Visual Resource Evaluation Report

Proposed Wireless Telecommunications Facility

1294 Pleasant Valley Road
North
Groton, Connecticut

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Visual Resource Evaluation

Optasite Towers LLC seeks approval from the Connecticut Siting Council for a Certificate of Environmental Compatibility and Public Need to construct a wireless telecommunications facility ("Facility") to be located on property at 1294 Pleasant Valley Road North ("host property") in the town of Groton, Connecticut. This "Visual Resource Evaluation" was conducted to approximate the visibility of the proposed Facility within a two-mile radius of the Site ("Study Area").

Project Introduction

The proposed Facility includes the construction of a 140-foot tall monopole and associated ground equipment to be located within a fenced enclosure at the base of the tower. Based on information provided by the project engineer, Clough Harbor Associates, LLP, the proposed project area is located at 142 feet above mean sea level (AMSL). Access to the proposed Facility would initially follow a partially paved driveway located on the host property then extend in a westerly direction to the project site.

Site Description and Setting

The host property includes 3.66 acres of land and is currently occupied by an enclosed kennel area and a small, single story commercial building currently used for canine grooming and related business activities. An associated driveway and parking area are also located on the host property. The proposed Facility is situated on an undeveloped portion of the host property, approximately 160 feet northwest of the enclosed kennel area. Land use within the general vicinity of the proposed Facility is comprised of medium-density residential parcels to the north, south and east; commercial and industrial land uses located along Route 12 to the west; and the US Naval Reservation (Groton submarine base) located off Route 12 further to the west. Segments of Interstate 95, Route 32 and Route 12 traverse the Study Area. In total, the Study Area contains roughly 75 linear miles of roadways.

The topography in the Study Area is generally characterized by rolling hills that range in ground elevation from approximately 5 feet AMSL along the banks of the Thames River to roughly 350 feet AMSL on top of Gunywamp Hill located to the east. The tree cover within the Study Area consists mainly of mixed deciduous hardwood species interspersed with stands of mature evergreen species. The tree canopy occupies approximately 4,600 acres of the 8,042-acre study area (57%). During the in-field activities associated with this analysis, an infrared laser range finder was used to accurately determine the average tree canopy height throughout the Study Area. Numerous trees were selected for measurement and the average tree canopy established, in this case 65 feet. Lastly, the Study Area features approximately 1,149 acres of surface water, dominated largely by the Thames River.

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METHODOLOGY

To estimate the visibility associated with the proposed Facility, VHB incorporates a two-fold approach utilizing both a predictive computer model and in-field analysis. The predictive model is employed to assess potential visibility throughout the entire Study Area, including private property and/or otherwise inaccessible areas for field verification. A "balloon float" and Study Area drive-through reconnaissance are also conducted to obtain locational and height representations, back-check the initial computer model results and provide photographic documentation from publicly accessible areas. Results of both activities are analyzed and incorporated into the final viewshed map. A description of the methodologies used in the analysis is provided below.

Visibility Analysis

Using ESRI's ArcView® Spatial Analyst, a computer modeling tool, the areas from where the proposed Facility is expected to be visible are calculated. This is based on information entered into the predictive computer model that includes the height of the proposed Facility, its ground elevation, the surrounding topography, existing vegetation and any significant structures/objects that may act to obstruct potential views such as tall buildings and/or elevated roadway infrastructure. Data incorporated in the model includes 7.5 minute digital elevation models (DEMs) and a digital forest layer for the Study Area. The DEMs were produced by the United States Geological Survey (USGS) in 1982 at a 30 meter resolution and serve as the topographic base underlying the model. The forest layer was derived through on-screen digitizing in ArcView® GIS. During this process, high-resolution, digital aerial photographs of the Study Area are incorporated into the computer model. The mature trees and woodland areas depicted on the aerial photos are manually traced in ArcView® GIS and then converted into a geographic data layer. The aerial photographs were produced in 2004 and have a pixel resolution of 0.5 foot.

