

<p><b>DOCKET NO. 483</b> - The United Illuminating Company application for a Certificate of Environmental Compatibility and Public Need for the Pequonnock Substation Rebuild Project that entails construction, maintenance, and operation of a 115/13.8-kilovolt (kV) gas insulated replacement substation facility located 700 feet southwest of UI's existing Pequonnock substation on an approximately 3.7 acre parcel owned by PSEG Power Connecticut, LLC at 1 Kiefer Street, Bridgeport, Connecticut, and related transmission structure and interconnection improvements.</p>	<p>} Connecticut          } Siting          } Council          October 11, 2018</p>
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**Findings of Fact**

**Introduction**

1. The United Illuminating Company (UI or Applicant), in accordance with provisions of Connecticut General Statutes (CGS) Sections 16-50g et seq., and Section 16-50j-1 et seq. of the Regulations of Connecticut State Agencies (RCSA), applied to the Connecticut Siting Council (Council) on April 26, 2018 for the construction, maintenance, and operation of a replacement 115/13.8 kilovolt (kV) gas insulated substation at 1 Kiefer Street, Bridgeport, Connecticut. (UI 1, p. FR-1)
2. UI provides electrical distribution service to the following municipalities in Connecticut: Ansonia, Bridgeport, Derby, East Haven, Easton, Fairfield, Hamden, Milford, New Haven, North Branford, North Haven, Orange, Shelton, Stratford, Trumbull, West Haven, and Woodbridge. (UI 3, response 3)
3. The proposed replacement substation would replace UI's existing 115-kV/13.8-kV air-insulated Pequonnock Substation, which is located on a 1.5-acre property at 1 Atlantic Street, Bridgeport. (UI 1, pp. ES-1 and ES-2)
4. The purpose of the proposed replacement substation facility is to mitigate coastal flood risks and asset condition issues at the existing Pequonnock Substation and to improve the reliability of service to customers in the Bridgeport area (service area) and to the New England power grid. (UI 1, p. FR-1)
5. The party in this proceeding is the Applicant. The intervenor in this proceeding is PSEG Power Connecticut LLC. (Transcript 1 – June 14, 2018, at 3:00 p.m. [Tr. 1], p. 5)
6. Pursuant to CGS § 16-50(b), public notice of the filing of the application to the Council was published in the Connecticut Post on April 12, 2018 and April 16, 2018. (UI 1, Tab H – Formal Requirements)
7. Pursuant to CGS § 16-50(b), notice of the application was provided to all abutting property owners by certified mail on or about April 9, 2018. Return receipts were received from 10 of the 13 abutters. Notice was unclaimed by three abutters: Parkside Properties LLC; ESM Holdings LLC; and Housing Authority of the City of Bridgeport. However, UI confirmed via the tracking numbers that notice was delivered to these three abutters. (UI 1, Tab H – Formal Requirements; UI 3, response 1)
8. In accordance with the Council's Application Guide for an Electric Substation Facility, UI provided notice to a number of area community groups including, but not limited to, land trusts, environmental groups, historic preservation groups, advocacy groups for the protection of Long Island Sound (LIS), and a local water company. (UI 1, Tab H – Formal Requirements)
9. UI provided notice to all federal, state and local officials and agencies listed in CGS § 16-50(b). (UI 1, Tab H – Formal Requirements)

### **Procedural Matters**

10. On April 27, 2018, the Council sent a letter to the State Treasurer, with a copy to the Chief Elected Official of the City of Bridgeport (City) stating that \$25,000 was received from UI and deposited in the Office of State Treasurer's Municipal Participation Account for use by the City to apply for a portion of the funds if they became a participant in the proceeding, pursuant to CGS § 16-50bb. (Record)
11. During a regular Council meeting on May 10, 2018, the application was deemed complete pursuant to RCSA §16-50/-1a and the public hearing schedule was approved by the Council. (Record)
12. Pursuant to CGS §16-50m, the Council published legal notice of the date and time of the public hearing in the The Connecticut Post on May 15, 2018. (Record)
13. Pursuant to CGS § 16-50m, on May 11, 2018, the Council sent a letter to the City to provide notification of the scheduled public hearing and to invite the municipality to participate in the proceeding. (Record)
14. On May 22, 2018, the Council held a pre-hearing teleconference on procedural matters for parties and intervenors to discuss the requirements for pre-filed testimony, exhibit lists, administrative notice lists, expected witness lists, filing of pre-hearing interrogatories and the logistics of the public inspection of the site scheduled for June 14, 2018, at the office of the Council. The Applicant was the only participant. (Council Pre-hearing Conference Memoranda dated May 15, 2018 and May 22, 2018)
15. In compliance with RCSA §16-50j-21, UI erected three signs in the vicinity of the proposed replacement substation. One sign was located near the intersection of Kiefer Street and Singer Avenue, and two signs were located along Ferry Access Road. The signs included the Applicant's name, type of facility proposed, the date and location of the Council's public hearing, and contact information for the Council. (UI 2)
16. The Council and its staff made a public inspection of the proposed site on June 14, 2018, beginning at 2:00 p.m. (Council's Hearing Notice dated May 11, 2018)
17. Pursuant to CGS § 16-50m, the Council, after giving due notice thereof, held a public hearing on June 14, 2018, beginning with an evidentiary session at 3:00 p.m. and continuing with a public comment session at 6:30 p.m. at the Bridgeport City Hall, Council Chambers, 45 Lyon Terrace, Bridgeport, Connecticut. (Tr. 1, p. 1; Transcript 2 – June 14, 2018, at 6:30 p.m. [Tr. 2], p. 1)
18. The Council continued the public evidentiary hearing session on July 24, 2018 at the office of the Council at 10 Franklin Square, New Britain, Connecticut. (Transcript 3 – July 24, 2018, at 1:02 p.m. [Tr. 3], p. 1)

### **Municipal Consultation and Community Outreach**

19. UI provided project introduction information to the City on March 20, 2017. UI provided a project update to the City on January 17, 2018. (UI 1, Tab H – Outreach Log)
20. On February 22, 2018, UI submitted a technical report to the City to commence the municipal consultation process. (UI 1, p. ES-7 and Tab H – Outreach Log; UI 1g – Municipal Consultation Filing)
21. On April 12, 2018, UI attended the Bridgeport's South End Neighborhood Revitalization Zone (SENRZ) Community Meeting to review the proposed project and accept input. At that meeting, UI received many questions. UI responded to all of the SENRZ questions on May 23, 2018. (UI 1, p. ES-8 and Tab H – April 12, 2018 Meeting Notice; Tr. 1, p. 15)

22. UI met with the City on April 16, 2018. By letter dated April 17, 2018, Mayor Ganim expressed his support for the proposed replacement substation project. Mayor Ganim notes that the proposed project would be an extension of the efforts to protect the Connecticut electric grid from outages due to coastal flooding and storm damage and to implement upgrades to the bulk electric system in general. Mayor Ganim notes that the proposed project would protect the electric system and provide benefits to residents and businesses in Bridgeport. (UI 1, Tab H – Letter from City dated April 17, 2018 and Outreach Log)
23. At the June 14, 2018 public hearing, Bill Coleman, Deputy Director for the City’s Office of Planning and Economic Development, expressed support for the proposed project, noted that the project is compatible with the City’s overall efforts to make itself more storm resilient, and noted that UI’s progressive approach (with regard to the substation) is appreciated. (Tr. 1, pp. 13-14)

#### **State Agency Comment**

24. Pursuant to C.G.S. § 16-50j (g), on May 11, 2018, the following State agencies were solicited by the Council to submit written comments regarding the proposed facility: Department of Energy and Environmental Protection (DEEP); Department of Public Health (DPH); Council on Environmental Quality (CEQ); Public Utilities Regulatory Authority (PURA); Office of Policy and Management (OPM); Department of Economic and Community Development (DECD); Department of Agriculture (DOAg); Department of Transportation (DOT); Connecticut Airport Authority (CAA); Department of Emergency Services and Public Protection (DESPP); and State Historic Preservation Office (SHPO). (Record)
25. The Council received comments from DEEP on June 6, 2018 and received additional comments from DEEP on August 8, 2018. Copies of the DEEP comments are attached hereto. (DEEP Comments received June 6, 2018 and August 8, 2018)
26. The following agencies did not respond with comment on the application: DPH, CEQ, PURA, OPM, DECD, DOAg, DOT, CAA, DESPP, and SHPO. (Record)

#### **System Planning and Mandatory Reliability Standards**

27. ISO New England Inc. (ISO-NE) is the not-for-profit corporation responsible for the reliable and economical operation of New England’s electric power system. It also administers the region’s wholesale electricity markets and manages the comprehensive planning of the regional power system. The planning process includes the periodic preparation of a Regional System Plan (RSP) in accordance with the ISO’s *Open Access Transmission Tariff* (OATT) and other parts of the *Transmission, Markets, and Services Tariff* (the ISO tariff), approved by the Federal Energy Regulatory Commission (FERC). Regional System Plans meet the tariff requirements by summarizing planning activities that include the following:
  - a) Forecasts of annual energy use and peak loads (i.e., the demand for electricity) for a 10-year planning horizon and the need for resources (i.e., capacity);
  - b) Information about the amounts, locations, and characteristics of market responses (e.g., generation or demand resources or elective transmission upgrades) that can meet the defined system needs—systemwide and in specific areas; and
  - c) Descriptions of transmission projects for the region that meet the identified needs, as summarized in an RSP Project List, which includes information on project status and cost estimates and is updated several times each year.

