**Visual Resource Evaluation Report**

# *Proposed Wireless Telecommunications Facility*

## 1027 Middle Turnpike East
## Manchester, Connecticut

Prepared for **Optasite, Inc.**
**1 Research Drive, Suite 200C**
**Westborough, MA 01581**

Prepared by ***VHB*/Vanasse Hangen Brustlin, Inc.**
**54 Tuttle Place**
**Middletown, CT 06457**

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# Visual Resource Evaluation

Optasite, Inc. seeks approval from the Connecticut Siting Council for a Certificate of Environmental Compatibility and Public Need to construct a wireless telecommunications facility ("Facility") on property located at 1027 Middle Turnpike East ("host property") in the Town of Manchester, 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 brown, 130-foot tall monopole with flush-mounted antenna panels 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, URS Corporation, the proposed project area is located at approximately 433 feet Above Mean Sea Level (AMSL). Access to the proposed Facility would be provided via a proposed gravel access drive that would extend to the proposed compound in a southerly direction from Middle Turnpike East.

## Site Description and Setting

Identified in the Town of Manchester Tax Assessors records as Map 064/Block 3950/Lot 1027, the host property consists of 9.07 acres of land and is currently undeveloped. The host property contains several wooded areas, but is mostly open land. Land use within the general vicinity of the host property is comprised of medium-density residential parcels. Several commercial land uses can be found further to the east and west of the host property along Route 6/Route 44. Segments of Interstate 384, Route 44 and Route 6 traverse the Study Area. In total, the Study Area contains roughly 109 linear miles of roadways.

The topography in the Study Area is generally characterized by rolling hills that range in ground elevation from approximately 350 feet AMSL to roughly 800 feet AMSL. The tree cover within the Study Area consists mainly of mixed deciduous hardwood species. The tree canopy occupies approximately 5,804 acres of the 8,042-acre study area (72%). 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. In addition, the Study Area features a total of approximately 83 acres of surface water; attributed mainly to Bolton Notch Pond, Case Pond and several reservoirs.

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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 (or in this instance a crane test) 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 computer model, including Facility height, its ground elevation, the surrounding topography, existing vegetation and any significant structures/objects that may act to obstruct potential views. 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. The forest layer was derived through on-screen digitizing in ArcView® GIS from 2004 digital orthophotos with a 0.5-foot pixel resolution.

Once the data are entered, a series of constraints are 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. A conservative tree canopy height of less than 50 feet is then used to prepare a preliminary viewshed map for use during the Study Area reconnaissance. The forested areas within the Study Area were then overlaid on the DEM with the measured tree height of 65 feet added and the visibility calculated for 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, this analysis was conducted in 32-foot increments from 130 feet down to 34 feet and the results consolidated into a single thematic layer in order to determine the approximate amount of the tower structure that would be visible from any given location.

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 parks and forests, recreational areas, dedicated open space as well as other categories. This layer is useful in identifying potential visual impacts to any sensitive receptors that may be located within the Study Area. In addition, utilizing the *Connecticut Walk Book (East)* it was determined that segments of the Shenipsit Trail, part of the Connecticut Blue Blaze System,

traverse the eastern third of the Study Area. These portions of the trail have been digitized and are depicted on the viewshed map contained in Attachment B of this document. Lastly, based on a review of available data published by the Connecticut Department of Transportation and discussions with staff in Manchester and Bolton, it was determined that there are no state or locally designated scenic roadways contained 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 crane test. Information obtained during the reconnaissance is then incorporated into the final visibility map.

## Crane Test and Study Area Reconnaissance

On June 18, 2006 Vanasse Hangen Brustlin Inc., (VHB) observed a crane test at the proposed Facility in order to evaluate the potential viewshed within the Study Area. The crane test consisted of raising and maintaining a crane arm adjacent to the proposed Site location to a height of 130 feet. Once the crane arm was erected, VHB personnel drove the public road system in the Study Area to inventory those areas where the crane arm was visible. During the crane test, weather conditions were sunny. The temperature was approximately 75 degrees.

## Photographic Documentation

During the crane test, 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 crane arm was, and was not, visible above and/or through the tree canopy. The crane 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 the photolog documentation map contained in Attachment A and are described below:

1. View from Middle Turnpike East adjacent to house #995, looking northeast.
2. View from Route 6/Route 44 adjacent to house #190, looking west.
3. View from Route 6/Route 44 just west of host property, looking southeast.
4. View from Lake Street adjacent to house #93B, looking southeast.
5. View from Garth Drive adjacent to house #180, looking northeast.
6. View from Trevor Court adjacent to house #30, looking east.
7. View from Middle Turnpike East at host property, looking northeast.

