Bridge roadway deck is about 40-feet wide with sidewalks and dedicated bike lanes on both sides. The Dr. Paul Dudley White Bike Path crosses over the bridge along Soldiers Field Road.

From the Anderson Bridge, the route follows North Harvard Street in Boston for approximately 3,200 feet to Franklin Street. North Harvard Street is approximately 40-feet wide and accommodates two-way traffic. It has sidewalks and areas of on-street parking on both sides of the road. There are dedicated bike lanes primarily on the west side of the road. There are pedestrian crossings at all major intersections. MassDOT's functional classification of North Harvard Street is urban minor arterial.

The route then turns southwest from North Harvard Street onto Franklin Street for about 2,100 feet. Franklin Street is approximately 22-feet wide and accommodates two-way traffic. It has sidewalks and sharrow bike lane markings on both sides of the road. There is on-street parking in select locations on one side of the road. There are also pedestrian crossings at all major intersections. MassDOT's functional classification of Franklin Street is local road.

From Franklin Street, the route turns east onto Lincoln Street for about 300 feet before terminating that the Brighton Substation. Lincoln Street is approximately 24-feet wide in this location and has sidewalks on both sides. There is no on-street parking or bike lanes along this segment of Lincoln Street. However, there is a pedestrian bridge that spans I-90 to the south, across the street from the Brighton Substation. There are pedestrian crossings where Lincoln Street intersects Franklin Street. MassDOT's functional classification of Lincoln Street is local road.

Local public transit opportunities along and/or near the Noticed Alternative Route B30 West in Cambridge and Boston includes MBTA bus routes 01, 64, 66, 68, 70, 85, 86, and 91. There is also the MBTA Red Line Subway tunnel where the route crosses over Main Street from Prospect Street in Cambridge. Except for a few local street segments (Franklin Street, Lincoln Street, Green Street), there are MBTA bus stops located in several locations along the route. The TMA EZRide Shuttle Route operates along Broadway in Cambridge.

Table 5-40 Description of Road Segments Along the Noticed Alternative Route B30 West

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Broadway	32 to 70	• Sidewalks on both sides • Median present in front of New Substation Site	Yes	818
Prospect Street	32	• Sidewalks on both sides	Yes	955
Western Avenue	20	• Sidewalks on both sides • Bicycle Lanes on both sides	Yes	940
Green Street	20	• Sidewalks on both sides • On-street parking on both sides	No	79
Putnam Avenue	24	• Sidewalks on both sides • On-street parking	No	379

Table 5-40 Description of Road Segments Along the Noticed Alternative Route B30 West (Continued)

Segment	Approximate Average Road Width (feet)	Extent of Sidewalks, Bike Lanes and On-Street Parking	Public Transportation Route?	Automatic Traffic Recorder (ATR) Hourly Total Vehicular Volume
Mt. Auburn Street	24	• Sidewalks on both sides • On-street parking • Bike lane on one side	Yes	443
JFK Street (including Anderson Bridge)	36	• Sidewalks on both sides • On-street parking (JFK Street only) • Bike lanes on both sides	Yes	924
North Harvard Street	40	• Sidewalks on both sides • On-street parking • Bike lanes on one side	Yes	1024
Franklin Street	22	• Sidewalks on both sides • Sharrow bike lane markings • On-street parking on one side	No	105
Lincoln Street	24	• Sidewalks on both sides	No	366

Comparison of Potential Impacts

Each of the Routes would require implementation of TMPs and close coordination with the City of Cambridge, City of Boston, MassDOT and MassDCR, to ensure that transportation impacts are minimized. Traffic management measures, including use of police details, temporary roadway closures and detours and temporary lane closures or shifts, would be required regardless of the route selected. The following additional factors were considered when comparing the potential construction impacts between these two routes:

- Number and size of pedestrian crossings impacted;
- Dedicated bicycle facility impacts and multi-use pathways;
- On-street parking impacts;
- Need for roadway closure & detour and availability of detour routes; and
- Width of roadway from curb to curb (usable space).

The Noticed Alternative Route B30 West is almost a half-mile longer than the Preferred Route B29F West and will potentially cause more transportation impacts during construction when compared to the Preferred Route B29F West. These potential impacts include work within or adjacent to nearly twice as many marked bicycle lanes (6.4 miles versus 3.4 miles (both sides of roads)), work on more streets with marked bicycle lanes (6 versus 5), nearly three times as many intersection crossings (68 vs. 24), more than twice as many pedestrian crossing areas (65 versus 31) and more work on streets that function as public bus routes (7 streets vs. 6).

In consideration of the above, the Company determined that the Preferred Route B29F West is superior to the Noticed Alternative Route B30 West relative to this criterion.

Impact Mitigation

- Upon completion of the detailed design work and prior to the start of construction, the Company will work closely with the Cities of Cambridge and Boston and state transportation agencies (MassDOT, MassDCR) to develop TMP's. The TMP will be submitted for review and approval by municipal and state authorities with jurisdiction over the impacted facility prior to construction. The Company will also closely coordinate with local officials and abutting property owners and businesses. Please refer to Section 5.8.2.1 for a description of the topics to be addressed in the TMP.

5.8.5.2 Land Use

The following table summarizes the general land uses mapped within 100 feet of the Preferred Route B29F West (River Street Bridge) and the Noticed Alternative Route B30 West (Anderson Bridge). The corresponding MassGIS mapped land-use areas are depicted on Figure 5-21.

Table 5-41 Summary of MassGIS Land Use Mapping within 100 feet of the Brighton Route B29F West and the Noticed Alternative Route B30 West

MassGIS Land Use Mapping	Preferred Route B29F West (acres)	Noticed Alternative Route B30 West (acres)
Commercial	11.33	19.42
Industrial	4.87	3.56
Open land	10.30	4.63
Residential (multi-family)	2.28	17.33
Residential (single family)	0.45	4.06
Right-of-way	13.57	12.97
Tax exempt	24.28	18.63
Unknown	5.18	0.15
Water	1.90	0.62
Mixed use (other)	--	0.74
Mixed use (primarily residential)	--	2.05

Preferred Route B29F West

The predominant mapped land use associated with the Preferred Route B29F West is tax exempt land totaling 24.28 acres, followed by commercial/industrial (16.20 acres) and right-of-way (13.57 acres). The mapped commercial and industrial land uses land uses include business areas near the New Substation and Kendall Square area, along Memorial Drive and Vassar Street, and along