



*Vanasse Hangen Brustlin, Inc.*

54 Tuttle Place  
Middletown, Connecticut 06457  
860 632-1500  
FAX 860 632-7879

**Memorandum**

To: Deb Osterhoudt, P.G.  
Infinigy Engineering & Surveying, PLLC  
11 Herbert Drive  
Latham, NY 12110

Date: October 6, 2010

Project No.: 40938.06

From: Vanasse Hangen Brustlin, Inc.

Re: Proposed Telecommunications Facility  
North Atlantic Towers LLC  
Preliminary Viewshed Analysis  
Naugatuck - CT1126  
880 Andrew Mountain Road  
Naugatuck, Connecticut

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Infinigy Engineering, on behalf of North Atlantic Towers LLC, has requested that Vanasse Hangen Brustlin, Inc. (VHB) complete a preliminary assessment of the potential visibility of a 120-foot tall telecommunications facility ("Facility") proposed for location on property at 880 Andrew Mountain Road in the town of Naugatuck, Connecticut ("host property"). The proposed 120-foot tall structure would replace an existing 100-foot tall monopole currently located on the host property. As part of the analysis, VHB has prepared the attached preliminary viewshed map, which identifies areas of potential year-round visibility associated with both the existing monopole and the proposed Facility within a two-mile radius ("Study Area"). The western portion of the Study Area extends into the neighboring towns of Oxford and Middlebury. The following provides a brief description of the proposed Facility and explains the methodologies used to prepare the preliminary viewshed map.

The proposed Facility would include the installation of 120-foot tall monopole with associated ground equipment located within a fence-enclosed compound area at the base of the tower structure. The ground elevation at the proposed Facility is approximately 852 feet above mean seal level.

The attached preliminary viewshed map was generated using ArcGIS® Spatial Analyst, a computer modeling tool developed by Environmental Systems Research Institute, Inc., to calculate the areas from where at least the top of the existing monopole (100 feet AGL) and the proposed Facility (120 feet AGL) is expected to be visible. Project- and Study Area-specific data were incorporated into the computer model, including tower heights, ground elevation, underlying and surrounding topography and existing vegetation. Information used in the model included Connecticut LiDAR<sup>1</sup>-based digital elevation data

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<sup>1</sup> LiDAR is an acronym for Light Detection and Ranging. It is a technology that utilized lasers to determine the distance to an object or surface. LiDAR is similar to radar, but incorporates laser pulses rather than sound waves. It measures the time delay between transmission and reflection of the laser pulse.

and model and a digital forest (or tree canopy) layer developed for the Study Area. The LiDAR-based Digital Elevation Model (DEM) represents ten-foot spatial resolution elevation information for the state of Connecticut that was derived through the spatial interpolation of airborne LiDAR-based data collected in the year 2000 and has a horizontal resolution of ten (10) feet. The data was edited in 2007 and made available by the University of Connecticut through its Center for Land Use Education and Research (CLEAR). To create the forest layer, mature trees and woodland areas depicted on aerial photographs (ranging in dates from 2004 to 2008) were manually digitized (hand traced) in ArcGIS®, creating a geographic data layer for inclusion in the computer model. The black and white, digital aerial photographs, obtained from the Connecticut Department of Transportation, were flown in the spring of 2004 and selected for use in this analysis because of their image quality and depiction of pre-leaf emergence (i.e., “leaf-off”) conditions. These photographs are half-foot pixel resolution. The more recent aerial photographs (2006 and 2008) were overlaid and evaluated to identify any new development resulting in the removal of trees.

Once the specific data layers were entered, the ArcGIS® Spatial Analyst Viewshed tool was applied to achieve an estimate of locations where the existing and proposed structures could be visible. First, only topography was used as a possible visual constraint; the tree canopy was omitted to evaluate potential visibility with no intervening vegetative screening. The initial omission of this data layer resulted in an excessively conservative prediction, but it provided an opportunity to identify areas within potential direct lines of sight of the Facility. The forest data layer was then overlaid and built into the DEM, using a conservative average tree canopy height of 50 feet, to establish a baseline assessment of intervening vegetation.