Photographs of the crane arm 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 seven locations identified above. The Photographic Simulations represent a scaled depiction of the proposed flush-mounted monopole from these locations. The height of the Facility is determined based on the location of the crane arm in the photographs and a proportional monopole image is simulated into the photographs. The simulations are contained in Attachment B.

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## CONCLUSIONS

Based on this analysis, areas from where the proposed 130-foot monopole would be visible above the tree canopy comprise approximately 30 acres, or less than one half of one percent of the 8,042 acre Study Area. Much of the anticipated year-round visibility depicted on the viewshed map is confined to the host property and the immediate vicinity thereof, generally within 0.25 mile of the proposed Facility. This includes limited views from select portions of Middle Turnpike East, Route 6/Route 44 and Lake Street. Views of the crane where also achieved from select areas further removed from the proposed site along portions of Garth Drive and Trevor Court to the west. VHB estimates that approximately 12 residences within the Study Area will have partial year round views of the proposed monopole above the existing tree line. The topography, existing tree cover and other vegetative screening found within the Study Area serve to minimize areas from where the proposed Facility is expected to be at least partially visible, particularly as one moves further away from the site. Moreover, the design of the proposed Facility (a brown flush-mounted monopole) would also minimize the visual effects of the monopole structure. No views are anticipated from the Shenipsit Trail. 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 50 additional acres and are generally located within a 0.25-mile radius surrounding the proposed Facility. Again, the design of the monopole would largely mitigate potential seasonal views. In total, VHB anticipates that approximately 9 additional

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

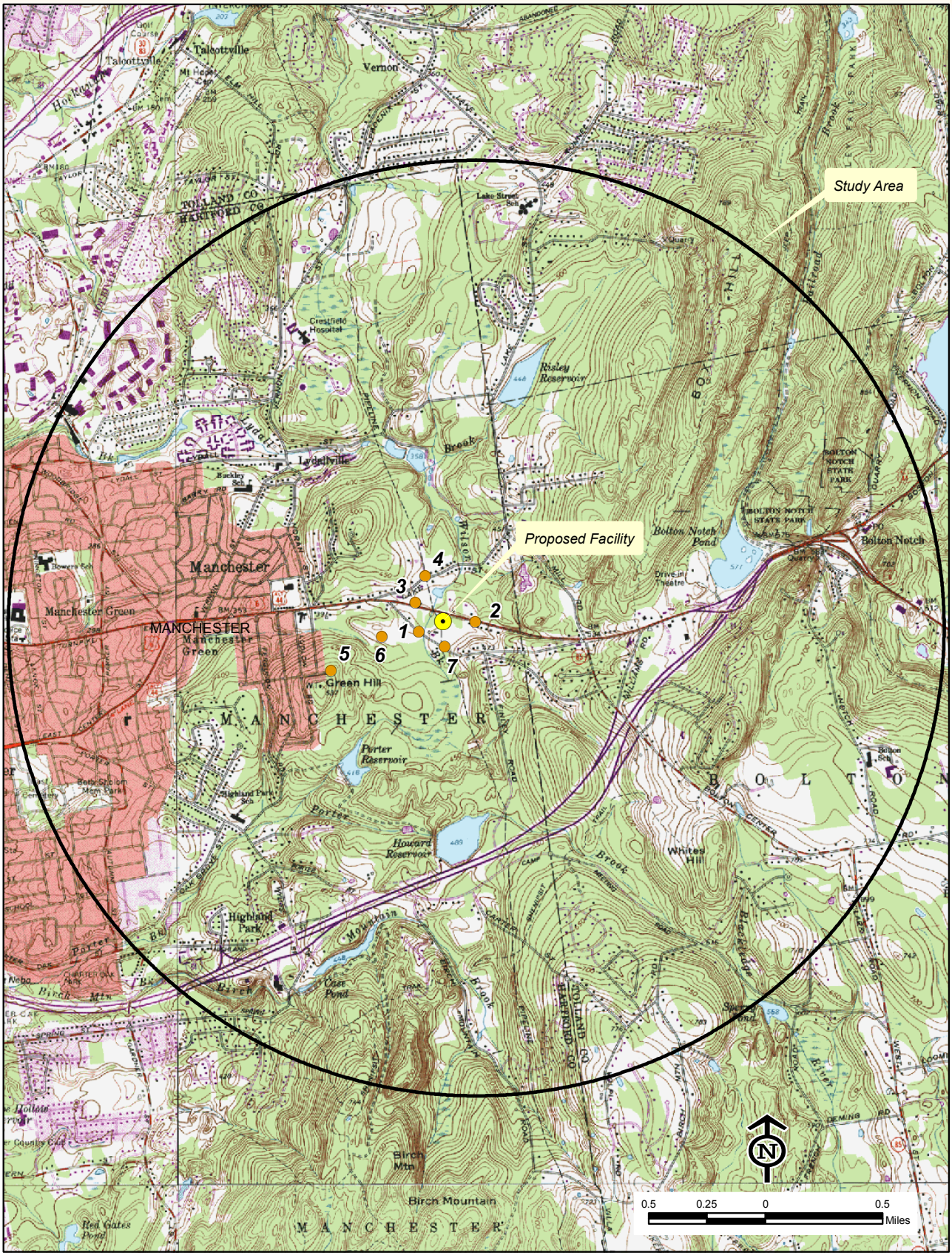
residences would achieve seasonal views of the proposed Facility from select portions of their respective properties.

