Comparative Visual Resource Evaluation Report

Proposed Wireless Telecommunications Facility

CT-999-0101

Two Alternative Site Locations:
58 Montano Road
618 Neipsic Road
(a/k/a 497A Wickham Road)
Glastonbury, Connecticut

Prepared for **Optasite Towers LLC**
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Westborough, MA 01581

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March 2008

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 telecommunications Facility to be located within the Town of Glastonbury, Connecticut. As part of the approval process, Optasite Towers LLC has selected two alternative sites for further evaluation that are referred to herein as Candidate A and Candidate B. Candidate A is located on property at 58 Montano Road and Candidate B is located on property at 618 Neipsic Road (a/k/a 497AWickham Road) in Glastonbury, Connecticut ("host properties"). The Candidate project sites are located approximately 600 feet apart. This "Visual Resource Evaluation" was conducted to approximate the visibility of a Facility at the proposed locations within a two-mile radius surrounding each of the Candidate sites ("Study Area") and present the results of the analysis in a comparative format.

Project Introduction

Development of Candidate A would include the construction of a 120-foot tall monopole and Candidate B would include the installation of a 130-foot tall monopole. Associated ground equipment would be located within a fence-enclosed compound area at the base of the tower structure. Based on information provided by the project engineers, Clough Harbour & Associates LLP, the Candidate A project area is located at approximately 260 feet Above Mean Sea Level (AMSL) and the Candidate B project area is located at approximately 215 feet AMSL. Access to the Candidate locations would be provided via a proposed gravel driveway off Montano Road and Wickham Road for Candidate A and Candidate B, respectively.

Site Description and Setting

Identified in the Town of Glastonbury Tax Assessors records as Map 75/Block 4480/Lot S0021, the Candidate A host property consists of approximately 1.3 acres land and is currently occupied by a single family residence. The proposed Facility would be situated on the northern portion of the host property. The Candidate B project area is located on a 12.15-acre parcel identified in the Town of Glastonbury Tax Assessors records as Map G7/Block 4740/Lot S0016. A single-family residence and several outbuildings currently occupy the property. The proposed Facility is located within a heavily wooded area on the western portion of the host property. Attachment A includes a photograph of the proposed project area. 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 Candidate site locations is comprised of roadway infrastructure associated with the Route 2 transportation corridor and medium-density residential parcels. Segments of Route 2, Route 17 and Route 94 are contained within the Study Area. In total, the Study Area features approximately 97 linear miles of roadways.

The topography within the Study Area is characterized by rolling hills that range in ground elevation from approximately 25 feet AMSL to just over 500 feet AMSL. Overall, the Study Area contains approximately 43 acres of surface water. The tree cover within the Study Area consists mainly of mixed deciduous hardwood species interspersed with stands of mature evergreen trees. The tree canopy occupies approximately 5,533 acres of the 8,337-acre study area (66%). 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.

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METHODOLOGY

In order to better represent the visibility associated with the Facility, Vanasse Hangen Brustlin, Inc. (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 2006 digital orthophotos with a 1-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 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 infrared 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.

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 among 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, based on a review of information published by the Connecticut Department of Transportation (ConnDOT) and discussions with municipal officials in Glastonbury, VHB has determined that there are no state or locally-designated scenic roadways contained within the Study Area.

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 February 24, 2008, VHB conducted a "balloon float" at the Candidate sites to further evaluate the potential viewshed within the Study Area. The balloon floats consisted of raising and maintaining an approximate four-foot diameter, helium-filled weather balloon at the proposed site location at a height of 120 feet for Candidate A and 130 feet for Candidate B, respectively. During the balloon float, the temperature was approximately 30 degrees Fahrenheit with calm wind conditions and sunny skies.

Photographic Documentation

Once the balloons were secured, 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 balloons were, and were not, visible above and/or through the tree canopy. The balloons were photographed from several vantage points to document the

actual view towards the proposed Facility. Several locations were the balloons were not visible are also included. The locations and orientations of the photos are described below:

1. Views from Neipsic Road at Wickham Road.
2. Views from Neipsic Road at Oakwood Drive.
3. Views from Route 2 westbound.
4. Views from Wickham Road north of Neipsic Road.
5. Views from Old Stage Road adjacent to house #170.
6. Views from Hale Road.
7. Views from Hale Road at Montano Road.
8. Views from Bidwell Street at Broadleaf Circle.
9. Views from Lincoln Drive adjacent to house #168.
10. Views from JB Williams Park.
11. Views from end of Wickham Road.
12. Views from Rotary Fields.

