APPENDIX K – VISUAL IMPACT ASSESSMENT

Visual Impact Assessment

Killingly Energy Center

June 2016

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TETRA TECH

Killingly Energy Center
an NTE Energy Project

EXECUTIVE SUMMARY

Tetra Tech, Inc. (Tetra Tech) performed a visual impact assessment for a 5-mile radius around the proposed Killingly Energy Center (KEC). Tetra Tech identified locations with potential views of the 150-foot tall KEC stack using a digital elevation model viewshed analysis, and then generated photographic simulations to assess the potential impact to the visual landscape. The analysis focuses on the anticipated change in observer views toward the 73-acre property within which KEC is proposed, including whether there would be a change in the character or quality of the view, and considers the viewer context as it relates to the manner in which a change would be experienced.

A wide range of factors, including the context of the viewers, duration of the view, degree of discernable detail, number of viewers, degree of natural buffering, and the scenic value of a location, were considered when assessing visual impact. Modeling did not indicate a potential change in view from identified federal, state or local areas of visual importance. Given the rural character of Windham County and its surrounding communities, views were considered from vantage points surrounding KEC in order to determine to what degree those existing views would potentially change.

Based on this analysis, KEC will not alter the visual environment for the majority of the area within 5 miles. For the majority of vantage points within the 5-mile radius, potential views of KEC will be screened by intervening distance, topography, vegetation, and/or existing structures. At certain locations, however, elements of KEC may be visible, most particularly the top of the stack. Simulations have been prepared to illustrate the limited vantage points from which KEC may be visible. In those locations, the view will typically be fleeting (as for travelers along Lake Road) or visible within a context comprised of similar landscape features, as KEC is located within an industrial area and relatively proximate to a similar facility, the Lake Road Generating facility, which has three slightly taller stacks.

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ACRONYMS/ABBREVIATIONS

Acronyms/Abbreviations	Definition
ACC	air-cooled condenser
amsl	above mean sea level
FAA	Federal Aviation Administration
Generating Facility Site	63-acre property, located north of Lake Road, proposed for the electric generating equipment associated with the Killingly Energy Center
HRSG	heat recovery steam generator
I-395	Interstate 395
KEC	Killingly Energy Center
KEC Site	73-acre property in Killingly, Connecticut proposed for the Killingly Energy Center
kV	kilovolt
the Last Green Valley	Quinebaug & Shetucket Rivers Valley National Heritage Corridor
LED	light-emitting diode
NTE	NTE Connecticut, LLC
Switchyard Site	10-acre property, located south of Lake Road, proposed for the utility switchyard associated with the Killingly Energy Center
Tetra Tech	Tetra Tech, Inc.
USFS	United States Forest Service
USGS	United States Geologic Survey

1.0 INTRODUCTION

This report provides a discussion of the visual impact assessment performed for the Killingly Energy Center (KEC), proposed by NTE Connecticut, LLC (NTE) to be located in Killingly, Connecticut. Identification of potential viewpoints, viewshed analysis, photographic simulations, and impact assessment are provided for a 5-mile radius around the 150-foot tall stack. This distance allows for consideration of both near and more distant viewing potential. The analysis focuses on the anticipated change in observer views toward the 73-acre property proposed for KEC (the KEC Site), including whether there would be a change in the character or quality of the view, and considers the viewer context as it relates to the manner in which a change would be experienced. The following sections address:

- The character and visual quality of the existing landscape;
- The visual characteristics of KEC;
- A description of the viewshed analysis utilized to identify key vantage points; and
- Anticipated visual impacts associated with KEC.

2.0 CHARACTER AND VISUAL QUALITY OF THE EXISTING LANDSCAPE

Landscape character is largely determined by the topography, land use, vegetation, and water features that define and contribute to the available vistas and views. The KEC Site (shown in Figure 1) is located in the Eastern Uplands region of northeastern Connecticut, between the Quinebaug River to the west and Alexander Lake to the east on low hills and level uplands. Lake Road bisects the KEC Site, with a 63-acre parcel located north of Lake Road proposed for the electric generating facility (the Generating Facility Site), and an approximately 10-acre parcel located south of Lake Road proposed for a utility switchyard (the Switchyard Site). Existing elevations on the KEC Site range from approximately 216 feet above mean sea level (amsl) near the east bank of the Quinebaug River in the northwest corner of the Generating Facility Site, to approximately 385 feet amsl in the southeast corner of the Switchyard Site (Figure 2).

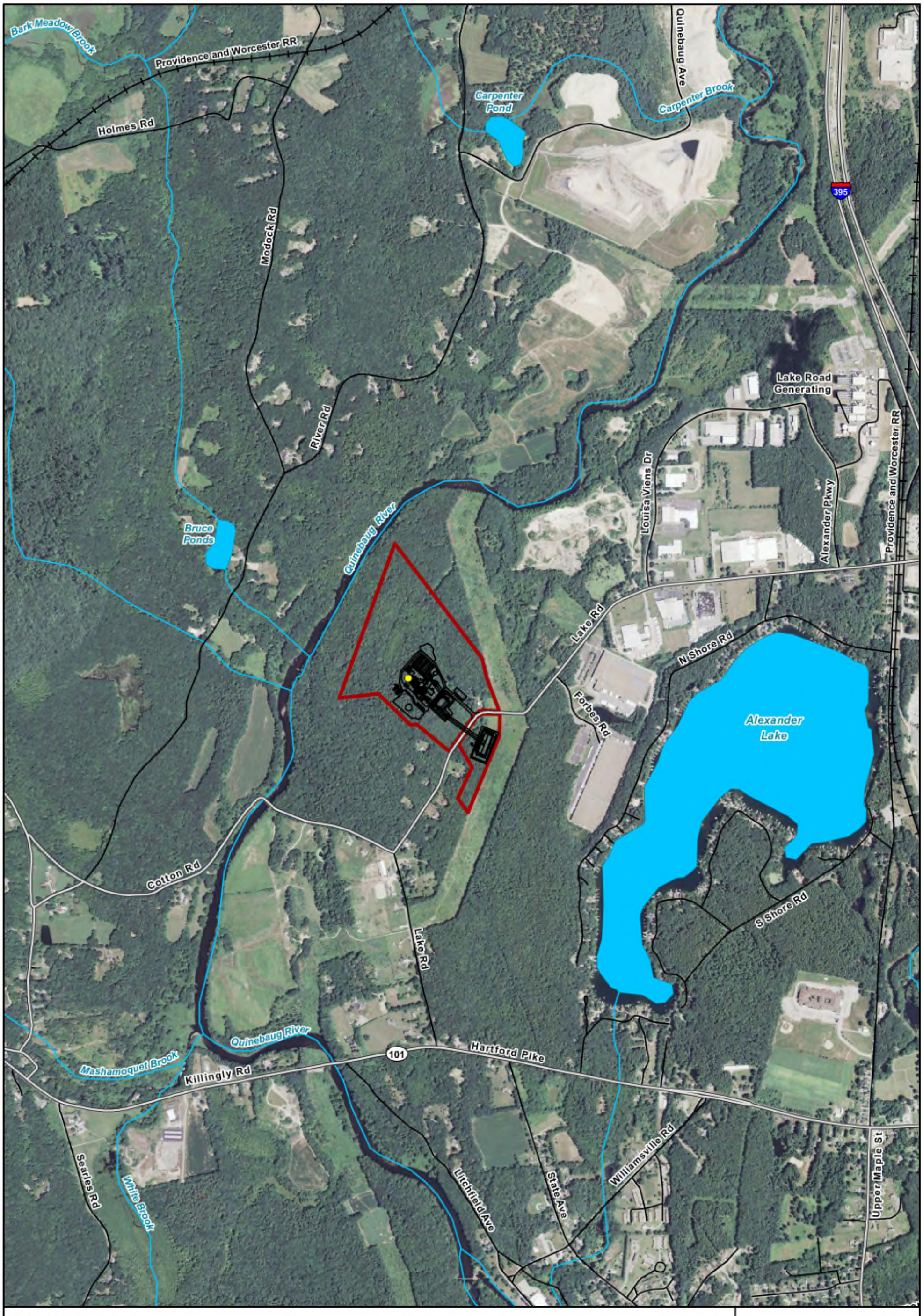
Figure 3 presents an aerial view of a 5-mile radius surrounding KEC's tallest feature (the 150-foot stack). The KEC Site is currently wooded and undeveloped, with the exception of a single residence and related structures (which will not remain on the KEC Site following construction) located proximate to Lake Road. The Generating Facility Site and the Switchyard Site are separated by Lake Road, a local roadway that extends from the intersection of Attawaugan Crossing Road and Upper Maple Street, along the southern boundary of the Killingly Industrial Park, and terminates at State Route 101. The Providence-Worcester Railroad extends in a north-south direction through the industrial area, parallel to Upper Maple Street. Industrial development exists north and south of Lake Road, extending west from the railroad and abutting the Switchyard Site. Additional industrial development exists between Upper Maple Street and Interstate 395 (I-395), south of a commercially zoned property along Attawaugan Crossing Road. Current businesses in or in the vicinity of the Killingly Industrial Park include Frito-Lay, Ryder Integrated Logistics, Unfi Dayville Warehouse, Automatic Rolls of New England, Putnam Plastics, U.S. Cosmetics, Web Industries, Superwinch, Killingly Asphalt, Nutmeg International Trucks, and a Rite Aid Distribution Center. In addition, Lake Road Generating, an approximately 812-megawatt electric generating facility in the Killingly Industrial Park, is approximately 1 mile northeast of the Generating Facility Site.

Outside of this industrial area, the area immediately surrounding the KEC Site is less developed and more rural residential in character. Alexander Lake, a densely developed recreational lake community, is located east of the KEC Site (beyond the industrial area immediately south of Lake Road), and the Quinebaug River winds north, west, and south of the KEC Site. The Dunn Preserve, a 32-acre forested parcel of conservation land owned by the Wyndham Land Trust,[1] lies along the eastern bank of the Quinebaug River, adjacent to the northwestern end 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.

As shown in Figure 2, the regional topography within a 5-mile radius of the KEC Site is varied, with rolling hills and valleys associated with lakes and rivers. In addition to the water features previously mentioned, several smaller ponds and reservoirs are scattered throughout the area.

The Quinebaug and Shetucket Rivers Valley National Heritage Corridor, also called the Last Green Valley, was established by the National Park Service in 1994, under Public Act 09-221. Encompassing 35 municipalities (26 in Connecticut, including the Town of Killingly) and approximately 595,000 acres of land in northeastern Connecticut and south-central Massachusetts, the Last Green Valley was designated to preserve the region's cultural, historical, and natural heritage. As shown in Figure 3, the entire 5-mile radius lies within the Last Green Valley. Four state parks associated with the Last Green Valley are located in the Town of Killingly, however, all are located more than 5 miles from the KEC Site.