# Attachment A

# Photolog Documentation Map, Crane Arm Photographs and Photographic Simulations

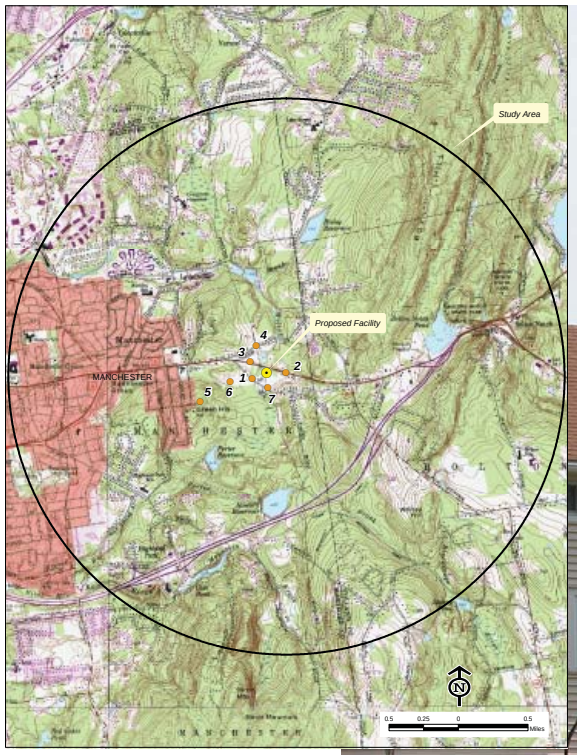
# Photolog Documentation

**Town of**
**Manchester**
**Connecticut**



# Photographic Documentation and Simulation *View 1*

Town of
**Manchester**
Connecticut




Middle Turnpike East
Manchester, CT

Brown Monopole with
flush mounted antennas

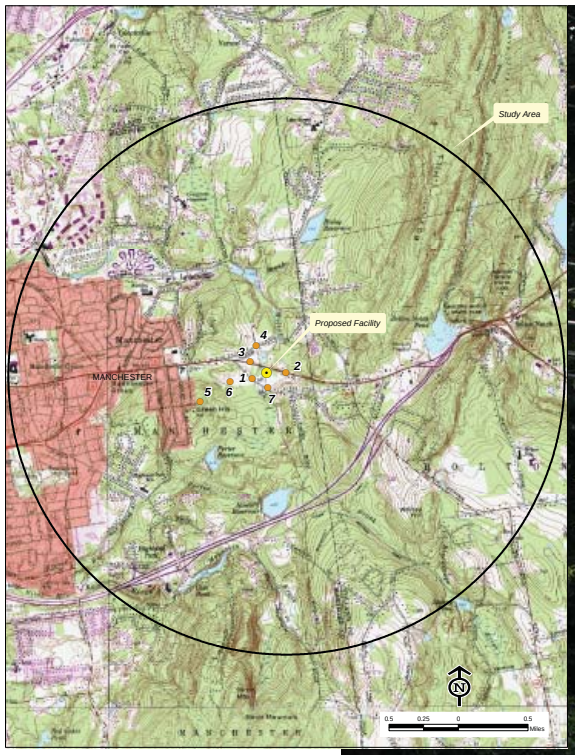

**PHOTO TAKEN FROM MIDDLE TURNPIKE EAST ADJACENT TO HOUSE #995, LOOKING NORTHEAST**

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.10 MILE +/-

Optasite
VHB Vanasse Hangen Brustlin, Inc.