Photographs of the balloon from the view points listed above were taken with a Nikon D-80 digital camera body and Nikon 18 to 135 mm zoom lens. For the purposes of this report, the lens was set to 50mm. "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 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

A photographic simulation was generated for the five photo locations introduced above where at least one of the balloons was visible. 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 photograph 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 monopoles would be visible above the tree canopy comprise approximately 24 acres and 19 acres for Candidate A and Candidate B, respectively (or less than one percent of the 8,337-acre Study Area for each Site). As depicted

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

on the viewshed map, the majority of the visibility associated with the Candidates occurs within the general vicinity of the sites, typically within 0.50-mile of each location. For both Candidate A and Candidate B, this includes select portions of the Route 2 corridor, Neipsic Road and Wickham Road where partial views of the Facilities may be achieved. Due to physical constraints and potentially hazardous conditions along Route 2, VHB staff was unable to obtain photographs of Candidate B from the roadway. However, passing views of the balloon were observed during the drive-by reconnaissance. Such views would be comparable to those depicted in View 3, which features potential views of Candidate A from Route 2. Limited views of the Candidate A monopole may be obtained from select portions of Old Stage Road (*View 5*). VHB estimates that at least partial views of the Candidate A monopole would be achieved from portions of approximately six residences located within the Study Area. This includes two residences located along Wickham Road, two residences located off Montano Road and two residences located along Old Stage Road. In addition, VHB estimates that at least partial views of the Candidate B monopole may be achieved from approximately nine residences within the Study Area. This includes five residences located along Neipsic Road, two residences located off Wickham Road and two residences located off Oakwood Drive. Overall, the topography and extensive tree cover contained within the Study Area serve to minimize the year-round visibility associated with each of the Alternative Sites.

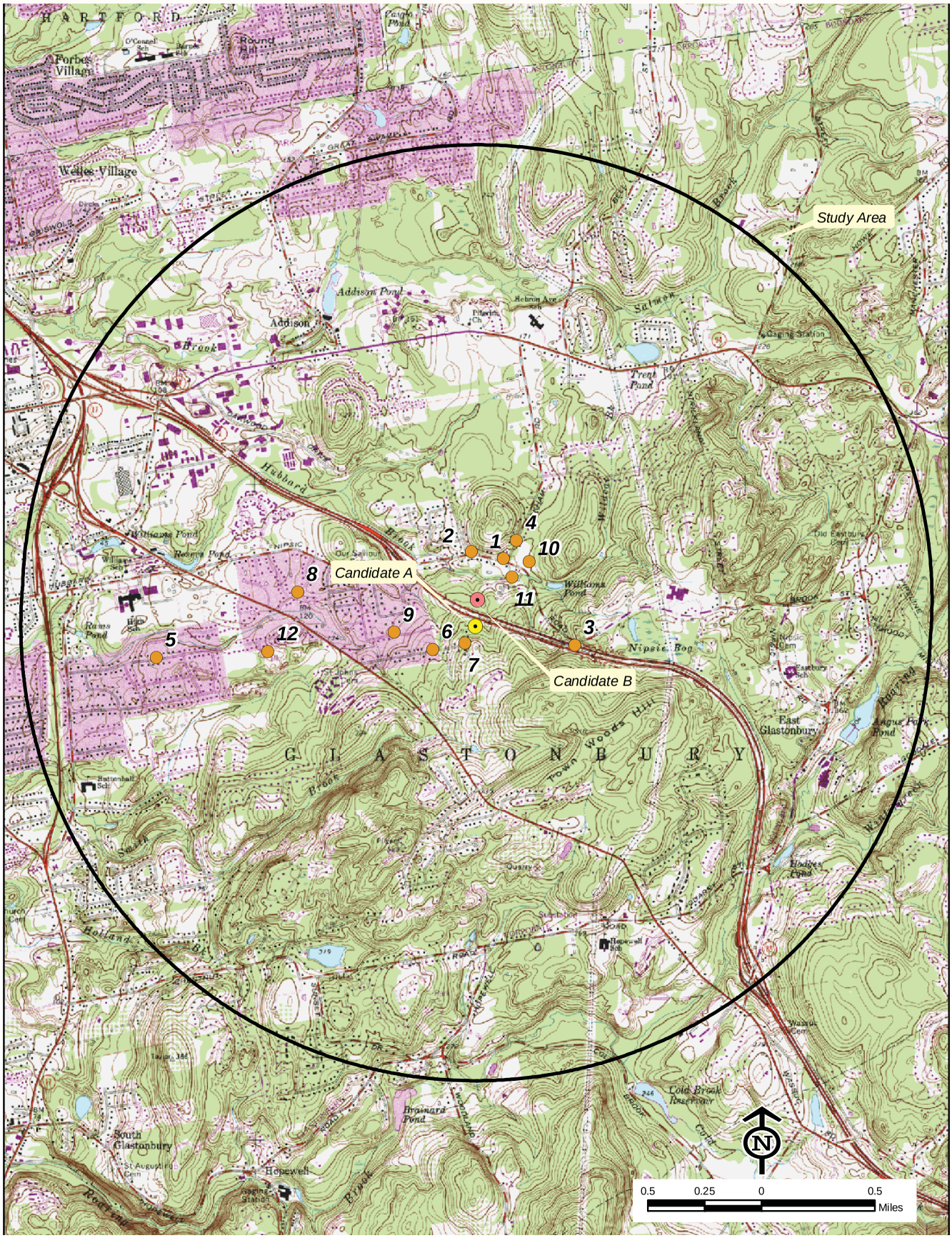
The viewshed maps also depict several additional areas where seasonal (i.e. during "leaf off" conditions) views are anticipated. These areas comprise approximately 7 acres and 10 acres for Candidate A and Candidate B, respectively. Generally, these areas are limited to the general Site vicinities. For Candidate A, this may include select portions of Montano Road, Neipsic Road and Route 2. VHB estimates that seasonal views of the proposed Candidate A location would be achieved from approximately four additional residential properties within the Study Area. Areas of potential seasonal visibility associated with Candidate B may include select portions of Neipsic Road and Oakwood Drive. In total, VHB estimates that seasonal views may be achieved from portions of approximately six additional residences within the Study Area.