(Council Administrative Notice Item No. 16 – 2017 Regional System Plan, p. iii)

28. New England's electric power grid has been planned and operated as a unified system of transmission owners and market participants. The New England system integrates resources with the transmission system to serve all regional load regardless of state boundaries. Most of the transmission lines are relatively short and networked as a grid. Therefore, electrical performance in one part of the system affects all areas of the system. (Council Administrative Notice Item No. 15 – 2015 Regional System Plan, pp. 25-26)
29. A rebuild or replacement of the Pequonnock Substation is not identified on the June 2018 RSP Project List. (Council Administrative Notice Item No. 17 – June 2018 RSP Project List)
30. In 2016, ISO-NE created a New England Asset-Condition Update List (ACUL) to capture all asset-condition Planning Advisory Committee presentations that occurred after May 18, 2015. ISO-NE updates the new ACUL three times per year along with its RSP Project List. (Council Administrative Notice Item No. 16 – 2017 RSP p. 80)
31. A Pequonnock Substation rebuild/replacement with a new substation adjacent to the existing one is identified on the ACUL dated June 2018 as planned UI Coastal Substation Flood Mitigation Study Project that received Proposed Plan Application/I.3.9 Approval from ISO-NE on December 28, 2016 with a projected in service date of December 2022. (Council Administrative Notice Item No. 18 – June 2018 ACUL)
32. In the 2018 Connecticut's Comprehensive Energy Strategy (2018 CES), Strategy 5 is to "continue to improve grid reliability and resiliency through state and regional efforts." This includes ensuring coastal resiliency of substations and other critical grid infrastructure to support DEEP's flood management goals. (Council Administrative Notice Item No. 51 – 2018 CES, pp. 45-48)
33. The proposed replacement Pequonnock Substation was noted in UI's 2018 Forecast of Loads and Resources Report (UI 2018 FLR). In the UI 2018 FLR, UI further noted that it had begun the process of obtaining a Certificate from the Council. (Council Administrative Notice Item No. 40, UI 2018 FLR, Tab 2)

### **Public Need**

#### **Bridgeport Area Electric System**

34. Eight 115-kV UI transmission lines (five overhead and three underground) feed the existing Pequonnock substation, which was initially placed into service in 1956 and has since undergone various modifications. This substation is connected to various distribution lines and serves the southern and western portions of the City of Bridgeport. The substation also serves emergency facilities including, but not limited to, firehouses, police stations, and hospitals. (UI 1, ES-1; Tr. 1, p. 16; Tr. 3, p. 38)
35. Four of the overhead transmission lines (Nos. 91001, 1130, 8809A, and 8909B) are aligned along the Metro-North Railroad (MNRR) corridor and are located on bonnets on top of railroad catenary structures. These lines connect the existing Pequonnock Substation to UI's Ash Creek Substation and Congress Substation, as well as to Eversource's Compo Substation. (UI 1, p. 1-4)
36. The fifth overhead line is located on PSEG property. It connects Bridgeport Harbor Unit (BHU) #3 and BHU #4 to Pequonnock Substation. BHU #3 is expected to retire by July 1, 2021 as part of a Community Environmental Benefit Agreement associated with the approved BHU #5. UI, as a transmission owner, is obligated to preserve the interconnection of existing commercially active generators (including BHU #4) when substation upgrades are performed. (UI 1, p. 1-4; UI 3, response 13; Council Administrative Notice Item No. 38, Petition No. 1218, Finding of Fact #10 and Decision and Order)

37. The three underground lines (Nos. 1710, 1697 and 1955) link the existing Pequonnock Substation UI's Trumbull Substation, Old Town Substation, and Singer Substation. The No. 1710 Line and the No. 1697 Line are both high pressure gas filled (HPGF) pipe-type cables, while the No. 1955 Line is a cross-linked polyethylene (XLPE) cable system with polyvinyl chloride (PVC) conduits encased in concrete. (UI 1, p. 1-4)

#### Existing Pequonnock Substation

38. The existing substation has asset condition issues, including settling of enclosure and yard foundations, structural concerns, inadequate space inside the control room, and no access for the emergency mobile transformer units. (UI 1, p. ES-3)
39. Evidence of uneven settling among the control enclosure's foundation is present and indicated by measurements taken within the enclosure in recent years. This settling has caused misalignment within the equipment housed in the enclosure as well as foundation and wall cracks. Also, the substation's 115-kV steel box structure has shown signs of foundation settling and twisting of steel supports causing misalignment of 115-kV disconnect switches. (UI 3, response 9)

#### UI Reliability Planning

40. Due to its elevation and proximity to Bridgeport Harbor, the existing Pequonnock Substation has been adversely affected by coastal flooding and storm damage such as from Tropical Storm Irene in August 2011 and Hurricane (Superstorm) Sandy in October 2012. (UI 1, p. 1-4)
41. During Tropical Storm Irene, the existing substation experienced flooding one to two feet above the yard elevation. (UI 1, p. 1-4)
42. During Hurricane Sandy, the existing Pequonnock Substation was preemptively de-energized\* due to the risk of catastrophic failure and associated long-term recovery issues. Water levels during that storm rose to within inches of the control room floor.

\*When the substation is de-energized, all customers (served by that substation) are without power. (UI 1, pp. ES-3 and 1-4 to 1-6; Tr. 1, p. 16)

43. Subsequently, as a short-term solution at the existing Pequonnock Substation, UI installed HESCO block flood barriers, enclosure door seals, sump pumps, additional interior cameras for flood monitoring, a backup station service generator, and a Supervisory Control and Data Acquisition (SCADA) alarm monitoring. UI also raised substation battery chargers and sealed all conduits under the substation. (UI 1, p. 1-6)
44. The existing Pequonnock Substation has a yard elevation of approximately 10 feet\*, which is equal to the previous 2010 Federal Emergency Management Agency (FEMA) 100-year flood elevation. The 100-year flood elevation or one percent annual chance flood level is also known as the Base Flood Elevation (BFE), or equivalently, the 100-year flood can be referred to as the "base flood."

\*The reference datum is the North American Vertical Data 1988 or (NAVD88). (UI 1, pp. ES-4 and 1-6; UI 5, response 33, FEMA document titled, "Designing for Flood Levels Above the BFE for Hurricane Sandy", p. 1)

45. The base flood is the national standard used by the National Flood Insurance Program and all federal agencies for the purposes of requiring the purchase of flood insurance and regulating new development. (UI 1, p. 1-6)

46. In 2013, FEMA issued significantly revised BFE maps for Fairfield County, including the City of Bridgeport. The FEMA BFE for the vicinity of Pequonnock Substation is 14 feet NAVD88, or about four feet higher than the previous 2010 BFE. (UI 1, p. 1-6)
47. In a FEMA document titled, “Designing for Flood Levels Above the BFE After Hurricane Sandy” dated April 2013 (FEMA Flood Design Report), FEMA notes that elevating to the BFE does not provide complete protection against flooding. Storms more severe than the base flood can and do occur. FEMA notes that the American Society of Civil Engineers’ Standard for Flood Resistant Design and Construction (ASCE-24) requires zero to three feet of “freeboard” or addition elevation above the BFE, depending on the flood zone and importance of the building. FEMA recommends that essential facilities (which can include utilities critical or essential for their community) be elevated or protected to the higher of: the code-mandated elevation, the community-mandated elevation, or the 500-year flood elevation. FEMA recommends a minimum of one foot of additional freeboard beyond the code requirements to account for a continuation of the historical rate of sea level rise. (UI 5, response 33, FEMA Flood Design Report, pp. 1, 2, 6, and 7)
48. In October 2016, PURA approved UI’s Storm Resiliency Plan, which includes the rebuild of Pequonnock Substation in order to protect vulnerable components of the electric distribution grid from flood/storm damage, reduce the time required to restore power if outages do occur, and complement other measures that UI already has implemented to increase the resiliency of the electric grid and protect it from future storms. (UI 1, p. 1-7; Council Administrative Notice Item No. 61 – PURA Review of UI’s 2016 Storm Resiliency Plan)
49. In a presentation dated April 26, 2018 titled, “ISO Recommendation for Cost Regionalization in Flood Hazard Areas” (ISO-NE Flood Hazard Presentation), ISO-NE recommended the following for flood design and regional cost recovery for new construction:
- a) For coastal locations, substations should be elevated to the higher of the BFE plus two feet or the 500-year flood elevation;
  - b) This substation elevation should be to the bottom of the equipment being installed, e.g. the bottom of a transformer; and
  - c) For control houses, the substation elevation should be at the control house floor in all situations.
- (UI 5, response 34 – ISO-NE Flood Hazard Presentation)
50. Section 8 of Connecticut Public Act 18-82 (PA-18-82), An Act Concerning Climate Change Planning and Resiliency, requires flood-proofing for properties located within the coastal boundary of not less than two feet freeboard above the BFE and any additional “freeboard” necessary to account for the most recent sea level change scenario published by the Marine Sciences Division of the University of Connecticut (UCONN) based on sea level change scenarios published by National Oceanic and Atmospheric Administration. (Council Administrative Notice Item No. 81 – PA 18-82)

Contingency Modeling – Pequonnock Substation

51. A 90/10 load forecast contains load projections based on a plausible worst-case hot weather scenario. It means that there is only a 10 percent chance that the projected peak load would be exceeded in a given year. 90/10 load forecasts are used for utility infrastructure planning. (Council Administrative Notice Item No. 30 – Council 2014/2015 Forecast of Electric Loads and Resources, p. 12)

52. UI's most recent 90/10 load forecast for loads served by Pequonnock Substation for 2018–2027 indicates a projected load of 38.5 megavolt-amperes (MVA) for 2018\* that would grow to 42.55 MVA by 2027, for a compound annual growth rate (CAGR) of approximately 1.12 percent.

\*The actual historical peak load was 25.9 MVA for 2018.

(UI 3, response 10; Council Administrative Notice Item No. 30 – Council 2014/2015 Forecast of Electric Loads and Resources, CAGR Formula, p. 53)

53. Pequonnock Substation's existing power transformers are 42/56/70 MVA each with an expected overload or "firm rating" of 77.0 MVA. The two proposed power transformers for the proposed replacement substation would be 30/40/50 MVA each, with an expected overload or firm rating of 72.0 MVA\*, which is about 93.5 percent of the existing substation capacity. (UI 3, response 10)

\*The firm rating is based on one transformer only in the event that one of the two transformers is out of service. The transformer could operate at this firm rating for typically up to 24 hours.

(UI 3, response 10; Tr. 1, p. 17)

54. While the proposed transformers would be smaller (in MVA capacity) than the existing transformers, this is due to significantly lower projected loads than in the past. Specifically, station service power for the Bridgeport Harbor Station used to be supplied by the distribution system. Today, it is supplied by the transmission system, so this resulted in a significant decline in distribution loads. (Tr. 1, p. 41; UI 3, response 10)

55. There exists potential for a major load increase in this area in the near future, including a proposed casino in Bridgeport, which would significantly increase the load on this substation. However, UI believes that the proposed capacity is sufficient to serve the area needs for the foreseeable future. (UI 3, response 10)

56. The proposed replacement substation would also be designed to accommodate a mobile transformer for emergency conditions. (UI 1, p. 2-3)

### **System Alternatives**

57. UI considered five potential system alternatives as noted below:

- a) No action;
- b) Raise the existing substation equipment components above the 14-foot base flood elevation;
- c) Install a perimeter flood wall system to protect the existing substation;
- d) Rebuild the entire substation in place, over the existing footprint; or
- e) Full replacement.