# Photographic Documentation and Simulation *View 2*

Town of
**Manchester**
Connecticut




Middle Turnpike East
Manchester, CT

Brown Monopole with
flush mounted antennas

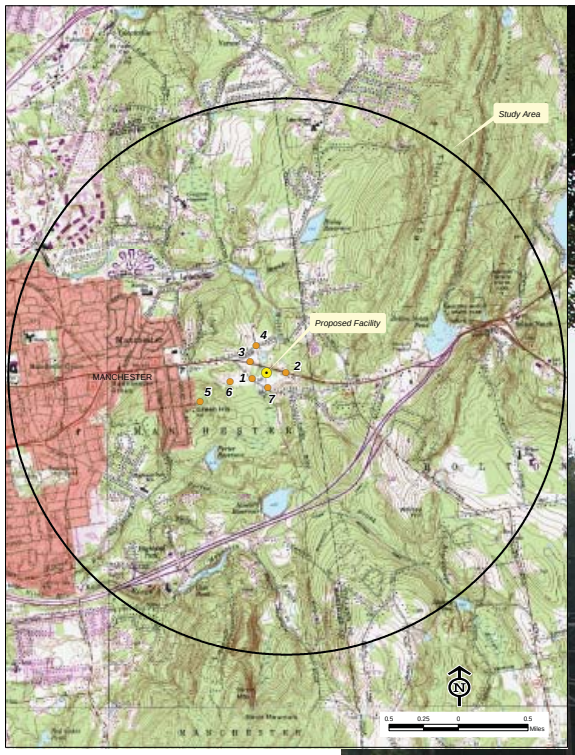

**PHOTO TAKEN FROM ROUTE 6/ROUTE 44 ADJACENT TO HOUSE #190, LOOKING WEST**

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.20 MILE +/-

Optasite
VHB Vanasse Hangen Brustlin, Inc.

# Photographic Documentation and Simulation *View 3*

Town of
**Manchester**
Connecticut




Middle Turnpike East
Manchester, CT

Brown Monopole with
flush mounted antennas

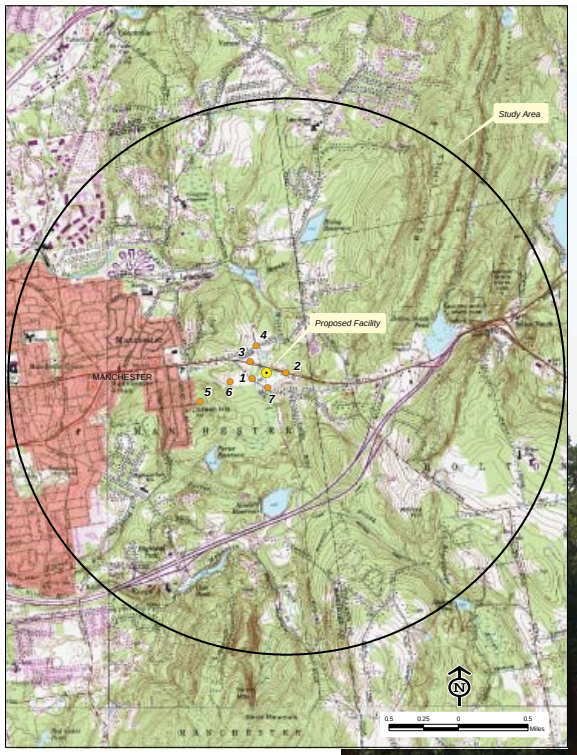

**PHOTO TAKEN FROM ROUTE 6/ROUTE 44 JUST WEST OF HOST PROPERTY, LOOKING SOUTHEAST**

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

Optasite
VHB Vanasse Hangen Brustlin, Inc.

