Application for a Certificate of Environmental Compatibility and Public Need

Killingly Energy Center

August 2016

Volume I: Application Narrative

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TETRA TECH

Killingly Energy Center
an NTE Energy Project

EXECUTIVE SUMMARY

The Killingly Energy Center (KEC), an approximately 550-megawatt (net) combined cycle electric generating facility proposed in the Town of Killingly, Windham County, Connecticut, is designed to competitively serve the existing and future demand for electricity generation in Connecticut and throughout the New England regional transmission system. KEC has been designed to meet the public need for adequate, reliable, economical, and environmentally sound long-term power.

For KEC, a number of locations were investigated as potential host communities. The 73-acre site located off of Lake Road in the Town of Killingly (the KEC Site) is considered uniquely qualified for several reasons:

- Existing electric transmission infrastructure extends immediately adjacent to the KEC Site;
- An interstate natural gas pipeline is located approximately 2 miles to the north of the KEC Site, with the opportunity to utilize an existing right-of-way that extends in proximity to the KEC Site;
- Connections to sufficient water and sewer resources are available within approximately 3,100 feet;
- The power generation elements of the KEC Site are just west of the Town of Killingly's industrial park, in an area identified in the Town of Killingly's Plan of Conservation and Development for future industrial use;
- Development of KEC at the KEC Site will result in low air emissions impacts and minimal impact on cultural or other environmentally sensitive areas; and
- Local officials have been open to the KEC proposal and support economic development.

KEC will bring additional economic development to a community that has identified the need for such economic growth, and will be sited in an area of the Town of Killingly specifically intended for this purpose. With minimal impact on existing infrastructure and the environment, KEC will provide energy reliability, jobs, and tax benefit, as well as incremental improvements that will improve the infrastructure and reliability of the existing water system, without significant demand on community resources or impact to the environment.

Combined cycle technology, with natural gas as the primary fuel and limited use of ultra-low sulfur distillate (ULSD) as backup, was chosen for KEC because it is reliable, highly efficient, and one of the most environmentally attractive alternatives for the generation of commercial-scale electricity. Further, KEC will provide the following additional environmental mitigation:

- Air quality impacts will be minimized, with the application of emission control technologies that satisfy Best Available Control Technology and Lowest Achievable Emission Rate, as applicable. Modeling undertaken for this application has confirmed that emissions will comply with the National Ambient Air Quality Standards, which are intended to be protective of the most sensitive members of the population, including those with breathing difficulties. In addition to meeting these standards, KEC will obtain nitrogen oxide (NO_x) emission reduction credits to offset its own emissions at a ratio of 1.2:1, which will permanently eliminate an upwind source of NO_x. Local and regional air quality will also be improved through the operation of KEC, by displacing the operation of older, less efficient generating facilities.

- Water use and discharge will be minimized through the use of an air-cooled condenser, reducing water use by 95 percent as compared to the use of conventional wet cooling towers.
- Noise impacts will be minimized by design criteria, equipment muffling, and the positioning of equipment to reduce sound travel. KEC's operations will comply with Connecticut and Killingly noise standards.
- No threatened or endangered species or historic or archaeological artifacts will be significantly impacted.
- Wetland impact will be avoided by KEC on 63-acre portion of the KEC Site where the generating facility will be located, and wetland buffers maximized to the extent possible. Wetland fill has been minimized with regard to the switchyard to be owned by Eversource (the Utility Switchyard). The limited unavoidable wetland impact associated with the Utility Switchyard will be offset with wetland replication, conservation easement, and restoration measures.
- Stormwater management will be achieved by careful site grading and stormwater detention basin design to maximize infiltration and minimize the potential for erosion and sedimentation during construction and operation.
- Blasting required during construction will comply with local requirements, which include the establishment of a formal blasting plan, limiting blast areas and strength to avoid offsite impact, identification of monitoring locations, advanced notifications, and post-blast surveys.
- Socioeconomic benefits include tax revenue, jobs, and their related benefits to the local and regional economy. Minimal requirements will be placed on local infrastructure and services.
- Traffic impacts during construction will be minimal and mitigated by the direct access that is available to the KEC Site via Interstate 395; locating construction work parking and laydown on the KEC Site; and by utilizing flaggers and other manual control for key deliveries or as otherwise needed. No significant traffic impacts are anticipated during operation due to the number of operating staff required.

KEC will contribute important local, state, and regional benefits by being an environmentally sound, low cost, and reliable source of power for Connecticut and the surrounding region; supporting future growth of renewable energy; reducing emissions due to displacement; and providing significant tax payments and substantial job benefits.

Table ES-1 provides a detailed guide to the location of Application requirements within this document.

Table ES-1: Guide to Application Contents

C.G.S. VI	Required Contents of Application	Location in Application
A	An executive summary.	Executive Summary
A	A description and the location of the proposed facility, including an artist's rendering and/or narrative describing its appearance.	Section 2.0, Project Description; Figure 2-6, KEC Rendering; Section 8.0, Project-Related Interconnections
B	A description of the technical specifications, including, but not limited to:	Section 2.0, Project Description
	1. Service life and capacity factor;	Section 2.4, Facility Capability, Operations, and Service Life; Section 2.13.5.1, Component Availability
	2. Fuel type and supply;	Section 1.6, Fuel Supply Availability Forecasts; 2.3.7, Ancillary Equipment; Section 8.1, Natural Gas Pipeline Interconnection
	3. Combustion technology;	Section 2.3 Facility Technology and Equipment
	4. Control systems, including pollution control technology;	Section 2.3.5, Air-Cooled Condenser; Section 2.6, Instrumentation and Controls; Section 2.7, Air Emissions and Control Systems; Section 2.9, Wastewater Generation, Treatment and Disposal; Section 2.10, Stormwater Management; Section 2.11, Noise Abatement; Section 2.12, Traffic; Section 2.13, Safety, Security, and Contingency Planning
	5. Water use and effluent discharge;	Section 2.8, Water Supply and Use; Section 2.9 Wastewater Generation, Treatment and Disposal; Section 3.2.2, Construction Best Management Practices (Earth Resources); Section 3.3.1, Grades and Stabilization (Earth Resources); Section 4.4, Construction-Related Impacts (Natural Resources); Section 4.5., Operational Impacts (Natural Resources); Section 6.2, Construction-Related Impacts (Water Resources); Section 6.3, Operational Impacts (Water Resources); Section 8.3, Water Pipe Interconnection; Section 8.4, Wastewater Pipe Interconnection

C.G.S. VI	Required Contents of Application	Location in Application
	6. Air emissions;	Section 2.7, Air Emissions and Control Systems; Section 5.0, Air Resources
	7. Waste disposal;	Section 2.14, Solid Waste
	8. Noise abatement;	Section 2.11, Noise Abatement; Section 7.4, Noise
	9. Provisions for emergency operations and shutdown;	Section 2.3.7.4, Auxiliary Boiler; Section 2.3.7.5, Emergency Fire Pump Engine; Section 2.6, Instrumentation and Controls; Section 2.13.2, Emergency Management Plan and Shutdown; Section 2.13.5, Safety and Reliability
	10. Fire suppression technology;	Section 2.3.7.5, Emergency Fire Pump Engine; Section 2.13.3, Fire Protection Systems
	11. Safety warning system;	Section 2.6 Instrumentation and Controls; Section 2.13.2 Emergency Management Plan and Shutdown; Section 2.13.5.2 Contingencies for Resource or Equipment Failure
	12. Proximity to municipal fire stations;	Section 7.7.1.3, Town Government, Schools, and Services
	13. Protective gear and control systems;	Section 2.13, Safety, Security, and Contingency Planning
	14. Traffic flow and potential evacuation routes;	Section 2.12, Traffic; Section 7.2.1, Traffic Assessment; Section 7.2.1.2, Traffic Safety and Evacuation Routes
	15. Traffic safety and fuel spill risk assessment for access routes to the site;	Section 7.2.1, Traffic Assessment; Section 7.2.1.3, Risk of ULSD Delivery Fuel Spills
	16. Provisions for leak detection of fuel and chemicals from storage areas; and	Section 2.13.4, Oil and Chemical Delivery, Storage and Management; Section 6.2.4, Construction Spill Prevention and Control; Section 6.3.4, Operational Spill Prevention and Control

C.G.S. VI	Required Contents of Application	Location in Application
	17. Hazardous materials management and fuel spill prevention and control.	Section 2.5, Fuel Type, Supply, and Storage; Section 2.13.4, Oil and Chemical Delivery, Storage and Management; Section 6.2.4 Construction Spill Prevention and Control; Section 6.3.4, Operational Spill Prevention and Control
C	A demonstration of how the proposed facility would comply with Prevention and Significant Deterioration and Non-Attainment New Source Review requirements, identification of potential maximum emissions from proposed and alternative fuel combustion, and a summary of air pollution control technologies.	Section 5.2, Applicable Regulatory Requirements; Section 5.4, Generating Facility Emissions and Controls; Section 5.5, Air Quality Impact Assessment
D	Alternative technologies, including: 1. Efficiency comparisons; and 2. Environmental comparisons.	Section 9.2, Alternative Technologies; Section 9.3, Alternative Designs
E	An emergency management/evacuation plan.	Section 2.13.2, Emergency Management Plan and Shutdown; Section 7.2.1.2, Traffic Safety and Evacuation Routes
F	Safety and reliability information, including: 1. Provisions for emergency operations and shutdowns; and	Section 2.6, Instrumentation and Controls; Section 2.3.7, Ancillary Equipment; Section 2.13.2; Section 2.13.2, Emergency Management Plan and Shutdown; 2.13.5, Safety and Reliability
	2. Fire suppression technology.	Section 2.3.7.5, Ancillary Equipment; Section 2.13.3, Fire Protection Systems
G	A Federal Aviation Administration determination for obstruction or hazard to air navigation.	Section 7.2.2, Airports

C.G.S. VI	Required Contents of Application	Location in Application
H	Itemized estimated costs, including: 1. Plant and fuel;	Section 1.7, Facility Costs
	2. Generating costs per kilowatt hour, both at the plant and related transmission line interconnection;	Section 1.5, Transmission Interconnection and Power Delivery; Section 1.7, Facility Costs
	3. Comparative costs of alternatives considered; and	Section 9.2, Alternative Technologies; Section 9.3, Alternative Designs
	4. Life-cycle costs.	Section 1.7, Facility Costs
I	Information regarding the forecast of available fuel and backup fuel supply proposed for the facility, the State of Connecticut, New England, and the United States.	Section 1.6, Fuel Supply Availability Forecasts
J	The location of existing and proposed pipelines or other infrastructure necessary to provide fuel and water to the proposed project including any upgrades necessary for the delivery of fuel and water to the facility during operation.	Section 1.6, Fuel Supply Availability Forecasts; Section 2.5, Fuel Type, Supply, and Storage
K	The source of fuel, water, and interconnections necessary for facility operation, the location of all infrastructure and pipelines with a map, the service area of the proposed infrastructure, other large users that may compete for the supply of fuel and water to proposed facility, and under what circumstances fuel and water could be curtailed to the facility.	Section 1.6, Fuel Supply Availability Forecasts; Section 2.5, Fuel Type, Supply, and Storage; Section 6.1.3, Regional Water Supply; Section 6.3.1, Water Supply; Section 6.3.2, Water and Wastewater Treatment and Disposal; Section 8.0, Project-Related Interconnections

C.G.S. VI	Required Contents of Application	Location in Application
L	Details of alternative fuel supply including fuel compatibility, schedule and mechanism necessary for fuel switching, equipment requirements, and analysis of alternatives with a comparison of facility reliability with and without alternative fuel supplies.	Section 1.6, Fuel Supply Availability Forecasts; Section 2.5 Fuel Type, Supply, and Storage
M	A comparison, with a narrative and tabular reporting, of wet and dry cooling technologies, non-contact cooling, and use of gray water if applicable, including the estimated capital and operating costs, effects on air emissions, water use, water discharge, water recycling, effects on water resources and water diversions, noise, and special requirements of each technology under all operating scenarios.	Section 9.3.2, Cooling System; Section 9.3.3, Water Supply
N	An explanation of consistency with regional water supply and watershed protection plans and permit application or executed permit, if applicable for the use of diverted water for cooling and other facility uses.	Section 6.1.3, Regional Water Supply; Section 6.3.1, Water Supply
O	A storm water management plan with modeling to predict the quality and quantity of anticipated runoff and discharge.	Section 2.10, Stormwater Management; Section 3.2.2, Construction Best Management Practices (Earth Resources); Section 3.3.1, Grades and Stabilization (Earth Resources); Section 6.2, Construction-Related Impacts (Water Resources); Section 6.3.3, Stormwater Management
P	The construction type of the transmission interconnection (overhead, underground, single circuit, double circuit) and the existing and expected transmission line loadings, substation interconnection plan, and the anticipated range of dispatch based on transmission grid constraints. Also, provide a final copy of, or a status report on, the independent system operator transmission grid interconnection study.	Section 1.5, Transmission Interconnection and Power Delivery

C.G.S. VI	Required Contents of Application	Location in Application
Q	A statement and full explanation of why the proposed facility is needed and how the facility would conform to a long-range plan for the expansion of the electric power grid serving the state and interconnected utility systems that would serve the public need for adequate, reliable, and economical service.	Section 1.4, Statement of Need and Economic Benefits
R	A justification for selection of the proposed site selected including a comparison with alternative sites which are environmentally, technically, and economically practicable. Include enough information for a complete comparison between the proposed site and any alternative site contemplated.	Section 9.1, Alternative Sites
S	Justification that the location of the proposed facility would not pose an undue safety or health hazard to persons or property along the area traversed by the proposed facility including: 1. Measurements of existing electric and magnetic fields (EMF) at the boundaries of the facility site with extrapolated calculations of exposure levels during expected normal and peak line loading;	Section 7.5, Electric and Magnetic Fields
	2. Calculations of expected EMF levels at the boundaries of the facility site that would occur during normal and peak operations of the facility; and	Section 7.5, Electric and Magnetic Fields
	3. A statement describing consistency with the Council's "Best Management Practices for Electric and Magnetic Fields," as amended;	Section 7.5.2, Consistency with Connecticut Siting Council Best Management Practices

C.G.S. VI	Required Contents of Application	Location in Application
	4. A description of siting security measures for the proposed facility consistent with the Council's "White Paper of the Security of Siting Energy Facilities," as amended; and	Section 2.13, Safety, Security, and Contingency Planning
	5. A description of the effect that the proposed facility would have on the environmental, ecology, and scenic, historic, and recreational values at and around the proposed site, and along new or expanded utility corridors, including effects on:	Section 3.0, Earth Resources; Section 4.0, Natural Resources; Section 5.0, Air Resources; Section 6.0, Water Resources; Section 7.0, Community Resources; Section 8.0, Project-Related Interconnections
	a. Public health and safety;	Section 2.13, Safety, Security, and Contingency Planning; Section 5.5, Air Quality Impact Assessment; Section 6.2.4, Construction Spill Prevention and Control; Section 6.3.4, Operational Spill Prevention and Control; Section 7.2.1.2, Traffic Safety and Evacuation Routes; Section 7.2.1.3, Risk of ULSD Delivery Fuel Spills; Section 7.4, Noise; Section 7.5, Electric and Magnetic Fields; Section 7.7.3.2, Demand on Local Services
	b. Local, state, and federal land use, conservation, and development plans;	Section 7.1, Land Use, Zoning, and Planning
	c. Existing and future development;	Section 2.1, Site Location and Access; Section 7.1, Land Use, Zoning, and Planning
	d. Adjacent land use;	Section 2.1, Site Location and Access; Section 7.1, Land Use, Zoning, and Planning
	e. Ecological integrity;	Section 4.0, Natural Resources
	f. Noise with baseline testing and modeling consistent with State regulations;	Section 7.4, Noise; Section 7.5, Electric and Magnetic Fields

C.G.S. VI	Required Contents of Application	Location in Application
	g. Consistency with plans for development and protection of recreational areas and areas of natural history including areas of geologic, ecological, and archaeological interest;	Section 3.1, Existing Site Conditions (Earth Resources); Section 4.0, Natural Resources; Section 7.1, Land Use, Zoning, and Planning; Section 7.3 Visual Resources and Aesthetics; Section 7.6 Cultural Resources
	h. Visibility based on photographic simulation, artist renditions, and sight line profiles;	Section 7.3, Visual Resources and Aesthetics
	i. Roads;	Section 2.1, Site Location and Access; Section 7.2.1, Traffic Assessment
	j. Wetlands and watercourses;	Section 4.0, Natural Resources
	k. Wildlife and vegetation, including rare and endangered species, critical habitats, and species of special concern, with documentation from the Department of Environmental Protection Natural Diversity Data Base;	Section 4.0, Natural Resources
	l. Public water supply watershed and aquifer areas, consistent with state and local conservation and development plans;	Section 6.0, Water Resources
	m. Archaeological and historic resources, with documentation by the State Historic Perseveration Officer; and	Section 7.6, Cultural Resources

C.G.S. VI	Required Contents of Application	Location in Application
	n. Other environmental concerns identified by the applicant, the Council, or any public agency, including but not limited to, where applicable: • Coastal Consistency Analysis (Connecticut General Statutes [C.G.S.] §22a-90) • Connecticut Heritage Areas (C.G.S. §16a-27) • Ridgeline Protection Zones (C.G.S. §8-1aa) • Aquifer Protection Zones (C.G.S. §22a-354b) • Department of Transportation Scenic Lands (C.G.S. §13a-85a) • State Parks and Forests (C.G.S. §23-5) • Agricultural Lands (C.G.S. §22-26aa) • Wild and Scenic Rivers (C.G.S. §25-199) • Protected Rivers (C.G.S. §25-200) • Endangered, Threatened or Special Concern Species (C.G.S. §26-303)	Section 3.1, Existing Site Conditions (Earth Resources); Section 4.0, Natural Resources; Section 6.1, Existing Conditions (Water Resources); Section 7.1.3, Recreational Resources; Section 7.3, Visual Resources and Aesthetics; Section 7.6, Cultural Resources
T	A statement and full explanation of why the proposed facility is necessary; 1. for the reliability of the electric power supply of the state; or 2. for a competitive market for electricity.	Section 1.4, Statement of Need and Economic Benefits

C.G.S. VI	Required Contents of Application	Location in Application
U	A statement of loads and resources as described in Conn. Gen. Stat. § 16-50r; 1. information on extent to which proposed facility is identified in and consistent with life cycle cost analysis and other advance planning; or 2. an explanation for any failure of the facility to conform with such information.	Section 1.4, Statement of Need and Economic Benefits
V	Safety and reliability information, including planned provisions for emergency operations and shutdowns; 1. Historic and expected availability of all facility components; 2. Availability of off-site resources such as water and fuel supply with resource plans documenting supply and capacity; 3. All mechanisms for contingency in the event of fuel curtailment, water curtailment, facility flame-out, and electrical component failure; and 4. The historic and expected availability of all necessary electric and fuel transmission infrastructure.	Section 1.5, Transmission Interconnection and Power Delivery; Section 1.6, Fuel Supply Availability Forecasts; Section 2.6, Instrumentation and Controls; Section 2.3.7, Ancillary Equipment; Section 2.13.2; Section 2.13.2, Emergency Management Plan and Shutdown; 2.13.5, Safety and Reliability
W	Estimated cost information, including plant costs, fuel costs, plant service life and capacity factor and total generating cost per kilowatt hour, both at the plant and related transmission, and comparative costs of alternatives considered;	Section 1.5, Transmission Interconnection and Power Delivery; Section 1.7, Facility Costs

C.G.S. VI	Required Contents of Application	Location in Application
X	A schedule showing the program for design, material acquisition, construction and testing, and operating dates;	Section 1.8, Project Schedule
Y	Available site information, including maps and description of present and proposed development, and geological, scenic, ecological, seismic, biological, water supply, population and load center data, including but not limited to a proposed site map(s) at a scale no smaller than 1 inch = 40 feet, a location map at a scale 1 inch = 2,000 feet, and aerial photos of suitable scale showing the site, access, and abutting properties including proximity to the following: 1. Settled areas; 2. Schools and daycare centers; 3. Hospitals; 4. Group homes; 5. Forests and parks; 6. Recreational areas; 7. Seismic areas; 8. Scenic areas; 9. Historical areas; 10. Areas of geologic, ecological, or archaeological interest; 11. Areas regulated under the Inland Wetlands and Watercourses Act (to be delineated by a Connecticut Certified Soil Scientist on large scale 1 inch = 40 feet maps);	Section 2.1, Site Location and Access; Section 3.0, Earth Resources; Section 4.0, Natural Resources; Section 5.0, Water Resources; Section 7.0, Community Resources

C.G.S. VI	Required Contents of Application	Location in Application
	12. Areas regulated under the Tidal Wetlands Act and Coastal Zone Management Act (to be delineated by a Connecticut Certified Soil Scientist on large scale 1 inch = 40 feet maps); 13. Public water supply sources including wells, reservoirs, watersheds, and aquifers; 14. Hunting or wildlife management areas; 15. Existing transmission lines within one mile of the site.	
Z	Justification for adoption of the site selected, including comparison with alternative sites;	Section 9.1, Alternative Sites
AA	Design information, including a description of facilities, plant efficiencies, electrical connections to the system, and control systems;	Section 2.0, Project Description; Section 8.0, Project-Related Interconnections
BB	A description of provisions, including devices and operations, for mitigation of the effect of operation of the facility on air and water quality, for waste disposal, for noise abatement, and information on other environmental aspects including but not limited to: 1. Construction techniques designed specifically to minimize adverse effects on natural areas and sensitive areas; 2. Special design features made specifically to avoid or minimize adverse effects on natural areas and sensitive areas, or to restore degraded areas;	Section 2.2, Proposed Facility Layout; Section 2.7, Air Emissions and Control Systems; Section 2.10, Stormwater Management; Section 2.11, Noise Abatement; Section 2.14, Waste Disposal; Section 3.2, Construction-Related Impacts and Mitigation Measures (Earth Resources); Section 3.3, Operational Impacts and Mitigation Measures (Earth Resources); Section 4.0, Natural Resources; Section 5.4, Generating Facility Emissions and Controls; Section 6.2, Construction-Related Impacts (Water Resources); Section 6.3, Operational Impacts (Water Resources); Section 7.3, Visual Resources and Aesthetics; Section 7.4, Noise

C.G.S. VI	Required Contents of Application	Location in Application
	3. Establishment of vegetation proposed near residential, recreational, and scenic areas; 4. Methods for preservation of vegetation for wildlife habitat and screening, and 5. Methods to replace any lost functions or reduced value of wetland areas affect by the proposed facility.	
CC	A listing of federal, state, regional, district and municipal agencies from which approvals either have been obtained or will be sought covering the proposed facility, copies of approvals received and the planned schedule for obtaining those approvals not yet received.	Section 1.2, Environmental Justice and Community Outreach; Section 10.0, Required Permits and Approvals
DD	Bulk filings of the most recent conservation, inland wetland, zoning, and plan of development documents of the municipality, including a description of the zoning classification of the site and surrounding areas, and a narrative summary of the consistency of the project with the Town's regulations and plans.	Bulk filings provided under separate cover; Section 7.1, Land Use, Zoning, and Planning

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
%	percent
$	United States Dollars
ºF	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
AC	alternating current
ACC	air-cooled condenser
ACS	American Community Survey
AGT	Algonquin Gas Transmission Company
AIM	Algonquin Incremental Market
Amsl	above mean sea level
AN	Audible Noise
the Applicant	NTE Connecticut, LLC
the Application	the application for a Certificate of Environmental Compatibility and Public Need and the accompanying attachments submitted by NTE Connecticut, LLC
ASOS	Automated Surface Observing System
BACT	Best Available Control Technology
Bcf	billion cubic feet
BMPs	Best Management Practices
BP	before present
Btu/kWh	British thermal units per kilowatt-hour
CECPN	Certificate of Environmental Compatibility and Public Need
CEMS	continuous emission monitoring system
Certificate	Certificate of Environmental Compatibility and Public Need for construction, maintenance, and operation of the Killingly Energy Center
CFR	Code of Federal Regulations
cfs	cubic feet per second

Acronyms/Abbreviations	Definition
C.G.S.	Connecticut General Statutes
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
ConnDOT	Connecticut Department of Transportation
the Council	Connecticut Siting Council
CPP	Clean Power Plan
CT	Connecticut
CT Zone	Connecticut capacity zone
CSC	Connecticut Siting Council
CSO	capacity supply obligation
CTG	combustion turbine generator
CWC	Connecticut Water Company
Danielson-NE LMA	Willimantic-Danielson Labor Market Area
dBA	A-weighted decibels
dBμV/m	decibels above 1 volt per meter
DCS	Digital Control System
DEEP	Connecticut Department of Energy and Environmental Protection
DLN	dry-low NO_x
EASTCONN	Eastern Connecticut Regional Educational Service Center
E&S Plan	Erosion and Sediment Control Plan
EIA	Energy Information Administration
EJ	Environmental Justice
EJ Plan	Environmental Justice Public Participation Plan
EMF	electric and magnetic fields
EM_x^{TM}	proprietary catalytic absorption system technology
ERCs	emission reduction credits
Exponent	Exponent, Inc.

Acronyms/Abbreviations	Definition
FAA	Federal Aviation Administration
FCA	Forward Capacity Auction
FCA 11	Forward Capacity Auction for the 2020/2021 delivery year
FCM	Forward Capacity Market
FERC	Federal Energy Regulatory Commission
FTEs	full-time equivalents
g	Earth's gravitational acceleration
the Generating Facility Site	an approximately 63-acre parcel of land located north and west of Lake Road proposed for development of the electric generating facility
GHG	greenhouse gas
gpd	gallons per day
gpm	gallons per minute
gr/100 scf	grains of total sulfur per 100 standard cubic feet
GSU	generator step-up transformers
H1H	highest first highest
H2H	highest second highest
H_2SO_4	sulfuric acid
Haley & Aldrich	Haley & Aldrich, Inc.
HAP	Hazardous Air Pollutant
Hesketh	Hesketh & Associates, Inc.
HRI	Historic Resource Inventory
HRSG	heat recovery steam generator
Hz	Hertz
I-395	Interstate 395
ICES	International Committee on Electromagnetic Safety
ICNIRP	International Commission on Non-Ionizing Radiation Protection
ICR	Installed Capacity Requirement
IEEE	Institute of Electrical and Electronics Engineers

Acronyms/Abbreviations	Definition
IMPLAN	IMpact analysis for PLANning model
IPaC	Information for Planning and Conservation
ips	inches per second
IRP	Integrated Resources Plan
ISO	International Organization for Standardization
ISO-NE	New England Independent System Operator
JEDI	Jobs and Economic Development Impact model
KEA	Killingly Engineering Associates, LLC
KEC	Killingly Energy Center, an approximately 550-MW combined cycle electric generating facility and related electrical interconnection switchyard
the KEC Site	the proposed location of the Killingly Energy Center consisting of approximately 73 acres of land along Lake Road in the Town of Killingly, Windham County, Connecticut
km	kilometers
kV	kilovolt
kV/m	kilovolts per meter
kW	kilowatt
kW-hr	kilowatt-hour
kW-mo	kilowatt-months
LAER	Lowest Achievable Emissions Rate
LED	light-emitting diode
lb/MMBtu	pounds per million British thermal units
LNG	liquefied natural gas
MADEP	Massachusetts Department of Environmental Protection
MECL	minimum emissions compliance load
mG	milliGauss
MGD	million gallons per day
MMBtu	million British thermal units per hour

Acronyms/Abbreviations	Definition
MMBtu/hr	million British thermal units per hour
MMcf	million cubic feet
Mott MacDonald	Mott MacDonald, LLC
MW	megawatt
MWh	megawatt-hour
N_2	nitrogen
NAAQS	National Ambient Air Quality Standards
NDDB	Natural Diversity Data Base
NEPOOL	New England Power Pool
NH_3	ammonia
NNSR	Nonattainment New Source Review
NO_2	nitrogen dioxide
NOAA	National Oceanic and Atmospheric Administration
NO_X	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NREL	National Renewable Energy Laboratory
NRHP	National Register of Historic Places
NSR	New Source Review
NTE	NTE Connecticut, LLC
NTE Energy	NTE Energy, LLC
O_2	oxygen
O_3	ozone
OSHA	Occupational Safety and Health Administration
PA	PA Consulting Group, Inc.
Pb	lead
PGA	peak ground acceleration
the Plan	the Killingly Plan of Conversation and Development adopted in 2010

Acronyms/Abbreviations	Definition
$PM_{2.5}$	particulate matter with a diameter of less than 2.5 microns
PM_{10}	particulate matter with a diameter of less than 10 microns
POI	point of interconnection
ppb	parts per billion
ppm	parts per million
ppmvdc	parts per million by volume dry at 15% oxygen
ppmw	parts per million by weight
PSD	Prevention of Significant Deterioration
psig	pounds per square inch gauge
QVEC	Quinebaug Valley Emergency Communications
RCRA	Resource Conservation and Recovery Act
R.C.S.A.	Regulations of Connecticut State Agencies
REMA	REMA Ecological Services LLC
RGGI	Regional Greenhouse Gas Initiative
RIDEM	Rhode Island Department of Environmental Management
RN	radio noise
ROP Zone	Rest-of-Pool capacity zone
ROW	right-of-way
rpm	revolutions per minute
RTO	Regional Transmission Organization
S	sulfur
scf	standard cubic feet
SCR	selective catalytic reduction
SER	Significant Emission Rate
SHPO	State Historic Preservation Office
SIA	Significant Impact Area
SILs	Significant Impact Levels
SNCR	selective non-catalytic reduction

Acronyms/Abbreviations	Definition
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control and Countermeasure
STG	steam turbine generator
SUSD	start-up/shutdown
the Switchyard Site	an approximately 10-acre parcel of land located south and east of Lake Road proposed for development of the Utility Switchyard
SWPPP	Stormwater Pollution Prevention Plan
Tetra Tech	Tetra Tech, Inc.
tpy	tons per year
THPO	Tribal Historic Preservation Office
TWh	terawatt-hours
UDP	Unanticipated Discovery Plan
ULSD	ultra-low sulfur distillate
UNFI	United Natural Foods
USACE	United States Army Corps of Engineers
USBM	United States Bureau of Mines
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
Utility Switchyard	proposed three-breaker ring bus to be owned by Eversource and located on the Switchyard Site
VOC	volatile organic compounds

1.0 INTRODUCTION

1.1 PURPOSE OF APPLICATION AND STATUTORY AUTHORITY

1.1.1 Statutory Authority and Purpose

This Application for a Certificate of Environmental Compatibility and Public Need (CECPN or Certificate) and the accompanying attachments (collectively, the Application) is submitted by NTE Connecticut, LLC (NTE or the Applicant), pursuant to Chapter 277a, Sections 16-50g et seq. of the Connecticut General Statutes (C.G.S.), as amended, Sections 16-50j-1 et seq. of the Regulations of Connecticut State Agencies (R.C.S.A.), as amended, and is consistent with the Connecticut Siting Council's (CSC's or Council's) Application Guide for an Electric Generating Facility dated June 2016.

The Applicant requests that the Council issue a Certificate for the construction, maintenance, and operation of the Killingly Energy Center (KEC), an approximately 550-megawatt (MW) combined cycle electric generating facility and related electrical interconnection switchyard proposed on two separate parcels totaling 73 acres of land along Lake Road in Killingly, Connecticut (the KEC Site). A 63-acre parcel north and west of Lake Road will support the electric generating facility (the Generating Facility Site), including a 150-foot tall exhaust stack. The electrical switchyard (Utility Switchyard) will be constructed on a 10-acre parcel (the Switchyard Site), located immediately across the street from the Generating Facility Site, south and east of Lake Road. The Utility Switchyard will ultimately be owned and operated by Eversource, and an easement will be granted by NTE to Eversource for the underlying property and access road. Both properties are immediately adjacent to and west of an existing Eversource electric transmission line right-of-way (ROW). The primary source of fuel for KEC will be natural gas, extending from existing service approximately 2 miles to the north of the KEC Site. During times of natural gas curtailment or service interruption, KEC will operate on ultra-low sulfur distillate (ULSD) as a backup fuel.

1.1.2 Applicant Information and Service Contact

NTE is a Delaware Limited Liability Company, with principal offices located at 24 Cathedral Place, Suite 300, St. Augustine, Florida 32084; and a New England office at 800 South Street, Suite 620, Waltham, Massachusetts. NTE, an affiliate of NTE Energy, LLC (NTE Energy), is focused on the goal of developing, constructing, owning, and operating power projects across the United States. NTE Energy is a family-owned business, employing some of the most experienced engineers, developers and commercial professionals in the industry. Collectively, NTE Energy team members have developed, constructed, owned, operated, and managed dozens of traditional and renewable generation facilities across the country and around the world, representing tens of thousands of MW of power generation. The team executes all aspects of project development, from initial market and site evaluations to permitting and financing, as well as construction. Currently, the team has thousands of MW under development, with two projects under construction in Ohio and North Carolina, both of which will begin operation in 2018. NTE Energy will have operation and management responsibility for those facilities.

Correspondence and/or communications regarding this Application may be addressed to, and notices and other papers may be served upon, the following:

Mark Mirabito, Vice President
NTE Connecticut, LLC
24 Cathedral Place, Suite 300
St. Augustine, FL 32084
mmirabito@nteenergy.com
kec.notices@nteenergy.com

Chris Rega, Senior Vice President, Engineering & Construction
NTE Energy, LLC
800 South Street, Suite 620
Waltham, MA 02453
crega@nteenergy.com

A copy of all such correspondence or communications should also be sent to:

Robinson & Cole LLP
280 Trumbull Street
Hartford, CT 06103-3597
(860) 275-8200
Attention: Kenneth C. Baldwin, Esq.
kbaldwin@rc.com

1.1.3 Project Team

In addition to NTE, the KEC team of professional firms contributing to this Application includes the following: Tetra Tech, Inc. (Tetra Tech); Mott MacDonald, LLC (Mott MacDonald); PA Consulting Group, Inc. (PA); Killingly Engineering Associates, LLC (KEA); F.A. Hesketh & Associates, Inc. (Hesketh); Haley & Aldrich, Inc. (Haley & Aldrich); REMA Ecological Services LLC (REMA); and Exponent, Inc. (Exponent). A brief description of the experience and credentials of these companies is provided below.

1.1.3.1 Tetra Tech, Inc. – Lead Environmental Consultant

Tetra Tech, the lead environmental consultant for KEC, is a leading provider of environmental consulting, engineering, remediation, and construction services worldwide. Tetra Tech is a publicly traded company with annual revenues in excess of $2.29 billion and more than 13,000 employees in 330 offices.

Tetra Tech provides comprehensive and fully integrated environmental, engineering, and construction services throughout all phases of energy projects – from the planning and development phase through licensing, engineering, construction, operation, and maintenance. Tetra Tech has supported development of more than 150 conventional power generating facilities, 400 renewable electric generating facilities, 100 transmission lines, and 200 natural gas pipelines throughout the United States and worldwide. Senior professionals at Tetra Tech directed or played a key role in the comprehensive permitting of several Connecticut electric generating facilities, as well as several early development projects in Connecticut. Tetra Tech senior professionals have also provided support to other NTE projects, including the Middletown Energy Center.

Among its many offices, Tetra Tech has locations in Wethersfield and West Haven, Connecticut, as well as more than 10 other locations throughout New England.

1.1.3.2 Mott MacDonald, LLC – Owner's Engineer

Mott MacDonald, providing owner's engineering services for KEC, is a global engineering, management, and development consultancy with significant experience providing engineering services for thermal power generation projects such as KEC. Its experience spans the complete range of skills needed to take a project from concept to commissioning. This includes feasibility and scoping studies, detailed design, and plant specifications. Mott MacDonald also has considerable experience as the lenders' engineer on due diligence assignments. Its expertise in combined cycle combustion turbine projects using both natural gas and liquid fuels is being brought to bear for KEC.

1.1.3.3 PA Consulting Group, Inc. – Market and Economic Consultant

PA, the electricity market and economic consultant for KEC, is a global consulting, technology, and innovation firm with over 2,000 consultants across the world. Using proprietary models, PA forecasts power prices for North American electricity markets, and the operations of the power plants within them. PA's energy consultants have analyzed the United States electricity markets for over 15 years. Over the past five years, PA has analyzed more than 225,000 MW of power plants, including 20,000 MW located in New England. In Connecticut, PA played a key role in the development of CPV's Towantic Energy Center. In the Northeast, PA has offices in Boston and New York City.

1.1.3.4 Killingly Engineering Associates, LLC – Civil Engineering Support

KEA is providing civil engineering support for KEC. Located in Killingly, Connecticut, KEA provides professional civil engineering and surveying services to the private and commercial sectors, specializing in site engineering and permitting for residential, commercial, industrial, and municipal development projects. Some of the specific engineering services KEA provides include: site feasibility studies; floodplain analysis; water quality engineering; development of stormwater management/pollution prevention plans; design of detention and retention facilities; roadway, drainage, and utilities design; construction plans and specifications; site development plans; and assistance with local, state, and federal permitting. KEA's partners are dedicated professionals with over 50 years of combined engineering experience.

1.1.3.5 F.A. Hesketh & Associates, Inc. – Traffic Engineer

Hesketh is a multi-discipline civil and traffic engineering firm providing traffic engineering services for KEC. Since the firm was founded in Bloomfield, Connecticut in 1976, Hesketh has provided professional engineering, land planning and land surveying services to a wide variety of private, municipal and state governmental clients in connection with project development throughout southern New England. The firm continues to specialize in highway and transportation engineering, traffic studies, civil engineering, site development planning and design and land surveying. Support for KEC is from Hesketh's East Granby, Connecticut office. The firm has had the privilege to provide civil and traffic engineering, land planning and land surveying services for numerous important developments throughout the region including all phases of the planning and design of Adriaen's Landing; the ING Northeast Regional Office in Windsor; the Pratt & Whitney engineering building; Rentschler Field/Cabela's; Evergreen Walk Life Style Center; Westfarms Mall; Buckland Hills Mall; and Foxwoods Casino and the Mashantucket Pequot Tribal Museum.

1.1.3.6 Haley & Aldrich, Inc. – Geotechnical Consultant

Haley & Aldrich, KEC's geotechnical consultant, draws from more than 600 engineers, scientists, construction professionals, and technical experts nationwide to collaborate and provide creative solutions. Since its founding in 1957, it has delivered long-term value, for both straightforward and complex projects. It provides strategic engineering consulting services from a tradition of specialized capabilities in the geosciences, providing geotechnical services ranging from site characterization, planning/preliminary design, final design, construction, and operation for utility projects. Staff supporting KEC are based in Rocky Hill, Connecticut, and have provided geotechnical engineering services for numerous electric generation, electric transmission, electric substation, gas transmission, and gas compressor station projects throughout the Northeastern United States.

1.1.3.7 REMA Ecological Services LLC – Wetland and Ecological Consultant

REMA, KEC's wetland and ecological consultant, is a Connecticut-based company formed in 1996 to provide natural resource management, environmental planning, and compliance services throughout the Northeast. REMA's core disciplines include soils, ecology, botany, wildlife, herpetology, aquatic biology, entomology, and environmental science, with much of its project work focused on wetlands, watercourses, and aquatic ecosystems. REMA staff soil/wetland scientists are experienced wetland delineators, using both state and federal criteria and guidelines, and hold Professional Wetland Scientist; Wildlife Biologist; Senior Ecologist; and Soil Scientist certifications.

1.1.3.8 Exponent, Inc. – Electric and Magnetic Fields Consultant

Exponent is providing electric and magnetic fields (EMF) consulting services for KEC. Exponent engineers and scientists have extensive experience in assisting clients to evaluate EMF at power frequencies as well as audible noise (AN) and radio noise (RN) that are associated with the operation of electric utility transmission and distribution facilities. Its scientists and engineers advise electric utilities, the electronics industry, research organizations, and national regulatory authorities and international scientific and health agencies; and also conduct applied EMF research and investigate health and safety concerns about EMF. Exponent has prepared Environmental Reports and Environmental Impact Statements for high-voltage transmission lines, electrical substations, and power generation plants across the United States and Canada as well as Ireland and Scotland. Its engineers and scientists have testified before the CSC on numerous occasions regarding modeling of EMF from existing and proposed electrical facilities and the current status of research on EMF and health.