(UI 1, pp. 9-2 to 9-12)

58. With the “No Action” alternative, the existing Pequonnock Substation would continue in-service at the present site, with no improvements made to mitigate coastal flood hazard risks or to upgrade the substation’s existing transmission and distribution system infrastructure. Consequently, the substation would remain at risk from flooding due to coastal storms. No action would be taken to resolve the substation’s current infrastructure issues such as structural integrity risks due to soil settling, inadequate short-circuit duty margins, and insufficient access/clearance for emergency 115/13.8-kV mobile transformers. Thus, the “No Action” alternative is unacceptable because the existing Pequonnock Substation would remain vulnerable to damage from coastal storms, or to the failure of structural components, either of which could lead to extended duration outages affecting customers and the bulk power system. (UI 1, pp. 9-2 and 9-3)
59. Raising the existing substation components above the 14-foot BFE was deemed impractical because almost all of the substation equipment is already below the 14-foot BFE. Furthermore, even if the equipment could be raised cost-effectively on the existing site, the other site deficiencies such as site settling or inadequate space for emergency mobile transformers would not be resolved. (UI 1, p. 9-4)
60. Installing a perimeter flood wall would not address the asset condition deficiencies. Existing substation components would have to be rebuilt and replaced, thus making the flood wall cost-ineffective and effectively requiring rebuilding the substation in place as described in FOF #61. (UI 1, p. 9-4)
61. The “Rebuild in Place” alternative would raise substation components above the BFE, provide space for a mobile transformer, and address other asset condition issues. However, during the rebuild, the substation would have to remain in service to supply Bridgeport area customers and to maintain reliability of the bulk power system in general. This alternative was rejected due to the significant construction challenges, including the need to acquire adjacent property and build temporary substation facilities, and extensive outage sequencing requirements. Furthermore, due to the challenging construction, the substation redevelopment could require more than five years, and it would be more costly than a new site alternative. See Section titled, “Project Cost and Cost Allocation.” (UI 1, p. 9-4)
62. UI’s August 17, 2016 Asset Condition Assessment Summary of Pequonnock Substation (ACASPS) indicates that the best solution would be to rebuild the entire substation on an adjacent property at a higher elevation, addressing all of the noted deficiencies. (UI 3, response 9, Attachment D - ACASPS, p. 2)
63. UI examined various replacement substation configuration options, evaluating both a gas-insulated substation (GIS) design and an air-insulated substation (AIS) design. However, an AIS design would require a larger area (more than approximately 2.8 acres), and it could not be accommodated on the approximately 2-acre portion\* of the 3.7-acre site. As a result, the AIS design was rejected in favor of a GIS design.

\*The two-acre portion of the site is the Bridgeport Harbor Station property. The remaining 1.7 acres include a portion of Ferry Access Road.  
(UI 1, pp. ES-2, 9-2, 9-11, 10-1, 10-2)



### Location Alternatives

64. In its search for a substation site, UI considered the following standard criteria listed below:
- a) Minimize the need to acquire residences and viable commercial/industrial uses to accommodate substation development;
  - b) Maintain consistency/compatibility with existing land uses and land use plans to the extent possible;
  - c) Minimize adverse effects on sensitive environmental resources and the social environment;
  - d) Maintain public health and safety;
  - e) Demonstrate cost-effectiveness while adhering to good engineering and sound environmental planning practices; and
  - f) Present the public with a clear and well documented methodology for the identification of the proposed and alternative sites.
- (UI 1, pp. 9-5 and 9-6)
65. UI also considered the following site-specific criteria relative to a replacement substation site.
- a) Distance to the existing Pequonnock Substation and 115-kV transmission lines;
  - b) Availability of property, e.g. sites that are vacant, for sale, or would not require the removal or relocation of existing commercial or residential uses;
  - c) Site size of at least 1.5 acres, including buffers and setbacks to accommodate a 115-kV GIS facility of the type required for the replacement substation;
  - d) Site topography and subsurface conditions;
  - e) Environmental and land use characteristics, including present and past property uses, e.g. presence of tidal or inland water resources, cultural resources, threatened or endangered species, and the need for environmental remediation, etc.;
  - f) Substation constructability;
  - g) Availability of property (e.g. via fee ownership or easement) for transmission and distribution line connections to the relocated substation;
  - h) Accessibility;
  - i) Permit-ability, i.e. the anticipated ability to obtain all required regulatory approvals for construction at the site; and
  - j) Cost.
- (UI 1, p. 9-6)
66. UI identified two sites that appeared to be viable for the development of the project. These sites are listed below:
- a) 375 Main Street, Bridgeport; and
  - b) 1 Kiefer Street, Bridgeport (i.e. the proposed site)
- (UI 1, p. 9-1)
67. After examining both sites, UI selected the proposed site for a replacement substation. The 375 Main Street was not selected because it would be more costly to develop than the proposed site. The underground HPGF 115-kV lines that connect to the existing Pequonnock Substation would have to be extended by approximately 1,300 feet to reach the 375 Main Street site. This would be about 570 feet longer than the HPGF extensions to the proposed site. In addition, the overhead 115-kV line that connects the existing Pequonnock Substation to BHU #3 would have to be extended to reach the 375 Main Street site. Lastly, the 375 Main Street site is identified by the City as a potential location for major redevelopment, and it is within a mixed land use area with residences, churches and two sites on the National Register of Historic Places (i.e. the Mary and Eliza Freeman Houses and the William D. Bishop Cottage District).
- (UI 1, p. 9-2)

### Proposed Site Location

68. The proposed site is currently located on 3.7 acres owned by PSEG and located at 1 Kiefer Street. Approximately two of these acres is vacant land located within PSEG's fenced Bridgeport Harbor Station property. The remaining approximately 1.7 acres of the site is located to the north and west (in the vicinity of Ferry Access Road) and is also owned by PSEG. UI and PSEG have entered into a Memorandum of Understanding regarding UP's purchase of the site. (UI 1, p. ES-2)
69. The portion of the property containing the proposed replacement substation site is zoned Industrial Heavy (IH). The northern portion of the project site (that includes areas for transmission interconnections) is located within the Downtown Village District (DVD-WF). (UI 1, pp. 4-6 to 4-8; UI 1, Tab A1 – Drawing No. PEQ-PR-NEW)
70. The site is located approximately 700 feet southwest of the existing Pequonnock Substation. The site is located in a highly developed industrial area south of Interstate 95 (I-95) and west of the Pequonnock River. Surrounding and nearby land uses include the Bridgeport Harbor Station generating facility, electrical utilities, oil storage facilities, storage yards, warehouses, commercial office buildings and the I-95 and MNRR/Amtrak railroad corridors. (UI 1, Tab D – Visibility Assessment, p. 1)
71. PSEG's Bridgeport Harbor Station generating facility is located immediately east of the proposed replacement substation site. Currently, Bridgeport Harbor contains two active electric generating units:
  - a) BHU #3 is a coal-fired steam unit with summer output of approximately 384 MW. This unit went into service on August 1, 1968. BHU #3 is expected to end commercial operation by July 1, 2021; and
  - b) BHU #4 is a peaking combustion turbine that burns jet fuel and has a summer output of approximately 17 MW. This unit went into service on October 1, 1967.(Council Administrative Notice Item No. 38, Petition No. 1218, Finding of Facts #6 and 193)
72. To the south of BHU #3 is PSEG's BHU #5, a 485 MW natural gas-fueled combined cycle generating unit with ultra-low sulfur distillate as the secondary or backup fuel. This project was approved by the Council on July 22, 2016 and is currently under construction with a projected commercial operation date of June 1, 2019. BHU #5 will have an electrical transmission connection to UP's Singer Substation. (Council Administrative Notice Item No. 38, Petition No. 1218, Findings of Facts #1, #7 and #76, Decision and Order dated July 22, 2018, and Quarterly Progress Report dated July 12, 2018)
73. The proposed site consists of a vacant, gravel lot that is presently used by PSEG for equipment and material laydown in support of the construction of its BHU #5 generator. (UI 1, p. 4-5)
74. Small patches of weeds are found along portions of the site boundaries. Vegetation on the northern portion of the project site (from the MNRR corridor to the proposed replacement substation location) consists of a mix of conifers and deciduous species and brush, as well as lawn areas and non-native ornamental plantings along either side of Ferry Access Road. Other vegetation found at the site is dominated by invasive species typical of disturbed sites, e.g. Asiatic bittersweet, Norway maple, Tree of Heaven, garlic mustard and multiflora rose. (UI 1, p. 4-5)

75. The nearest residences from the center of the proposed replacement substation are equidistant and located approximately 700 to 800 feet to the southwest\*. These residences are located at 309 Main Street and 77 Whiting Street, roughly at the intersection of Main Street and Whiting Street.

\*The proposed fence line is about 478 feet away to the nearest residences.

(UI 3, response 5; Tr. 1, p. 24; UI 1, Tab A.1 – Drawing PEQ-PR-NEW)

76. There are approximately 21 residences located within a 1,000-foot radius of the center of the proposed replacement substation. (UI 3, response 4)

### **Proposed Replacement Substation Description**

77. The proposed replacement substation would have an irregular shape with an interior fenced area of 1.8 acres or approximately 77,400 square feet. (UI 1, Tab A.1, Drawing PEQ-PR01; UI 3, response 7)

78. The proposed replacement substation would be enclosed by a 14-foot high chain link fence with one foot of barbed wire on top. (UI 1, p. 3-5 and Tab A.1 – Drawing No. PEQ-PR01)

79. Access to the substation would be via a new paved access inside the fenced substation from three gates: one off of Ferry Access Road (the primary entrance gate); one off of Singer Avenue; and one off of an existing (internal) PSEG access drive. (UI 1, Tab A.1 – Drawing No. PEQ-PR01; Tr. 1, pp. 25-26)

80. The interior surface of the proposed replacement substation would consist of approximately one-inch grade stone on top, with the exception of the access drives, which would be paved. (UI 1, Tab A.1 – Drawing No. PEQ-PR01; Tr. 1, p. 26)

81. The GIS would be housed within an enclosure with dimensions of approximately 92 feet long by 87 feet wide by 34 feet high. The GIS equipment enclosure would include the following components:

- a) 115-kV motor-operated line disconnect switches;
- b) 115-kV motor-operated ground switches;
- c) 115-kV GIS bus;
- d) GIS access platforms;
- e) 115-kV current and potential transformers for metering and equipment protection;
- f) AC station service equipment;
- g) Local control cabinets for GIS equipment;
- h) Overhead crane for equipment installation and maintenance; and
- i) Heating and ventilation equipment. (UI 1, pp. 2-2 and 2-3)

82. The control and relaying equipment (to be located within the southern portion of the fenced substation) would be housed within an enclosure with dimensions of approximately 72 feet long by 36 feet wide by 14 feet high. The control and relaying enclosure would include the following components:

- a) Protection and control panels with associated relay and metering equipment;
- b) 125-Volt direct current (VDC) battery banks and associated chargers;
- c) Lavatory facility;
- d) Communications equipment; and
- e) Heating, ventilation and air conditioning equipment (HVAC) equipment;

(UI 1, p. 2-3; UI 1, Tab A.1, Drawing PEQ-PR01)

83. North of the GIS enclosure, a small portion of the AIS\* would connect the GIS equipment to distribution transformers in order to step the voltage down from 115-kV to 13.8-kV. This portion of the proposed replacement substation would include the following:
- a) Two 115-kV/13.8-kV power transformers;
  - b) 115-kV disconnect switches mounted on steel structures;
  - c) Associated insulators, tubular aluminum bus, surge arrestors, and connectors;
  - d) 90-foot wood telecommunications pole; and
  - e) An additional equipment enclosure (with dimensions of approximately 75 feet long by 30 feet wide by 13 feet high) would be located within the northern portion of the fenced substation to house the 13.8-kV distribution circuit breakers and associated outgoing distribution cable circuits.