Once the data are entered, a series of constraints is applied to the computer model to achieve an estimate of where the Facility will be visible. Initially, only topography was used as a visual constraint; the tree canopy is omitted to evaluate all areas of potential visibility without any vegetative screening. Although this is an overly conservative prediction, the initial omission of these layers provides a reference for comparison once the tree canopy is established and also assists in the evaluation of potential seasonal visibility of the proposed Facility. The forested areas within the Study Area were then overlaid on the DEM with a measured tree height of 65 feet added. The visibility was subsequently calculated and incorporated into the final Viewshed map. The forested areas are then extracted from the areas of visibility, with the assumption that a person standing among the trees will not be able to view the Facility beyond a distance of approximately 500 feet. Depending on the density of the vegetation in these areas, it is assumed that some locations within this range will provide visibility of at least portions of the Facility based on where one is standing.

Lastly, in order to calculate the approximate amount of the monopole structure that may be visible above the tree canopy, this process was repeated in 35-foot increments and the results combined into a single thematic data layer.

Also included on the map is a data layer, obtained from the Connecticut State Department of Environmental Protection (CTDEP), which depicts various land and water resources such as state parks and forests, recreational facilities, dedicated open space and CTDEP boat launches and other categories. This layer is useful in identifying potential visual impacts to any sensitive receptors that may be located within the Study Area. Lastly, based on a review of available data published by the Connecticut Department of Transportation and discussions with staff in Groton, it was determined that there are no state or locally designated scenic roadways located within the Study Area.

A preliminary viewshed map is generated for use during the in-field activity in order to confirm that no significant land use changes have occurred since the 2004 aerial photographs used in this analysis were produced and to verify the results of the model in comparison to the balloon float. Information obtained during the reconnaissance is then incorporated into the final visibility map.

Balloon Float and Study Area Reconnaissance

On February 12, 2007 Vanasse Hangen Brustlin Inc., (VHB) conducted a balloon float at the proposed Facility in order to evaluate the potential viewshed within the Study Area. The balloon float consisted of tethering an approximate four-foot diameter, helium-filled weather balloon at the proposed Site location at a height of 140 feet. Once the balloon was aloft, VHB personnel drove the public road system in the Study Area to inventory those areas where the balloon was visible. During the balloon float, weather conditions were mostly sunny with occasional light breezes. Temperatures during the float ranged between 40 and 45 degrees Farhenheight.

Photographic Documentation

During the balloon float, VHB staff conducted a drive-by reconnaissance along the roads located within the Study Area with an emphasis on nearby residential areas and other potential sensitive receptors in order to evaluate and refine the results of the preliminary viewshed map and to verify where the balloon was, and was not, visible above and/or through the tree canopy. The balloon was photographed from a number of different vantage points to document the actual view towards the proposed Facility. The locations and orientations of the photos are depicted on photolog documentation map contained in Attachment A and are described below:

1. View from Pleasant Valley Road North adjacent to house #1276, looking northeast.
2. View from Ohio Avenue north of Rhode Island Drive, looking northeast.
3. View from Murphy's Drive (within Woods Walk Condominiums under construction), looking northeast.
4. View from Pleasant Valley Road North north of entrance to host property, looking southwest.

Photographs of the balloon from the view points listed above were taken with a Nikon Digital Camera COOLPIX 5700, which has a lens focal length equivalent to a 35 mm camera with a 38 to 115 mm zoom. "The lens that most closely approximates the view of the unaided human eye is known as the normal focal-length lens. For the 35 mm camera format, which gives a 24x36 mm image, the normal focal length is about 50 mm.[1]" The optical zoom lens for the Nikon COOLPIX was set at a range of 50 mm to 70 mm for the purposes of this Visual Resource Evaluation.

The locations of the photographic points are recorded in the field using a hand held GPS receiver and are subsequently plotted on the maps contained in the attachments to this document.

Photographic Simulation

Photographic Simulations were generated for the four locations identified above. The Photographic Simulations represent a scaled depiction of the proposed monopole from these locations. The height of the Facility is determined based on the location of the balloon in the photographs and a proportional monopole image is simulated into the photographs. The simulations are contained in Attachment A.