1.1.4 Application and Municipal Participation Fee

The estimated total construction cost for KEC will be in excess of $5,000,000; in fact, the estimated total construction cost is $537 million. Therefore, pursuant to Section 16-50v-1a(b) of the R.C.S.A., an application fee of $25,250.00 accompanies this Application in the form of a check payable to the Council. Also, in accordance with C.G.S. Section 16-50bb, NTE has submitted an additional $25,000.00 to be deposited into the Council's Municipal Participation Account.

1.2 ENVIRONMENTAL JUSTICE AND COMMUNITY OUTREACH

Pursuant to Section 22a-20a of the C.G.S., applicants seeking to obtain a Certificate from the Council or a permit from the Connecticut Department of Energy and Environmental Protection (DEEP) for an electric generating facility (an "affecting facility") within an Environmental Justice (EJ) Community, as that term is defined, shall file a meaningful public participation plan with the Council prior to filing an application for a permit or Certificate and consult with the chief elected official of the town. The Town of Killingly is an EJ Community. In accordance with these requirements, an EJ Public Participation Plan (EJ Plan) was developed and submitted to DEEP and the Council. The final EJ Plan was approved by DEEP on April 19, 2016. As called out in the EJ Plan, NTE commenced a robust community outreach effort in March of 2016 to ensure local awareness of KEC and to provide opportunities for public review of the KEC proposal and participation in the regulatory approval process. This community outreach effort included:

- Public information meetings held on March 22, May 4, and July 11, 2016. Notice of these meetings was sent to over 300 community members, organizations, businesses, abutting landowners, and municipal and state officials, was placed in the local newspaper, and posted on the property in accordance with EJ requirements;
- Informational meetings with the Killingly Town Council, Economic Development Commission, Planning & Zoning Commission, Inland Wetlands & Watercourses Commission, business owners, neighborhood residents, and other interested stakeholders;
- Maps, plans, studies, and reports published on the KEC website (www.killinglyenergycenter.com), with hard copies of this information also made available for review at the Killingly Town Hall and Killingly Public Library;
- A sign posted on the property identifying it as the "Proposed Site" of KEC and providing contact information;
- Presentations to local business associations, industry groups, and community stakeholders;
- Individual meetings with community members interested in learning more about KEC;
- Ongoing development of an e-mail contact list through sign-up sheets at public meetings, as well as website forms to provide KEC updates to interested community members; and
- A regular (monthly) newsletter and other local communication regarding KEC events and milestones circulated to KEC's e-mail list, published in the local newspaper, and provided at the Killingly Town Hall and Killingly Public Library.

In accordance with Section 16-50l(e) of the C.G.S., NTE submitted a Technical Report to municipal officials in Killingly, Pomfret, and Putnam on May 4, 2016. In addition, on July 19, 2016, NTE presented its KEC proposal at a joint meeting of the Killingly Planning & Zoning Commission and Inland Wetlands & Watercourses Commission. The KEC team expects to be invited to present additional information to both Commissions in the near future and respond to their questions as they develop their municipal regulate and restrict order and recommendations about the proposal to the Council pursuant to C.G.S. 16-50x(d).

1.3 COMPLIANCE WITH NOTICE REQUIREMENTS

Copies of this Application have been sent to municipal officials in the Towns of Killingly, Pomfret, and Putnam as well as to regional, state, and federal officials, pursuant to C.G.S. Section 16-50l(b). A certificate of service, along with a list of the officials served with a copy of the Application, is included in Appendix A.

Notice of NTE's intent to submit this Application was published on August 15 and August 16, 2016, in the Norwich Bulletin pursuant to C.G.S. Section 16-50l(b). A copy of the published legal notice is included in Appendix A. Affidavits of Publication will be forwarded to the CSC as soon as they are available.

Appendix A also contains a certification that notice of NTE's intent to file this Application was sent to each person appearing of record as an owner of land that may be considered to abut the KEC Site in accordance with C.G.S. Section 16-50l(b), as well as a list of the landowners to whom such notice was sent and a sample notice letter.

1.4 STATEMENT OF NEED AND ECONOMIC BENEFITS

The following section outlines: how KEC contributes to the electric reliability of Connecticut and the overall New England electricity system; the need for KEC, as well as its benefits; and KEC's consistency with the DEEP's long-term energy policy.

1.4.1 Adequate, Reliable, and Economic Electric Supply and Service

Load-serving entities located within the State of Connecticut are members of the New England Independent System Operator (ISO-NE), an independent, non-profit Regional Transmission Organization (RTO) serving Connecticut, Massachusetts, New Hampshire, Rhode Island, Vermont, and portions of Maine (Figure 1-1). Among other items, ISO-NE operates the region's transmission network and administers the Federal Energy Regulatory Commission (FERC) approved wholesale energy, ancillary, and capacity markets. In 1997, ISO-NE was created by the New England Power Pool (NEPOOL) market participants to operate the regional electricity system, create and administer the wholesale markets, and ensure open access to transmission. In 2005, FERC Order 2000 designated ISO-NE as an RTO; as such, ISO-NE assumed the additional responsibility for system planning.

In 1996, in accordance with FERC Orders 888 and 889, state regulators and load-serving entities throughout the New England region began the process of electricity market deregulation, and Connecticut's Department of Public Utility Control began formal participation in the region's process of deregulation with the enactment of Public Act No. 98-28. Subsequently, in 1998, Connecticut adopted an order approving retail choice for the state. Retail choice allows Connecticut electricity ratepayers the option to select a competitive retailer to supply their electricity needs, while still relying on the local electric utility for distribution service.

Figure 1-1
Town of Killingly's Location in ISO-NE

Killingly Energy Center
an NTE Energy Project

Currently, there are two major distribution companies under the retail choice program operating in Connecticut: Connecticut Light & Power (doing business as Eversource) manages the distribution system for approximately 70 percent of Connecticut; and United Illuminating Company, serving southwestern Connecticut, serves approximately 15 percent of Connecticut. The remaining 15 percent of the state is served by smaller distribution companies who are not in the retail choice territories. The Town of Killingly is served by Eversource.

ISO-NE accomplishes system planning for reliability via the Forward Capacity Market (FCM) capacity procurement mechanism, approved by FERC in 2006. As members of ISO-NE, Connecticut load-serving entities rely upon ISO-NE's FCM capacity procurement mechanism to meet projected peak electricity demand plus a target amount of reserves (i.e., extra capacity). It is through the FCM, discussed further in the following sections, that ISO-NE determines the reliability-driven need for new capacity resources like KEC.

1.4.2 Need for the Project

1.4.2.1 Economic Need for the Project

The FCM capacity procurement mechanism is used by ISO-NE to ensure the regional electricity market has enough capacity resources to reliably meet current and future electricity demand. Under the FCM, Forward Capacity Auctions (FCAs) are used as a market-based approach to determine system-wide and localized needs for both existing and new capacity through a competitive auction process. This process is designed to select the appropriate amount of existing and new capacity resources that are needed for system-wide and local reliability while simultaneously maximizing social surplus.[1] The capacity resources are selected by clearing the FCA. Therefore, capacity resources that clear the FCA are, by definition, needed for reliability.

Forward Capacity Market Overview

The FCA is conducted three years prior to the capacity commitment period (i.e., delivery year) for which it is being held. The FCA is a descending clock auction whereby the auction starting price is reduced in each round until the amount of remaining capacity is equal to the value that ISO-NE places on additional excess capacity, based on its demand curve parameters. Capacity resources participating in the FCA do not

[1] Social surplus, or social welfare, is defined as the sum of consumer and supplier surplus. Consumer surplus is the difference between the amount that consumers would be willing to pay and the amount they actually pay. Supplier surplus is the difference between the amount that suppliers are actually paid and the amount that they would have been willing to accept.

submit sell offers; existing capacity resources that wish to withdraw from the auction must submit a de-list bid, which is subject to a reliability review.

The capacity that is required to meet ISO-NE's future system-wide demand is called the Installed Capacity Requirement (ICR). The ICR is the minimum amount of capacity required for ISO-NE to meet its resource adequacy planning criterion. Additionally, the FCM takes into account locational capacity needs to ensure that regional zones have sufficient capacity to maintain reliability when transmission constraints prevent the delivery of electricity to any particular capacity zone. Capacity requirements vary from year to year. For the upcoming FCA, ISO-NE proposes to model two transmission-constrained zones: an import-constrained Southeastern New England Zone (Rhode Island and eastern Massachusetts) and an export-constrained Northern New England Zone (Maine, Vermont, and New Hampshire). The Connecticut capacity zone (CT Zone), where KEC will be located, and the Western Massachusetts zone will be included as part of the unconstrained Rest-of-Pool capacity zone (ROP Zone).

For each FCA, capacity resources receive a capacity supply obligation (CSO) of at least one year, which requires the capacity resource to bid into the energy market. In return, cleared capacity resources receive the applicable clearing price for that FCA (and can be financially penalized if they do not deliver on the assigned capacity obligation). ISO-NE's next FCA is for the 2020/2021 delivery year (FCA 11), which will be held in February 2017. This auction will determine the capacity that is needed for reliability in ISO-NE during the 2020/2021 delivery year. KEC plans to participate in FCA 11.

An analysis of KEC's impacts within the ISO-NE wholesale electricity market was prepared, including: capacity projections for FCA 11; impacts on Connecticut electricity reliability; and impacts on Connecticut electricity ratepayer costs. These impacts, which include details regarding underlying methodology and assumptions, are discussed in Appendix B (Sections 3.3 and 3.4 of Appendix B-2).

For FCA 11, a total cleared capacity of approximately 35.5 gigawatts is projected, resulting in a clearing price of $6.19/kilowatt-months (kW-mo). At this clearing price, KEC is projected to clear the auction. If KEC clears FCA 11, then ISO-NE (and, by proxy, Connecticut load-serving entities that are participants in ISO-NE) will have determined KEC to be needed for the reliability of Connecticut and the wider New England market.

1.4.2.2 Positive Economic Impacts

Construction of KEC will provide significant benefits to the local and regional economies, across three categories – direct, indirect and induced impacts. Direct benefits reflect those effects resulting from KEC's direct expenditures. Indirect impacts reflect supply chain effects from KEC's direct expenditures. Lastly, induced impacts reflect effects from increased household income due to direct and indirect impacts, and wholesale electricity cost savings. Construction-related businesses will likely experience an influx of dollars as equipment and construction materials may be provided by local or regional businesses. Ancillary expenditures, such as local service-related and rental businesses will likely experience an increase in revenue during the construction phase due to the construction workers in the area. Non-payroll direct expenditures, such as services and rentals, made locally during the construction period, are anticipated to include to services such as transportation, security, catering, and clearing. Additionally, indirect and induced economic activity in industries including food services, investigation and security systems, real estate services (i.e., lodging/leasing and rentals), and retail stores is anticipated.

KEC is projected to provide economic benefits to the State of Connecticut and the Town of Killingly during both its construction and operating periods (Appendix B). These economic benefits are expected to be realized in the three areas outlined below.

- KEC's construction – Equipment, materials, and labor used during construction and state sales tax, permitting fees, and other activities.
- KEC's operations – Fixed and variable costs associated with the materials and labor needed to operate the facility as well as annual property taxes to the Town of Killingly.
- Electricity cost savings to Connecticut ratepayers – KEC's entry will result in lower wholesale capacity and energy prices, thereby resulting in electricity cost savings to Connecticut ratepayers.

For each of these areas, economic benefits were measured according to three factors: job creation; wage creation; and economic output using the IMPLAN (IMpact analysis for PLANing model) and the National Renewable Energy Lab's (NREL) Jobs and Economic Development Impact (JEDI) model.

IMPLAN has been in use for more than 30 years and was originally created by the United States Forest Service and commercialized by the Agricultural Department at the University of Minnesota. IMPLAN is used to assess economic impacts related to a wide variety of capital projects by federal and state agencies and private industry, including the United States Department of Agriculture, United States Department of the Interior, United States Army Corps of Engineers (USACE), and United States Coast Guard. In addition to being used to assess the economic impacts of power plants, IMPLAN has also been used to assess impacts from baseball stadiums, forestry, factories (e.g., Tesla's Gigafactory), etc. JEDI was developed by NREL, a United States Department of Energy laboratory, specifically to assess the economic impacts of power plant construction and operations, and has been in use by the power industry for more than 15 years.

Based on the analysis in Appendix B, KEC is projected to contribute positive economic benefits to the State of Connecticut during construction and operations. These benefits, summarized below, include more than $1 billion in increased economic output from 2017 through 2024, and 1,374 jobs created in 2024. Projected construction impacts associated with KEC are:

- Jobs – During the peak of KEC's construction (2018-2019), 515 jobs will be created in 2018 (including 273 onsite) and 386 jobs will be created in 2019 (including 204 onsite).
- Salaries and wages – KEC's total wage creation during construction is projected to be $162 million (an average of $41 million per year). Of this $162 million, $116 million will be attributed to direct wage creation (an average of $29 million per year).
- Economic output – From 2017-2020, the total economic output from KEC is projected to be $236 million (an average of $59 million per year).

Projected operations impacts associated with KEC are:

- Jobs – KEC's operations will create 1,374 jobs in 2024.
- Salaries and wages – The associated wage creation with these jobs will be $98 million in 2024, and total wage creation from 2020 through 2024 is projected to be $375 million.
- Economic output – Total economic output from 2020 through 2024 will be $991 million, with $259 million in 2024.

In addition to these state-wide benefits, KEC is also projected to have positive economic impacts on the Town of Killingly. Operation of KEC is expected to require approximately 25 to 30 full-time employees (included in the total above), anticipated to work in three 8-hour shifts per day. The expectation is that many of the construction jobs described above, as well as these onsite operations jobs will be filled by residents of the Town of Killingly and the neighboring towns. The annual wages associated with these operations jobs is projected be $3 million, with a cumulative $13 million in wages over the first five years of operations. Additionally, KEC's operations will result in a significant increase in the Town of Killingly's tax revenue.

A more detailed discussion of KEC's economic impacts on the State of Connecticut and the Town of Killingly is provided in Section 7.7. In addition, a more detailed discussion of the analysis, input assumptions and findings is provided in Appendix B (B-1 and B-2: Sections 2.2 and 2.3).

1.4.2.3 Positive Environmental Impacts

In addition to the economic benefits discussed in the previous section, KEC will also have positive environmental impacts on the State of Connecticut and the surrounding region. More specifically, KEC's entry will result in a decrease in annual emissions by New England power plants due to KEC operating ahead of (i.e., displacing) older, inefficient and higher-emitting power plants in the market. The full analysis, including a discussion of methodology, is presented in Appendix B (Section 2.5 of Appendix B-2).

Table 1-1 illustrates the environmental benefits, via emissions reductions, associated with KEC. From 2020 to 2024, the initial five years of KEC's operations, region-wide emissions of carbon dioxide (CO_2) are projected to decrease by 1.5 million tons, while nitrogen oxides (NO_X) and sulfur dioxide (SO_2) are projected to decrease by 3,500 tons and 1,900 tons, respectively. The cumulative decrease in CO_2 is equivalent to planting 35 million trees (United States Environmental Protection Agency [USEPA] 2015).

Table 1-1: New England and New York Emission Reductions Resulting from Operation of KEC (tons)

Pollutant	2020	2021	2022	2023	2024
CO_2	243,000	311,000	360,000	307,000	334,000
NO_X	536	640	870	824	847
SO_2	229	406	458	424	441

The reduction in emissions is primarily driven by KEC's high operating efficiency, which in technical terms equates to a low full load heat rate.[2] More specifically, as a highly efficient combined cycle natural gas-fired electricity generating facility, KEC requires less fuel input (e.g., natural gas) per megawatt-hour (MWh) of electricity produced than nearly all of existing natural gas-, fuel oil-, and coal-fired power plants in New England. As such, when KEC produces electricity it will be dispatched, or operated, ahead of less efficient (and less environmentally friendly) forms of electricity generation currently operating in the market.

These market-wide emission reductions help the ability of the State of Connecticut meet its CO_2 emission reduction targets. Since Connecticut is a participant in the Regional Greenhouse Gas Initiative (RGGI), all thermal power plants greater than 25 MW located within Connecticut (as well as the eight other participatory states) are subject to CO_2 emissions caps. The addition of KEC will not impact the overall emissions reduction goals of RGGI, given that its emissions are also accounted for under the RGGI cap. KEC is likely to lead to an overall decrease in regional CO_2 emissions given its high operating efficiency, and may lead to an overall less costly compliance trajectory under the RGGI program. By reducing CO_2 emissions fleetwide, KEC could have a positive impact on Connecticut's ability to meet its emissions reduction targets set forth in the USEPA Clean Power Plan (CPP). Whether KEC contributes to the state's compliance capability depends on how Connecticut ultimately decides to comply with the CPP. If Connecticut chooses to exclude new power plants from its compliance plan, then KEC will not be subject to CPP and, therefore, its development will have no impact on the state's ability to comply. If the state's compliance plan does include new power plants, then the entry of the highly efficient KEC would enhance Connecticut's ability to comply with the CPP.

[2] A full load heat rate is a measurement of a power plant's efficiency in converting feedstock (e.g., natural gas) into electricity at maximum operating output. A lower heat rate equates to higher efficiency.

1.4.3 Consistency with State Long Range Plan

As part of Connecticut's 2014 Integrated Resources Plan (IRP), DEEP has proposed several capacity resourcing strategies that it believes will help the State of Connecticut reach the goal of achieving a reliable, clean, and cost-effective pool of energy supply. Chief among these strategies is the goal of ensuring Connecticut has enough capacity to meet peak winter electricity demand in a clean and cost-effective manner.

The development of KEC supports both parts of these strategies. Not only would KEC add approximately 550 MW of reliable electricity generation to Connecticut – KEC's firm natural gas contract (see Section 1.6) and ULSD backup virtually guarantee KEC will be available to operate under any circumstance – but with natural gas prices at near-historic lows (and by using state-of-the-art combined cycle combustion turbine technology) it would do so in a cost-effective manner. When KEC enters the market in 2020, it is likely to be one of only a handful of facilities in New England with both firm natural gas and ULSD supply, and it will be 25 percent (%) more efficient at generating electricity than today's average Connecticut power plant.

1.5 TRANSMISSION INTERCONNECTION AND POWER DELIVERY

KEC's combustion and steam turbines will provide rotational inertia to their respective synchronous generators, which will be located immediately adjacent to their respective turbines on the Generating Facility Site. The synchronous generators associated with the combustion and steam turbines will be totally enclosed closed loop water-to-air cooled units, will rotate at 3,600 revolutions per minute (rpm), and will provide alternating current (AC) power at 60 hertz (Hz). The combustion turbine generator (CTG) output voltage will be nominally rated at 20 kilovolts (kV), whereas the steam turbine generator (STG) output voltage will be nominally rated at 18 kV.

Synchronous generators of this type are a key component for maintaining robust reliability of the regional electric grid during a time when regional deployment of intermittent renewable energy, such as wind and solar resources, has been increasing rapidly, and aging resources such as coal and nuclear plants have been, or are forecasted to be, decommissioned in the coming years. Renewable resources, while important to the future development and evolution of the power industry, require reliable, flexible baseload power generation as a backstop to respond quickly to changes in renewable resources (i.e., solar and wind).

Frequent and sizeable changes in renewable resource availability and output resources require rotational inertia-based generation to respond in order to maintain the proper ratio of regional electricity supply and demand. Differences in regional electricity supply and demand cause over- or under-frequency or voltage events and ultimately lead to decreased grid strength and reliability, and in severe events, can result in blackouts. Rotational inertia-based generation not only maintains a consistent, reliable, baseload source of generation, but can respond quickly to mitigate the effects of sudden and dramatic peaks or outages inherent in inverter-based generation relying on variable weather conditions to produce power. Battery energy storage technology (e.g., lithium, lead acid, flow, vanadium, etc.), which could be used as a method to increase renewable penetration, has not yet progressed sufficiently from an energy density, longevity, reliability, or cost standpoint, nor has the technology been deployed in significant enough quantities to guarantee the level of grid reliability and strength that is required by independent system operators and other energy reliability commissions. KEC uses proven, efficient, reliable, combined cycle technology that will allow the energy industry to progress with higher levels of renewable penetration as required by federal and regional mandates, while maintaining extremely high levels of grid reliability.

The CTG and STG outputs, at 20 kV and 18 kV, respectively, will be connected to their respective generator step-up transformers (GSU), both located immediately adjacent to those generators on the Generating Facility Site. Each GSU will "step-up" the respective generator output voltage to 345 kV, which will allow for connection to the Eversource regional transmission system.

The plant switchyard, located adjacent to the GSUs on the Generating Facility Site, and the nearest equipment to Lake Road, will consist of two, high voltage 345-kV circuit breakers, disconnect switches, and associated bus structures, and will serve to consolidate the output from both synchronous generators (i.e., the full KEC facility) to a single point. From this point, a short three-phase transmission line segment will cross Lake Road, originating from a vertical tangent structure in the collection yard located on the Generating Facility Site, and terminating at a vertical tangent structure located within the Utility Switchyard located on the Switchyard Site, south of Lake Road.

Details regarding Switchyard Site are addressed in this Application to the extent possible, as NTE has optioned and expects to retain control of that parcel. The Utility Switchyard and an easement for the land on which it will be located will ultimately be transferred to Eversource to own and operate. Depending on the terms of the agreement, engineering, design, and construction may be implemented by either NTE or Eversource. Eversource will file with the CSC for a Petition for Declaratory Ruling associated with the Utility Switchyard and connection to its existing ROW at a later date.

The proposed Utility Switchyard will be located immediately adjacent to Eversource's 115-kV and 345-kV transmission line ROW, eliminating the need for any new transmission corridor or ROW to supply KEC's output from the Utility Switchyard to the regional transmission system. The Utility Switchyard will be designed in a three-breaker ring bus configuration to allow for an in-and-out tap of the existing 345-kV transmission line, such that the power generated by KEC can flow through the existing line.

The existing Eversource ROW includes two 115-kV transmission lines immediately adjacent to the Switchyard Site, with two 345-kV lines on the opposite side of the ROW. KEC will connect to Eversource's 345-kV Line 3271, which was installed in 2015. The specific segment of Line 3271 originates at Lake Road

Switching Station to the east and ends at the Card Substation to the southwest. An overhead interconnection is proposed, using dead-end structures within the Utility Switchyard and at the 345-kV structure on Line 3271 within the existing ROW to facilitate the interconnection tap of the existing line. The shieldwire on the affected segment of the adjacent 115-kV line will be relocated or removed to reduce any visual impact associated with the overhead connection and reduce the height of the 345-kV dead-end structures to the extent possible. The shieldwire associated with the 345-kV tie-in will serve as protection for both the 345-kV line and the 115-kV line below. Pending Eversource's final design requirements, additional shieldwire between the existing 115-kV structures and the new 345-kV dead-end structures at the Utility Switchyard may be required to ensure full protective coverage for both the affected span of 115-kV line and the new 345-kV tie-in.

Interconnection cost has been considered by NTE as a key component in both feasibility and site selection. A thermal injection analysis was completed for KEC's point of interconnection (POI). The base cases used for the analysis were the 2015 FERC/ISO-NE 2020 summer peak, 2020-2021 winter peak, and 2025 summer peak. All 69-kV and above single-element contingencies within a 10-bus radius of the POI within ISO-NE were considered, as well as the ISO-NE approved multiple contingency list within a 10-bus radius from each POI within ISO-NE. Areas monitored included transmission elements rated 69-kV and above that are within a 10-bus radius of KEC in ISO-NE. Incremental output (in steps of one MW) up to 1,100 MW were modeled. Additionally, all prior active major generation queue positions ahead of KEC were modeled (based upon information at the time the study was performed). Each base case scenario was modeled under normal and contingency conditions with the KEC incremental output injected at the POI.

The study identified upgrades associated with KEC's approximately 550-MW peak output along approximately 30.6 miles of 345-kV transmission and 3.1 miles of 115-kV transmission. Using cost assumptions for reconductoring, the total estimated costs were identified for thermal upgrades to accommodate KEC's output are on the order of $11 million. KEC is currently in the ISO-NE queue (#598) and is awaiting performance of its System Impact Study to refine information regarding the need for potential upgrades.

The cost of the Utility Switchyard was also examined, based upon similar facilities for other NTE projects. Costs for the Utility Switchyard were estimated to be approximately $7 million, which would result in a total interconnection cost of approximately $18 million.

1.6 FUEL SUPPLY AVAILABILITY FORECASTS

KEC has contracted for firm delivered natural gas fuel supply to provide the greatest possible level of delivery reliability for its natural gas fuel supply needs, with ULSD as a backup fuel.

KEC's firm delivered natural gas fuel supply will be sourced directly from Algonquin Gas Transmission

Company (AGT) interstate natural gas pipeline, through a firm natural gas fuel supply agreement with Emera, a major New England natural gas fuel supplier. The natural gas interconnection will include a natural gas pipeline lateral approximately 2.8 miles in length, connecting the existing AGT pipeline to KEC within an existing natural gas line lateral ROW owned and operated by Yankee Gas (as further discussed in Section 8.1). Industry experts working on behalf of NTE have provided analysis demonstrating that an ample supply of both natural gas commodity and transportation are available for the reliable long-term operation of KEC. Recent historical expansion of natural gas production along with KEC's location proximate to the AGT system are keys to KEC's natural gas fuel supply reliability.

KEC is located south of the traditional pipeline constraints that occur farther north on the New England natural gas supply system around the major metropolitan and load centers, resulting in strong natural gas fuel reliability for KEC. In addition to existing infrastructure, the Algonquin Incremental Market (AIM) Project (currently under construction by AGT) and Access Northeast Pipeline Project (currently under development by Eversource Energy, National Grid, and Spectra Energy) will further enhance deliverability throughout New England for electric power generation.

Advancements in drilling technology and completion techniques have enabled the recovery of natural gas from historically uneconomic basins in the United States and Canada. At the same time, efficiencies in drilling have reduced the cycle time of drilling new wells, allowing more wells to be drilled with the same rig and reducing unit production costs. As a result, natural gas production in the United States has grown from 55 billion cubic feet (Bcf) per day in 2008 to 74 Bcf per day in 2015.

The increase in natural gas supply that is economic in the United States has significantly decreased natural gas pricing and contributed to increased demand for natural gas from the power sector. Specifically, since 2008, natural gas-fired generation in the United States has increased from approximately 750 terawatt-hours (TWh) in 2008 to approximately 1,300 TWh in 2015, nearly a 75% increase. As such, natural gas is expected to continue to be a major driver of electric power prices in the United States for the foreseeable future. Although the reliance on natural gas as a fuel for power generation has increased significantly, the continued increase in production provides ample supplies of natural gas well into the future.

Projections related to natural gas supply are supported by information from the United States Energy Information Administration (EIA) 2016 Annual Energy Outlook. Specifically, New England's natural gas supply is from four primary sources: interstate pipelines moving natural gas from supply markets in the United States (primarily via the AGT pipeline); eastern Canadian production (via the Maritimes & Northeast Pipeline); western Canadian production (via the TransCanada Mainline and Trans Quebec & Maritimes, as well as the Iroquois pipelines); and liquefied natural gas (LNG) via three facilities (Northeast Gateway, Neptune, and Everett), or via Canaport in Nova Scotia via the Maritimes & Northeast Pipeline, as shown in Figure 1-2.

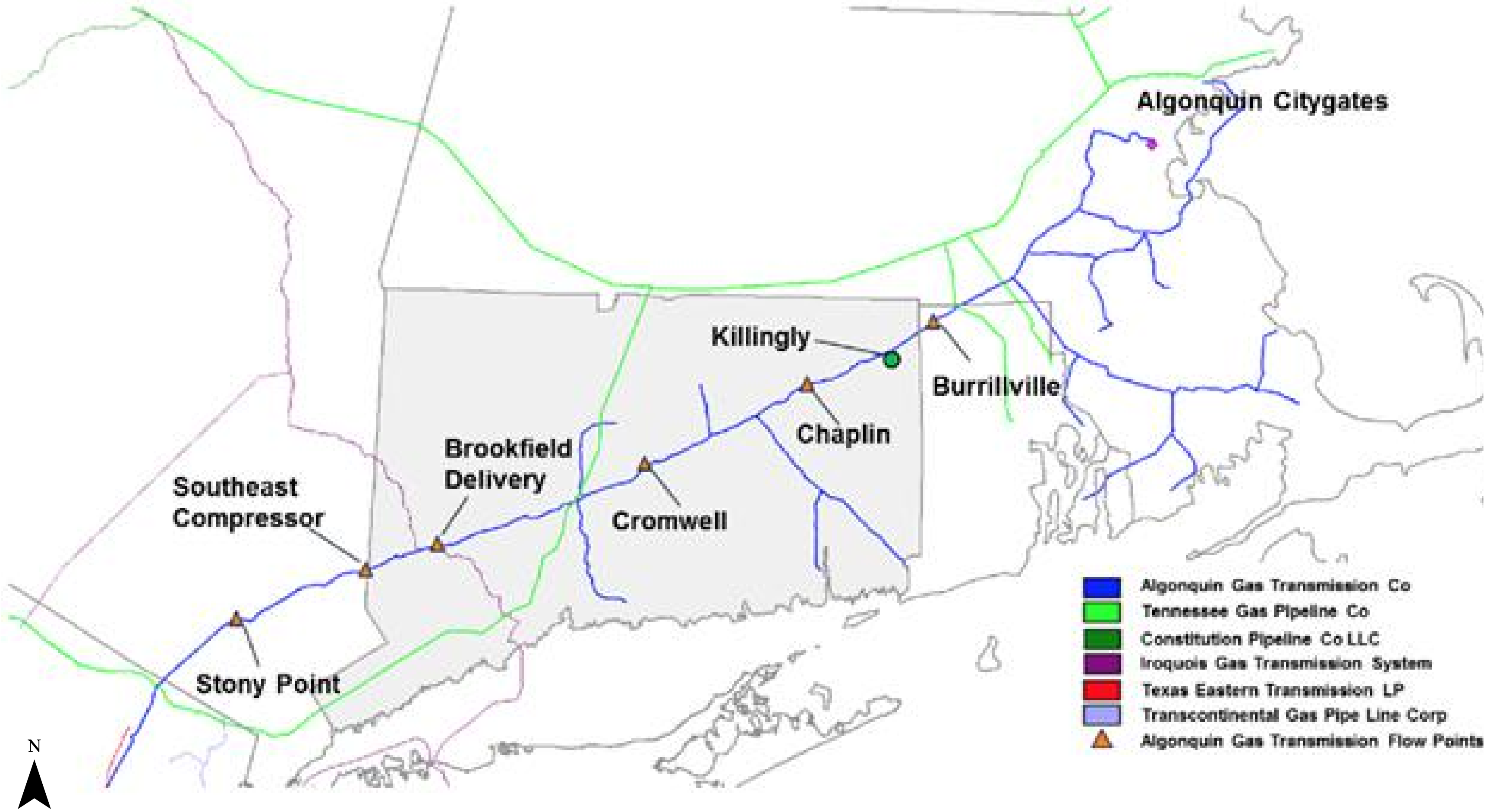


Figure 1-2
Overview of New England Natural Gas Pipelines

Killingly Energy Center
an NTE Energy Project

New England is located at the extreme end of the aforementioned interstate pipelines, which has occasionally led to supply shortfalls – particularly during the peak winter heating demand season of November through March for non-firm natural gas users. The shortfalls are generally driven by competing demand from upstream, population-dense markets along the Eastern seaboard, as well as system constraints on the pipelines serving this market. Although, as previously discussed, these constraints do not impact KEC due to its strategic location, it is anticipated that these constraints will be significantly relieved upon completion of the AIM Project, Tennessee Gas Pipelines Connecticut Expansion, and Spectra's Atlantic Bridge and Access Northeast projects, which will add 1.5 Bcf per day of carrying capacity to the New England market (Figure 1-2).

As noted above, KEC has contracted for firm natural gas fuel supply utilizing a firm delivered natural gas contract structure. Under the firm delivered natural gas contract structure, NTE will enter into a natural gas fuel supply agreement with a single fuel supplier (AGT) that will provide interstate pipeline transportation, natural gas commodity, and balancing service bundled into one firm delivered natural gas fuel supply. The supplier holds a firm obligation to deliver natural gas regardless of market conditions; however, there could be circumstances where even firm natural gas pipeline transportation is curtailed due to operational flow orders or other operation events on the interstate pipeline even though a firm obligation exists. In this circumstance, KEC continues to have a delivery obligation to ISO-NE and thus must generate as required to maintain system integrity on the electric grid.

Backup fuel is required in order to meet the capacity and delivery obligations of ISO-NE, as ISO-NE's delivery obligations are not excused even in the event of curtailment of firm natural gas fuel supply. From an operations reliability standpoint this should position KEC advantageously versus other power plants in Connecticut that primarily rely on either solely interruptible natural gas transport or backup ULSD. By having both a firm natural gas contract and ULSD backup, KEC would be able to operate under virtually any situation.

KEC's firm natural gas transport contract will provide up to 95,000 million British thermal units (MMBtu) per day for seven years, starting in 2020. This is enough natural gas to support KEC's operations at maximum output for 24 hours. In accordance with KEC's air permit application, use of ULSD will only be allowed when natural gas is unavailable (likely due to an extreme natural gas demand event) and for up to a maximum of 720 hours per year of operations. However, it is expected that KEC would operate using ULSD for only a handful of hours at a time, and not likely in every year.

1.7 FACILITY COSTS

KEC's equipment and construction costs are anticipated to total $537 million. Equipment costs total $318 million, and include: the combustion turbine and generator; the heat recovery steam generator (HRSG); the exhaust stack; the steam turbine generator; cooling and related systems; and the plant switchyard. Construction and other costs total $219 million, and include development, design, and construction.

As shown in Table 1-2, $142 million of the total $537 million is projected to be spent in Connecticut with none of KEC's power generation equipment (e.g., combustion and steam turbines) assumed to be purchased in Connecticut.

Table 1-2: KEC Expenditures in Connecticut

Expenditure Type	Connecticut Share of Total Cost ($ millions)
Materials	**$10**
Power Generation	$0
Plant Equipment	$10
Plant Construction Labor	**$104**
Other[3]	**$28**
Total	***$142***

1.8 PROJECT SCHEDULE

An anticipated schedule is shown in Figure 1-3. The Air Permit Application and CSC Application have now been submitted; KEC is currently working to complete other permit applications. NTE anticipates that applications for these additional permits will be filed during summer/early fall 2016. Agency review and public participation will be on-going throughout 2016, with a goal of having major permits issued for KEC by the first quarter of 2017.

KEC expects to commence construction during the second quarter of 2017, and will require approximately three years to complete KEC Site preparation, construction, and testing to support providing power to the electrical grid by summer 2020, as required by the supply commitments KEC intends to make in FCA 11.

3 Includes costs associated with general facilities, engineering/design, construction insurance, land, permitting fees, transmission grid connection, spare parts, and sales tax (materials and equipment purchases).

Project Schedule

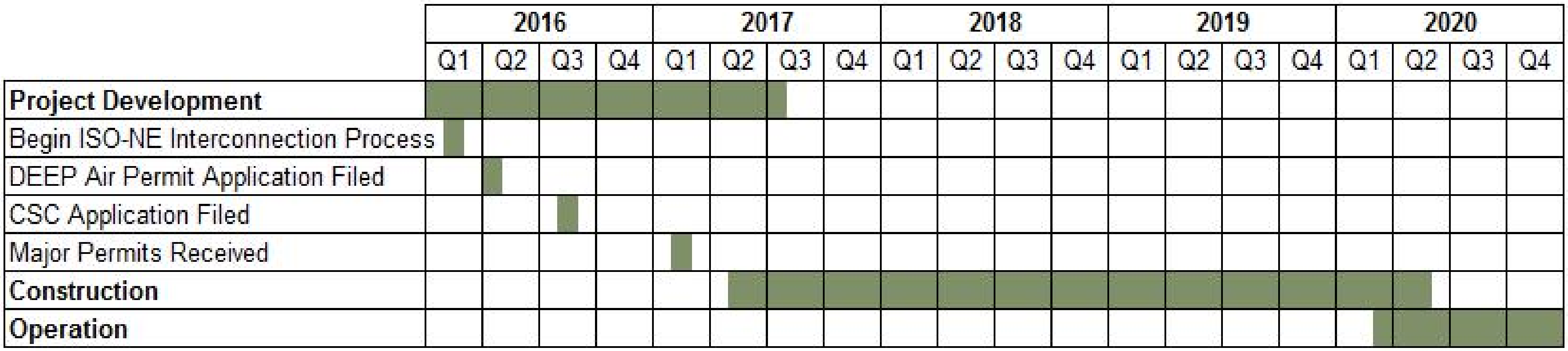


Figure 1-3

KEC Anticipated Schedule

2.0 PROJECT DESCRIPTION

NTE is proposing to construct and operate KEC, an approximately 550-MW combined cycle, electric generating facility and associated electrical interconnection switchyard. KEC is proposed to be located on the KEC Site, approximately 73 acres along Lake Road in the Town of Killingly, Windham County. Details regarding KEC are provided in the following sections, including: site location and access; proposed facility layout; facility technology and equipment; facility capability, operations, and service life; fuel type, supply, and storage; instrumentation and controls; air emissions and control systems; water supply and use; wastewater generation, treatment, and disposal; stormwater management; noise abatement; traffic; safety, security, and contingency planning; solid waste; and facility staffing and training.