\*While the proposed replacement substation would be considered a GIS, a small portion of the layout would still be considered air-insulated.

(UI 1, pp. 1-7 and 2-3; UI 1, Tab A.1, Drawing PEQ-PR01)

84. UI would redirect the eight 115-kV transmission lines that presently feed the existing Pequonnock Substation to connect to the proposed replacement substation. (UI 1, p. 1-9)

85. To route the five overhead transmission lines into the proposed replacement substation, 17 new galvanized tubular steel monopole structures, ranging in height from 75 feet to 100 feet, would be installed. These monopoles are listed as follows:

- a) Five of the monopoles would be located on UI's proposed replacement substation site, directly adjacent to the GIS enclosure. These monopoles would serve to "walk down" the conductors to the substation gas-to-air bushings.
- b) Two of the monopoles would be installed on the northern portion of UI's proposed 3.7-acre property to connect the four overhead Line Nos. 91001, 1130, 8809A, and 8909B located along the MNRR corridor to the proposed replacement substation.
- c) Seven of the monopoles (three on the north side of the MNRR tracks and four on the south side of the tracks) would be installed on DOT or City property to complete the connection of Line Nos. 91001, 1130, 8809A, and 8909B between the railroad corridor and the proposed replacement substation. The lengths of these overhead connections would be 325 feet, 400 feet, 950 feet, and 900 feet, respectively; and
- d) Three of the monopoles would be installed on PSEG property to connect BHU #3 and BHU #4 to the proposed replacement substation. The length of this proposed overhead connection would be approximately 1,050 feet.

(UI 1, pp. 1-9 and 2-5; UI 3, responses 13 and 17)

86. The three underground transmission lines (consisting of conduits and conductors) that feed the existing substation would be re-routed or extended to connect to the proposed replacement substation. These underground transmission connections are noted as follows:
- a) Two HPGF underground transmission cables (Line Nos. 1697 and 1710) would connect to the proposed replacement substation to the east by extending the existing steel pipes approximately 730 feet to the southwest, crossing PSEG and UI property. The new buried splice chamber for the HPGF lines will be located on UI property at the existing Pequonnock Substation site;
  - b) An XLPE cable (Line No. 1995), which extends along Ferry Access Road to the existing substation, would be intercepted at an existing transmission splice chamber (located beneath Ferry Access Road) and, from there, it would be redirected to the proposed replacement substation. Approximately 500 feet of new concrete-encased PVC duct bank would be constructed.

(UI 1, pp. ES-5, 1-9 and 2-6)

87. To deliver power to UI's electric distribution system in the Bridgeport area, the distribution circuits that connect to the existing Pequonnock Substation would be extended and reconfigured as necessary to connect to the proposed replacement substation. These distribution circuits would consist of duct lines and splice chambers, which would be buried on PSEG and UI property, as well as beneath local roads. The distribution circuit get-away from the proposed replacement substation would be two new PVC underground duct banks. The proposed replacement substation would have 17 distribution feeders planned to exit the substation. (UI 1, p. 3-11; UI 3, response 28)
88. Notification to the Federal Aviation Administration (FAA) is required for the proposed substation and transmission structures and construction equipment. UI would provide such notice to the FAA at least 45 days prior to the start date of the proposed construction. (UI 3, response 25)
89. The project would require approximately 18 to 24 months to construct. Construction would commence in the third quarter of 2019 and end with an in-service date in approximately the fourth quarter of 2021. (UI 1, pp. ES-5 and 7-1)
90. Construction would generally occur from 7:00 a.m. to 7:00 p.m. Monday through Saturday, although certain tasks would require work on Sundays or during other non-standard hours. For example, some of the non-standard work hours would be related to construction along the railroad right-of-way. UI would consult with MNRR, DOT and AMTRAK to coordinate any work hours within the railroad right-of-way. Also, certain transmission and/or distribution equipment would have to be temporarily taken out of service to perform connections. This work would be coordinated with the Connecticut Valley Electric Exchange (CONVEX) and would require non-standard work hours. (UI 1, pp. ES-5, 3-10; UI 3, response 15)

91. After the proposed replacement substation is constructed, the eight 115-kV transmission lines are connected, and the facility is placed into service, UI would decommission the existing Pequonnock Substation and associated 115-kV line connections. This decommission work would include, but not be limited to:
- a) Decommissioning electrical components within the substation (e.g. the removal of sulfur-hexafluoride gas from circuit breakers and dielectric fluid from transformers);
  - b) Removing above-ground\* structural components within the substation, as necessary;
  - c) Dismantling and removing the existing overhead transmission line connections to the substation (e.g. removal of conductors, arms, and six monopole structures), as well as 10 bonnets on which the lines are located above the railroad catenary structure; and
  - d) Removing a short segment of HPGF cable and an approximately 960-foot long segment of XLPE cable, extending from SC1 to the substation. The buried duct for the XLPE cable would be left in place.

\*It has not yet been determined if existing concrete foundations would remain in place or not.

(UI 1, p. 2-6; UI 3, response 21)

### Environmental Considerations

#### Coastal Area Resources

92. Although the entire proposed project site is located within a coastal boundary, the proposed project would not conflict with any defined coastal policies (under Connecticut's Coastal Management Act) that provide guidelines for uses and activities subject to Connecticut's Coastal Management Program. (UI 1, pp. 4-4 and 5-3)

#### Historic and Archaeological Resources

93. No historic properties would be affected by the proposed replacement substation project. Since the proposed project parcel already contains utility equipment, and the general area is well developed, the proposed project would not have any effect on the viewshed of the two NRHP resources: the Mary and Eliza Freeman Houses or the William D. Bishop Cottage Development Historic District. (UI 1, Tab B.1.2–Response from State Historic Preservation Office July 25, 2017; UI 1, Tab E – Cultural Resources Report, p. 3; UI 1, Tab D – Visibility Analysis, p. 1)
94. The Area of Potential Effect (for cultural resources review purposes) has been disturbed repeatedly throughout the nineteenth and twentieth centuries, and it no longer possesses any archaeological sensitivity. Thus, no additional archaeological research is recommended prior to construction. (UI 1, p. 10-1 and Tab E – Cultural Resources Report, pp. 2-3)

#### Wildlife

95. By letter dated March 30, 2017, DEEP reviewed the Natural Diversity Database (NDDDB) and found that the peregrine falcon, a state-designated Threatened Species, occurs in close proximity to the proposed site. On or about March 30, 2018, UI submitted to DEEP proposed best management practices (BMPs) to protect the peregrine falcon. (UI 1, Tab B.2.2)
96. By letter dated June 5, 2018, DEEP indicated that it had reviewed UI's peregrine falcon BMPs and recommends modified BMPs as noted in the June 6, 2018 DEEP comments attached hereto. (UI 3, response 18)

97. To protect the peregrine falcon, UI would comply with DEEP's modified BMPs dated June 5, 2018. (Tr. 1, p. 28; UI 3, response 18)
98. On March 14, 2018, the U.S. Fish and Wildlife Service (USFWS) responded to UI's inquiry about potential impacts to federally-listed species. USFWS indicated that while the red knot, a federally-listed Threatened species, should be considered, there are no critical habitats within the project area. (UI 3, response 19)
99. Connecticut is within the range of the northern long-eared bat (NLEB), a federally-listed Threatened species and State-listed Endangered species. There are no known northern NLEB hibernacula in Bridgeport. There are no known NLEB maternity roost trees within 150 feet of the proposed project. No impacts to the NLEB would be expected. (UI 3, response 3; Council Administrative Notice Item No. 85 – DEEP NLEB Map; Council Administrative Notice Item No. 52 – DEEP Endangered, Threatened and Special Concern Species dated August 2015; Tr. 1, p. 28)

#### Wetlands and Watercourses

100. No watercourses presently exist at the site. (UI 1, Tab C – Wetland Delineation Report, p. 2)
101. Wetland soils are not present at the site. (UI 1, Tab C – Wetland Delineation Report, p. 2)
102. The proposed replacement substation site is not located within a DEEP-designated Aquifer Protection Area (APA). (Council Administrative Notice Item No. 84 – DEEP statewide APA Map; UI 1, p. 4-3)

#### Groundwater

103. Groundwater in the project area is classified by DEEP as GB. Water with a GB classification includes industrial process and cooling waters and base flows for hydraulically connected water bodies. Such water is presumed to be not suitable for human consumption without treatment. The classification of groundwater as GB is consistent with the historical industrial uses in the project area. (UI 1, p. 4-3)
104. The depth to groundwater in the project area ranges from five to nine feet below grade. UI would have a dewatering plan related to the DEEP General Permit process. If contaminated groundwater is discovered, UI would work with DEEP and have a treatment system to address that issue. (Tr. 1, p. 27)
105. UI would prepare a Stormwater Pollution Control Plan in accordance with the DEEP General Permit for the Discharge of Stormwater and Dewatering from Construction Activities (DEEP General Permit). (UI 1, p. 3-10)
106. No trees greater than six inches in diameter would be removed to construct the proposed project. (UI 3, response 16)

#### Soil and Earthwork

107. UI would utilize the proper erosion controls to protect the substation slopes from erosion. (Tr. 1, p. 66)
108. Erosion and sedimentation controls would be consistent with the 2002 Connecticut Guidelines for Erosion and Sedimentation Control. (UI 1, p. 3-10)

109. The total estimated amounts of cut and fill required for the proposed project are noted below (assuming no on-site re-use of existing spoils).