# Photographic Documentation and Simulation *View 4*

Town of
**Manchester**
Connecticut




Middle Turnpike East
Manchester, CT

Brown Monopole with
flush mounted antennas


**PHOTO TAKEN FROM LAKE STREET ADJACENT TO HOUSE #93B, LOOKING SOUTHEAST**

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.19 MILE +/-

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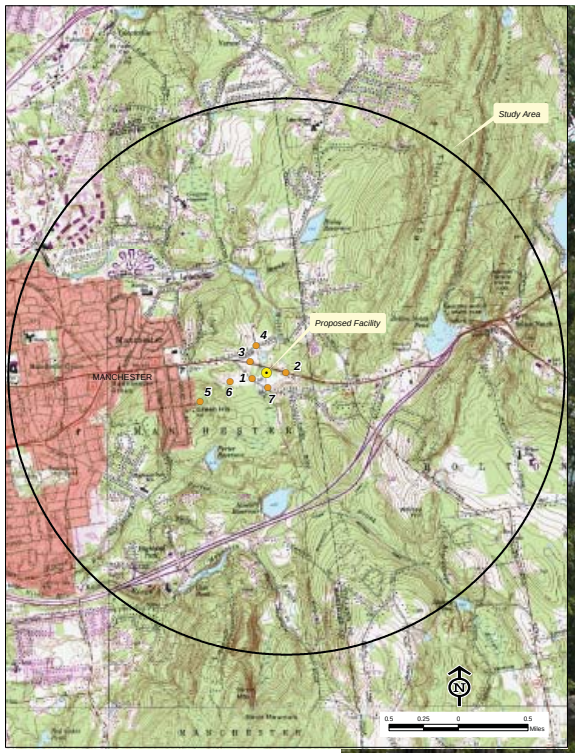
# Photographic Documentation and Simulation *View 5*