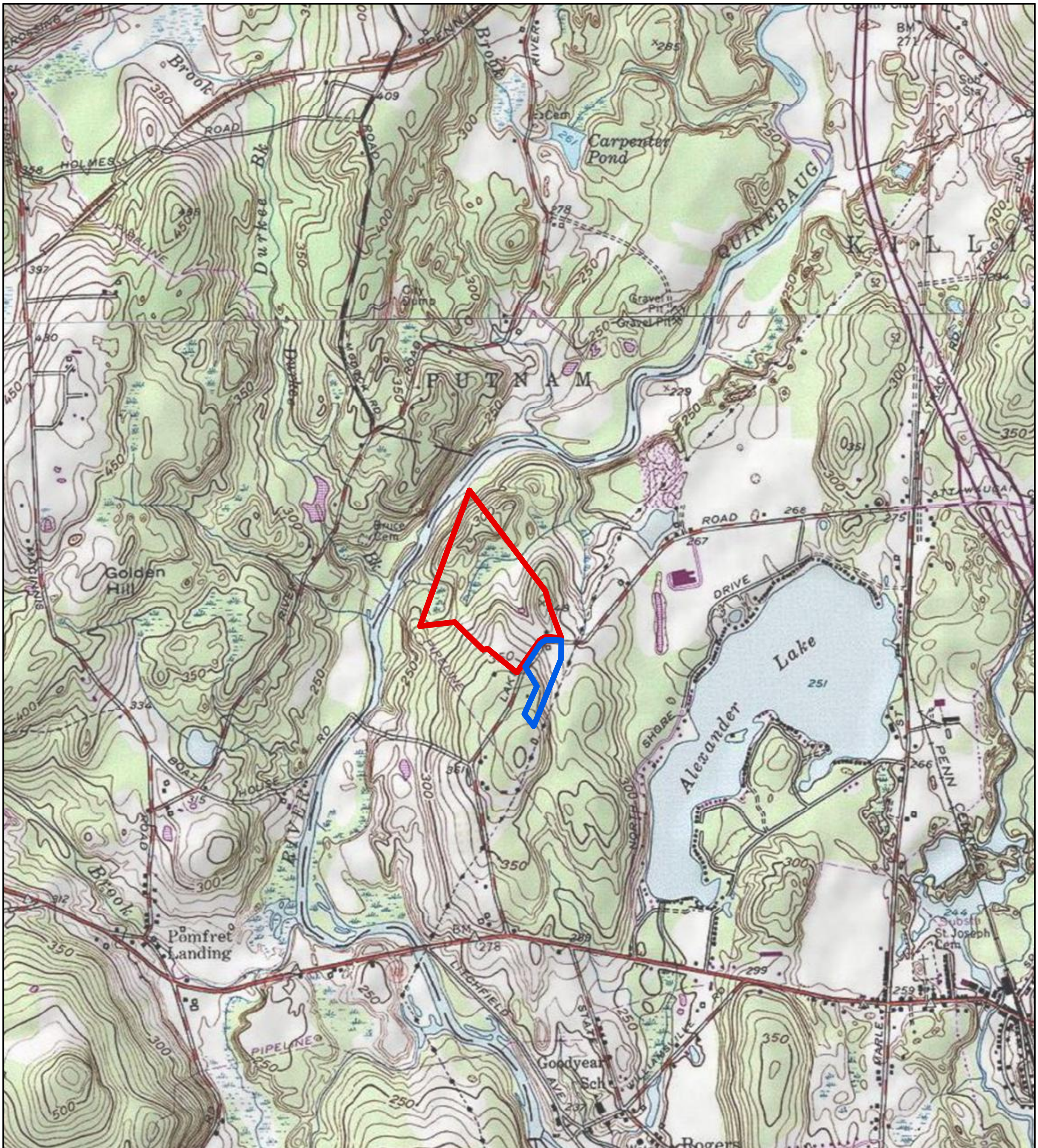
2.1 SITE LOCATION AND ACCESS

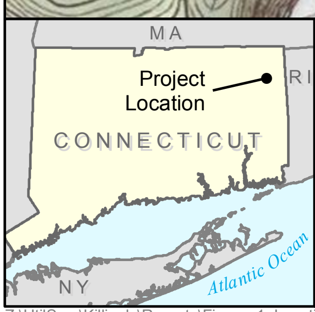
The approximately 73-acre KEC Site consists of two separate parcels located at 180 and 189 Lake Road (Figures 2-1 and 2-2). The approximately 63-acre Generating Facility Site is located north and west of Lake Road and proposed for development of the electric generating facility. The approximately 10-acre Switchyard Site is located south and east of Lake Road and is proposed for development of the Utility Switchyard, which will interconnect KEC to the existing Eversource 345-kV transmission circuit and the regional grid via the abutting Eversource transmission line ROW.[4]

The KEC Site is located in the northwest corner of the Town of Killingly, and is surrounded by industrial and low-density residential use. The KEC Site is largely undeveloped. One two-story house and associated structures are located in the southeast corner of the Generating Facility Site, with the balance of the Generating Facility Site consisting of undeveloped woodland, a man-made pond, wetlands, and bedrock outcrops near the center of the parcel. The Switchyard Site is predominantly wooded, with an open field and a dilapidated barn structure located to the north, along Lake Road. Other features on the Switchyard Site include several small outbuildings, stone walls, a remnant foundation, and a small family cemetery.

The KEC Site is located proximate to the Killingly Industrial Park, which is located within a large, industrial-zoned district located along Lake Road, north-northeast of the KEC Site (Figure 2-3). The Generating Facility Site is identified in the Town of Killingly's *2010-2020 Plan of Conservation and Development* as an area intended for future industrial use. Industries within the Killingly Industrial Park and in other areas proximate to the KEC Site include:

[4] The Eversource transmission line ROW contains two 115-kV and two 345-kV transmission lines and support structures.





Legend

- Generating Facility Site
- Switchyard Site

N

0 1,000 2,000 Feet

Figure 2-1
KEC Site Location
(Topographic Map)

Killingly Energy Center
an NTE Energy Project

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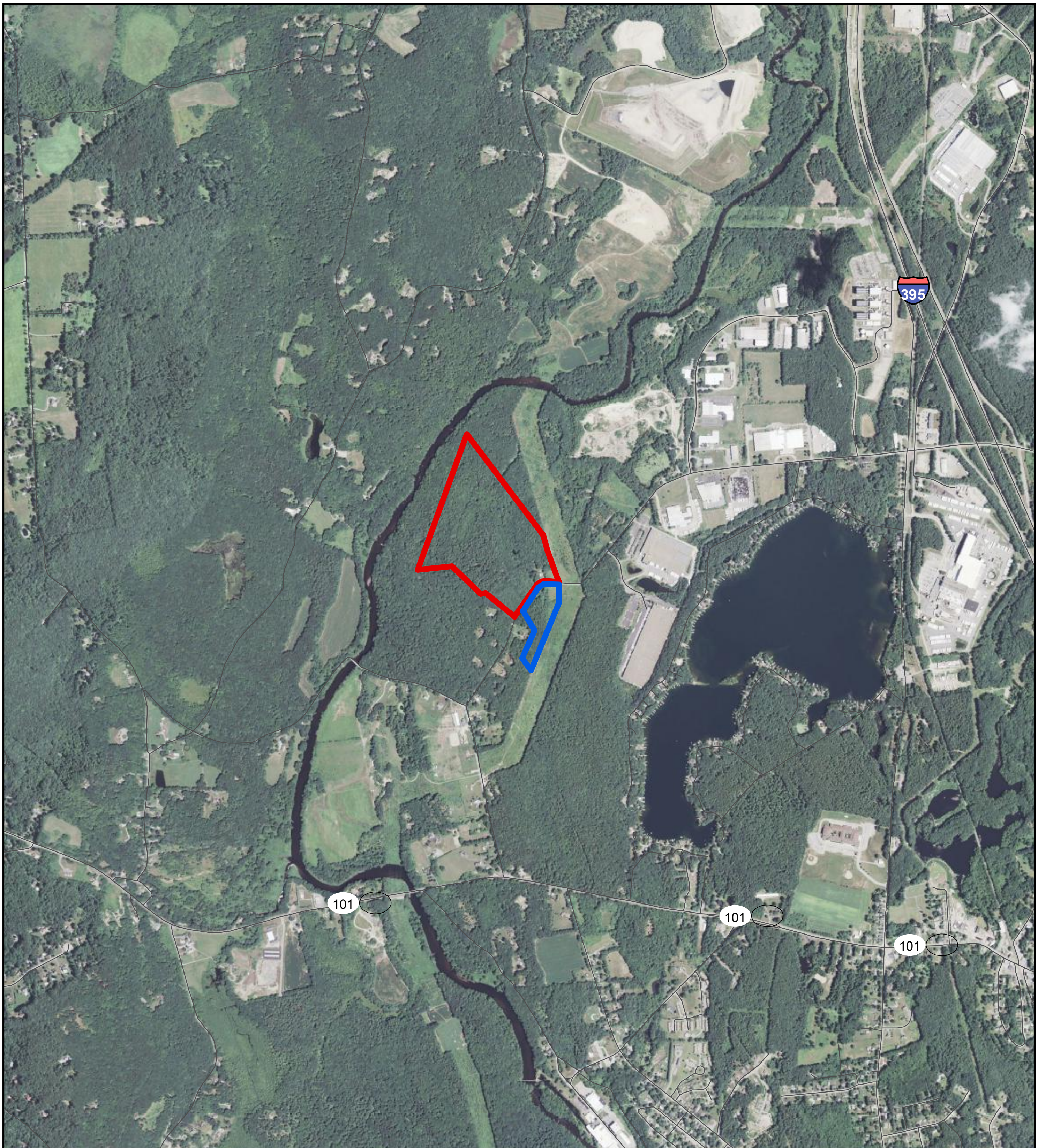

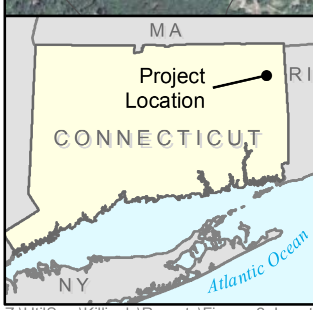

Legend

Generating Facility Site

Switchyard Site

N

0 1,000 2,000 Feet

Figure 2-2
KEC Site Location
(Aerial Photograph)

Killingly Energy Center

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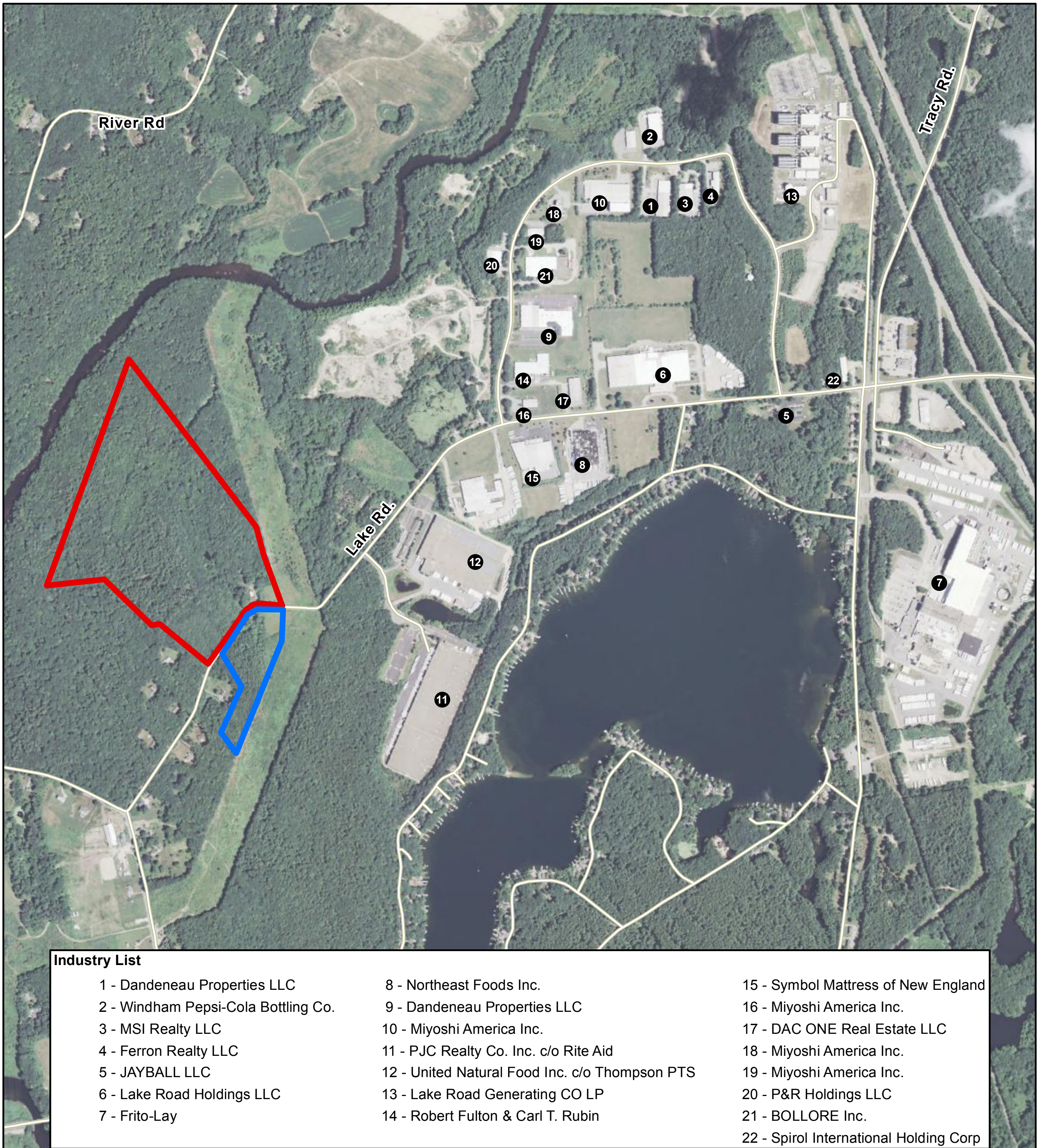

Legend

- Generating Facility Site
- Switchyard Site
- Roads

N

0 750 1,500 Feet

Figure 2-3
Proximate Industries

Killingly Energy Center
an NTE Energy Project

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- The Lake Road Generating Facility, an approximately 800-MW combined cycle electric generating facility with three units located on 56 acres at 56 Alexander Parkway, approximately 1 mile northeast of the KEC Site;
- Frito-Lay, a 460,000 square foot manufacturing facility on 79 acres at 1886 Upper Maple Street;
- United Natural Foods (UNFI and Ryder Integrated Logistics), a 442,000 square foot manufacturing and warehouse facility on 31 acres at 260 and 300 Lake Road;
- Rite Aid Distribution Center, a 460,000 square foot distribution warehouse facility on 32 acres at 30 Forbes Road;
- Symbol Mattress of New England, a 73,600 square foot manufacturing facility on 7.8 acres at 312 Lake Road;
- U.S. Cosmetics Corporation, a 118,000 square foot manufacturing and warehouse facility on 11 acres off Lake Road and Louisa Viens Drive;
- Northeast Foods (Automatic Rolls of New England), a 75,000 square foot manufacturing facility on 8 acres at 328 Lake Road;
- DAC ONE/DAC TWO Real Estate, a 20,000 square foot manufacturing and warehouse facility on 2.3 acres at 329 Lake Road;
- Lake Road Holdings (Superwinch), a 220,000 square foot manufacturing and warehouse facility on 21 acres at 349 Lake Road;
- Jayball Inc., a 6,500 square foot multi-use storage facility on 6 acres at 394 Lake Road;
- Spirol International, a 11,000 square foot manufacturing and warehouse facility on 5 acres at 429 Lake Road;
- Ferron Realty (Web Industries), a 10,000 square foot manufacturing and warehouse facility on 2 acres at 154 Louisa Viens Drive;
- MSI Realty, a 35,000 square foot warehouse facility on 3 acres at 140 Louisa Viens Drive;
- Pepsi-Cola, a 25,000 square foot warehouse facility on 5 acres at 135 Louisa Viens Drive;
- Dandeneau Properties, a 40,000 square foot manufacturing facility on 3.5 acres at 130 Louisa Viens Drive;

- P&R Holdings, a 11,000 square foot warehouse facility on 3 acres at 61 Louisa Viens Drive;
- Bollore Inc., a 75,000 square foot manufacturing facility on 7 acres at 60 Louisa Viens Drive;
- Dandeneau Properties (Putnam Plastics), a 94,000 square foot manufacturing facility on 9 acres at 40 Louisa Viens Drive; and
- Robert Fulton & Carl Rubin (Web Industries), a 41,000 square foot manufacturing facility on 4 acres at 20 Louisa Viens Drive.

In total, the northwest Killingly industrial area maintains more than 2.2 million square feet of industrial, manufacturing and warehouse development.

The Generating Facility Site is currently separated from these existing industries by the Eversource ROW located along the KEC Site's eastern boundary, and property that includes a residence, fields, forest, and a former sand and gravel operation. Industrial properties are located east of the Switchyard Site, beyond the Eversource ROW, with residential development and Alexander Lake located farther east. Alexander Lake is an approximately 190-acre kettle pond, surrounded by a densely developed residential lake shorefront community. Residential development lies along the shore of Alexander Lake, with the Frito Lay industrial facility on the east side of Upper Maple Street.

Interstate 395 (I-395) is located approximately 1.25 miles east of the KEC Site. Additional industrial development exists between Upper Maple Street and I-395, south of a commercially zoned property along Attawaugan Crossing Road. The Providence-Worcester Railroad extends in a north-south direction through the industrial area, parallel to Upper Maple Street. Lake Road, which separates the Generating Facility Site and the Switchyard Site, is a local roadway that extends from an intersection with Attawaugan Crossing Road and Upper Maple Street, through the Killingly Industrial Park, and terminates to the southwest of the KEC Site at State Route 101. As noted above, industrial development exists north and south of Lake Road, extending west from the railroad, and abutting the Switchyard Site.

Outside of the industrial area, the area immediately surrounding the KEC Site is less developed and has a more rural residential character. In addition to Alexander Lake, the Quinebaug River is located to the north and west of the KEC Site, and the Five Mile River is located west of Upper Maple Street approximately 1.25 miles east of the KEC Site. The Dunn Preserve, a 32-acre forested parcel of conservation land owned by the Wyndham Land Trust, lies along the eastern bank of the Quinebaug River, adjacent to the northwestern edge of the Generating Facility Site. Access to the Dunn Preserve is via a 0.4-mile unpaved road that extends northwest from Lake Road along the Generating Facility Site's western boundary.

To the north of the Generating Facility Site, on the opposite bank of the Quinebaug River, is wooded area, agricultural land, and an ash landfill in the Town of Putnam. To the west of the Generating Facility Site, on the west side of the Quinebaug River, lies a rural residential district in the Town of Pomfret.

Scattered residences are located west and south of the KEC Site along Lake Road. These residences are located on relatively large lots, and are surrounded by woods. The closest residence lies approximately 110 feet west of the Switchyard Site, with the next closest located 260 feet west of the closest equipment associated with the Generating Facility Site.

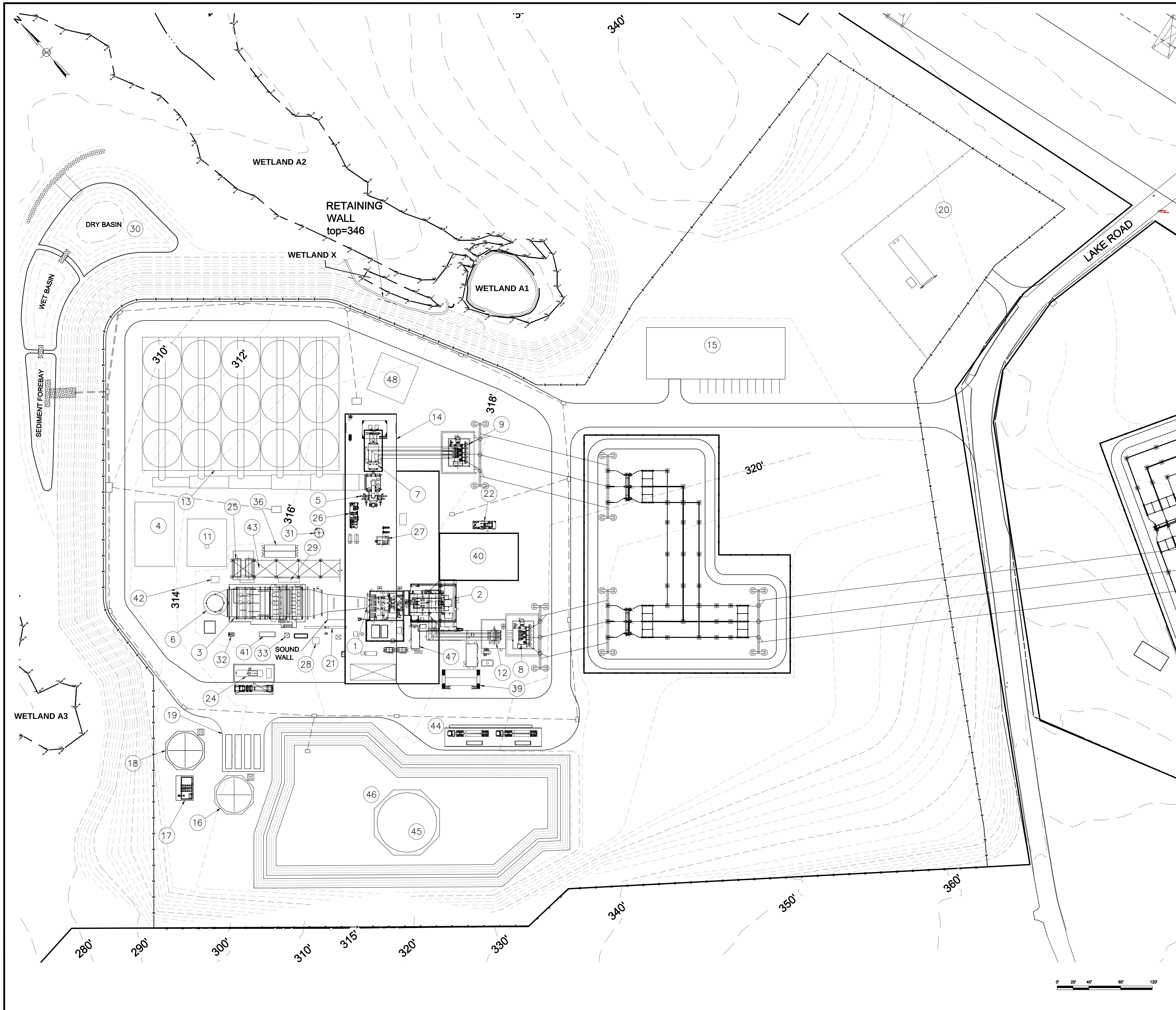
Access to the KEC Site during construction and operation will be off Lake Road via a 30-foot-wide access driveway that will extend approximately 500 feet into the Generating Facility Site (as shown in Figures 2-4 and 2-5), and then loop around the generating equipment. The driveway off of Lake Road will lead to a controlled security gate; KEC will be staffed 24 hours per day, and the gate will be remotely monitored by personnel in the control room and administration building. The developed portion of the Generating Facility Site will be surrounded by security fencing. Within the security fence, an interior roadway will encircle the generating equipment for ready access. Parking will be available proximate to the proposed administrative building.

The developed portion of the Switchyard Site will be surrounded by security fencing. Access to the Utility Switchyard will be via a gravel road extending southeast from Lake Road to the fenced Utility Switchyard. A small gravel parking area will be located outside of the security fencing. Within the security fence, an interior road will encircle the Utility Switchyard equipment for ready access.

2.2 PROPOSED FACILITY LAYOUT

The KEC layout is presented on Figures 2-4 and 2-5. KEC will be constructed in a 1x1x1 configuration, meaning it will consist of one CTG, one HRSG, and one STG. The HRSG will be equipped with natural gas-fired duct burners for supplemental firing. The steam produced from the HRSG will power the STG, and the exhaust steam will be condensed back into water via a multi-fan air-cooled condenser (ACC). The CTG and STG will be enclosed inside the turbine building. A central control room will also be provided proximate to the turbine building. The HRSG will exhaust via a 150-foot tall stack.

The balance of KEC will include an auxiliary boiler, backup diesel generator, emergency fire pump engine, a 1 million-gallon ULSD storage tank, a 500,000-gallon raw water storage tank, a 500,000-gallon demineralized water tank, and a 12,000-gallon tank for storing 19% aqueous ammonia (NH_3) (used for emissions control). An administration building and associated parking will be located on the east side of the Generating Facility Site, adjacent to the access driveway. The administration building will consist of offices, conference rooms, and warehouse/storage space. A computer-generated rendering of KEC is provided on Figure 2-6.



Notes

Legend

1. COMBUSTION TURBINE (GT)
2. COMBUSTION TURBINE GENERATOR (GTG)
3. HEAT RECOVERY STEAM GENERATOR (HRSG)
4. CLOSED COOLING WATER
5. STEAM TURBINE (ST)
6. EXHAUST STACK
7. STEAM TURBINE GENERATOR (STG)
8. GENERATOR STEP-UP TRANSFORMER (GSU)
9. STG STEP-UP TRANSFORMER
10. AIR INLET FILTER HOUSE (NOT SHOWN)
11. AUXILARY BOILER
12. UNIT AUXILARY TRANSFORMER
13. AIR COOLED CONDENSER (ACC) & CONDENSATE COLLECTION ENCLOSURE
14. TURBINE BUILDING
15. ADMIN/ WAREHOUSE/ WATER TREATMENT BUILDING
16. RAW / FIRE WATER STORAGE TANK & RW PUMPS
17. FIRE PUMPS ENCLOSURE
18. DEMINERALIZED WATER STORAGE TANK & PUMPS
19. DEMINERALIZED WATER TRAILERS AREA
20. FUEL GAS METERING
21. FUEL GAS HEATER
22. DIESEL GENERATOR
23. PLANT SWITCHYARD
24. AMMONIA STORAGE TANK, PUMPS, & UNLOADING AREA
25. BOILER FEED PUMPS
26. STG LUBE OIL SKID
27. AIR COMPRESSORS, RECEIVERS & DRYERS SKID
28. FUEL GAS FINAL FILTER
29. DUCT BURNER SKID
30. DETENTION POND
31. STG DRAINS TANK & SUMP
32. HRSG BLOW OFF TANK & DRAINS PUMPS
33. HRSG BLOWDOWN SUMP
34. STORM WATER RETENTION POND
35. CIVIL OIL WATER SEPARATOR (NOT SHOWN)
36. BOP MOTOR CONTROL CENTER (MCC)
37. PLANT GATE (NOT SHOWN)
38. NOT USED
39. CTG ELECTRICAL PACKAGE
40. CENTRAL CONTROL ROOM / ELECTRICAL
41. AMMONIA INJECTION SKID
42. CONTINUOUS EMISSIONS MONITORING SYSTEM (CEMS)
43. PIPE RACK
44. FUEL OIL UNLOADING
45. FUEL OIL TANK
46. FUEL OIL BERM
47. GT LUBE OIL SKID
48. FUEL GAS COMPRESSORS

Reference Drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
H	07/14/16	AF	FOR CLIENT REVIEW	KP	JW
G	06/28/16	AF	FOR CLIENT REVIEW	KP	JW
F	05/24/16	AF	FOR CLIENT REVIEW	KP	JW
E	05/20/16	AF	FOR CLIENT REVIEW	KP	JW
D	05/04/16	AF	FOR CLIENT REVIEW	KP	JW
C	04/12/16	AF	FOR CLIENT REVIEW	KP	JW
B	04/11/16	AF	FOR CLIENT REVIEW	KP	JW
A	04/07/16	AF	FOR CLIENT REVIEW	KP	JW

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Client
NTE ENERGY
KILLINGLY ENERGY CENTER
KILLINGLY CONNECTICUT

Figure 2-4

KEC Site Layout and Grading

Killingly Energy Center
an NTE Energy Project

PRELIMINARY NOT FOR CONSTRUCTION
REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION

Designed	-	Eng check	JW
Drawn	AF	Approved	-
Dwg check	KP	Project Mngr	JW
Scale at ANSI E	1" = 40'-0"	Date	04/07/16
Rev	H		
Drawing Number	334954CT-GA-203		

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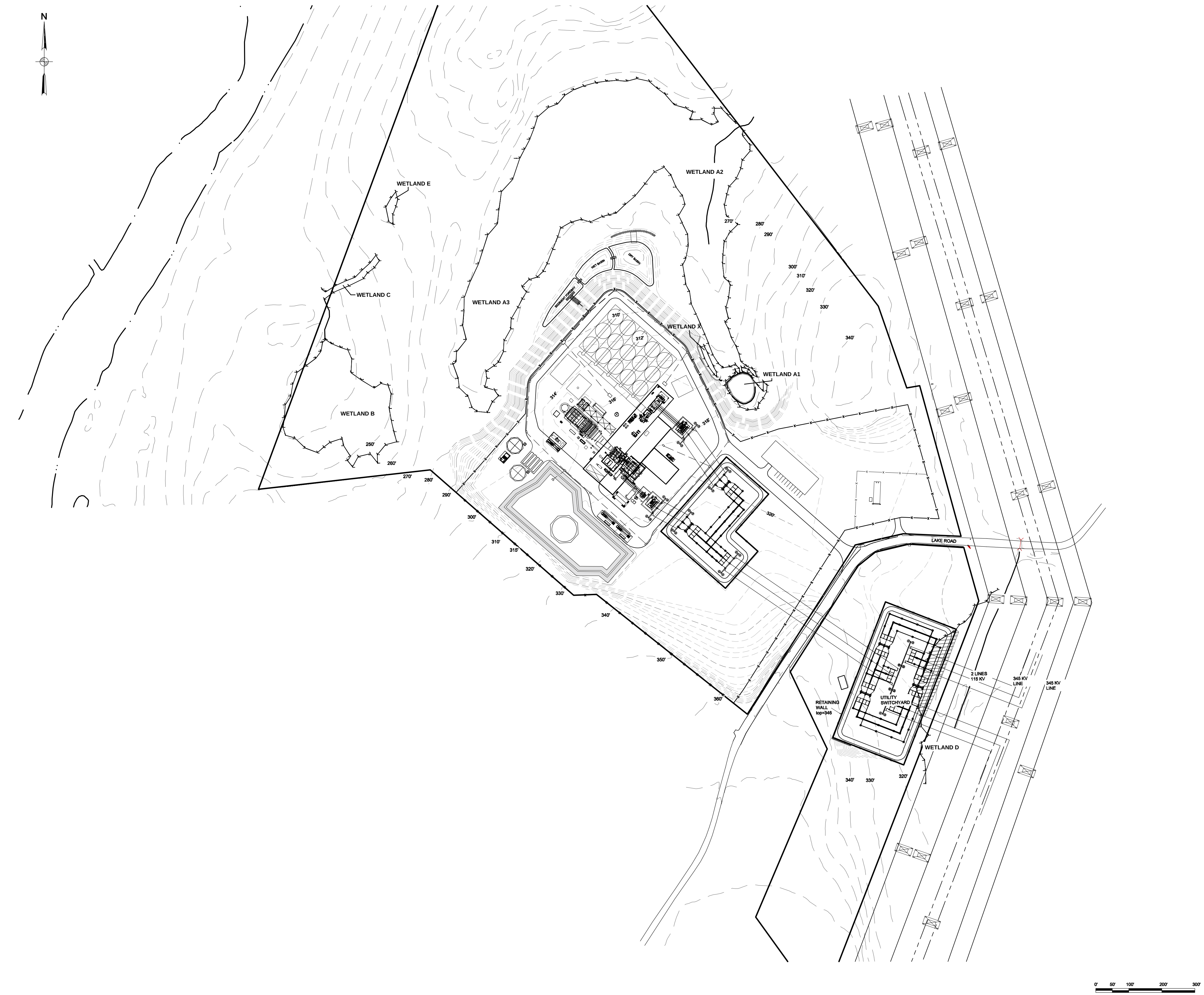

Notes

Legend

Reference Drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
G	07/14/16	AF	FOR CLIENT REVIEW	KP	JW
F	06/28/16	AF	FOR CLIENT REVIEW	KP	JW
E	05/20/16	AF	FOR CLIENT REVIEW	KP	JW
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C	04/12/16	AF	FOR CLIENT REVIEW	KP	JW
B	04/11/16	AF	FOR CLIENT REVIEW	KP	JW
A	04/07/16	AF	FOR CLIENT REVIEW	KP	JW

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Client
NTE ENERGY

KILLINGLY ENERGY CENTER
KILLINGLY CONNECTICUT

Figure 2-5

KEC Plot Plan

Killingly Energy Center
an NTE Energy Project

PRELIMINARY
NOT FOR
CONSTRUCTION
REPLACE WITH
ENGINEERS STAMP
AT CONSTRUCTION
AND/OR
FABRICATION

Designed	-	Eng check	JW
Drawn	AF	Approved	-
Dwg check	KP	Project Mngr	JW
Scale at ANSI E	1" = 100'-0"	Date 04/07/16	Rev G

Drawing Number
334954CT-SA-203

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Figure 2-6
KEC Rendering

Killingly Energy Center
an NTE Energy Project

KEC's electrical collection system, including high voltage electrical circuit breakers, will be located on the Generating Facility Site within the surrounding security fencing, oriented on the portion of the layout closest to Lake Road. Overhead electrical lines will originate from vertical tangent structures within the electrical collection system and extend across Lake Road to terminate at vertical tangent structures within the security fencing on the Switchyard Site. A separately fenced gas metering station within the primary security fence will be located approximately 100 feet from Lake Road and to the southeast of the Generating Facility Site. An access road will extend directly to the gas metering station from Lake Road.

The KEC footprint will occupy approximately 13 acres of the 63-acre Generating Facility Site. A total of 24 acres on the Generating Facility Site will be graded and used during construction; this includes the KEC footprint; stabilized grading and stormwater management features; and temporary construction worker parking and equipment laydown. The construction laydown and staging areas will be reestablished as green areas once construction is complete; portions of these areas may be used for overflow or emergency parking with grass pave or a turf reinforcement option.

The KEC layout was carefully designed to consider the functional requirements of each individual component, as well as positioning the equipment to minimize impacts to the community and the environment, as further discussed in Section 9.3.4. Avoiding wetland impact, minimizing visual impact, and reducing KEC-generated noise were all important considerations in layout design. Equipment with a low visual profile was selected, where possible, including a reduced height for the ACC and a 150-foot height for the HRSG stack, which balances visibility concerns and air quality considerations to enable appropriate dispersion of emissions while minimizing visibility. A buffer of at least 50 feet will remain around the perimeter of the Generating Facility Site with the exception of the access driveway and the access to the gas yard, and existing vegetation will be retained wherever practical.

The Switchyard Site will consist of the Eversource owned and operated Utility Switchyard, which will interconnect KEC to Eversource's existing 345-kV transmission system through the use of an in-and-out loop-feed and overhead tie-in of the existing 345-kV line, identified as Line 3271. The overhead connection will require a single dead-end structure to maintain clearance for the interconnection over the existing 115-kV transmission line. An access drive and small parking area will be located on the Switchyard Site, with a chain link security fence surrounding the Utility Switchyard. Of the 10-acre Switchyard Site, a total of 4 acres will be utilized during construction, including for Utility Switchyard construction and temporary construction worker parking and equipment laydown; temporary work spaces will be restored upon completion of construction. Details of the switchyard will be the subject of a future CSC filing by Eversource.

2.3 FACILITY TECHNOLOGY AND EQUIPMENT

2.3.1 Combined Cycle Technology

KEC will utilize combined cycle technology that offers high efficiency and minimal environmental impacts. Combined cycle refers to a process in which electricity is generated by a CTG and, using the waste heat in the exhaust gases to generate steam, additional electricity is generated by a STG. Combined cycle generation consumes less fuel to generate a kilowatt-hour (kW-hr) of electricity than either a simple cycle gas turbine or a utility boiler with a steam generator. Consequently, the economic and cost saving benefits of burning less fuel, as well as the environmental benefits of burning less fuel and displacing older, less efficient, higher-emitting sources, are significant.

The principal components of the combined cycle power block include the CTG, HRSG, and STG. A conceptual flow diagram, provided in Figure 2-7, illustrates the combined cycle process. In this process, the fuel is ignited in the CTG, and the combustion expels high-temperature exhaust gases that expand through the CTG causing the turbine blades and shaft to rotate. A generator coupled with the turbine shaft converts rotational mechanical energy into electrical energy. The waste heat from the CTG combustion exhaust gases is subsequently recovered in the HRSG, which generates steam that is then routed to the STG. In the STG, the expanding steam causes the steam turbine blades and shaft to rotate, converting the rotational mechanical energy into electrical energy through the use of a generator. Duct firing is incorporated in the HRSG to generate additional steam when called for by energy demand.

The specific components are discussed in the following sections.

2.3.2 Combustion Turbine Generator

NTE proposes to install one Siemens SGT6-8000H CTG that will produce approximately 300 MW (nominal). The CTG is a rotary internal combustion engine consisting of four major sections – the compressor, the combustor, the turbine, and the electrical generator.

The CTG will incorporate NO_X combustion control technologies, including dry-low NO_X (DLN) combustors during natural gas firing and water injection during ULSD firing. CTG emission control technologies are discussed further in Section 2.7.2.

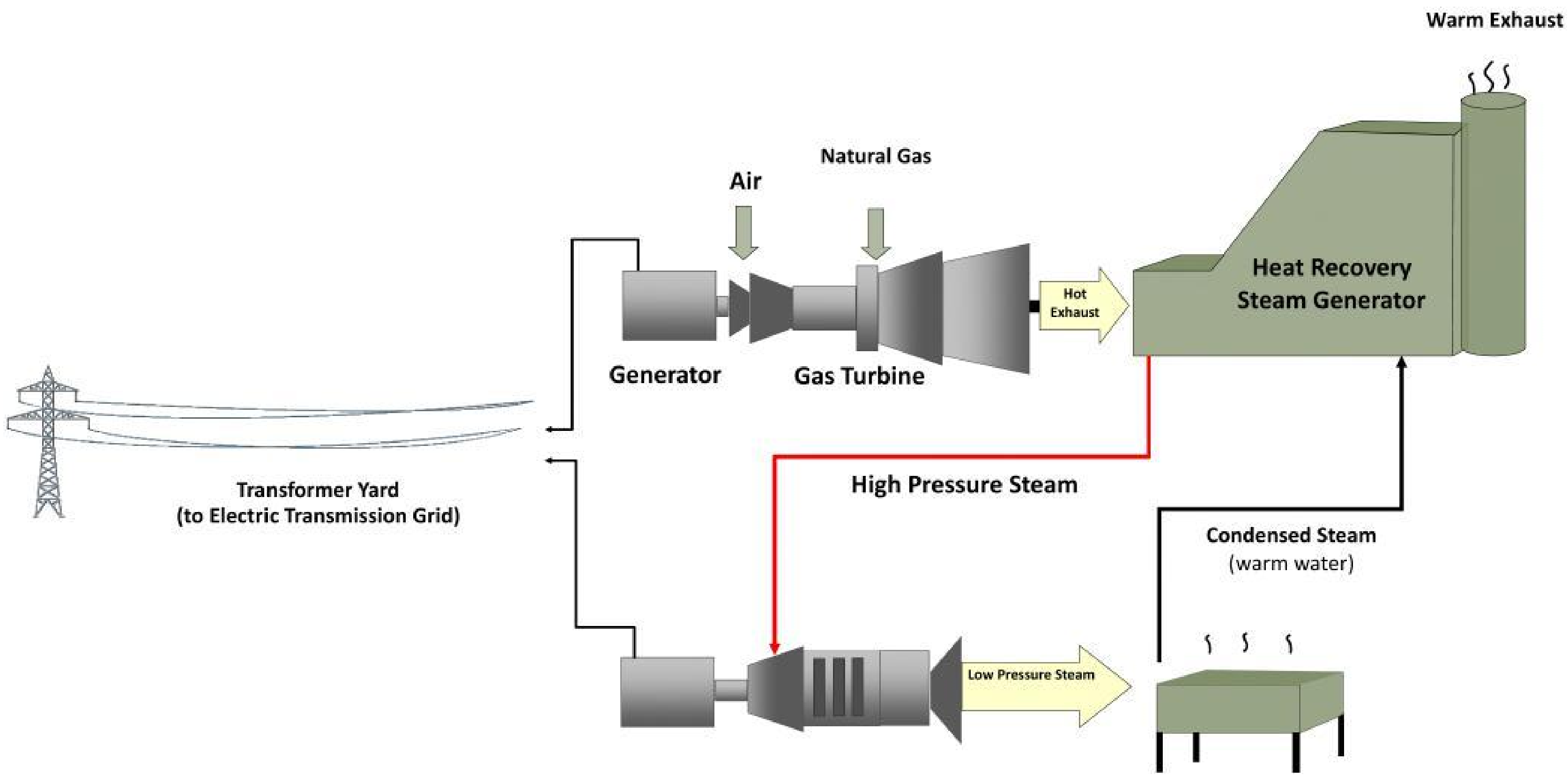

Figure 2-7

Schematic of the Combined Cycle Process

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2.3.3 Heat Recovery Steam Generator

Waste heat in the CTG exhaust will be recovered to generate steam in the HRSG to power the STG. The HRSG will be a multi-pressure, horizontal unit with reheat capabilities and natural circulation. The HRSG will be designed for horizontal gas turbine exhaust flow through vertical tube heat transfer sections, and will have supplemental fuel firing provided by an approximately 920 million British thermal units per hour (MMBtu/hr) natural gas-fired duct burner. The natural gas-fired duct burners will generate additional steam for the STG during periods of high electricity demand. The HRSG will also have a chemical feed system to maintain feed water pH and oxygen levels in accordance with the manufacturer's guidelines.

The system will incorporate post-combustion emission control technologies. Selective catalytic reduction (SCR) technology, widely recognized as the most stringent available control technology for NO_X emissions from combustion sources, will be installed to control NO_x emissions. An oxidation catalyst will be installed to control carbon monoxide (CO) and volatile organic compound (VOC) emissions. The SCR and oxidation catalyst will be located within the HRSG downstream of the CTG and duct burners. Emission control technologies are discussed further in Section 2.7.2. Exhaust gases from the HRSG will be released to the atmosphere through a 150-foot tall stack.