As a final step, the forested areas were extracted from the areas of visibility, using a conservative assumption that a person standing within the forest will not be able to view the proposed Facility beyond a distance of approximately 500 feet. Depending on the density of the intervening tree canopy and understory of the surrounding woodlands, it is assumed that some locations within this distance could provide visibility of at least portions of the existing and proposed structures at any time of the year. In “leaf-on” conditions, this distance may be overly conservative for most locations. However, for purposes of this analysis, it was reasoned that forested land beyond 500 feet of the proposed Facility would consist of light-impenetrable trees of a uniform height.

Also included on the map is a data layer, obtained from the State of Connecticut Department of Environmental Protection (“CTDEP”), which depicts various land and water resources such as parks and forests, recreational facilities, dedicated open space, CTDEP boat launches and other categories.

Based on this analysis, areas from where the existing 100 foot tall monopole is currently visible above the surrounding tree canopy comprise approximately 69 acres within the 8,042-acre Study Area, or less than one percent of the total land area contained therein. Year-round visibility increases slightly to approximately 81 acres with the introduction of the proposed replacement Facility at 120 feet AGL (roughly one percent of the Study Area). As shown on the preliminary viewshed map, year-round visibility associated with both the existing monopole and the proposed Facility occurs primarily in the immediate area of the host property and Andrews Hill, and at distances of a mile and beyond on heights of land to the north. To a lesser degree, several small, isolated areas of potential year-round visibility also occur to the southwest and southeast, at distances of approximately one mile and beyond the proposed Facility. This includes a short stretch of the State Bridle Path along the west shoreline of Towantic Pond in Oxford. The results of the preliminary assessment do not indicate an appreciable difference in the overall visibility associated with the proposed Facility in comparison to the 100-foot tall monopole that currently exists on the host property.

Although not depicted on the preliminary viewshed map, VHB estimates that near-view (within 0.5 mile) visibility would expand during leaf-off conditions along select portions of Andrew Mountain Road to the west and north of the host property and, to a lesser degree, along the hill’s southern slope and

lower elevations at its base to the east. During those months of the year when leaves are off the deciduous trees, views of the Facility could be attained through the trees from portions of these areas.



Proposed Tower  
Location

Existing View

**Site Location**

880 Andrew Mountain Road,  
Naugatuck, CT 06770

**Naugatuck - Simulation of Photo 1**  
CT-1126

**120' Monopole Simulation**  
View from Dorman Dr, approx. 0.21 miles Southwest of  
Proposed Location.  
Approx. 10% of tower visible through trees in winter.



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Proposed Tower Location



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**Site Location**

880 Andrew Mountain Road,  
Naugatuck, CT 06770

**Naugatuck - Simulation of Photo 2**  
CT-1126

**120' Monopole Simulation**

View from Dorman Dr., approx. 0.24 miles Southwest  
of Proposed Location.

Approx. 21% of tower visible through trees in winter.



Proposed Tower  
Location

Existing View

**Naugatuck - Simulation of Photo 3**

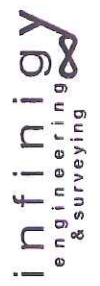
CT-1126

**120' Monopole Simulation**

View from Fieldstone Terrace, approx. 0.40 miles  
Southwest of Proposed Location.  
Approx. 10% of tower visible through trees in winter.

**Site Location**

880 Andrew Mountain Road,  
Naugatuck, CT 06770





**Site Location**

880 Andrew Mountain Road,  
Naugatuck, CT 06770

**Naugatuck - Simulation of Photo 4**  
CT-1126  
**120' Monopole Simulation**  
View from Corner of Fieldstone Terrace & Yorktown Ln.,  
approx. 0.40 miles Southwest of Proposed Location.  
Tower not visible.





Existing View

Proposed Tower  
Location

**Naugatuck - Simulation of Photo 5**

CT-1126

**120' Monopole Simulation**

View from Andrew Mountain Rd., approx. 0.14 miles  
Southwest of Proposed Location.

Approx. 30% of tower visible through trees in winter.

