Visual Resource Evaluation Report

Proposed Wireless Telecommunications Facility

Route 198
Woodstock, Connecticut

Prepared for 

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October 2007

Visual Resource Evaluation

Cellco Partnership (dba Verizon Wireless) seeks approval from the Connecticut Siting Council for a Certificate of Environmental Compatibility and Public Need for the construction of a wireless telecommunications facility ("Facility") to be located on property off Route 198 in the Town of Woodstock, Connecticut (identified herein as the "host property"). This Visual Resource Evaluation was conducted to evaluate the visibility of the proposed Facility within a two-mile radius ("Study Area").

Project Introduction

The proposed Facility includes a 140-foot tall monopole with associated ground equipment located at its base, all to be situated within a fence-enclosed, gravel-covered compound area. The proposed project area is located at approximately 795 feet Above Mean Sea Level (AMSL). Access to the Facility would follow an existing woods road located on the host property that extends to the site area in an easterly direction from Route 198. The existing woods road requires improvements to accommodate service vehicles.

Site Description and Setting

Identified in the Town of Woodstock Tax Assessors records as Map 5124/ Block 19/ Lot 16, the "host property" consists of approximately 53.6 acres of mostly wooded, undeveloped land. A photograph of the proposed project area is included in Attachment A. Attachment A also contains a map that depicts the location of the proposed Facility and the limits of the Study Area. Land use within the general vicinity of the proposed Facility and host property is comprised of large tracts of undeveloped woodlands and low-density residential parcels. Segments of Route 171, Route 197 and Route 198, important regional state numbered routes, traverse the Study Area. In total, the Study Area features approximately 56 linear miles of roadways.

The topography within the Study Area is characterized by rolling hills. Ground elevations within the Study Area range from approximately 600 feet AMSL to approximately 1,000 feet AMSL. The Study Area contains approximately 413 acres of surface water, dominated in large measure by Black Pond, Keach pond, Chamberlain Pond, Lake Bungee and Witches Woods Lake. The tree cover within the Study Area consists mainly of mixed deciduous hardwood species interspersed with stands of mature evergreens. The tree canopy occupies approximately 6,851 acres of the 8,042-acre study area (85%). 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 was determined to be 65 feet.

■

METHODOLOGY

In order to better represent the visibility associated with the Facility, VHB uses a two-fold approach incorporating 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 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 which the top of the 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 and existing vegetation. Data incorporated into the predictive model includes a digital elevation model (DEM) and a digital forest layer for the Study Area. The DEM was derived from the United States Geological Survey (USGS) National Elevation Dataset (NED), a seamless, publicly available elevation dataset with an approximate 30-meter resolution. The forest layer was derived through on-screen digitizing in ArcView® GIS from 2001 and 2005 digital orthophotos with 1-meter and 2-meter pixel resolutions, respectively.

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 assists in the evaluation of potential seasonal visibility of the proposed Facility. A conservative tree canopy height of 50 feet is then used to prepare a preliminary viewshed map for use during the Study Area reconnaissance. The average height of the tree canopy is determined in the field using a hand-held infra-red laser range finder. The average tree canopy height is incorporated into the final viewshed map; in this case, 65 feet was identified as the average tree canopy height. The forested areas within the Study Area were then overlaid on the DEM with a height of 65 feet added and the visibility calculated. As a final step, the forested areas are 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. This analysis was conducted in four increments in order to calculate areas of potential tree line views and/or views of the upper 25% of the proposed monopole; views where approximately half of the proposed

structure would be visible; views where approximately 75% of the monopole would be visible; and views where the entire Facility would be visible. The results where then consolidated into a single thematic 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 parks and forests, recreational facilities, dedicated open space, CTDEP boat launches and other categories. This layer is useful in identifying potential visibility from any sensitive receptors that may be located within the Study Area. Lastly, based on both a review of published information and discussions with municipal officials in Woodstock, it was determined that there are two locally designated scenic roads contained within the Study Area. These include Sherman Road located to the northwest of the proposed Facility and Camp Road located to the southeast.

A preliminary viewshed map (using topography and a conservative tree canopy height of 50 feet) is generated for use during the in-field activity in order to confirm that no significant land use changes have occurred since the 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 July 17, 2007 Vanasse Hangen Brustlin Inc., (VHB) conducted a "balloon float" at the proposed Facility site to further evaluate the potential viewshed within the Study Area. The balloon float consisted of raising and maintaining an approximate four-foot diameter, helium-filled weather balloon at the proposed site location at a height of 140 feet. Once the balloon was secured at a height of 140 feet, 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 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. In addition, at the request of officials in Woodstock, a publicly-noticed balloon float was conducted by VHB on August 25, 2007 in order to provide residents with an opportunity to assess the likely visibility of the proposed Facility. VHB staff also utilized the August 25th float to obtain photographic documentation from Black Pond (represented in Views 3 and 4). During the July 17, 2007 balloon float, the temperature was approximately 75 degrees Fahrenheit with calm wind conditions and mostly sunny skies. Weather conditions during the August 25th float were initially overcast then became mostly sunny with temperatures above 80 degrees Fahrenheit. Winds were generally calm during the float.

Photographic Documentation

During the balloon floats, VHB personnel drove the public road system in the Study Area to inventory those areas where the balloon was visible. As was noted previously in this report, VHB staff also conducted reconnaissance from Black Pond located to the southeast of the proposed Facility. The balloon was photographed from a number of different vantage points to document the actual view towards the proposed Facility. Several photographs where the balloon was not visible are also included. The locations of the photos are described below:

1. View from Route 198 south of Sherman Road.
2. View from Route 198 adjacent to house #937.
3. View from Black Pond.
4. View from Black Pond adjacent to eastern shore.
5. View from Black Pond boat launch.
6. View from Route 198 adjacent to house #1274.
7. View from Route 198 at Route 197
8. View from Route 197 adjacent to house #1775.
9. View from Route 198 north of Wind Swept Drive.
10. View from Route 198 adjacent to host property.
11. View from Old Turnpike Road adjacent to house # 129.

Photographs 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 representative locations where the balloon was visible during the in-field activities. The photographic simulations represent a scaled depiction of the proposed Facility from these locations. The height of the Facility is determined based on the location of the balloon in the photograph and a proportional

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

monopine image is simulated into the photographs. The simulations are contained in Attachment A.

CONCLUSIONS

Based on this analysis, areas from where the proposed 140-foot tall Facility would be visible above the tree canopy comprise approximately 56 acres, or less than one percent of the 8,042-acre Study Area. As depicted on the viewshed map (provided in attachment B), much of the visibility associated with the proposed Facility occurs over open water on Black Pond to the southeast (approximately 34 acres of the 56-acre total). Other areas of year-round visibility include limited locations along Route 198 to the west and northwest of the host property (as photo documented), and several similar small areas located on private properties to the southwest, west and northwest which could not be field verified or photographed during the balloon float. Potential views along Route 198 would be characterized as passing in nature. Overall, the rolling topography and extensive vegetative cover contained within the Study Area would serve to minimize the extent of year-round visibility associated with the proposed Facility. VHB estimates that select portions of approximately six residential properties could have at least partial year-round views of the proposed Facility. This includes four residences located along Route 198 immediately west of the proposed Facility and two residences located north of the Route 197 roadway corridor. No views are anticipated from Sherman Road or Camp Road which are locally designated scenic roadways. The viewshed map also depicts several additional areas where seasonal (i.e. during "leaf off" conditions) views are anticipated. These areas comprise approximately 124 acres and include the wooded areas located immediately adjacent to the proposed Facility as well as select portions of Route 198 and Old Turnpike Road. VHB estimates that seasonal views of the proposed Facility could be achieved from portions of approximately 6 additional properties within the Study Area.