[1] Wyndam Land Trust, Inc. Tucker Preserve. May 1, 2016. http://www.wyndhamlandtrust.org/preserves/preserves_dunn.html



Legend

- Stack Location
- Interstate/Highway
- Local Road
- Railroad
- Waterbody

N

0 500 1,000 Feet

Figure 1
Project Site

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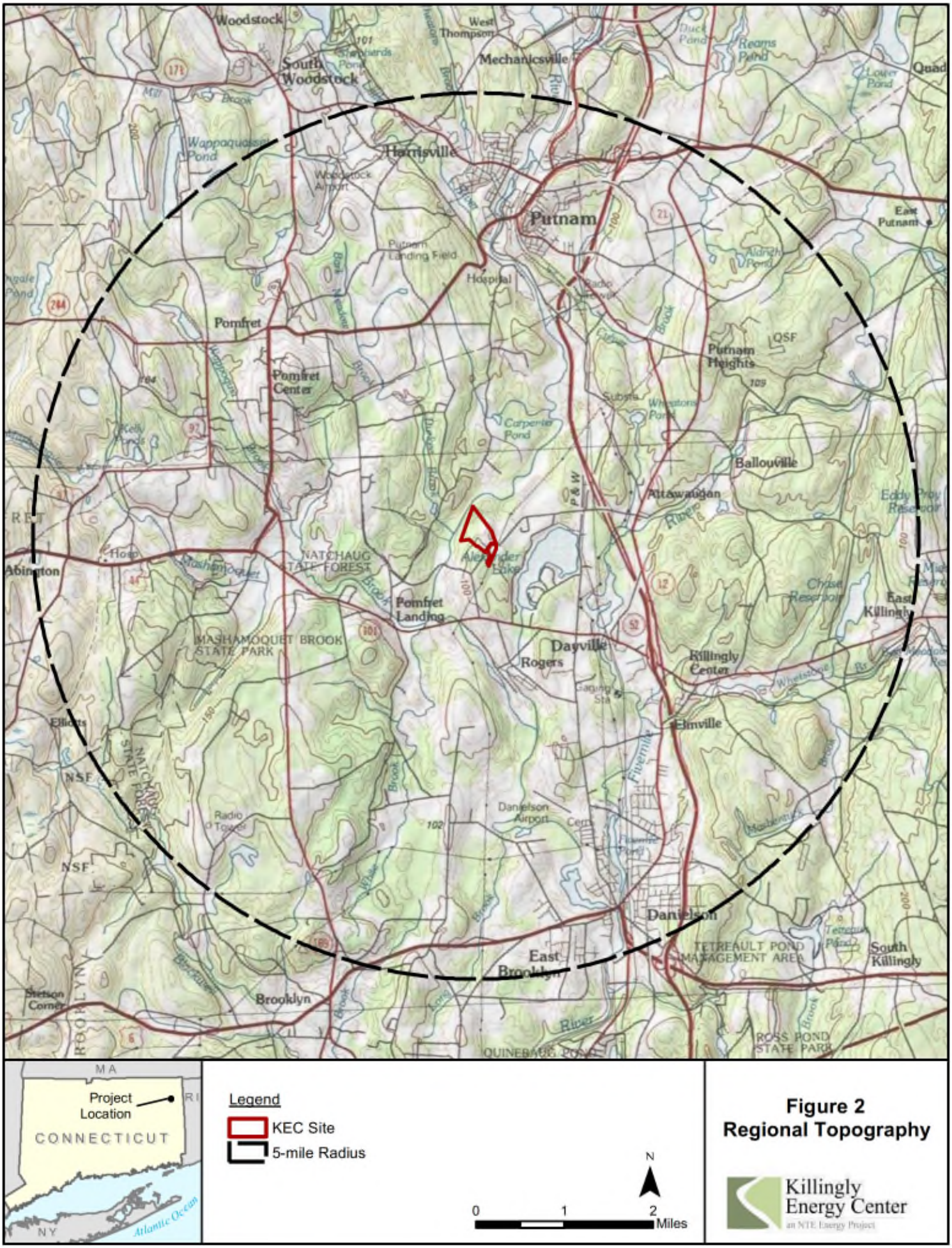

Figure 2
Regional Topography

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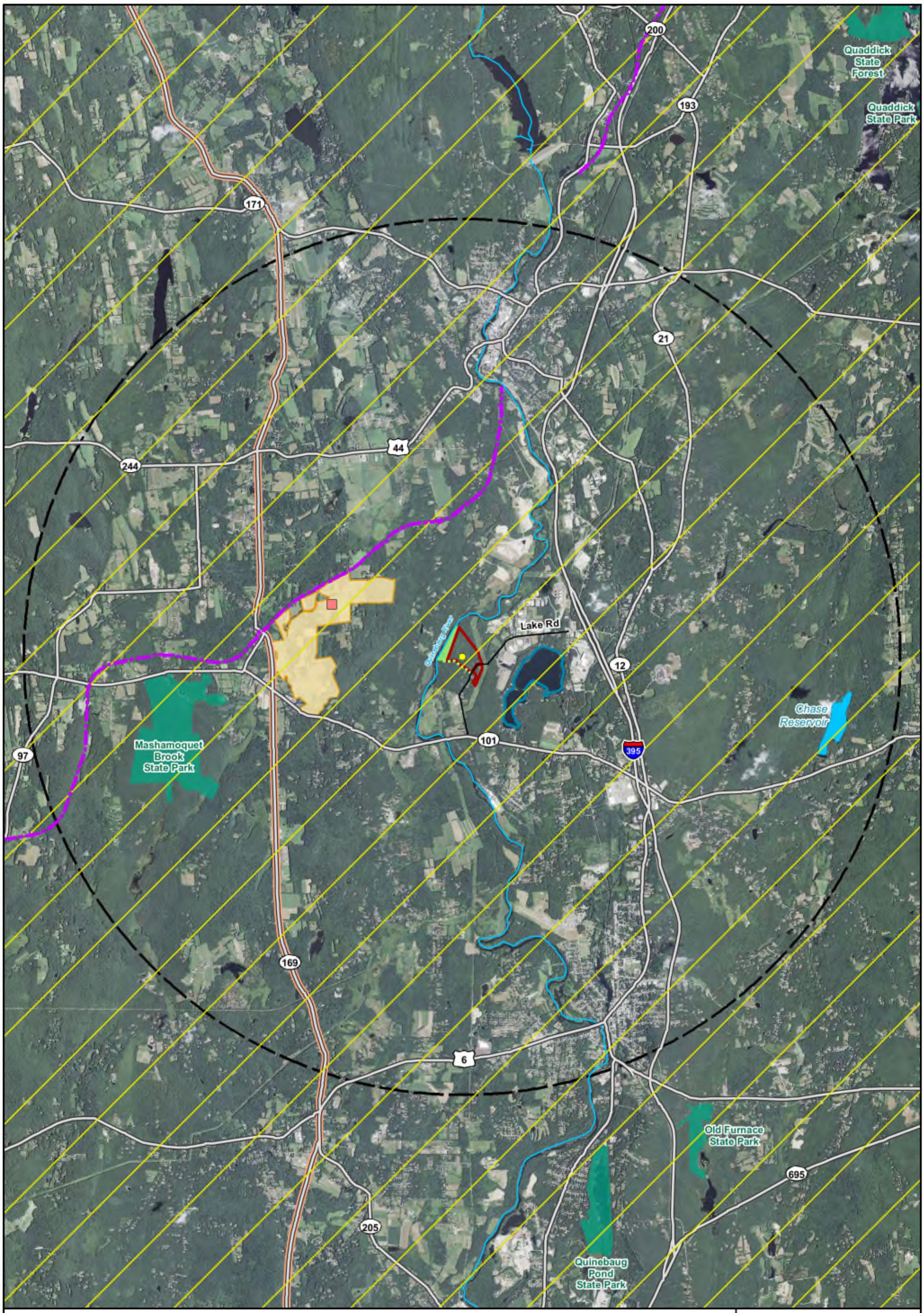

Figure 3
Key Aesthetic Features

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Portions of three municipalities are encompassed within the 5-mile radius: the KEC Site lies within the Town of Killingly, which is located south and east of the Quinebaug River. The Town of Pomfret is located north and west of the Quinebaug River, northwest of the KEC Site; and the Town of Putnam is located east of the Quinebaug River, northeast of the KEC Site.

As shown in Figure 1, the only major transportation corridor within the 5-mile radius is I-395, a 4-lane, divided highway extending in a generally north-south direction approximately 1.25 miles east of the KEC Site. This highway includes two areas (approximately 1.4 miles east of KEC) designated by the Connecticut Department of Transportation and purchased under the Federal Highway Beautification Act of 1965 within which billboards or other such structures or facilities are prohibited. State Route 101 extends in an east-west direction approximately 0.75 mile south of the KEC Site. Closer to I-395, State Route 101 is densely developed with businesses and residences, while further west the development density decreases. Approximately 2 miles west of KEC, State Route 169 extends in a generally north-south direction (Figure 3). An approximately 32-mile portion of State Route 169 (from Rocky Hollow Road in Lisbon to the Massachusetts border in Woodstock) is designated as a National Scenic Byway primarily for its scenic qualities as a winding country road, lined with stone walls and vistas of farmland and quintessential New England villages.

Land use in the Town of Killingly transitions from the industrial development in the northwest corner, near the KEC Site, to a more open landscape in the south and east. Commercial and residential development increases along the major roadways, with the majority of the town characterized by dense forest and scattered residences. In the Town of Pomfret, residential density decreases, with a greater percentage of open fields and woodlands. The Town of Putnam is also characterized by scattered residences and woodlands, although portions to the east have industries associated with existing and former mining and other industrial operations.

Most of the 5-mile radius is forested, with a dense mixture of evergreen and deciduous trees. This dense vegetation, coupled with the undulating terrain, significantly limits the locations within the 5-mile radius that have expansive views. In fact, visual line-of-sight is often interrupted by vegetation immediately proximate to viewers, giving many areas a limited vantage.

3.0 VISUAL CHARACTERISTICS OF KEC

The KEC Site is designated (in the 2010-2020 Plan of Conservation and Development) for future industrial use consistent with the existing industrial development present to the east. The Generating Facility Site, located north of Lake Road, is currently undeveloped, with the exception of its single residence and related features. The KEC Site is predominantly forested, with dense tree growth around the perimeter, and less dense and small diameter tree growth in the interior. Clearings associated with the residence and prior farming activities are located along Lake Road, although a line of trees exists around all but approximately 50 feet of the Lake Road frontage. On the Switchyard Site, the existing developed areas are located proximate to Lake Road, and open land exists in the northeast corner, adjacent to the existing transmission line corridor.

Figure 4 provides a rendering of KEC. The largest elements of KEC will be the turbine generator building (91 feet above ground level), the heat recovery steam generator (HRSG) enclosure (95 feet above ground level), the 115-foot tall air-cooled condenser (ACC), and the 150-foot tall exhaust stack. Other features, including tanks, smaller buildings, and electrical and gas compression equipment, will be smaller in scale.

The 150-foot stack, the tallest feature of KEC, will be located in the north-central portion of the layout, which (in order to avoid impact to wetlands) will be located just to the southwest of the center of the Generating Facility Site. The stack will be a neutral color steel construction and will include a galvanized test platform. It is not anticipated that navigation lighting will be required by the Federal Aviation Administration (FAA), although review is still pending; should lighting be required by the FAA, a stack lighting platform would be incorporated to support a dual lighting system that would result in red lighting at night and medium intensity white lights during the day. If the FAA does not require lighting for safety purposes, stack lighting will not be installed. Navigation lighting has not been required for the Lake Road Generating facility or on the adjacent electric transmission line structures.

The HRSG extends between the stack and turbine building, with the ACC located east of the stack and north of the turbine building. Structure walls will be insulated metal siding supported on a steel frame. The ACC structure consists of a large bank of fans on a steel support structure. Although no building enclosure is associated with the ACC, the fan bank itself represents a solid visual element at the top of the ACC.

Ancillary buildings, equipment, and storage tanks will have an industrial appearance, but will be considerably smaller than the main structures. None of these elements are anticipated to affect KEC's potential for visual impact on the surrounding area.

Electrical equipment on the Generating Facility Site will be located in the southerly portion of the KEC layout, and overhead electrical lines will extend across Lake Road to the Switchyard Site. Within the Switchyard Site, electrical lines will connect into the proposed Switchyard and, from there, interconnect with the existing 345-kilovolt (kV) electric transmission circuit.

A key design goal of the KEC is to maintain as much of the existing vegetation as possible. The Generating Facility Site has substantial wooded vegetation, with only the southeastern corner near Lake Road unscreened by trees. The Switchyard Site is more open along Lake Road, but much of the Switchyard Site is also heavily forested. Although clearing will be required around KEC and for the proposed temporary work spaces, an approximately 50-foot wooded buffer will be maintained. Landscaping is planned around the entrance, near the front of the administration building, and near the associated visitor parking area. There will also be landscaping planned along the frontage of the Switchyard Site.