<b>Activity</b>	<b>Quantity Removed (c.y.)</b>	<b>Quantity Added (c.y.)</b>
Site Grading		4800
Foundation Excavations & Structural Fill	3575	1800
Stormwater Retention	911	911
<b>Totals</b>	<b>4486</b>	<b>7511</b>

(UI 3, response 23)

110. UI anticipates the on-site re-use of spoils where possible based on the analytical data from UI’s Phase II Soil/Groundwater Investigation and certain geotechnical criteria. However, in order to achieve the engineered design elevation, UI would need to import clean fill to the site. Any fill brought to the site would meet DEEP’s definition of “clean fill” as defined in DEEP’s Management of Contaminated Environmental Media. (UI 3, response 24)

111. Disturbed soils would be pre-characterized and subsequently managed in accordance with DEEP solid waste regulations and UI requirements. Certain impacted soils excavated during construction may be removed from the project area and properly disposed off-site. UI would adhere to state and federal requirements for the disposal of any contaminated soils. (UI 1, p. 5-2)

112. Post-construction noise levels (from the proposed transformers\*) at the property boundaries would be in compliance with DEEP noise control regulations.

\*The proposed transformers would be the dominant source of noise associated with the proposed project.

(UI 1, Tab F – Noise Assessment, pp. 1, 6 and 10)

113. The proposed GIS equipment would utilize sulfur hexafluoride (SF<sub>6</sub>), which is considered a greenhouse gas. While a GIS vendor has not yet been selected, the switchgear is required to have a leakage rate of less than 0.5 percent per year. UI would utilize filling, storage and handling techniques to ensure minimal loss of SF<sub>6</sub> to the environment during any operation involving filling or de-gassing of equipment. (UI 3, response 14)

114. Each of the proposed transformers would have a secondary containment designed to hold 110 percent of a transformers insulating (mineral) oil capacity and would include accidental spill prevention measures. The proposed transformers’ insulating oil would not contain polychlorinated biphenyls (PCBs). (UI 1, p. 3-5; Tr. 1, p. 27)

Flood Design

115. UI uses a 50-year typical substation life. With a “starting point” of approximately 2020, this places the “end point” for sea level rise considerations at roughly the year 2070. (Tr. 3, p. 40)

116. UI found a lot of variation in the different predictions for sea level rise. (Tr. 3, p. 18)



117. The University of Connecticut (UConn) published a draft sea level rise forecast that includes just over two feet of sea level rise (or roughly 2.2 feet) by 2070. (Tr. 3, pp. 35-40)
118. The National Oceanic and Atmospheric Administration (NOAA) makes sea level rise predictions for many locations with tide gauges, including for the Bridgeport area. Currently, at Bridgeport, it is about 4 millimeters (mm) per year, just based on the historical trend. This is consistent with what is in the UConn report. (Tr. 3, pp. 49-50)
119. The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) projects a sea level rise of about 20 inches (or about 1.67 feet) by 2050. (DEEP Comments received August 8, 2018, p. 2)
120. While the first installment of the federal Quadrennial Energy Review (QER) has a forecast sea level rise of about 32 inches by 2060, the UConn sea level rise forecast would be preferred to use as it includes international and national models, as well as specific situations in Connecticut. (Council Administrative Notice Item No. 9 – QER, p. 2-10; Tr. 3, pp. 50-51)
121. The entire proposed replacement substation site, proposed transmission interconnection locations, and the existing Pequonnock Substation are located within the FEMA Zone AE, a special flood hazard area subject to inundation by the 1 percent annual chance flood, also known as the 100-year flood zone. (UI 1, Appendix A.4 – FEMA Flood Insurance Rate Map)
122. In the vicinity of the existing Pequonnock Substation and the proposed replacement substation, the current 500-year flood (or 0.2 percent annual chance flood) elevation is 15.9 feet. (UI 3, response 8b and 8c)
123. A site specific survey was not performed for the potential alternative site at 375 Main Street. However, the existing elevation at that site ranges from roughly 6 feet to 10 feet. (UI 5, response 31)
124. The existing elevation of the proposed replacement substation site varies from about 8.3 feet to 11.4 feet. (UI 1, Tab A.1 – Substation Site Plans and Drawings, Drawing No. PEQ-PR01)
125. Historically, the design elevation standard used by the industry was the 100-year flood elevation plus one foot, otherwise known as the “100 plus 1.” UI performed research and polled utilities regarding their flood design practices. Virtually all have used the “100 plus 1” standard. (Tr. 3, p. 17)
126. The proposed replacement substation would have a design flood elevation (DFE) of 17 feet to the top of the concrete (TOC), i.e. to the tops of any foundations of freestanding structures and the floors of any buildings. This would be three feet above the BFE or about one foot above the 500-year flood elevation. (Tr. 3, p. 41)
127. As a comparison, BHU #5 has an approved TOC flood elevation design of 18.5 feet. (UI 5, response 35; Council Administrative Notice Item No. 38, Petition No. 1218, Phase II Development and Management Plan received November 1, 2016)
128. UP’s proposed replacement substation design would comply with the ASCE 24-14 standard for a flood design for a Class 4 facility\*, which also includes protection against the effects of storm surge. ASCE 24-14 requires two feet of freeboard (above the BFE) for the proposed facility.

\*A Class 4 facility is the most “critical” type of facility. The proposed replacement substation fits this category because it would supply emergency facilities.

(UI 3, response 8e; Tr. 3, pp. 21, 37-38, and 53)

129. UI's proposed replacement substation design would comply with FEMA's recommendation of a minimum of one foot of additional elevation (on top of the two feet of freeboard for ASCE-24) to account for sea level rise. (UI 3, response 8d; UI 5, response 33, FEMA Flood Design Report; Tr. 1, pp. 37-38 and 53)
130. UI's proposed replacement substation design would comply with the ISO-NE Flood Hazard Presentation dated April 26, 2018. (UI 5, response 34 – ISO-NE Flood Hazard Presentation; Tr. 3, p. 41)
131. UI's proposed replacement substation design would comply with (and even exceed) the requirements of PA 18-82. UI's proposed three feet of freeboard well exceeds the minimum of two feet of freeboard required by PA 18-82. Even two feet of freeboard would conservatively exceed the 20 inches of sea level rise projected for by 2050 by CIRCA. (DEEP Comments dated August 8, 2018)
132. If required by the Council, UI is willing to increase its DFE by an additional one or two feet at the proposed replacement substation site. (Tr. 3, p. 20)
133. To elevate the replacement substation by one foot higher than UI's proposal would have an incremental cost of about \$1.2M. To elevate the replacement substation by two feet higher than UI's proposal would have an incremental cost of about \$1.7M. UI would ultimately submit the proposed project through the ISO-NE Transmission Cost Allocation (TCA) process for a regional cost recovery determination, but preliminary indications are that any incremental flood protection costs beyond the current proposal would likely be borne by Connecticut ratepayers. (UI 5, response 34)
134. An increase in substation elevation of more than two feet above UI's proposed DFE would lead to a significant increase in cost and complications regarding material quantities, slopes, and grading, and it would likely require a total re-design of the proposed replacement substation. (Tr. 3, pp. 81-82)
135. Because site flooding is anticipated to be coastal flooding from LIS, the proposed replacement substation's displacement of floodwater would have a negligible effect on the existing adjacent area flood plain. (UI 3, response 8h)
136. While all of the proposed transmission interconnections would be located within the 100-year flood zone, UI does not have any flooding concerns with respect to the proposed underground interconnections because the manholes typically retain water, so it would be the same scenario. With regard to overhead structures, they would be roughly 80 to 95 feet tall, and the foundation design allows the structures to be located in water. (Tr. 3, p. 48)
137. With regard to possible flooding of access drives and the ability of trucks to access the proposed replacement substation during a storm, UI stated that it was able to access the existing Pequonnock Substation with trucks even during Hurricane Sandy and Storm Irene. In the event UI does not have trucks capable of crossing flooded access drives, UI would have the National Guard and/or other emergency assistance. (Tr. 3, pp. 48-49)

#### Visibility

138. The tallest features of the proposed project would be the new monopoles for the transmission interconnection, which range in height from 75 to 100 feet. (UI 1, p. 2-5 and Tab A.1, Drawing No. PEQ-PR-SK3 and PEQ-PR-SK4)

139. At the proposed replacement substation itself, the tallest features would be the transmission structures with a height of at least 70-feet 9-inches above final grade. The next tallest features would be the lightning masts, which would reach a height of slightly in excess of 50 feet above final grade. (UI 1, Tab A.1, Drawing No. PEQ-PR-SK3)
140. The tallest building on the proposed replacement substation footprint would be the GIS building, approximately 33-feet 4-inches tall above the TOC, or about 36-feet 4-inches above final grade. (UI 1, Tab A.1, Drawing Nos. PEQ-PR-SK4 and PEQ-PR01)
141. Post-construction, the replacement substation would be consistent with surrounding land uses. Portions of the replacement substation would be visible from abutting northern and western locations along Ferry Access Road and Singer Avenue, as well as from a short stretch of elevated I-95 farther to the northwest. In addition to these locations, views of the new transmission structures would extend out to ¼-mile west and north. However, the presence of large, existing utility and industrial infrastructure will serve to obstruct new equipment from several surrounding residences. Thus, the proposed project would not adversely affect views in the surrounding community. (UI 1, Tab D – Visibility Analysis, p. 2)
142. The closest state-designated scenic road is the Merritt Parkway from the New York State Line to the Housatonic River Bridge, which is about 4.4 miles away. The proposed replacement substation would not be visible from this scenic road. (UI 3, response 6)
143. The nearest school to the proposed replacement substation site is Abcd Jamie Hulley Early Learning located approximately 900 feet to the west. There are no day care facilities located within 2,000 feet of the proposed replacement substation site. (UI 1, Tab D – Visibility Analysis, Public Facilities and Resources)
144. The proposed transmission structures and proposed replacement substation ground equipment are not expected to be visible from Seaside Park or Knights Field to the south. (UI 1, Tab D – Visibility Analysis, Visibility Map and Surrounding Features Map)
145. The proposed replacement substation would use low-level lighting for safety and security purposes. The illumination would be visible in the immediate vicinity of the substation. However, such lighting would be consistent with the illumination of other industrial facilities in the vicinity. UI would employ additional lighting only for work at night under abnormal or emergency conditions. The lights would incorporate UP's standard design for illumination of substation yards such as the use of area lights mounted on equipment support structures, perimeter fence posts and enclosures. (UI 1, p. 5-8)