Attachment A

Photolog Documentation Map, Project Area Photographs, and Balloon Float/ Photographic Simulations

Photolog Documentation

Town of
Glastonbury
Connecticut



Photographic Documentation

Candidate Site A

Town of
Glastonbury
Connecticut

PROPOSED PROJECT AREA - CANDIDATE A

Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation

Candidate Site B

Town of
Glastonbury
Connecticut

PROPOSED PROJECT AREA - CANDIDATE B

Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

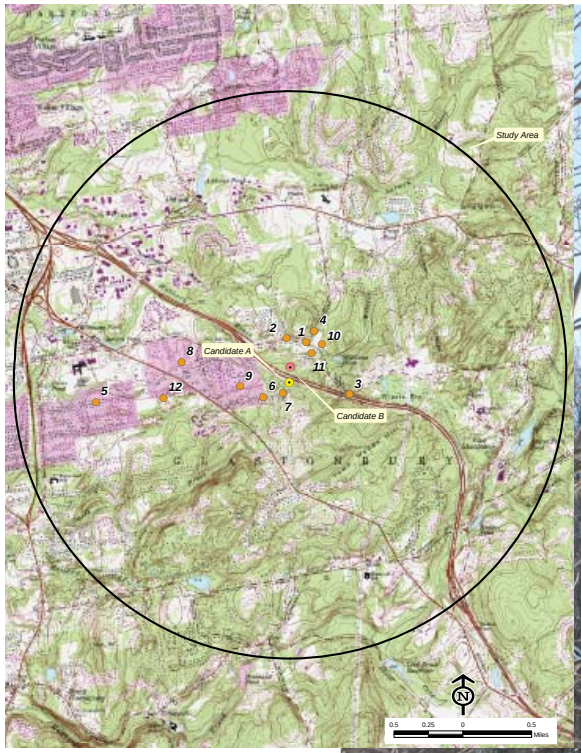
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation

View 1 Candidate B

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM NEIPSIC ROAD AT WICKHAM ROAD, LOOKING SOUTHWEST - CANDIDATE B IS VISIBLE; CANDIDATE A IS NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 0.22 MILE +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.32 MILE +/-