Attachment A

Site Area Photograph, Photolog Documentation Map, Balloon Float Photographs, and Photographic Simulations

Photographic Documentation

Town of
Woodstock
Connecticut

Route 198
Woodstock, Connecticut

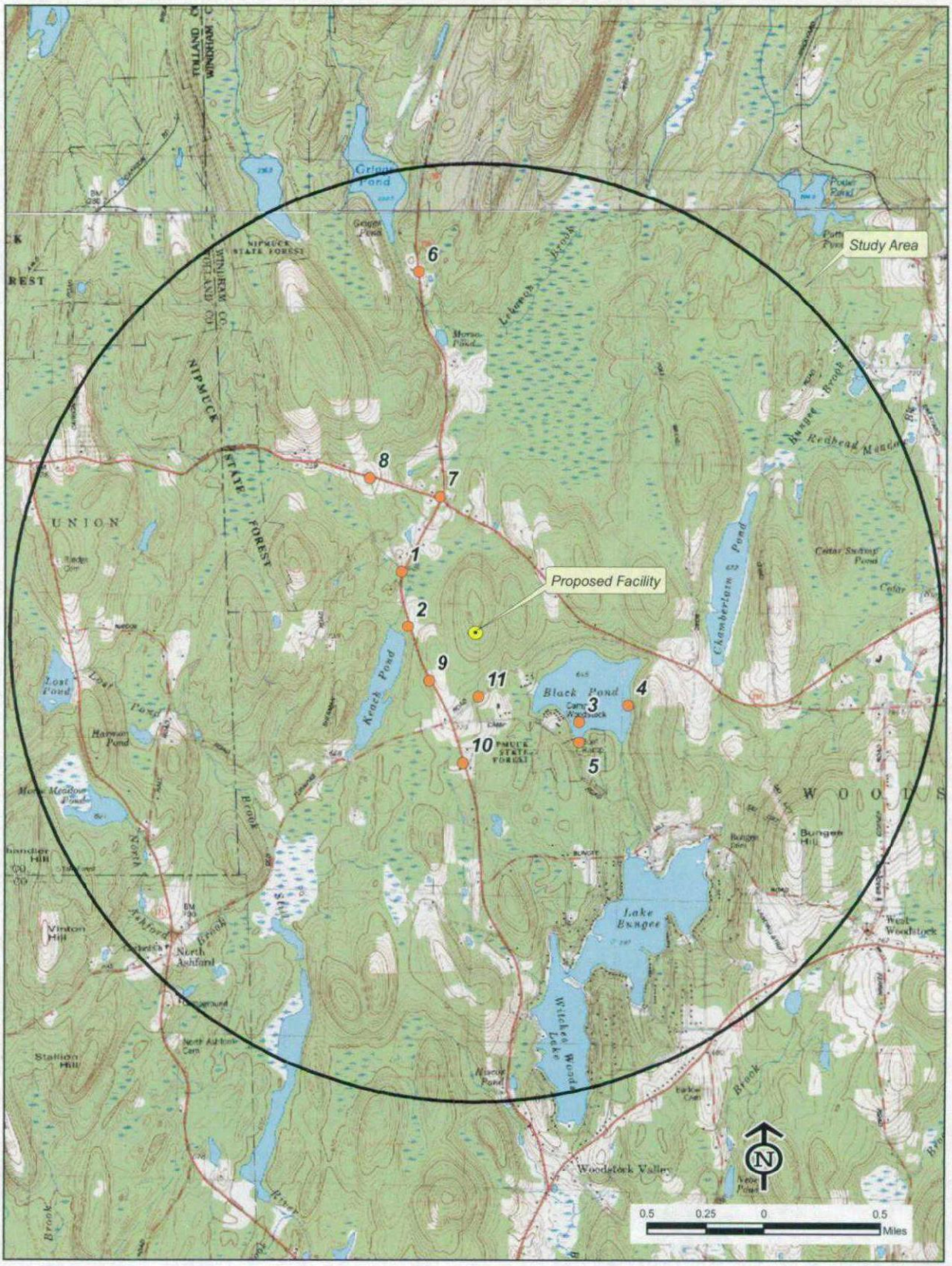
Monopole installation
with 4 carriers

PHOTO TAKEN OF PROPOSED SITE AREA

Vanasse Hangen Brustlin, Inc.

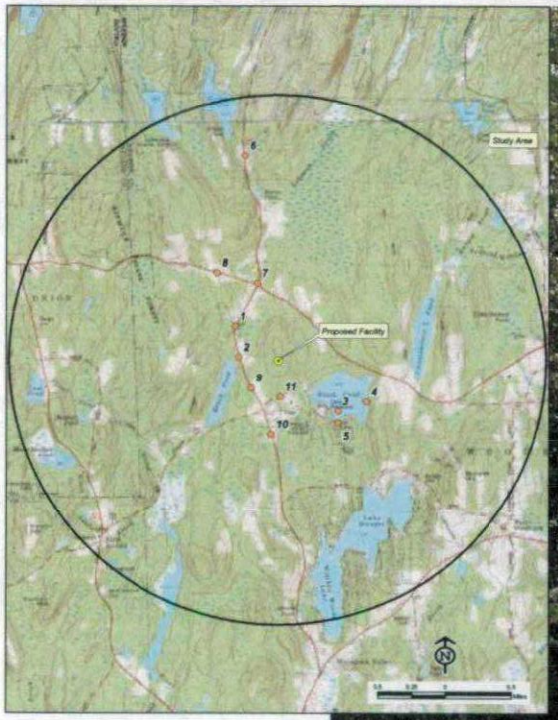
Photolog Documentation

Town of
Woodstock
Connecticut



Photographic Documentation and Simulation *View 1*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

PHOTO TAKEN FROM ROUTE 198 SOUTH OF SHERMAN ROAD, LOOKING SOUTHEAST

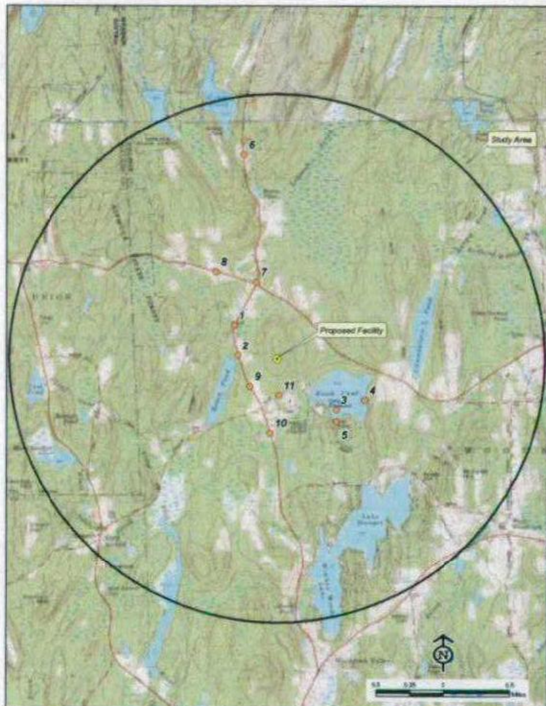
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.41 MILE +/-

verizon wireless

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 2*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

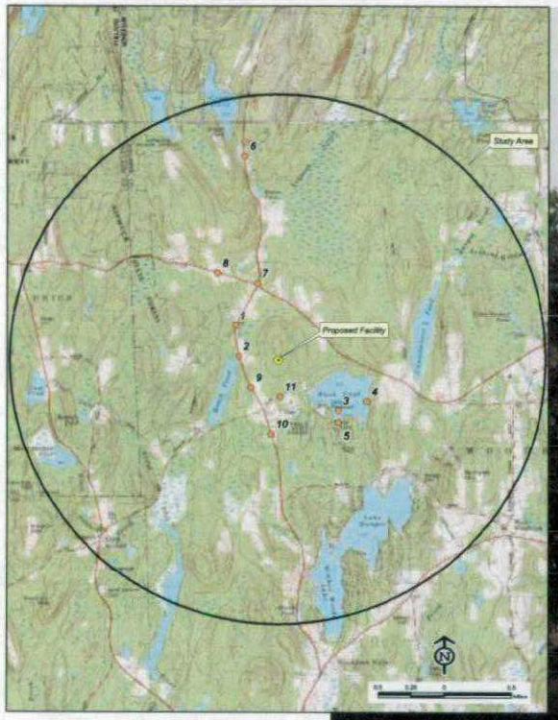
Monopole installation
with 4 carriers

PHOTO TAKEN FROM ROUTE 198 ADJACENT TO HOUSE #937, LOOKING SOUTHEAST
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.30 MILE +/-

Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 3*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