Lighting for KEC will be designed to have minimal impact on the surrounding community while providing for safe operations. 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:

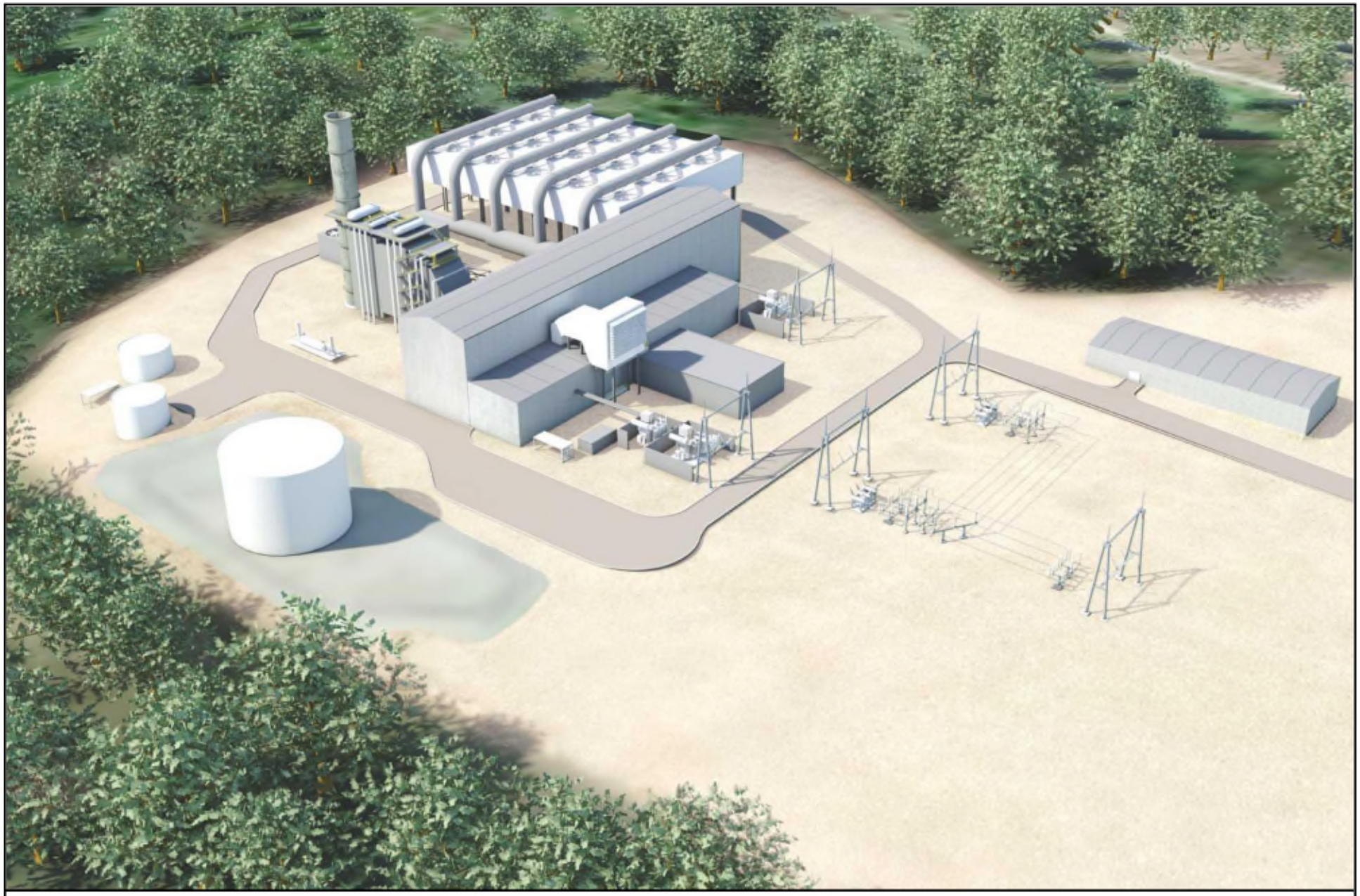

Figure 4
KEC Rendering

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- 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, continuous emission monitoring system 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.
- Electrical switchyard – 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 switchyard. Switchable task-specific lighting will be provided for nighttime maintenance only.

4.0 VIEWSHED ANALYSIS

The viewshed analysis considered key aesthetic resources located within the 5-mile radius that may be especially sensitive to visibility; the extent to which existing terrain and vegetation prevents views toward KEC; and the landscape patterns and anticipated uses of locations in the surroundings. Based upon this information, representative locations were selected for conducting specific visibility impact assessment. A description of this process is provided in the following sections.

4.1 KEY AESTHETIC RESOURCES

As noted above, Figure 3 illustrates the Quinebaug River and the Dunn Preserve; Alexander Lake; State Route 169; the Airline North State Park Trail; Mashamoquet Brook State Park; Chase Reservoir; and the Bafflin Sanctuary. Each of these have been identified as key aesthetic resources within a 5-mile radius of the KEC stack that may be especially sensitive to changes in view. Each is briefly discussed in greater detail below:

- Quinebaug River: A 69-mile long river originating in Sturbridge, Massachusetts and flowing into the Shetucket River, northeast of Norwich, Connecticut, the Quinebaug River runs north-south, dividing the 5-mile radius area in half. Most of the river located within the 5-mile radius is designated as a National Recreational Trail by the National Park Service; this designation requires suitable boating access points, as well as places ashore for camping and picnicking. In the vicinity of KEC, the Quinebaug River is approximately 170 feet wide and lined with tall, dense vegetation. No official boating access point or campground is proximate to the KEC Site.
- Dunn Preserve: The 32-acre Dunn Preserve, owned by the Wyndham Land Trust, extends for approximately 2,000 feet along the eastern bank of the Quinebaug River. An accessway extends northwest off Lake Road, forming the southwestern boundary of the Generating Facility Site. Although parking is not available, the Dunn Preserve is open to the public and, therefore, would likely host recreational uses for whom the view would be a component of their experience.
- Alexander Lake: An approximately 200-acre private lake located in the northwestern corner of Killingly, Connecticut, Alexander Lake is utilized for swimming, boating and fishing, and each spring the lake is re-stocked. Residential development exists along the vast majority of the shoreline, with a private beach on the eastern shore. The use of kayaks, canoes, sail boats, motor boats (electric only), and jet skis are permitted. The visual setting would be a component of the recreational and residential uses occurring at the lake.
- State Route 169: An approximately 32-mile stretch of State Route 169 (from Rocky Hollow Road in Lisbon to the Massachusetts border in Woodstock) has been designated as a National Scenic Byway for its scenic quality as a winding country road, lined with stone walls and vistas of farmland and quintessential New England villages. Scenic quality is, therefore, a key attribute to maintain along this roadway corridor.
- Airline North State Park Trail: The Airline North State Park Trail is a rail trail and linear state park located on the historic Airline Railroad. This 50-mile, multi-use trail was declared a national recreational trail in 2001. The Airline North State Park Trail is a recreational component of the Last Green Valley. As a rail trail, views are more typically limited to within the actual trail corridor, but are an aspect of its use and enjoyment.
- Mashamoquet Brook State Park: The Mashamoquet Brook State Park is a 900-acre, publicly owned recreational area located in the Town of Pomfret. The park offers facilities for camping, swimming, fishing, and picnicking. Notable features include the Wolf Den national historic site, the Brayton Grist Mill, and the Table Rock and Indian Chair natural stone formations.

- Chase Reservoir: The 365-acre Chase Reserve is a nature preserve located in East Killingly. The preserve is open to the public for hiking, fishing (from non-motorized boats), kayaking, and canoeing; however, hunting and swimming are prohibited.
- Bafflin Sanctuary: The 702-acre Bafflin Sanctuary, located in Pomfret, Connecticut, was historically a working dairy farm, and is now the location of a Connecticut Audubon Society center. The property is designated an Important Bird Area, and contains beaver ponds, grasslands, a hemlock ravine, and walking trails.

These areas received special consideration in the selection of potential vantage points for simulations, as further informed by the considerations addressed below.

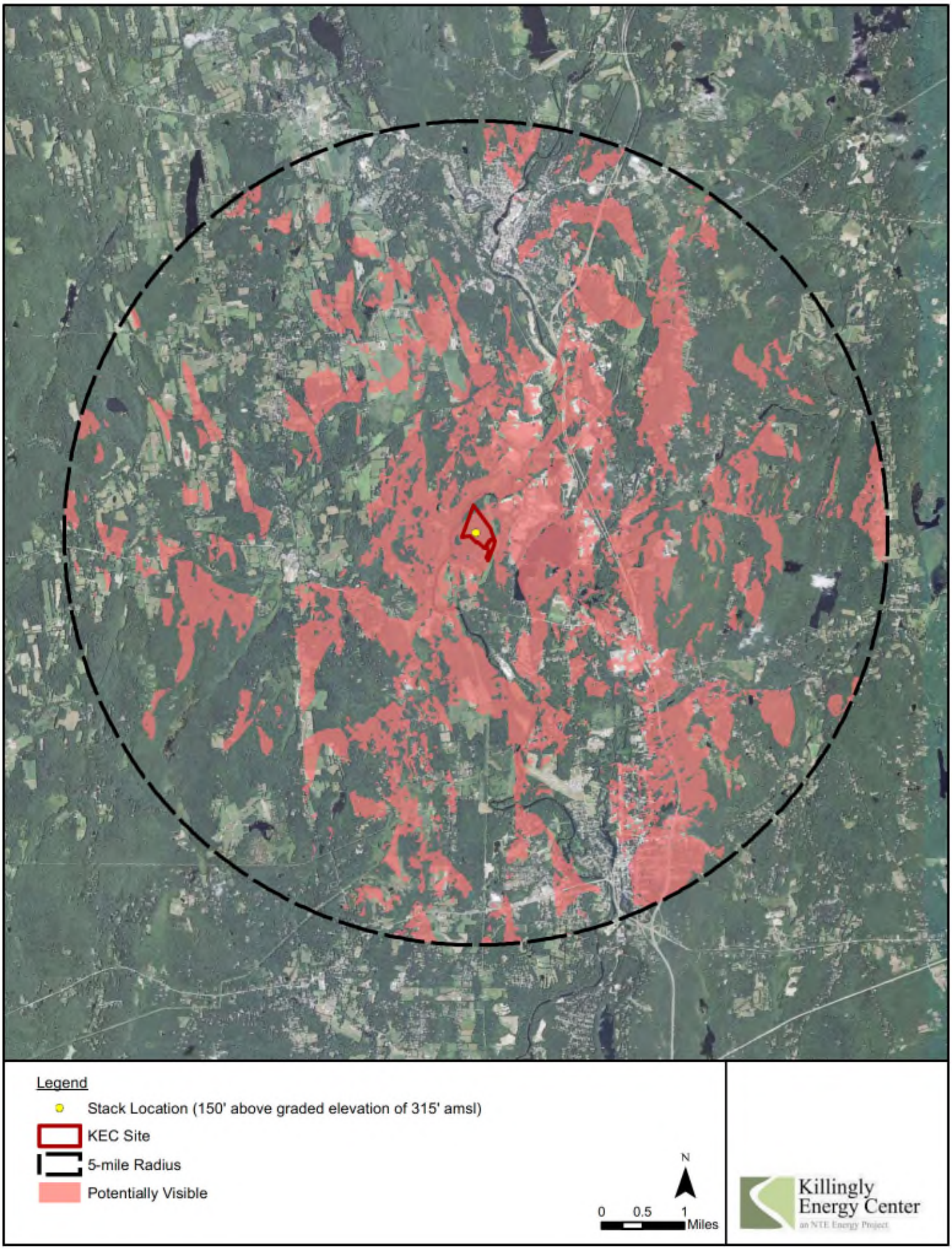
4.2 AREAS OF POTENTIAL VISIBILITY

In addition to identifying key areas of potential visual sensitivity, the potential for visual change within the entire 5-mile radius was also considered. Computerized methods were used to identify areas from which the KEC stack (as the tallest element) might be visible. This was done by creating a digital elevation model of the area based on United States Geologic Survey (USGS) terrain data. Using the visibility function within the computer modeling Viewshed Tool in Arc GIS, the areas from which the top of the stack (150 feet above the proposed base elevation of 315 feet amsl) could potentially be seen were identified.

Figure 5 illustrates the visual screening effect of terrain only, without taking vegetation into consideration. The undulating terrain surrounding KEC eliminates the potential for views from nearly 75 percent of the 5-mile radius. However, this approximation still vastly overstates the potential visibility, since the significant tree cover in the area is not considered.