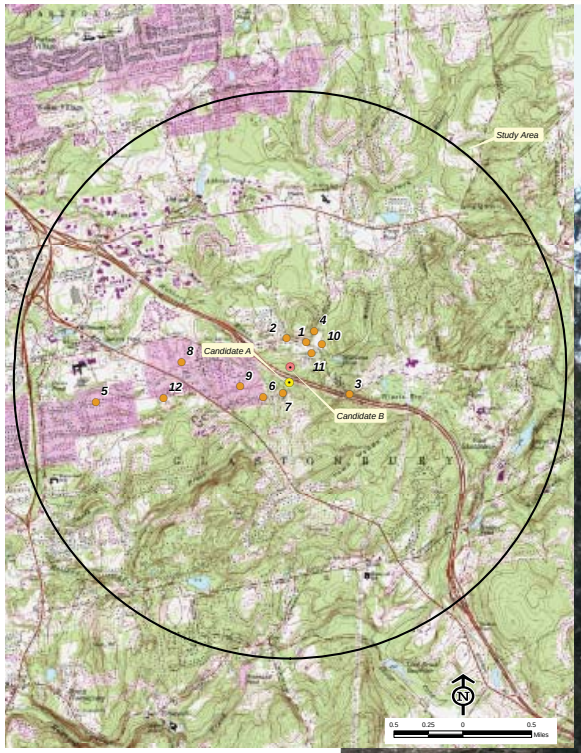
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation

View 2 Candidate B

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

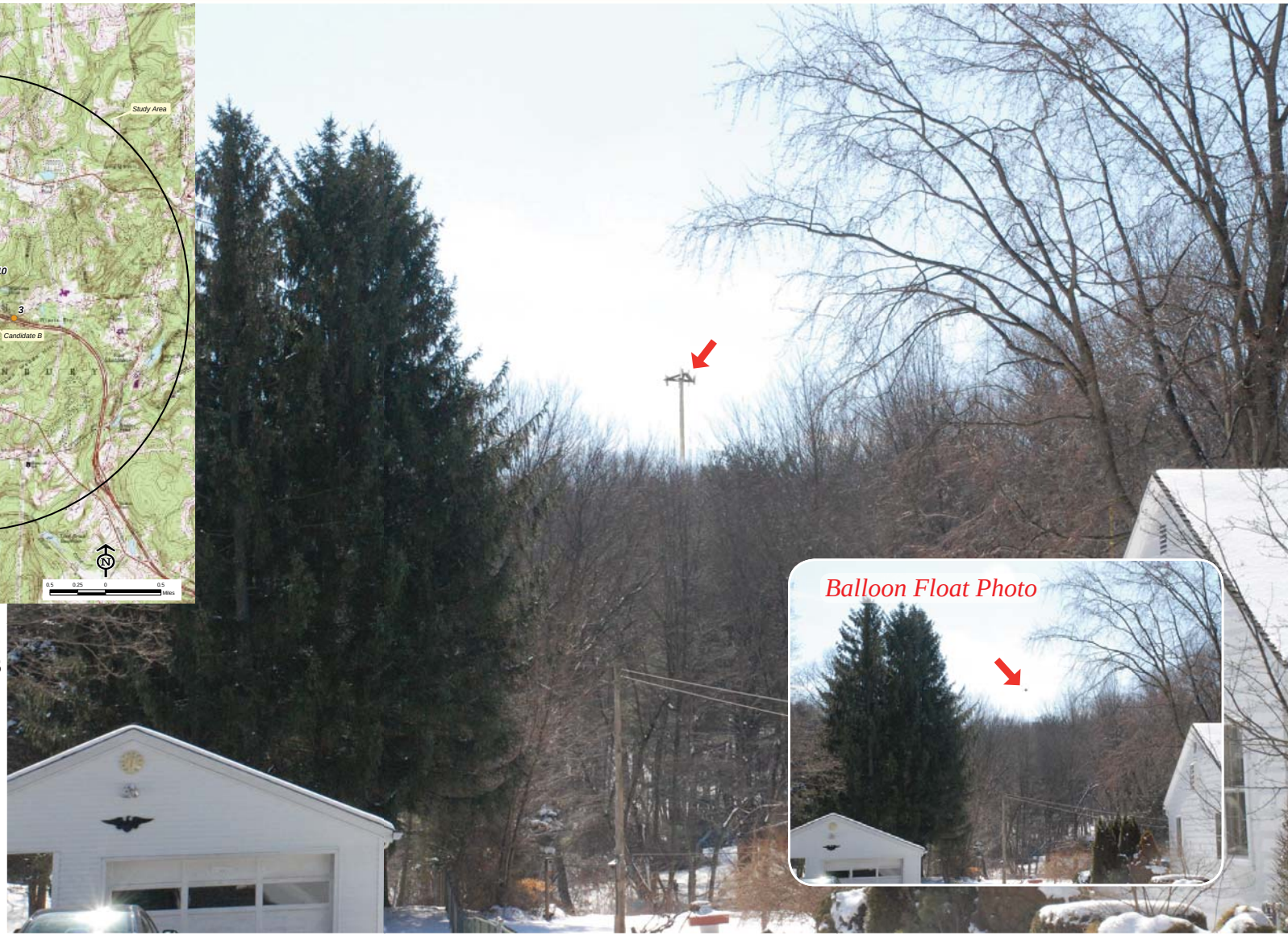


PHOTO TAKEN FROM NEIPSIC ROAD AT OAKWOOD DRIVE, LOOKING SOUTHWEST - CANDIDATE B IS VISIBLE; CANDIDATE A IS NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 0.23 MILE +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.34 MILE +/-