#### **Public Safety**

146. UP's proposed replacement substation would comply with the standards of the National Electrical Safety Code, American National Standards Institute (ANSI), the Institute of Electrical and Electronic Engineers (IEEE), good utility practice and PURA regulations regarding the method and manner of construction. (UI 1, p. 3-1)
147. For fire protection, the proposed replacement substation would meet the requirements of IEEE/ANSI as well as the National Fire Protection Association. (UI 1, p. 3-11)
148. UI trains its employees and the local fire department on safe methods to address a substation fire. (UI 1, p. 3-11)

149. UI would secure the control house and equip it with fire extinguishers, as well as remotely monitored smoke detectors. Smoke detection would automatically activate an alarm at the UI System Operations Center, and the system operators would then take appropriate action. (UI 1, p. 3-12)
150. The proposed replacement substation yard would be gated and locked. Security cameras and motion detectors would be installed that provide complete visibility within the interior of the proposed replacement substation and perimeter fence. (UI 1, p. 3-12)
151. Appropriate signs would be posted at the proposed replacement substation fence and gates in order to alert the general public of the presence of high voltage equipment. (UI 1, p. 3-12)
152. By letter dated December 28, 2016, the ISO New England Reliability Committee (ISO-NE RC) determined that the proposed project would not have a significant adverse effect on the reliability or operating characteristics of the transmission system. (UI 3, response 27 – ISO-NE RC Letter dated December 28, 2016)
153. UI would equip the proposed replacement substation with measures designed to ensure continued service in the event of outages or faults in transmission or substation equipment. If an energized line or piece of substation equipment fails, protective relaying equipment would immediately remove the failed line or equipment from service, thereby protecting the public and the remaining equipment within the substation. (UI 1, p. 3-11)
154. The project design would include protective relaying equipment to automatically detect abnormal system conditions (e.g. a faulted overhead transmission line) and to send a protective trip signal to circuit breakers to isolate the faulted section of the transmission system. The protective relaying schemes would have redundant primary and backup equipment so that a failure of one scheme would not require the portion of the system monitored by that equipment to be removed from service.
155. The protective relaying and associated equipment, along with a SCADA system for 24/7 remote control and equipment monitoring, would be housed at UI's System Operations Center. (UI 1, p. 3-11)
156. Corona noise generated by the 115-kV system is too weak and too low a frequency to interfere with communications in the very high frequency (VHF) and ultra-high frequency (UHF) bands in radio, wireless, telecommunications, cable television, or satellite television. (UI 3, response 26)
157. The proposed replacement substation would have provisions to accommodate a temporary mobile transformer for emergency conditions. (UI 1, p. 2-2)
158. UI would have a 250-kilowatt diesel backup station service generator at the proposed replacement substation. It would be able to supply the full load of the station for 24 hours based on its approximately 700-gallon fuel tank. Secondary containment would be part of the fuel tank. (UI 1, p. 3-2; Tr. 1, pp. 23-24; Tr. 2, p. 57)
159. In December 2009, President Obama proclaimed power grids as critical infrastructure vital to the United States. The Department of Homeland Security, in collaboration with other federal stakeholders, state, local, and tribal governments, and private sector partners, has developed the National Infrastructure Protection Plan (NIPP) to establish a framework for securing our resources and maintaining their resilience from all hazards during an event or emergency. (Council Administrative Notice Item No. 3)

160. On February 12, 2013, President Obama signed Executive Order 13636 on Improving Cyber Security for Critical Infrastructure, along with an accompanying Presidential Policy Directive on Critical Infrastructure Security and Resilience. The order established the U.S. policy to "enhance the security and resilience of the nation's critical infrastructure." The Secretary of Homeland Security has been given the overall responsibility for critical infrastructure protection, and identifies the Department of Energy as the sector-specific agency responsible for the energy sector. The Department of Energy may draw upon the North American Electric Reliability Corporation's (NERC) expertise. (Council Administrative Notice Item No. 4; Council Administrative Notice Item No. 57)
161. NERC developed Physical Security Reliability Standard CIP-014-1 to address threats and vulnerabilities to the physical security of critical infrastructure on the bulk power system. CIP-014-1 consists of standards and requirements related to security of electronic perimeters, protection of critical cyber assets including personnel, training, security management and disaster recovery planning. CIP-014-1 requires transmission owners to deploy systems for monitoring security events and to have comprehensive contingency plans for cyberattacks, natural disasters and other unplanned events. (Council Administrative Notice Item No. 8; Council Administrative Notice Item No. 57)

### **Electric and Magnetic Field Levels**

162. Electric fields (EF) and magnetic fields (MF) are two forms of energy that surround an electrical device. Transmission lines are a source of both EF and MF. (Council Administrative Notice Item No. 29)
163. EF is produced whenever voltage is applied to electrical conductors and equipment. Electric fields are typically measured in units of kilovolts/meter. As the weight of scientific evidence indicates that exposure to electric fields, beyond levels traditionally established for safety, does not cause adverse health effects, and as safety concerns for electric fields are sufficiently addressed by adherence to the National Electrical Safety Code, as amended, health concerns regarding Electric and Magnetic Fields (EMF) focus on MF rather than EF. (Council Administrative Notice Item No. 29)
164. MF is produced by the flow of electric currents. The magnetic field at any point depends on the characteristics of the source, including the arrangement of conductors, the amount of current flow through the source, and the distance between the source and the point of measurement. Magnetic fields are typically measured in units of milligauss (mG). (Council Administrative Notice Item No. 29)
165. International health and safety agencies, including the World Health Organization, the International Agency for Research on Cancer (IARC), and the International Commission on Non-Ionizing Radiation Protection (ICNIRP), have studied the scientific evidence regarding possible health effects from MF produced by non-ionizing, low-frequency 60-Hertz alternating currents in transmission lines. Two of these agencies attempted to advise on quantitative guidelines for mG limits protective of health, but were able to do so only by extrapolation from research not directly related to health: by this method, the maximum exposure advised by the International Committee on Electromagnetic Safety (ICES, part of IARC) is 9,040 mG, and the maximum exposure advised by the ICNIRP is 2,000 mG. Otherwise, no quantitative exposure standards based on demonstrated health effects have been set world-wide for 60-Hertz MF, nor are there any such state or federal standards in the U.S. The existing and calculated MF levels for this project are well below these recommended exposure levels. (Council Administrative Notice Item No. 29)

166. ICNIRP limits for general public exposure to 60 Hz electric fields is 4.2 kV/m. ICES limits for general public exposure to 60 Hz electric fields is 5 kV/m\*.

\*Within power line ROWs, the guideline is 10 kV/m under normal load conditions.

(UI 1, Tab G – Electric and Magnetic Field Assessment, p. 21)

167. Although substations are not the subject of the Council’s *EMF Best Management Practices (BMPs) for the Construction of Electric Transmission Lines in Connecticut*, UI applied certain design/analysis elements that comport with the Council’s BMPs as follows:

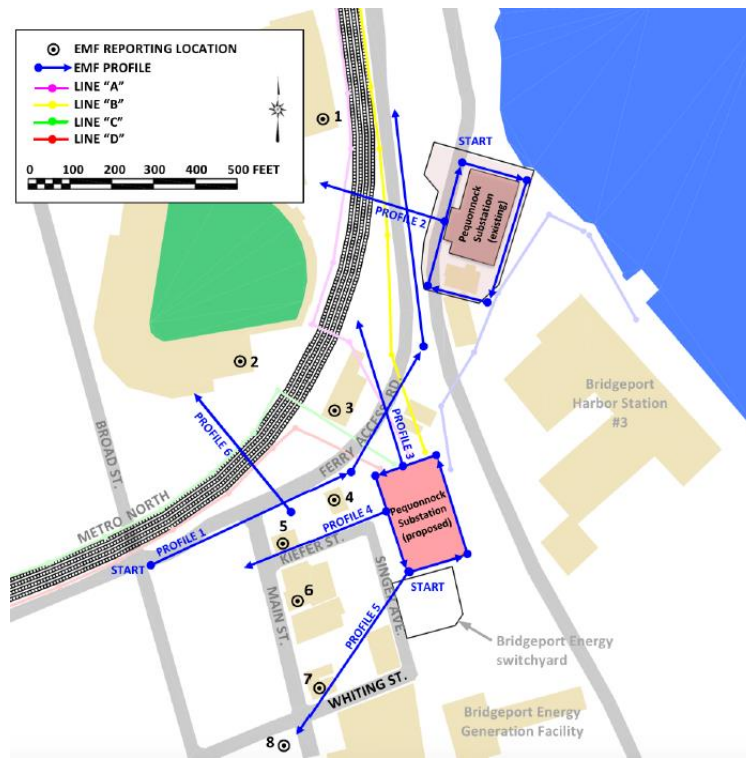
- a) peak load conditions at that time of the application filing in 2018 and the projected “average daily peak” in 2027 were considered;
- b) any previously approved changes to the electrical system were considered;
- c) calculations were performed at a height of one meter above grade;
- d) it is noted that there are no adjacent statutory facilities where children might congregate in the vicinity of the proposed replacement substation; and
- e) the location for the proposed replacement substation would be in an industrial area, and the proposed terminations of overhead transmission lines would have essentially no effect on the calculated magnetic fields at dwellings in the surrounding community. Thus, the proposed project would be consistent with “non-cost/low-cost designs that do not compromise system reliability or worker safety, or environmental and aesthetic project goals.”

(UI 1, Tab G – Electric and Magnetic Field Assessment, pp. 35-36)

168. In UI’s EMF analysis, “existing” or “pre-construction” conditions assume that overhead and underground transmission lines are in their existing alignment, and the existing Pequonnock Substation is in service. “Post-construction” conditions assume that the proposed replacement substation is in service, the existing substation is de-energized, and the existing transmission lines are re-terminated at the proposed replacement substation. (UI 1, Tab G – Electric and Magnetic Field Assessment, pp. 6 and 23)

169. Average daily peak load conditions are referred to as “average load conditions” in UI’s EMF analysis. (UI 1, Tab G – Electric and Magnetic Field Assessment, p. 26)

170. The existing and post-construction magnetic field levels based on average load conditions are indicated below.



Profile	Heading	Modeling condition	Distance from proposed substation perimeter (ft)				
			0	100	150	200	300
2	west	Pre-Project	55.2	47.3	7.4	16.4	6.7
		Post-Project	4.7	9.9	12.7	15.7	0.8
3	north	Pre-Project	24.0	26.8	10.3	23.8	26.6
		Post-Project	95.9	75.6	73.2	76.1	17.5
4	west	Pre-Project	6.8	1.9	2.1	*56.8	3.6
		Post-Project	36.0	2.6	2.4	*57.2	3.8
5	southwest	Pre-Project	13.4	0.8	0.6	0.9	*12.8
		Post-Project	2.9	0.7	0.6	0.8	*12.8
6	north	Pre-Project	1.2	2.5	7.5	†24.2	†20.3
		Post-Project	1.2	2.5	7.5	†24.2	†20.3

† This location is near overhead 115-kV transmission lines on the adjoining ROW.