Town of
**Manchester**
Connecticut




Middle Turnpike East
Manchester, CT

Brown Monopole with
flush mounted antennas

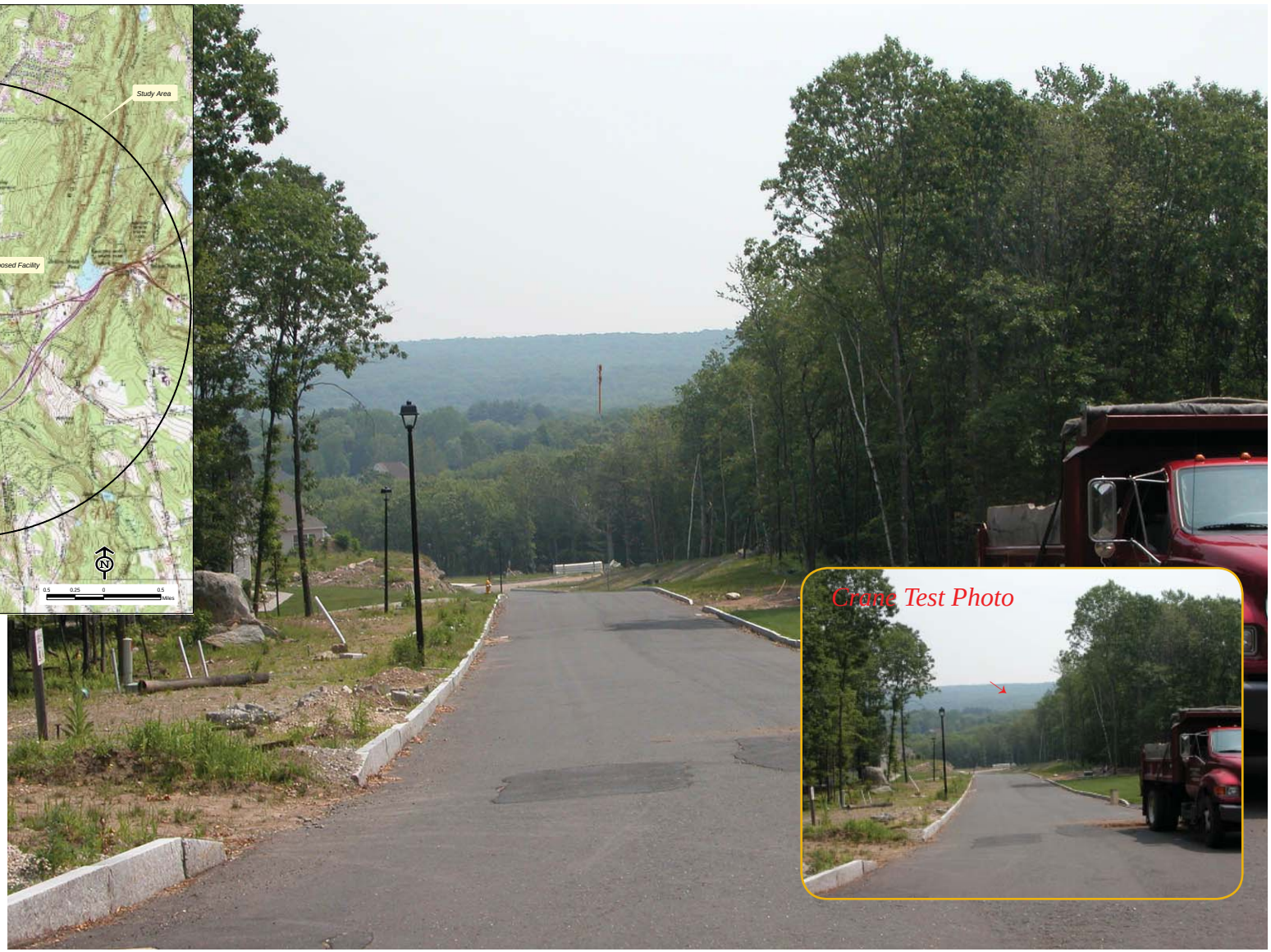


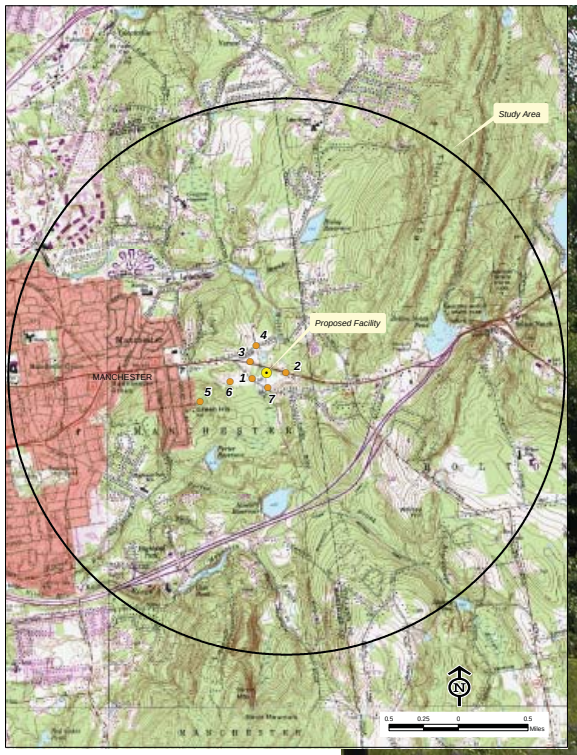

**PHOTO TAKEN FROM GARTH DRIVE ADJACENT TO HOUSE #180, LOOKING NORTHEAST**

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.48 MILE +/-

Optasite
VHB Vanasse Hangen Brustlin, Inc.

