



Phase 1 Preliminary Assessment

Visual Resources

Seneca Compressed Air Energy Storage Project

New York State Electric and Gas

**Town of Reading
Schuyler County, New York**

**Environmental Resources Management
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Boston, MA 02116**

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ATTACHMENT 1

NYSEG CAES GEP Stack Height Estimation

1 PHASE 1 PRELIMINARY ASSESSMENT VISUAL RESOURCES

1.1 EXISTING ENVIRONMENT

1.1.1 Project Description and Location

The proposed Seneca compressed air energy storage (CAES) Project will be a 130 to 180 MW plant that consists of an electrically driven compression cycle and a turbine expansion cycle that will produce electricity. The CAES plant is intended to provide sufficient storage to allow full operation during peak demand time periods in support of market needs (approximately 10 hours per day). The proposed CAES plant will be located off State Route 14A, in Reading, Schuyler County, New York. The facility is located west of Seneca Lake in northern Schuyler County (*Figure 1.1*).

More specifically, the site is located within the municipal boundary of Reading in Schuyler County, NY approximately one mile southeast of Reading Center (population 1,786 - 2000 Census) and approximately one mile west of Seneca Lake. The site is situated on a gradual incline which rises from the lake shoreline at 450 feet above sea level to approximately 1000 feet at the main plant site.

The CAES plant will be located on an undeveloped field consisting of low shrubs and small wetland areas, bordered by mixed and deciduous forest to the south and east. The site will be accessed from State Route 14A to the north and adjacent to existing light commercial buildings to the north, northwest. On the western edge of the site an active railroad right-of-way extends north-south with additional mixed forest and fields farther west.

Figure 1.1 Existing Setting of Proposed Project Site



1.1.2 Visual Appearance of the Project Area

With respect to the broader context, the area surrounding the CAES Project primarily consists of agricultural land, mixed and deciduous forest, small towns and other scattered residences. There are isolated industrial facilities in the area, e.g., U.S. Salt operations on the western shore of Seneca Lake, approximately 1.5 miles to the southeast of the proposed project facility, but otherwise the project area is rural. There are very few existing large vertical man-made structures in the Project Area that would have a similar visual impact to the proposed facility other than occasional radio masts and transmission towers and lines.

Watkins Glen (population 2,149 - 2000 Census), 3.5 miles to the southeast, is the largest settlement in the area and has a commercial center focused on recreational tourism at Seneca Lake. Small neighborhoods and water front houses occur along the entire lake shore.

Seneca Lake is oriented north-south and is approximately one mile east of the proposed project area. On either side of the lake, the ground rises rapidly on to ridges running parallel to the lake, up to 2,100 feet on the western side and 1,800 feet to the east.

The broader area surrounding the Project location contains many aesthetic resources, mostly to the south and east of the proposed project site. To the east, between Seneca and Cayuga lakes, is the Finger Lakes National Forest. The North Country Scenic Trail extends through the southern part of this National Forest to Seneca Lake, and then extends south through Watkins Glen. There is also a State Park and additional state-owned lands to the south of the site in Watkins Glen. Scattered to the north and south of the Project site are several locations of potential scenic interest that are on the list of National Registry of Historic Places, such as churches, historic villages and homes. All of these sites of interest are described in more detail in *Section 1.3.3*.

1.2 VISUAL RESOURCES ASSESSMENT APPROACH

1.2.1 Overview

This preliminary assessment reviews potential visibility impacts associated with proposed structures on the CAES plant site and is based on the surrounding ground surface elevation and potential screening forest cover. Consistent with New York Department of Environmental Conservation (NYSDEC) Program Policy DEP-00-2, *Assessing and Mitigating Visual Impacts* guidelines, ERM has applied a spatial modeling technique called Viewshed Analysis to define areas of potential visibility of the following structures:

- CAES stack: 213 feet (maximum estimated good engineering practice (GEP) height);
- CAES Cycle 2 stack: 190 feet (best current height estimate). Tall blue stack in *Figure 1.2*;
- Turbine Building Cycle 2: 76 feet. Rectangular orange buildings in *Figure 1.2*; and
- The CAES power line connecting to the Transmission Line to the west: Various heights for individual poles ranging from 56.5 to 74.5 feet.

Information about building and stack dimensions and calculated GEP for both CAES cycles was provided by WorleyParsons (Attachment 1).

Figure 1.2 Proposed Site Layout (Cycle 2) Looking Southeast



1.2.2 Viewshed Analysis

1.2.2.1 Bare Earth Model

ERM acquired digital elevation data from the United States Geological Survey (USGS) National Elevation Dataset (NED) that provides ground elevations on an approximate 3-meter grid. The NED is a bare earth model (i.e., provides elevation of the actual ground surface) and therefore removes any screening effects potentially provided by trees or buildings. This bare earth model can therefore be considered a worst-case scenario for potential visibility of a site. In conformance with NYSDEC Policy DEP-00-2, this bare-earth analysis enables the identification of all locations and visual resources from which the proposed project facility may be visible.

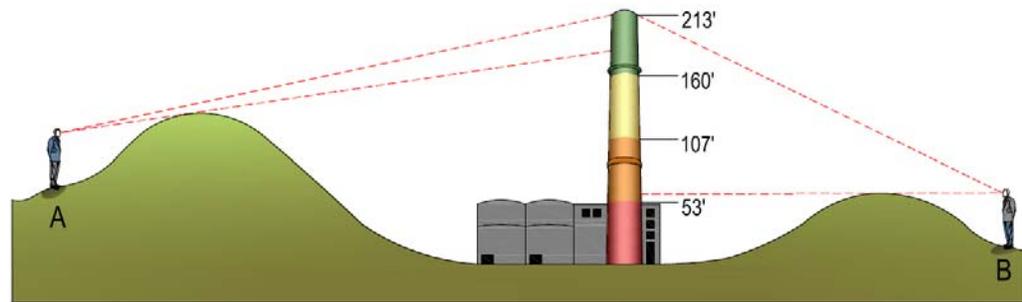
The Viewshed is calculated by placing an observer (assumed viewer height of 6 feet or 1.8 meters) on every grid point (3-meter spacing) in the elevation model and evaluating whether a mapped structure (e.g. top of emissions stack) can be seen from that location or whether intervening topography (hills, ridges, etc.) blocks the view. The output of this analysis is a grid of the entire study area showing locations where the mapped structure is potentially visible.

The standard Viewshed output simply shows whether a structure is visible or not from a given location and does not consider how much of the structure can be seen. The visual impact of seeing only the uppermost

part of a structure, e.g., top 10 feet of a stack) is very different from seeing the entire structure, e.g., full 213 feet of CAES GEP stack.

ERM has therefore developed an enhancement to the standard Viewshed analysis required by the NYSDEC Policy that takes into account how much of an individual structure is potentially visible. For each structure being assessed the total structure height was divided into four equal sections as shown schematically in *Figure 1.3* for the 213 foot CAES GEP stack. By running the Viewshed analysis iteratively for these four separate structure heights and combining the results it is possible to differentiate the area of potential visibility into categories based on the approximate percentage of the structure that is visible, rather than simply visible or not visible.

Figure 1.3 Schematic of Stack Visibility Percentage Estimates for Different Observers



For example, as shown in *Figure 1.3*, Observer A is able to see the top of the stack (213 feet) but is unable to see top of the next modeled section (160 feet) because of the intervening terrain. Therefore Observer A is able to see less than 25% of the stack or alternatively they can see a maximum of the upper 53 feet of the stack. Similarly, Observer B has a less obstructed view but is still unable to see the top of the lowest modeled section (53 feet). Observer B is able to see between 50 and 75% of the stack or alternatively they can see up to a maximum of the upper 160 feet of the stack.

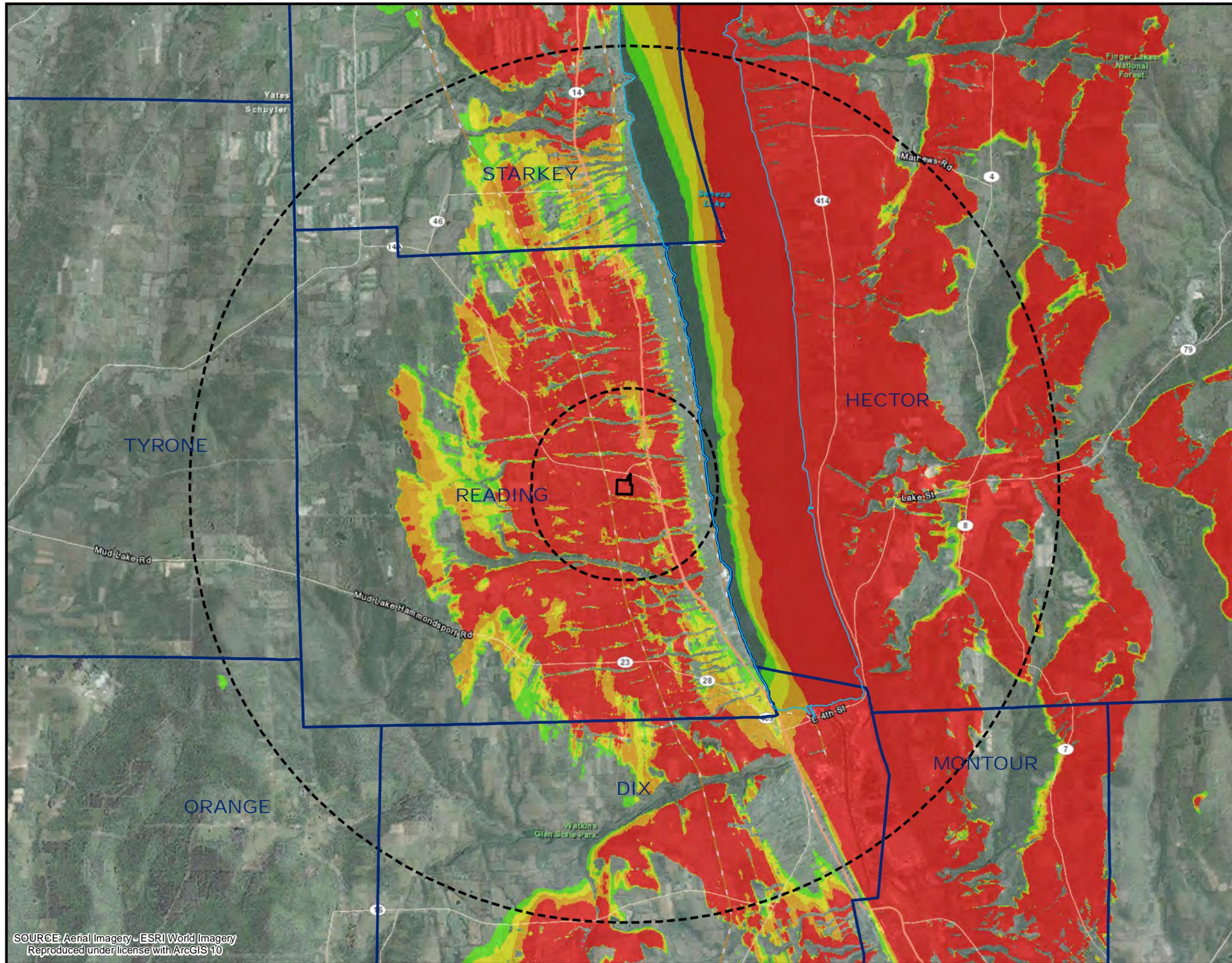
This principle is illustrated further in *Table 1.1* overleaf for the CAES GEP Stack. Observer A would fall into the category $\leq 25\%$ Visible (shown in green) while Observer B would fall into the category 50-75% Visible (shown in orange). This color scheme, used in both *Figure 1.3* and *Table 1.1*, is carried through on all of the following map figures presenting the Viewshed analysis results.

Table 1.1 *Percentage Visibility of CAES GEP stack (213 feet)*

Visibility Map Category	Modeled Stack Height for Viewshed			
	213 ft	160 ft	107 ft	53 ft
≤ 25% Visible (≤ top 53 feet Visible)	Visible	Not Visible	Not Visible	Not Visible
25-50% Visible (≤ top 53-106 feet Visible)	Visible	Visible	Not Visible	Not Visible
50-75% Visible (≤ top 106-160 feet Visible)	Visible	Visible	Visible	Not Visible
75-100% Visible (≥ top 160 feet Visible)	Visible	Visible	Visible	Visible

Further differentiation of the outputs into narrower percentage ranges is possible. However, for the scope of this preliminary assessment 25% increments represent a good compromise between modeling time and visibility assessment detail. At this initial stage the primary purpose of applying this categorization is to identify areas where potential visual impacts will be highest and determine the best viewpoints from which to take photographs to capture viewshed lines of sight (see section below).

For this assessment, ERM has calculated separate Viewsheds from the bare earth data for a stack at an estimated GEP height of 213 feet (*Figure 1.4*), a stack at 190 feet (Cycle 2) (*Figure 1.5*) and the proposed Turbine Building at 76 feet (Cycle 2) (*Figure 1.6*). The results of this analysis are discussed in *Section 1.3.1*.