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CONCLUSIONS

Based on this analysis, areas from where the proposed 140-foot monopole would be visible above the tree canopy comprise approximately 245 acres, or roughly three percent of the 8,042 acre Study Area. As depicted on the attached viewshed map (Attachment B), the majority of the year-round visibility associated with the proposed Facility occurs over open water on the Thames River, accounting for approximately 217 acres of the 245-acre total. According to the viewshed model, these areas of visibility extend to the immediate shoreline of the Thames River. However, during the balloon float and in-field reconnaissance, no

[1] Warren, Bruce. *Photography*, West Publishing Company, Eagan, MN, c. 1993, (page 70).

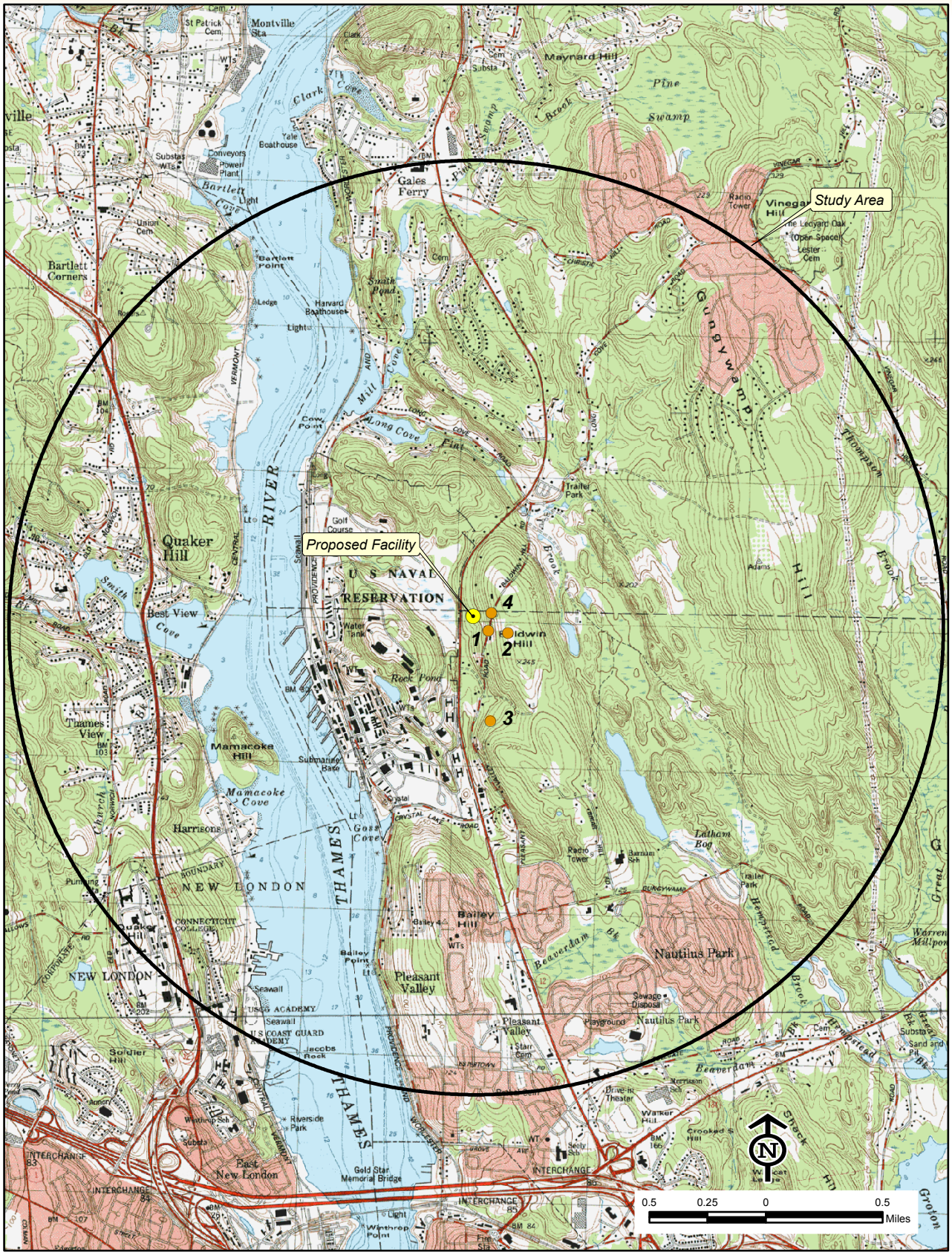
views of the balloon were observed from the adjacent roadway network. Of the remaining 28 acres of year-round visibility, 23 acres occurs within the US Naval Reservation located to the west. Since access to this property is restricted, potential views from the base could not be verified during the balloon float. Other areas of year-round visibility are located along select portions of Pleasant Valley Road North and Ohio Avenue within the immediate vicinity of the proposed Facility and along portions Murphy's Drive located to the south/southeast within the Woods Walk Condominiums currently under construction. As evidenced by the photographic simulations contained in this report, such views could generally be characterized as limited and/or passing in nature. In total, VHB estimates that at least partial views of the proposed Facility would be achieved from approximately eight existing residential properties within the Study Area. Based on observations made in the field during the balloon float, this would increase by two to three properties following completion of the Woods Walk Condominiums. Overall, the potential year-round visibility associated with the proposed Facility is minimized by both the topography and forest cover contained within the Study Area. In addition, several of the taller buildings located within the US Naval Reservation also act as a significant limiting factor, particularly from those areas within the western half of the Study Area. The viewshed map also depicts several additional areas where seasonal (i.e. during "leaf off" conditions) views through the trees are anticipated. These areas comprise approximately 37 additional acres and are mostly limited to the immediate vicinity of the proposed Facility and host property, generally within approximately 0.20 mile. VHB anticipates that ten additional residences will achieve limited, seasonal views of the proposed Facility from select portions of their respective properties. These properties are located along Ohio Avenue and Pleasant Valley Road North.