2.3.4 Steam Turbine Generator

The STG will be a 3,600 rpm, tandem compound, reheat steam turbine with a high pressure/intermediate pressure section and double flow low pressure section design. The STG will generate an additional approximately 250 MW of electric power at International Organization for Standardization (ISO) conditions[5] with supplemental duct firing of the HRSG.

The STG will be designed to run continuously, but will be capable of operating as a cycling unit to respond to fluctuations in electricity demand. The STG will be located in the turbine building with the CTG. The STG will be equipped with an ACC, where the steam exhaust will be condensed into water.

2.3.5 Air-Cooled Condenser

To minimize the water requirements of KEC, steam from the STG will be condensed in an ACC with the condensed water sent back to the HRSG. A multi-fan ACC will cool and condense the exhaust steam from the STG. The ACC relies on indirect heat transfer with the ambient air, thereby eliminating the need for substantial water requirements typical of many water-cooled power generating facilities, in which conventional forced-draft wet cooling towers with direct contact with the ambient air results in substantial

[5] 59 degrees Fahrenheit (ºF), 60% relative humidity, and ambient pressure at sea level.

evaporative water losses. An ACC-equipped facility utilizes approximately 95 percent less water than a conventional wet-cooled facility, and eliminates a significant source of visual water vapor plume.

The ACC, directly attached to and abutting the STG, and associated condensate collection system (where the condensed water will be transferred for reuse), will be located east of the HRSG. The system will consist of 15 modules and will be designed for reliable operation under all operating loads.

2.3.6 Electrical Generators and Interconnections

The CTG and STG are rated at a nominal 300 MW and 250 MW, respectively. The total of approximately 550 MW of generation will be integrated into the ISO-NE electric grid via an electrical interconnection with the existing 345-kV transmission system.

The on-site generator step-up transformers, located adjacent to each respective generating unit, will convert (step up) the generated electricity's voltage from the CTG's approximately 20 kV and the STG's approximately 18 kV, to 345 kV in order to provide electricity at the same voltage as the existing electric transmission circuit. An overhead 345-kV transmission line will extend from the Generating Facility Site's electrical equipment across Lake Road to enter the Switchyard Site.

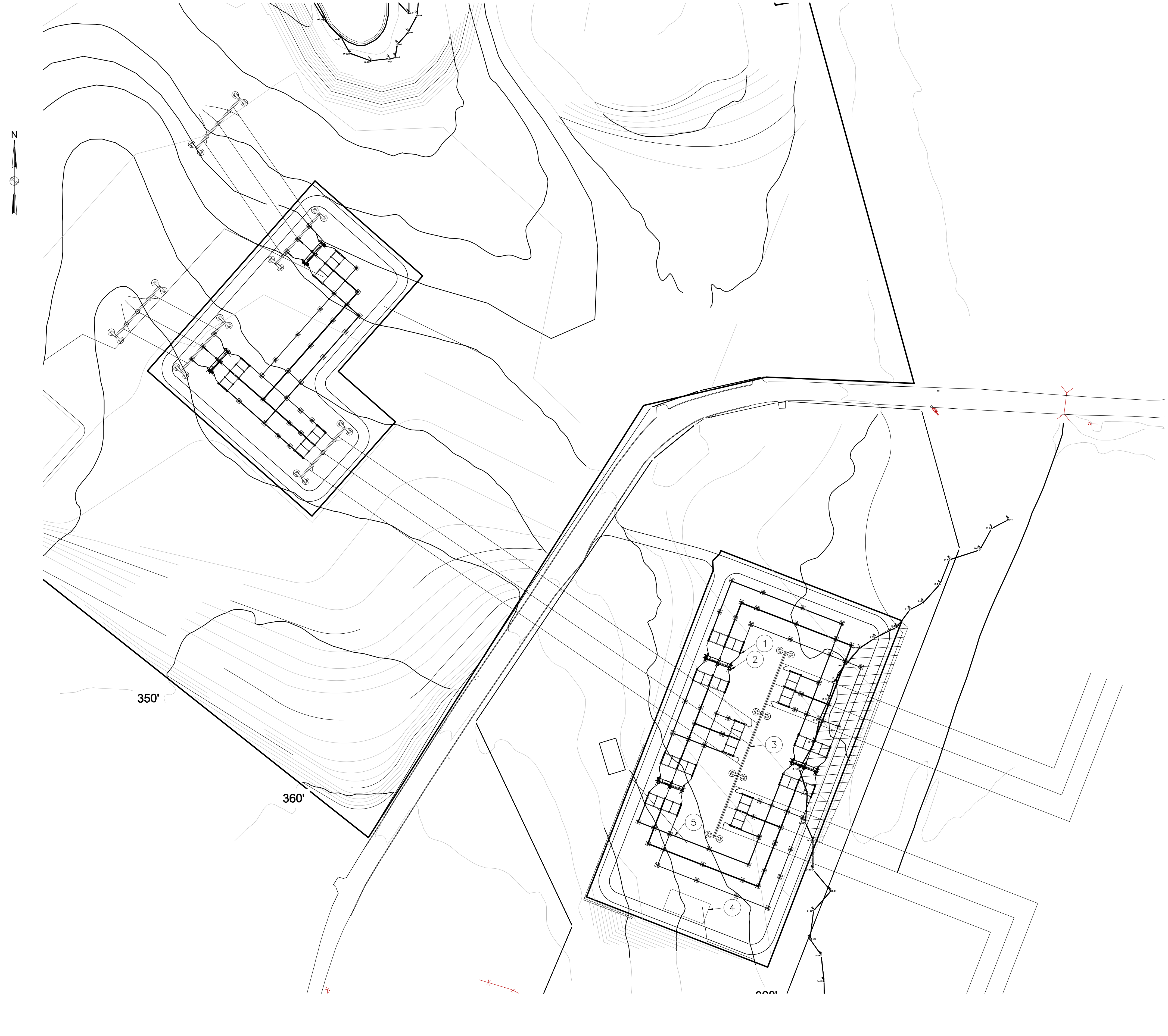
The Utility Switchyard, to be constructed on the Switchyard Site, will allow for direct interconnection of the electrical lines from KEC into the existing Eversource 345-kV transmission system. Figure 2-8 illustrates the layout of the existing transmission lines and the conceptual configuration of KEC's electrical components. The Utility Switchyard design and layout is per Eversource's standard guidelines. The final interconnection plan will be confirmed upon completion of an interconnection system impact study coordinated by ISO-NE and Eversource.

The Utility Switchyard will include circuit breakers, disconnect switches, surge arrestors, relays, controls and communications equipment required to integrate KEC's electric generation into the ISO-NE electric grid, while maintaining reliability and stability.

2.3.7 Ancillary Equipment

2.3.7.1 Natural Gas (Dew Point) Heater

A natural gas (dew point) heater will be located on the Generating Facility Site. The natural gas fired heater will increase the natural gas temperature as necessary to avoid any condensation (liquid droplets) freezing or entering the CTG.



Notes

Legend

1. 345kV CIRCUIT BREAKER
2. DISCONNECT SWITCH
3. A-FRAME STRUCTURE
4. CONTROL BUILDING
5. BUS

Reference Drawings

Rev	Date	Drawn	Description		App'd Ch'k'd
A	8/11/16	KS	FOR CLIENT REVIEW	BK	JW

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Figure 2-8

Details of Electric Transmission Interconnection

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PRELIMINARY NOT FOR CONSTRUCTION
REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION ISSUE IF REQUIRED BY PROJECT ADMINISTRATION MANUAL

Designed		Eng check	BK
Drawn		Approved	BK
Dwg check		Project Mngr	JW
Scale at ANSI E 1" = 40'-0"		Date 8/11/16	Rev A

334954CT-SA-301
Drawing Number

2.3.7.2 Natural Gas Compressor

Electric motor-driven natural gas compressors (one for use and one for redundancy) will be located on the Generating Facility Site to ensure the gas pressure entering the CTG meets turbine manufacturer specifications. Natural gas supplied by AGT may vary in pressure, depending on other system demands. The electric natural gas compressor(s) will provide additional compression, when needed.

2.3.7.3 Auxiliary Boiler

A natural gas-fired auxiliary boiler will operate as needed to keep the HRSGs warm during periods of turbine shutdown, and provide sealing steam to the steam turbine during CTG startups to reduce startup times and emissions. The auxiliary boiler will be equipped with low NO_X burners to minimize NO_X emissions. The auxiliary boiler will have a maximum input capacity of 84 MMBtu/hr and will be limited to 4,600 hours per year of operation.

2.3.7.4 Backup Generator

A ULSD-fired backup generator engine with a maximum power rating of 1,380 kilowatts (kW) (mechanical) will provide backup power to support on-site emergency loads in the event of a total power loss on the local or regional transmission grid; during use of the backup generator, energy would not be supplied to the electrical grid. The backup generator engine would only be used in the case of grid unavailability and for periodic readiness testing; as such, its operating hours will be limited to a maximum of 300 operating hours per year (a total of 500 hours for both the backup generator and the emergency fire pump).

2.3.7.5 Emergency Fire Pump Engine

The emergency fire pump engine will provide on-site firefighting capabilities as a backup to the electric motor-driven fire pump. The emergency fire pump engine will fire ULSD fuel, and will typically only operate for testing and to maintain operational readiness in the event of an emergency. It will be limited to a maximum of 300 operating hours per year (a total of 500 hours for both the backup generator and the emergency fire pump).

2.4 FACILITY CAPABILITY, OPERATIONS, AND SERVICE LIFE

KEC will generate approximately 550 MW of electricity utilizing primarily natural gas, with ULSD as a limited-use backup fuel. ULSD use will be limited in accordance with KEC's air permit to instances when natural gas is not available, and for no more than 720 hours on rolling annual basis. It is expected that the actual use of ULSD will be on the order of once every two to three years. The ability to utilize ULSD as a backup fuel enhances reliability for the ISO-NE grid under conditions when natural gas use may be curtailed or is unavailable and electricity is required. The HRSG will be equipped with natural gas-fired duct burners for supplemental firing, and evaporative cooling of the CTG combustion air will be used to increase efficiency when temperatures exceed 59ºF.

When fired with natural gas at ISO conditions, KEC will have a nominal electric production capability of approximately 550 MW, with 301 MW from the CTG. Exhaust heat from the CTG will pass through the HRSG and produce steam that will drive the STG. This process will result in the generation of approximately 248 MW, when the duct burners are operational, and 151 MW without the duct burners. KEC will have an approximately 14-MW parasitic load at ISO conditions with duct firing, resulting in a total net output to the grid of 535 MW at ISO conditions with duct firing.

When firing ULSD at ISO conditions, KEC will have a total gross electrical production capability of 383 MW, with 260 MW from the CTG and 123 MW from the STG. Duct firing will not occur when firing ULSD in the CTG.

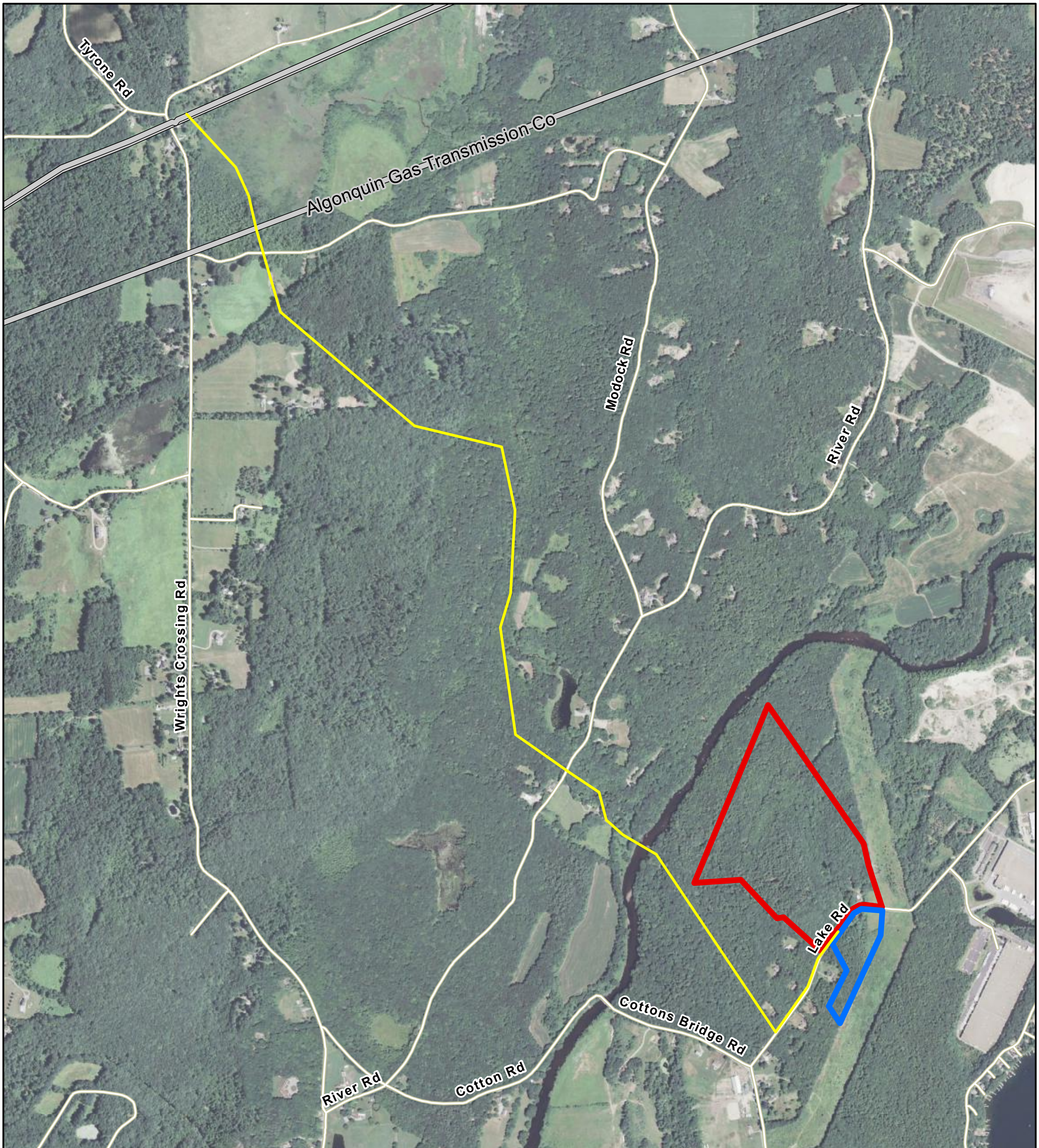
KEC is proposed to be permitted for continuous operation seven days per week, 52 weeks per year, although two weeks of routine maintenance outage time is typically expected per year. During normal operation, the generation from KEC may vary from approximately 40% load (or 220 MW gross) to 100% load (550 MW gross) depending on the ISO-NE electric system dispatch.

KEC is designed for a service life of at least 30 years.

2.5 FUEL TYPE, SUPPLY, AND STORAGE

Natural gas will be supplied via a new natural gas pipeline lateral interconnected to one of the two nearby AGT natural gas pipelines that lie approximately 2 miles to the north of the Generating Facility Site. KEC will require a maximum of 3.9 million cubic feet (MMcf) per hour of natural gas at a minimum pressure of 550 pounds per square inch gauge (psig) located at the inlet of the gas turbine interface when operating at 100% load and approximately 650 psig at the KEC Site boundary. The AGT pipelines have a peak day capacity of approximately 2.74 Bcf per day. Average operating pressure in the vicinity of KEC ranges between 650 psig and 750 psig, thus requiring natural gas compressors at the KEC Site.

A proposed interconnection will provide natural gas to KEC utilizing the existing Eversource (formerly Yankee Gas) ROW located just west of the KEC Site. As discussed further in Section 8.1, Eversource will replace the existing pipeline with a new expanded natural gas pipeline in the existing ROW capable of serving the natural gas fuel supply requirements of KEC and the natural gas customers currently served. Eversource will also install a short section of natural gas lateral along Lake Road from the existing ROW to the Generating Facility Site specifically to serve the natural gas fuel supply requirements of KEC. The updated ROW, including the lateral, will be approximately 2.8 miles long (Figure 2-9) and will include



Legend
- Generating Facility Site
- Switchyard Site
- Pipeline Interconnection
- Existing NG Pipeline
- Roads

N
0 750 1,500
Feet

Figure 2-9 Natural Gas Interconnection

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Z:\UtilServ\Killingly\Reports\NaturalGas\NaturalGas_20160801.mxd metering at the AGT pipeline and metering/regulation at the KEC Site.

Natural gas supplied to KEC will pass through a moisture separator prior to use. A vane type filter/separator will be provided in the gas stream, upstream of the CTG, to restrict particles and liquids from entering the combustion turbine. Electric motor-driven fuel gas compressors will be located on the Generating Facility Site.

Natural gas will be provided through a firm natural gas fuel supply contract to meet KEC's requirements. This arrangement will minimize gas supply costs and provide high levels of reliability and operational flexibility. During certain unforeseen pipeline supply problems, KEC will utilize ULSD to fire the CTG in accordance with the air permit. Although NTE is requesting authorization from DEEP to utilize ULSD for up to 720 hours per year (30 days), actual use is expected to occur on the order of several hours once every two to three years and only under the circumstance where natural gas supply is not available.

ULSD, which has a maximum sulfur content of 0.0015%, will be purchased from local suppliers. As shown in Figures 2-4 and 2-5, a one million-gallon storage tank will be constructed south and west of the turbine building to store ULSD; this will provide sufficient ULSD for approximately two days' use at full operating load, with truck delivery to replenish the supply should extended use be required. The ULSD storage system will include a truck unloading area, fuel pumping facilities, and associated piping from the storage area to the combustion turbine. The fuel storage tanks, truck unloading area, and associated pumping and piping facilities will be designed in accordance with all applicable regulatory standards, which include established standards for secondary containment to prevent leaks and spills from contaminating the environment. Based on previous experience, NTE expects that with proper maintenance the ULSD can be stored for two to three years.

2.6 INSTRUMENTATION AND CONTROLS

Instrumentation and control devices will sense, indicate, transmit, and control process variables as required to ensure safe, efficient, and reliable operation of KEC. A Digital Control System (DCS) will monitor and control many of the systems and components installed at KEC, such as the CTG, STG, and other associated equipment.

Operating personnel will have complete control and monitoring capability via the DCS. This will include control and monitoring, control adjustments, data logging, continuous emissions monitoring and control, event logging, alarms and start-up/shutdown (SUSD) functions. For example, the DCS will implement both closed and open loop control to bring KEC from start-up to the desired operating conditions and back to shutdown. The DCS will also monitor, display, and record process data received from field sensors and through communication links. This information will be used for general process supervision, calculations associated with equipment performance, and historical recordkeeping and trending, including sequence of events recording and diagnostics for management and maintenance of KEC.

2.7 AIR EMISSIONS AND CONTROL SYSTEMS

2.7.1 Air Emissions

KEC will fire natural gas during normal operation, with the capability to fire ULSD as a backup fuel for no more than 720 hours per year, and only under the circumstance where natural gas is not available. Firing clean-burning natural gas with limited use of ULSD, in conjunction with the advanced control equipment discussed in Section 2.7.2, will result in low emissions. The anticipated emission rates (steady-state) from KEC are provided in Table 2-1. The emissions rates represent the utilization of Best Available Control Technology (BACT) and Lowest Achievable Emission Rate (LAER) technology.

Table 2-1: KEC LAER and BACT Emissions Rates (steady-state)

Pollutant	Gas Firing (no duct firing)	Gas Firing (duct firing)	ULSD Firing
NO_X	2.0 ppmvdc[a]	2.0 ppmvdc	5.0 ppmvdc
CO	0.9 ppmvdc	1.7 ppmvdc	2.0 ppmvdc
VOC	1.0 ppmvdc	2.0 ppmvdc	2.0 ppmvdc
SO_2	Fuel sulfur limit	Fuel sulfur limit	Fuel sulfur limit
PM_{10}/$PM_{2.5}$[b]	Vendor Specifications	Vendor Specifications	Vendor Specifications
Sulfuric Acid (H_2SO_4)	Fuel sulfur limit	Fuel sulfur limit	Fuel sulfur limit
NH_3	2.0 ppmvdc	2.0 ppmvdc	5.0 ppmvdc

[a] ppmvdc = parts per million by volume dry at 15 percent oxygen.

[b] PM_{10} = particulate matter with a diameter of less than 10 microns; $PM_{2.5}$ = particulate matter with a diameter of less than 2.5 microns.

Annual emissions are presented in Table 2-2.

Table 2-2: KEC Facility-Wide Annual Potential Emissions (tons per year [tpy])

Pollutant	CTG and Duct Burners	Auxiliary Boiler	Natural Gas Heater	Emergency Generator	Fire Pump	Facility Total
NO_x[a]	133.9	1.64	0.29	2.92	0.30	139.1
CO[a]	133.8	7.14	0.89	1.60	0.26	143.6
VOC[a]	48.3	0.78	0.08	0.15	0.02	49.3
SO_2	24.7	0.29	0.04	0.003	0.0005	25.1
$PM_{10}/PM_{2.5}$	100.8	0.97	0.12	0.09	0.02	102.0
Greenhouse Gas (GHG) (as CO_2 equivalent [CO_{2e}])	1,966,937	22,610	2,809	308	49	1,993,260[a]
H_2SO_4	8.76	0.02	0.006	0.0002	0.00003	8.8
Lead (Pb)	0.0018	$9.5x10^{-5}$	$1.2x10^{-5}$	$1.4x10^{-6}$	$2.3x10^{-7}$	0.002
NH_3	49.5	N/A	N/A	N/A	N/A	49.5
Max Individual HAP (hexane)	7.06	0.35	0.04	N/A	N/A	7.5
Total Hazardous Air Pollutants (HAPs)	14.1	0.36	0.05	0.01	0.003	14.6

[a] Includes 547 tpy of fugitive GHG emissions from circuit breakers and natural gas handling.

The values in Table 2-2 are based on the following simultaneous assumptions, operating at 100% load:

- CTG operating up to 8,760 hours per year at 59°F, firing natural gas with duct firing;
- CTG operating up to 720 hours per year at -10°F, firing ULSD;
- Auxiliary boiler operating 4,600 hours per year;
- Natural gas heater operating 4,000 hours per year; and
- Emergency generator and fire pump engines each operating 300 hours per year.

The annual emissions represent the utilization of BACT and LAER technology as discussed in Section 2.7.2.

2.7.2 Emission Controls

KEC will incorporate various state-of-the-art emission control systems to minimize emissions of NO_X, CO, VOCs, SO_2, $PM_{10}/PM_{2.5}$, H_2SO_4, Pb, GHG, and HAPs. KEC, like most of the northeast United States, is located in a designated ozone (O_3) nonattainment area. KEC will implement stringent emission controls in order to demonstrate LAER for NO_X to minimize emissions of this O_3 precursor. BACT will be applied to control emissions of all other regulated pollutants. NTE proposes to install DLN combustors and a water injection system to control NO_X emissions during combustion of natural gas and ULSD, respectively. Downstream of the combustion control systems, SCR technology will further control NO_X emissions, and an oxidation catalyst will control CO and VOC emissions. KEC will also utilize clean-burning natural gas with a maximum sulfur content of 0.5 grains per 100 standard cubic feet (gr/100 scf) in conjunction with limited firing of ULSD as backup fuel, to minimize SO_2, PM, H_2SO_4, Pb, and HAP emissions. Use of a high-efficiency CTG in combined cycle mode will minimize GHG emissions.

2.7.2.1 Dry Low NO_X Combustion (Natural Gas Firing)

DLN combustion is a pre-formation, combustion technique to abate NO_X emissions. DLN combustors, located in the CTG, control key combustion parameters, including the fuel-to-air ratio and the flame temperature. The DLN combustors mix the fuel and air immediately prior to combustion. This process, known as pre-mixing, reduces both the flame temperature required for combustion and the concentration of oxygen in immediate proximity to the flame. DLN combustors utilize fuel-to-air ratios below stoichiometric values and a lower flame temperature to inhibit NO_X formation. DLN combustion will be utilized during natural gas operation, and reduce emissions to 2.0 ppmvdc in conjunction with the SCR.

2.7.2.2 Water Injection (ULSD Firing)

Water injection, like DLN combustion, is a pre-formation, pre-combustion technique to reduce NO_X emissions. Water injection will occur during ULSD firing to control NO_X emissions in the CTG, upstream of the SCR system. In the presence of high temperatures, atmospheric nitrogen (N_2) and oxygen (O_2) form thermal NO_X; water injection limits the formation of thermal NO_X by reducing the flame temperature as the water absorbs heat. Water injection will help to reduce NO_X emissions to 5.0 ppmvdc in conjunction with the SCR.

2.7.2.3 Selective Catalytic Reduction

SCR is a highly effective, post-combustion, flue gas treatment technique to reduce NO_X emissions. Aqueous NH_3 (≤19% concentration by weight), the NO_X reducing reagent, will be injected into the flue gas downstream of the CTG and duct burners and upstream of the SCR catalyst bed. In the presence of the SCR catalyst, the NO_X and aqueous NH_3 will form stable-state N_2 and water vapor. The catalyst bed will be installed in the HRSG at the optimum temperature for the catalytic reaction of NO_X and NH_3.

During natural gas firing, the SCR system will reduce NO_X concentrations to 2.0 ppmvdc, with or without duct firing, at all steady-state load conditions and ambient temperatures. During ULSD firing, the SCR system will reduce NO_X concentrations to 5.0 ppmvdc at all steady-state load conditions and ambient temperatures. A small amount of unreacted NH_3, called the ammonia slip, will continue through the HRSG and out the stack. The ammonia slip will be limited to 2.0 ppmvdc during natural gas firing and 5.0 ppmvdc during ULSD firing, at all steady-state load conditions and ambient temperatures.

2.7.2.4 Oxidation Catalyst

An oxidation catalyst system will be located downstream of the CTG and duct burners in the HRSG to control CO and VOC emissions. Flue gas produced in the CTG and duct burners will filter through a catalyst bed, in which the excess air in the flue gas will oxidize the CO and VOC forming CO_2 and water vapor. The oxidation catalyst will be installed in the HRSG at the optimum temperature for catalytic oxidation.

The oxidation catalyst system will reduce CO concentrations in the flue gas to 1.7 ppmvdc and 0.9 ppmvdc with and without duct-firing, respectively, at all steady-state load conditions and ambient temperatures during natural gas firing. CO concentrations will be limited to 2.0 ppmvdc during ULSD firing.

VOC concentrations will be reduced to 2.0 ppmvdc and 1.0 ppmvdc with and without duct-firing, respectively, at all steady-state load conditions and ambient temperatures during natural gas firing. VOC concentrations will be limited to 2.0 ppmvdc during ULSD firing.

2.7.2.5 Other Emission Controls

NTE selected natural gas, the lowest NO_X-emitting fuel available, as KEC's primary fuel source. To ensure reliability, limited firing of ULSD in the CTG may occur when natural gas is unavailable. KEC will fire low sulfur fuels to reduce the quantity of SO_2, $PM_{10}/PM_{2.5}$, H_2SO_4, Pb, and HAP emissions. The sulfur in the natural gas will be limited to the sulfur content in the natural gas pipeline. The USEPA defines pipeline quality natural gas in the Acid Rain regulations under 40 Code of Federal Regulations (CFR) 72.2 as natural gas that contains no more than 0.5 gr/100 scf of sulfur. ULSD will have a maximum sulfur content of 15 parts per million (ppm) by weight and will be fired no greater than 720 hours per year, and only when natural gas is unavailable. Due to the negligible ash content in natural gas and the limited hours of ULSD operation, the concentration of $PM_{10}/PM_{2.5}$ from fuel ash will be low. Natural gas is the lowest GHG-emitting fossil fuel and will be the primary fuel for KEC.

2.7.3 Emission Reduction Credits and Displacement

In accordance with the requirements of R.C.S.A. Section 22a-174-3a(l)(5), NTE will procure emission reduction credits (ERCs) to offset the emissions from KEC. The NO_X ERCs will be created prior to the date KEC becomes operational, and will come from the same nonattainment area as KEC, or a contiguous nonattainment area that is designated as an equal or higher nonattainment classification that contributes to nonattainment (upwind) in the KEC area. Since NTE will purchase NO_X ERCs to offset potential emissions at a ratio of 1.2 to 1, total regional NO_X emissions will decrease as a result of KEC. Additionally, as a new, efficient source of energy generation, KEC will displace older, less efficient and higher emitting generating facilities, resulting in further regional air quality improvements.

2.7.4 Emissions Monitoring

As required under 40 CFR 75, a continuous emission monitoring system (CEMS) will be incorporated into KEC to continuously monitor NO_X, CO, and NH_3 emissions from the CTG and duct burners. The CEMS will record emissions to ensure compliance with the required standards. Quarterly CEMS emission reports will be prepared and submitted in accordance with 40 CFR 75.

2.8 WATER SUPPLY AND USE

KEC's water supply will be provided by the Connecticut Water Company (CWC), Crystal Water Division, a subsidiary of Connecticut Water Service, Inc. CWC currently serves the Town of Killingly and will require no increase in the permitted capacity of existing wells to meet KEC's water needs. As described in Section 6.3.1, CWC has confirmed its ability to supply the required volumes. The proposed interconnection to the existing water system is shown in Figure 2-10.

Normal operation of KEC when firing natural gas will require on the order of 50,000 to 100,000 gallons per day (gpd) of water (Figures 2-11a and 2-11b). Up to 50,000 gpd may be required for HRSG makeup and miscellaneous plant uses on an average annual operating day. In periods of higher ambient temperatures (generally above 59°F), KEC will use evaporative cooling of the combustion air to enhance efficiency and energy output; when in use, the evaporative cooler will use up to an additional 50,000 gpd, depending on ambient temperature. Additional water use will be required for emissions control during extremely limited times when natural gas is unavailable, and use of ULSD is necessary for electric grid reliability. When using ULSD, water is injected into the combustion turbine to reduce NO_X levels, whereas when firing natural gas, DLN combustion is used (DLN combustion is not available for ULSD firing). Water injection for NO_X control during ULSD firing will increase the total water demand up to 400,000 gpd of water. However, ULSD firing would only occur during extremely limited times when natural gas is not available, and at no time would occur for more than 720 hours over a given year. While average water use of KEC would usually range from 50,000 gpd in the winter up to 100,000 gpd in the summer, the maximum daily use (reflecting ULSD use) could be up to 400,000 gpd for those limited occasions when back-up fuel is required. The following systems will require water supply:

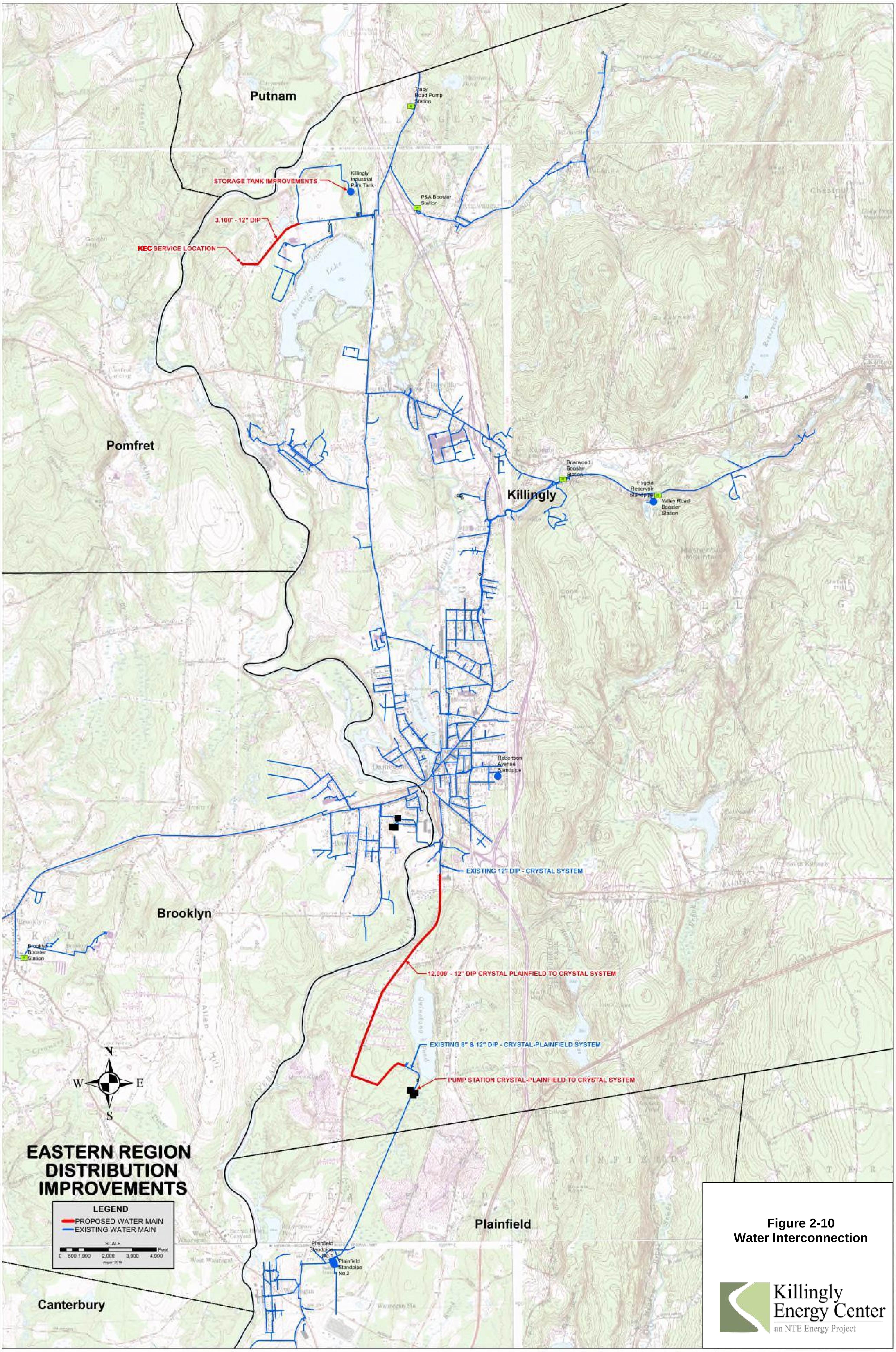
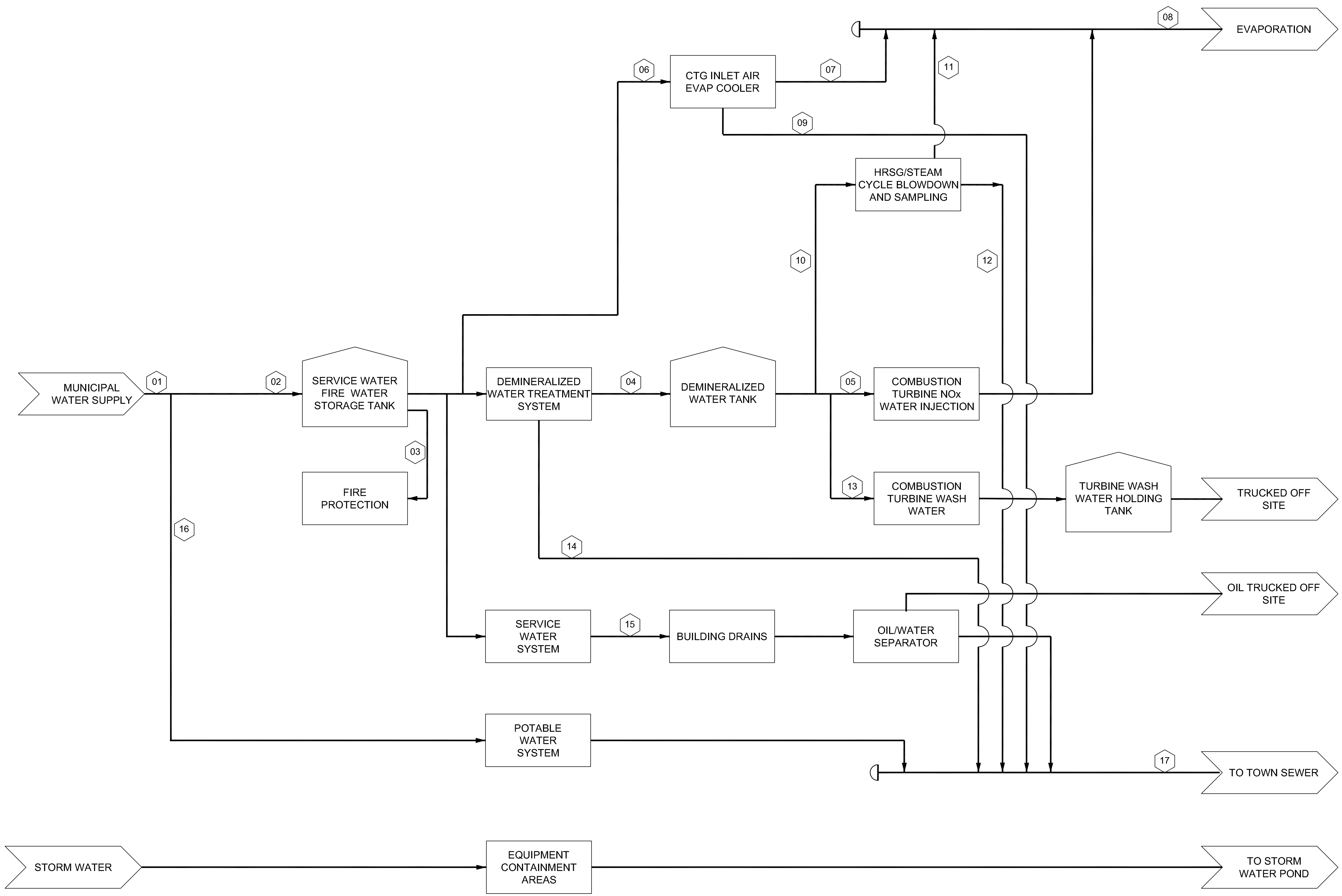


Figure 2-10
Water Interconnection



Notes

1. CASE 1 ASSUMES OPERATION AT WINTER AMBIENT CONDITIONS, 100% CT LOAD ON GAS, DUCT BURNER OFF, EVAP COOLER OFF.
2. CASE 2 ASSUMES OPERATION AT ANNUAL AVERAGE AMBIENT CONDITIONS, 100% CT LOAD ON GAS, DUCT BURNER OFF, EVAP COOLER OFF.
3. CASE 3 ASSUMES OPERATION AT SUMMER AMBIENT CONDITIONS, 100% CT LOAD ON GAS, DUCT BURNER ON 12 HRS/DAY, EVAP COOLER ON 12 HRS/DAY.
4. CASE 4 ASSUMES OPERATION AT WINTER AMBIENT CONDITIONS, 100% CT LOAD ON ULSD, DUCT BURNER OFF, EVAP COOLER OFF.
5. CASE 5 ASSUMES OPERATION AT SUMMER AMBIENT CONDITIONS, 100% CT LOAD ON ULSD, DUCT BURNER OFF, EVAP COOLER ON 12 HR/DAY.
6. PROCESS IS SHOWN FOR DIAGRAMMATIC PURPOSES BUT CONSUMPTION IS NEGLIGIBLE.