To account for additional screening effects from vegetation, the approximate extent of forested areas was identified through the use of 2011 Land Cover Data provided by the USGS National Land Cover Database, supplemented by aerial interpretation of Google Earth imagery. This evaluation assumes that KEC would not be visible from any location where line-of-sight would be blocked by intervening vegetation. It is possible that steep terrain changes or clearing since 2011 may provide isolated additional views of KEC; it is also possible that additional screening may exist that was not reflected in the available mapping. For example, the potential screening associated with vegetation did not take into account the more narrow bands of trees that exist along many of the local roadways, which could afford additional screening beyond that reflected in this modeling analysis. Mature forest areas were assigned a conservative vegetation height (60 feet) based on local assessment. Figure 6 shows the resulting analysis of location of potential visibility considering both terrain and vegetation. This analysis results in an additional 23 percent of the 5-mile radius being unlikely to have a potential view of the KEC stack, leaving approximately 2 percent of the 5-mile radius with potential visibility when considering both terrain and vegetation. Although visibility potential when considering the effect of trees can generally be considered greater during winter leaf-off conditions, in this vicinity, the presence of evergreen trees and the density of the wooded areas is anticipated to provide strong visual buffering during all seasons.

Figure 7 illustrates, for the 5-mile radius, distances considered by United States Forest Service (USFS) visual assessment methodology to be the areas from which views would be considered to be in the foreground, middleground or background. These “distance zones” provide a frame of reference to classify the degree to which the details of the viewed element would be factors in assessing potential visual impact. The “foreground” area, identified as occurring from 0 to 0.5-mile from KEC, is considered to be a location from which KEC elements would be visually clear, if visible. “Middleground” views are considered by the USFS methodology to be from 0.5-mile to 4 miles; from such a distance, a viewer would still have the potential to identify individual forms and would have the potential to observe some texture and color as well. From distances greater than 4 miles, views would be considered “background,” where texture and color would be lost and only land use patterns would be likely


Legend
Stack Location (150' above graded elevation of 315' amsl)
KEC Site
5-mile Radius
Potentially Visible
N
0
0.5
1
Miles
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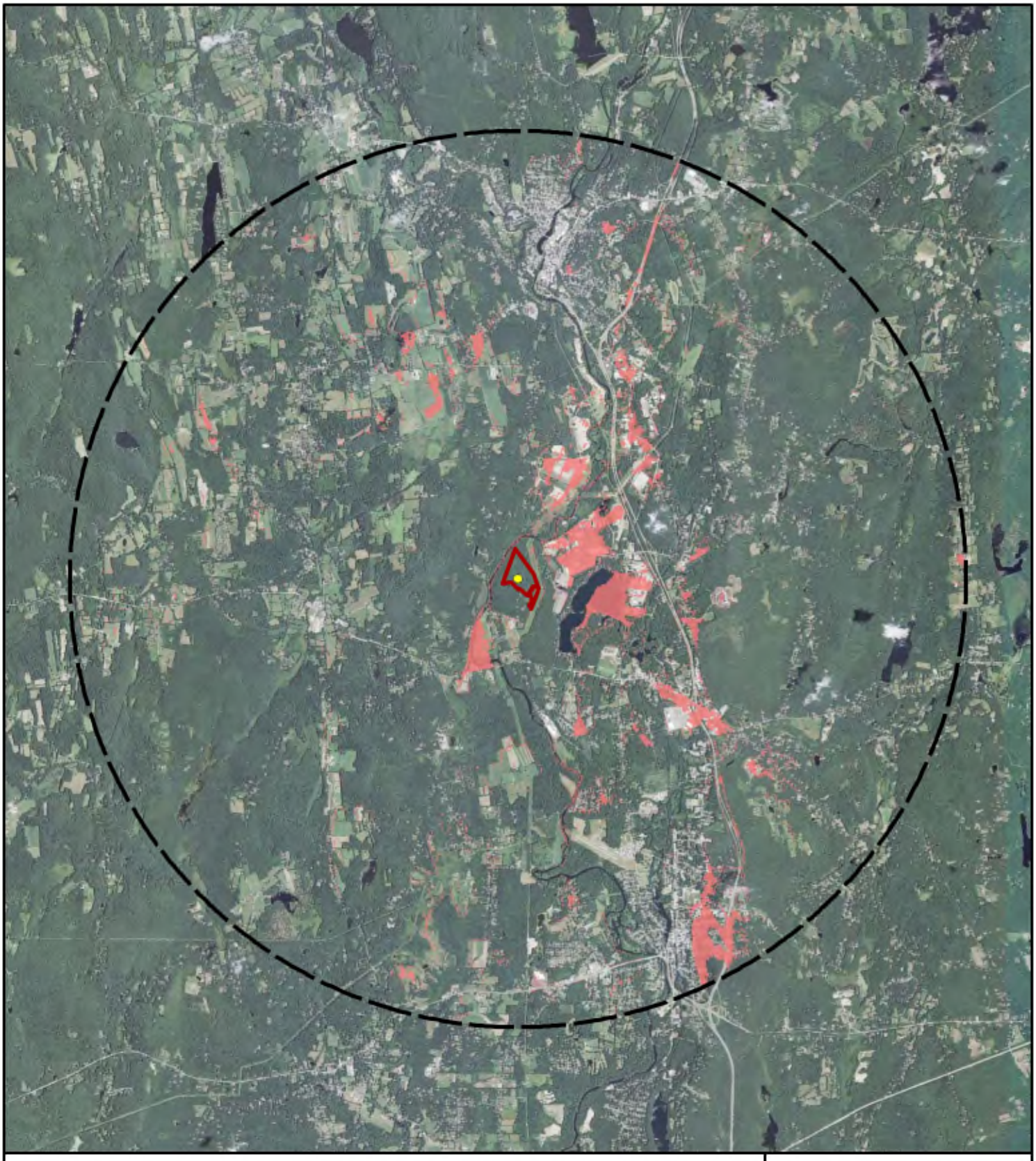
Legend
Stack Location (150' AGL)
KEC Site
5-mile Radius
Potential Visibility*
N
0
0.5
1
Miles
Killingly
Energy Center
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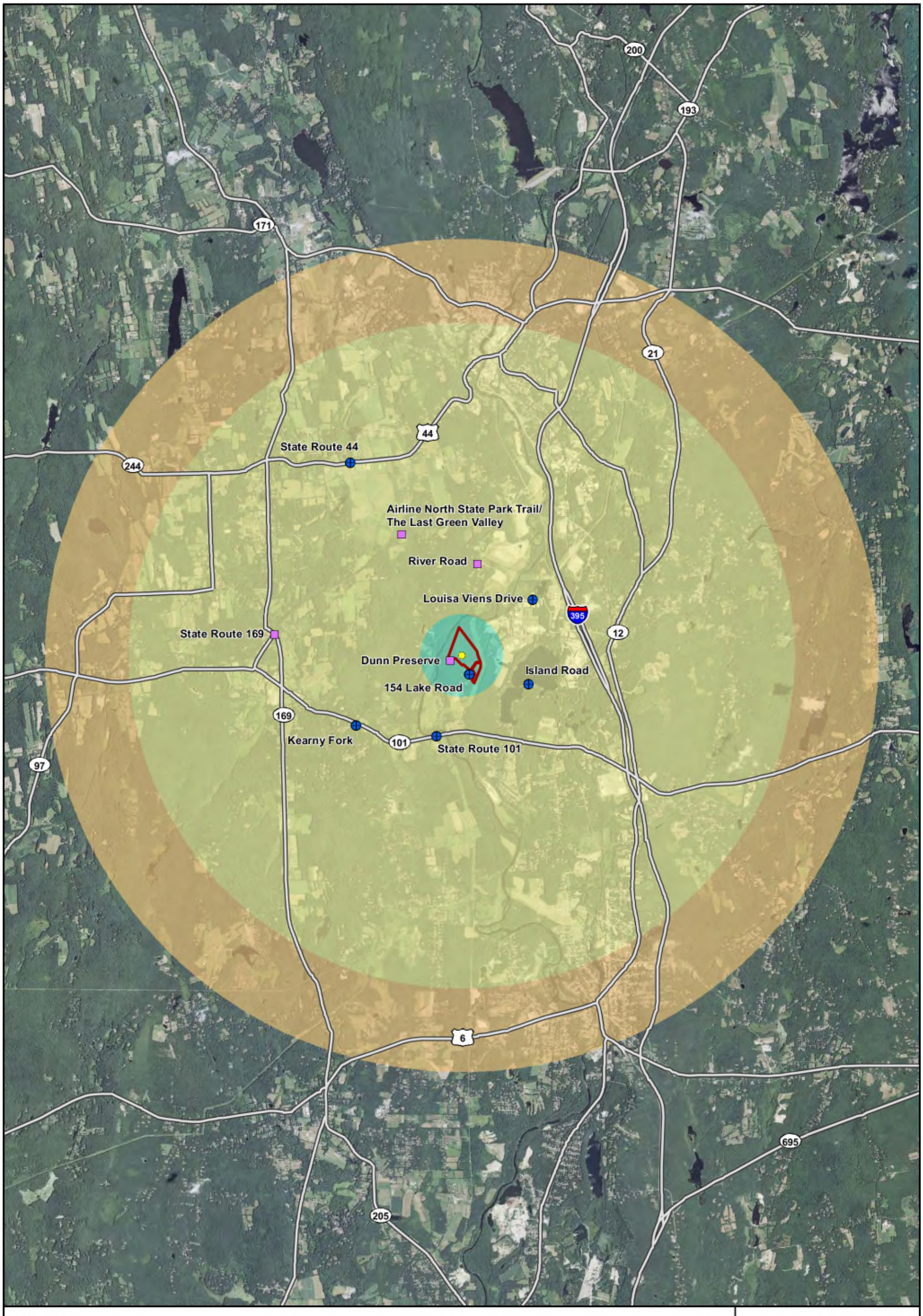

Figure 7

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distinguishable. These distance zones were considered in the selection of potential viewpoints for assessment, focusing on location only within the foreground or middleground zones.

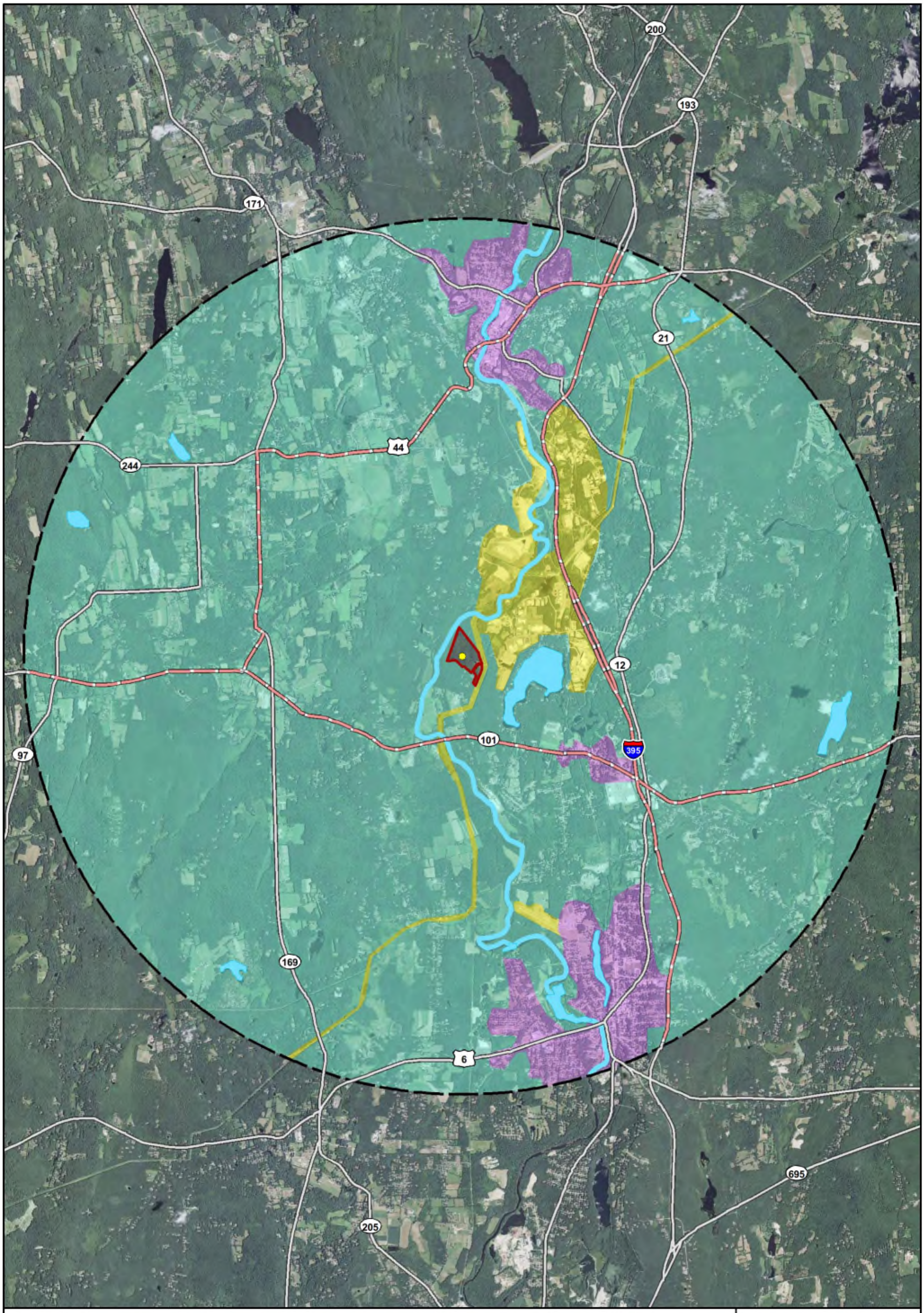
4.3 LANDSCAPE SIMILARITY ZONES

Within the 5-mile radius, discrete landscape similarity zones were also identified (Figure 8). These zones were determined based on a review of topography, vegetation, water, land use, and user activities. The identified landscape similarity zones are described below.