Attachment A

Photolog Documentation Map, Balloon Float Photographs and Photographic Simulations

Photolog Documentation

Town of
Groton
Connecticut



Photographic Documentation and Simulation *View 1*

Town of
Groton
Connecticut

1294 Pleasant Valley
Road North
Groton, CT
CT999-0108

Monopole installation

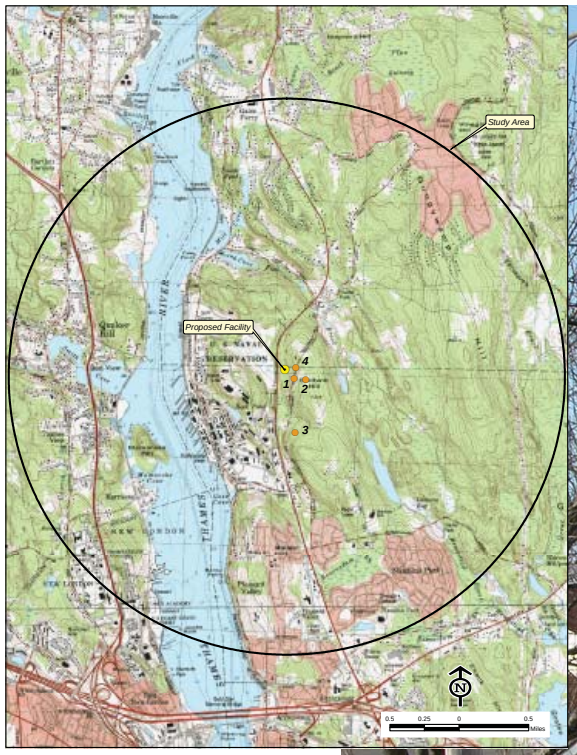
PHOTO TAKEN FROM PLEASANT VALLEY ROAD NORTH ADJACENT TO HOUSE #1276, LOOKING NORTHEAST

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.09 MILE +/-

Optasite
VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 2*

Town of
Groton
Connecticut



1294 Pleasant Valley
Road North
Groton, CT
CT999-0108

Monopole installation

PHOTO TAKEN FROM OHIO AVENUE NORTH OF RHODE ISLAND DRIVE, LOOKING NORTHEAST

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.17 MILE +/-

Optasite
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Photographic Documentation and Simulation *View 3*