Legend

- Seneca Lake Shoreline
- Municipal Boundaries
- Proposed Site Boundary
- 1 & 5 Mile Buffers of Site Boundary

Potential Visibility of Emissions Stack

- Not Visible
- < 25% of Structure Visible
- 25 - 50% of Structure Visible
- 50 - 75% of Structure Visible
- 75 - 100% of Structure Visible

NOTES:

This figure depicts the potential visibility of a 213 foot Emissions Stack using a bare earth elevation model of the ground surface from the National Elevation Dataset (NED). Refer to the accompanying report for a full description of the analysis methodology.

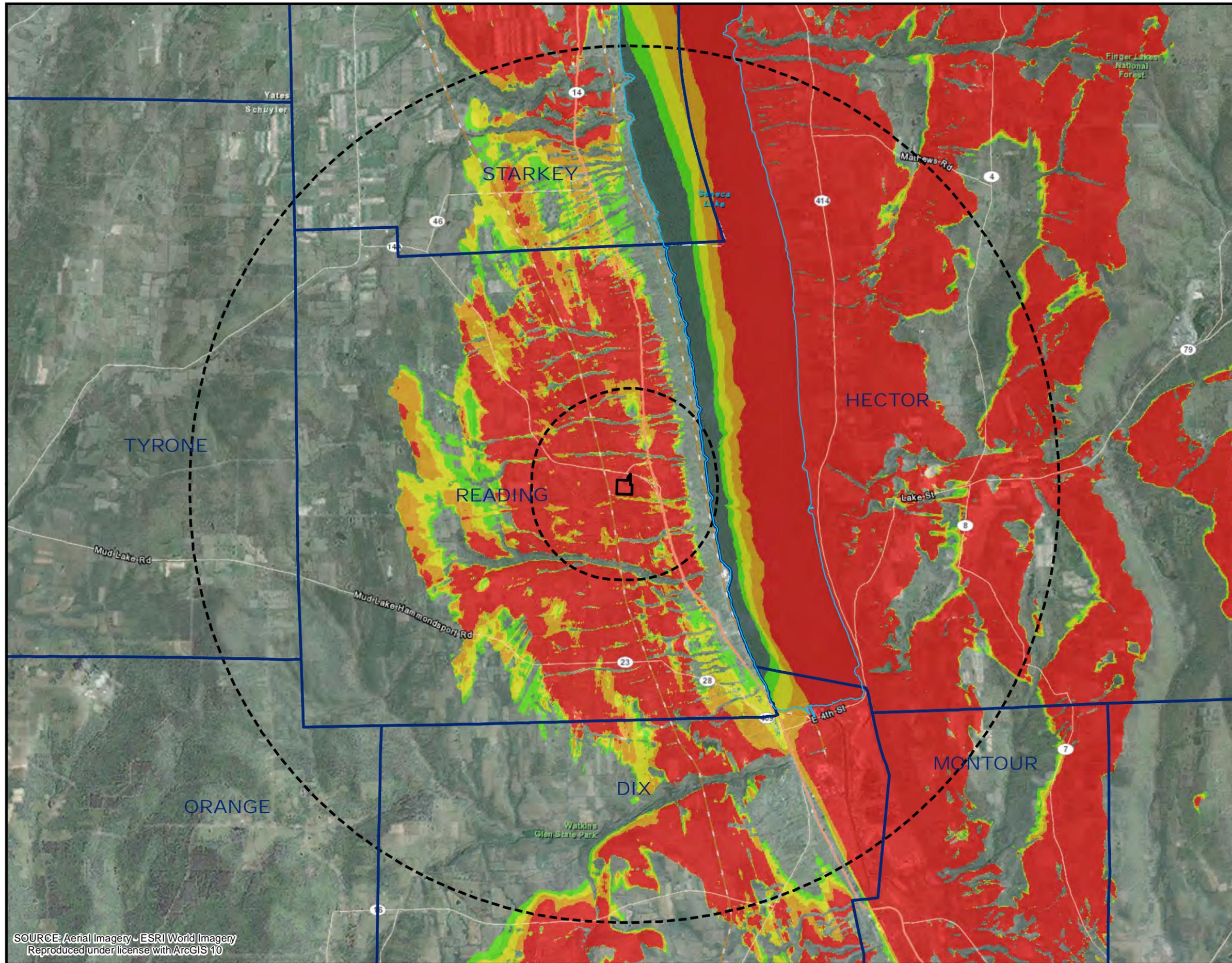


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Figure 1.4: Potential Visibility of 213 foot Emissions Stack
 Bare Earth Elevation Model

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 Town of Reading
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Legend

- Seneca Lake Shoreline
 - Municipal Boundaries
 - Proposed Site Boundary
 - 1 & 5 Mile Buffers of Site Boundary
- Potential Visibility of Emissions Stack**
- Not Visible
 - < 25% of Structure Visible
 - 25 - 50% of Structure Visible
 - 50 - 75% of Structure Visible
 - 75 - 100% of Structure Visible

NOTES:

This figure depicts the potential visibility of a 190 foot Emissions Stack using a bare earth elevation model of the ground surface from the National Elevation Dataset (NED). Refer to the accompanying report for a full description of the analysis methodology.

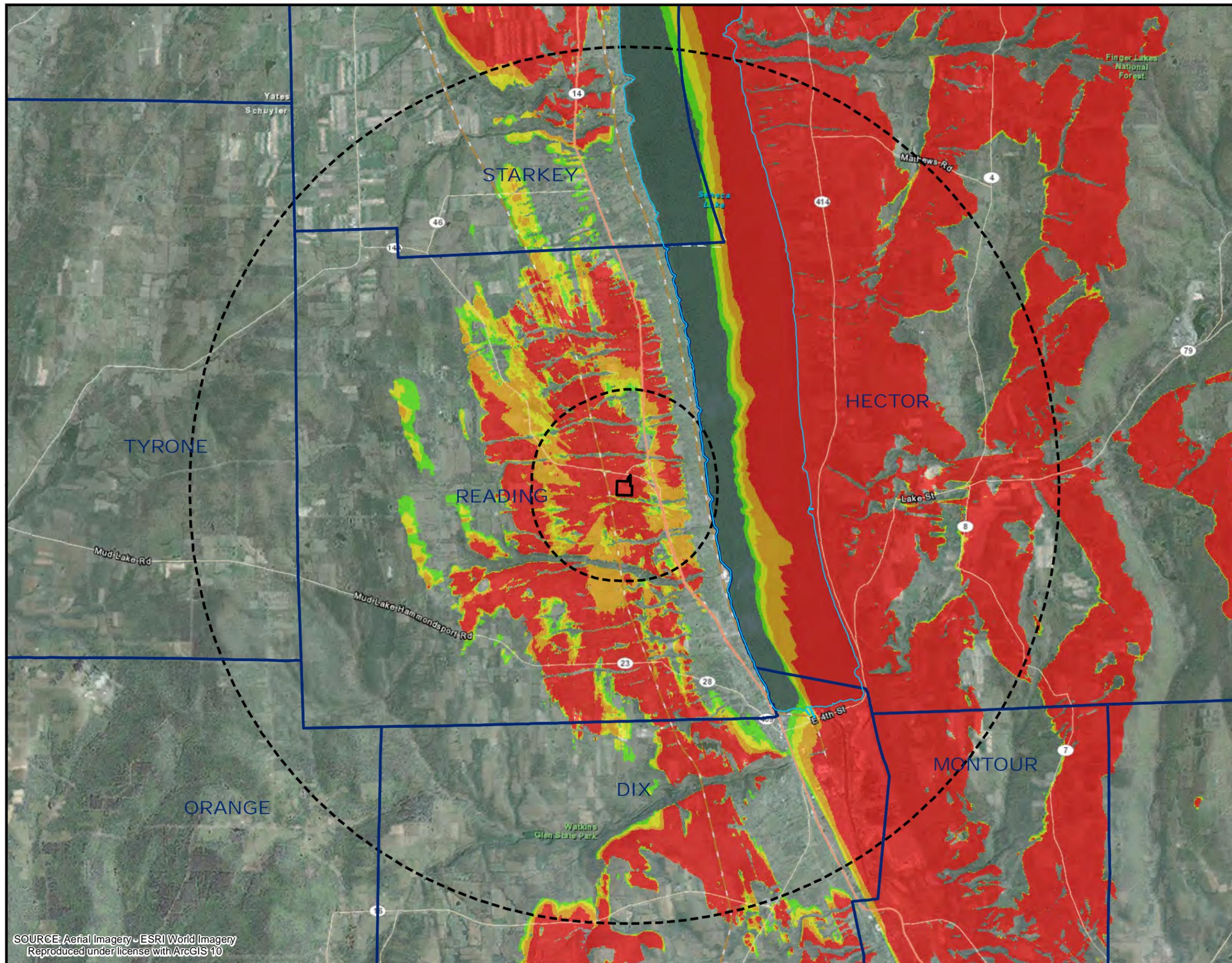


Figure 1.5: Potential Visibility of 190 foot Emissions Stack
Bare Earth Elevation Model

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Legend

- Seneca Lake Shoreline
- Municipal Boundaries
- Proposed Site Boundary
- 1 & 5 Mile Buffers of Site Boundary

Potential Visibility of Turbine Building

- Not Visible
- < 25% of Structure Visible
- 25 - 50% of Structure Visible
- 50 - 75% of Structure Visible
- 75 - 100% of Structure Visible

NOTES:
 This figure depicts the potential visibility of a 76 foot Turbine Building using a bare earth elevation model of the ground surface from the National Elevation Dataset (NED). Refer to the accompanying report for a full description of the analysis methodology.

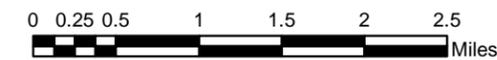


Figure 1.6: Potential Visibility of 76 foot Turbine Building
 Bare Earth Elevation Model

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 Schuyler County, NY

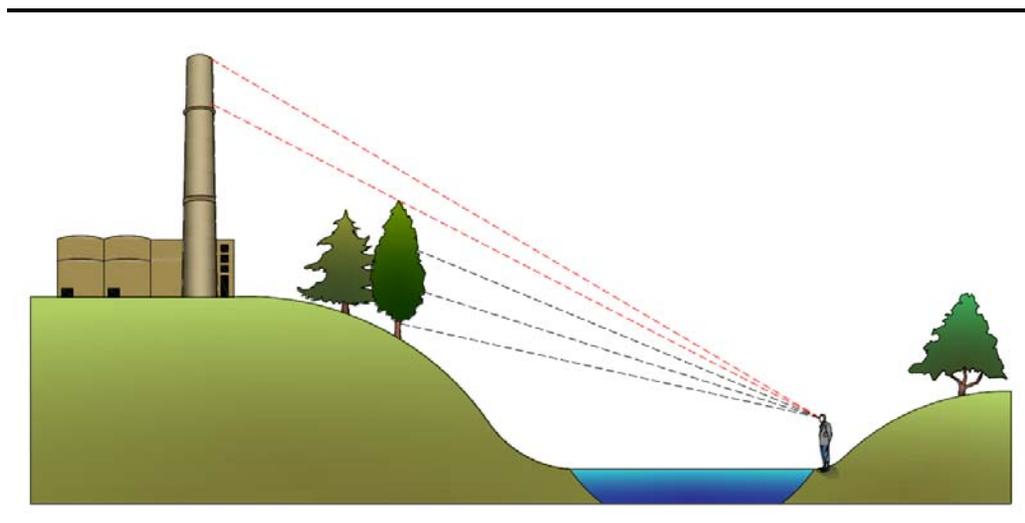


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1.2.2.2 Vegetation Screening Model