\* This location is near underground transmission lines on Ferry Access Road or Main Street.

(UI 1, Tab G – Electric and Magnetic Field Assessment, pp. 18 and 37)

171. The highest calculated magnetic field level for pre-construction conditions was in the range of 750 to 900 mG near the northwest corner of the existing Pequanock Substation site. Magnetic field levels at this location under average load conditions would decrease to nearly 0 mG post-construction with the existing substation de-energized. (UI 1, Tab G – Electric and Magnetic Field Assessment, pp. 6, 29 and 39)

172. The highest post-construction magnetic field level would be about 168 mG (in the vicinity of a repositioned underground circuit) along Ferry Access Road, approximately 537 feet east of the intersection with Broad Street. (UI 1, Tab G – Electric and Magnetic Field Assessment, p. 42, Figure 12)

173. At the nearest residences to the proposed replacement substation (located approximately at the intersection of Main Street and Whiting Street), pre-construction and post-construction magnetic field levels (under average load conditions) would differ by approximately 0.2 mG, which would be an insignificant change. It would be roughly one-fifth of what the average magnetic field level is in the center of a home not near any appliance. (Tr. 1, pp. 24, 29-31)
174. The highest measured electric field level of about 0.12 kV/m was recorded beneath the conductors of the existing overhead terminations on the north side of the existing substation. Only small electric field levels (below 0.03 kV/m) were measured around the existing and proposed replacement substation sites. Electric field levels will not differ appreciably around the proposed replacement substation because the configuration of equipment and overhead interconnections is similar to pre-project conditions. (UI 1, Tab G – Electric and Magnetic Field Assessment, p. 8)

**Project Cost and Cost Allocation**

175. The estimated costs of the proposed project and various alternatives are summarized below:

Alternatives	Transmission-related Costs	Distribution-related Costs	Percent Transmission-related Costs	Percent Distribution-related Costs	Total
Proposed Project	\$130.8M	\$40.5M	76 percent	24 percent	\$171.3M*
Rebuild On Site	\$200.4M	\$69.2M	74 percent	26 percent	\$269.6M
375 Main Street Alternative Site	\$148.0M	\$47.0M	76 percent	24 percent	\$195.0M
General Site Alternative (1/2-mile radius)**	\$150.5M	\$96.2M	61 percent	39 percent	\$246.7M

\*The cost in the Application was originally estimated to be in excess of \$125 million (M), but it was revised to approximately \$171.3M because UI subsequently obtained better cost estimates via Requests for Proposals out for equipment and materials.

\*\*This 0.5 mile distance reflects the need to define sites near the existing substation, where the eight 115-kV lines presently connected to the existing substation could be efficiently and cost-effectively relocated to the replacement substation.  
 (UI 5, response 30; UI 1, pp. ES-5 and 9-5; Tr. 1, p. 22)

176. The proposed project cost of \$171.3M does not include the costs to decommission the existing Pequonnock Substation. Decommissioning costs have not yet been finalized, but UI expects that even by adding decommissioning costs, the proposed project would still be more economical than a rebuild on site or the two alternatives (one location-specific and one general) listed on FOF #175. (Tr. 3, response 78)
177. Costs of the Project would be recovered through regionalized and localized cost allocation. In general, distribution costs are localized and most transmission costs are regionalized provided that ISO-NE determines the transmission project provides a regional reliability benefit and it is in accordance with good utility practices. (UI 5, response 24)
178. The process that ISO-NE uses to make this regional cost recovery determination is referred to as the Transmission Cost Allocation (TCA) process, which includes input from all New England stakeholders. The TCA process for the proposed project has not yet been initiated because the process typically begins after the completion of the siting process and the detailed design when the project scope and likely costs have been established. (UI 5, responses 34 and 36)

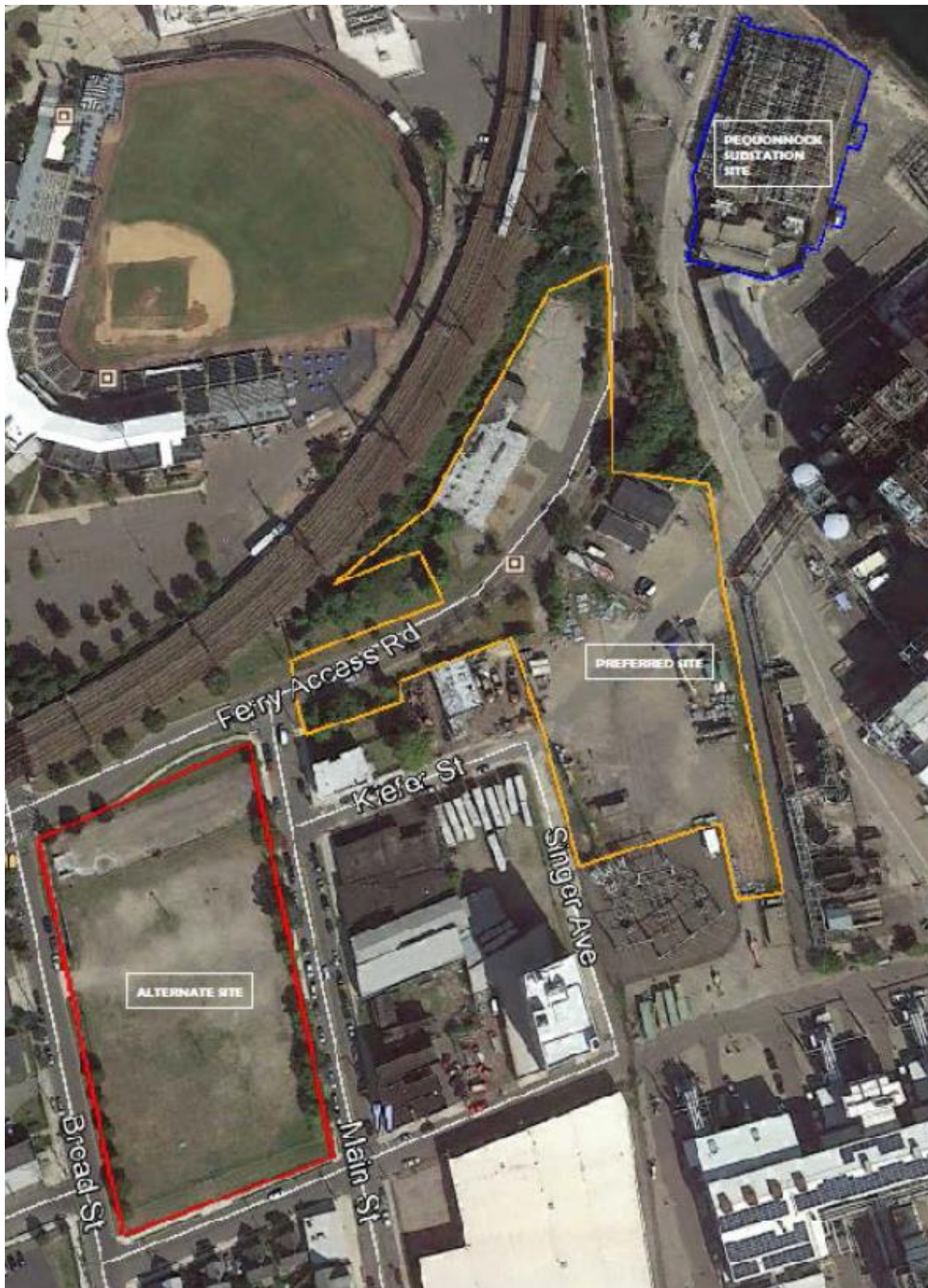


179. Pool Transmission Facilities (PTF) are the facilities rated 69-kV or higher owned by the participating transmission owners, over which ISO-NE has operating authority in accordance with the terms of the Transmission Operating Agreements. (Council Administrative Notice Item No. 16 – 2017 Regional System Plan, p. 19)
180. PTF costs are typically shared across all New England ratepayers based on load share which is approximately 25 percent for Connecticut and 75 percent for the rest of New England. (UI 5, response 34)
181. The cost allocation breakdown for the proposed project is as follows:

PTF Costs for Connecticut	\$32.0M
PTF Costs for rest of New England	\$96.2M
<u>Distribution and Non-PTF Costs for UI customers</u>	<u>\$43.1M</u>
Total	<u>\$171.3M</u>