Legend

Reference Drawings

B	08/15/16	AF	FOR CLIENT REVIEW	JW	JW
A	08/15/16	AF	FOR CLIENT REVIEW	JW	JW
Rev	Date	Drawn	Description	Ch'k'd	App'd

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Figure 2-11a

KEC Water Balance

Killingly Energy Center
an NTE Energy Project

PRELIMINARY NOT FOR CONSTRUCTION
REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION

Designed	-	Eng check	-
Drawn	-	Approved	-
Dwg check	-	Project Mngr	-
Scale at ANSI D: SCALE		Date: 08/05/16	Rev: B

Drawing Number
334954CT-WBD-101 01

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SUMMARY FLOW TABLE (kgpd)						
NODE #	DESCRIPTION	CASE1[1]	CASE2[2]	CASE3[3]	CASE4[4]	CASE5[5]
1	Municipal Water Supply (Total)	41.7	40.0	70.0	327.6	345.4
2	Raw Water to Storage Tank	38.9	37.2	67.1	324.7	342.5
3	Fire Protection	Note 6	Note 6	Note 6	Note 6	Note 6
4	Demineralized Water Treatment Product	29.2	27.8	34.7	260.7	257.8
5	CTG Water Injection	0.0	0.0	0.0	231.5	231.5
6	Make-up to CTG Inlet Air Coolers	0.0	0.0	21.4	0.0	21.4
7	CTG Inlet Air Cooler Evaporation	0.0	0.0	14.3	0.0	14.3
8	Total Evaporation	11.6	11.0	28.1	243.1	256.2
9	CTG Inlet Air Cooler Blowdown	0.0	0.0	7.1	0.0	7.1
10	Make-up to Steam Cycle	29.2	27.8	34.7	29.2	26.2
11	Steam Cycle Vent	11.6	11.0	13.8	11.6	10.4
12	Steam Cycle Blowdown	17.6	16.7	20.9	17.6	15.8
13	Combustion Turbine Wash Water	Note 6	Note 6	Note 6	Note 6	Note 6
14	Demineralized Water Treatment Waste	6.8	6.5	8.1	61.2	60.5
15	Equipment Washdown	2.9	2.9	2.9	2.9	2.9
16	Potable Water Supply	2.9	2.9	2.9	2.9	2.9
17	Discharge to Town Sewer (Total)	30.2	29.0	41.9	84.5	89.2

Notes

1. CASE 1 ASSUMES OPERATION AT WINTER AMBIENT CONDITIONS, 100% CT LOAD ON GAS, DUCT BURNER OFF, EVAP COOLER OFF.
2. CASE 2 ASSUMES OPERATION AT ANNUAL AVERAGE AMBIENT CONDITIONS, 100% CT LOAD ON GAS, DUCT BURNER OFF, EVAP COOLER OFF.
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6. PROCESS IS SHOWN FOR DIAGRAMMATIC PURPOSES BUT CONSUMPTION IS NEGLIGIBLE.

Legend

Reference Drawings

Rev	Date	Drawn	Description	Ch'k'd	App'd
B	08/15/16	AF	FOR CLIENT REVIEW	JW	JW
A	08/15/16	AF	FOR CLIENT REVIEW	JW	JW

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Figure 2-11b
KEC Water Balance (cont.)

Killingly Energy Center
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PRELIMINARY NOT FOR CONSTRUCTION
REPLACE WITH ENGINEERS STAMP AT CONSTRUCTION AND/OR FABRICATION

Designed	-	Eng check	-
Drawn	-	Approved	-
Dwg check	-	Project Mngr	-
Scale at ANSI D: SCALE		Date: 08/05/16	Rev: B

Drawing Number
334954CT-WBD-101 02

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- *Potable Water*: Potable water will be supplied directly from CWC; no additional on-site treatment is required. The supply of potable water will be routed via a dedicated piping system to drinking fountains, showers, toilets, and sinks. Normal facility usage will be approximately 2,900 gpd.
- *Demineralizer Water*: Treated water from the demineralizer system will supply the HRSG with high purity makeup water required by the steam cycle. During periods of ULSD firing, demineralized water will also be used for water injection to control NO_X emissions. High purity water supply to the HRSG and for water injection will be supplied by a demineralizer water treatment system consisting of a reverse osmosis membrane system and a mixed bed polisher. A 500,000-gallon water storage tank will be constructed on-site to store demineralized water. During full load operation on natural gas, total makeup to the HRSGs will be up to 40,000 gpd. During full load operation on during ULSD, water injection will consume up to 232,000 gpd.
- *Plant Service Water*: Minor uses of water will be supplied through KEC's service water system, including wash waters and supply to the close loop auxiliary cooling water system. During normal operation, water requirements for these uses are established at 2,900 gpd.
- *Water for Fire Protection*: The fire protection system consists of hydrants, hose stations, deluge system, and potable extinguishers. Fire water is supplied from the raw/fire water storage tank. This tank will have a dedicated reserve of approximately 150,000 gallons for fire protection.

Water will be treated (demineralized) in the on-site water treatment facilities, located in the water treatment building. This building, which will also serve as the administration and warehouse storage building, is located along the Generating Facility Site access driveway, across from the on-site switchyard.

A 500,000-gallon raw/fire water storage tank and a 500,000-gallon demineralized water storage tank will be constructed on-site to provide adequate capacity to balance the water usage and supply. To maintain adequate supply pressure to KEC, a small booster pump station may be constructed on-site. A portion of the raw water storage tank capacity will also be reserved for fire protection. Pumps and underground piping will be constructed on-site to supply KEC's needs.

2.9 WASTEWATER GENERATION, TREATMENT, AND DISPOSAL

Wastewater generated by KEC (as shown on Figures 2-11a and 2-11b) will include demineralizer water treatment reject, plant equipment and floor drains, sanitary wastes, CTG evaporative cooler blowdown, and HRSG blowdown. Additionally, when the CTG is off-line, it will be periodically washed with water. The discharge associated with the water washing will be captured in a dedicated tank and trucked off-site for proper disposal. The following systems will generate wastewater:

- *Demineralizer Water Treatment Wastewater*: Operation of the reverse osmosis demineralizer water treatment system includes a reject stream which concentrates any impurities existing in the raw water source. Total amount of wastewater produced from the reject during normal full load operation will be approximately 8,000 gpd when firing natural gas and approximately 62,000 gpd when firing ULSD.
- *Plant Equipment and Floor Drains:* Equipment drains and floor drains receiving wastewater from equipment drains and washdowns will produce approximately 2,900 gpd. These wastewaters will be directed to an oil/water separator prior to discharge.
- *Sanitary Wastes*: Sanitary wastewater consisting of toilet flushes, sink drains, shower drains, and drinking fountains will be directly discharged to KEC's sewer connection. Normal operation is expected to produce 2,900 gpd of sanitary wastewater.
- *HRSG Blowdown*: In order to maintain safe and reliable operation, the HRSG must "blow down" water from the steam cycle. Normal operation is expected to produce up to 21,000 gpd of blowdown water that will be directed to the blowdown tank prior to discharge.
- *CTG Evaporative Cooler Blowdown*: In order to maintain safe and reliable operation, the CTG Evaporative Cooler must "blow down" water from the sump. Normal operation is expected to produce up to 10,000 gpd of blowdown wastewater.

It is estimated that the KEC will produce an average of approximately 30,000 to 45,000 gpd of wastewater under normal natural gas-fired operation, and up to 90,000 gpd of wastewater during ULSD operation. Wastewater generated by KEC will be pre-treated to the extent required to assure compliance with sewer discharge requirements of the Town of Killingly's sewer system, operated by Suez. Use of an oil/water separator for the building drains will ensure compliance with these criteria.

All wastewaters will flow directly via an approximately 3,100-foot sewer interconnection to the existing Killingly sewer system located in Lake Road, as shown on Figure 2-12. As discussed in Section 6.3.2, NTE has received confirmation of the existing system's ability to accept and treat the required volumes.

2.10 STORMWATER MANAGEMENT

To manage the potential effects of stormwater runoff associated with construction and operation, KEC will incorporate design and operating procedures to manage stormwater in accordance with state and federal guidelines for the Stormwater Pollution Prevention Plan (SWPPP) and Best Management Practices (BMPs).

Operational stormwater design has included reducing impervious surface area to the greatest extent possible, as well incorporation of bio-swales and a tiered stormwater detention pond. These features will allow for appropriate conveyance, treatment, and retention of flows to maximize infiltration (return of rainfall to the groundwater), control water quality, and minimize the potential for erosion and sedimentation.

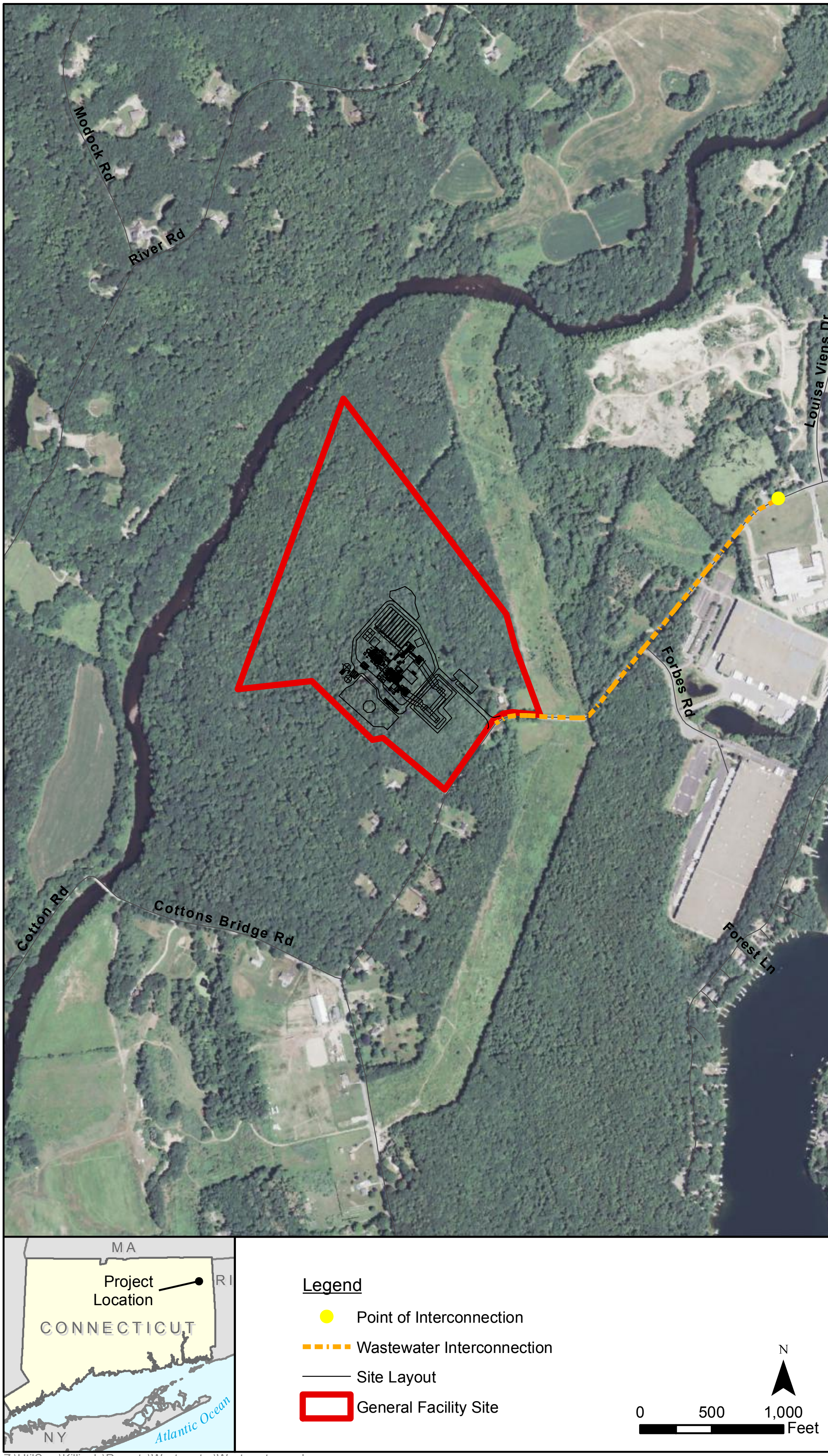

Figure 2-12 Wastewater Interconnection

Killingly Energy Center
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On the Switchyard Site, where less impervious surface will be created, similar stormwater management measures have been integrated in accordance with applicable design standards.

A detailed SWPPP has been developed for the KEC Site, as further discussed in Sections 3.2, 3.3, 6.2, and 6.3.

2.11 NOISE ABATEMENT

NTE has incorporated significant noise control measures into the design of KEC, as outlined in additional detail in Section 7.4. The primary noise sources on the KEC Site will be the ACC, CTG, STG, combustion turbine main step-up transformers, air inlet face and filtering housing, the exhaust stack, and the HRSG. This equipment is generally enclosed within buildings, which provide considerable sound attenuation. Equipment located outdoors, such as the ACC, which requires airflow to function, has been positioned to maximize both the distances from Generating Facility Site boundaries, and shielding from other on-site structures and existing vegetation to the extent possible.

NTE has focused on integrating low-noise features and effective mitigation elements into KEC's design and layout. The design, more specifically, will position louder equipment (e.g., ACC) towards the center of the Generating Facility Site, and incorporate the following types of mitigation: a silencer system in the HRSG exhaust stack; increased casing thickness for the HRSG transition duct; and acoustical lagging for the HRSG duct burner gas piping. The combustion turbine enclosure air inlet vents and air discharge vents will also incorporate a silencer system. Several large components will be enclosed in the turbine building, including: the hydraulic supply unit; fuel oil pumping skid; combustion turbine enclosure; water injection pump skid; CTG; STG; hot box; and lube oil unit. Additional information detailing the proposed KEC design and mitigation measures (e.g., acoustically treated equipment enclosures, acoustic silences, sound walls or barriers, and low-noise equipment) is provided in Section 7.4.

As proposed, operation of KEC will fully comply with all applicable State of Connecticut and Town of Killingly noise control standards and limits, which limit noise from industrial uses to 51 A-weighed decibels (dBA) during nighttime hours at the KEC Site's closest boundary with residentially zoned property; KEC's sound levels are at or lower than this level at all property boundaries. Final design configurations may be updated to incorporate different noise abatement measures, but will continue to comply with state and local standards.

2.12 TRAFFIC

The Generating Facility Site will be accessed via a proposed driveway properly designed to accommodate the anticipated driveway volumes, and facilitate vehicle and equipment access from Lake Road (Figures 2-4 and 2-5). The proposed driveway will be located approximately 340 feet south and west of the eastern Generating Facility Site boundary, extending approximately 500 feet from Lake Road into the Generating Facility Site and its internal ring road. The proposed 30-foot-wide driveway will consist of two 15-foot-wide lanes for vehicle traffic both entering and exiting the Generating Facility Site, and will operate under stop sign control at the driveway/Lake Road intersection. The driveway has been designed to accommodate tractor trailer construction and delivery vehicles to enable the delivery of ULSD and other industrial items required for KEC operation.

During the anticipated 33-month construction period, construction laydown and parking areas will be located on-site. Traffic accessing the KEC Site will generally consist of construction personnel, heavy construction equipment, and material and equipment deliveries. The number of construction personnel on-site during the construction period will range from a low of 40 to a high of 350 workers per day during the approximately 3-month peak period, projected to occur during the first months of 2019. It is expected that as many as 30 truck deliveries per day will occur during the construction period; however, deliveries will occur throughout the construction day, not necessarily during the peak hours. It is projected that a majority of the construction traffic (75%) will orient to and from the east, along Lake Road toward I-395.

When KEC operation commences in 2020, the total operational staff will include up to 30 employees working over several shifts. Parking areas will be located near the administrative building along the access driveway.

Additional detail regarding KEC's effect on local traffic is provided in Section 7.2.1. Lake Road may require widening of the curve immediately east of the KEC Site to accommodate the tractor trailer delivery vehicles, and a repositioning of the existing "no through truck traffic" sign to be just west of the KEC driveway.

2.13 SAFETY, SECURITY, AND CONTINGENCY PLANNING

During both construction and operation of KEC, safety is of the utmost importance. Safety programs will be an integral part of each construction contractor's responsibilities and a part of the daily operating routine at KEC. Safety programs developed for both construction and operation will be coordinated with the Town of Killingly's fire and emergency response personnel. KEC will be designed, constructed, and operated in accordance with federal, state, and local regulations and responsible engineering practices, including the Occupational Safety and Health Administration (OSHA). The latest edition of design standards and regulations will be used to develop KEC's programs. In addition, plans and provisions for cyber security protection will be implemented, consistent with the requirements of the North American Electric Reliability Corporation (NERC) and with the CSC's Whitepaper on the Security of Siting Energy Facilities.

2.13.1 Lighting Plan

Navigation marking and lighting on the exhaust stack will not be required by the Federal Aviation Administration (FAA). Access and maintenance lighting, which can be turned off when not in use, will be required and installed on the stack. Other lighting for KEC will be designed to be adequate for safe operations while minimizing impact on the surrounding community. KEC area lighting will meet the standards of the Illuminating Engineering Society Lighting Handbook and any code requirements of the Town of Killingly. Lighting will consist of the following:

- General KEC lighting – Pole-mounted light-emitting diode (LED) fixtures with full cut-off optics to reduce unwanted glare and fugitive light. Fixtures will be oriented towards the facility and will be controlled with light sensing switches.
- Doorway lighting – Wall-mounted LED fixtures with full cut-off optics to reduce unwanted glare and fugitive light. The doorway fixtures, controlled by photovoltaic cells, will be located above the doors and directed downward.
- Platform lighting – The walkway areas of the ACC, HRSG, CEMS equipment platform, and other equipment-related platforms will be lit by heavy-duty stanchion mounted LED area lights, typically mounted 8 feet above the platform elevation. The stairway fixtures and platform area lighting are generally off during normal operation and turned on during maintenance from locally mounted switches and photovoltaic cells. This reduces the potential for nighttime fugitive light.
- Utility Switchyard – KEC anticipates the installation of structure-mounted LED fixtures with photovoltaic cells and full cut-off optics to reduce unwanted glare and fugitive light will be provided for personnel safety and security within the Utility Switchyard. Switchable task-specific lighting will be provided for nighttime maintenance only. All lighting will be in accordance with Eversource design requirements and operational standards.

2.13.2 Emergency Management Plan and Shutdown

As part of normal operating procedures to be developed for KEC, an emergency management plan will be developed and coordinated with the Town of Killingly. Representatives from KEC will review these procedures with the Town of Killingly, and appropriate cooperative measures will be included in the procedures. The final procedures will be filed with the Town of Killingly's fire department and safety authorities.

KEC will incorporate a variety of alarms and control systems to provide early identification of emergency situations that may require plant and/or system shutdown. Radio/mobile phone communications will be provided to link all personnel. Radio/mobile phone contact, in tandem with system alarms, will provide early warning to employees of any unsafe operating conditions. Employees will be trained for these emergency conditions and how to respond to such conditions.

2.13.3 Fire Protection Systems

The on-site fire protection system will consist of hydrants, hose stations, sprinkler systems, deluge systems, CO_2 system, and portable fire extinguishers. Fire water will be supplied from KEC's 500,000-gallon raw/fire water storage tank. Water supply from this tank will be controlled to maintain a minimum of approximately 150,000 gallons of water storage in the event of a fire. The fire water system will include one electric- and one diesel engine-driven main fire pump and one small jockey pump for pressure maintenance. A fire main will be installed, with hydrants situated throughout the Generating Facility Site. A standpipe system will be provided for the turbine building.

The CTG will include a high-pressure CO_2 fire protection system, the STG will include sprinkler systems, and the GSU will include a deluge system. Portable CO_2 and dry chemical fire extinguishers will be provided throughout KEC buildings to provide quick response in the event of a fire.

In addition to the on-site resources, NTE will coordinate with local fire stations to ensure that appropriate equipment and training is available to meet emergency needs.

2.13.4 Oil and Chemical Delivery, Storage and Management

Construction, operation, and maintenance of KEC will require a number of chemicals and lubricants. The chemicals will be stored in contained areas, appropriately designed for storage with secondary containment that will meet all applicable safety codes. A comprehensive list of the chemicals that are anticipated to be stored or handled on-site during construction and operation are presented in Tables 2-3 and 2-4, respectively. The tables detail the type, estimated quantity, and storage method of each chemical and lubricant. An updated list of chemicals will be provided to the appropriate local emergency response entities throughout KEC's construction and operating life.

Table 2-3: KEC On-Site Chemical Storage – Construction

Chemical	Nominal Quantity	Storage Method
Medium WT Oil	2,800 gallons	5-gallon containers on palettes in Conex box
Waste Oil	200 to 500 gallons	55-gallon drums (bermed)
WD-40	110 gallons	1-gallon containers and spray cans

Chemical	Nominal Quantity	Storage Method
Thinners/Solvents/Xylene/Methyl/ Ethyl/Ketone/Acetone	<110 gallons	1-gallon or less containers in Conex box
Insecticides	30 to 55 gallons	Spray cans in tool room
Various Aerosol Cans (waste)	Potential for large quantities over the course of construction	Punctured empty containers become regular waste
Paint	50 to 1,000 gallons	55-gallon drums and 5-gallon containers in Conex box
Gasoline	500 gallons	Above ground portable storage tank with self-contained berm or fuel truck
ULSD Fuel	200 to 500 gallons	Above ground storage tank with self-contained berm or fuel tank; Small dedicated ULSD tanks within the emergency engines
Chemicals Utilized in Cleaning of HRSG and Piping:		Delivered by contractor at time of service
• Citric Acid percent (3% weight concentration)	40,000 pounds	
• Caustic Soda 30 percent (pH to 9.0)	875 gallons	
• Sodium Nitrite (0.5% weight)	63 gallons	
• OSI-1 Inhibitor (0.1% Volume)	2,750 pounds	
• Pen-7 Surfactant (0.1% Volume)	63 gallons	
• Antifoam Agent	63 gallons	
Cleaning Solvents	Maintenance warehouse	55-gallon drums or Conex box

[a] A Conex box is a steel cargo container per OSHA standards located inside a berm area.

Table 2-4: KEC On-Site Chemical Storage – Operation

Chemical	Purpose	Location	Storage Method
15% sodium hypochlorite solution	Biocide – supplemental chlorination of raw water tank	Water treatment building – inside	400-gallon tote

Chemical	Purpose	Location	Storage Method
93% sulfuric acid	pH adjustment – RO feedwater	Water treatment building – inside	400-gallon tote
sodium hexametaphosphate solution	Antiscalant – RO feedwater	Water treatment building – inside	250-gallon tote
38% sodium bisulfate solution	Reducing agent – dechlorination of RO feedwater	Water treatment building – inside	250-gallon tote
Trisodium Phosphate	Scale/corrosion control – HRSG	Turbine building	Two 400-gallon totes
Filming amine	ACC/condensate/feedwater corrosion control	Turbine building	400-gallon tote
19% aqueous ammonia	Corrosion control	Turbine building	400-gallon tote
Trisodium Phosphate	Scale/corrosion control – auxiliary boiler	Turbine building	250-gallon tote
19% aqueous NH_3	SCR system	Outdoors – power block	12,000-gallon tank
Steam turbine lube oil	Steam turbine lubrication and Servo valve control	Turbine building	12,500-gallon tank
Steam turbine control oil	Steam turbine Servo valve control	Turbine building	500-gallon tank
ULSD fuel	Gas turbine fuel oil	Outdoors – power block	1,000,000-gallon tank
Gas turbine main oil	Gas turbine lubrication	Turbine building	9,000 gallon-tank
Gas turbine control oil	Gas Turbine Servo Valve Control	Turbine building	500-gallon tank
ULSD	Backup generator engine	Outdoors – power block	765-gallon day tank
ULSD	Fire pump engine	Outdoors – power block	340-gallon tank
Antifreeze	Fire pump and backup generator engines	Various	5 gallons for fire engine, 130 gallons for backup generator engine

Chemical	Purpose	Location	Storage Method
Lubricating oils	Fire pump, backup generator, boiler feed pumps, and other rotating equipment	Various	Internal engine oil sumps and cools
Main transformer oil	Insulation and cooling	Various	Internal transformer casing
Auxiliary transformer oil	Insulation and cooling	Various	Internal transformer casing
Gas turbine compressor wash	Cleaning gas turbine compressor	Turbine building	Three 250-gallon tanks: anti-freeze agent, detergent tank, and mixing tank
CO_2 gas	Generator purge	Turbine building	Twelve 12-pack bottles (144 bottles total)
Hydrogen gas	Generator coolant	Turbine building	One tube trailer
CO_2 gas	Gas turbine fire protection	Turbine building	75 sets of 120-pound cylinders
N_2 gas	HRSG layup, fuel gas purge	HRSG	One tube trailer
O_2 gas	Maintenance	Maintenance warehouse	Cylinders (Estimated one to three)
Propane gas	Maintenance	Maintenance warehouse	Cylinders (Estimated one to three)
Acetylene gas	Maintenance	Maintenance warehouse	Cylinders (Estimated one to three)
CEMS gases	Calibration gases (O_2, CO, NO_X, and NH_3)	Warehouse and CEMS buildings	Cylinders (three sets)
Sulfur hexafluoride	Circuit breaker fault interrupting media	Turbine building/switchyard	Internal breaker casing

Special considerations will be made during both construction and operation to assure that chemicals and substances that may pose safety hazards are appropriately handled, stored, and disposed of in accordance with regulatory requirements and manufacturers' recommendations.

All materials will be evaluated during construction. Materials determined hazardous will be stored in designated storage areas that will include safety containment measures. Chemical storage tanks will be contained in curbed areas designed to store 110% of the tank contents in the event of tank failure. Aqueous NH_3 and other non-water storage tanks will be constructed within concrete containment areas with the capacity to store 110% of the largest contained tank; the ULSD containment area will be lined. Sumps will be provided in the containment areas to collect spills. Feedwater chemicals will be stored in curbed areas to control leaks and spills. Lubricants will be stored in a curbed area designated to contain a spill from the largest container vessel. An oil sump will be provided in the curbed areas, the discharge of which will be directed to KEC's oil/water separator. Construction personnel will be trained on proper use, handling, personal protective equipment, storage, and disposal of hazardous materials.

Once operational, the most significant chemical storage requirements, other than for ULSD, will be for the treatment of steam and feedwater systems, and the operation of the SCR system. Operation will require limited amounts of lubricating oils and certain other industrial chemicals, which will be stored in covered areas. Operating personnel will be trained on the proper use, handling, protective equipment, storage, and disposal of all chemicals to be stored on the Generating Facility Site.

On-site tanks will be equipped with a level gauge, and monitored locally or in the control room. KEC has incorporated technology and developed responses for any significant, although unlikely, change in tank level. In the unlikely event of a tank failure or rupture, KEC will implement its Spill Prevention Control and Countermeasure (SPCC) Plan for its oil storage tanks and an Emergency Response Plan, which will address all oil and chemical storage and include notification of the appropriate regulatory agencies. Delivery of ULSD will be via truck, anticipated to come directly from I-395 along Lake Road to the Generating Facility Site. Unloading will be within curbed containment areas, and the SPCC Plan and the Emergency Response Plan will address the appropriate steps to be taken in the unlikely event of an unanticipated spill. The SPCC Plan and Emergency Response Plan for construction will be finalized prior to commencement of construction activities, and will be updated for operational use as KEC transitions into start-up activities.

Once KEC is operational, it is anticipated to be a conditionally exempt small quantity generator under the federal Resource Conservation and Recovery Act (RCRA) because it will generate less than 100 kilograms (220 pounds) per month of materials classified as hazardous. KEC will not treat or dispose of waste material, nor will it store waste material for more than 90 days. Waste materials will be hauled off-site by transporters licensed under applicable RCRA and Connecticut law provisions for final disposal of waste materials at RCRA-permitted facilities.

Transformers within the on-site switchyard will contain a dielectric fluid that will be considered in the SPCC plan.

2.13.5 Safety and Reliability

2.13.5.1 Component Availability

KEC will provide a reliable electricity source to supply to the ISO-NE electric power system. Although capable of continuous, steady operation, operation of KEC is anticipated to occur 60 to 75% of the year. During normal operation, the production from KEC may vary from approximately 40% load (220 MW gross) to 100% load (550 MW gross) depending on ISO-NE electric system dispatch and ambient conditions.

As identified in the 2014 IRP for Connecticut, prepared by DEEP, inadequate natural gas delivery infrastructure threatens reliability and affordability, particularly during peaking winter periods, in New England. Natural gas is expected to be available as KEC has secured a firm gas contract; however, in the event of limited natural gas resources, KEC will utilize ULSD as backup fuel, as needed, for up to 720 hours per year. Actual ULSD use is expected to occur on the order of once every two to three years.

KEC will be designed for a service life of at least 30 years.

2.13.5.2 Contingencies for Resource or Equipment Failure

Combined cycle electric generating facilities have excellent safety records, and NTE will follow all applicable federal, state, and local codes and standards to create a safe and reliable facility. In addition to normal operating procedures, NTE will develop emergency response procedures pertaining to emergency operation and shutdown. Representatives from KEC will collaborate with the Town of Killingly to ensure proper safety design, operation configuration, and appropriate cooperative measures are included in the emergency response procedures. Following review and coordination with the local emergency authorities, the final emergency response procedures will be filed with the Town of Killingly's fire department and safety authorities.

KEC will also incorporate advanced safety technology to mitigate the risk of emergency, all of which will be supervised in the central control room, adjacent to the turbine building. KEC will incorporate a variety of alarms and control systems to provide early identification of emergency situations that may require plant and/or system shutdown. Control devices will be used to sense, indicate, transmit, and control process variables as required for safe, efficient, and reliable operation of KEC and its systems and components. For example, as discussed in Section 2.6, the DCS will provide for real-time monitoring to allow for immediate responses in the event KEC is not performing optimally.

Radio/mobile phone contact linking KEC personnel, in tandem with system alarms, will provide early warning to employees of any unsafe operating conditions. Employees will be trained to initiate appropriate and timely responses to an array of emergency conditions.

In the event of an emergency, KEC will utilize ancillary equipment, such as the backup generator. If power from the electric grid is unavailable, the backup generator will automatically operate to maintain essential services (safety and control systems, lighting, communications, etc.) until grid power is restored.

In addition to emergency responses, prior to commencement of construction, NTE will develop and implement a comprehensive security plan, including for cyber-security, to address both the construction and operational phases of KEC. The plan will include perimeter fencing that secures the complete operations of the Generating Facility Site and the fuel gas metering station. A chain link fence, a single sliding gate, and surveillance equipment will be used to permit only authorized access onto the KEC Site. The gate will be locked at all times with access provided by KEC personnel. The control room will have surveillance views of the gate, and the ability to open the gate. Normal plan lights and emergency temporary lighting will be provided throughout the KEC Site. During construction, on-site staff will monitor this system throughout all construction phases. Once KEC is operational, on-site staff operation and surveillance will be 24 hours per day, seven days per week. The security plan provides an additional precautionary measure to anticipate potential emergencies and implement strategies to prevent incidents to the greatest extent possible.

At the Switchyard Site, the Utility Switchyard will be enclosed by a locked chain link fence to prevent unauthorized access. Security for this element will be directly undertaken by Eversource in accordance with its standard operating practices.

2.14 SOLID WASTE

During KEC's construction, solid waste will be generated that is typical of normal construction efforts. This includes packing materials, office waste, scrap lumber, metals, cables, glass, cardboard containers, and debris from lunches and catering/vending machines. In addition, during construction and pre-operational cleaning, some solvents and flushing materials will be used. Solid waste that can be neither recycled nor reused will be stored in on-site containers for disposal.

During KEC's operations, generated solid waste is anticipated to consist of office waste, including paper and miscellaneous trash, as well as plant operations wastes such as spent chemical and lube oil containers, water treatment waste, spare parts, packaging, etc. Any solid waste generated will be removed by a licensed hauler. SCR catalysts will be removed and returned to a catalyst vendor for regeneration, salvage, or disposal. Programs will be developed to ensure that potentially hazardous wastes are separated from normal waste, including segregation of storage areas and proper labeling of containers. All waste will be removed from the KEC Site by licensed contractors in accordance with applicable regulatory requirements and managed in licensed facilities

2.15 FACILITY STAFFING AND TRAINING

Operation of KEC will be managed and supervised by a team of experienced operating personnel to be hired and trained during the latter part of the construction schedule; staff will be licensed, as required. Operating personnel are expected to include a facility manager; an operations manager, with reporting shift supervisors; control room operators; roving operators; and a maintenance manager, with reporting maintenance supervisors and technicians. KEC will be staffed by approximately 25 to 30 employees, working in shifts. No staff will be stationed on the Switchyard Site.

KEC's employees will be trained for normal and emergency operating conditions. The training programs will range from combustion turbine operation and maintenance to DCS operation. Construction and operating personnel will be trained to adhere to OSHA standards and codes with respect to all construction and operating practices. This will include the use of appropriate personal protection equipment, such as hard hats, hearing protection, and safety glasses; control of access to sensitive construction and operating areas; and procedures for handling chemicals and hazardous substances. All construction and operating personnel will be required to attend regular safety training sessions to implement the safety procedures developed for KEC.

3.0 EARTH RESOURCES

3.1 EXISTING SITE CONDITIONS

This section describes the geologic setting and existing conditions at the KEC Site, including underlying bedrock; seismic activity; topography; and existing soils. An understanding of the existing geologic setting will inform construction and operation procedures and management practices.

3.1.1 Geology

The approximately 73-acre KEC Site is located in the Eastern Uplands of northeastern Connecticut, a physiographic region characterized by metamorphic rock dating from the Paleozoic Era. The geologic terranes of the Eastern Uplands broadly consist of Iapetus (Oceanic) Terrane and Avalonian (Island-Arc) Terrane, predominantly composed of gneiss, granite, and schist grade metamorphic rocks. Geologic mapping of the region indicates that bedrock in this region is steeply dipping to an almost vertical degree, with numerous Paleozoic faults that strike mainly north to south.

Figure 3-1 presents the bedrock underlying the KEC Site. The KEC Site is underlain by felsic gneiss of the Quinebaug Formation dating to the Middle Ordovician Period, approximately 470 to 458 million years ago. The Quinebaug Formation consists of medium- to dark-gray, medium-grained, well-layered gneiss. This bedrock is part of the Iapetus Terrane, an ancient seabed that was compressed, metamorphosed and elevated by collision first by the Avalonian Island-Arc and then by the African continental plate approximately 250 million years ago (Rogers 1985; Bell 1985; Killingly Planning and Zoning Commission 2010). Over the succeeding eons, erosion and glaciation removed younger overlying geological formations.

Modern landforms were shaped by repeated glaciations during the Pleistocene Epoch between 2 million and 12,000 years before present (BP). Glacial advances scoured uplands and formed glacial kettle ponds in outwash, including Alexander Lake. Glaciers retreated after 17,000 years BP in the vicinity of the Town of Killingly, leaving thick mantles of rocky till on uplands. Glacial-retreat lakes and streams formed in valleys (created in the ancient bedrock faults) of the Quinebaug River and Five Mile River, depositing gravel, sands, silt, and clay on lowlands (Killingly Planning and Zoning Commission 2010). Following glacial retreat, vast wetlands covered lowlands and depressions, formed alongside the rivers, while at higher elevations the thin glacial till mantle, discussed below, remained relatively undisturbed. Bedrock outcrops occur in the central portion of the Generating Facility Site, but no bedrock or surficial deposits of economic significance have been identified.

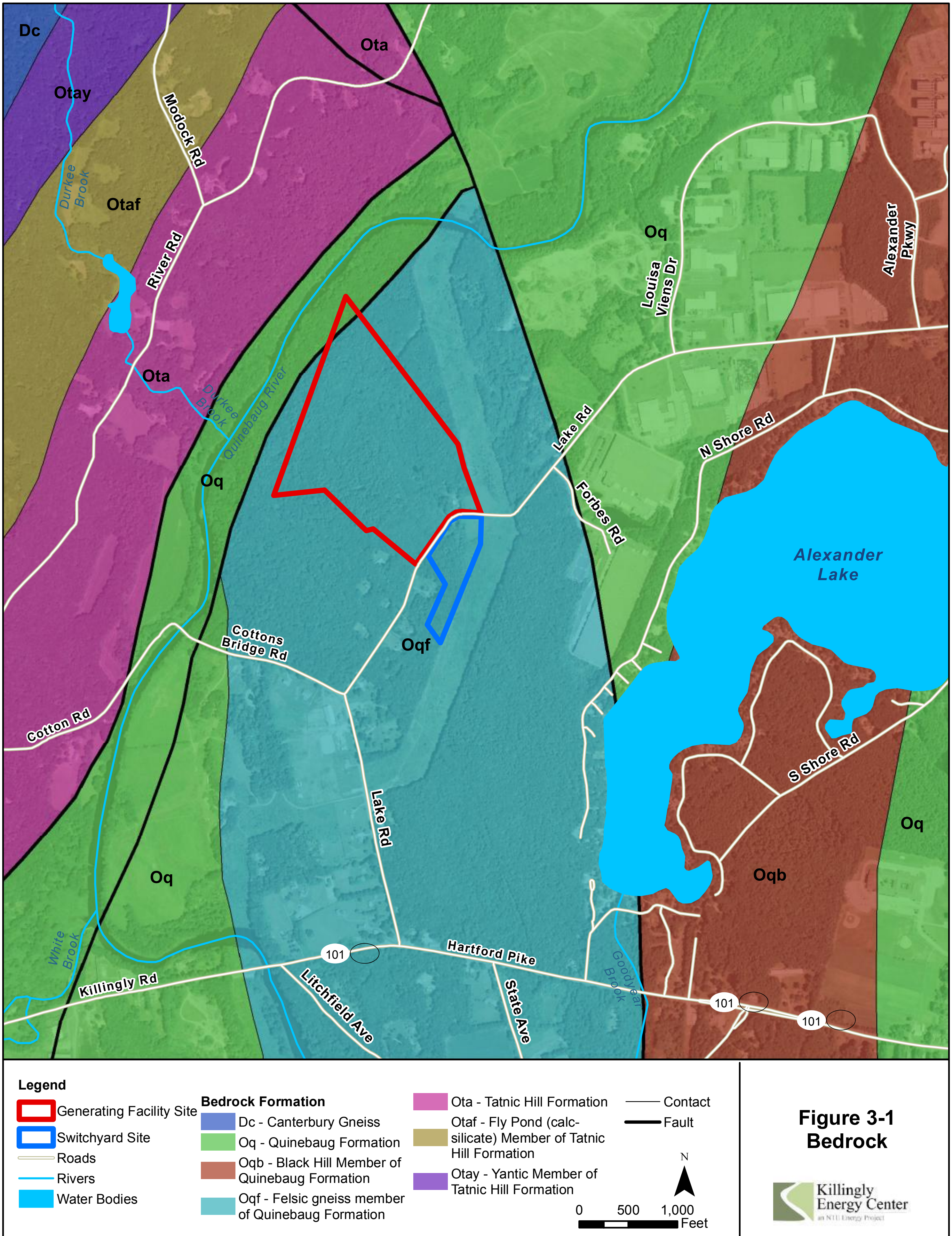

Figure 3-1
Bedrock

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Surficial materials, unconsolidated deposits overlying the bedrock, also formed or were deposited during the Pleistocene Epoch. Deposits across the state, glacial in origin, are broadly categorized as glacial till and glacial stratified deposits; the KEC Site consists of glacial till. Glacial till is generally a discontinuous mantle on the bedrock of poorly sorted materials ranging from sand, silt, and clay to larger boulders and stones. The continuous, unsorted glacial till deposited over the bedrock on the KEC Site is characterized as thin till. Glacial till of this character is generally sandy, particularly in the Eastern Highlands.

Test borings conducted at the KEC Site (Appendix C) encountered an approximate range of 1 to 5 feet of topsoil/subsurface soil overlying an approximate range of 2 to greater than 28 feet of glacial till overlying the bedrock. The observed topsoil/subsurface soil was very loose to loose dark organic soil with silt and sand. Up to 2 feet of topsoil was encountered, overlying 1 to 4 feet of subsoil. Cobbles and boulders were also observed at the ground surface. The observed glacial till was dense to very dense gray-brown silty sand consisting of sand, silt and gravel deposits. Drill rig response and drilling also indicated this stratum includes numerous cobbles and boulders.

The bedrock observed at the KEC Site was hard gray gneiss to white quartzite with a low foliation angle. When bedrock was encountered in the testing bores, the top of the bedrock elevation ranged from approximately 3 to 24 feet below ground surface. Locally, the bedrock is weathered.