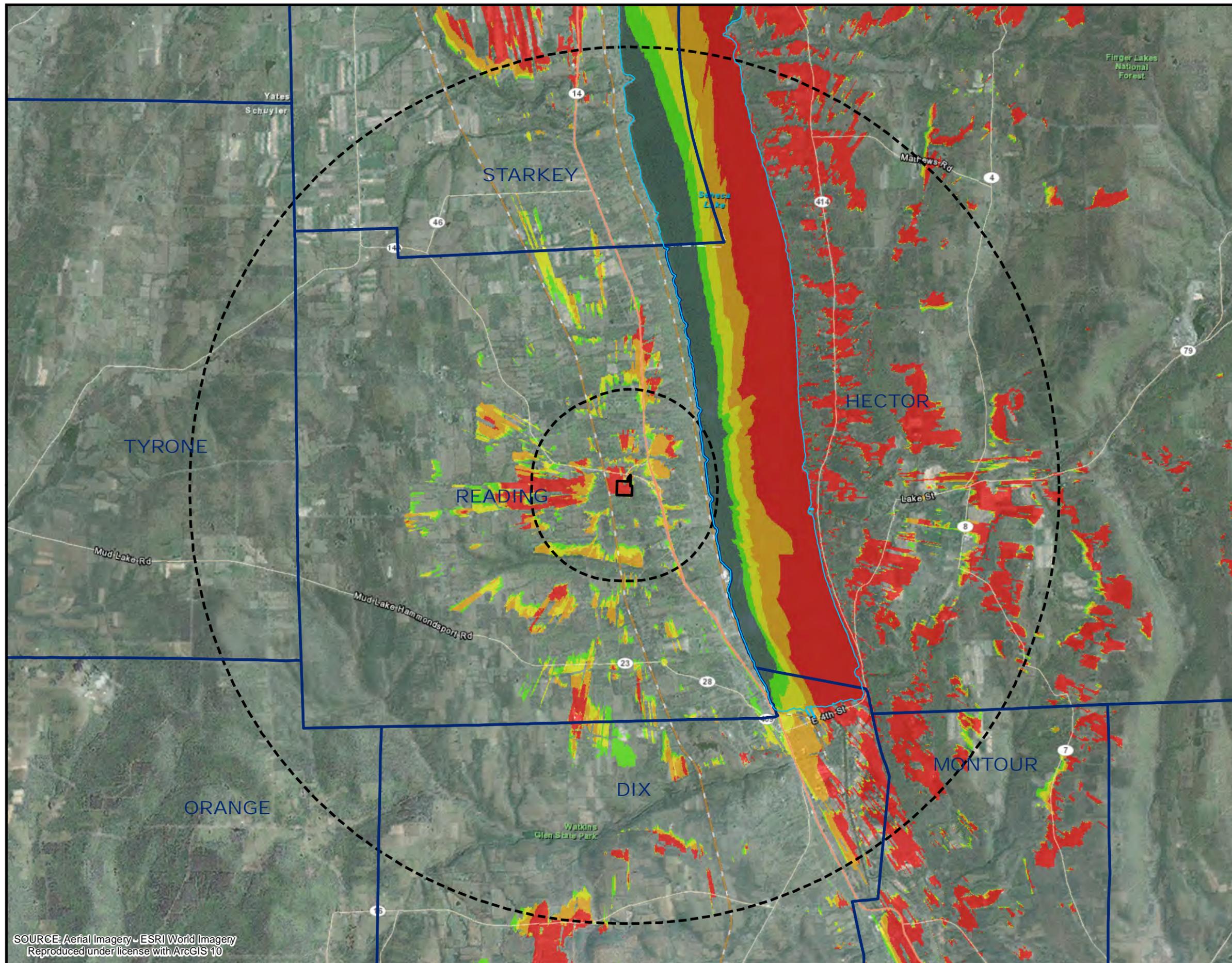
As described in the previous section, a bare earth model excludes the potential screening effects of vegetation and buildings. As the surrounding area, particularly immediately adjacent to the site, is largely forested (>50% forest cover within 5 miles of the site) then these screening effects are potentially significant and need to be considered in any assessment of potential visibility. *Figure 1.7* presents a schematic representation of vegetation screening, showing how this can significantly reduce the potential visibility of a development. It is expected that existing forest cover will provide considerable screening of the proposed project site, either screening structures completely or reducing the portion of the structure that is visible.

Figure 1.7 Schematic of Reduction in Visibility from Vegetation Screening



For this assessment, ERM extracted areas of forest cover from the United States Department of Agriculture (USDA) 2010 Cropland Data Layer (CDL), which provides crop-specific land cover information, including forest cover, at a ground resolution of 30 meters. Based on field observations, ERM assumed a conservative estimate for tree heights of 30 feet across the surrounding forested areas. These were added to the existing NED elevation model to create screens across the entire Project Area. It should be noted that this approach creates a complete barrier to view as if the trees were a continuous wall. Depending on the time of year the screening effects will vary (e.g., in winter with no leaves the screening effect will be reduced). As described in *Section 1.4* further detailed assessment (under Phase 2) will need to incorporate these seasonal effects in judging visibility.

The Viewshed was then re-calculated using this vegetation corrected elevation model for the same structures as the bare earth model. In addition to the screens from vegetation it was assumed that no structures would be visible from within the forested areas. The results of this analysis are presented in the following figures: stack at a GEP height of 213 feet (*Figure 1.8*), a stack at 190 feet (Cycle 2) (*Figure 1.9*) and the Turbine Building (Cycle 2) at 76 feet (*Figure 1.10*). To facilitate comparison to the bare-earth model *Figure 1.11* provides a side-by-side comparison of the two model types for the 213 foot stack. The results of this analysis are discussed in *Section 1.3.1*.



Legend

- Seneca Lake Shoreline
- Municipal Boundaries
- Proposed Site Boundary
- 1 & 5 Mile Buffers of Site Boundary

Potential Visibility of Emissions Stack

- Not Visible
- < 25% of Structure Visible
- 25 - 50% of Structure Visible
- 50 - 75% of Structure Visible
- 75 - 100% of Structure Visible

NOTES:
 This figure depicts the potential visibility of a 213 foot high Emissions Stack using a vegetation corrected elevation model of the ground surface from the National Elevation Dataset (NED). The effect of screening from existing interpretation has been included in this analysis using information on forest cover extents from the USDA 2010 Cropland Data Layer. Refer to the accompanying report for a full description of the analysis methodology.

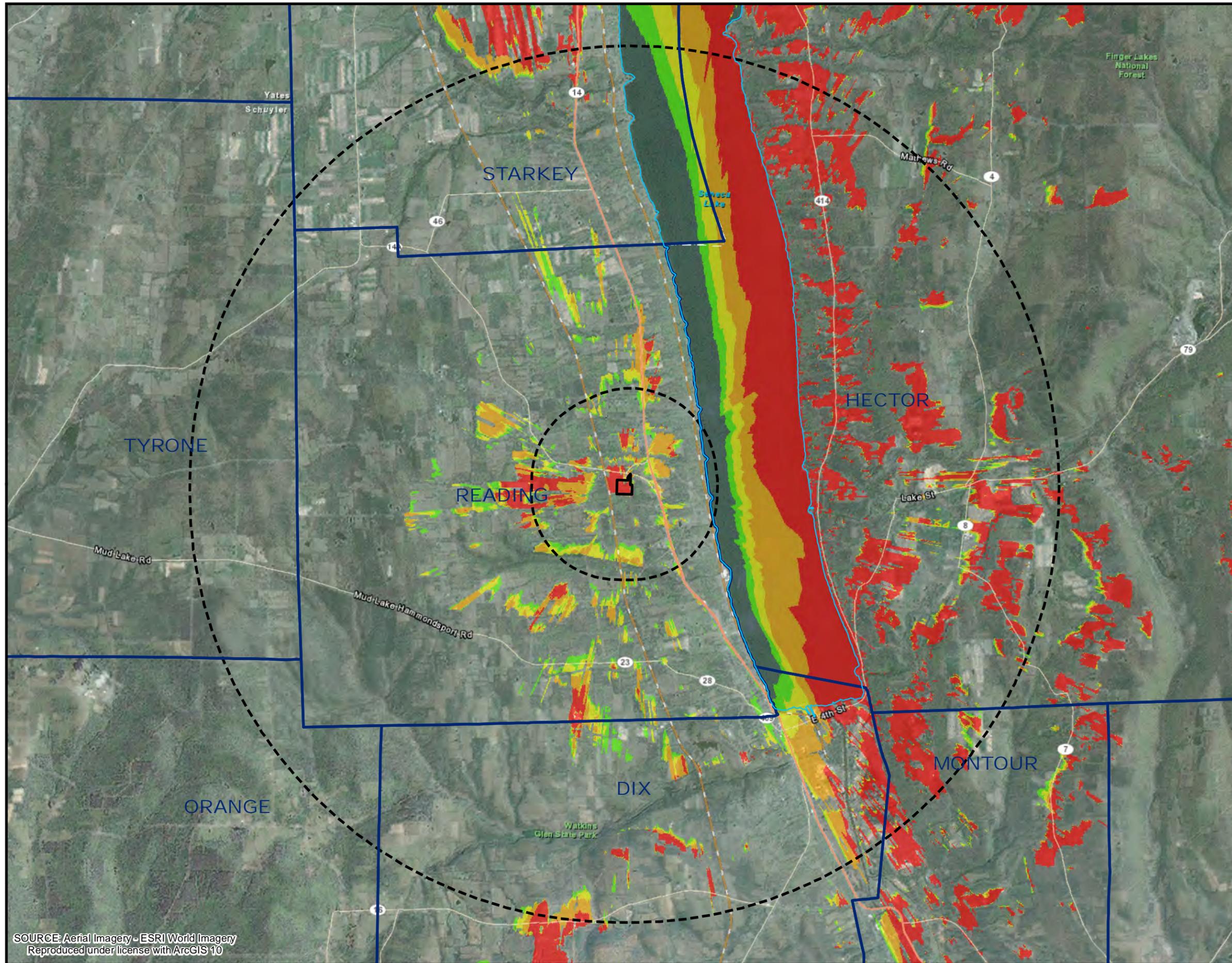


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Figure 1.8: Potential Visibility of 213 foot Emissions Stack
 Vegetation Corrected Elevation Model
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Path: G:\Graphics\Clients_V_2\WorleyParsons\Watkins Glen, NY\MapX\WorkingFigures\Visualization\StackVisibility_213FL_ForestCorrected.mxd



Legend

- Seneca Lake Shoreline
 - Municipal Boundaries
 - Proposed Site Boundary
 - 1 & 5 Mile Buffers of Site Boundary
- Potential Visibility of Emissions Stack**
- Not Visible
 - < 25% of Structure Visible
 - 25 - 50% of Structure Visible
 - 50 - 75% of Structure Visible
 - 75 - 100% of Structure Visible

NOTES:
 This figure depicts the potential visibility of a 190 foot high Emissions Stack using a vegetation corrected elevation model of the ground surface from the National Elevation Dataset (NED). The effect of screening from existing interpretation has been included in this analysis using information on forest cover extents from the USDA 2010 Cropland Data Layer. Refer to the accompanying report for a full description of the analysis methodology.

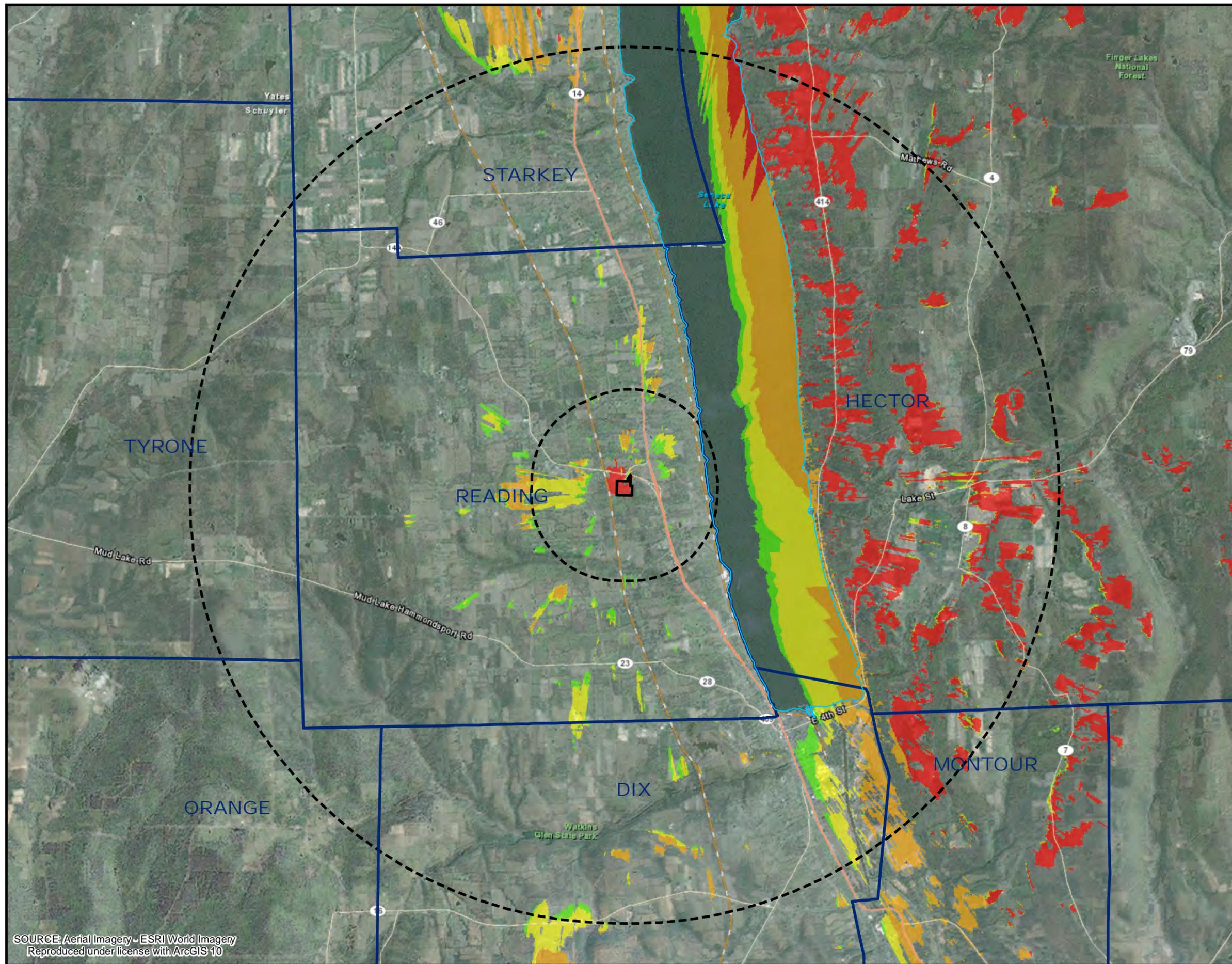


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Figure 1.9: Potential Visibility of 190 foot Emissions Stack
 Vegetation Corrected Elevation Model
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 Schuyler County, NY



Path: G:\Graphics\Clients_V_2\WorleyParsons\Walkins Glen, NY\MXD\WorkingFigures\Visualizations\StackVisibility_190FL_ForestCorrected.mxd



Legend

- Seneca Lake Shoreline
- Municipal Boundaries
- Proposed Site Boundary
- 1 & 5 Mile Buffers of Site Boundary
- Potential Visibility of Turbine Building**
- Not Visible
- < 25% of Structure Visible
- 25 - 50% of Structure Visible
- 50 - 75% of Structure Visible
- 75 - 100% of Structure Visible

NOTES:

This figure depicts the potential visibility of a 76 foot high Turbine Building using a vegetation corrected elevation model of the ground surface from the National Elevation Dataset (NED). The effect of screening from existing interpretation has been included in this analysis using information on forest cover extents from the USDA 2010 Cropland Data Layer. Refer to the accompanying report for a full description of the analysis methodology.