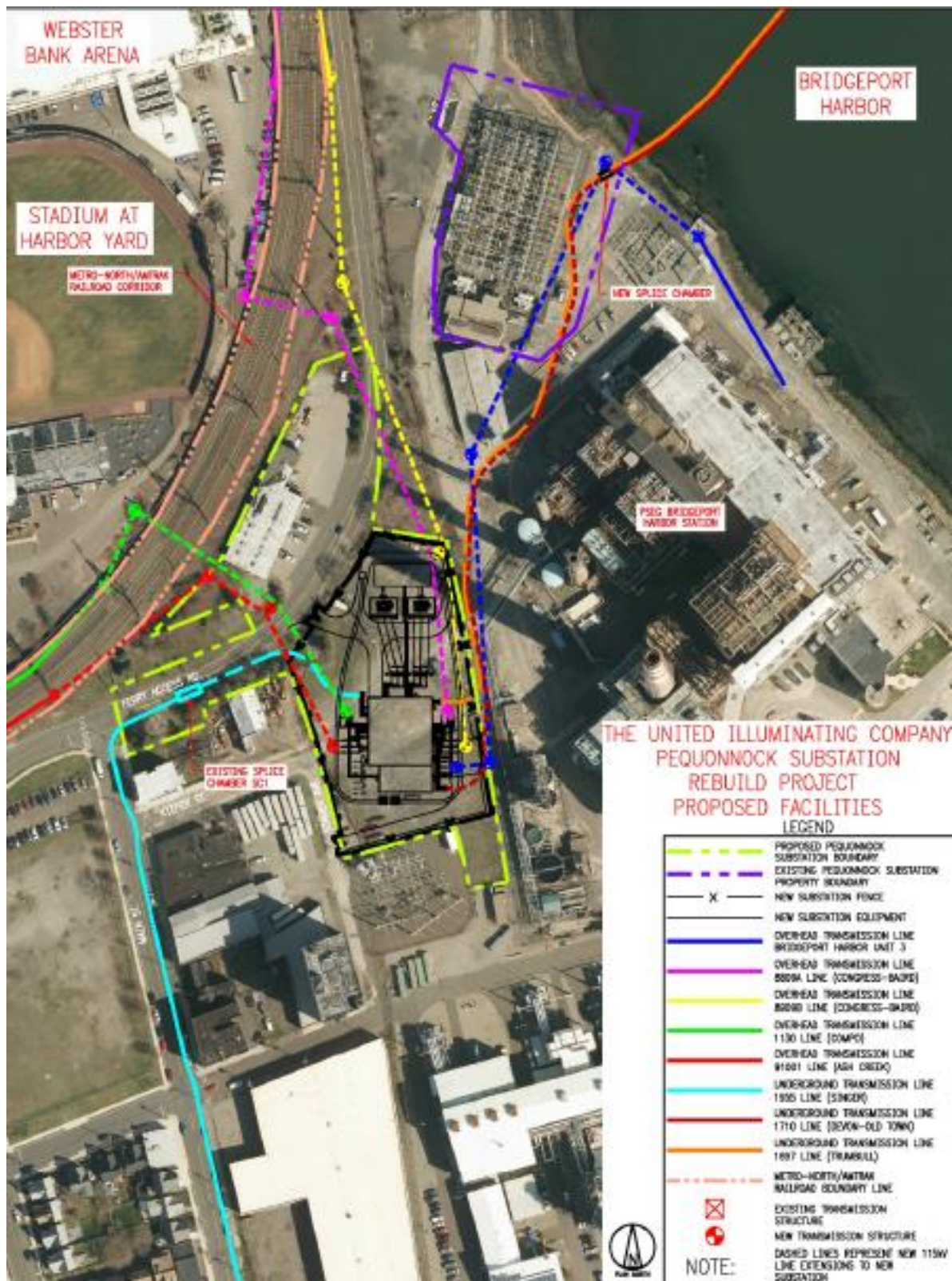
(UI 5, response 34)

**Figure 1 - Site Location**



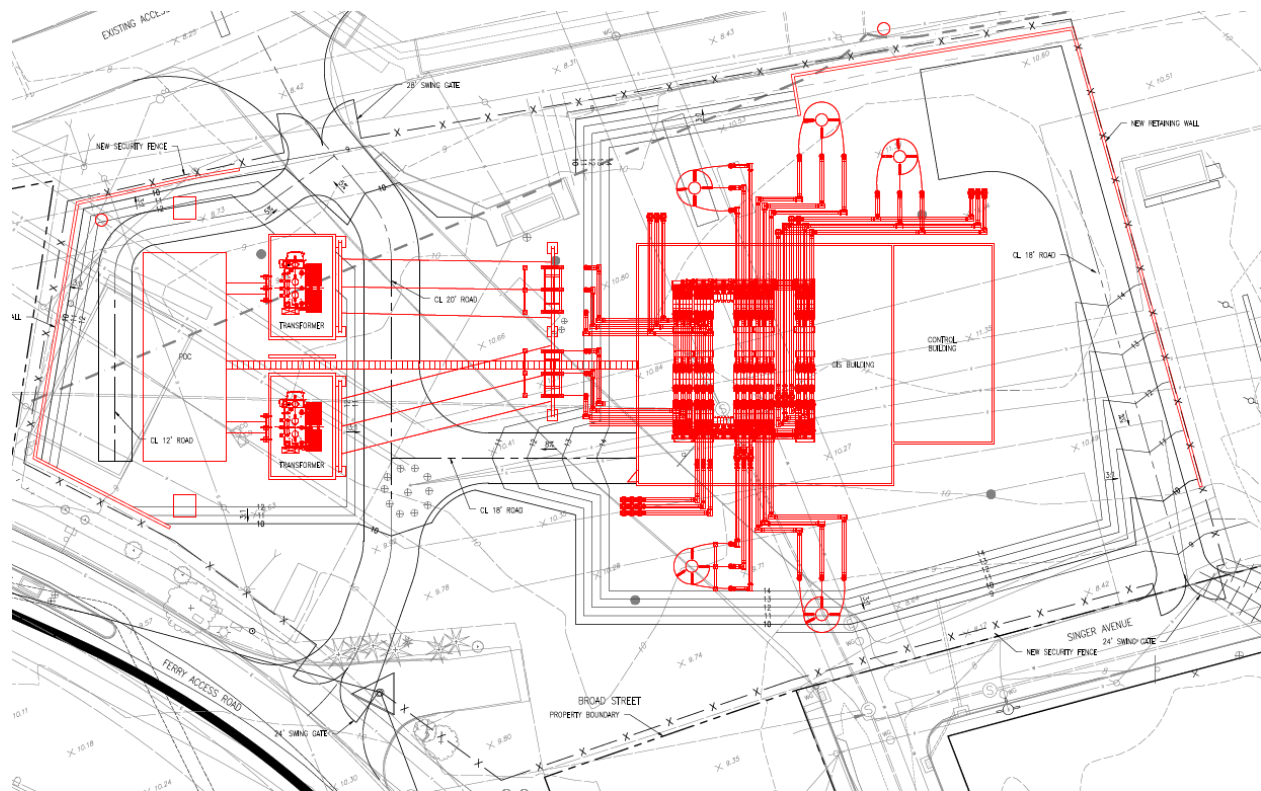
(UI 1, p. 9-8)

**Figure 2 - General Site Plan**

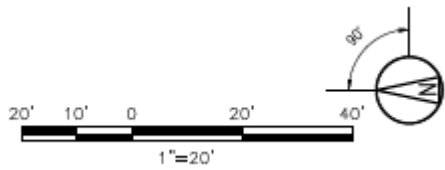


(UI 1, p. ES-10)

**Figure 3 - Proposed Replacement Substation Site Plan**

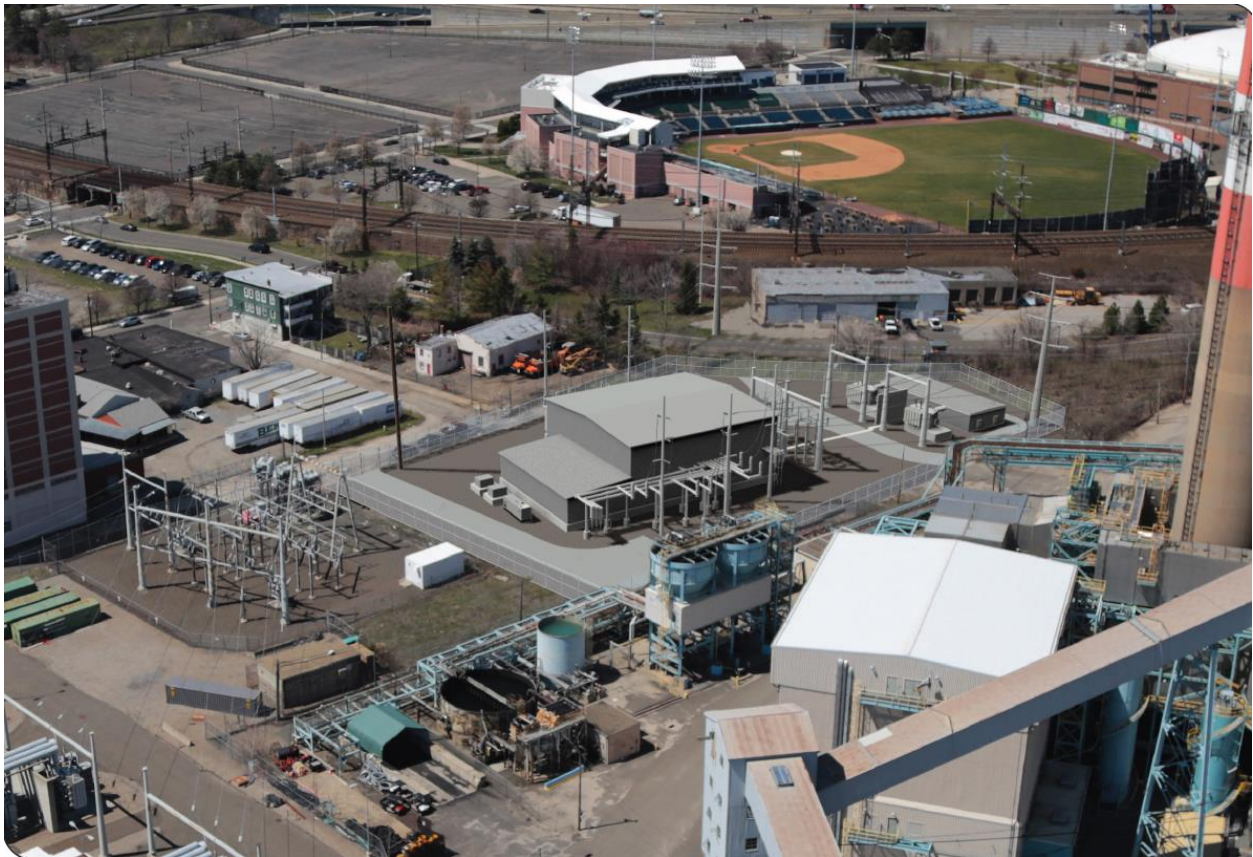


LEGEND	
	ROAD
	ROAD CENTERLINE
	MAJOR CONTOUR
	MINOR CONTOUR
	NEW STRUCTURES
	NEW SECURITY FENCE
	PROPERTY BOUNDARY



(UI 1, Appendix A.1, Drawing No. PEQ-PR01)

**Figure 4 - Aerial View and Simulation of Proposed Project**



(UI 1, Tab D – Visibility Analysis)

**Figure 5 – Visibility Map for Proposed Project**



**Legend**  
□ Approximate Site Boundary  
**Approximate Areas of Visibility**  
■ Proposed Transmission Poles Visible  
■ Proposed Ground Equipment and Transmission Poles Visible  
□ Municipal Boundary

**Visibility Map**  
Pequonnock Substation Rebuild  
Bridgeport, Connecticut

Base Map Source: 2016 CT Aerial Imagery (CTECO)  
Map Scale: 1 in = 500 ft  
Map Date: February 2019