# Photographic Documentation and Simulation *View 6*

Town of
**Manchester**
Connecticut




Middle Turnpike East
Manchester, CT

Brown Monopole with
flush mounted antennas

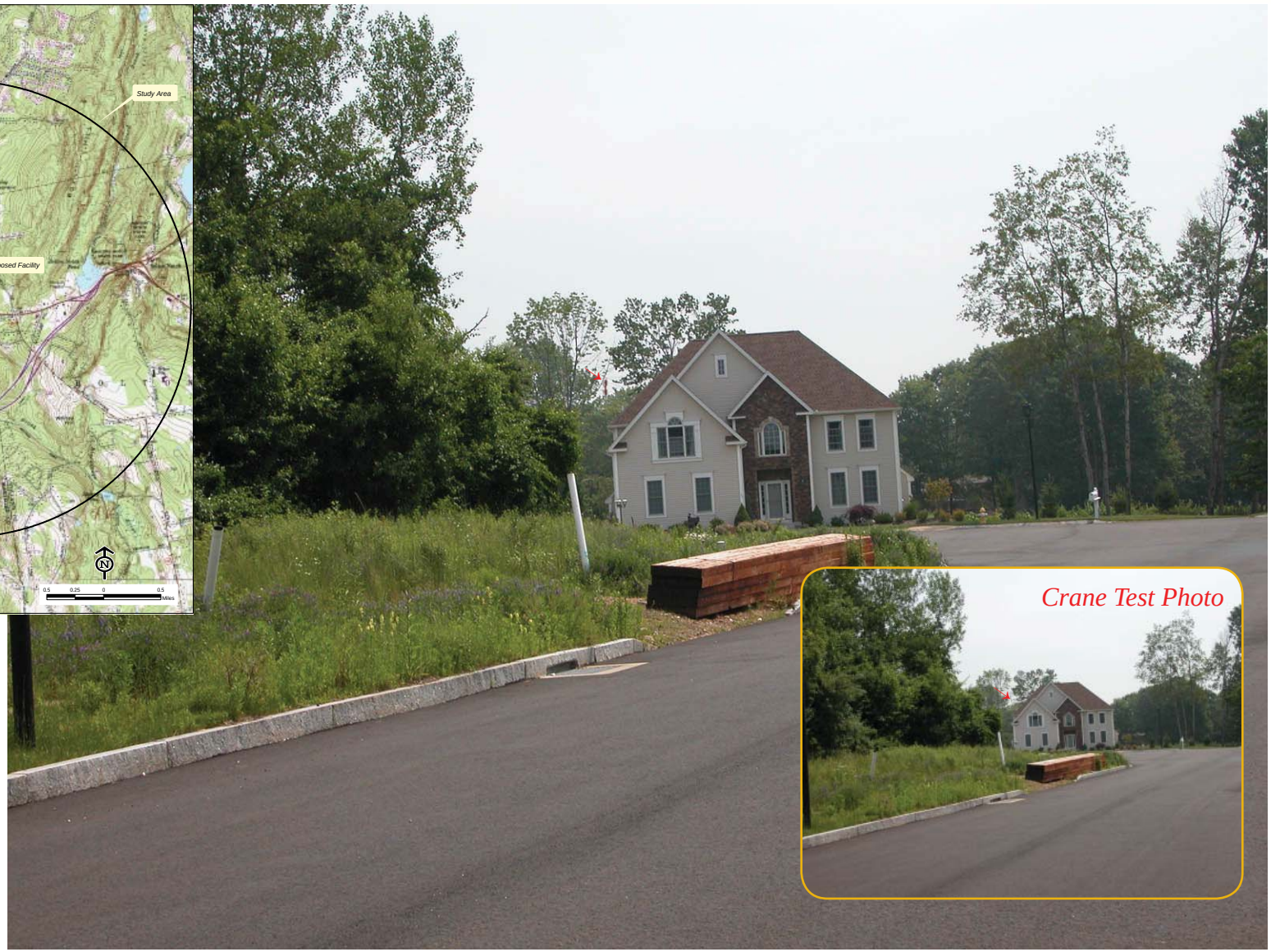


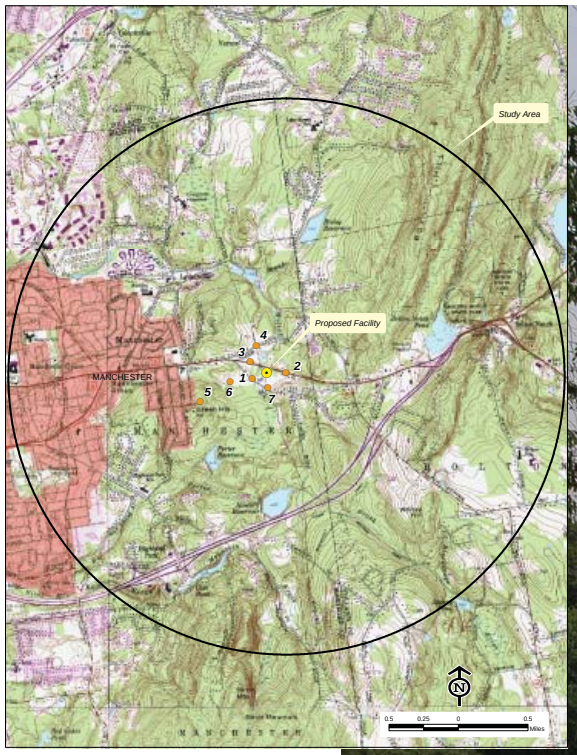

**PHOTO TAKEN FROM TREVOR COURT ADJACENT TO HOUSE #30, LOOKING EAST**

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.48 MILE +/-

Optasite
VHB Vanasse Hangen Brustlin, Inc.

# Photographic Documentation and Simulation *View 7*

Town of
**Manchester**
Connecticut




Middle Turnpike East
Manchester, CT

Brown Monopole with
flush mounted antennas


**PHOTO TAKEN FROM MIDDLE TURNPIKE EAST AT HOST PROPERTY, LOOKING NORTHEAST**

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

Optasite
VHB Vanasse Hangen Brustlin, Inc.