- Industrial Zone: Industrial development dominates the area east of the Generating Facility Site. This zone was not considered to have high visual sensitivity to KEC.
- Highway Commercial Corridor: The primary transportation corridor within the 5-mile radius is I-395, located approximately 1.25 mile east. State Route 101, located approximately 0.8 mile south of the KEC Site, is another heavily-used transportation corridor with a combination of commercial and residential land uses. State Route 169 is located approximately 2 miles west of KEC and was also considered; although not heavily commercially developed, it reflects a major local road and a sensitive visual resource due to its designation as a National Scenic Byway. As shown in Figure 6, due to the frequency of road-side vegetation, most views along these transportation routes appear to be screened.
- Open Water: The Quinebaug River, located northwest of KEC, and Alexander Lake, located to the east, are both large open water bodies located within the 5-mile radius. These features offer recreational activities, such as swimming, fishing, and boating. Both resources are located at a significantly lower elevation than KEC, and are lined with tall, dense vegetation and bordering steep hills that help contribute to visual screening. Other open water areas within the 5-mile radius include Five Mile Pond, located 3.2 miles south of the KEC Site, and Chase Reservoir, located 4 miles east of the KEC Site. Several tributaries and offshoots of the Quinebaug River traverse the 5-mile radius, including Carpenter Brook, Wolf Den Brook, and White Brook.
- Village/City: Within the 5-mile radius there are several areas of dense residential settlement, designated for this assessment as village/city, such as the centralized downtown areas of Killingly and Putnam, and the Village of Dayville. Located more than 1.2 miles southeast of KEC, the Village of Dayville is the closest dense residential center. Views from this area are already industrial in character, with large facilities, such as Lake Road Generating and Frito-Lay Inc., as well as I-395, within the existing viewshed.
- Rural Residential: The remaining portions of the 5-mile radius are classified as rural residential, with residences and other uses occurring along local roadways interspersed with open or wooded undeveloped areas. Although some residences are surrounded by open fields, most are situated amidst densely wooded areas. As indicated in Section 4.2, this dense vegetation provides considerable screening of potential views towards KEC.

4.4 VIEWER GROUPS

Based on the field survey and desktop data review, possible viewer groups within the 5-mile radius were identified. These groups were determined based on the frequency and duration of exposure to views of KEC, the viewer's position in the landscape, and the viewer's activity and presumed sensitivity to changes in the visual landscape. The existing industrial setting adjacent to KEC's proposed location is an existing visual element in the landscape that is currently experienced by all viewers. Viewer groups identified are described below.



Legend

- Stack Location
- KEC Site
- 5-mile Radius
- Highway Commercial Corridor
- Industrial
- Rural Residential
- Village/City
- Open Water

N

0 0.5 1 Miles

Figure 8
Landscape Similarity Zones

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- Local Residents: Local residents have views that are likely to be stationary. They have knowledge of the local landscape and are sensitive to alterations to particular views that are important to them. The population density of viewers within 5 miles of KEC is variable, with higher population density found in the centralized downtown areas of Killingly and Putnam and in the Village of Dayville, as well as around Alexander Lake, and an extremely low population density in the remaining area.
- Through Travelers: These individuals are travelling through the area on local roadways and along I-395 and State Routes 101, 44, and 169. These viewers, because they are driving, are typically focused on the road and immediate surroundings and would experience only transitory views of their surroundings. Consequently, their views of the surrounding landscape will generally be peripheral and relatively brief in duration.
- Tourists and Seasonal Residents: Drawn to the area specifically to enjoy the recreational and scenic resources associated with the region, many tourists and seasonal residents may have a high sensitivity to a change in the visual quality and landscape character, depending upon the specific activities in which they are engaged. Alexander Lake has a seasonal residential community, with many homes around the lake only occupied during the summer months.
- Recreational Users: These individuals may include the tourists and seasonal residents noted above, but would also include local people involved in outdoor recreational activities. Outdoor recreational activities within 5 miles of KEC include boating, fishing, hunting, hiking, and bicycling. Although sensitivity of these users to visual changes is variable, to some, visual quality is an important part of the recreational experience. Recreational features within proximity of KEC include: the Quinebaug River, the Dunn Preserve, State Route 169, Airline North State Park Trail, Mashamoquet Brook State Park, Chase Reservoir, and Bafflin Sanctuary. Parks, reservoirs, and other recreational areas are also scattered throughout the area. Alexander Lake is not considered a public recreational feature as it is a private lake and not open to public recreational users; however, it is classified within the category of tourists and seasonal residents, for whom the recreational aspect also has high importance.

4.5 SELECTED VIEWPOINT LOCATIONS

The goal for selecting visual receptor locations was to ensure views from a variety of directions and distances that would represent the closest potential views of KEC, taking into consideration various uses and potential viewers within the area. Viewpoint locations were selected based on the following criteria:

- Representative locations indicated to have direct line-of-sight views;
- Significance of viewpoints;
- Level of viewer exposure (frequency and number of viewers); and
- Existing and proposed land uses.

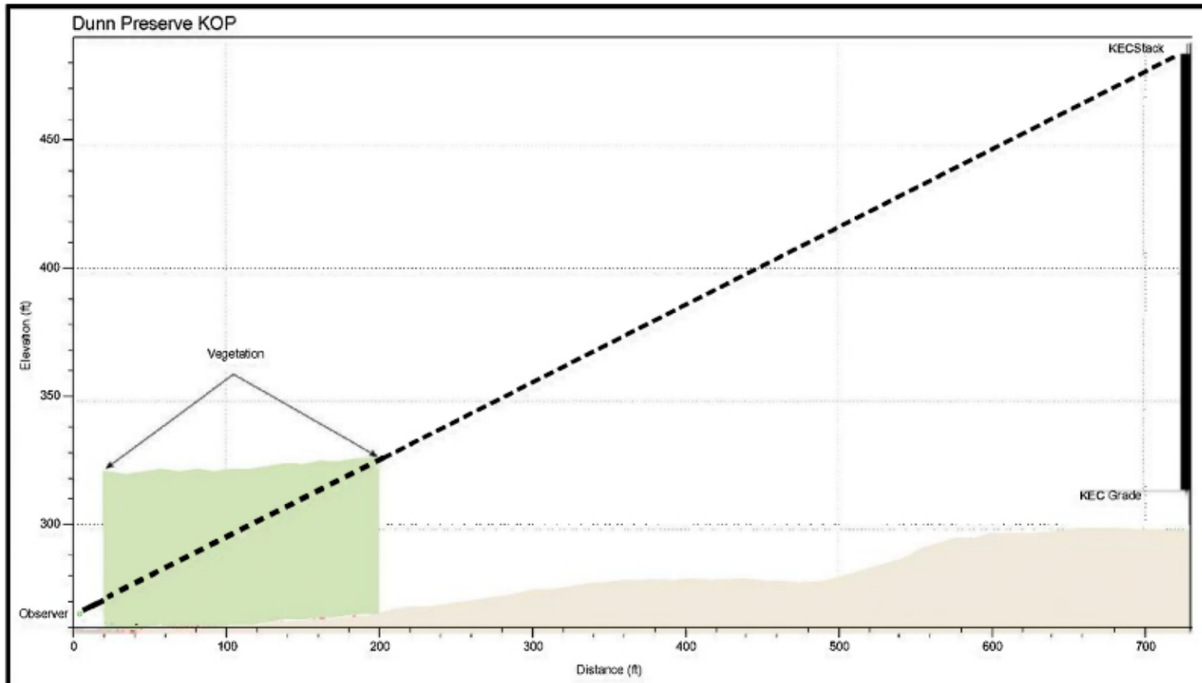
Several locations were considered but not selected for various reasons. A line-of-sight drawing was generated for each of these considered locations as confirmation for not carrying them forward for visual simulations. These line-of-sight drawings incorporated USGS topographic data and assumed a 60-foot vegetative height, using aerial imagery to approximate the location of vegetation.[2] A 6-foot tall viewer was placed at the viewpoint, and the 150-foot tall KEC stack was placed in the location where it is proposed at the planned base elevation of 315 feet amsl. By considering a line drawn from the viewer to the top of the stack, and the extent to which intervening terrain or vegetation would interrupt that view, a determination can be made as to whether additional simulations would be

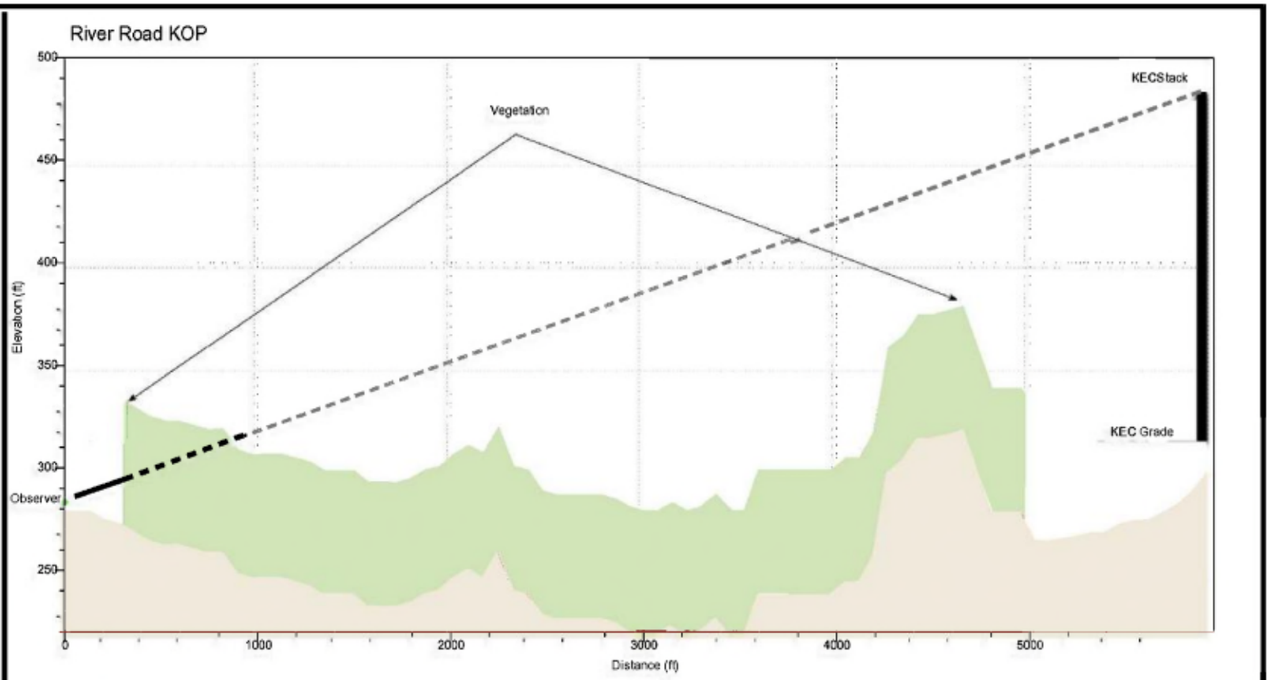
[2] Approximate vegetation is only shown as it relates to the observer's line-of-sight. Additional vegetation may exist, but does not directly impair the view and is, therefore, excluded from the drawing.