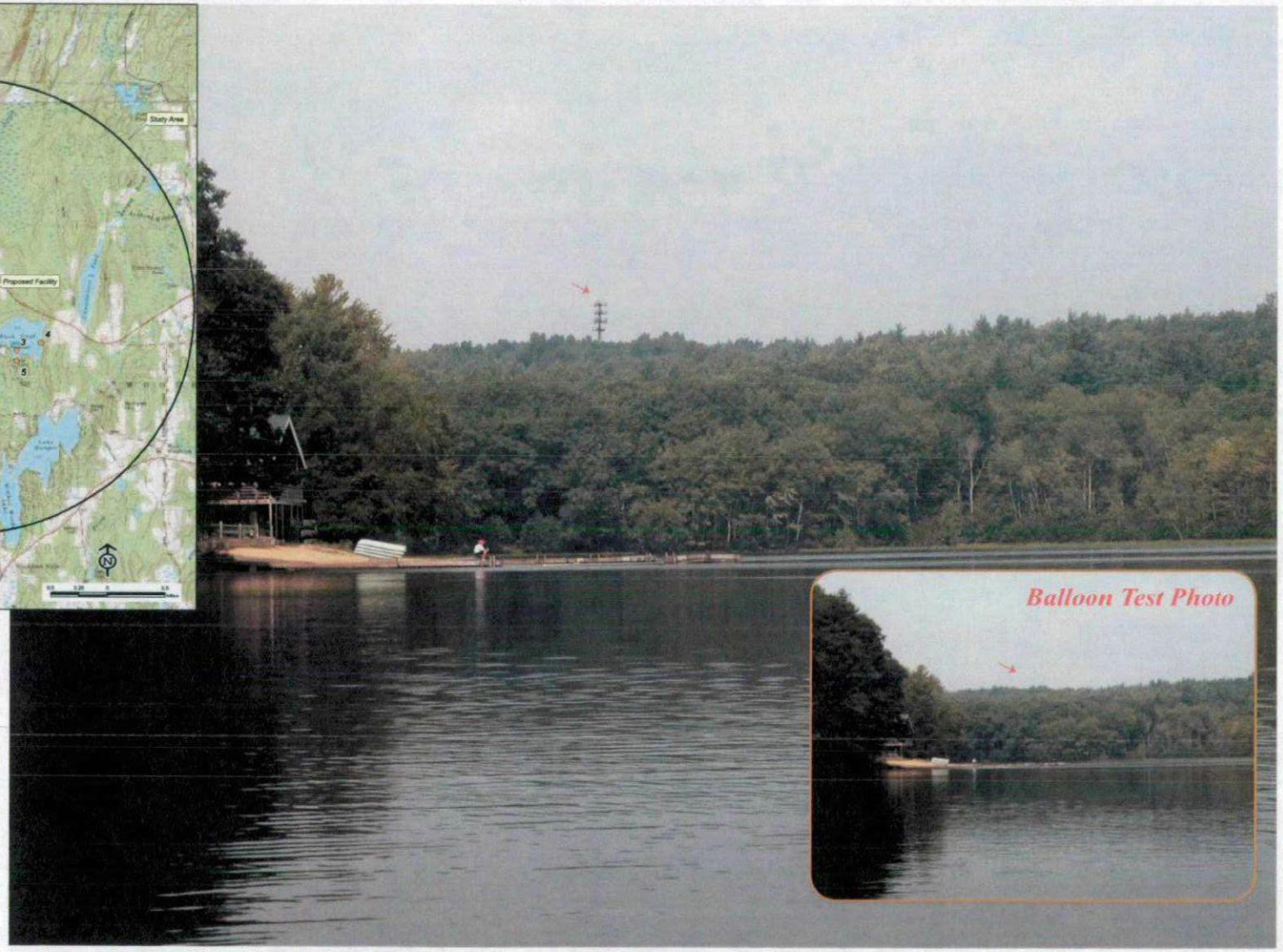


PHOTO TAKEN FROM BLACK POND, LOOKING NORTHWEST

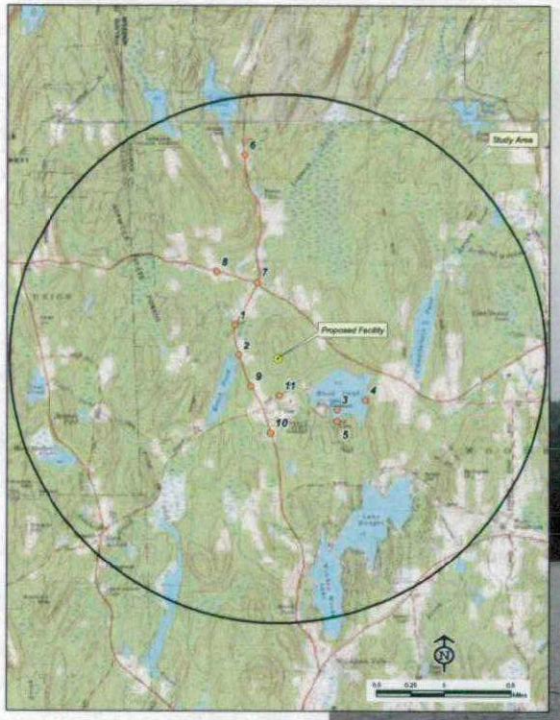
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.59 MILE +/-

verizon wireless

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 4*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