3.1.2 Seismology

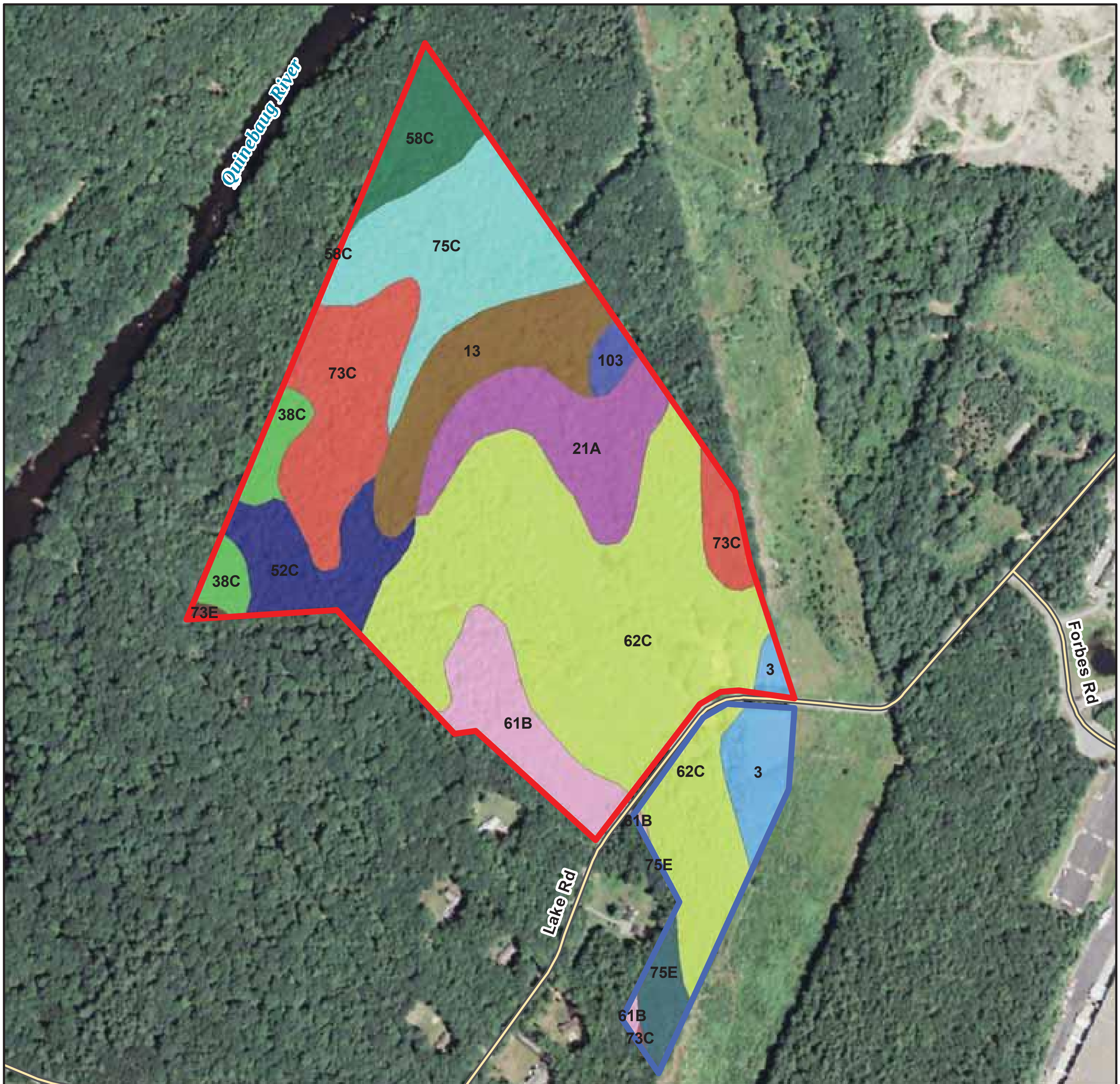
Connecticut is located in a region with relatively minimal seismic activity. The overall likelihood of a significant earthquake in Connecticut is low, with the lowest potential in the northeast. Geologic maps identify the Honey Hill-Lake Char Fault, approximately 2 miles from the KEC Site, as well as smaller faults in proximity to the KEC Site. Near the KEC Site, the peak ground acceleration (PGA) that has a 2% chance of exceedance in 50 years has a value of 0.08 g.[6] The probability of an earthquake with a magnitude greater than 5.0 on the Richter scale occurring on (or in reasonable proximity to) the KEC Site within the next 50 years is 2%. The probability of an earthquake with a magnitude greater than 5.0 on the Richter scale remains low within a 50 kilometer (km) radius around the KEC Site, reaching a maximum probability of 4% southwest of and distant from the KEC Site, near the southwestern Connecticut-New York border, and northeast of and distant from the KEC Site, near the Massachusetts-New Hampshire border. A discussion of seismic design considerations is included in Section 3.3.2.

[6] Where PGA is measured as a fraction of the earth's gravitational acceleration (g).

3.1.3 Topography and Soils

The KEC Site is located amid ridge-and-valley topography shaped by Connecticut's glacial history. Topographic features of the Eastern Uplands include the Windham Hills and the Northeast Highland's north-south Bolton and Tolland Mountain Ranges, and the east-west Mohegan Range. The elevation in the Eastern Uplands ranges from approximately 300 to 1,000 feet above mean sea level (amsl), with elevations generally reducing from the northern to southern portion of the state approaching Long Island Sound. The KEC Site exhibits the lower range in the Eastern Uplands, ranging from approximately 238 feet amsl, near the eastern bank of the Quinebaug River, along the northwestern boundary of the Generating Facility Site, to a maximum elevation approaching 391 feet amsl in the southwest corner of the Switchyard Site. The undulating Generating Facility Site reaches a maximum elevation of just over 362 feet amsl in the southwest corner. Figure 2-1 presents the KEC Site and existing topography on a United States Geologic Survey (USGS) 7.5-minute series topographic map.

The KEC Site's soil characteristics were obtained from the United States Department of Agriculture Natural Resources Conservation Service. As shown on Figure 3-2, the soil survey identified 13 soils on the KEC Site. Table 3-1 lists the soils currently located on the KEC Site, and the corresponding mapping units, drainage class, available water capacity, geomorphology, and approximate extent of each soil unit in acres and percentage of the total KEC Site. The Hollis, Chatfield, Canton, and Charlton series are derived from rocky tills found on uplands and bedrock. The Hinkley, Sutton, and Gloucester series' gravely and sandy soils are derived from glacial outwash found on ridges overlooking the Quinebaug. The Ridgebury, Leister, and Whitman soils are from glacial retreat lakes found on level uplands. Walpole, Ninigret, Tisbury, and Rippowan series are found in low-lying wetlands and floodplains. In general, on-site soils were formed in glacial till sediments that were derived mainly from gneiss, granite, and/or schist grade metamorphic parent material.



Legend

Generating Facility Site

Switchyard Site

Soil Unit

- 103: Rippowam fine sandy loam
- 13: Walpole sandy loam, 0-3% slopes
- 21A: Ninigret and Tisbury soils, 0-5% slopes
- 38C: Hinckley loamy sand, 3-15% slopes
- 3: Ridgebury, Leicester, and Whitman soils, 0-8% slopes, extremely stony
- 52C: Sutton fine sandy loam, 2-15% slopes, extremely stony
- 58C: Gloucester gravelly sandy loam, 8-15% slopes, very stony
- 61B: Canton and Charlton soils, 3-8% slopes, very stony
- 62C: Canton and Charlton soils, 3-15% slopes, extremely stony
- 73C: Charlton-Chatfield complex, 3-15% slopes, very rocky
- 73E: Charlton-Chatfield complex, 15-45% slopes, very rocky
- 75C: Hollis-Chatfield-Rock outcrop complex, 3-15% slopes
- 75E: Hollis-Chatfield-Rock outcrop complex, 15-45% slopes

N

0 200 400 Feet

Figure 3-2
Soils

Killingly Energy Center
an NTE Energy Project

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Table 3-1: Soil Classifications

Soil		Drainage Class	Available Water Capacity	Geomorphology	Area	
Map Unit	Description				Acres	Percent
3	Ridgebury, Leicester, and Whitman soils, 0-8% slopes, extremely stony	Very poorly drained to poorly drained	Very low to moderate	Depressions, drainageways, ground moraines, hills	2.7	3.7
13	Walpole sandy loam, 0-3% slopes	Poorly drained	Moderate	Deltas, depressions, outwash plains, outwash terraces	5.5	7.6
21A	Ninigret and Tisbury soils, 0-5% slopes	Moderately well-drained	Low	Depressions, drainageways, kame terraces, outwash plains, kames, moraines, outwash terraces, deltas, valley trains	6.3	8.6
38C	Hinckley loamy sand, 3-15% slopes	Excessively drained	Low	Eskers, kame terraces, outwash plains, kames, moraines, outwash terraces, outwash deltas	1.8	2.5
52C	Sutton fine sandy loam, 2-15% slopes, extremely stony	Moderately well-drained	Moderate	Depressions, drainageways	3.7	5.0
58C	Gloucester gravelly sandy loam, 8-15% slopes, very stony	Somewhat excessively drained	Low	Hills	2.6	3.6
61B	Canton and Charlton soils, 3-8% slopes, very stony	Well-drained	Low	Hills	4.2	5.7
62C	Canton and Charlton soils, 3-15% slopes, extremely stony	Well-drained	Low	Hills	27.2	37.7
73C	Charlton-Chatfield complex, 3-15% slopes, very rocky	Well-drained	Low	Hills, ridges	8.3	11.4
73E	Charlton-Chatfield complex, 15-45% slopes, very rocky	Well-drained	Low	Hills, ridges	0.0	0.0
75C	Hollis-Chatfield-Rock outcrop complex, 3-15% slopes	Well-drained to somewhat excessively drained	Very low to low	Hills, ridges	8.2	11.2
75E	Hollis-Chatfield-Rock outcrop complex, 15-45% slopes	Well-drained to somewhat excessively drained	Very low to low	Hills, ridges	1.5	2.1
103	Rippowarm fine sandy loam	Poorly drained	Low	Floodplains	0.7	1.0
Total					**73**	**100**

3.2 CONSTRUCTION-RELATED IMPACTS AND MITIGATION MEASURES

This section describes the potential construction impacts and appropriate mitigation measures associated with earth resource protection. Construction of KEC is not anticipated to result in adverse impacts to the existing earth resources on and surrounding the KEC Site.

3.2.1 Clearing, Grading, and Blasting

Preparation of the KEC Site for construction is anticipated to commence in 2017, and continue for approximately four months of the 33-month construction phase. Site preparation will, in certain portions of the KEC Site, require the removal of trash piles, vegetation, roots, and stumps; stone walls that cannot be retained; topsoil; subsoil; fill soil; unsuitable materials; structures and foundations; and subsurface utilities.

With the exception of the small cemetery on the Switchyard Site, the existing structures and foundations on the KEC Site will be removed. Following demolition and the removal of debris, the KEC Site will be graded and excavated utilizing techniques such as clearing, grubbing, material removal, and limited blasting.

Before grading commences, surface materials, such as topsoil and other underlying soft and unsuitable material, will be removed from designated construction areas. The topsoil and subsurface material will be sorted and stockpiled on the KEC Site within designated erosion control areas, in accordance with the SWPPP (Appendix D). Standard heavy equipment will be used to cut, fill, and re-grade the KEC Site. The intent of the grading plan is to minimize the total net import or export of material (i.e., balance the total cut and fill). To achieve this, during this process, excavated material will be reused on-site as fill wherever possible. Import of limited quantities of structural fill may be required if adequate material is not present on site. Soils or material unsuitable for use on-site will be recycled off-site for landscaping or non-engineering grade fill.

In some locations, excavation up to 30 feet of glacial till and bedrock are proposed to reach the required subgrade. Conventional heavy construction equipment, such as excavators, bulldozers, graders, front-end loaders, and dump trucks, can remove soils and portions of weathered rock (e.g., cobbles and boulders) that will be encountered at the ground surface and in the glacial till. Temporary cuts in the bedrock will be planned in advance, as necessary.

While techniques, such as ripping, are feasible for shallow rock cuts, certain areas will require blasting to reach the proposed subgrades. Controlled blasting techniques will be utilized to ensure that nearby structures are not damaged by blasting, flyrock or vibrations. Conventional blasting mats will be utilized to contain flyrock within the construction work area. Vibrations from blasting will be minimized by carefully controlling the size and timing of the blasts. By utilizing a series of smaller blasts instead of one large blast, vibrations are greatly reduced. A specialized blasting contractor will implement the work in accordance with a formal blasting plan.

Controlled blasts usually last about one second because they are actually a series of small blasts timed far enough apart to allow the vibrations from each individual detonation to appropriately dissipate. Because the vibrations dissipate rapidly, off-site structures will experience negligible vibration. Ground vibrations at nearby structures of concern will be kept below the safe limits recommended by the United States Bureau of Mines ([USBM] 1980). At these vibration levels, no impacts related to blasting to environmental features, aboveground structures or below ground structures are anticipated. Additional details regarding blasting measurements that will be implemented to minimize impacts, including nearby groundwater well monitoring, are provided in Section 3.2.2.2.

3.2.2 Construction Best Management Practices

KEC has been designed to be compatible with the KEC Site's environmental resources and surrounding land uses. Construction will disturb approximately 24 acres on the Generating Facility Site and 4 acres on the Switchyard Site over the duration of the 33-month construction period and will strictly comply with all applicable laws, regulations, ordinances, and guidelines, as well as the recommendations of a comprehensive geotechnical engineering report (Appendix C). To minimize and mitigate adverse impacts, detailed construction procedures will be developed and implemented in accordance with BMPs. Construction BMPs will aim to maximize the use of previously disturbed areas; minimize clearing of forested areas; avoid substantial earth movement; and maintain practical technical equipment orientation to facilitate construction in an efficient, safe, and least-impact manner. Contractors and construction personnel performing clearing, grading, blasting, and other construction-related work at the KEC Site will be required to review safety policies and site-specific construction plans prior to the commencement of construction. There will also be daily safety "tailgate" meetings, weekly safety meetings and continual safety policy oversight to assure all safety measures are properly communicated and implemented.

Specific measures identified to manage stormwater, including erosion and sedimentation control, as well as blasting, are addressed below.

3.2.2.1 Stormwater Management and Erosion and Sediment Control

Erosion and sediment control measures will be implemented during site preparation in accordance with the BMPs outlined in the site-specific SWPPP (Appendix D). The control measures will protect existing earth resources, minimize the area of disturbed land, and control site drainage and runoff. Prior to grading and site clearing activities, perimeter erosion and sedimentation controls, such as silt fences and haybale barriers, will be established. A temporary sedimentation basin will be constructed during the establishment of proper subgrades throughout the KEC Site. Drainage systems will be installed to within approximately 5 feet (adjusted per specific site conditions) of the final location of buildings or facilities, and the stormwater basin will be installed to be used as a sedimentation basin throughout the remainder of construction.

Additional control measures to be utilized during construction will include: the installation of anti-tracking devices at the construction entrance; installation of swales, stone or woodchip dikes, and silt fences to control flow and isolate site runoff to prevent sedimentation; installation of fabric erosion control blankets to protect and stabilize slopes; installation of hay bales at drainage basins to protect storm drains from sediment; installation of hay bales around stockpiles; and internal drainage basins to control the flow of runoff.

Prior to and throughout construction, efforts to control stormwater flow and reduce the potential for soil erosion and sedimentation will include: meticulous evaluation of site-specific characteristics and stormwater flows; careful placement and maintenance of vehicles and construction equipment; and development of a spill prevention and cleanup plan. Requirements for proper material handling, storage, and disposal will be addressed prior to commencement of construction. Ongoing: application of topsoil to promote the growth of vegetation following final grade; enforcement of grading restrictions; and application of surface roughening with tracked machinery to create horizontal depressions in the soil will also help prevent erosion and sedimentation during the construction phase.

Formal inspections by the KEC construction team will occur within the first 30 days following the commencement of construction. The KEC Site will continue undergoing monthly inspections for the first 90 days of construction to ensure proper installation of erosion and sedimentation control measures. After this period, the KEC Site will undergo regular inspection and NTE will be responsible for updating the SWPPP as necessary.

During clearing and grading activities, any additional excavated materials will be temporarily stockpiled prior to disposal or recycling on- or off-site for landscaping or non-engineering grade fill. Material will be reused wherever possible; soils or material unsuitable for use on-site will be recycled off-site. Stockpiles will be maintained in accordance with the SWPPP (Appendix D). Excavation and grading will be performed in a manner that optimizes good site drainage and runoff control.

3.2.2.2 Blasting Control Measures

As explained in Section 3.2.1, all blasting operations will adhere to controlled techniques and applicable state and local statutes and regulations governing the safe and secure transportation, storage, possession, handling, and use of explosives. Explosives will not be stored on-site, and the handling of explosives will be coordinated with local safety officials.

A blasting contractor with a current license in the State of Connecticut will be required to obtain all necessary permits prior to blasting, including submitting the plan to the Killingly Fire Marshal. The specialized blasting contractor will conduct a pre-blast survey of existing conditions to evaluate structures of concern and all structures located within 250 feet of the blast locations, including groundwater wells. A minimum of five locations will be identified for monitoring air pressure, seismic, and sound levels during blasting events. To protect the integrity of the remaining bedrock, perimeter control measures (e.g., line drilling, pre-splitting, or cushion blasting) are required where permanent rock slopes and steepened temporary rock slopes are planned. Blasting will also incorporate measures to minimize potential for damage and unnecessary rock excavation caused by blasting. Conventional blasting mats will be utilized to prevent flyrock from leaving the construction work area.

The blasting contractor will design blasting rounds specifying the amounts and type of explosives per blast hole and delay, the quantity to be excavated, the number and diameter of blast holes, distances to the nearest structures, and seismograph locations. The blasting rounds will be designed to maintain vibrations measured on the ground surface adjacent to structures of concern below the industry standards for vibrations, as a function of frequency set forth in the United States Bureau of Mines Report of Investigation 8507, as recommended in the geotechnical engineering report prepared for KEC (Appendix C).

Nearby property owners and town officials will be notified prior to blasting. To ensure safety and prevent unauthorized individuals from approaching the blast area, a blasting warning system will be implemented to alert personnel and unauthorized individuals of the impending blast. This warning system will include signs posted at all access points to the KEC Site and blasting area, as well as audible warning signals. The signs will state that blasting operations are occurring and describe the audible warning signals when the blasting occurs. Audible signals sounded 5 minutes and 1 minute prior to the blast will be followed by an "all clear" signal after the blast. Prior to the commencement of blasting, the blasting contractor will be required to submit a detailed conceptual blasting plan for approval by the general contractor. The conceptual blasting plan will include types and amounts of explosives, hours of operation, warning system information, methods for transportation and hanging of explosives, pre-blast survey, compliance with local, state and federal laws, coordination with local safety officials, and safety measures. Blasting will be limited to normal working hours, between 8:00 a.m. and 5:00 p.m., Monday through Friday during the KEC Site preparation phase.

Vibration monitoring during blasting will be conducted at, and adjacent to, proximate structures or between the blasting and structure of concern. If damage is reported during the blasting, the pre-blast survey will aid in determining if the reported damage is the result from the blasting on the KEC Site or was rather a pre-existing condition. Seismographs will also be used to establish vibration levels associated with blasting. To determine whether excessive vibrations were created by blasting, seismographs will be placed in specific locations identified by the pre-blast survey. The seismograph records will be used to document the vibration levels created by the blasting. The most likely blasting method will use non-electric delays or electric delays with a sequential timer to start the blast; the delay controls when each hole detonates. This allows the blasting contractor a high degree of control to avoid vibration damage to nearby structures.

Insurance requirements will be established as part of the contract with the blasting contractor. This insurance will provide for compensation in the unlikely event that impacts to off-site structures were to occur as a result of on-site blasting. The pre-blast survey will allow for documentation of conditions before and after blasting efforts, as warranted.

3.3 OPERATIONAL IMPACTS AND MITIGATION MEASURES

3.3.1 Grades and Stabilization

Following construction of KEC, a final grading plan will be implemented. Under this plan, activities will include completion of all stormwater management systems, placing of fill to achieve final grade elevations, and installation of landscaping. The establishment of permanent vegetation on exposed soils and construction of permanent traffic corridors will preserve soils and slopes during operation. The post-construction stormwater management methods will be reviewed and approved by DEEP, in conjunction with a 401 Water Quality Certification. The purpose of the final stormwater management system will be to minimize the release and suspension of pollutants; effectively and safely remove water from the roadway and other critical areas; and properly treat stormwater before final discharge from the KEC Site. The approved control measures will promote infiltration and recharge of the groundwater through pervious surfaces on the KEC Site. A tiered stormwater detention/infiltration basin will concurrently collect and treat flow from impervious surfaces, and discharge a large portion of the treated water into a riprap level spreader. The suspended soil and floatable materials will be removed by hoods or elbow inserts in sumped catch basins. This method is anticipated to remove 80% of the annual anticipated sediment load. Riprap outlet protection will be utilized to dissipate the velocity of stormwater and runoff flows, and discharge flows to vegetated surfaces on gentle slopes prior to discharge to resource areas.

Following construction and the installation of post-construction equipment, all pre-construction installations (e.g., construction entrances and silt fencing) and stormwater collection and treatment devices will be properly inspected, cleaned, and removed, as necessary. Given the comprehensive stabilization measures, the proposed alterations to the KEC Site's geologic and topographic properties are not anticipated to cause any change or adverse impacts to the surrounding areas.

3.3.2 Seismic Design

KEC has been designed to meet or exceed all applicable building codes, including careful consideration of seismic provisions. The seismic soil design criteria were established in accordance with the Connecticut State Building Code. In the unlikely event of seismic activity, the soils at the KEC Site are not considered susceptible to substantial weakening or movement (less than 0.5 inches). The building foundations and walls will be similarly designed to withstand seismic pressures (see Appendix C).

4.0 NATURAL RESOURCES

Detailed investigations of natural resources at the KEC Site have been conducted over an approximately six-month period in order to robustly characterize existing conditions. Detailed reports are provided in Appendix E for wetlands and waterways and in Appendix F for habitat and species issues. The following sections provide a summary of information regarding existing conditions and anticipated effect associated with KEC with regard to: wetlands and waterways; terrestrial vegetation and habitat; and listed species.

4.1 WETLANDS AND WATERCOURSES

A delineation of wetlands and waterways at the KEC Site has been completed that identified approximately 10.95 acres of regulated wetland within the 73-acre site (see Figure 2-5).

On the Generating Facility Site, the A series of wetlands are interconnected and are the major wetland system. The A series consists of a man-made pond (Wetland A1) and two intermittent stream wetland systems (Wetland A2 and A3) that join together. A small disturbed wetland (Wetland X) is located near Wetland A1, with other small pockets of wetland (Wetlands B, C, and E) located farther from Lake Road and the KEC footprint. All wetland fill has been avoided on the Generating Facility Site, and design measures have been incorporated to preserve wetland functions and values. Appendix E-1 provides details regarding the measures incorporated to preserve wetland functions and values, while Appendix E-2 provides details about wetland and waterway characteristics.

On the Switchyard Site, Wetland D is a portion of a larger wetland that is located within the existing electric transmission ROW that extends onto the property. Due to various constraints (as detailed in Section 9.3.4), approximately 0.3 acre of wetland impact is unavoidable on the Switchyard Site. As discussed further in Appendix E-1, wetland replication and enhancement is proposed to offset this proposed impact. This will include a wetland replication area of 17,000 square feet to be located within a conservation easement of approximately 0.77 acre, as well as wetland enhancement in the form of invasive vine and shrub removal (approximately 18,000 square feet on the Switchyard Site and 35,000 square feet on the Generating Facility Site). A post-construction invasive species control plan will also be prepared and implemented.

An application for a General Permit is planned for submittal to the USACE for the limited and unavoidable wetland fill associated with the Utility Switchyard.

4.2 TERRESTRIAL VEGETATION AND HABITAT

Details regarding the regional and site-specific characteristics of vegetation on the KEC Site have been compiled in Appendix F-1. Cover types have been assessed, detailed vegetation and species lists have been developed, and species-specific surveys have been completed for species listed by the United States Fish and Wildlife Service (USFWS) and on DEEP's Natural Diversity Database (NDDB) as potentially located in the KEC Site vicinity. Listed species surveys are discussed in Section 4.3. Additional focused efforts have been undertaken for: bird activity and use and pond/vernal pool surveys as addressed further below.

4.2.1 Avian Surveys

Avian diversity at the KEC Site was assessed using several methodologies (as discussed in greater detail in Appendix F-1). First, the point-census method of inventory was employed, following a protocol for breeding bird surveys often used in Connecticut (i.e., Modified Ontario Method). The point census took place during early mornings in June 2016. Second, an owl call-back survey was conducted during evening hours, also in June 2016. Third, birds were inventoried by REMA during its multiple visits to the KEC Site.

For the point counts, 14 avian census points were established (12 at the Generating Facility Site and two at the Switchyard Site). In all, 582 individual bird observations were made of 72 species. The most abundant bird species at the KEC Site is the ovenbird (*Seiurus aurocapilla*), with 60 total observations, almost twice as many as the next most abundant species, the blue jay (*Cyanocitta cristata*). Both of these species have two of the loudest songs and vocalizations of breeding birds in Connecticut, which may partially be responsible for the high numbers in the survey. The ovenbird is a denizen of closed-canopy forests, while blue jays prefer forest edges and do not venture deep into maturing forest. Because the KEC Site is characterized both by maturing forest and by forest edges, their presence is not unexpected.

Two different groups of birds emerge from the data. The first is composed of six species that make up 151 of the 582 individual bird sightings. These are considered amongst the most abundant bird species in Connecticut (Bevier 1994): mourning dove (*Zenaida macroura*), blue jay, American crow (*Corvus brachyrhynchos*), black-capped chickadee (*Poecile atricapillus*), American robin (*Turdus migratorius*), and Northern cardinal (*Cardinalis cardinalis*). They are species that are well adapted to a variety of habitats, including forest edges, small woodlots, rural landscapes, and suburbia.

The second group is composed of four species that make up 134 of the 582 individual bird sightings. These are all considered forest-interior bird species: red-eyed vireo (*Vireo olivaceous*), wood thrush (*Hylocichla mustelina*), ovenbird, and scarlet tanager (*Piranga olivacea*). These species are well adapted to forest interiors and are not often found in small woodlots. They are sensitive to parasitism by brown-headed cowbirds (*Molothrus ater*), also observed at the site, which are typically found at forest edges. Thus, these forest-interior birds are most often found several hundred feet away from forest edges, in deeper woods, and are somewhat sensitive to habitat fragmentation.

During the owl call-back surveys, the presence of a breeding pair of barred owls (*Strix varia*) was confirmed. In addition, one eastern screech owl (*Megascops asio*) was observed at the Switchyard Site adjacent to the electric transmission ROW.

One Connecticut *Species of Special Concern*, the broad-winged hawk (*Buteo platypterus*), was observed by REMA at the site. The sightings were on separate days and in separate areas. One sighting was at the Switchyard Site, within the deciduous forest to the southwest of Wetland Unit D, while the other was just off-site, about 80 to 100 feet to the west of the Generating Facility Site's western property boundary, again in predominantly deciduous forest. Broad-winged hawks are often observed within wetlands and riparian areas, feeding on a variety of prey: small birds, amphibians, and a variety of insects, and they are typically found in large blocks of unfragmented habitat, such as that at this site and its environs. However, no indication of nesting was encountered within the KEC Site. With the abundance of suitable habitat in the vicinity of the KEC Site that will remain post-development, breeding habitat for this species is secure.

Approximately 23 acres of trees will be cleared at the Generating Facility Site, and less than 1.5 acres of trees will be cleared at the Switchyard Site. Tree clearing has the potential to effect forest-interior bird species (e.g., wood thrush, ovenbird, scarlet tanager). The new forest edge created by KEC could also extend the zone of influence of the brown-headed cowbird further into the interior of the Generating Facility Site's upland and wetland forested habitats. However, the northern and northwestern sections of the Generating Facility Site, which includes the western bedrock dominated ridge, as well as the eastern forested ridge, will continue to provide suitable habitat for all the species currently present, with the possible exception of the Louisiana waterthrush (*Parkesia motacilla*), a wetland-depended species, observed breeding within Wetland Unit A3, which may be displaced to other available wetland areas.

From a regional perspective, all of the forest-interior species observed at the KEC Site, as well as other forest and forest edge specialists are secure within their Connecticut range. None of these species are "listed" in Connecticut (i.e., endangered, threatened, special concern), and their International Union for Conservation of Nature conservation status is classified as "Least Concern" (LC). Moreover, within close proximity to the KEC Site, even immediately to the west and west of the Quinebaug River, hundreds of acres exist where protected or undeveloped forest land with much interior or "core" forest would continue to support the types of forest-interior birds observed at the KEC Site.

4.2.2 Pond/Vernal Pool Surveys

Two potential amphibian breeding areas were identified early on in February of 2016, during initial reconnaissance field investigations at the KEC Site. Specifically, these were the man-made pond (i.e., Wetland A2), and a small flooded portion of Wetland B (see Figure 2-5). The small area of vernal pool embedded in Wetland B is the only viable on-site habitat for the breeding and reproduction of wood frogs and spotted salamanders, which are considered obligate “vernal pool” amphibians. While spotted salamander egg masses were observed at the man-made pond (Wetland A1), predation by fish, green and bullfrogs, and other predators (e.g., crayfish), preclude successful reproduction. In fact, the pond is an “ecological sink” or “trap” which, due to the surrounding suitable terrestrial habitat and the favorable hydroperiod, attracts spotted salamanders to a poor quality habitat for breeding, with only a slight possibility of reproductive success. However, the pond appears to be suitable breeding habitat for green frogs (*Lithobates clamitans*), to a lesser extent for bull frogs (*Pyxicephalus adspersus*), and also for spring peepers (*Pseudacris crucifer*).

Although the vernal pool habitat that is located within a portion of Wetland B does not have optimal hydrology for the reproduction of spotted salamanders (*Ambystoma maculatum*), it is possible that successful reproduction could be supported during certain years. Given that adult spotted salamanders live for 15 to 20 years, with some recorded as old as 30 year, a population is likely to exist in the area surrounding that vernal pool.

Development associated with KEC will not encroach more than about 430 feet from the edge of the vernal pool habitat in Wetland B, as measured from the toe of the proposed fill slope. A significant amount of suitable terrestrial habitat will remain in the vicinity of this breeding habitat for both of the obligate vernal pool amphibians to use during the terrestrial phase of their lifecycle. Dispersal and connectivity corridors will remain significantly intact, including connectivity with other documented off-site vernal pool habitat, thus continuing to support metapopulation dynamics.

4.3 LISTED SPECIES

Consultation with the DEEP to request a review of the NDDB for state-listed species resulted in the identification of the following species with the potential to occur within the vicinity of the KEC Site (Appendix F-4): a state-listed threatened butterfly, the frosted elfin (*Callophrys irus*), and two special concern moths, the fragile dagger moth (*Acronicta fragilis*) and the pink star moth (*Derrima stellata*), the red bat (*Lasiurus borealis*), the wood turtle (*Glyptemys insculpta*), and the eastern box turtle (*Terrapene carolina*). Review of potential federally listed species provided USFWS documentation identifying the northern long-eared bat (*Myotis septentrionalis*) as well as a list of potential migratory birds with the potential to pass through the area. The avian survey described in Section 4.2.1 characterizes migratory and other bird use of the KEC

Site. The other listed species are discussed below.

4.3.1 Reptile Surveys

REMA conducted reptile surveys at the KEC Site including targeted searches for the two "Connecticut-listed" reptiles (i.e., wood turtle, eastern box turtle) that have been documented by DEEP in the vicinity of the KEC Site (Appendix F-1). The listed turtles were not encountered at the KEC Site or in its immediate vicinity. However, other reptiles, particularly snake species, were encountered at the KEC Site, including milk snake (*Lampropeltis t. triangulum*), brown snake (*Storeria dekayi*), and ring-neck snake (*Diadophis punctatus edwardsii*).

The eastern box turtle is a "Special Concern" species because many formerly robust Connecticut populations are either extinct or remnants. Although none were observed, habitat suitable for species use exists on the KEC Site, particularly the eastern forested ridge at the Generating Facility Site, the woods immediately adjacent to Wetland Units A1 and A2, and the woods adjacent to the eastern portions of Wetland Unit A3. The Switchyard Site also contains suitable habitat for this species. The maintained Eversource electric transmission ROW in close proximity to the KEC Site increases favorability for species use.

Wood turtles are always found in association with riparian habitats, more often large perennial streams and rivers, which are bordered by forest and open meadows (Klemens 1993). Wood turtles are wide-ranging in their terrestrial phase with large riparian buffer needs, using upland forest, wetland forest, as well as shrubland and wet meadow. At the KEC Site, the core habitat for the wood turtle is located off-site, west and northwest, along the Quinebaug River riparian corridor. While suitable terrestrial habitat exists at the KEC Site, such as deciduous woods and open field, local topography greatly inhibits connectivity between the Quinebaug River habitats and those of the KEC Site; the Generating Facility Site's prominent western ridge blocks movement of wood turtles and slopes immediately to the east of the Quinebaug River are too steep for wood turtle passage. Although possible, it is not considered likely that wood turtles occur at the KEC Site.

Measures will be implemented during construction (e.g., silt fencing and confirmation that no turtles are located within the work space) to prevent potential impact to turtle species. Once KEC is operational, no significant impact to turtle species is anticipated, even with the small reduction in available habitat.

4.3.2 Invertebrate Surveys

Surveys for potential moth and butterfly species (Appendix F-2) included the use of ultraviolet, mercury vapor, and white fluorescent lights to attract insects, and searching of flower heads and ground by headlamp and sweeping. Voucher specimens were collected for non-target species of Lepidoptera. All voucher specimens will be deposited in the collection of the University of Connecticut in Storrs as a representative sample of mid-summer night-active Lepidoptera for the KEC Site. None of the target species were observed and, further, no populations of wild indigo (*Baptisia tinctoria*) the host plant of the frosted elfin were noted within or in close proximity to the KEC Site.

Insects attracted to the lights were predominantly flies (Diptera), caddisflies (Trichoptera) and Lepidoptera. Smaller numbers of Hemiptera, Homoptera, Neuroptera and Coleoptera were observed. At least 80 species of macrolepidoptera were observed from the families Noctuidae, Geometridae, Arctiidae and other groups. Noctuids represented the most species diverse group of macrolepidoptera observed and were represented by genera including *Catocala* (Underwings), *Xestia* (Darts), and others. A modest number of Lepidoptera were observed during the survey, including unidentified macrolepidoptera, microlepidoptera, and butterflies. A variety of widespread polyphagous species are present at the KEC Site and have a wide selection of grasses, early successional plants, trees and shrubs to feed on. Some widespread host-specific species of Lepidoptera are also present at the KEC Site and rely on common plant species.

A variety of common butterfly species were observed, primarily in the field sites and edges. The most abundant butterfly species was the Common Ringlet (*Coenonympha tullia)*, a grass-feeding species that was found in the fields both north and south of Lake Road. Other species observed included Viceroy (*Limenitis archippus*), Little Wood Satyr (*Megisto cymela*), Black Swallowtail (*Papilio polyxenes*), Least Skipper (*Ancyloxypha numitor*) and Question Mark (*Polygonia interrogationis*).

The presence of significant numbers of aquatic insects such as caddisflies, aquatic hemipterans, and coleoptera from a diverse assortment of families indicate the proximity of the KEC Site to nearby aquatic and wetland habitats, mostly occurring offsite within the Eversource electric transmission ROW.

No significant impact to invertebrates is anticipated in association with KEC.

4.3.3 Bat Monitoring Survey

An acoustic bat survey (Appendix F-3), approved by USFWS was conducted, targeting the federally and state-listed northern long-eared bat. While the northern long-eared bat was not detected, several other bat species were detected as potentially foraging or roosting at the KEC Site. Of the five bat species detected, four species – the eastern red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and little brown bat (*Myotis lucifugus*) – are “listed” in Connecticut. Based on the presence of the “Connecticut-listed” bat species at the KEC Site, no tree clearing will occur in the months of June and July in order to avoid the pup season for the bat species.

5.0 AIR RESOURCES

KEC is a proposed state-of-the-art combined cycle electric generating facility that has integrated emission control devices that will be protective of human health and the environment. Consistent with DEEP air program regulations, KEC will meet LAER and BACT standards, as applicable, and through offsets and displacement (as addressed in Section 2.7.3) – will reduce current NO_x, PM, SO_2 and CO_2 emissions in Connecticut with additional NO_x reductions upwind from Connecticut. KEC will minimize emissions through the use of highly efficient turbine equipment firing clean-burning natural gas as its primary fuel and installation of advanced emissions control technology. Emissions from KEC will not cause an exceedance of any applicable air quality standard. The following sections discuss baseline conditions and describe the analyses conducted to evaluate KEC's air quality impacts.

5.1 BASELINE AIR QUALITY, METEOROLOGY, AND CLIMATOLOGY

KEC's potential effect on air quality is partially dependent on the existing characteristics of both land and air resources; these are discussed below.

5.1.1 Regional Topography

Regional topography is an important consideration for air flow. Terrain in the immediate vicinity of the KEC Site is relatively flat. Terrain starts to rise approximately 4.5 miles northwest of the KEC Site (elevation of 656 feet amsl), and continues to gradually rise to 1,230 feet amsl at a distance approximately 18.5 miles to the northwest. To the north, the terrain gradually rises to approximately 1,300 feet amsl at a distance of 30.5 miles from the KEC Site. In addition, there is a small ridge of terrain reaching 655 feet amsl approximately 5.5 miles southeast of the KEC Site.

5.1.2 Climatology and Meteorology

The climate in Connecticut varies considerably over short periods of time. This significant variability is present within any given month, season or year. The regional climate is affected by three types of air: cold, dry air from subarctic North America; warm, moist air from the Gulf of Mexico; and cool, damp air from the North Atlantic. Since the region experiences prevailing west-to-east atmospheric flow, the first two types are more influential than the third, which is often associated with severe winter storms experienced in the northeastern United States, colloquially known as "Nor'easters." Eastern Connecticut experiences weather fluctuations from sunny to cloudy to stormy conditions throughout the year, with an average of about 140 cloudy days per year (based on National Oceanic and Atmospheric Administration [NOAA] Climate Normals 1981 - 2010).

5.1.2.1 Precipitation

Average annual precipitation at the nearest representative meteorological station, West Thompson Lake in Thompson, Connecticut, is approximately 51 inches (based on NOAA Climate Normals 1981-2010). The normal monthly precipitation is distributed relatively evenly throughout the year, ranging from 3.54 inches in February to 4.73 inches in November. Prolonged droughts and widespread floods are infrequent, with measurable precipitation occurring on an average of one in three days.

5.1.2.2 Temperature

The average annual air temperature at West Thompson Lake is 47.8°F (based on NOAA Climate Normals 1981-2010). The coldest months are December, January, and February, with an average temperature of approximately 27.1°F for this period. The average maximum temperature during winter is 37.7°F and the average minimum temperature in winter is 16.4°F. June, July, and August are the warmest months, with an average temperature near 68.1°F for these three months. The average maximum temperature during summer is 79.6°F and the average minimum temperature in summer is 56.7°F.

5.1.2.3 Wind Speed and Direction

Air quality modeling for KEC utilized five years of site-specific surface meteorological data from the nearby Automated Surface Observing System (ASOS) station at Windham Airport, with upper air observations from the radiosonde monitoring device at Albany, New York. The Windham Airport is located approximately 16 miles southwest of the Generating Facility Site, with no significant intervening terrain; therefore, it is considered by DEEP to be representative of the Generating Facility Site. A five-year (2010-2014) frequency distribution of wind speed and wind direction measured at the Windham Airport is presented in Figure 5-1. The distribution shows that winds are most commonly from the northeast and northwest, with calm winds (less than 0.5 miles per hour) occurring approximately 10 percent of the time.