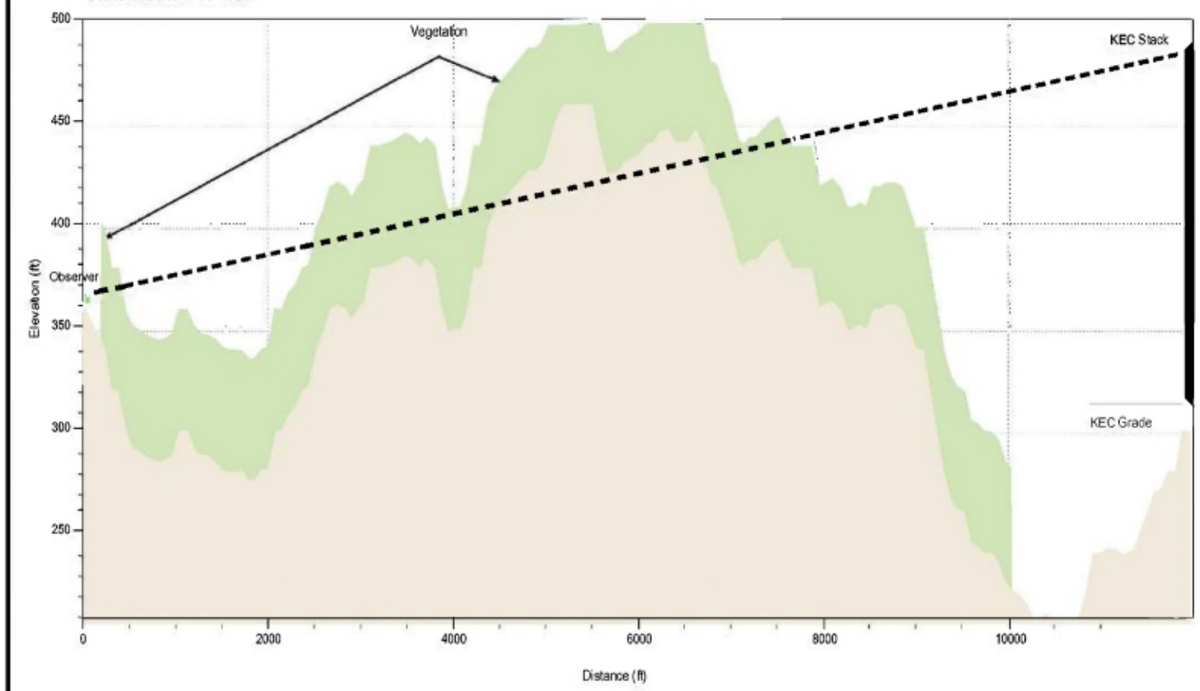
meaningful. The line-of-sight drawings for each of the considered, but not selected, viewpoints are provided in Figure 9, and discussed below.

- Dunn Preserve: The 32-acre Dunn Preserve, owned by the Wyndham Land Trust, extends for approximately 2,000 feet along the eastern bank of the Quinebaug River. An access road extends northwest off Lake Road, forming the western boundary of the Generating Facility Site. Dense vegetation is the dominant feature along the access road and conservation area. Limited parking is available via a small pull-off area adjacent to Lake Road; however, the Dunn Preserve is open to the public and, therefore, hosts recreational viewers. Although located adjacent to KEC, due to the dense vegetation and steep topography, views will be screened. As shown on Figure 9, an observer on the Dunn Preserve would be surrounded by tall, dense vegetation, which would significantly screen any view of KEC. Even with the clearing of some vegetation in order to accommodate KEC construction, views from the Dunn Preserve and access trail will remain screened by the remaining vegetation. Therefore, another proximate location (154 Lake Road) was selected to represent adjacent views of KEC.
- River Road: Located due north of KEC, River Road was considered to represent local residential views from the north. As shown on Figure 9, tall, dense vegetation will significantly screen the view of observers on this roadway. Since only scattered residences are located throughout the area north of KEC, and dense vegetation lines the crisscrossing country roads, this location was not selected.
- State Route 169: Approximately 32 miles (from Rocky Hollow Road in Lisbon to the Massachusetts border in Woodstock) of State Route 169 have been designated as a Scenic Byway. Although through travelers and recreational viewers may be common along this route, since this roadway is over 2 miles west of KEC and lined with tall, dense vegetation, KEC is not expected to be visible from this location. As shown on Figure 9, the intervening topography and tall, dense vegetation will significantly screen views from observers on this roadway. This view is also representative of the Mashamoquet Brook State Park, which lies over 3 miles west of the KEC Site, beyond State Route 169.
- Airline North State Park Trail/The Last Green Valley/Bafflin Sanctuary: The 50-mile, multi-use Airline North State Park Trail is part of the 595,000-acre Last Green Valley. The Airline North State Park Trail runs generally east-west, with the closest point located approximately 1.8 miles northwest of KEC. In most locations, the trail lies amidst tall, dense vegetation, with only the trail itself cleared. As shown on Figure 9, observers on this trail will be surrounded by tall, dense vegetation that significantly screens distant views. The Bafflin Sanctuary is also located in this general direction, and was not selected due to the significant forest cover associated with this facility. Therefore, other locations, such as State Route 44, were selected to represent views from the north.

At each of the selected locations, photographs were taken, using a standard (35 millimeter) lens. All views were focused toward the Generating Facility Site, where the tallest elements of KEC will be located, but the simulations incorporated all KEC-related structures. The selected locations are mapped on Figure 7 and described as follows:







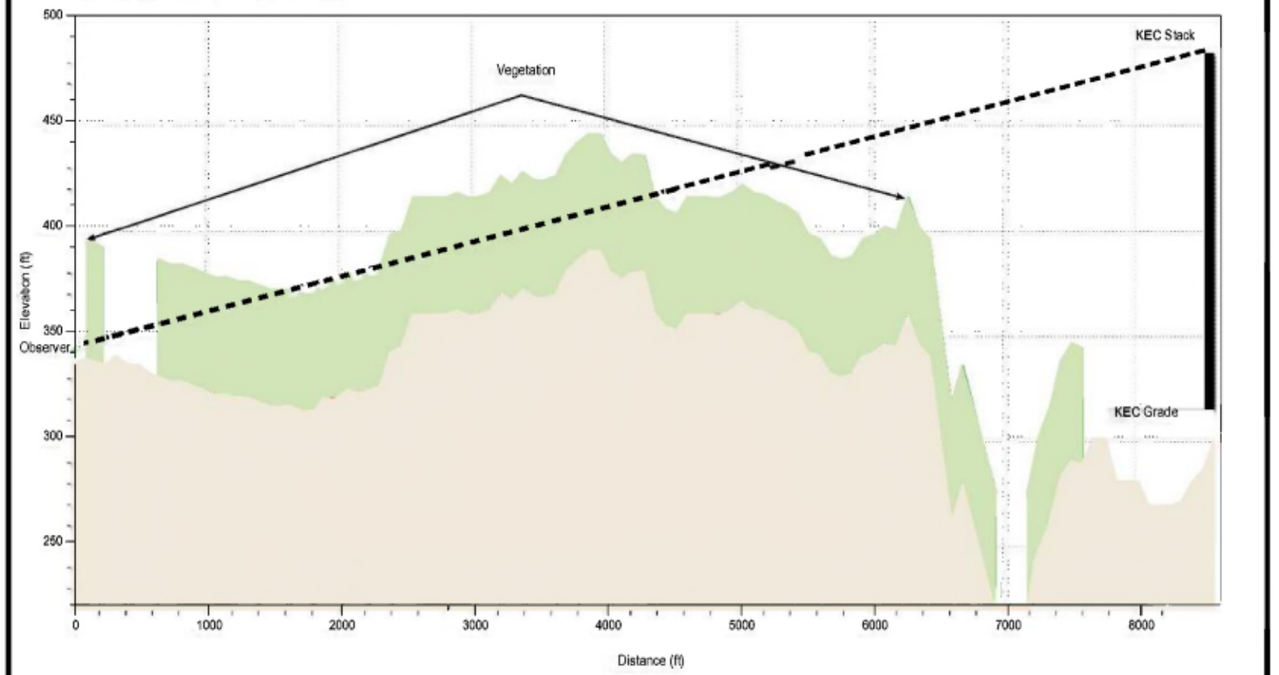


Figure 9.
Line-of-Sight Views from Considered but Not Selected Viewpoints

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- 154 Lake Road is located at the southwestern corner of the Generating Facility Site, adjacent to the Switchyard Site. This residential property was selected to represent proximate views of KEC, such as those from Lake Road and the Dunn Preserve. Current views from this location, as shown on Figure 10, are dominated by the tall, dense vegetation that lines Lake Road.
- The Island Road location is in a direct line-of-sight to KEC, on the eastern side of Alexander Lake. This location is intended to represent views of KEC from the southeast, particularly as experienced by residents along the shore of Alexander Lake with this direct view. The view shown on Figure 11 is from the only location where views from the road were not blocked by existing structures. As seen in the figure, views to the west include the lake and residences along the opposite bank in the foreground, with a dense line of tall vegetation in the background. With nearly every lot developed along the lake, views in the remaining directions are dominated by other residences and associated structures. Although not shown in the figure (located further east and out of the photographed frame of reference), views from the lake, particularly for residences along the north side of Island Road, also include the three stacks associated with the Lake Road Generating facility that appear just over the treeline. This view is also representative of the Chase Reservoir, which lies 4 miles southeast of the KEC Site, although those views will be considerably more distant, with potentially greater vegetative and topographic screening.
- State Route 101, located approximately 0.8-mile southwest of KEC, represents potential views of KEC from the south, where both local residents and through travelers are expected. State Route 101 is a 2-lane road, running east-west from the border of Connecticut and Rhode Island to its intersection with State Route 169. Current views from this roadway toward the KEC Site are dominated by vegetation, with tall trees lining most of the road. The existing 345-kV transmission corridor lies in the foreground of Figure 12, as the lines cross State Route 101 in a generally north-south orientation.
- Kearny Fork provides a vantage toward the KEC Site from the southwest, representing views from both local residents and through travelers. As shown on Figure 13, current views from this location are dominated by tall, dense vegetation which lines the roadway. Where distant views are possible, several industrial elements, include the existing 345-kV transmission corridor, are visible.
- State Route 44 provides a vantage from the northwest, representing views from both local residents and through travelers. Although located over 2 miles from KEC and not indicating via the digital elevation model that views would be possible, this location was selected to represent views from the scattered open fields located throughout the Town of Pomfret, north of the KEC Site. As shown on Figure 14, current views show gently rolling terrain, with scattered areas of tall vegetation.
- Louisa Viens Drive provides a vantage from the northeast, representing views from within the Killingly Industrial Park, as well as through travelers along I-395. Although not considered a sensitive visibility area, this location was selected to represent views toward the KEC Site from the northeast. As seen on Figure 15, much of the area is developed, although landscaping has left some scattered vegetation. More distant views from this direction are dominated by industrial features of the Killingly Industrial Park, as well as the existing 345-kV transmission corridor, the Lake Road Generating facility, and I-395.

Figure 10
Photograph from 154 Lake Road - Existing Conditions

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Figure 11
Photograph from Island Road - Existing Conditions

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Figure 12
Photograph from State Route 101 - Existing Conditions

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Figure 13
Photograph from Kearny Fork - Existing Conditions

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Figure 14
Photograph from State Route 44 - Existing Conditions

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Figure 15
Photograph from Louisa Viens Drive - Existing Conditions

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5.0 IMPACT ON SELECTED VIEWSHEDS

During construction, any change in visual character will be temporary in nature, as the various phases of KEC construction occur over an approximately three-year period. Although cranes will be temporarily employed on the KEC Site, they will be viewed as linear elements extending along the tree line. The balance of the temporary construction activity will occur within the KEC Site and will be shielded from view. The focus of this assessment is, therefore, on the visual effect of KEC once constructed.