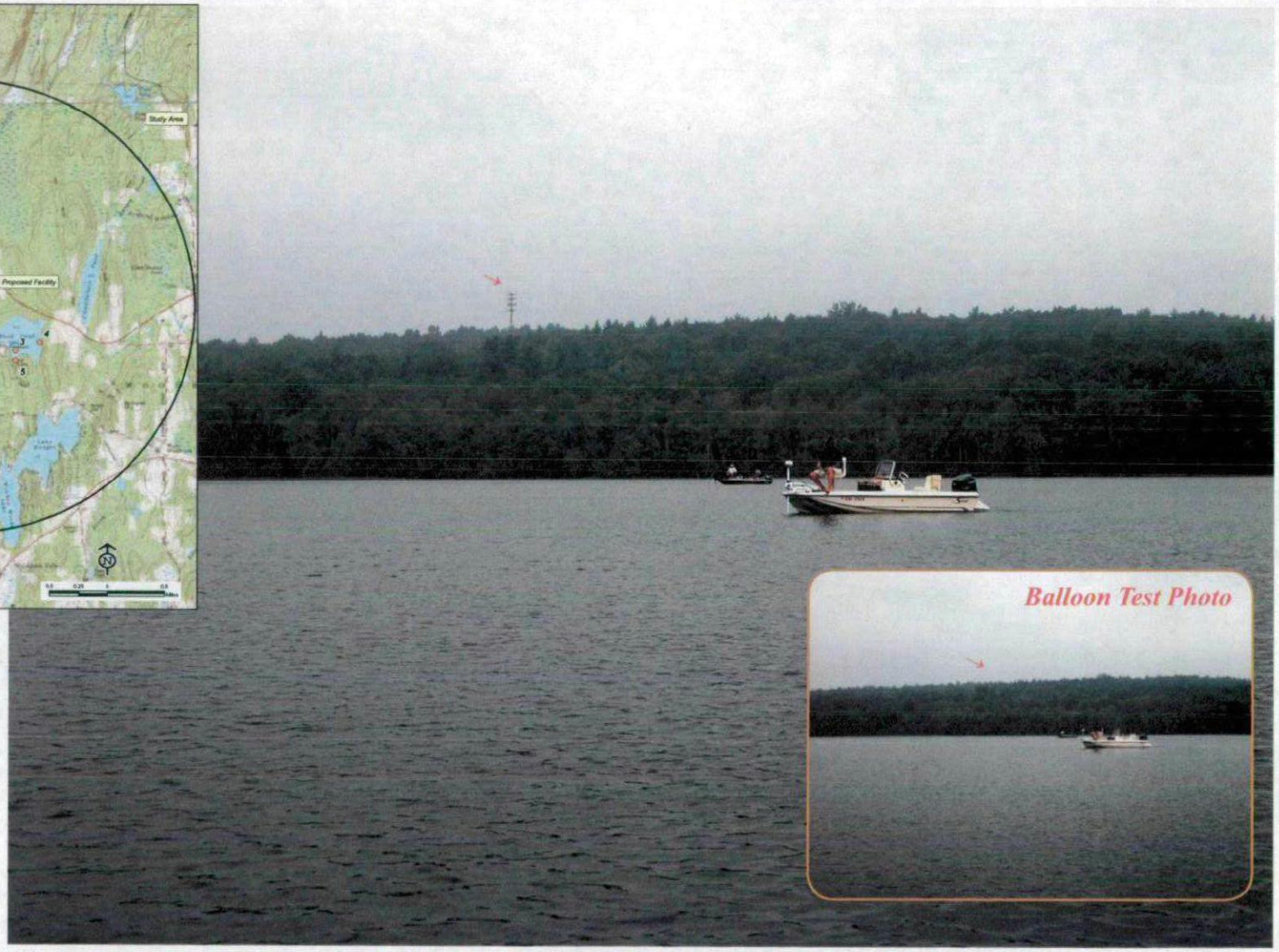


PHOTO TAKEN FROM BLACK POND ADJACENT TO EASTERN SHORE, LOOKING NORTHWEST

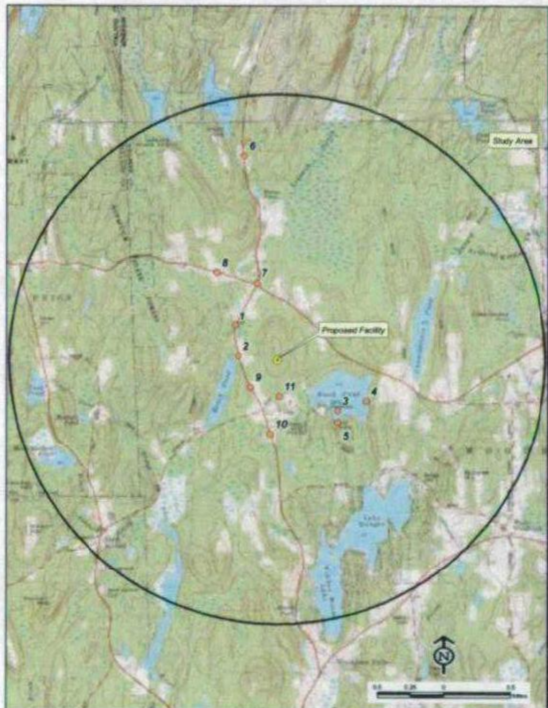
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.72 MILE +/-

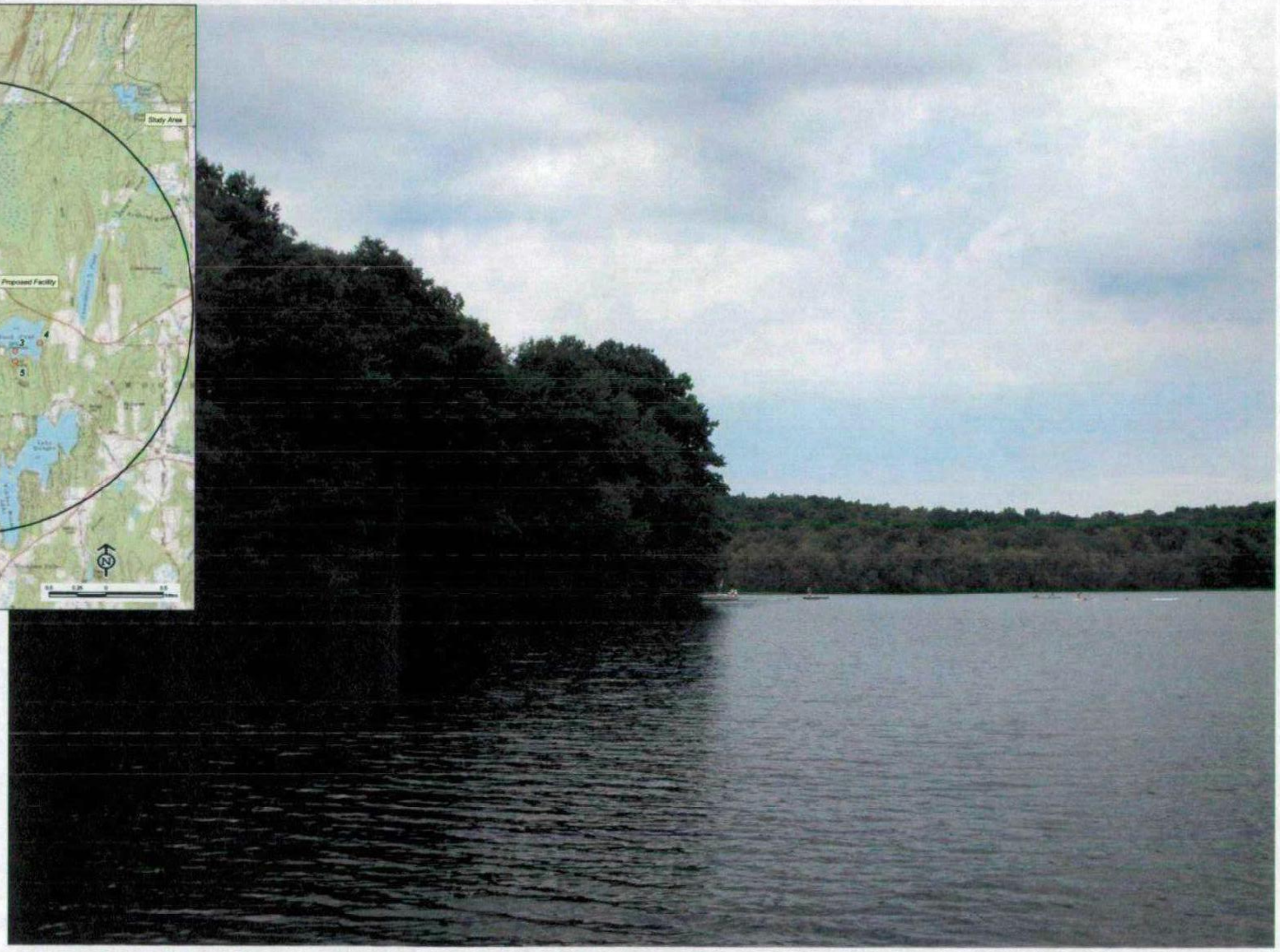
verizon wireless

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 5*

Town of
Woodstock
Connecticut





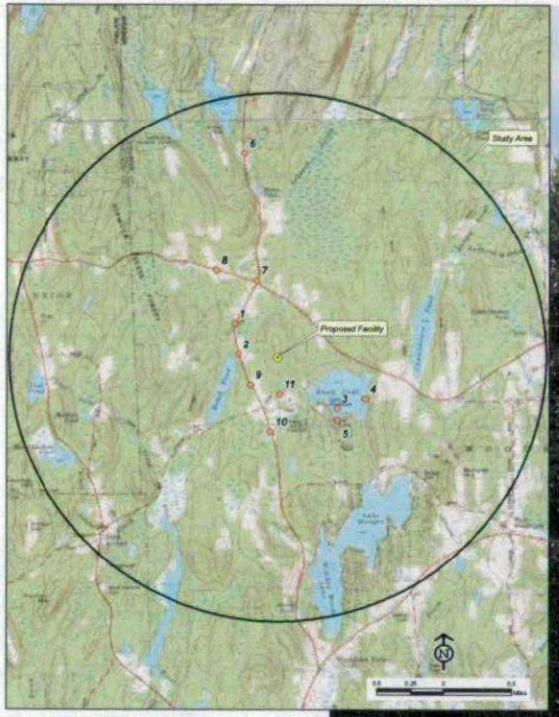
Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

PHOTO TAKEN FROM BLACK POND BOAT LAUNCH, LOOKING NORTHWEST - BALLOON IS NOT VISIBLE
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.65 MILE +/-

Photographic Documentation and Simulation *View 6*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