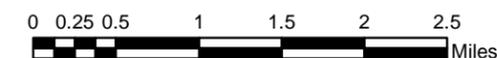
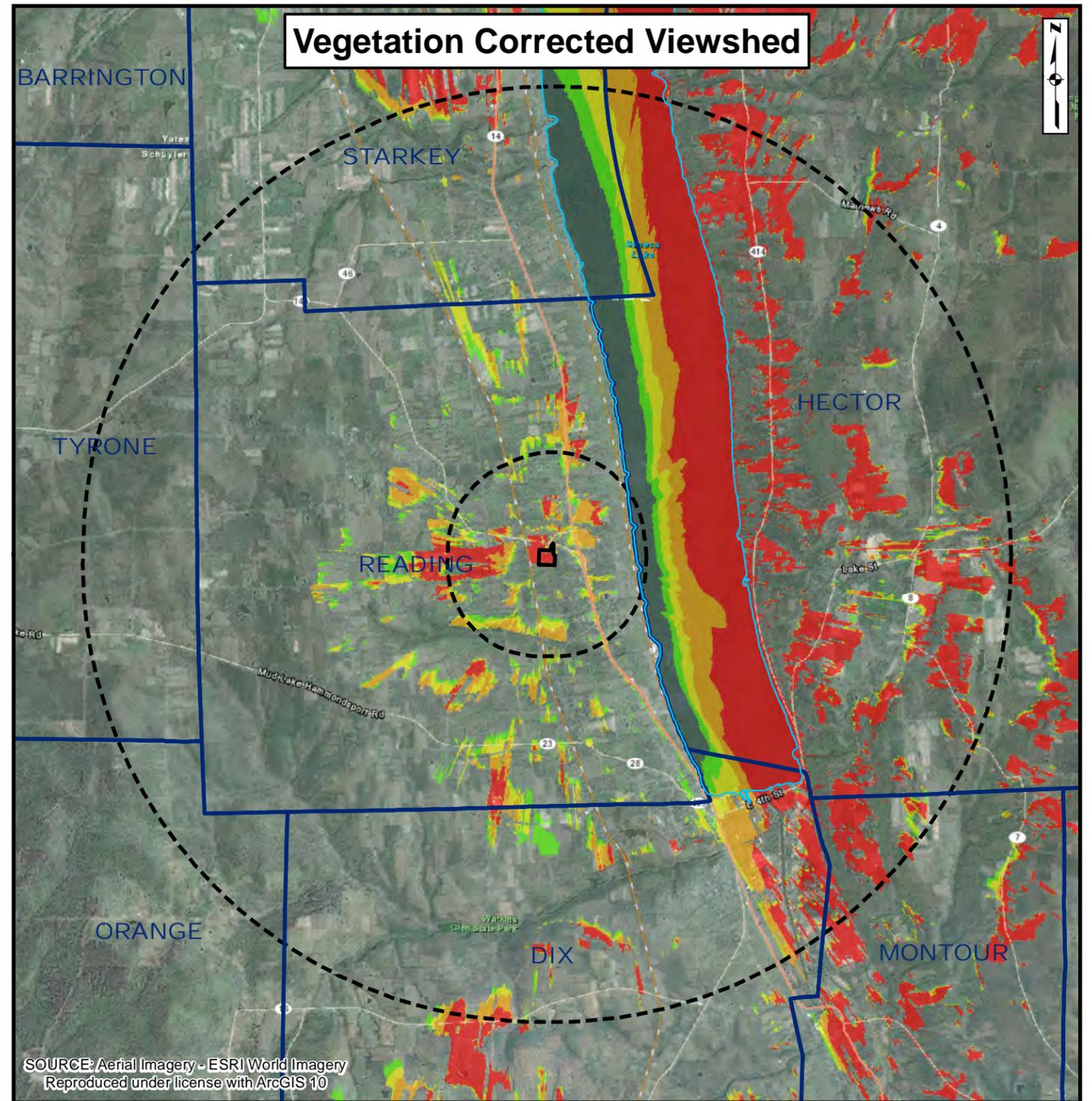
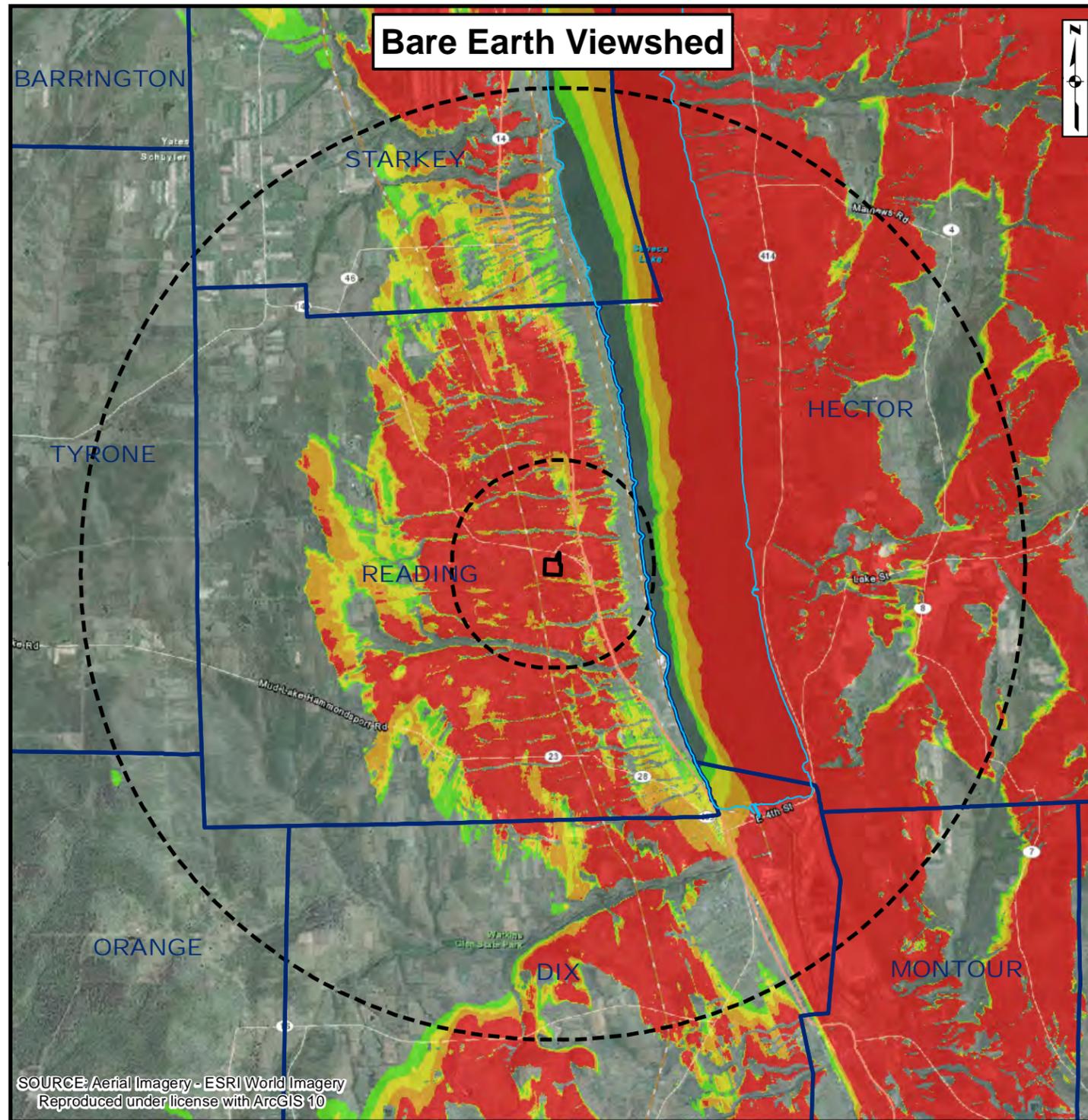


Figure 1.10: Potential Visibility of 76 foot Turbine Building
Vegetation Corrected Elevation Model

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Legend

- Seneca Lake Shoreline
- Municipal Boundaries
- Proposed Site Boundary
- 1 & 5 Mile Buffers of Site Boundary

Potential Visibility of Emissions Stack

- Not Visible
- < 25% of Structure Visible
- 25 - 50% of Structure Visible
- 50 - 75% of Structure Visible
- 75 - 100% of Structure Visible



NOTES:

This figure compares the potential visibility of a 213 foot Emissions Stack using a bare earth elevation model of the ground surface and a vegetation corrected elevation model from the National Elevation Dataset (NED). Refer to the accompanying report for a full description of the analysis methodology.

Figure 1.11: Potential Visibility of 213 foot Emissions Stack Bare Earth and Vegetation Corrected Elevation Model

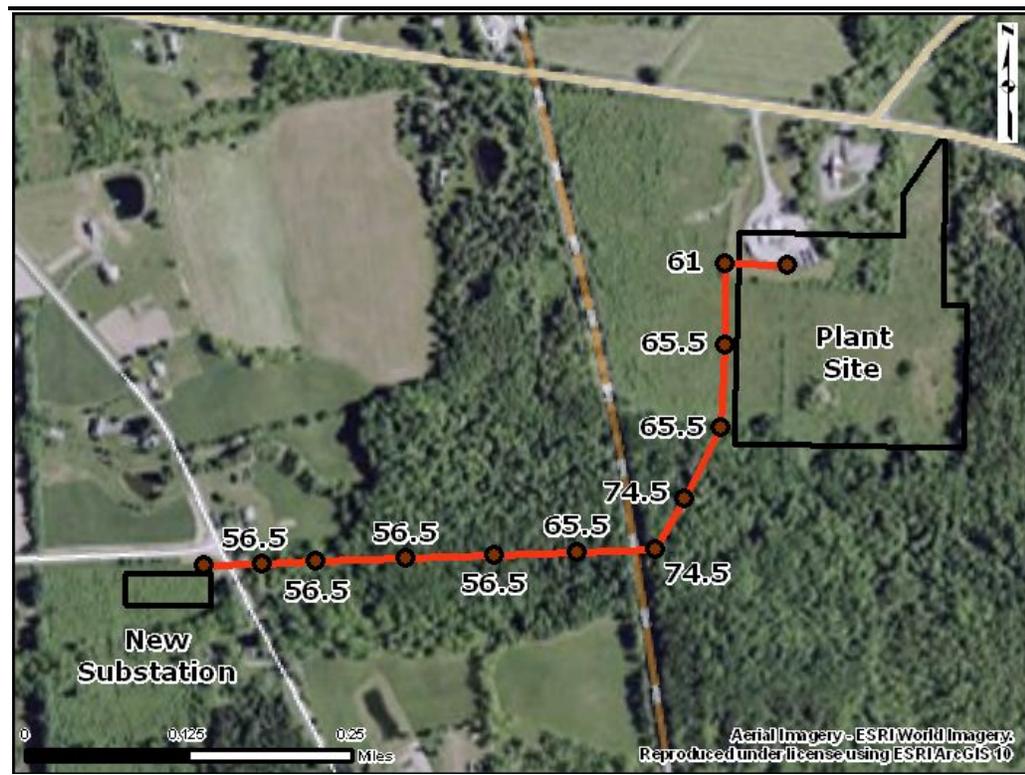
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1.2.2.4 *Transmission Line Assessment*

ERM also applied a Viewshed analysis to the proposed overhead transmission line running west from the CAES plant site. As shown in *Figure 1.12* the proposed route of the transmission line from the plant to connect with the substation passes primarily through existing forest. Due to variations in topography and the need to have specific clearance over barrier features (e.g., a railway) the individual transmission poles vary in height from 56.5 to 74.5 feet as shown in *Figure 1.12*.