Town of
Groton
Connecticut

1294 Pleasant Valley
Road North
Groton, CT
CT999-0108

Monopole installation

PHOTO TAKEN FROM MURPHY'S DRIVE (WITHIN WOODS WALK CONDOS-UNDER CONSTRUCTION), LOOKING NORTHEAST

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.45 MILE +/-

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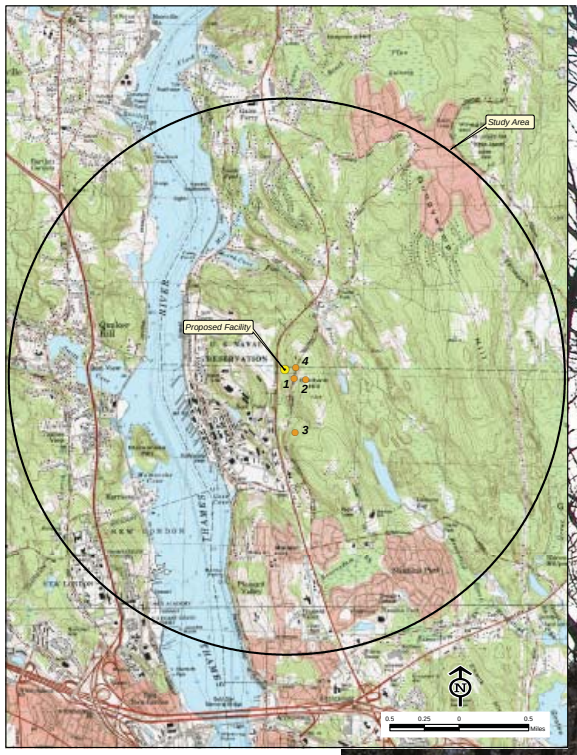
VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 4*

Town of
Groton
Connecticut



1294 Pleasant Valley
Road North
Groton, CT
CT999-0108

Monopole installation

PHOTO TAKEN FROM PLEASANT VALLEY ROAD NORTH NORTH OF ENTRANCE TO HOST PROPERTY, LOOKING SOUTHWEST - BALLOON IS VISIBLE THROUGH TREES

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.08 MILE +/-

Optasite
VHB Vanasse Hangen Brustlin, Inc.