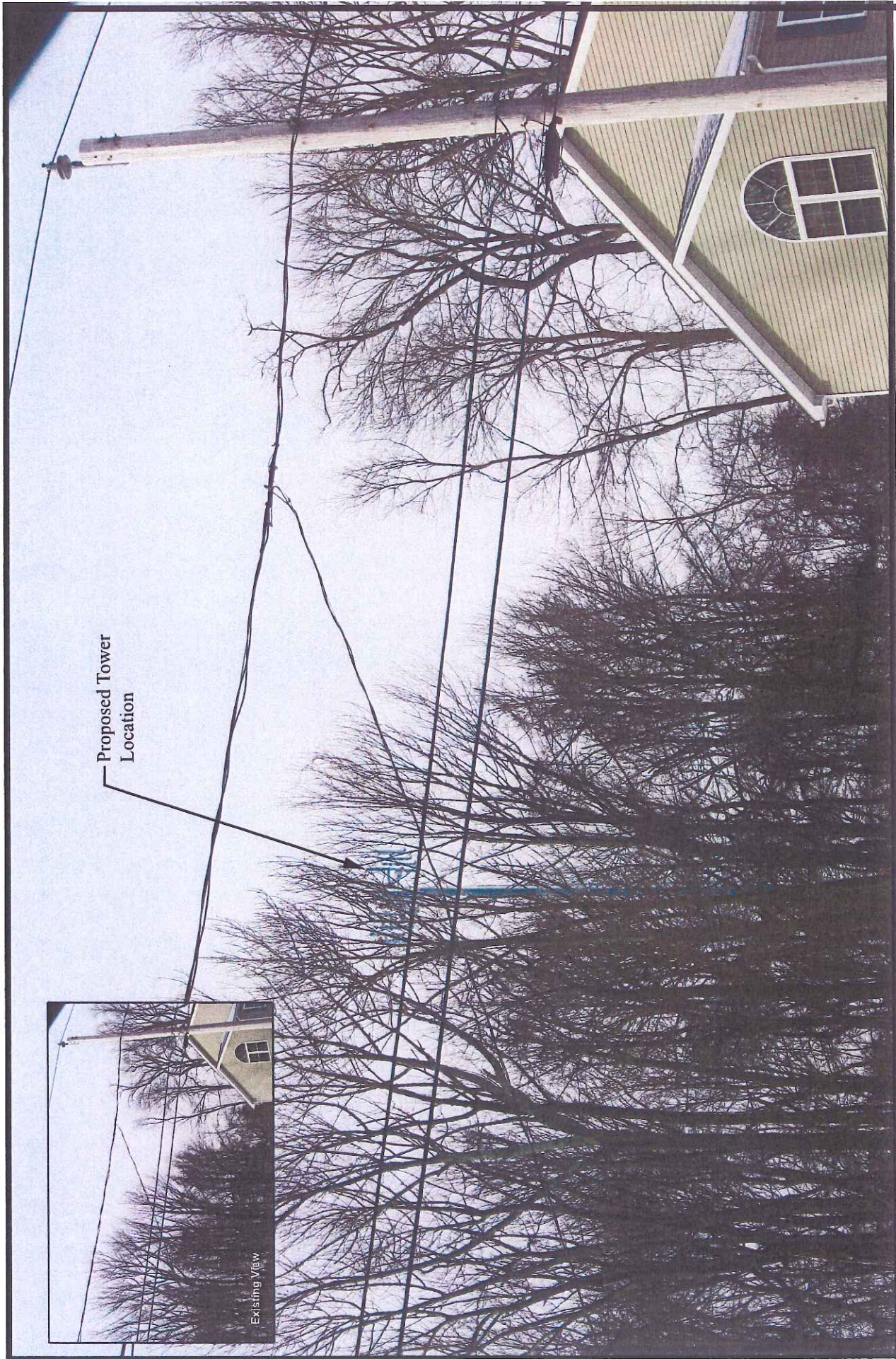
**Site Location**

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Proposed Tower  
Location

Existing View

**Naugatuck - Simulation of Photo 6**  
CT-1126

**120' Monopole Simulation**

View from Tower Lane, approx. 0.09 miles Northeast of Proposed Location.

Approx. 40% of tower visible through trees in winter.

**Site Location**

880 Andrew Mountain Road,  
Naugatuck, CT 06770



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Proposed Tower  
Location

Existing View

**Naugatuck - Simulation of Photo 7**

CT-1126

**120' Monopole Simulation**

View from Andrew Mountain Rd., approx. 0.32 miles  
Northeast of Proposed Location.