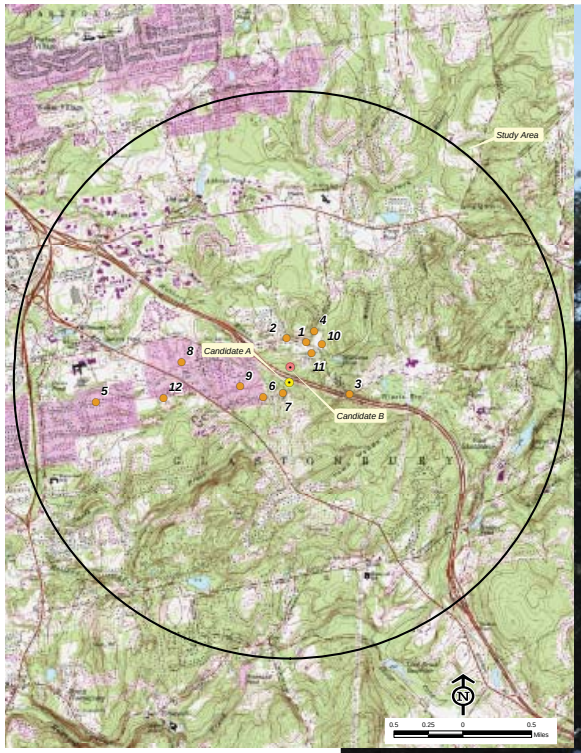
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation

View 3 Candidate A

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM ROUTE 2 WESTBOUND, LOOKING NORTHWEST -
CANDIDATE A IS VISIBLE; CANDIDATE B IS NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.21 MILE +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 0.29 MILE +/-

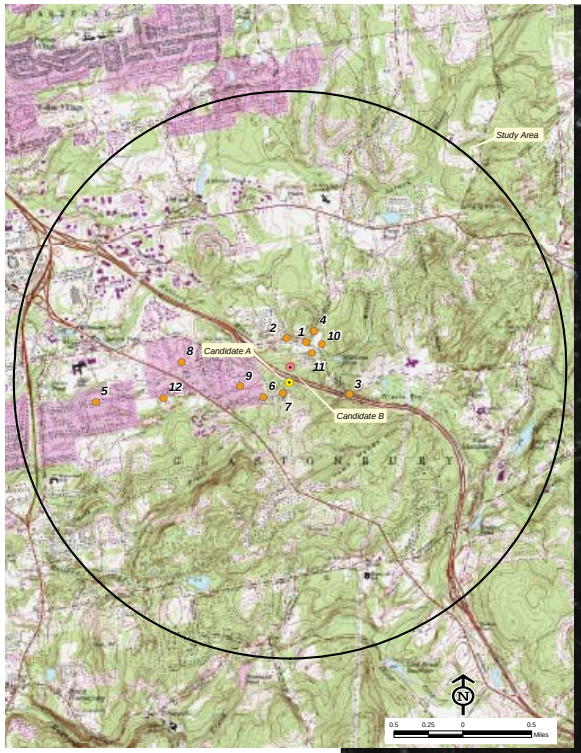
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation

View 4 Candidate A

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM WICKHAM ROAD NORTH OF NEIPSIC ROAD, LOOKING SOUTHWEST - CANDIDATE A IS VISIBLE; CANDIDATE B IS NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.43 MILE +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 0.31 MILE +/-