Figure 1.12 *Proposed Transmission Line Route with Pole Heights (feet)*

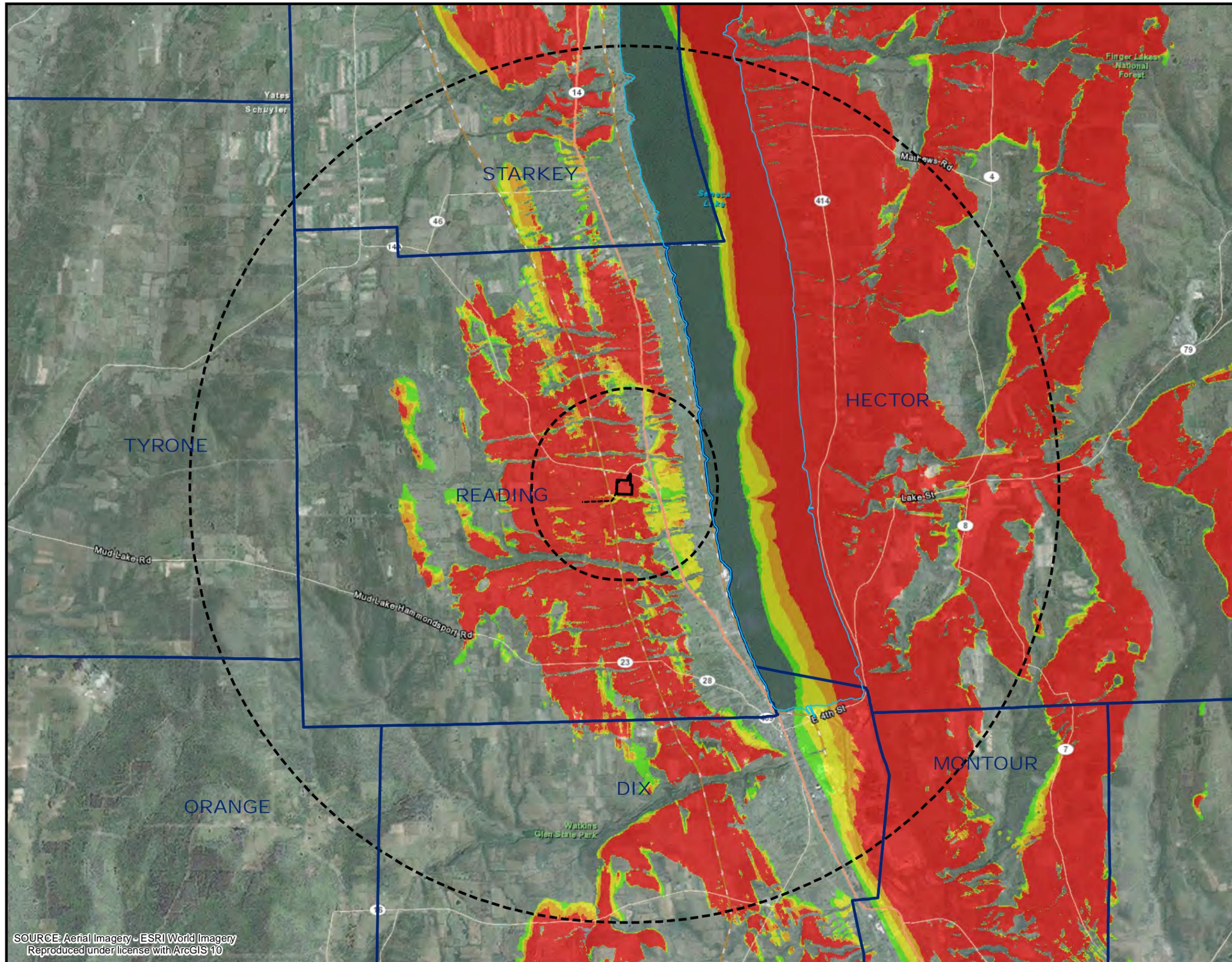


For the transmission line Viewshed, both a bare-earth and vegetation-corrected model were calculated using the same method as described for the main plant structures with two key differences. For the vegetation-corrected model, the forest cover was removed along the proposed route providing 50 feet of clearance on either side of the power line to create the effect of a right-of-way along the transmission line.

The other key difference is that rather than look at the percentage of each pole that is visible, the total number of poles visible from any location was assessed. The Viewshed output therefore consists of a grid covering the entire Project Area with numeric values from 0 (no poles visible) up to 10

(10 poles visible). This cumulative Viewshed analysis gives a better indication of the variation in visual impacts when there are multiple structures and is commonly used in both wind turbine and transmission line visual assessments.

The results of this analysis are presented in the following figures: proposed transmission line, bare earth model (*Figure 1.13*), and proposed transmission line, vegetation corrected model (*Figure 1.14*). The results of this analysis are discussed in *Section 1.3.1*.



Legend

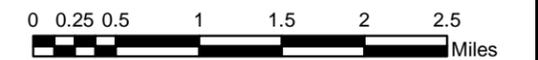
- Seneca Lake Shoreline
- Municipal Boundaries
- Proposed Site Boundary
- 1 & 5 Mile Buffers of Site Boundary
- Proposed Transmission Line

Potential Visibility of Transmission Line Poles (# of Poles Visible out of 10)

- No Poles Visible
- 1-3 Poles Visible
- 4-6 Poles Visible
- 7-9 Poles Visible
- 10 Poles Visible

NOTES:

This figure depicts the potential visibility of the 10 proposed transmission line poles of varying height (56.5 - 74.5 ft) using a bare earth elevation model of the ground surface from the National Elevation Dataset (NED). Refer to the accompanying report for a full description of the analysis methodology.

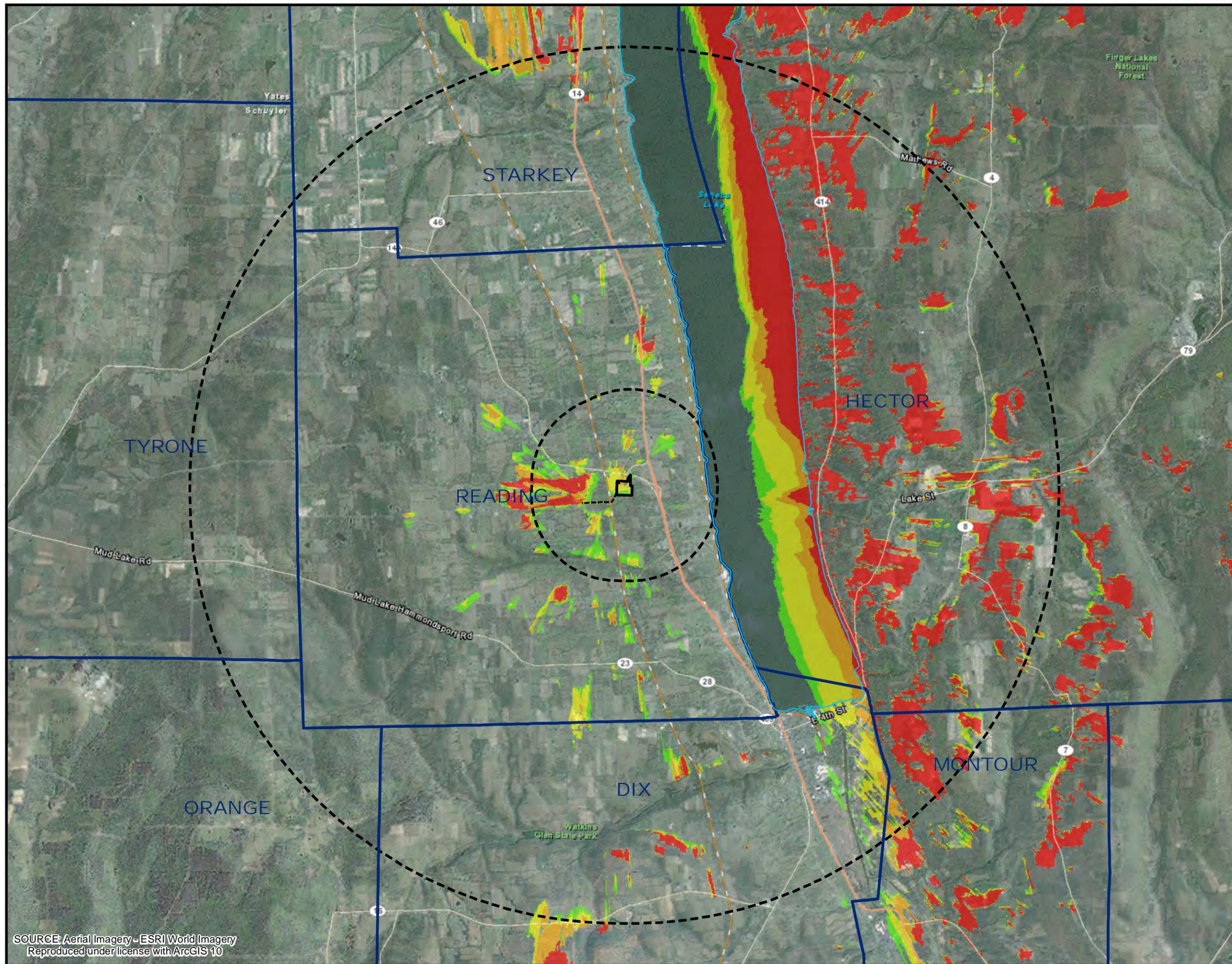


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Figure 1.13: Potential Visibility of Proposed Transmission Line Poles
 Bare Earth Elevation Model

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Legend

- Seneca Lake Shoreline
- Municipal Boundaries
- Proposed Site Boundary
- 1 & 5 Mile Buffers of Site Boundary
- Proposed Transmission Line

Potential Visibility of Transmission Line Poles (# of Poles Visible out of 10)

- No Poles Visible
- 1-3 Poles Visible
- 4-6 Poles Visible
- 7-9 Poles Visible
- 10 Poles Visible

NOTES:
 This figure depicts the potential visibility of the 10 proposed transmission line poles of varying height (56.5 - 74.5 ft) using a vegetation corrected elevation model of the ground surface from the National Elevation Dataset (NED). The effect of screening from existing vegetation has been included in this analysis using information on forest cover extents from the USDA 2010 Cropland Data Layer. Refer to the accompanying report for a full description of the analysis methodology.

N

0 0.25 0.5 1 1.5 2 2.5 Miles

Figure 1.14: Potential Visibility of Proposed Transmission Line Poles
 Vegetation Corrected Elevation Model

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1.3 POTENTIAL VISUAL RESOURCES IMPACTS

1.3.1 Overview of Potential Visibility

The preceding figures show the potential visibility of both structures on the main plant site and the transmission line as described in the previous section. For the purposes of describing the results of the assessment all stated percentages of structure visibility (see *Section 1.2.2*) and general descriptions **are based on the potential visibility of the 213 foot GEP stack from the vegetation-corrected model unless otherwise stated in the text.**

1.3.1.1 Main Plant Site

As depicted in the preceding figures, the area with the highest potential visibility of structures on the main plant site is the eastern side of Seneca Lake. The eastern shoreline of the lake, directly due east of the CAES project site, has a high predicted visibility (75-100%), due to the lower elevation and direct line of site created by the open water. The forest cover on the eastern side of the lake, however, extends to the shoreline and so when vegetation screening is taken into account, the potential visibility decreases dramatically (*Figure 1.8*) away from the shoreline. There are, however, remaining pockets of high visibility from some of the larger agricultural areas where vegetation screening does not occur and isolated cases where there are breaks in the tree canopy. As noted in *Section 1.2.2.2* the screening effect of tree cover will be seasonal to some extent due to the presence of deciduous trees and further evaluation of leaf-off conditions is recommended.

Further east, the potential visibility of the site decreases due to elevation changes, with the ridge dropping away to the east. North, south, and west of the site generally have lower predicted visibility because of topographic variations and existing forest cover screening the site from view.

To the southeast, the village of Watkins Glen (largest settlement in the area) has moderate (50-75%) to high (75-100%) potential visibility of the project site. In particular, areas along the waterfront on the south-eastern corner of Seneca Lake have the highest potential visibility. Waterfront areas on the southwestern corner of Seneca Lake have a lower predicted visibility due to a reduced line of site created by the intervening topography. Although the downtown area has a predicted unrestricted visibility of the project site, the buildings can also be expected to screen many views of the proposed stack.