At least 50 feet of existing tree cover will be retained, where present, around the KEC Site following construction; in many locations the remaining tree cover will be considerably greater. Therefore, KEC will be well-screened by surrounding topography and vegetation, for all but the closest views. Even during winter months ("leaf off" conditions), vegetation in this area will provide significant screening of KEC, due to tree density and the mix of evergreen and deciduous trees.

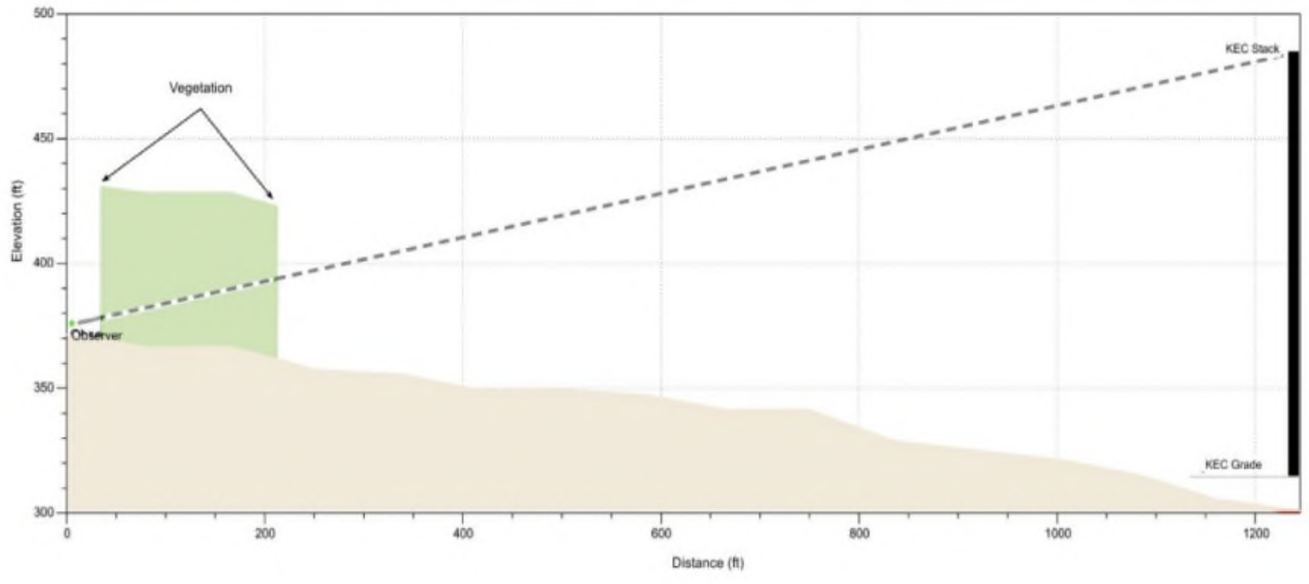
Landscaping will be incorporated at the KEC entrance, and the resulting visual character will be consistent with views of other industrial businesses that are seen by travelers along Lake Road. The main KEC structures will be set back from Lake Road approximately 600 feet, with the tallest structure (the 150-foot stack) viewed approximately 1,000 feet from the road and behind other shorter structures.

In order to evaluate the potential visual change to the surroundings associated with KEC, photographs were taken from each of the locations identified in Section 4.5 in a direction facing toward the Generating Facility Site. The photographs were taken in the spring, prior to the presence of leaves on deciduous trees (referred to as "leaf-off"); therefore, they reflect maximum visibility conditions. During "leaf-on" conditions, even greater levels of screening and decreased visibility would occur. Figures 10 through 15 provide existing condition photographs of the selected views.

Using the three-dimensional model of KEC created in Autodesk 3DS Max, positioned in space with the appropriate orientation and at the appropriate base elevations, simulations of the same views with KEC in place have been created; these are shown on Figures 16 through 21. Although the simulations do not indicate facility or stack visibility due to existing vegetation screening from these publicly accessible locations, it is anticipated that other locations will exist where the KEC stack will have the potential to be visible. However, the location and position of KEC relative to surrounding topography, vegetation, and other intervening structures often results in its limited visible elements blending into the backdrop of an industrial landscape or existing treetops (which are natural vertical elements).

A summary of KEC visibility from each simulated location is provided below. Line-of-sight drawings are also provided in each figure to provide additional context for the simulated views.

- The view from 154 Lake Road is directly adjacent to KEC. As shown on Figure 16, existing topography and dense vegetation will largely screen KEC from view. KEC has been designed to preserve at least a 50-foot buffer of vegetation around the KEC Site to maintain existing visual screening. Although not the case from this specific location, it is expected that, from some vantage points along Lake Road (particularly surrounding the entrance drive and the short stretch of frontage to the east that has limited existing tree line), KEC will be visible. KEC's structures, however, will be set back approximately 600 feet off Lake Road and will be framed by trees. This view is from an average elevation along Lake Road, with lower elevations to the east and higher elevations to the west. Although locations at higher elevations along Lake Road may have stacktop views, most residences are set back off the road and surrounded by tall vegetation. The new transmission lines that will extend overhead to cross Lake Road will be similar to many such features experienced along local roadways. Viewers represented by this location include passengers in vehicles driving along Lake Road, where views will be fleeting and observed within the context of the overall setting. Additionally, two homes are located on the north side of Lake Road to the east, approximately 2,000 feet from the Generating Facility Site, and nine residences are located on Lake Road within approximately 1,500



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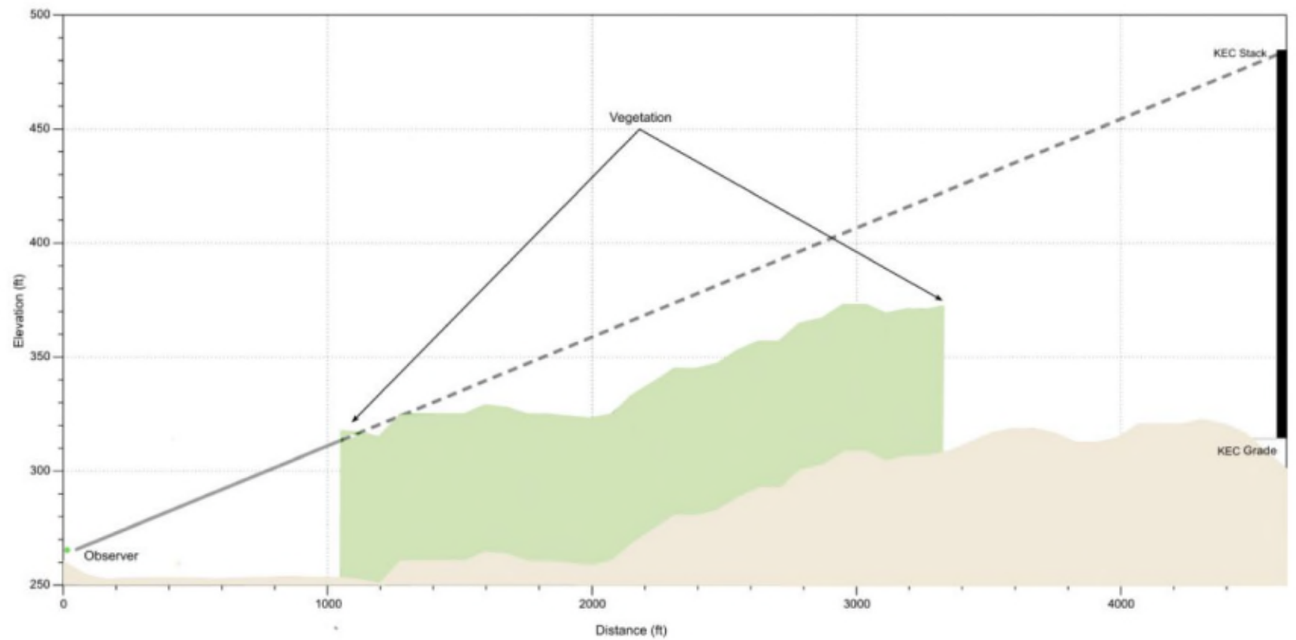

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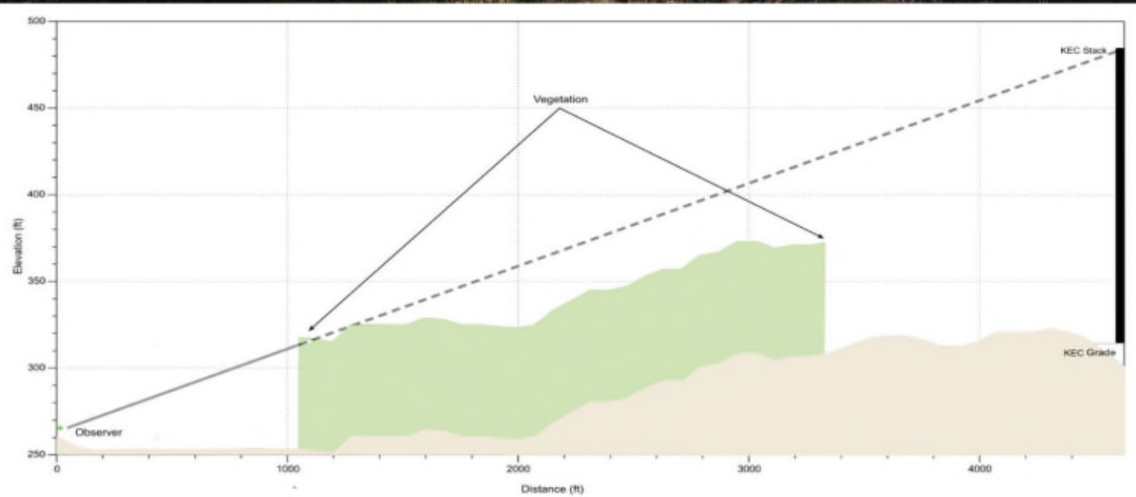
Top of Stack Behind Treeline



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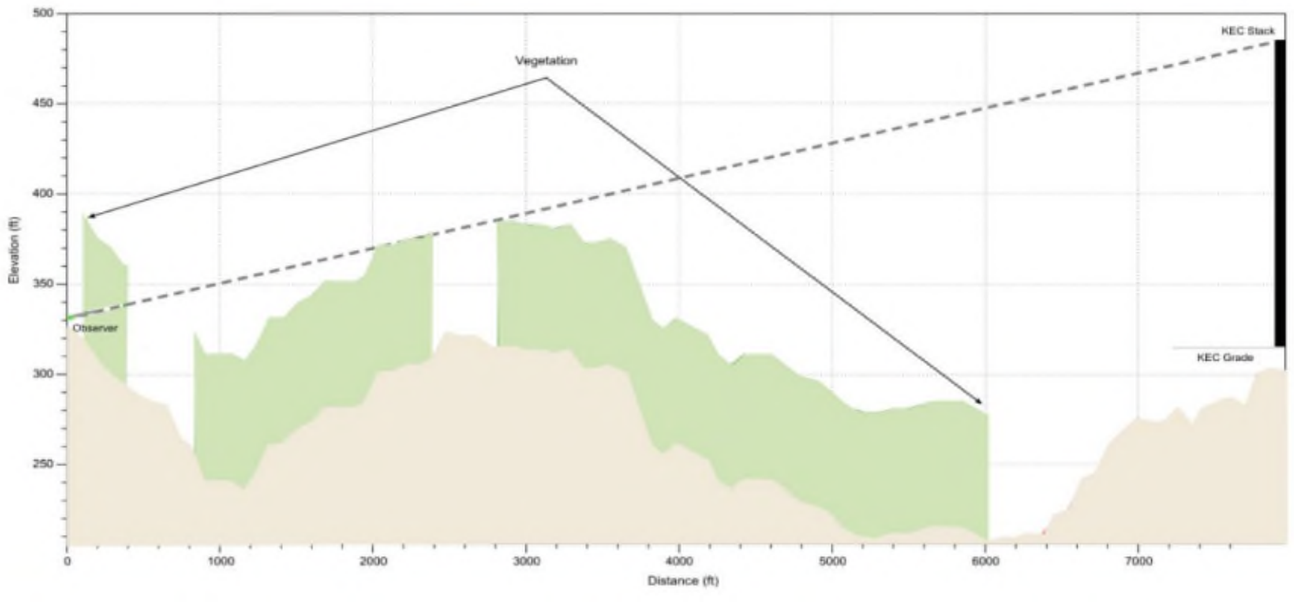