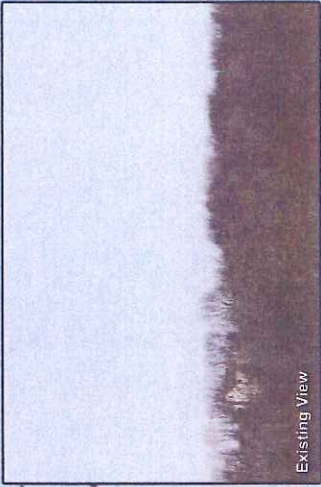
Approx. 20% of tower visible through trees in winter.

**Site Location**

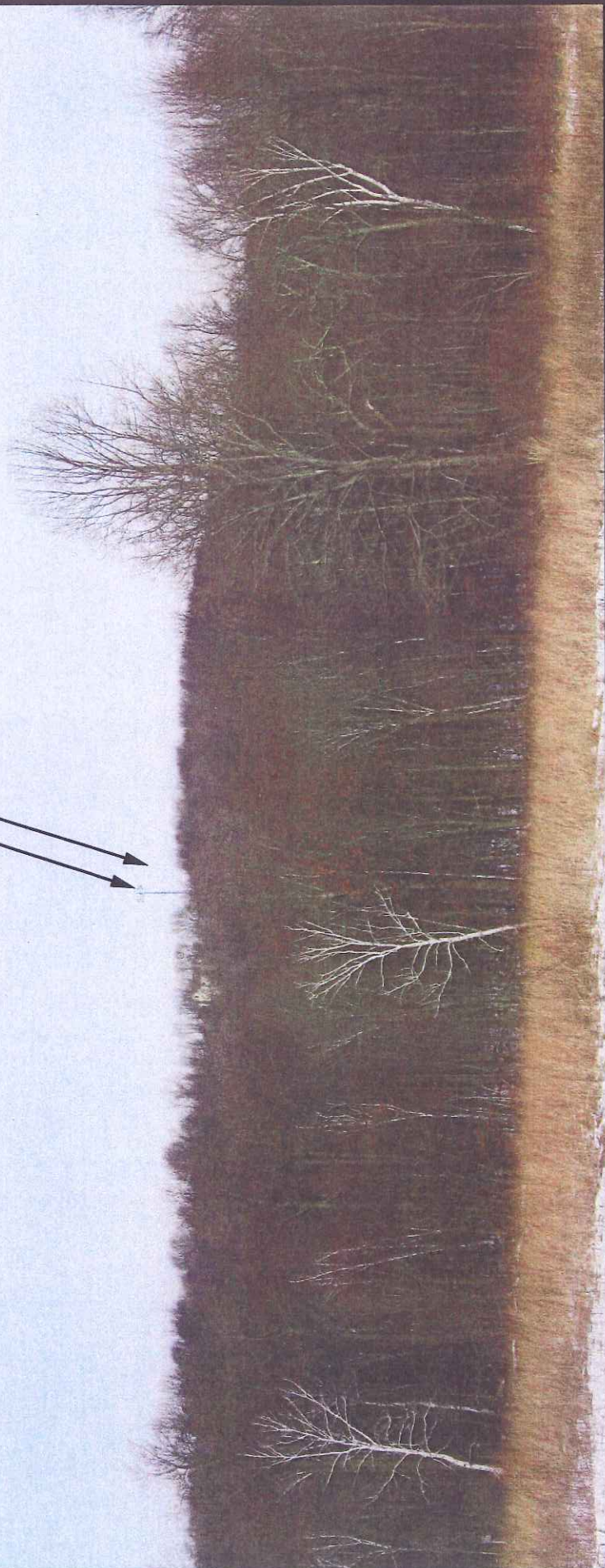
880 Andrew Mountain Road,  
Naugatuck, CT 06770



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Proposed Tower Location  
Existing Tower Location



**Naugatuck - Simulation of Photo 13**

CT-1126

**120' Monopole Simulation**

View from Hunter Mountain Rd., approx. 0.95 miles Southeast of Proposed Location.  
Approx. 23% of lower visible in winter conditions.

**Site Location**

880 Andrew Mountain Road,  
Naugatuck, CT 06770





Existing View

Proposed Tower  
Location

**Naugatuck - Simulation of Photo 14**

CT-1126

**120' Monopole Simulation**

View from Hunter Mountain Rd., approx. 0.96 miles  
Southeast of Proposed Location.  
Approx. 40% of tower visible through trees in winter.

**Site Location**

880 Andrew Mountain Road,  
Naugatuck, CT 06770