5.1.3 Ambient Air Quality

5.1.3.1 Baseline Ambient Air Quality

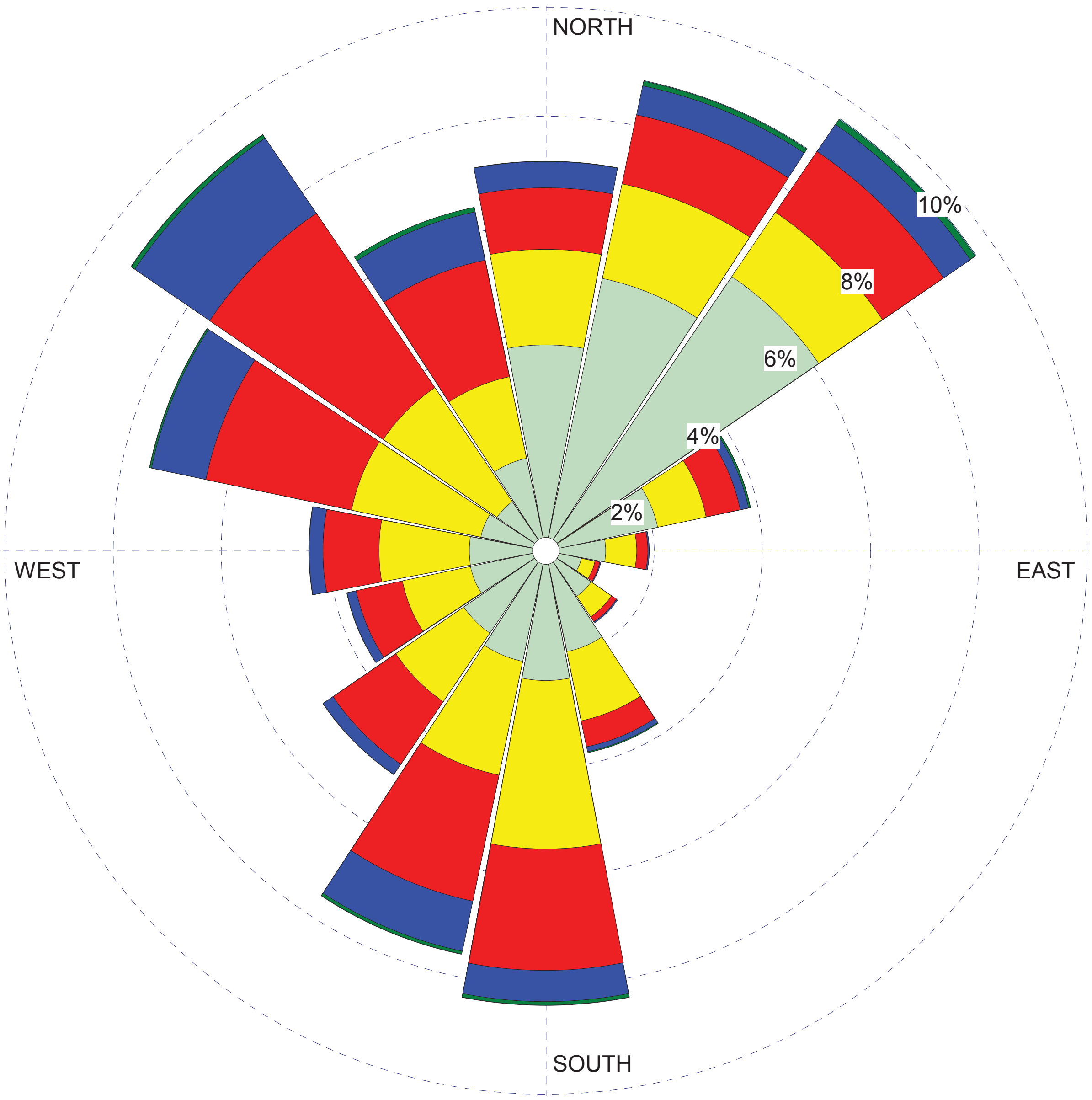
Monitoring data collected by DEEP from its statewide air quality monitoring network were reviewed to identify a representative monitoring site for each criteria pollutant and to determine ambient background concentrations for the area surrounding the Generating Facility Site. Data collected from air quality monitoring sites are used, in part, to verify attainment status with respect to the National Ambient Air Quality Standards (NAAQS; further discussed in Section 5.2.1). Windham County is designated as attainment/unclassifiable with respect to the NAAQS for all criteria pollutants except O_3; Windham County

WIND ROSE PLOT:

Project: NTE Connecticut - Killingly Energy Center
Met: Windham CT Airport 2010-2014

DISPLAY:

Wind Speed
Direction (blowing from)



WIND SPEED
(m/s)

- >= 11.1
- 8.8 - 11.1
- 5.7 - 8.8
- 3.6 - 5.7
- 2.1 - 3.6
- 0.5 - 2.1

Calms: 9.90%

DATA PERIOD:

Start Date: 1/1/2010 - 00:00
End Date: 12/31/2014 - 23:00

TOTAL COUNT:

43270 hrs.

CALM WINDS:

9.90%

AVG. WIND SPEED:

2.71 m/s

Figure 5-1
Wind Rose for Windham Airport from 2010 – 2014

Killingly Energy Center
an NTE Energy Project

is a moderate nonattainment area for the 1997 O_3 standard and a marginal nonattainment area for the 2008 O_3 standard.

Selection of representative monitoring sites considers the proximity to the Generating Facility Site and a systematic comparison of the monitoring site environment to the environment surrounding the Generating Facility Site. The monitor in McAuliffe Park in East Hartford, Connecticut (ID#09-009-1003) was selected as the location closest to the Generating Facility Site that monitors for all criteria pollutants (discussed further in Section 5.2.1), and in a location similar to or more industrialized than the area surrounding the Generating Facility Site. This makes the monitoring data conservatively representative. Table 5-1 compares the background concentrations at this monitoring site to the NAAQS. As shown, existing ambient concentrations of SO_2, nitrogen dioxide (NO_2), CO, PM_{10}, and $PM_{2.5}$ near the Generating Facility Site are in compliance with the health-protective NAAQS.

Table 5-1: Background Air Quality Data

Pollutant	Averaging Period	Concentration Rank	Background Concentration ($\mu g/m^3$)[1]	NAAQS ($\mu g/m^3$)	Percent of NAAQS
SO_2	1-hour	99th percentile	21.0	196	10.7%
	3-hour	2nd high	23.6	1,300	1.8%
	24-hour	2nd high	12.1	365	3.3%
	Annual	Mean	2.0	80	2.5%
PM_{10}	24-hour	2nd high	25	150	16.7%
$PM_{2.5}$	24-hour	98th percentile	20	35	57.1%
	Annual	Mean	7.4	12	61.7%
NO_2	1-hour	98th percentile	79.0	188	42.0%
	Annual	Mean	16.9	100	16.9%
CO	1-hour	2nd high	2,185	40,000	5.5%
	8-hour	2nd high	1,495	10,000	15.0%

[1] $\mu g/m^3$ – micrograms per cubic meter

5.1.3.2 Ambient Air Quality Trends

Air quality trends are used to demonstrate how current air quality compares with historic observations to assess whether the air quality is improving and to determine if control and abatement strategies are effective. Air quality in Connecticut has shown considerable improvement in the last 20 years. Improvement has resulted from a number of programs aimed at reducing emissions from both stationary and mobile sources, both in Connecticut and throughout the mid-Atlantic and eastern United States, where upwind emissions significantly impact downwind air quality in Connecticut.

Following deregulation of the electric utility sector, ISO-NE now dispatches units in New England primarily based on the units' marginal cost (essentially fuel cost), turning plants on and off as load (demand) varies throughout the day and season. As a result of introduction of new, more efficient natural gas-fired combined cycle plants like KEC, older, less efficient plants (largely fueled by coal or oil) run less frequently because newer, more efficient plants have lower marginal cost. Some of the older plants have ceased operation and more are expected to retire in the upcoming few years. This is primarily due to the superior "heat rate" of the new plants – they can produce the same amount of electricity with considerably less fuel compared to older, less efficient plants. Similar trends have been occurring, although to varying degrees, in the upwind states. This has resulted in a decrease in emissions from the utility sector, which has in turn, has contributed significantly to improved air quality across all of Connecticut.

Figures 5-2 through 5-6 show the trend in air quality improvement in Connecticut.

5.2 APPLICABLE REGULATORY REQUIREMENTS

The USEPA and DEEP have promulgated regulations that establish ambient air quality standards, air emission control requirements, and prevention of significant deterioration (PSD) increments. These standards and increments provide the basis for affirming that KEC will not have a significant adverse effect on ambient air quality.

5.2.1 National Ambient Air Quality Standards

The USEPA has developed NAAQS for six air contaminants, known as criteria pollutants. These standards have been set to protect public health and welfare. These criteria pollutants are SO_2, PM_{10}/$PM_{2.5}$, NO_2, CO, O_3, and Pb. Particulate matter is characterized according to size. Particulate matter having an effective aerodynamic diameter of 10 microns or less is referred to as PM_{10} or "respirable particulate." PM having an effective aerodynamic diameter of 2.5 microns or less is referred to as $PM_{2.5}$, or "fine particulate"; $PM_{2.5}$ is a subset of PM_{10}.

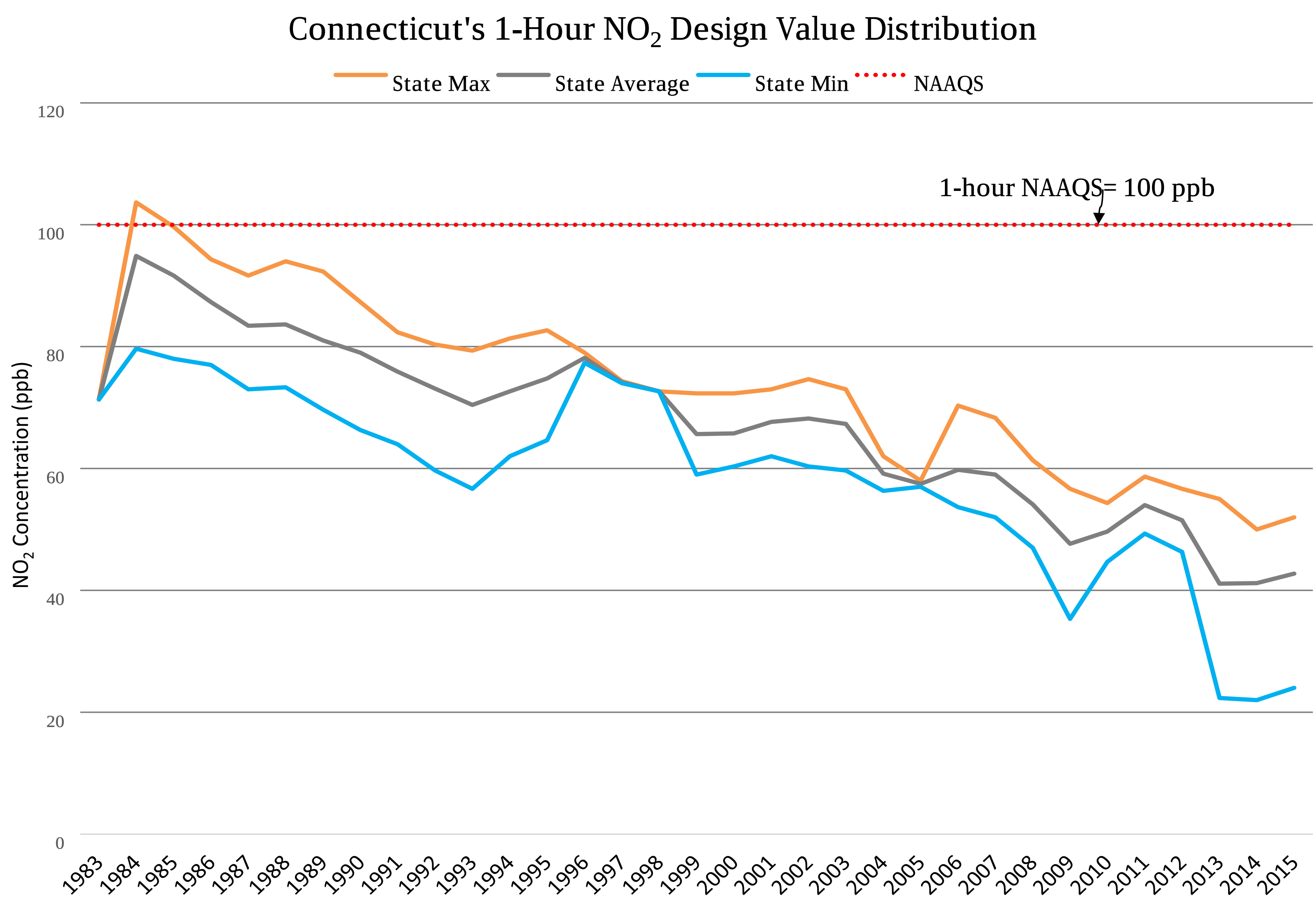


Figure 5-2
Air Quality Trend for 1-Hour NO_2

Killingly Energy Center
an NTE Energy Project

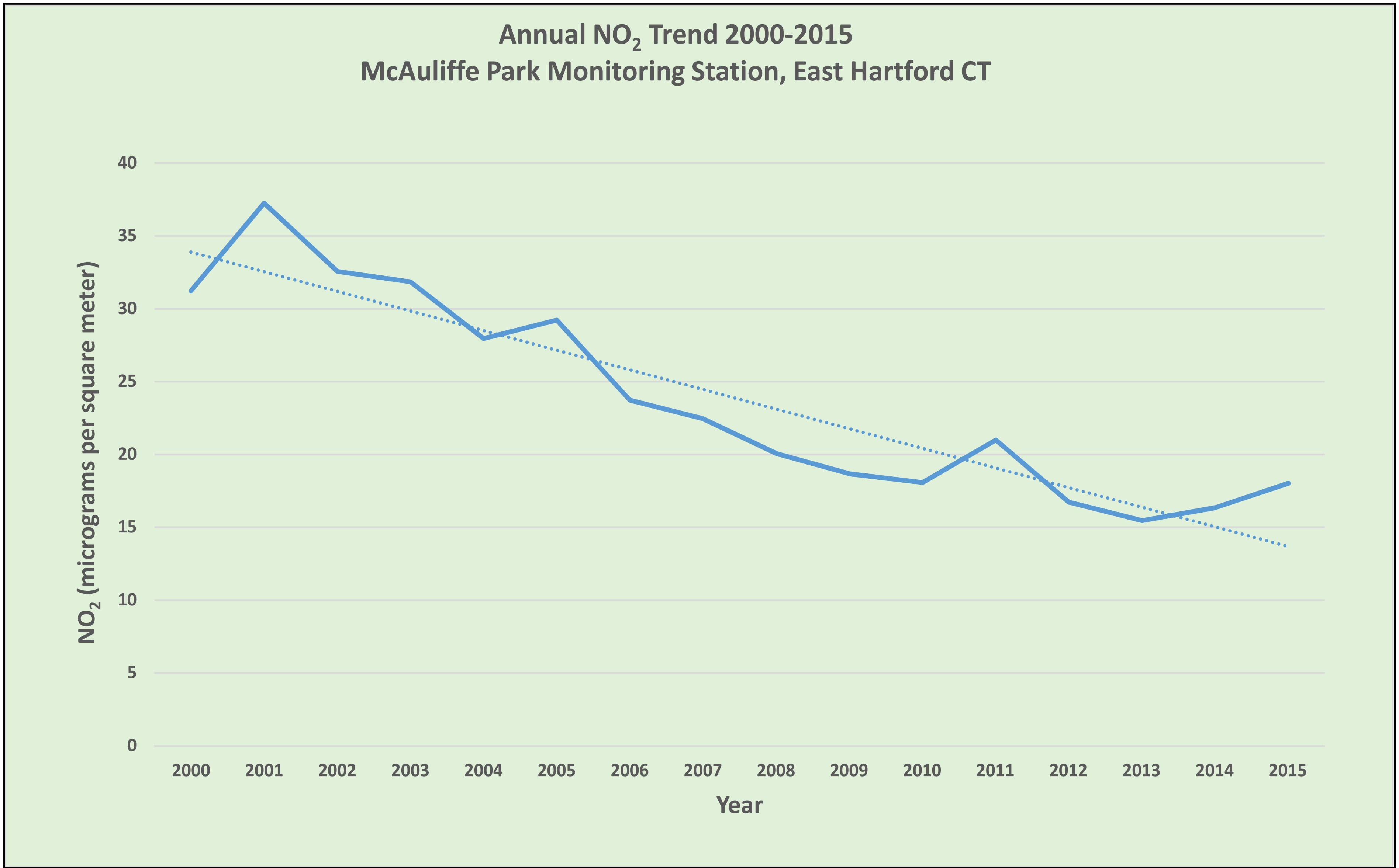


Figure 5-3
Air Quality Trend for Annual NO_2

Killingly Energy Center
an NTE Energy Project

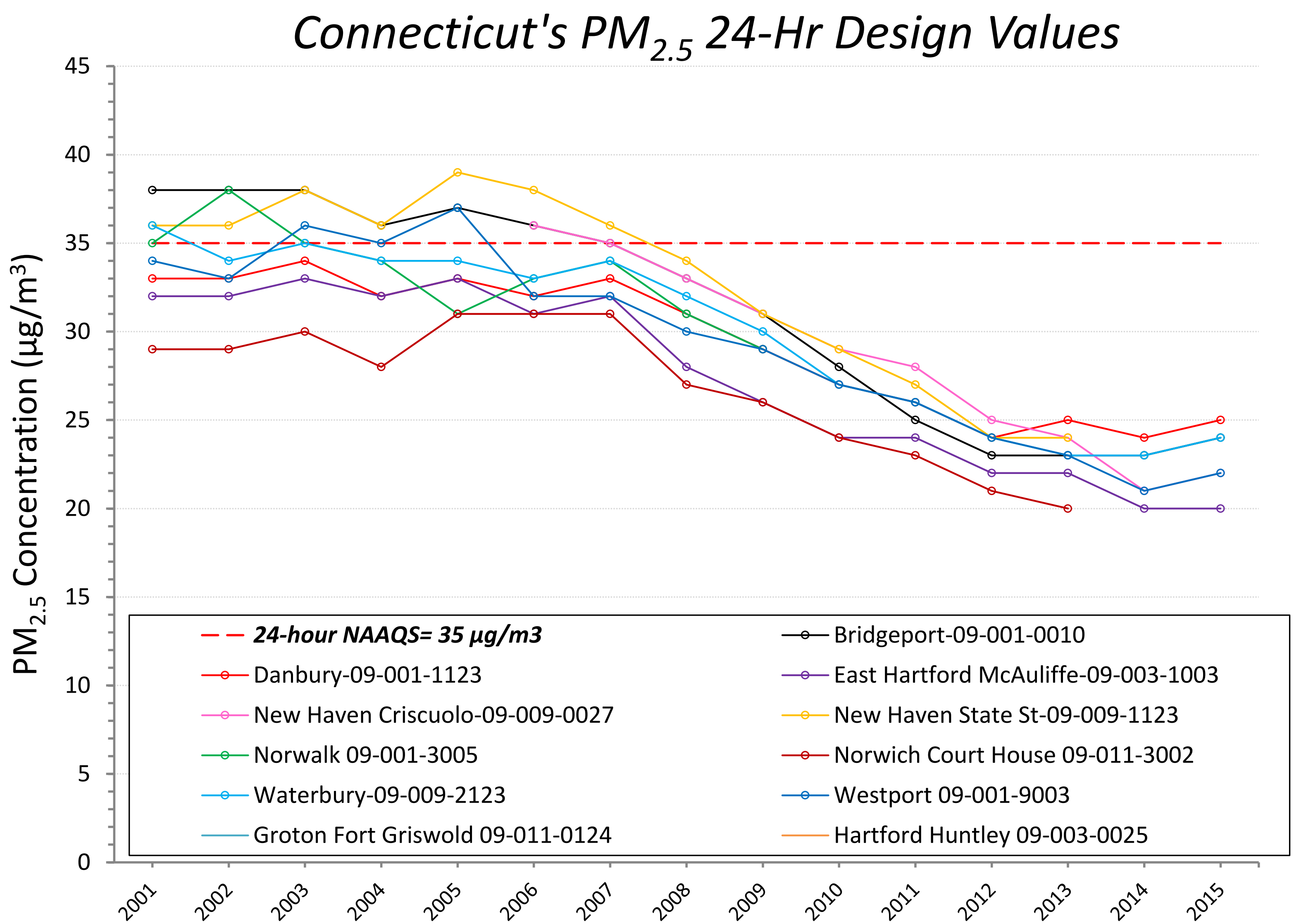


Figure 5-4
Air Quality Trend for 24-Hour $PM_{2.5}$

Killingly Energy Center
an NTE Energy Project

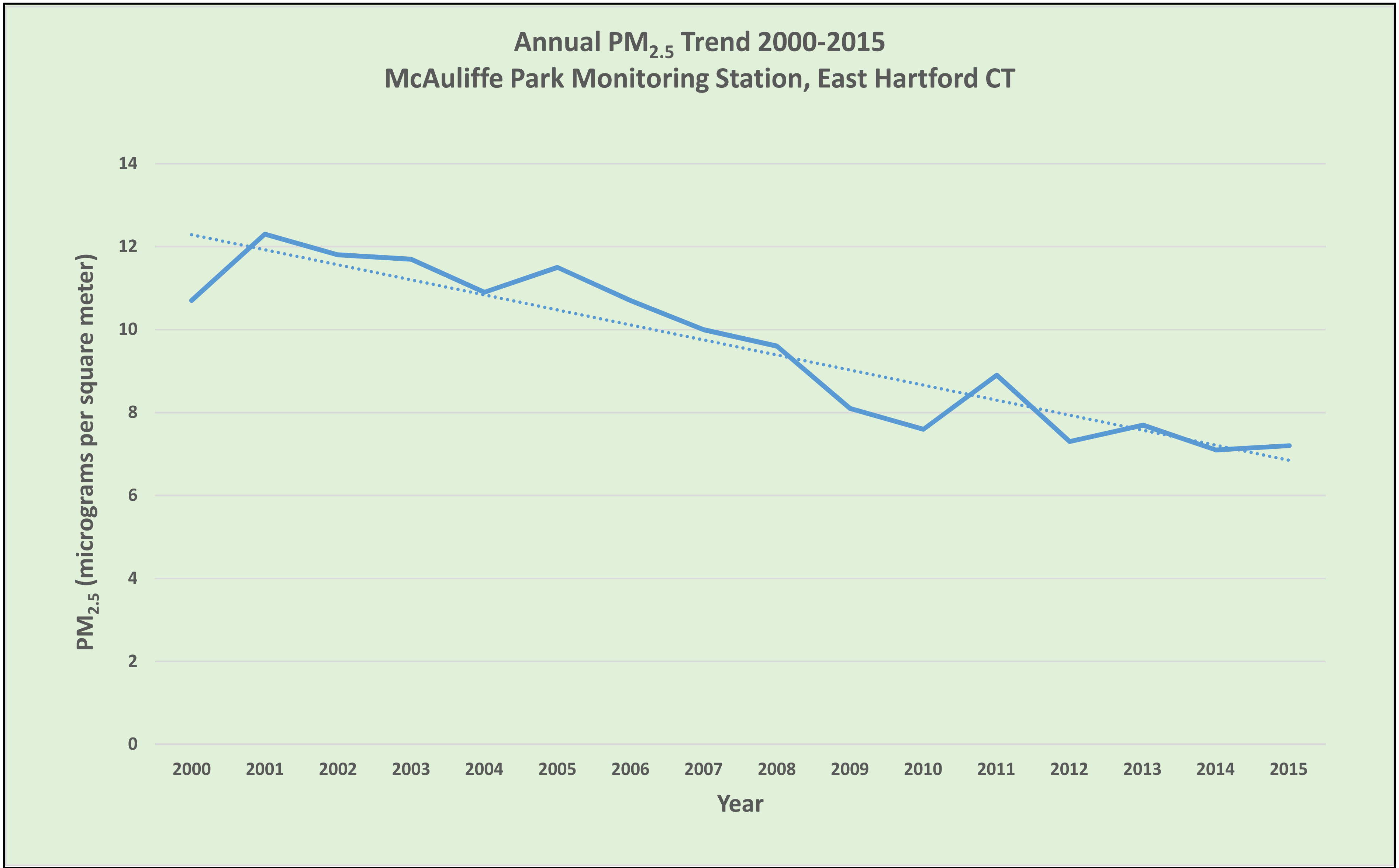


Figure 5-5
Air Quality Trend for Annual $PM_{2.5}$

Killingly Energy Center
an NTE Energy Project

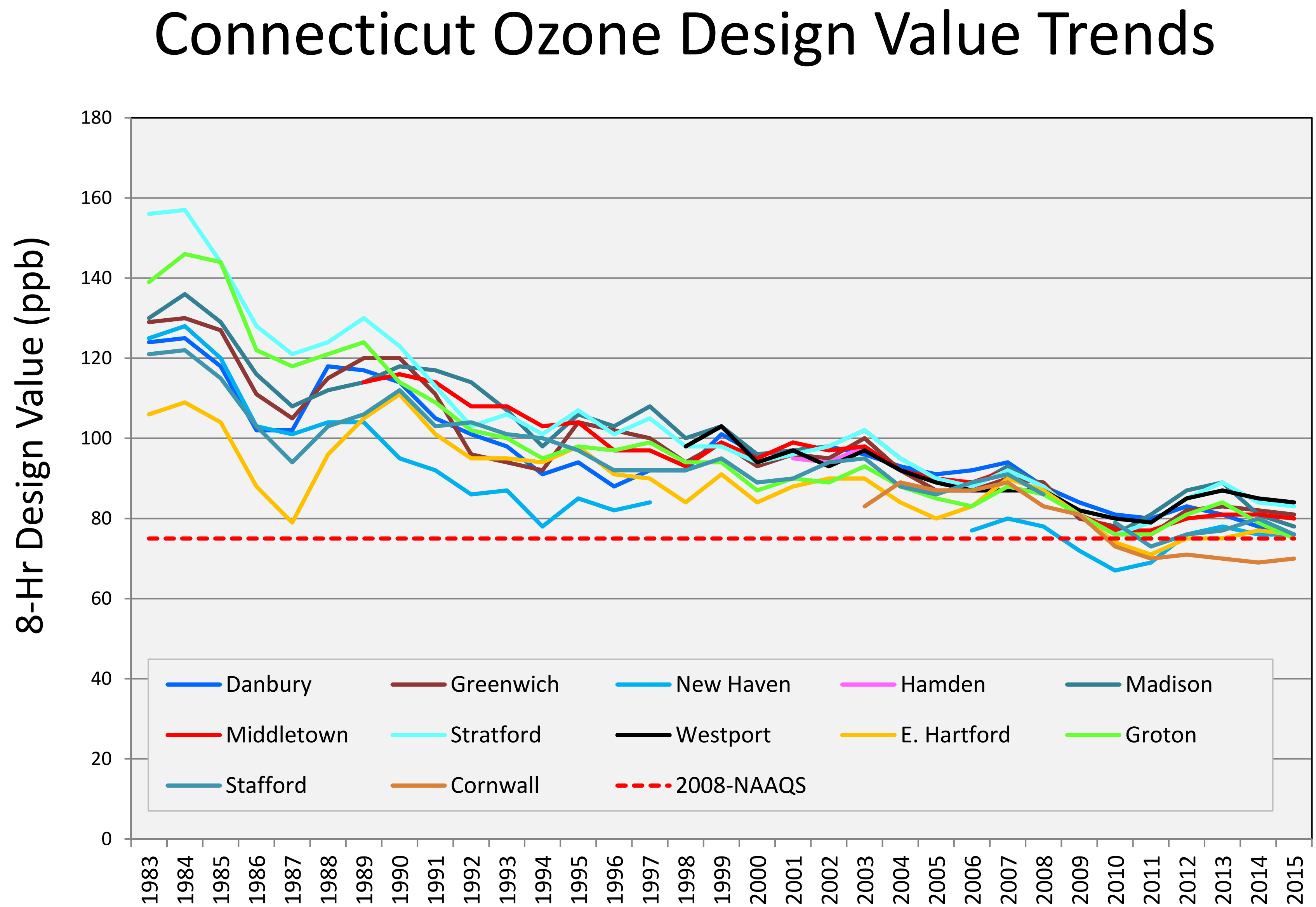


Figure 5-6
Air Quality Trend for 8-Hour Ozone

Killingly Energy Center
an NTE Energy Project

The NAAQS have been developed for various durations of exposure. The NAAQS for short-term periods (24 hours or less) typically refer to pollutant levels that cannot be exceeded more than a limited number of times per year. The NAAQS for long-term levels typically refer to pollutant levels that cannot be exceeded for exposures averaged typically over one year. The NAAQS include both "primary" and "secondary" standards. The primary standards are intended to protect human health, and the secondary standards are intended to protect the public welfare (which includes the environment) from any known or anticipated adverse effects associated with the presence of air pollutants.

One of the basic goals of federal and state air pollution regulations is to ensure that ambient air quality, including contributions from ambient background as well as existing and proposed new sources, is or will be in compliance with the NAAQS. For each criteria pollutant, every county of the United States has been designated as one of the following categories: attainment, nonattainment or unclassifiable. In areas designated as attainment, the air quality with respect to the pollutant is equal to or exceeds the NAAQS. These areas are under a mandate to maintain such air quality (i.e., to prevent significant deterioration). In areas designated as nonattainment, the air quality with respect to the pollutant does not meet the NAAQS. These areas must take actions to improve air quality, and achieve attainment with the NAAQS within a certain period of time. In areas designated as unclassifiable, there are limited air quality data; these areas are treated as attainment areas by the USEPA and DEEP.

As noted in Section 5.1.3, Windham County is designated as attainment/unclassifiable with respect to the NAAQS for all criteria pollutants with the exception of O_3; Windham County is a moderate nonattainment area for the 1997 O_3 standard and a marginal nonattainment area for the 2008 O_3 standard.

Applicants for new major sources or major modifications of existing major sources are required to perform dispersion modeling analyses to predict air quality impact concentrations of the new or modified sources in comparison to Significant Impact Levels (SILs), screening levels that have been established for the criteria pollutants to help define the parameters of the air quality analysis that must be completed.[7] If modeling of the source alone predicts concentrations below the SILs, no further cumulative modeling for that parameter is required. If a parameter exceeds the SIL, then cumulative modeling is required for comparison to the NAAQS.

[7] In Sierra Club v. EPA (June 23, 2014), the Court of Appeals for the 9th Circuit vacated some portions of USEPA's rule establishing SILs for $PM_{2.5}$. However, recent USEPA guidance recommends that the use of the $PM_{2.5}$ SIL value may be justified on a case-by-case basis by comparisons with ambient monitoring data. http://www.epa.gov/nsr/documents/20130304qa.pdf

Further, in areas attaining the NAAQS for a particular pollutant, air quality with respect to that pollutant is not permitted to degrade beyond specified levels, called PSD increments, as a result of the cumulative impacts of all new emission sources.

Table 5-2 presents the NAAQS, SILs, and PSD increment values and averaging periods for the various criteria pollutants

Table 5-2: National Ambient Air Quality Standards, Significant Impact Levels and PSD Increments

Pollutant	Averaging Period	NAAQS		SIL (µg/m³)	PSD Increment (µg/m³)
		Primary (µg/m³)	Secondary (µg/m³)		
NO_2	Annual[a]	100	Same	1	25
	1-hour[b]	188	None	7.5	None
SO_2	Annual[ac]	80	None	1	20
	24-hour[c]	365	None	5	91
	3-hour[d]	None	1,300	25	512
	1-hour[e]	196	None	7.8	None
$PM_{2.5}$	Annual[ag]	12	Same	0.3	4
	24-hourh[i]	35	Same	1.2	9
PM_{10}	24-hour[f]	150	Same	5	30
CO	8-hour[d]	10,000	None	500	None
	1-hour[d]	40,000	None	2,000	None
O_3	8-hour[i]	147	Same	None	None
Pb	3-month[a]	0.15	Same	None	None

[a] Not to be exceeded.
[b] To attain this standard, the 3-year average of the 98th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 100 parts per billion (ppb) (188 µg/m³).
[c] The 24-hour and annual average primary standards for SO_2 have been revoked. However, these standards remain in effect until one year after an area is designated for the new 1-hour standard.
[d] Not to be exceeded more than once per year.
[e] To attain this standard, the 3-year average of 99th percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 75 ppb (196 µg/m³).
[f] Not to be exceeded more than once per year on average over 3 years.
[g] To attain this standard, the 3-year average of weighted annual mean $PM_{2.5}$ concentrations at community-oriented monitors must not exceed 12 µg/m³.
[h] To attain this standard, the 3-year average of 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m³.
[i] To attain this standard, the 3-year average of the fourth highest daily maximum 8-hour average O_3 concentrations measured at each monitor within an area over each year must not exceed 0.070 ppm.

5.2.2 Nonattainment New Source Review

The Nonattainment New Source Review (NNSR) program governs projects located in areas designated nonattainment for any criteria pollutant if the project has the potential to emit the nonattainment pollutant above a certain threshold. Under the NNSR program, a new project located in an area designated as nonattainment for O_3 must satisfy NNSR requirements for NO_X and/or VOC emissions (which are precursors of O_3) if they exceed the applicable NNSR thresholds, which is 50 tpy each for NO_X and VOC in Windham County. KEC will have potential NO_X emissions above the NNSR threshold, but potential VOC emissions will be below the NNSR threshold.

Because KEC's emissions of NO_X are subject to NNSR, KEC is required to implement LAER controls for this pollutant and secure emission offsets. As set out in KEC's air permit application package to DEEP (Appendix G), the CTG will be equipped with DLN burners (during natural gas firing), water injection (during ULSD firing), and SCR to control NO_X emissions. These emissions controls satisfy LAER requirements. In conformance with NNSR requirements, NTE will secure NO_X offsets, or ERCs, for KEC at a ratio of 1.2:1.

5.2.3 Prevention of Significant Deterioration

The PSD program governs projects located in areas designated attainment for one or more pollutants if the project has the potential to emit an attainment pollutant above a certain threshold. Under the PSD program, a combined cycle electric generating facility is considered a major source if maximum permitted emissions of any pollutant are greater than 100 tpy. As shown in Table 5-3, KEC will have potential emissions greater than 100 tpy for NO_X, CO, and $PM_{10}/PM_{2.5}$. Therefore, KEC will be a major PSD source.

For a new major PSD source, PSD requirements also apply to each PSD subject pollutant that is emitted in excess of its defined Significant Emission Rate (SER). Because KEC will be a new major source of NO_X, CO, and $PM_{10}/PM_{2.5}$, and has potential emissions of VOC, H_2SO_4, and GHG above their respective SER (as summarized in Table 5-3), KEC is required to implement BACT controls for NO_X, CO, VOC, $PM_{10}/PM_{2.5}$, H_2SO_4, and GHG. NO_X BACT will be satisfied using the LAER controls as described in Section 5.2.2. As set out in KEC's air permit application package to DEEP (Appendix G), an oxidation catalyst will be installed to control CO and VOC emissions. KEC will fire natural gas as the primary fuel, with limited use of ULSD to minimize $PM_{10}/PM_{2.5}$, SO_2, and H_2SO_4 emissions. GHG emissions will be minimized by utilizing natural gas as the primary fuel and efficient generating technology. These controls meet BACT requirements for these pollutants.

Table 5-3: Summary of KEC Emissions and Applicable PSD Thresholds

Pollutant	KEC Annual Potential Emissions (tpy)	PSD Major Source Threshold (tpy)	PSD Significant Emission Rate (tpy)	PSD Review Applies
CO[a]	143.6	100	100	Yes
NO_x[a]	139.1	100	40	Yes

Pollutant	KEC Annual Potential Emissions (tpy)	PSD Major Source Threshold (tpy)	PSD Significant Emission Rate (tpy)	PSD Review Applies
SO_2	25.1	100	40	No
PM	102.0	100	25	Yes
PM_{10}	102.0	100	15	Yes
$PM_{2.5}$	102.0	100	10	Yes
VOC[a]	49.3	100	40	Yes
Pb	0.002	100	0.6	No
H_2SO_4	8.8	100	7	Yes
GHGs (as CO_2e)	1,993,260[b]	N/A	75,000	Yes

[a] Includes incremental emissions due to startup and shutdown.

[b] Incudes 547 tpy of fugitive GHG emissions from circuit breakers and natural gas handling.

The PSD program requires an air quality modeling analysis to demonstrate that subject projects do not affect compliance with the NAAQS. PSD increments have been established to prevent the air quality in areas that meet NAAQS from significantly deteriorating; the modeling analysis must also demonstrate that the proposed project will comply with the PSD increment.

Projects subject to PSD requirements are also required to evaluate impacts with any nearby PSD Class I Areas. PSD Class I Areas are specifically designated pristine locations (e.g., National Parks, Wildlife Refuges, and Wilderness Areas) that are afforded additional protection by the Clean Air Act. The closest PSD Class I Area is Lye Brook National Wilderness Area in southern Vermont, located more than 99 miles from the Generating Facility Site. The Federal Land Managers have implemented initial screening criteria to determine whether impacts to PSD Class I Areas from sources greater than 31 miles (50 km) away would be considered negligible (NPS 2010). KEC's screening results are well below the screening level; therefore, no further analysis of Class I Area impacts is required.

5.2.4 Minor Source Requirements

Emissions below the NNSR and PSD thresholds described above may be subject to requirements for minor sources as specified in R.C.S.A. Section 22a-174-3a(a)(1)(D). For example, emissions of SO_2 will be below its SER, but will be above the DEEP's minor source permitting threshold (potential emissions of 15 tpy or more). Emissions of NH_3 are not regulated under the PSD and NNSR programs, but are regulated under DEEP's minor source permitting program. KEC will have potential emissions of ammonia above the minor source permitting threshold under R.C.S.A. Section 22a-174-3a(a)(1)(D). As a result, SO_2 and NH_3 emissions will trigger DEEP's BACT requirements under R.C.S.A. Section 22a 174-3a(j)(1)(C). As set out in KEC's air permit application package to DEEP (Appendix G), SO_2 emissions will be minimized through the use of very low sulfur fuels (natural gas and ULSD), and NH_3 emissions will be limited through proper SCR and catalyst design.

5.3 CONSTRUCTION-RELATED IMPACTS AND MITIGATION

Construction impacts on air quality will predominately consist of the relatively minor emissions from construction equipment and fugitive dust emissions. General construction vehicles (both gasoline- and diesel-powered) and other diesel-powered equipment will emit minor amounts of VOCs, SO_2, CO, NO_X, and $PM_{10}/PM_{2.5}$. These contaminants are not expected to cause any significant impacts on the KEC Site or the surrounding area.

DEEP guidance requires mitigation measures to minimize potential air quality impacts associated with construction activities. Such impacts include those resulting from the demolition of existing structures, open soil and excavation activities, transport of materials, operation of construction vehicles and other powered equipment, and the use of volatile chemicals for construction activities. To minimize construction-related emissions, NTE proposes to require that contractors associated with the construction of KEC implement the following measures:

- Install emission control devices, such as oxidation catalysts, and/or the use of clean fuels;
- Establish truck staging zones for all diesel-powered vehicles in locations where diesel emissions will have the least impact on the general public;
- Limit idle time to three minutes or less for all mobile equipment, in compliance with DEEP requirements;
- Locate diesel-powered engines away from fresh air intakes, air conditioners, and windows;
- Wet exposed surfaces to control fugitive dust, as necessary; and
- Schedule outdoor construction activities, whenever possible, during daylight hours in order to minimize impacts associated with limited dispersion during typically more stable nighttime ambient conditions.

Reporting by contractors will be required to ensure proper implementation of these control measures. Implementation of the measures discussed above is expected to minimize potential air quality impacts from the construction of KEC.

5.4 GENERATING FACILITY EMISSIONS AND CONTROLS

KEC will implement air pollutant mitigation measures in accordance with the air permit to be issued by DEEP. The air permit will implement the applicable requirements under the NNSR and PSD programs as well as DEEP's minor source requirements. As described in Section 5.2.2 and in Appendix G, emissions of NO_X are subject to NNSR, and KEC is required to implement LAER controls for this pollutant.