As discussed above and evident from the Viewshed maps, the screening effect of vegetation can be expected to substantially reduce potential visibility between the bare-earth model and the vegetation-corrected model. *Table 1.2* quantifies the potential visibility for the two models and the different project structures within a 5-mile radius of the main facility boundary. Comparing the two models shows that based on the current modeling assumptions, a significant reduction in visibility can be expected from existing vegetation screening. The next phase of assessment should include refining the estimate of tree canopy height and density, and assessing the variation in screening at different time of year. Buildings should also be integrate into the assessment.

Table 1.2 Viewshed Analysis Results - 5-mile radius of Project Site

	Bare Earth Model		Vegetation Corrected Model	
	Area (sq. miles)	% of Total Area	Area (sq. miles)	% of Total Area
213 ft. Emissions Stack Visibility				
Not visible	445.27	78.9%	523.66	92.8%
<25%	8.23	1.5%	3.44	0.6%
25-50%	9.11	1.6%	4.12	0.7%
50-75%	10.10	1.8%	5.43	0.9%
75-100%	91.70	16.2%	27.62	4.9%
190 ft. Emissions Stack Visibility				
Not visible	449.02	79.6%	525.12	93.1%
<25%	7.29	1.3%	3.27	0.6%
25-50%	8.38	1.5%	3.82	0.7%
50-75%	9.33	1.7%	5.58	1.0%
75-100%	90.39	16.0%	26.48	4.7%
76 ft. Turbine Buildings Visibility				
Not visible	466.26	82.6%	532.86	94.4%
<25%	3.76	0.7%	2.15	0.4%
25-50%	4.27	0.8%	4.35	0.8%
50-75%	5.87	1.0%	7.96	1.4%
75-100%	84.23	15.0%	16.95	3.0%

1.3.1.2 *Proposed Transmission Line*

As for structures on the main plant site, the bare earth Viewshed model (Figure 1.13) shows extensive potential visibility of the transmission line poles, particularly from the eastern side of Seneca Lake, both on the water and along the shoreline. Incorporating the screening effect of forest cover, however, substantially reduces the potential visibility (Figure 1.14) such that only a limited number of locations will potentially be able to see the transmission line. If the current estimate of tree height is too conservative, then this will be reduced even further. In addition, the potentially slender profile of the transmission poles will reduce the distance from which they can effectively be seen.

Further assessments should specifically evaluate the tree cover height and density along the proposed power line route and assess the visibility of existing transmission lines in the area (some are visible in the following viewpoint examples).

1.3.2 *Views from Key Vantage Points*

Using the results of the Viewshed Analysis, ERM selected a series of viewpoints for preliminary field evaluation. These were selected to ensure coverage from all directions at varying distances from the proposed site. Only locations that were identified as being visible (with a high percentage visibility) from the Viewshed Analysis were selected. Wherever possible, locations that coincided with both visibility and the presence of existing aesthetic resources were selected. Figure 1.154 shows the location of the viewpoints described in the following sections.

For each viewpoint a brief description of the setting and potential visibility is provided with a field photo indicating the approximate position of the proposed project site. During the more detailed Phase 2 stage of the project, after the project has been officially announced to the public and full access to the plant property can be obtained, a visible balloon will be stationed at the Project Site and photographic documentation from the field points will be made.

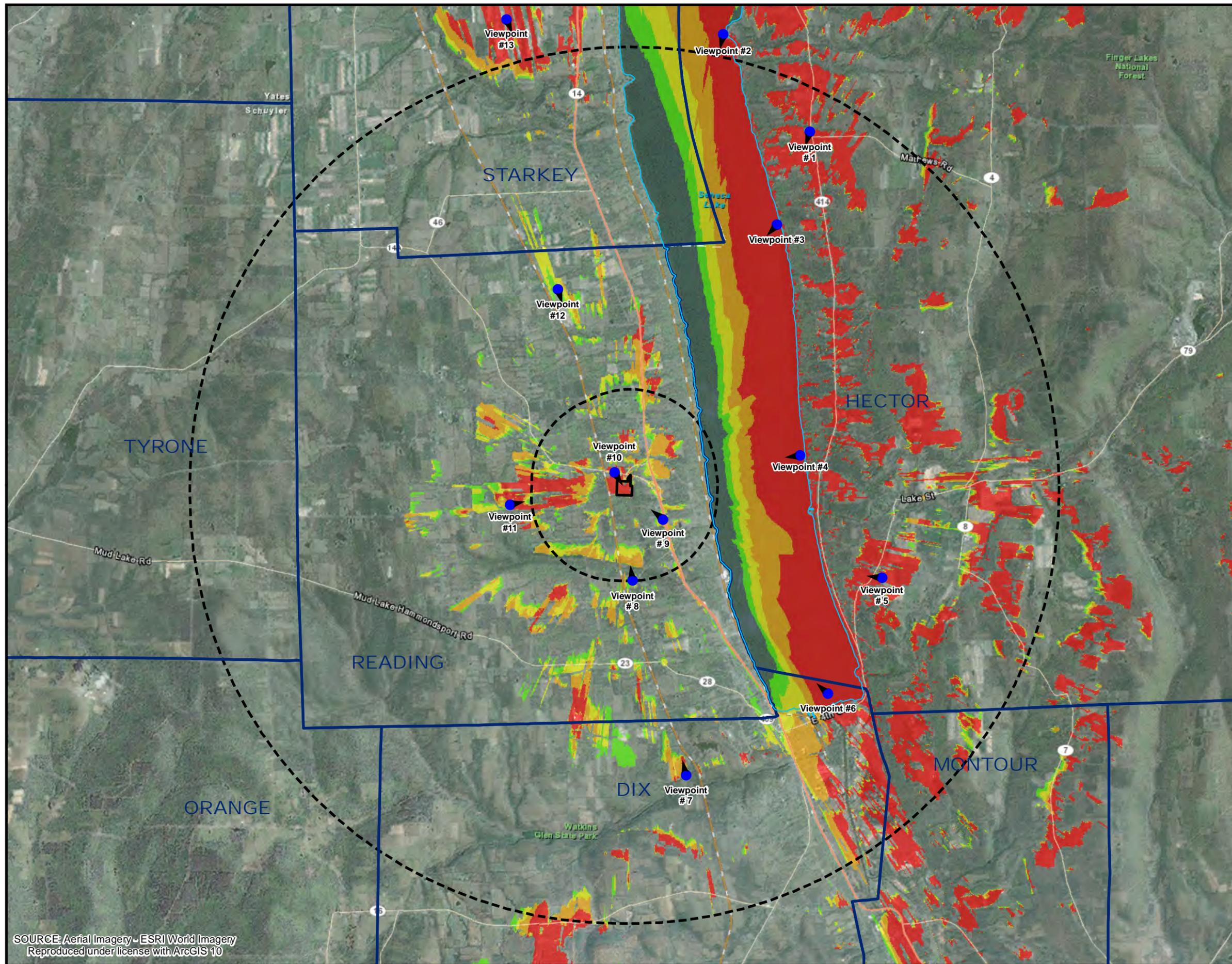
Viewpoint 1: State Route 414 - Inland: 5.8 miles NE of Site

Depending upon forest cover and elevation, the project will be visible from various locations in this general area on the eastern side of Seneca Lake. At this specific location, which is 150 feet lower than the project site and within a large field, 75-100% of the 213 foot proposed stack (height \geq 53 feet of the 213 foot stack) is predicted to be visible. The only significant

visual resource near Viewpoint 1 is the First Presbyterian Church of Hector (1.25 miles in the opposite direction from the site) and at 5.8 miles from the Project Site the stack and buildings should have limited impacts on the view. The site is obscured from view in the field photo by a large tree in the foreground but would be visible from other nearby areas where vegetation screening does not occur. The single row of trees in this photo provides a good example of where a reduction in screening effects may occur under leaf-off conditions.

Photo 1.1 Viewpoint 1: Facing southwest across Seneca Lake





Legend

- Seneca Lake Shoreline
- Municipal Boundaries
- Proposed Site Boundary
- 1 & 5 Mile Buffers of Site Boundary
- Viewpoint Location

Potential Visibility of Emissions Stack

- Not Visible
- < 25% of Structure Visible
- 25 - 50% of Structure Visible
- 50 - 75% of Structure Visible
- 75 - 100% of Structure Visible

NOTES:
 This figure depicts the potential visibility of a 213 foot high Emissions Stack using a vegetation corrected elevation model of the ground surface from the National Elevation Dataset (NED). The effect of screening from existing interpretation has been included in this analysis using information on forest cover extents from the USDA 2010 Cropland Data Layer. Refer to the accompanying report for a full description of the analysis methodology.

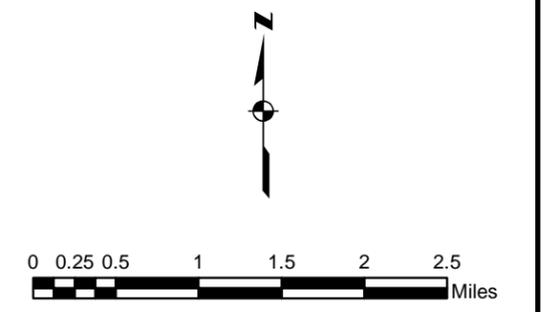


Figure 1.15: Potential Visibility of 213 foot Emissions Stack and Viewpoint Locations Vegetation Corrected Elevation Model
 NYSEG
 Compressed Air Energy Storage (CAES) Project
 Town of Reading
 Schuyler County, NY

SOURCE: Aerial Imagery - ESRI World Imagery
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Path: G:\Graphics\Clients_V_2\WorleyParsons\Walkins Glen, NY\MXD\WorkingFigures\Visualizations\StackVisibility_213FL_ForestCorrected_ViewpointLocs.mxd

Viewpoints 2-4: Northeastern and eastern Waterfront: 2-5.5 miles E and NE of Site

The Project Site is predicted to be visible from the entire eastern shoreline of Seneca Lake from 3.5 miles to the southeast to 12 miles to the northeast of the Site. The lakeshore is approximately 560 feet below the project site, but despite this height differential the 213 foot stack will primarily be visible, although against a background of trees rather the sky due to the presence of the ridge rising behind the site to the west.

Significant tree cover along most of the shoreline will likely screen the visibility of the Project Site further inland to the east. However, the lakeshore and lake itself has a high recreational value with many waterfront residents along the shoreline. Few public access points exist along the shoreline except for Warren Clute Public Park and the North Country Scenic Trail, both to the southeast in Watkins Glen. Photographs were taken along the eastern coast at 5.5 miles NE (Viewpoint 2), 3.5 miles NE (Viewpoint 3) and 2 miles E (Viewpoint 4). Photos were taken from a boat on the lake and the exact position of the Project Site cannot be pinpointed in the photographs.

Photo 1.2 *Viewpoint 2: Facing south across Seneca Lake from the lakeshore*



Photo 1.3 *Viewpoint 3: Facing southwest across Seneca Lake from the lakeshore*



Photo 1.4 Viewpoint 4: Facing west across Seneca Lake from the lakeshore



Viewpoint 5: Country Road 9 - Inland: 3 miles ESE of Site

Viewpoint 5 lies within a large agricultural area with extensive fields on top of the ridge on the eastern side of the lake. This elevation, combined with an increasing density in forest cover, shields the inland areas east of Seneca Lake to the view of the Project Site. However, areas with expansive agricultural fields have a predicted visibility of the Site. The only documented aesthetic resource in the area of Viewpoint 5 is the North Country Scenic Trail (0.5 miles west of Viewpoint 5). Because of the higher elevation of the project site and extensive agricultural fields in the vicinity of the Viewpoint, approximately 75-100% of the 213 foot proposed emissions stack is predicted to be visible from this viewpoint.

Photo1.5 *Viewpoint 5: Facing northwest from the ridge on the eastern side of Seneca Lake*



Viewpoint 6: Watkins Glen Lakeside Park - Waterfront: 3.5 miles SE of Site

This viewpoint is low-lying, not much higher than the lake surface itself approximately 540 feet lower than the Project Site, primarily consisting of high-density development, mixed and deciduous forest and wetland. Due to the lower elevation and Seneca Lake, approximately 75-100% of the 213 foot proposed stack is predicted to be visible from this viewpoint, which is situated in front of the Lakeside Park. This view already includes the US Salt Works on the lakeshore, which is visible in the same line of sight.

In general, the southern end of Seneca Lake, including a large portion of Watkins Glen (~3 miles away), has a high predicted visibility (>50% of proposed 213 foot stack). The southeastern corner of the lake has the highest probability of visibility (75-100% of proposed 213 foot stack). Further inland to the east the predicted visibility drops as forest cover increases and shields the project site (4 miles SE). However, inland areas to the east with high agricultural use still have high predicted visibility due to open, expansive fields. Most of the downtown area and the entire waterfront along the southern edge of Seneca Lake have some level of predicted visibility of the proposed 213 foot stack. The southwestern corner of the lake has the lowest potential visibility along the shoreline (25-50%), versus the southeastern corner of the lake which has a higher predicted visibility (75-100%).