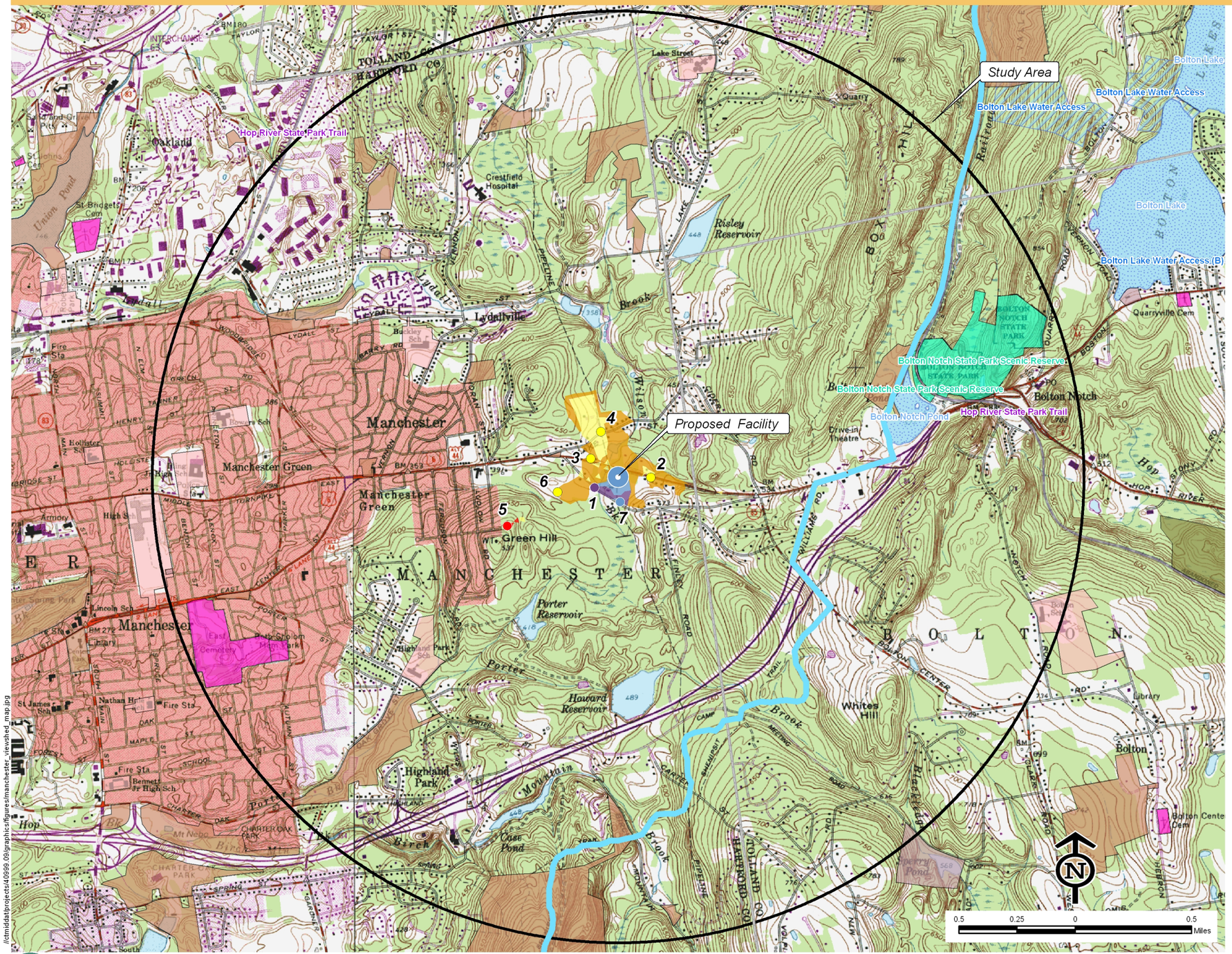
# Attachment B

# Viewshed Map

# Viewshed Map

## Topography and Forest Cover as Constraints

*Town of Manchester Connecticut*




## Proposed Telecommunications Facility
## 1027 Middle Turnpike East
## Manchester, Connecticut

NOTE:
- Viewshed analysis conducted using ESRI's Spatial Analyst.
- Proposed Facility height is 130 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, 2006
- Base map comprised of Manchester and Rockville USGS Quadrangle Maps
- Protected properties data layer provided CTDEP, 2003
- Scenic Roads layer derived from available State and Local listings.

Map Compiled September 2006

### Legend

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

Anticipated Seasonal Visibility (Approximately 50 Acres)

Photographs - June 18, 2006

Photographic Locations (Color coded to correspond to areas of visibility)

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

- Tree Line to Upper 25% - 20 Acres
- 50% - 1 Acre
- 75% - 3 Acres
- Entire Facility Visible - 6 Acres

***Total Year-Round Visibility Approximately 30 Acres***

Protected Properties (Municipal)
- Cemetery
- Preservation
- Conservation
- Existing Preserved Open Space
- Recreation
- General Recreation
- School
- Uncategorized

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)
- Shenipsit Trail (CT Blue Blaze)
- Town Line
- Protected Properties (Federal)

//ctmiddat/projects/40999.09/graphics/figures/manchester_viewshed_map.jpg

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Optasite