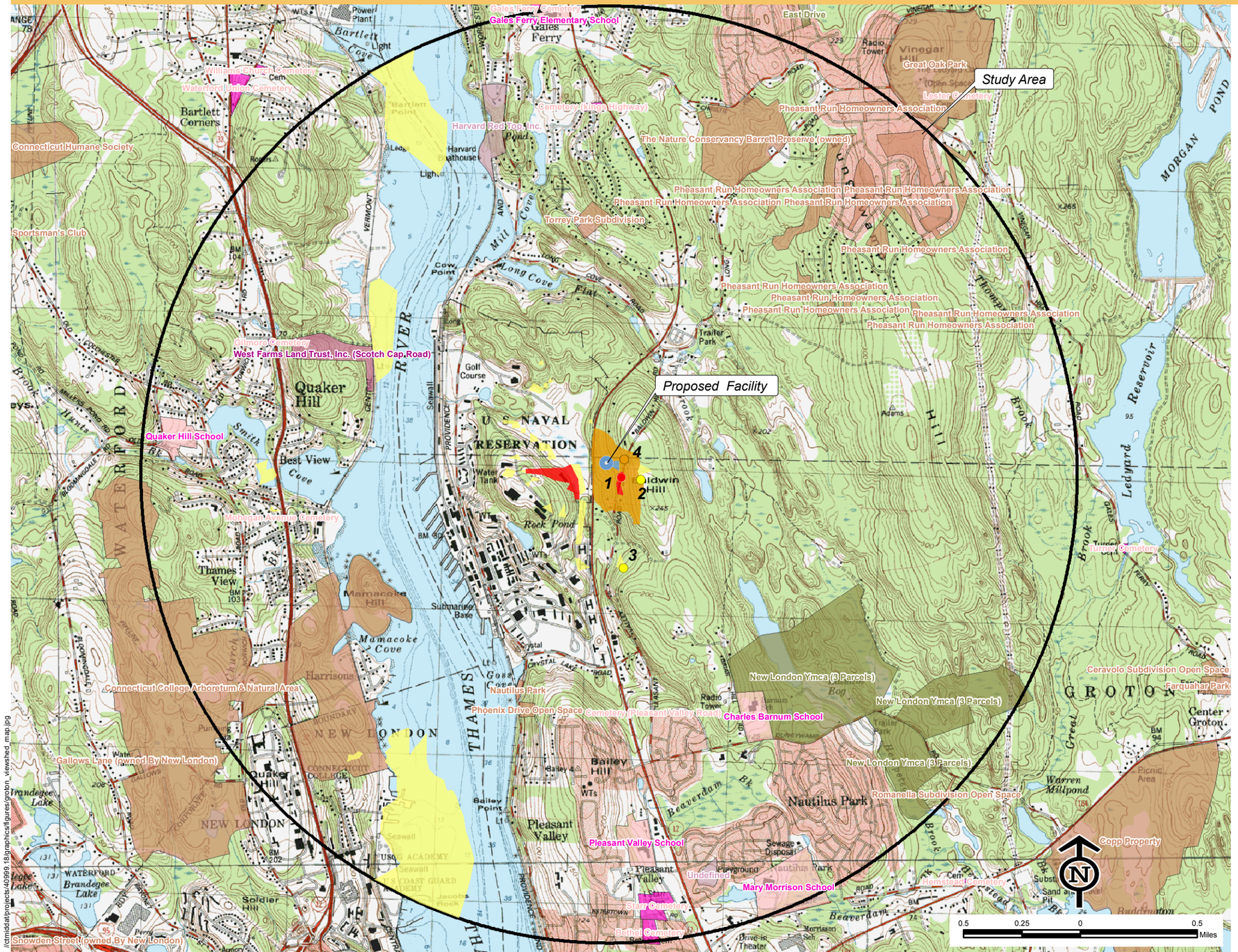
Attachment B

Viewshed Map

Viewshed Map

Topography and Forest Cover as Constraints

Town of Groton Connecticut



Proposed Telecommunications Facility
CT-999-0108
1294 Pleasant Valley Road North
Groton, Connecticut

NOTE:
- Viewshed analysis conducted using ESRI's Spatial Analyst.
- Proposed Facility height is 140 feet.
- Existing tree canopy height estimated at 65 feet.

DATA SOURCES:
- 7.5 minute digital elevation model (DEM) with 30 meter resolution produced by the USGS, 1982
- Forest areas derived from 2004 digital orthophotos with 0.5-foot pixel resolution, respectively; digitized by VHB November, 2006
- Base map comprised of Uncasville and New London USGS Quadrangle Maps
- Protected properties data layer provided CTDEP, 2003
- Scenic Roads layer derived from available State and Local listings.

Map Compiled February 2007

Legend

- Proposed Monopole Location (Includes area of visibility approximately 500 feet around facility)

Photographs - February 12, 2007

- Photographic Locations (Color coded to correspond to areas of year-round visibility)
- Balloon Visible Through Trees

Anticipated Seasonal Visibility (Approximately 37 Acres)

***Approx. % Of Monopole Visible (Year-Round)**

- Upper 25% Visible - 235 Acres
- 50% Visible - 9 Acres
- Entire Facility Visible - 1 Acre

****Total Year-Round Visibility Approximately 245 Acres***

Protected Properties (Municipal)

- Cemetery
- Preservation
- Conservation
- Existing Preserved Open Space
- Recreation
- General Recreation
- School
- Uncategorized

**Note: Approximately 217 acres of the total year-round visibility occurs over open water on the Thames River. Visibility contained within the US Navel Reservation is approximately 23 acres.*

Protected Properties (CT DEP)

- State Forest
- State Park
- DEP Owned Waterbody
- State Park Scenic Reserve
- Historic Preserve
- Natural Area Preserve
- Fish Hatchery
- Flood Control
- Other
- State Park Trail
- Water Access
- Wildlife Area
- Wildlife Sanctuary

- DEP Boat Launches
- Scenic Road (State and Local)
- Town Line
- Protected Properties (Federal)

//ctmiddal/projects/40999.18/graphics/figures/groton_viewshed_map.jpg

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