Approximately 50-75% of the 213 foot stack is predicted to be visible from the downtown Watkins Glen area. However, within these developed areas of Watkins Glen existing buildings should provide additional screening of the Project Site depending on building height (accounting for building screening has not been included in this Phase 1 analysis). Various aesthetic resources can be found in this area (see *Section 1.3.3*), although in several cases these aesthetic resources exist in areas of intense development, where as noted above the buildings may screen the view of the Project Site.

Photo 1.6 Viewpoint 6: Facing northwest from Warren Clute Park



Viewpoint 8: Irelandville: 1 mile S of Site

This viewpoint is situated to the south of the Project Site at approximately the same elevation. Tree cover will likely screen most of the site structures. However, 50-75% of the 213 foot stack will be visible above the trees against the sky.

Photo 1.8 *Viewpoint 8: Facing north towards the Project Site*



Viewpoint 9: Gabriel's Junction – Route 14: 0.5 miles SE of Site

Viewpoint 9 is on highway 14A to the southeast of the site where there is a small cemetery adjacent to the road. Although this does not classify as a specific aesthetic resource under NYSDEC guidelines, the site will have cultural value to users from the local community. The adjacent forest and elevation below the site will obscure most of the Project Site structures. However 25-50% of the 213-foot stack (top 107 feet) is predicted to be visible above the trees from this viewpoint.

Due to its close proximity to the site, seasonal changes in tree cover may drastically reduce screening of the site and this viewpoint will require re-evaluation under leaf-off conditions.

Photo 1.9 Viewpoint 9



Viewpoint 10: Route 14 A: 0.2 miles NW of Site

This Viewpoint is taken from Route 14A, approximately 0.2 miles NW of the proposed CAES Project site. Areas directly north of the site have a high predicted visibility (75-100% of 213-foot stack) depending upon forest cover and agricultural fields. This viewpoint is taken from the same approximate elevation and no aesthetic resources exist in the area. Due to proximity this viewpoint has a high predicted visibility (75-100%) of the 213 foot stack above the visible tree cover. Existing commercial/industrial buildings can be seen in the foreground of the view and it would be expected that new CAES structures and buildings on the proposed site will benefit from similar partial screening by the surrounding vegetation.

Photo 10 *Viewpoint 10: Facing southeast towards the site from Route 14A*



Viewpoint 11: Jennings Road: 1.3 miles W of Site

Areas directly west of the site have a high predicted visibility due to the lack of forest cover and abundance of agricultural fields. This viewpoint is taken along Jennings road that extends directly west and provides a direct line of sight to the proposed site. This viewpoint is situated approximately 400 feet above the Project Site. To the west of this viewpoint, elevation increases and then flattens, screening most areas further to the west. From this location 75-100% of the proposed stack is predicted to be visible against the backdrop of fields and forest on the eastern side of Seneca Lake. In addition, this viewpoint includes the area along the transmission line right-of-way which will reduce screening of the site.

Photo 11 *Viewpoint 11: Facing east downhill towards the Project site*



Viewpoint 12: Chase Road: 2.4 miles N of Site

Areas north of the CAES Project site have a low predicted visibility due to elevation and forest cover. This viewpoint is situated at approximately the same elevation as the Project site and approximately 25-50% of the proposed stack is predicted to be visible above the tree cover that forms the skyline.

Photo 12 *Viewpoint 12: Facing south across agricultural fields*



Viewpoint 13: Route 44: 5.5 mile N of Site

Viewpoint 13 has a high predicted visibility (75-100% of proposed stack), although from this distance the effect the proposed stack would have on the surrounding landscape will be appreciably reduced. This viewpoint is situated at approximately the same elevation as the Project site; therefore the stack will be visible above the trees on the skyline. For reference, the existing transmission towers visible on the left hand side of the photo are approximately 0.7 miles away.

Photo 13

Viewpoint 13



1.3.3 *Inventory of Aesthetic Resources*

In accordance with the NYSDEC Program Policy (DEP-00-2) titled, “Assessing and Mitigating Visual Impacts” (7/31/2000), important aesthetic resources, as defined by the state, were inventoried and analyzed to determine if the proposed CAES Project site may adversely affect these sensitive visual resources. *Figure 1.14* shows the location of all qualifying aesthetic resources (i.e., must be evaluated by a visual assessment) as defined by the NYSDEC regulations within a 10-mile radius of the Project Site. These aesthetic resources are described in the following sections with their location relative to the Project Site, and the predicted visibility based on the Viewshed analysis. Note, all estimates of visibility cited are based on the vegetation corrected model for the 213-foot stack.

1.3.3.1 *National or State Register of Historic Places*

There are 24 properties in the National Register of Historic Places within a 10-mile radius of the site (*Table 1.3*)

Table 1.3 *Predicted Visibility of Project Stack from sites on National or State Register of Historic Places*

Map ID	Site Description	Distance from Site	Predicted Visibility
1	Watkins Glen Grand Prix Course	2.7 miles south	Zero from majority of site. <75% from visible sections
2	Chapman, A.F., House	3.2 miles south	0%
3	First Baptist Church of Watkins Glen	3.4 miles south	50-75%
4	US Post Office - Watkins Glen	3.4 miles south	50-75%
5	Schuyler County Courthouse Complex	3.5 miles south	50-75%
6	First Presbyterian Church of Hector	5.5 miles northeast	75-100%
7	Brick Tavern Stand	5.9 miles southeast	75-100%
8	Montour Falls Historic District	5.9 miles southeast	<25%
9	Logan Methodist Church	6.0 miles southeast	0%
10	Noyes, John, House	6.8 miles north	Zero from majority of site. 75-100% from visible sections

Map ID	Site Description	Distance from Site	Predicted Visibility
11	Lee School	7.2 miles southeast	0%
12	McCloud, J.M., House	7.5 miles north	0%
13	Dundee Village Historic District	7.5 miles north	<25%
14	First Presbyterian Church	7.6 miles north	0%
15	Dundee Methodist Church	7.7 miles north	0%
16	Starkey Corners Methodist Church	7.9 miles north	0%
17	Hair, Uriah, House	8.1 miles north	0%
18	Weston Schoolhouse	8.4 miles west	0%
19	Curtis, Thomas Bennet, House	8.5 miles north	0%
20	Spicer-Millard House	8.6 miles northwest	0%
21	Queen's Castle	8.9 miles north-northeast	75-100%
22	Swortz, William, House	9.2 miles north	75-100%
23	Spence, Dr. Henry, Cobblestone Farmhouse and Barn Complex	9.3 miles north	0%
24	Supplee, Daniel, Cobblestone Farmhouse	9.4 miles north	50-75%

1.3.3.2 *State Parks*

Watkins Glen State Park is approximately 3.2 miles south of the Project Site. Apart from a small section of open land on the western edge of the park, the proposed stack has no predicted visibility due to the extensive forest cover.

1.3.3.3 *Urban Cultural Parks*

There are no Urban Cultural Parks within a 10-mile radius of the Project Site

1.3.3.4 *State Forest Preserve*

The site is not located near the Adirondack or Catskill Parks which are defined as The State Forest Preserve by the NYS Constitution Article XIV. However, Sugarhill State Forest is approximately 3 miles southwest of the Project site, extending to 10 miles southwest. Due to the raised elevation between the state owned forest and the Project site, there is no predicted

visibility of the proposed 213-foot stack from any part of this property. Similarly, Texas Hollow State Forest (6 miles southeast) is also blocked from view by the intervening ridge.

1.3.3.5 *National Wildlife Refuges, State Game Refuges and State Wildlife Management Areas*

There are no National Wildlife Refuges in a 10-mile radius of the Proposed site. However, there is a state-owned Wildlife Management area located approximately 4 miles southeast of the proposed site, extending to 6 miles southeast called the Catharine Creek Wildlife Management Area (WMA). This WMA is low-lying and primarily consists of herbaceous wetlands. The majority of the WMA has a predicted visibility of 75-100% of the proposed 213-foot stack.

1.3.3.6 *National Natural Landmarks*

There are no National Natural Landmarks within a 10-mile radius of the Proposed site

1.3.3.7 *The National Park System, Recreation Areas, Seashores, Forests*

The Green Mountain and Finger Lakes National Forest is located approximately 3 miles east of the Project site and extends until roughly 14 miles northeast of the site. The vast majority of this National Forest has no predicted visibility of the proposed 213-foot stack as the forest will screen potential views. However, some areas where there are breaks in tree cover are predicted to have high visibility of the stack.

1.3.3.8 *Rivers designated as National or State Wild, Scenic or Recreational*

There are no rivers designated as National, or State Wild, Scenic or Recreational within a 10-mile radius of the Proposed site.

1.3.3.9 *A site, area, lake, reservoir or highway designated or eligible for designation as scenic*

There is a proposed scenic byway that will cross south of Seneca Lake through Watkins Glen, Hector, and Lodiⁱ. At this time, ERM was unable

ⁱ Source: <https://www.nysdot.gov/display/programs/scenic-byways/seneca-lake-hector-lodi>

to obtain the exact route of this proposed Scenic Byway and therefore could not perform a determination of visibility impact for this resource.

1.3.3.10 *Scenic Areas of Statewide Significance*

There are no Scenic Areas of Statewide Significance within a 10-mile radius of the Proposed site.

1.3.3.11 *A State or federally designated trail, or one proposed for designation*

The North Country National Scenic Trail spans seven states and once completed, it will be the longest contiguous hiking trail in the United States (<http://northcountrytrail.org/>). Once constructed, the trail will pass through the southern edge of the Finger Lakes National Forest, extend west to the eastern edge of Seneca Lake, turn south and pass through Watkins Glen and then head West towards Sugarhill State Forest. The majority of the trail that passes within 10 miles of the Project Site does not have a predicted visibility of the proposed 213-foot stack. However, some sections near Seneca Lake, 3-5 miles southeast of the Proposed site, would have some visibility impacts. The southeastern section of the trail that passes through Watkins Glen along Seneca Lake (4.6 miles SE of proposed site) has the highest predicted visibility (large areas of 75-100% predicted visibility of proposed 213 foot stack).

1.3.3.12 *Adirondack Park Scenic Vistas*

The Proposed Site is not located near Adirondack Park.

1.3.3.13 *State Nature and Historic Preserve Areas*

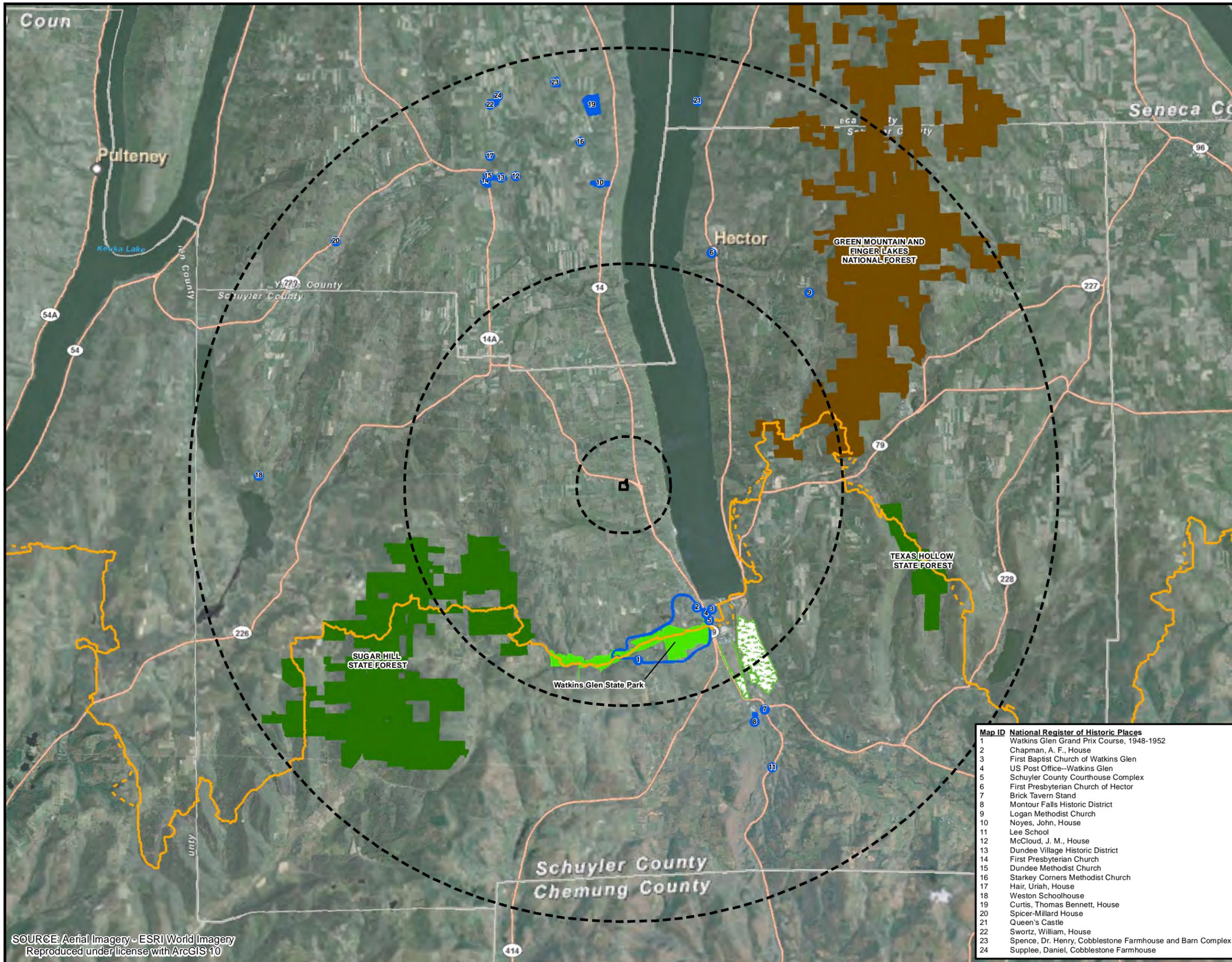
There are no State Nature or Historic Preserve areas located within a 10-mile radius of the Proposed Site.