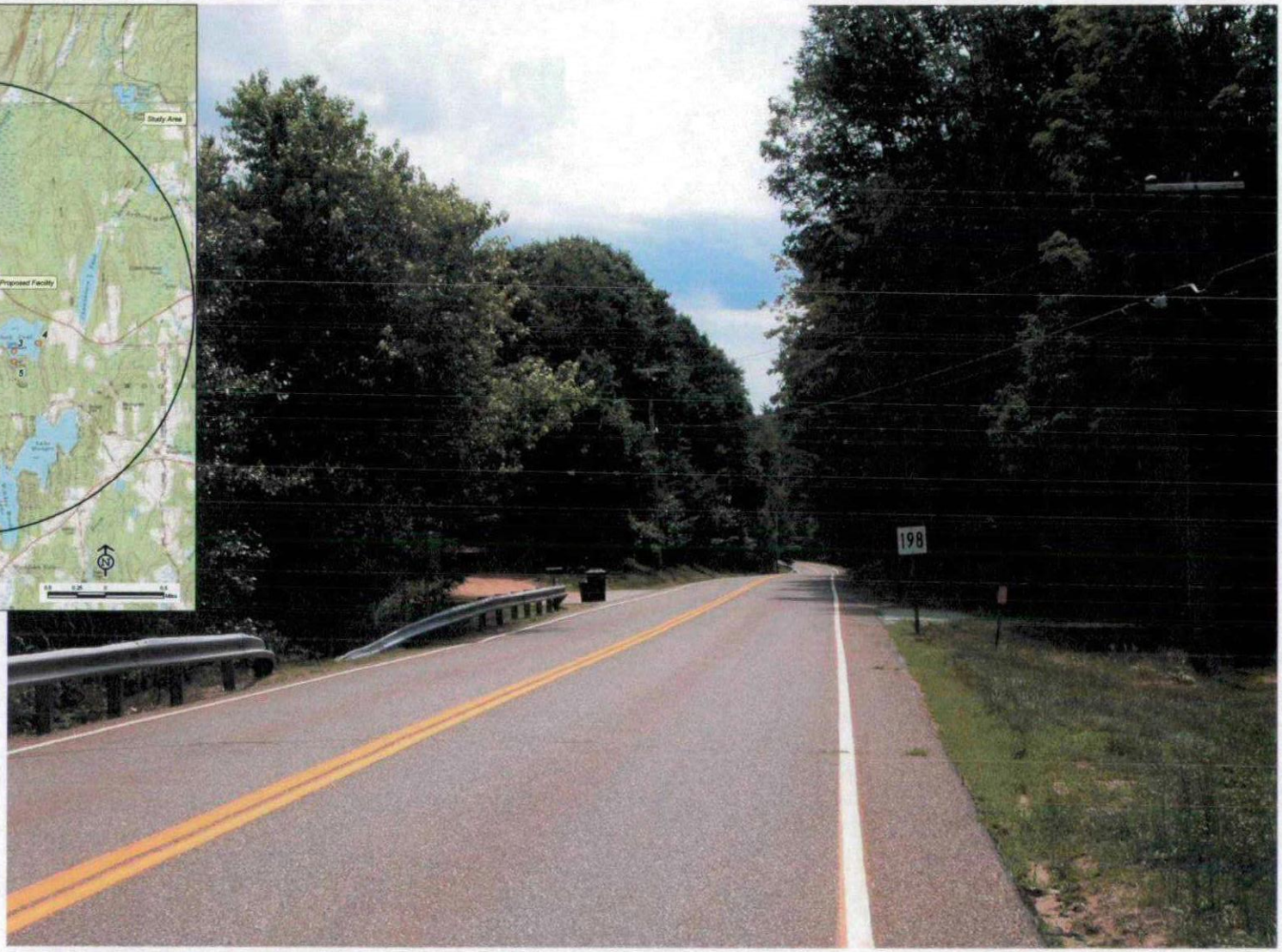


PHOTO TAKEN FROM ROUTE 198 ADJACENT TO HOUSE #1274, LOOKING SOUTHEAST - BALLOON IS NOT VISIBLE

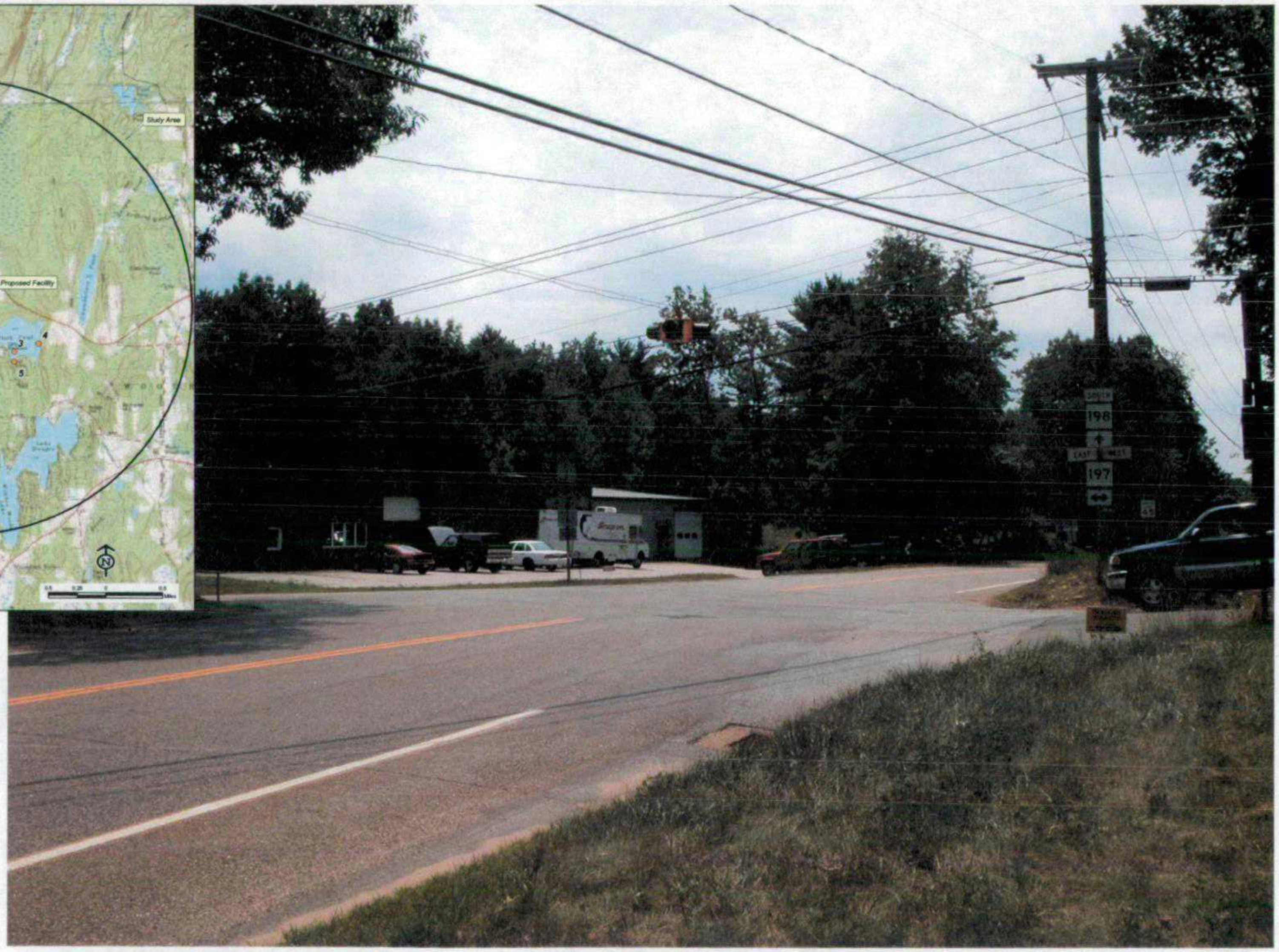
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 1.56 MILES +/-

verizon wireless

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 7*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

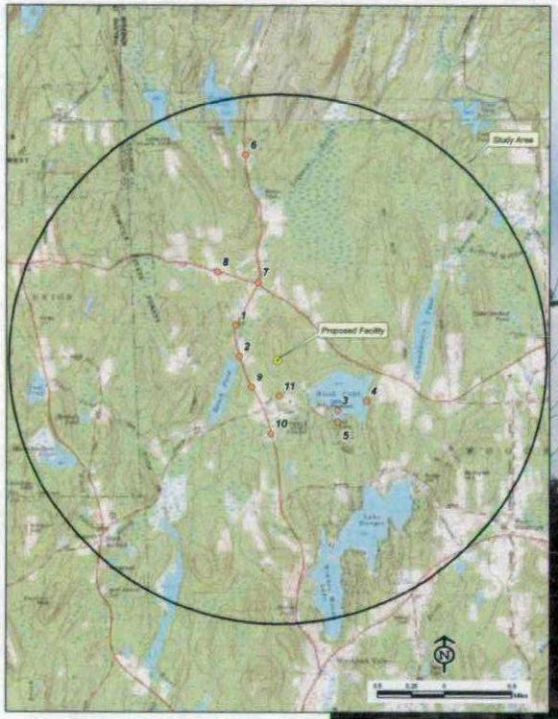
PHOTO TAKEN FROM ROUTE 198 AT ROUTE 197, LOOKING SOUTHEAST - BALLOON IS NOT VISIBLE

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.60 MILE +/-

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 8*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