The CTG will be equipped with DLN burners (during natural gas firing), water injection (during ULSD firing), and SCR to control NO_X emissions. An oxidation catalyst will be installed to satisfy BACT requirements for CO and VOC emissions. KEC will fire natural gas as the primary fuel, with limited use of ULSD to minimize $PM_{10}/PM_{2.5}$, SO_2, and H_2SO_4 emissions. Advanced combined cycle CTG technology will be used to satisfy BACT for GHG emissions, and optimized SCR design will control NH_3 emissions. The proposed LAER and BACT emission rates for the CTG are provided in Table 5-4 and Appendix G.

Table 5-4: Proposed CTG LAER and BACT Emission Rates

Pollutant	Natural Gas Firing (without duct firing)	Natural Gas Firing (with duct firing)	ULSD Firing
NO_x	2.0 ppmvdc	2.0 ppmvdc	5.0 ppmvdc
VOC	1.0 ppmvdc	2.0 ppmvdc	2.0 ppmvdc
CO	0.9 ppmvdc	1.7 ppmvdc	2.0 ppmvdc
$PM_{10}/PM_{2.5}$[a]	0.0055 lb/MMBtu	0.0059 lb/MMBtu	0.0155 lb/MMBtu
H_2SO_4	0.00056 lb/MMBtu	0.00053 lb/MMBtu	0.00054 lb/MMBtu
GHG	7,273 Btu/kW-hr (net, annual, natural gas firing at ISO full load, no supplemental firing)		
SO_2	0.0015 lb/MMBtu (≤0.5 gr S/100 scf)	0.0015 lb/MMBtu (≤0.5 gr S/100 scf)	0.0015 lb/MMBtu (≤15 ppmw S)
NH_3	2.0 ppmvdc	2.0 ppmvdc	5.0 ppmvdc

[a]$PM_{10}/PM_{2.5}$ lb/MMBtu emission rates cover all operating loads at or above minimum emissions compliance load (MECL)
lb/MMBtu = pounds per million British thermal units of fuel fired; Btu/kWh = British thermal units of fuel fired per kilowatt-hour of electricity generated; ppmw = parts per million weight; S = sulfur.

Since KEC is located in a nonattainment area for O_3, NNSR regulatory requirements mandate that new major projects for NO_X emissions secure emissions offsets, or ERCs, of NO_X in amounts equal to 1.2 times the proposed emissions. This requirement is driven by the regional need to reduce O_3 levels, as NO_X is an O_3 precursor. Thus, for every ton of NO_X emitted from KEC, a corresponding shutdown or emissions reduction equaling 1.2 tons is required from existing regional emission sources. As a result, KEC will produce a net reduction in regional NO_X emissions, thus promoting further progress for attaining compliance with the O_3 standards in the future. To qualify for offsets, ERCs must be approved by DEEP. O_3 is a regional pollutant formed in the atmosphere by photochemical reactions primarily involving NO_X and VOC. Because these reactions take considerable time to occur (in the presence of strong sunlight), local ozone levels are largely the result of upwind precursor emissions (in many cases hundreds of miles). Therefore, the emissions offsets may be from the same nonattainment area as the proposed project or from a contiguous nonattainment area that contributes to nonattainment in the proposed project's nonattainment area (i.e., from an upwind contiguous nonattainment area).

5.5 AIR QUALITY IMPACT ASSESSMENT

NTE has submitted an air permit application to DEEP for the construction and operation of KEC. This application documents that KEC's anticipated emissions, and proposed emission controls, will comply with applicable state and federal air quality standards. The use of combined cycle technology and associated emission controls inherently produces lower emissions, particularly in comparison with older facilities that operate less efficiently and with fewer emission controls. In addition, KEC will incorporate the use of LAER and BACT emission controls and secure NO_X offsets to further reduce emission levels.

An evaluation of the potential impacts of KEC's air emissions on ambient air quality has been conducted in accordance with the USEPA's *Guideline on Air Quality Models* (USEPA 2005) and DEEP (2009) guidance, and supplemented by additional agency guidance, as documented in an air quality modeling protocol. The results indicate that KEC will not cause environmental or health impacts; KEC will not cause or contribute to an exceedance of any NAAQS, PSD increment or soil and vegetative pollutant thresholds. A brief summary of the modeling analyses is provided below; a detailed discussion can be found in Appendix G.

5.5.1 Comparison with SILs

As a conservative measure to further ensure air quality protection, KEC's dispersion modeling evaluates hypothetical but virtually impossible worst-case conditions – reflecting a composite of operating conditions that could never happen simultaneously – to predict maximum ground-level concentrations for each pollutant and averaging period. Details regarding assumptions for cases modeled can be found in Appendix G. As previously noted, the maximum concentrations are first compared to the corresponding SILs, which are small fractions of the NAAQS and considered *de minimis* levels. If the maximum concentrations from the worst-case scenarios are below the corresponding SILs, then compliance is demonstrated and no additional analysis is necessary. As shown in Table 5-5, the maximum predicted concentrations are less than SILs for all pollutants and averaging periods, except for 1-hour NO_2 and 24-hour $PM_{2.5}$.

Since the maximum predicted concentration exceeds the corresponding SIL for 1-hour NO_2 and 24-hour $PM_{2.5}$, a cumulative impact analysis was conducted for these two pollutants with other major emission sources in the area, as discussed further below.

Table 5-5: Maximum Predicted Impact Concentrations

Pollutant	Averaging Period	Rank Basis for SIL Assessment	Impact Concentration (μg/m^3)	SIL (μg/m^3)	Extent of SIA (km)
NO_2 (Normal Load)	1-hour	H1H (5-year Average)	21.07	7.5	20.2
	Annual	H1H	0.93	1	NA
CO	1-hour	H1H	1,427	2,000	NA
	8-hour	H1H	131	500	NA
PM_{10}	24-hour	H1H	3.96	5	NA
	Annual	H1H	0.35	1	NA
$PM_{2.5}$	24-hour	H1H (5-year Average)	3.15	1.2	8.05
	Annual	H1H (5-year Average)	0.29	0.3	NA
SO_2	1-hour	H1H (5-year Average)	2.92	7.8	NA
	3-hour	H1H	1.51	25	NA
	24-hour	H1H	0.99	5	NA
	Annual	H1H	0.09	1	NA

Notes:

- Maximum highest first highest (H1H) concentrations are used for comparison with the SILs. Impact concentrations are based on maximum predicted across the range of 5 years modeled for all pollutants except $PM_{2.5}$ (both annual and 24-hour), NO_2 (1-hour only), and SO_2 (1-hour only), which are based on the maximum 5-year average H1H values. NO_2 concentrations assume NO_X to NO_2 conversion at 80% (short term) and 75% (annual).
- SIA = Significant Impact Area, defined as a circle with a radius equal to the distance to the furthest receptor for which the maximum predicted impact exceeds the SIL; note that all values are below the NAAQS.

5.5.2 Cumulative Modeling for Comparison with NAAQS

Identification of other NO_x and $PM_{2.5}$ sources to be included in the cumulative modeling was based on an inventory of sources located within approximately 31 miles (50 km) of the KEC Site using the DEEP Radius Search Tool for 2008 Air Emissions Inventory Data, provided by DEEP. DEEP guidance, based on distance and actual annual emissions levels, was used to select from the inventory the specific sources for use in the cumulative modeling assessment. Consultation with the Massachusetts Department of Environmental Protection (MADEP) and the Rhode Island Department of Environmental Management (RIDEM) also occurred to identify appropriate source information in those respective states. Detailed emissions and stack parameter data for the sources at the modeled facilities are provided in Appendix G, along with details on the source inventory selection criteria.

DEEP guidance criteria for inclusion of sources in a cumulative impact modeling analysis is as follows:

- All individual source stacks with actual emissions of >15 tpy of a pollutant within the radius of significance of a project;
- All individual source stacks with actual emissions of ≥ 50 tpy within 20 km of a project; and
- All individual source stacks with actual emissions of ≥ 500 tpy within 50 km of a project.

All sources selected using the guidance criteria are modeled at their maximum allowable emission rate for all short term averaging times and at their actual emission rates for annual average modeling.

Five existing and proposed background NO_X sources met the DEEP criteria for inclusion in the cumulative 1-hour NO_2 NAAQS analysis:

- Lake Road Generating Co., Killingly, Connecticut (1.24 miles away);
- Algonquin Gas Compressor Station, Burrillville, Rhode Island, existing and proposed (11 miles away);
- Invenergy Clean River Energy Center (proposed), Burrillville, Rhode Island (11 miles away);
- Exeter Energy, Sterling, Connecticut (11.6 miles away); and
- Wheelabrator Millbury, Millbury, Massachusetts (25.7 miles away).

Two existing and proposed background sources of $PM_{2.5}$ met the criteria for inclusion in the cumulative 24-hour $PM_{2.5}$ NAAQS analysis:

- Lake Road Generating Co., Killingly, Connecticut (1.24 miles away); and
- Invenergy Clean River Energy Center (proposed), Burrillville, Rhode Island (11 miles away).

One background source, the proposed Invenergy Clean River Energy Center, met the criteria for inclusion in the 24-hour $PM_{2.5}$ PSD increment assessment.

In addition to the emissions from KEC and those from the cumulative inventory sources, the NAAQS compliance assessment includes representative ambient background concentrations for all receptors and time periods where impacts from KEC are above the SIL; additional margin is incorporated in the assessment because ambient background concentrations would include emissions from the other specific sources. The resulting total concentrations, with all those contributions, are less than the corresponding 1-hour NO_2 and 24-hour $PM_{2.5}$ NAAQS, as shown in Table 5-6.

Table 5-6: Cumulative NAAQS Compliance Assessment

Pollutant	Averaging Period	Cumulative Impact Concentration (µg/m^3)	Ambient Background (µg/m^3)	Total Impact Plus Background (µg/m^3)	NAAQS (µg/m^3)
NO_2 (Normal Load)	1-Hour	67.5	79	146.5	188
NO_2 (SUSD)	1-Hour	62.5	79	141.5	188
$PM_{2.5}$	24-Hour	7.2	20	27.2	35

Notes:

- Total cumulative impact concentrations based on consideration of all receptors and time periods where KEC impacts are above the SIL (based on 5-year average maximum H1H for 1-hour NO_2 and 24-hour $PM_{2.5}$).
- NO_2 concentrations conservatively assume 80% NO_X to NO_2 conversion.
- Assessment of the 1-hour NO_2 NAAQS for the transient turbine SUSD conditions consists of adding ambient background to KEC-only concentrations.

5.5.3 PSD Increment Analysis

A PSD increment analysis was conducted for 24-hour $PM_{2.5}$, which is the only pollutant/averaging time for which impacts from KEC exceed the respective SIL that has an established PSD increment. The results of the PSD increment compliance assessment for 24-hour $PM_{2.5}$ are presented in Table 5-7. The results show that the cumulative impacts of KEC and the proposed Invenergy Clean River Energy Center are well within the available increment.

Table 5-7: Cumulative PSD Increment Compliance Assessment

Pollutant	Averaging Period	Total Increment Consumption[1] (µg/m^3)	Maximum Allowable PSD Increment (µg/m^3)
$PM_{2.5}$	24-hour	3.4	9

[1] Impact concentrations are conservatively based on the maximum highest second highest (H2H) concentration predicted across the range of modeled years.

5.5.4 Visibility Analysis

KEC will comply with the PM_{10}/$PM_{2.5}$ and visible emissions requirements specified in Section 22a-174-18 of the R.C.S.A. Compliance with these regulations addresses the intent of the PSD plume blight visibility requirements. The VISCREEN model was used to assess potential visibility impacts at the closest PSD Class I Area, the Lye Brook National Wilderness Area (approximately 99 miles away). The maximum potential emissions from KEC were used in the analysis. The results indicated that the visibility impairment related to KEC's plume will not exceed threshold criteria. Details of the analysis can be found in Appendix G.

5.5.5 Impacts on Soils and Vegetation Analysis

Confirmation that KEC will not result in significant impacts to sensitive vegetation and soils utilized USEPA screening methodology (USEPA 1980). All pollutant concentrations from KEC are well below the vegetation sensitivity and soil screening thresholds. Details of the analysis can be found in Appendix G.

6.0 WATER RESOURCES

This section describes the existing surface water and groundwater resources, the regional water supply, existing wastewater treatment and disposal infrastructure, and KEC's construction and operational impacts.

6.1 EXISTING CONDITIONS

6.1.1 Surface Water Resources

KEC lies within the 1,474-square mile Thames River Watershed that spans south-central Massachusetts (251 square miles), eastern Connecticut (1,162 square miles), and northwestern Rhode Island (61 square miles), before discharging into Long Island Sound. The Quinebaug River meanders north and west of the KEC Site (Figure 2-1), and is the closest major waterbody. The Quinebaug River Watershed makes up 850 square miles (57%) of the larger Thames River Watershed. The Quinebaug River system flows approximately 69 miles, originating from East Brimfield Lake in Massachusetts and then flowing southeast and south through Connecticut. The Quinebaug River ends near the southern boundary of Town of Lisbon, where the river discharges to the Shetucket River.

The USGS records flow at several stream gauging stations along the Quinebaug River. Station 011255000 is located 3.6 miles upriver of the KEC Site in the Town of Putnam. This station is at elevation 216 amsl and records drainage for 328 square miles of the watershed. Based on 60 years of records, mean flow is highest in April and lowest in August at 1,140 and 219 cubic feet per second (cfs), respectively. Station 01127000 is located approximately 20 miles downriver of the KEC Site in Jewett City. This station is at elevation 63 amsl and records drainage for 713 square miles of the watershed. Based on 60 years of records, mean flow is highest in March and lowest in August at 2,520 cfs and 482 cfs, respectively. The Quinebaug River is classified as a Class B water (DEEP Water Quality Classifications Map). Designated uses include fish and wildlife habitat; recreation; navigation; and agricultural or industrial supply.

The other significant surface waterbody in proximity to the KEC Site is Alexander Lake (approximately 0.5-mile to the east). Alexander Lake is a large kettle pond, approximately 190 acres in size, with an average depth of approximately 24 feet and a maximum depth of 53 feet. Kettle ponds are predominantly replenished by precipitation and groundwater. Alexander Lake is not fed by either the Quinebaug River or Five Mile River system (just to the east), and is relatively isolated to surface water flow. During significant rain events when groundwater levels around the lake are high, surface water can exit the lake via Goodyear Brook (located at the far southern end of the lake) or via an unnamed channel on the southeastern side of the lake that drains to Five Mile River (a tributary of the Quinebaug River).

Alexander Lake is classified as Class A waters (DEEP Water Quality Classifications Map). Class A designated uses include fish and wildlife habitat; potential drinking water supply; recreation; navigation; and agricultural or industrial supply. Alexander Lake is largely recreational, with single-family residences occupying most of its shoreline. No public access points exist, but small boats of residents around the lake can access a private boat launch on the southeast shore. Boats larger than 10 horsepower are prohibited.

Based on topography and DEEP mapping, the KEC Site is within the sub-watershed of the Quinebaug River (Sub-Basin No. 3700-00), while Alexander Lake is in Sub-Basin 3700-23 (Figure 6-1). The sub-basin, or watershed, divide for these basins is located immediately east of the existing Eversource electric transmission ROW. Both sub-basins are underlain by both stratified outwash sands or dense till overlying bedrock, with Sub-Basin 3700-00 predominantly underlain by the till/bedrock deposits and Sub-Basin 3700-23 predominantly underlain by stratified outwash sands; each has a significantly different surface water hydrology flow regime.

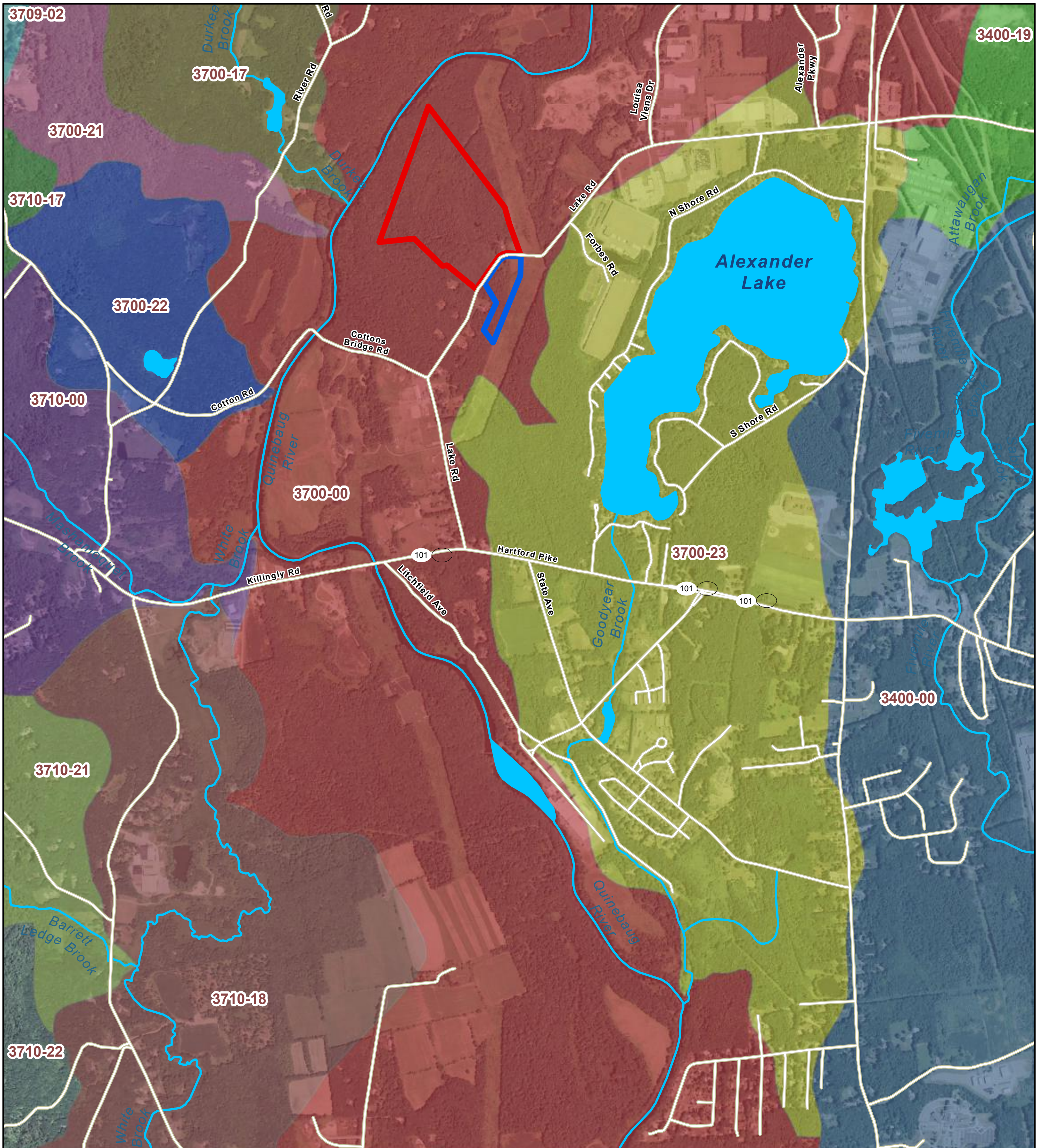
In Sub-Basin 3700-00, surface water (as well as groundwater, as discussed in Section 6.1.2) flows from the KEC Site to downgradient wetlands and intermittent streams that discharge into the Quinebaug River. Natural and anthropogenic springs discharging at higher elevations from the till at the edge of wetlands and contribute to surface water flow (Appendix E).

The predominant surface water feature in Sub-Basin 3700-23 is Alexander Lake. During significant rain events, surface water within this sub-basin generally flows from the north, west, and east to the lake.

The Town of Killingly does not have a DEEP-approved Watershed Protection Plan to address water resources in the town; however, the Town of Killingly Plan of Conservation and Development (2010-2020) recognizes the importance of protecting the drainage basins (watersheds). The KEC Site is not within established overlay districts for watershed protection, but, as is the case throughout the town, KEC will be required to utilize low impact development techniques in its stormwater design to comply with water quality standards and protect water resources.

6.1.2 Groundwater Resources

The KEC Site is located on the northern side of a bedrock hill covered by a relatively thin mantle of glacial till (unsorted clay to boulder size overburden rock fragments deposited directly by glacial ice). Till is often very dense due to the weight of the former glacier on top of it. The till deposits have a relatively low ability to yield water. However, fractures in the underlying bedrock can produce water at quantities suitable for domestic and small commercial volumes when fractures bearing water are encountered. The most productive surficial aquifers in Connecticut are sand and gravel deposits that occurs at the surface or beneath fine-grained deposits. The KEC Site, however, is located within an area of till that is neither a



Legend

- Generating Facility Site
- Switchyard Site
- Roads
- Rivers
- Water Bodies

Local Sub-basin Area

3400-00	3700-21	3710-00
3400-19	3700-22	3710-17
3700-00	3700-23	3710-18
3700-17	3709-02	3710-21

Note:
Data derived from CT DEEP. Sub-Basin 3700-23 is larger than that used by the Alexander Lake Watershed Association as it includes down gradient areas from the Lake.

N

0 1,000 2,000 Feet

Figure 6-1 Sub-Basins Along Quinebaug River and Alexander Lake

Killingly Energy Center
an NTE Energy Project

Z:\UtilServ\Killingly\Reports\Watersheds\Drainage_Basin_20160727.mxd surficial aquifer nor stratified drift (Surficial Aquifer Potential Map). Till is generally a thin and poorly sorted glacial deposit with significantly lower potential yield.

Borings performed at the KEC Site indicate water table at depths of 5 to 20 feet in low permeability overburden soils. The domestic bedrock well currently located at the KEC Site indicates a yield of 30 gallons per minute from a well installed in the bedrock at a depth of 160 feet. Groundwater at the KEC Site is classified as Class GA (DEEP Water Quality Classifications Map). Class GA-designated uses include existing private and potential public or private supplies of water; DEEP presumes that groundwater in such areas is suitable for drinking and other domestic uses without treatment, as well as base flow for hydraulically connected surface water bodies.

At the base of the bedrock hill in the direction of Alexander Lake, the western lake shore marks the beginning of a classic glacial valley stratified drift aquifer. This valley, located east of the KEC Site, is approximately 1 mile wide and mimics the north-south orientation of the underlying bedrock. Based on numerous borings collected by the USGS in the 1960s, including some located within the Killingly Industrial Park, this valley slopes from the east and west to the center, where the elevation of stratified sands and gravels is 100 feet amsl. This represents a substantial sandy aquifer, but it is not located on the KEC Site.

6.1.3 Regional Water Supply

CWC currently serves the Town of Killingly, including the existing Lake Road Generating facility (an electric generating facility with three generating units) and other industrial uses within the Killingly Industrial Park. These uses, as well as other Town of Killingly residential, commercial, and industrial uses supplied by CWC, are served by the Crystal Water Division (a portion of the larger CWC system that was acquired from Crystal Water Company in 1999). Additional detail is provided in Appendix H to describe specific wells of interest within the existing CWC system that are either proximate to the KEC or are anticipated to be used to provide water to KEC.

The four wellfields discussed in Appendix H (Figure 6-2) are: the Killingly Industrial Park Wellfield; the Phillip B. Hopkins Wellfield; the Brooklyn Wellfield; and the Plainfield Division Wellfield. CWC has confirmed that it has sufficient resources to meet KEC needs and that the Phillip B Hopkins Wellfield and the Brooklyn Wellfield will be the primary sources utilized for KEC; a connection between the already connected Phillip B. Hopkins Wellfield, Killingly Industrial Park Wellfield and Brooklyn Wellfields and the Plainfield Division Wellfield is planned to enhance reliability throughout the system. Although the Killingly Industrial Park Wellfield is proximate to the KEC Site, it is not expected to be used to meet KEC's water needs based on its low permitted volume and its infrequent historical use. Wellfield descriptions, including permitted capacities, are outlined in Appendix H.

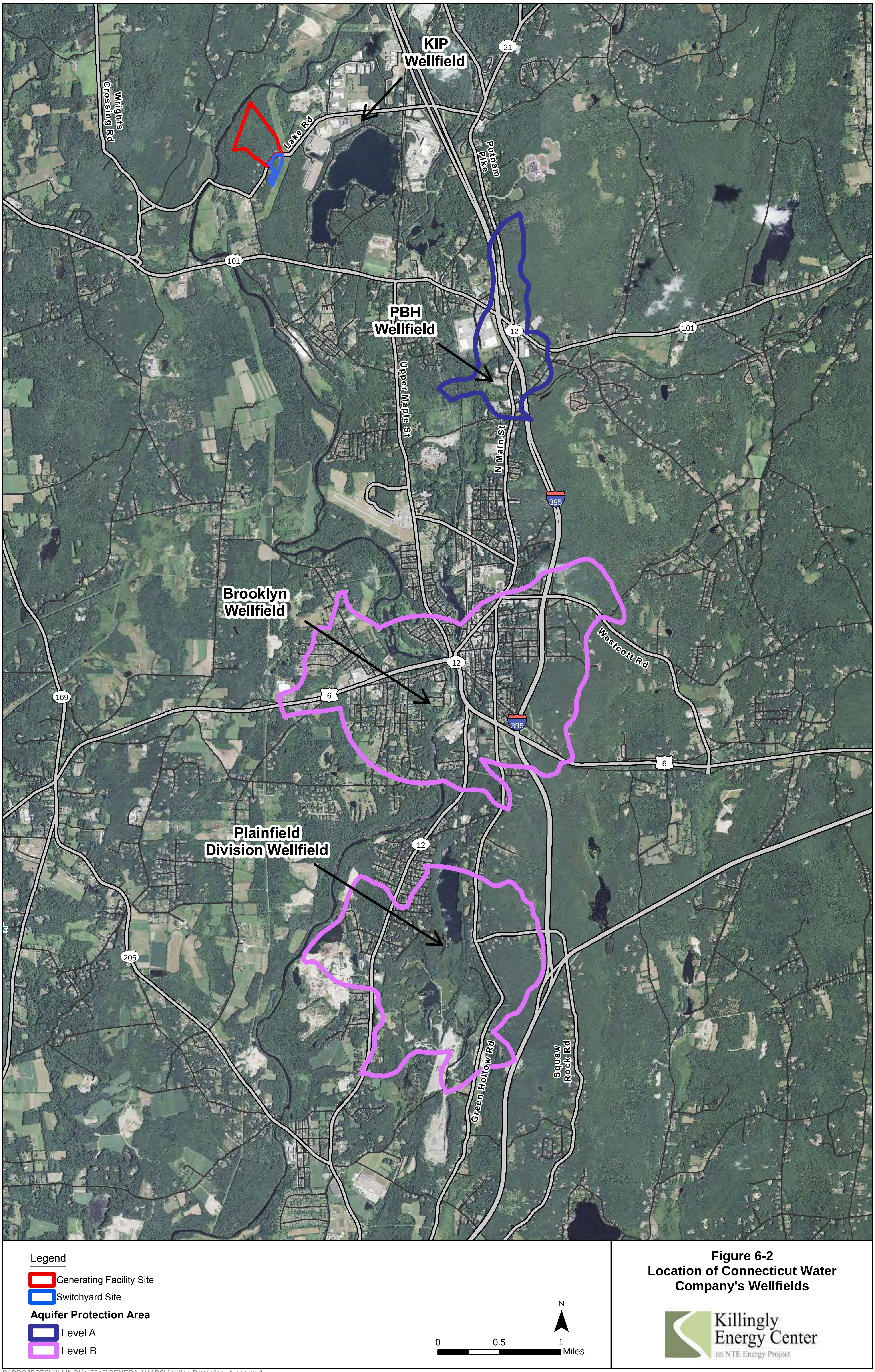


Figure 6-2
Location of Connecticut Water Company's Wellfields

Killingly Energy Center
an NTE Energy Project

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6.1.4 Existing Wastewater Treatment and Disposal Systems

The Town of Killingly's wastewater treatment facility, operated by Suez, has a design capacity of 8 MGD, with an average daily flow into the treatment plant of 3 MGD, and currently serves various residential, commercial, and industrial uses. The wastewater treatment facility discharges into the Quinebaug River south of the KEC Site in accordance with its National Pollutant Discharge Elimination System (NPDES) permit.

6.2 CONSTRUCTION-RELATED IMPACTS

6.2.1 Dewatering of Shallow Groundwater

Given depths to groundwater that range from 5 to 20 feet below ground surface and excavation depths on the order of 25 to 30 feet, it is possible that dewatering operations will be required during certain phases of construction. However, most excavation is proposed in areas with low permeability soils and bedrock, where the need for dewatering would be substantially less under most conditions. If necessary, dewatering will be used to temporarily reduce the level of the groundwater table for excavation, subgrade preparation, filling, foundation construction, and utility construction.

To the extent necessary, it is anticipated that dewatering can be accomplished via open pumping from sumps, temporary ditches, and trenches within and around excavations. Dewatering systems will be designed and operated with appropriate BMPs to prevent erosion and sedimentation and to allow for settling of discharge prior to release in accordance with applicable permits. Accumulated water will be directed away from the excavation and work areas to sump locations and gradually released for infiltration or flow (using appropriate erosion control measures) over upland area towards the on-site wetlands.

6.2.2 Stormwater Management

NTE will implement construction procedures to protect stormwater quality at the KEC Site. Construction procedures have been developed in accordance with federal and state guidelines for SWPPP and BMPs for stormwater control and discharge associated with electric generating facilities. More specifically, the drainage design and water quality mechanisms have been designed in accordance with the 2004 Connecticut Stormwater Quality Manual. Potential sources of pollution have been evaluated, and mitigation measures and construction procedures have been compiled in a site-specific SWPPP (Appendix D).

Existing stormwater flows on the Generating Facility Site drain generally northward from a central wetland area with higher elevations. The proposed development will result in the disturbance of approximately 24 acres of upland area. Following construction, the majority of the KEC footprint not taken up by structures will consist of pervious materials, with slopes of approximately 2%.

The existing, well-established, dense vegetation on the KEC Site currently influences stormwater runoff, slowing and reducing runoff and increasing losses from infiltration, evaporation, and transpiration. Stormwater management will prioritize minimizing the area of disturbance and protecting the natural features of the land to the maximum extent possible. Measures will include: limiting the total area of clearing and grading; minimizing the area exposed to active development at any one time; protecting vegetation from construction equipment with fencing, tree armoring, tree walls and/or retaining walls; installing operating storm drainage systems and stable outlets as soon as possible; and adhering to a construction schedule to complete final grading and stabilization as soon as possible.

During construction, the potential sources of water pollution (e.g., oil; paint, solvents, cleaners, and other chemicals handled and/or stored on-site; construction debris and dirt) will be carefully managed to prevent accidental release. Staked haybales will protect storm drains from sediment prior to paving. Following the initial paving, silt socks or sacks, crush stone berms or stone filled geotextiles may be installed to replace the haybales as appropriate. Other measures to be implemented during construction to reduce the volume and velocity of runoff and keep discharging runoff clean include:

- Diversions, stone dikes, silt fences, and similar control measures to dissipate the erosive energy of runoff;
- Installation of measures to avoiding diversion of drainage between drainage systems that could cause potential downstream flooding and erosion;
- Measures to separate construction waters from clean water and divert and isolate runoff from wetlands, watercourses, and drainage ways until the sediments in that runoff has been properly trapped or detained; and
- Implementation of erosion and sedimentation controls when releasing clean runoff.

The Switchyard Site currently drains down-gradient from higher elevations in the southwest corner to the lower elevations north and east through a former agricultural field to a wetland adjacent to the existing transmission right-of-way that abuts the Switchyard Site. Construction of the Utility Switchyard will result in the disturbance of 4 acres of land and approximately 0.3-acre of direct wetland impact. Portions of the temporary work space encompassed in that 4 acres will be utilized for wetland mitigation, as further discussed in Section 4.0. Grading, which will be minimized by the construction of a retaining wall on the south-southwest portion of the Switchyard Site, will produce less 3% slopes. Similar BMPs will be utilized during construction on the Switchyard Site as those identified for the Generating Facility Site.

6.2.3 Erosion and Sedimentation Control

KEC will implement a Soil Erosion and Sediment Control Plan (E&S Plan) as part of the SWPPP (Appendix D) in accordance with applicable federal, state, and local requirements, specifically, the federal Water Pollution Control Act and the Soil Erosion and Sediment Control Act (R.C.S.A. Sections 22a-325 through 22a-329). The E&S Plan will be finalized prior to the commencement of construction, with careful consideration of state recommendations and guidance (i.e., the 2002 Connecticut Guidelines for Soil Erosion and Sediment Control), to minimize soil erosion and sedimentation at the Site. The E&S Plan will identify potential areas of the KEC Site particularly susceptible to erosion and sedimentation, as well as appropriate strategies to minimize and mitigate the identified areas and control concerns. Measures will include the following:

- Preserve existing vegetation to the maximum extent possible;
- Field-identify the limits of construction activity, and keep construction vehicles and equipment within the designated work area;
- Establish stabilized construction entrances and anti-tracking pads to minimize off-site tracking of sediments;
- Install perimeter controls and sediment controls (e.g., silt fencing and/or haybale barriers) to create small drainage areas within the perimeter following clearing activities;
- Utilize haybale dams, as necessary, within temporary swales or as protection around basins prior to paving;
- Direct runoff from small disturbed areas to abutting areas of undisturbed vegetation to reduce concentrated flows and increase the settlement and filtration of sediments (or to other stable outlets); and
- Install temporary sediment basins and diversion channels, as necessary, to intercept runoff and collect sediment prior to discharge.

Topsoil stripped from construction areas will be properly stockpiled and protected by perimeter fencing (e.g., a silt fence or wood chip berm) in accordance with the SWPPP/E&S Plan. Stockpiles that stand for more than 30 days will be additionally stabilized with temporary seeding. No stockpiles will be located within 15 feet of areas of concentrated flows or pavement, nor exceed a 2:1 slope.

Following the establishment of final grades, the topsoil will be reapplied to appropriate areas and evenly distributed to a minimum depth of 4 inches to promote growth of vegetation. Final grading will also adhere to restrictions regarding minimum slope lengths and other land grading requirements established in the E&S Plan. Surface roughening with tracked machinery along slopes will create horizontal depressions in the soil. Steep slopes will be seeded, mulched, and subsequently reinforced with erosion control blanketing or turf reinforcement mat.

6.2.4 Construction Spill Prevention and Control

NTE will develop and implement a comprehensive SPCC Plan outlining the spill prevention, containment and control procedures at the KEC Site. Construction procedures will be developed in accordance with the requirements of the federal Clean Water Act and 40 CFR 112.1. The SPCC Plan will include: the oil containment systems and procedures to prevent oil spills; control measures to prevent oil spills from contaminating navigable waters and adjoining shorelines; and emergency response and remediation procedures to contain, clean up, and mitigate the potential impacts of an oil spill. Employees handling and managing hazardous materials will be required to review the SPCC Plan, after which, a copy will be stored on-site for reference. The SPCC Plan will be amended as necessary (e.g., changes to facility design, operation, or maintenance that potentially impact the discharge of oil).

6.3 OPERATIONAL IMPACTS

6.3.1 Water Supply

Daily water requirements for KEC will depend on the fuel type, the rate at which fuel is consumed at any given time, operating characteristics, and ambient outdoor temperature. Under normal operating conditions, when firing natural gas, the average, anticipated water use for KEC is up to 50,000 gpd in the winter and up to 100,000 gpd in the summer. The maximum use, reflecting limited periods of ULSD use, could be up to 400,000 gpd. KEC's water balance is provided in Figures 2-11a and 2-11b.

Up to 50,000 gpd may be required for HRSG makeup and miscellaneous plant uses on an average operating day. In periods of higher ambient temperatures (above 59°F), KEC will use evaporative cooling of the combustion air to enhance efficiency and energy output; when in use, the evaporative cooler will consume up to an additional 50,000 gpd, depending on ambient temperature. Water needs for KEC's typical operation will be primarily associated with the use of ultra-purified water in the HRSG. Although it is a closed-cycle process in which water will be recirculated and recycled through the system, the need to retain water purity in the system means that periodic discharges (or blowdown) of the recycled water and addition of new water (make-up water) is necessary.

Additional water use will be required for emissions control during extremely limited times when natural gas is unavailable and use of ULSD is necessary for electric grid reliability. When using ULSD, water is injected into the combustion turbine to reduce NO_X levels, whereas during natural gas firing, DLN combustion is used; DLN combustion is not available for ULSD firing. Water injection for NO_X control during ULSD firing will increase the total water demand up to 400,000 gpd of water. However, ULSD use will only occur during extremely limited times when natural gas is not available, and at no time will it occur for more than 720 hours over a given year. The frequency of these occasions is expected to be on the order of several hours once every two to three years.

KEC will have an extremely low water demand for a facility of its type and magnitude through its incorporation of an ACC, with its water requirements reduced by over 95% compared to a more conventional wet-cooled project configuration.

The CWC Crystal Water Division will supply the operational water needs to KEC through its existing water supply system. This volume of water can be supplied and falls within the water available based on volume represented in the CWC's existing diversion registrations and permits. Infrastructure improvements that will meet the needs of KEC as well as improve water delivery to other customers in the area, include a piping connection between the Plainfield and Brooklyn Wellfields (see Figure 2-10) and upgrades to the water storage tank at the Killingly Industrial Park. Correspondence provided in Appendix H confirms adequate system resources to meet KEC's limited water needs.

6.3.2 Water and Wastewater Treatment and Disposal

Due to the lower water demands associated with KEC, as an air-cooled facility, wastewater discharge will also be relatively low. As shown on Figures 2-11a and 2-11b, KEC will produce approximately 30,000 to 90,000 gpd of wastewater discharge. It is anticipated to be adequately handled by the Town of Killingly wastewater treatment facility. Correspondence provided in Appendix H indicates that the facility has adequate capacity and the ability to accept wastewater of KEC's discharge quality.

6.3.3 Stormwater Management

BMPs are incorporated in the operational design of KEC to ensure effective stormwater management of existing flows associated with the increase in impervious surfaces. The BMPs will focus on overland flow erosion control, roadway drainage conveyance, and water quality and treatment.

Overland flow erosion control includes having vegetation and other pervious cover installed to prevent the release and suspension of pollutants and minimize the erosion of the roadway shoulders and paved surfaces on-site. Devices will also be installed to dissipate the erosive energy of water, and reduce the volume and velocity of runoff.

Conveyance BMPs incorporated in the stormwater design include: open systems (such as steep roadway shoulders, banks, spillways, and channels); and closed systems (such as culverts and conduit pipes). These will be installed as necessary to effectively and safely remove water from the roadway and other critical areas of infrastructure.

Water quality and treatment BMPs operate via sedimentation, infiltration, filtration, and biological degradation of stormwater. As non-structural stormwater treatment methods are preferential, post-construction control measures will promote groundwater recharge through pervious surfaces. Methods include the construction of stormwater depressions for roof drainage, overland flow and sheet flow from the paved surfaces. A large portion of the stormwater from paved surfaces will be collected and treated by a large stormwater basin and discharged to a riprap level spreader constructed on ground level. Suspended solids and floating materials will be primarily removed by hoods or elbow inserts installed in permanent sump catch basins. The design and installation of the riprap outlet protection will dissipate the erosive energy of water, and discharge the water to gently sloping vegetated surfaces prior to final discharge. Infiltration and extended overland flows where practical will effectively and safely reduce runoff.

6.3.4 Operational Spill Prevention and Control

Prior to operation, KEC will update its comprehensive SPCC Plan to address operating procedures at the Generating Facility Site. Specific containment areas will be designed around ULSD and chemical storage areas, as well as around unloading areas. Just as during construction, the SPCC Plan will be the basis for employee training and coordination with local emergency services. The SPCC Plan will continue to be amended as necessary during KEC's operating life (e.g., changes to facility design, operation, or maintenance that potentially impact spill prevention and response procedures).