1.3.3.14 *Palisades Park*

The Proposed site is not located near Palisades Park.

1.3.3.15 *Bond Act Properties purchased under Exceptional Scenic Beauty or Open Space category*

Research has not identified any Bond Act Properties purchased under Exceptional Scenic Beauty or Open Space category near the Proposed site. Prior visual resource studies in the area have also not identified any Bond Act Properties.



Legend

Aesthetic Resources

- National Register of Historic Places
- State Parks
- State Forests
- Catharine Creek WMA
- Green Mountain and Finger Lakes National Forest
- Existing North Country National Scenic Trail
- Proposed North Country National Scenic Trail

Site Features

- Proposed Site Boundary
- 1, 5 & 10 Mile Buffers of Site Boundary

SOURCE:
National and State Register of Historic Places: New York State Parks and Recreation and Historic Preservation (NYS OPRHP)
State Parks: NYS OPRHP
State Forests: New York State Department of Environmental Conservation (NYSDEC)
Wildlife Management Areas: NYS DEC
National Forests: NYS OPRHP
North Country National Scenic Trail: National Park Service



Map ID	National Register of Historic Places
1	Watkins Glen Grand Prix Course, 1948-1952
2	Chapman, A. F., House
3	First Baptist Church of Watkins Glen
4	US Post Office--Watkins Glen
5	Schuyler County Courthouse Complex
6	First Presbyterian Church of Hector
7	Brick Tavern Stand
8	Montour Falls Historic District
9	Logan Methodist Church
10	Noyes, John, House
11	Lee School
12	McCloud, J. M., House
13	Dundee Village Historic District
14	First Presbyterian Church
15	Dundee Methodist Church
16	Starkey Corners Methodist Church
17	Hair, Uriah, House
18	Weston Schoolhouse
19	Curtis, Thomas Bennett, House
20	Spicer-Millard House
21	Queen's Castle
22	Swortz, William, House
23	Spence, Dr. Henry, Cobblestone Farmhouse and Barn Complex
24	Supplee, Daniel, Cobblestone Farmhouse

SOURCE: Aerial Imagery - ESRI World Imagery
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Figure 1.16: Aesthetic Resources
 NYSEG
 Compressed Air Energy Storage (CAES) Project
 Town of Reading
 Schuyler County, NY



Path: G:\Graphics\Clients_VJ_ZWorley\Parsons\Watkins Glen, NY\Map\Working\Figures\Visualizations\AestheticResources\Overview_Rev1.mxd

This Phase 1 Visual Resources assessment provides a preliminary overview of potential visibility impacts of the proposed CAES Project site. This preliminary review reveals that while Project structures will be visible from many locations, areas of forest cover surrounding the Project site and more generally throughout the Project area will in many instances limit visibility of the 213 foot stack, the tallest project structure. Other structures, such as the turbine building, will be more effectively screened by nearby tree stands, limiting the visibility of the CAES plant. Assumptions made, e.g., height of tree cover, for Phase 1 have been conservative, to ensure that visibility is overestimated rather than underestimated.

At this preliminary stage based on both the Viewshed Analysis and the subsequent field survey the primary areas of concern for potential visual impacts are:

- **Watkins Glen:** From within the town and along the waterfront at the southern end of the Seneca Lake the proposed project is predicted to be visible when looking out across the lake. This view already contains the US Salt Works on the lake shore (*Viewpoint 6*)
- **Eastern Shore of Seneca Lake:** Lake shore residents on this side of the lake and recreational users will have direct views of some of the project structures (*Viewpoints 2, 3 & 4*).
- **Project Site Vicinity:** In the immediate vicinity of the site (< 1 mile) views are likely to be impacted not only by the stack but also by other project structures such as the turbine building, and transmission line. Of the four viewpoints recorded within this radius (*8, 9, 10 & 11*), *Viewpoint 9* poses the greatest potential for concern because of the impact on the cemetery at this location.

This Phase 1 preliminary assessment provides an initial review of anticipated visual resource impacts associated with building the CAES Project. However, there are limitations with the current approach that will need to be addressed during Phase 2 of the Project. Key points to be addressed during Phase 2 include:

- **Accurate Screening Heights:** More accurate estimates of tree cover heights are available by using existing Light Detection and Ranging (LiDAR) elevation data for the CAES study area coupled with field verification. LiDAR is an airborne sensor to capture high resolution elevations of the ground surface and includes data on treetop heights

and any other screening features (e.g., buildings) and is already available in the vicinity of the site from a commercial data provider. Any change in tree cover height, particularly in the immediate vicinity of the Project Site may substantially alter the areas of potential visibility. Building heights and their screening effects in Watkins Glen should also be further evaluated.

- **Seasonal Field Surveys:** The majority of forest cover in the Project Area is mixed deciduous and coniferous. Consequently, some variation in screening can be expected at different times of year corresponding to leaf-on and leaf-off conditions. ERM recommended viewpoints should be visited again in winter conditions to assess these variations. If possible, additional field surveys should make use of an observable balloon tethered over the site to aid viewing of the proposed stack location during surveys. Typically this procedure uses a brightly colored (e.g., yellow, orange) 10-15 foot high balloon that would be clearly visible against the expected background (i.e., trees, sky). Note placement of the balloon would need to occur after the CAES Project has been officially communicated to the public so as not draw undue attention to the project.
- **Cultural Resources:** In addition to the aesthetic resources defined by NYSDEC, there are additional cultural resources in the area that have been identified during the cultural resource assessment. It will be necessary to include an evaluation of potential visibility for all of these sites during Phase 2.
- **Cooling Tower Plume Assessment:** While the CAES stack will be the most permanent prominent visual structure for the project, the associated plume from the cooling tower could potentially be more extensively visible under certain atmospheric conditions. ERM recommends that for Phase 2, once the final engineering design has been completed, that a comprehensive cooling tower plume visibility assessment be undertaken using the CALPUFF air quality dispersion model to understand the potential temporal and spatial visibility of the plume.
- **Mitigation Strategies:** In general, the stack will most commonly be visible against the skyline, although from some locations the background will be forest and field cover. Phase 2 will need to consider mitigation options for building materials and surface finishes for all CAES project structures, taking into account the visible background. Following the seasonal vegetation screening assessment, it is also recommended that options be considered for new plantings to provide additional screening either at the site itself or potentially at key resource locations on other landowners property.

REFERENCES CITED

- Assessing and Mitigating Visual Impacts, (7/31/2000). *New York State Department of Environmental Conservation (NYSDEC DEP-00-2).*
- National Elevation Dataset, (1999). *U.S. Geological Survey (USGS), EROS Data Center.*
- USDA, National Agricultural Statistics Service, 2010 New York Cropland Data Layer, (1/10/2011). *United States Department of Agriculture (USDA), National Agricultural Statistics Service (NASS), Research and Development Division (RDD), Geospatial Information Branch (GIB), Spatial Analysis Research Section (SARS).*
- Using Viewshed and Observer Points for visibility analysis, (6/29/2011). *Environmental Systems Research Institute (ESRI).*
(<http://help.arcgis.com/en/arcgisdesktop/10.0/help/index.html#/009z000000v8000000.htm>),

Attachment 1 - NYSEG CAES GEP Stack Height Estimation

NYSEG CAES GEP Stack Height Estimation **(Revision 1, 26-Sept-2011)**

The following is a preliminary estimation of the stack heights associated with Cycles 1 and 2 for the NYSEG CAES Project based on updated building dimensions. From the regulations pertaining to the prevention of significant deterioration of air quality (PSD), 40 CFR 52.21(h) Stack heights - The degree of emission limitation required for control of any air pollutant under this section shall not be affected in any manner by -- (i) So much of the stack height of any source as exceeds good engineering practice (GEP), or (ii) Any other dispersion technique. So the height of the new stack was estimated based on not exceeding GEP stack height.

The EPA has promulgated regulations which establish the practice of using a formula for determining the GEP stack height needed to avoid excessive concentrations of air pollutants in the immediate vicinity of the source as a result of atmospheric downwash, wakes or eddies which may be caused by the source itself, nearby structures or nearby terrain features (40 CFR 51.100(ii)). According to this regulation, "Good engineering practice" (GEP) stack height means the greater of:

1. 65 meters (213 feet), measured from the ground-level elevation at the base of the stack, or
2. $H_g = H + 1.5L$,

Where:

H_g = GEP stack height, measured from the ground-level elevation at the base of the stack

H = Height of nearby structure(s) measured from the ground-level elevation at the base of the stack

L = Lesser dimension, height or projected width, of nearby structure(s)

The following table presents a preliminary GEP stack height determination/calculation based on an interpretation of the regulations and guidelines, and the predominant structures "nearby" the new stack, which is the Turbine/Compressor Building for both Cycles. There are no nearby elevated terrain features nor prominent off-site structures to affect this determination.

STRUCTURE	- ESTIMATED DIMENSION -				ESTIMATED GEP STACK HEIGHT, Hg
	HEIGHT (1)	WIDTH	LENGTH	PROJECTED WIDTH (2)	
Cycle 1-Turbine/Compressor Building	57'-6" (L)	75'-8"	394'-4"	NA	143'-9"
Cooling Tower	72'-4" (L)	66'-0"	240'-0"	NA	180'-10" (G)
Cycle 2-Turbine/Compressor Building	76'-0" (L)	109'-8"	447'-11"	NA	190 ft (G)
Cooling Tower	72'-4" (L)	66'-0"	240'-0"	NA	180'-10"

L = Lesser dimension of height or projected width. (Ground level elevation at stack foundations assumed to be the same as throughout the site.)

G = Per regulation GEP stack height is 213 feet.

- Note: (1) Heights are based on a ground level elevation of the stack. The height of the mechanical draft cooling tower includes the five, 34'-4" diameter, 13'-9" high exhausts.
- (2) The new stacks are being located west of the cooling tower in both cycles, and south of the Turbine/Compressor Building in Cycle 1 and north of the Turbine/Compressor Building in Cycle 2. Because the Cooling Tower for Cycle 1 and the Turbine/Compressor Building for Cycle 2 are the highest structure in the vicinity of the stacks and are wider than they are tall, the projected widths were not estimated in order to simplify the determination.

Based on the above estimation of the stack height, a stack height of 180'-10" was determined to be GEP for Cycle 1 and 190 feet for Cycle 2. Per the regulation, a stack up to 65 meters (213 feet) can be installed and not exceed GEP. So a stack height of **213 feet** is the **maximum** height that can be used in the PSD air quality modeling. A stack taller than 213 feet can be installed, but credit can only be taken for that portion that does not exceed GEP. Likewise a stack shorter than 180'-10" for Cycle 1 and 190 feet for Cycle 2 can be installed as long as the emissions from the source do not cause a violation of ambient air quality standards, do not exceed PSD ambient air increments, do not cause impairment to visibility, and do not cause a violation of any applicable safety and building codes.

The reviewing agency may require the use of a field study or fluid model to verify GEP stack height for the source.

There is a computer program (Building Profile Input Program [BPIP]) that calculates Building Heights and Projected Building Widths "values for every quarter of a degree for a full 360 degrees" of wind direction. The information presented in this document is not nearly as detailed as can be performed by this program. The BPIP probably should be utilized to confirm the GEP calculation presented here.

Reference:

Drawing Number: CAES-1-DW-111-002-101, Revision C, General Arrangement Cycle 1, Site Plan

Drawing Number: CAES-1-DW-111-002-102, Revision A, General Arrangement Cycle 1, Elevations and Sections

Drawing Number: CAES-1-DW-111-002-201, Revision D, General Arrangement Cycle 2, Site Plan

Drawing Number: CAES-1-DW-111-002-202, Revision A, General Arrangement Cycle 2, Elevations and Sections (In Preparation)

“Guideline for Determination of Good Engineering Practice Stack Height”, (Technical Support Document for the Stack Height Regulations), EPA, EPA-450/4-80-023R, June 1985.