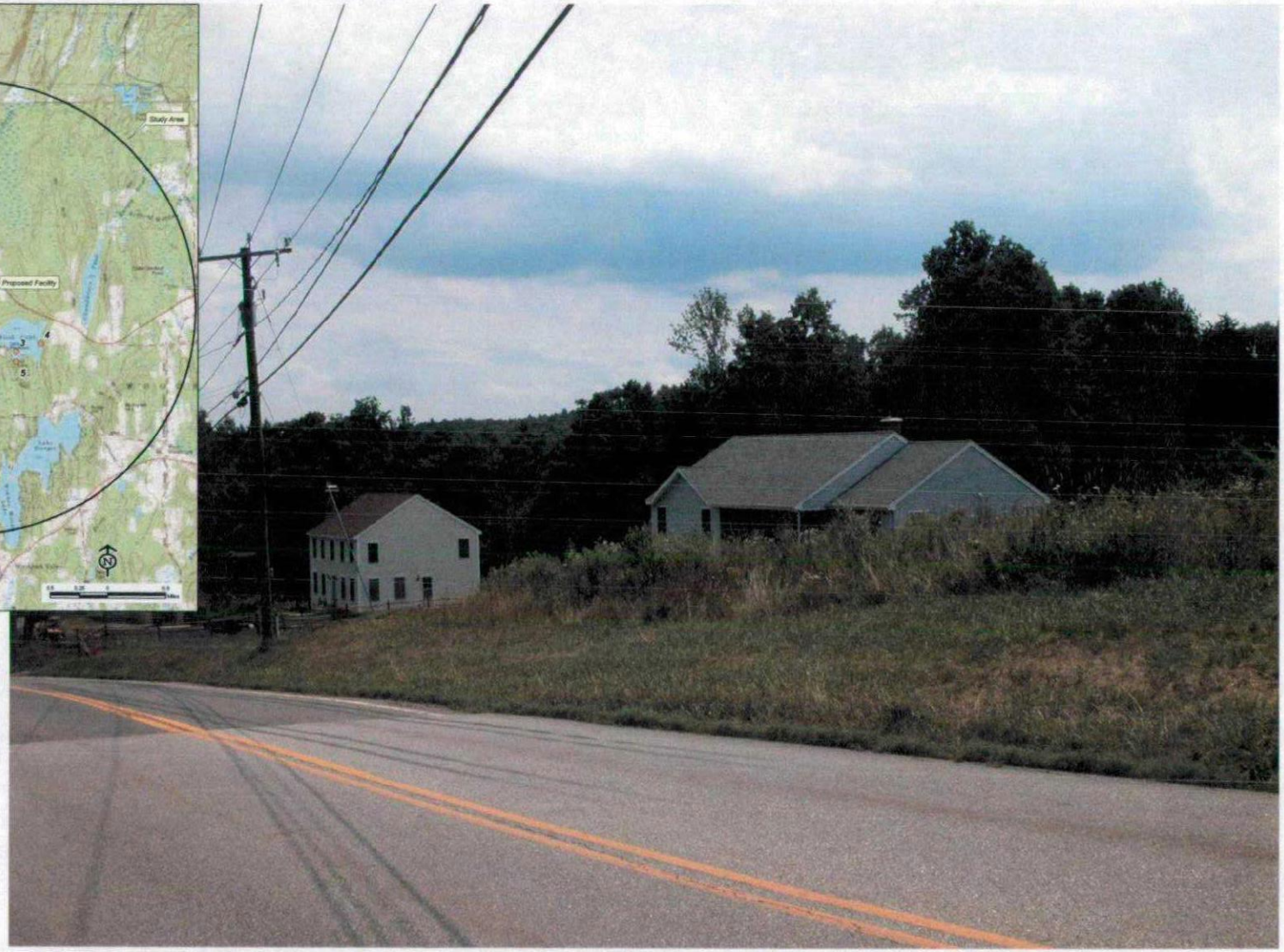


PHOTO TAKEN FROM ROUTE 197 ADJACENT TO HOUSE #1775, LOOKING SOUTHEAST - BALLOON IS NOT VISIBLE

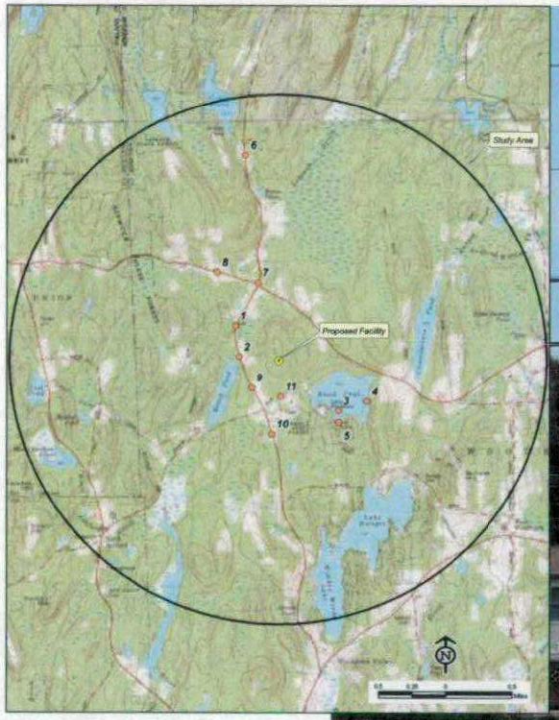
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.81 MILE +/-

verizon wireless

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 9*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