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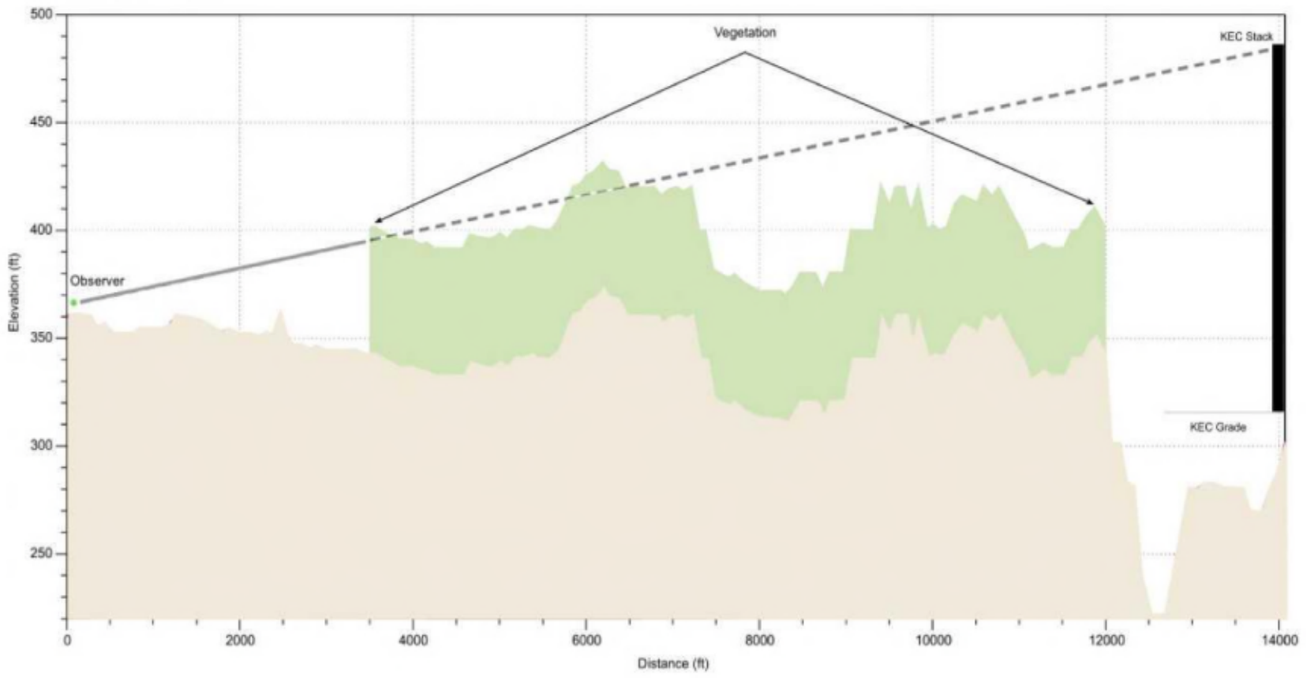

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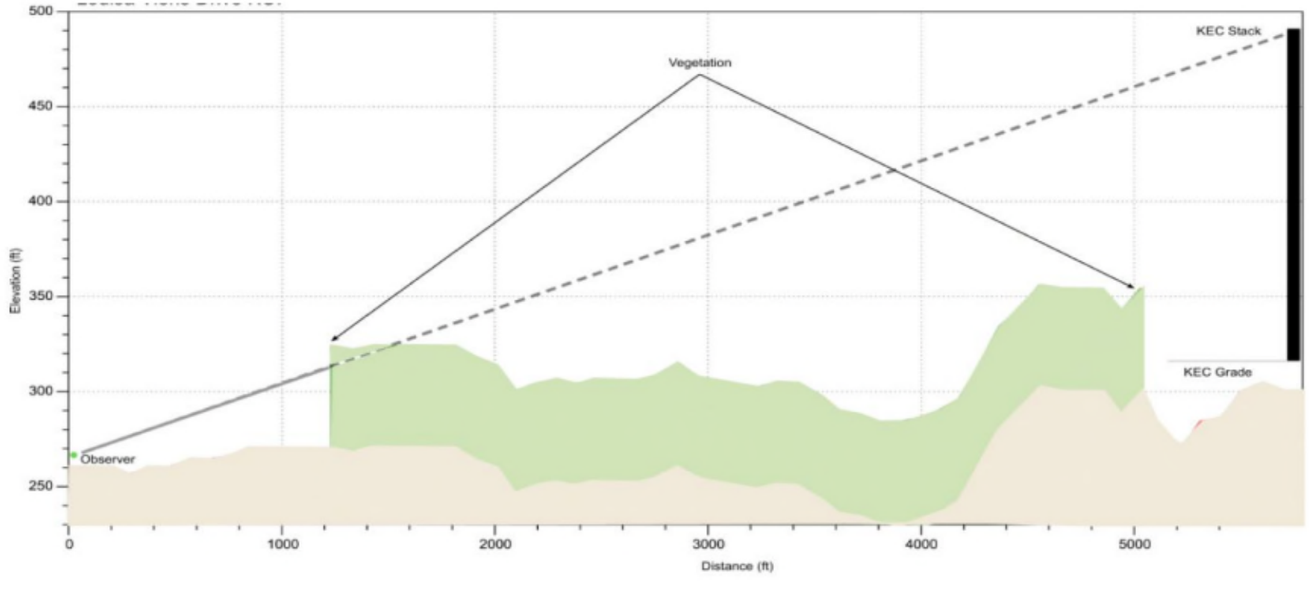

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feet of the KEC Site (between the KEC Site and the intersection of Lake Road and Cottons Bridge Road, set back on both sides of the road). Due to the tall, dense vegetation along each side of Lake Road, KEC is expected to be largely screened from view. In areas where the KEC may be visible, it will be similar in appearance to other industrial structures that currently exist within the landscape.

- The Island Road location represents a location along Alexander Lake across from KEC that currently provides open views from the roadway. Viewers represented from this location would include seasonal and other residents along the lake who have views in this direction, as well as recreational users of this private lake. As shown on Figure 17, existing topography and dense vegetation will largely screen KEC from view. The top of the KEC stack is approximately at the top of the treeline from this location; it is possible that, in locations surrounding the lake with slightly higher elevation, stacktop views would result. This would be similar to what is currently experienced by residences on Island Road and on Alexander Lake, who are viewing toward the Killingly Industrial Park. Currently, three stacks associated with the Lake Road Generating facility are visible above the treeline in some locations along Alexander Lake. Therefore, KEC's single stack will represent only an incremental change to the existing visual landscape.
- The view from State Route 101 would be experienced by through travelers along this road, as well as from residences and businesses in the area. As shown on Figure 18, existing topography and dense vegetation completely screen KEC from view in this location. In an effort to get the most direct view KEC, this photograph was not taken from the road, but by climbing to the top of a 10-foot tall roadside berm; actual views from State Route 101 in this location would be further screened by the berm. This photograph was taken at an average elevation along State Route 101. From all elevations, views toward KEC would be significantly screened by tall, dense roadside vegetation. In locations along State Route 101 with a higher elevation, the tallest elements of KEC may be visible; however, KEC would only represent another minor industrial element in the visual landscape, with more proximate elements, such as the existing 345-kV transmission line structures, in the foreground.
- The Kearny Fork location represents views from residential areas southwest of KEC. Although situated at a lower elevation than more distant locations in this direction, this viewpoint was selected to be most representative of the location where residences are located. As shown on Figure 19, the tall vegetation that lines State Route 101 significantly screens distant views. Without these foreground trees, tall elements of KEC, such as the stack, may be visible during leaf-off conditions, but behind the existing treeline. It is possible that, in locations with a slightly higher elevation, stacktop views would result; however, these higher elevations along Kearny Fork occur farther away from the KEC, which would result in even more distant views.
- The view from State Route 44 would be experienced by through travelers along this road, as well as from residences and farms in the area. As shown on Figure 20, existing topography and dense vegetation completely screen KEC from view in this location. In other locations along State Route 44, KEC may be visible; however, the viewed elements would be more than 2 miles away and, particularly since only the single stack would likely be visible, would only represent another minor element in the visual landscape.
- Although the view from Louisa Viens Drive is in an industrial area, not classified as visually sensitive, this location was selected as a surrogate to represent views from through travelers on I-395 and residential viewers in the Town of Putnam, northeast of KEC. As shown on Figure 21, the existing structures and vegetation located in the Killingly Industrial Park will screen most views of KEC from this direction. Where visible, KEC would only represent another minor element in the visual landscape.

As demonstrated by these simulations, KEC will not likely be visible except from its immediate surroundings (along Lake Road) and in certain directions from Alexander Lake.

During nighttime, KEC's lighting could be an additional visual element. However, lighting will be limited to the amount necessary for safety and will be designed to prevent excess light extending off of the site. Lighting will be directed inward, toward the KEC structures and equipment. Additionally, in many instances, lighting will be minimal unless triggered by a motion sensor or manually turned on for safety, security, or task lighting. KEC lighting will not result in a significant impact or change in existing visibility. It is not anticipated that navigation lighting will be required by the FAA, although review is still pending. Should lighting be required by the FAA, a stack lighting platform would be incorporated to support a dual lighting system that would result in red lighting at night and medium intensity white lights during the day. If the FAA does not require lighting for safety purposes, stack lighting will not be installed.

In addition to KEC's structural elements, potential visual impacts exist with regard to the water vapor plume generated during operation. Since KEC incorporates air cooling instead of wet-cooled technology, a major source of potential plume is not relevant and will not occur. For KEC, the only potential visible plume will be the water vapor emitted from the stack under certain operating and atmospheric conditions. Any visible plume from this source would be the result of water vapor condensation forming in the exhaust plume as it exits the stack, similar to a person's visible breath on a cold winter morning. Like a visible breath, the water vapor plume would be more prevalent during the cooler seasons (late fall, winter, and early spring), when atmospheric conditions are conducive to condensation of water vapor in the exhaust.

A simulation was conducted to identify the anticipated visual impact of this plume. This simulation considers the potential visible plume for a typical hour in January (among the coldest times of the year) and on a clear day (with clouds or grey skies, visibility would be considerably less even with water vapor potentially present) with little wind (higher existing wind speeds cause the plume to dissipate faster). As the exhaust exits the stack, its natural buoyancy makes it rise; as it rises, however, the existing temperature and motion of the air through which it travels begins to cool the plume and make it dissipate with distance. With greater distance from the stack top, the water vapor will transition from a generally opaque cloud-like appearance to integrating more and more of the surrounding air until the plume is wispy and then finally no longer visible.

Figure 22 illustrates a representative plume during cold winter conditions. The frequency, persistence, and size of a potential water vapor plume will depend primarily on meteorological conditions, as well as the temperature and water content of the exhaust. KEC's exhaust from its single stack will be similar to what is currently experienced from the Lake Road Generating facility's three stacks. Given the distance between the two facilities, each facility will have plume visibility in its own immediate surroundings, with no overlapping of plumes.

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6.0 CONCLUSION

Based on the analysis documented in this report, KEC will not alter the visual environment for the majority of the area within 5 miles. For the majority of vantage points within the 5-mile radius, potential views of KEC will be screened by intervening distance, topography, vegetation, and/or existing structures. At certain locations, however, elements of KEC may be visible, most particularly the top of the stack. Simulations have been prepared to illustrate the limited vantage points from which KEC may be visible. In those locations, the views will typically be fleeting (as for travelers along Lake Road) or visible within a context comprised of similar landscape features, as KEC is located within an industrial area and relatively proximate to a similar facility, the Lake Road Generating facility, which has three slightly taller stacks.