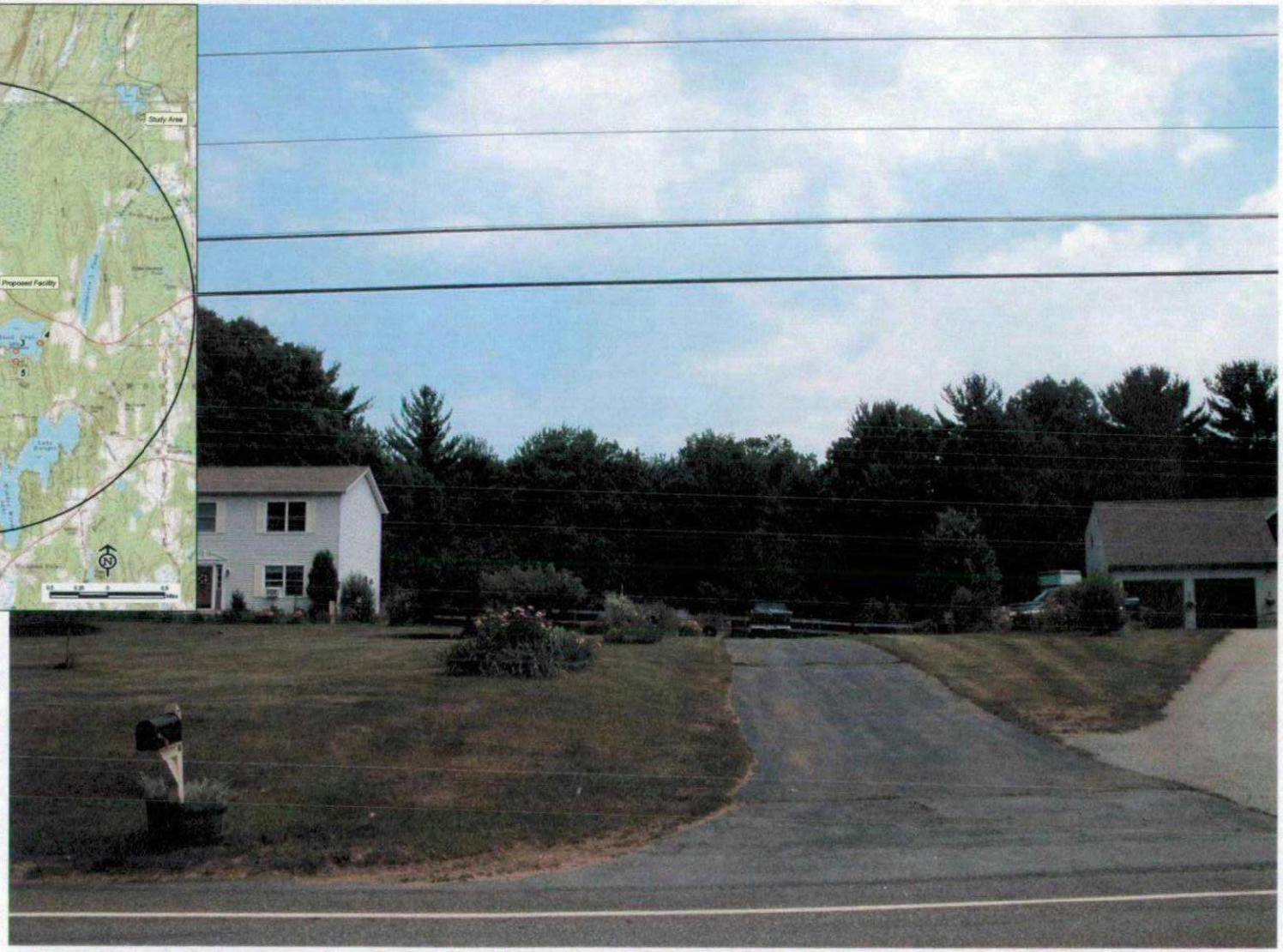


PHOTO TAKEN FROM ROUTE 198 NORTH OF WIND SWEPT DRIVE, LOOKING NORTHEAST - BALLOON IS NOT VISIBLE

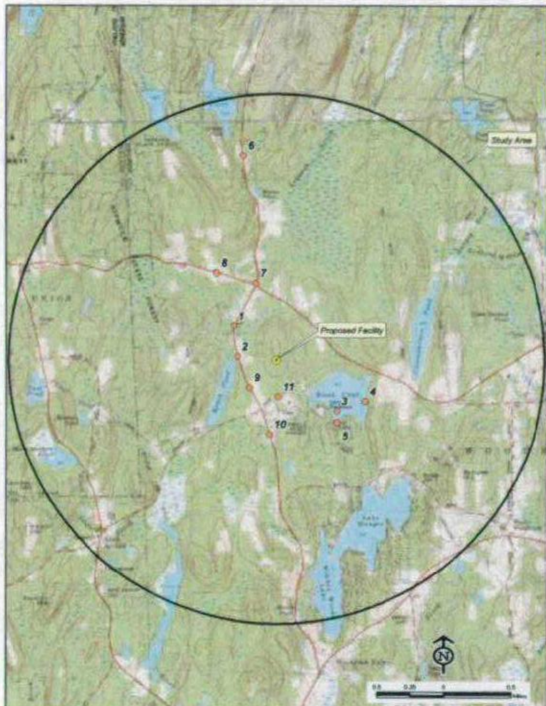
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.30 MILE +/-

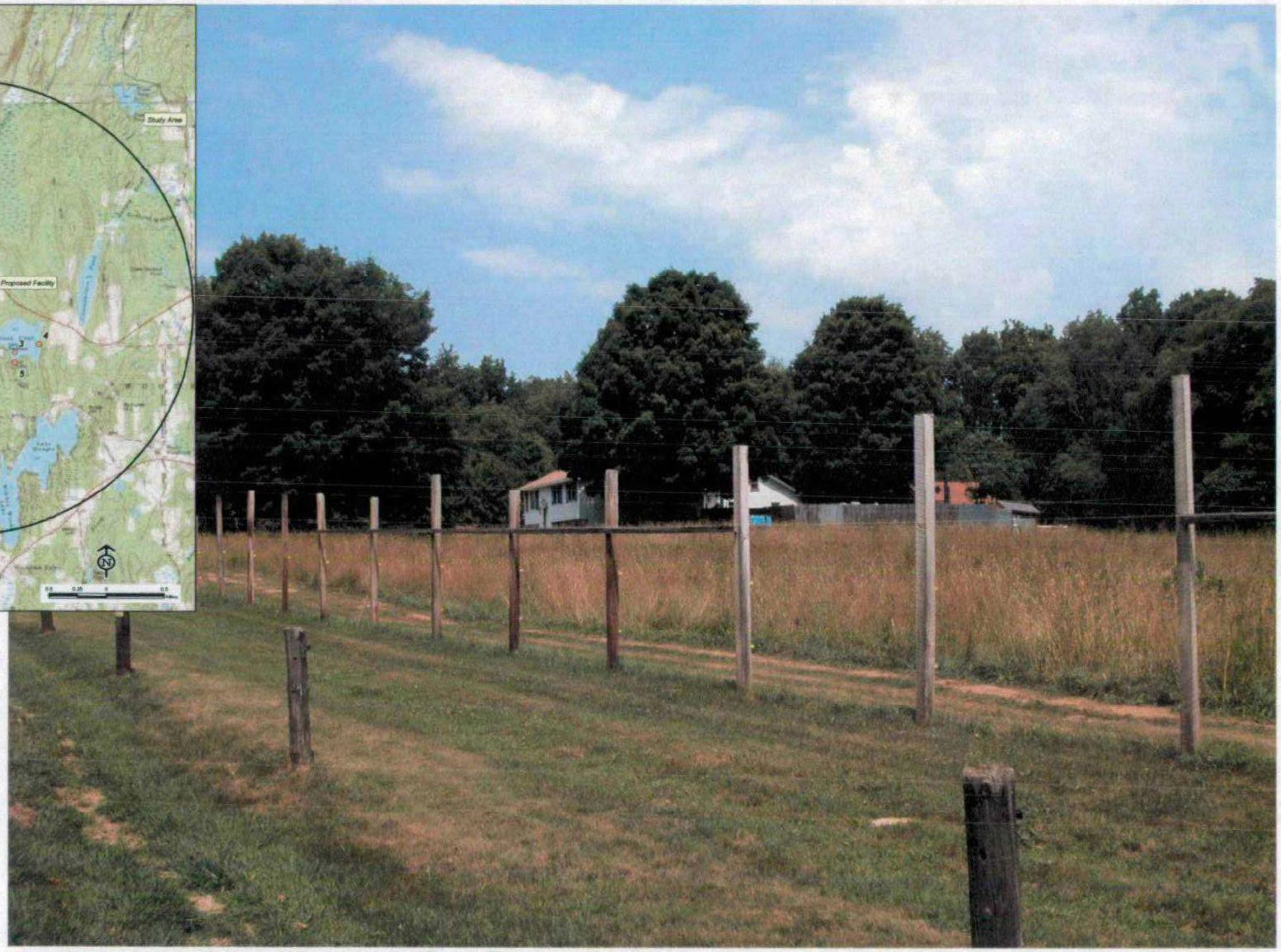
verizon

Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 10*

Town of
Woodstock
Connecticut





Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

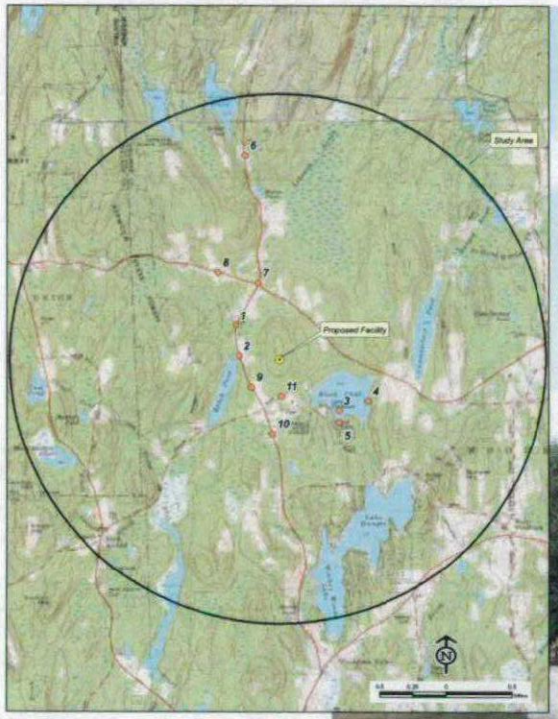
PHOTO TAKEN FROM ROUTE 198, LOOKING NORTH - BALLOON IS NOT VISIBLE

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.56 MILE +/-

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation *View 11*

Town of
Woodstock
Connecticut



Route 198
Woodstock, Connecticut

Monopole installation
with 4 carriers

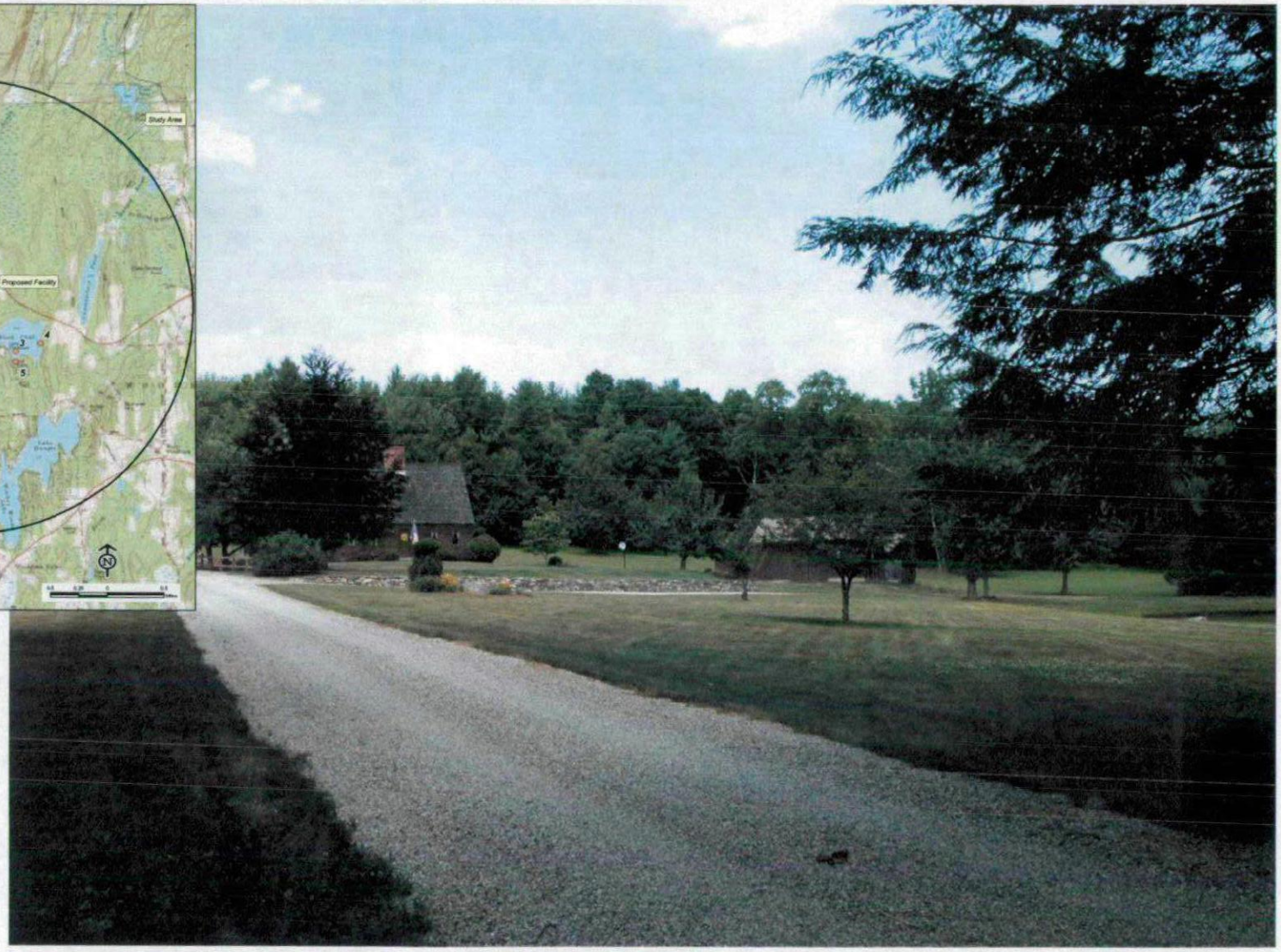


PHOTO TAKEN FROM OLD TURNPIKE ROAD ADJACENT TO HOST PROPERTY, LOOKING NORTH - BALLOON IS NOT VISIBLE

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.28 MILE +/-

verizon wireless

VHB Vanasse Hangen Brustlin, Inc.

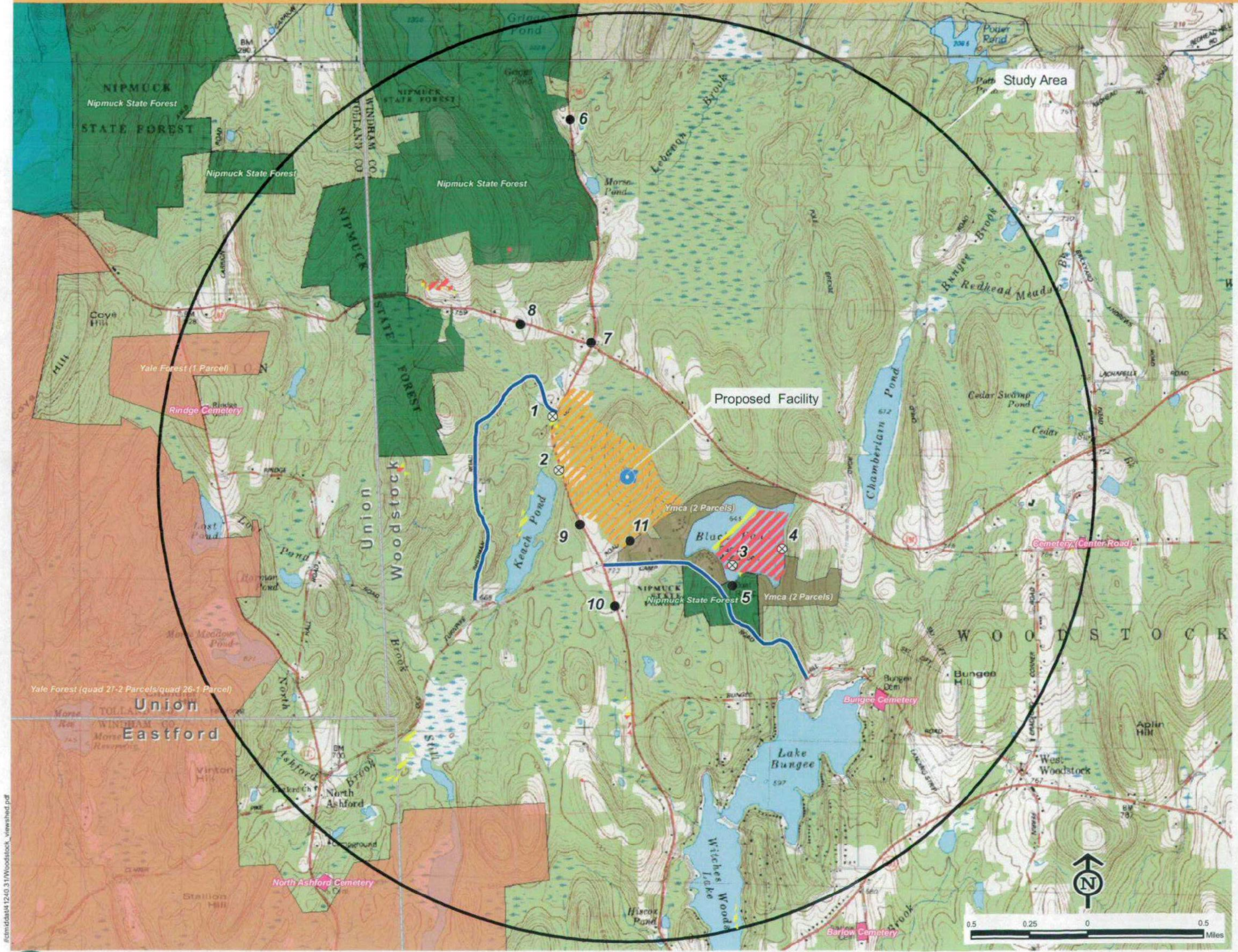
Attachment B

Viewshed Map

Viewshed Map

Topography and Forest Cover as Constraints

Town of Woodstock Connecticut



Proposed Verizon Wireless Telecommunications Facility Woodstock Northwest Route 198 Woodstock, Connecticut

NOTE:
- Viewshed analysis conducted using ESRI's Spatial Analyst.
- Proposed Facility height is 140 feet.
- Existing tree canopy height estimated at 65 feet.
- Study Area consists of a two mile radius around the proposed Facility and includes 8,042 acres of land

DATA SOURCES:
- National Elevation Dataset (NED) with a resolution of one arc-second (approximately 30 meters) produced by the USGS, 1925 - 1999
- Forest areas derived from 2004 digital orthophotos with 0.5-foot pixel resolution; digitized by VHB, 2007
- Base map comprised of Eastford, Southbridge and Westford USGS Quadrangle Map
- Protected properties data layer provided CTDEP; May, 2007
- Scenic Roads layer derived from available State and Local listings.

Map Compiled October 2007

Legend

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

Photographs - June 17, 2007/August 25, 2007
- Balloon Not Visible
- Balloon Visible Above Trees

- Anticipated Seasonal Visibility (Approximately 124 Acres)

Approx. % of Monopole Visible (Year-Round)
- Upper 25% to Tree Line - 14 Acres
- 50% - 38 Acres
- Entire Facility Visible - 3 Acres

Total Year-Round Visibility Approximatley 55 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

- Protected Properties (Federal)

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

VHB Vanasse Hangen Brustlin, Inc.
Transportation | Land Development | Environmental Services

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