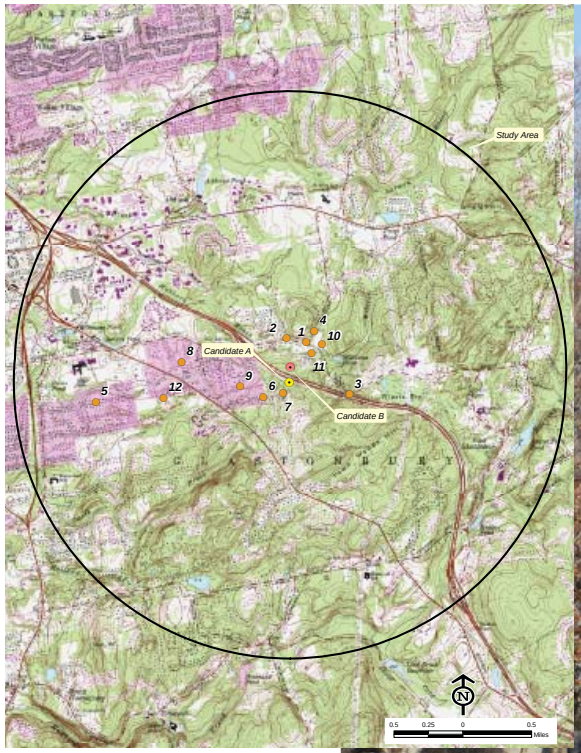
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation and Simulation

View 5 Candidate A

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM OLD STAGE ROAD ADJACENT TO HOUSE #170, LOOKING NORTHEAST - CANDIDATE A IS VISIBLE; CANDIDATE B IS NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 1.39 MILES +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 1.42 MILES +/-

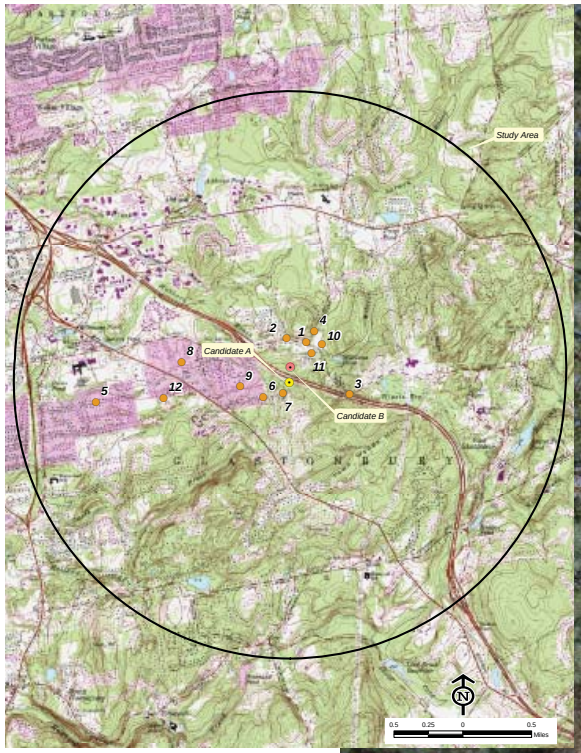
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation

View 6

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM HALE ROAD, LOOKING NORTHEAST -
BALLOONS ARE NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.21 MILE +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 0.29 MILE +/-

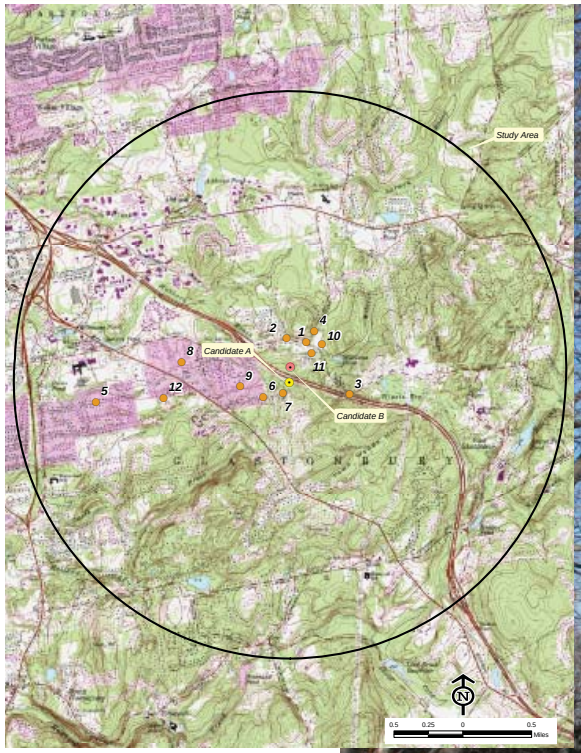
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation

View 7

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM HALE ROAD AT MONTANO ROAD, LOOKING NORTHEAST - BALLOONS ARE NOT VISIBLE FROM THIS LOCATION

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

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

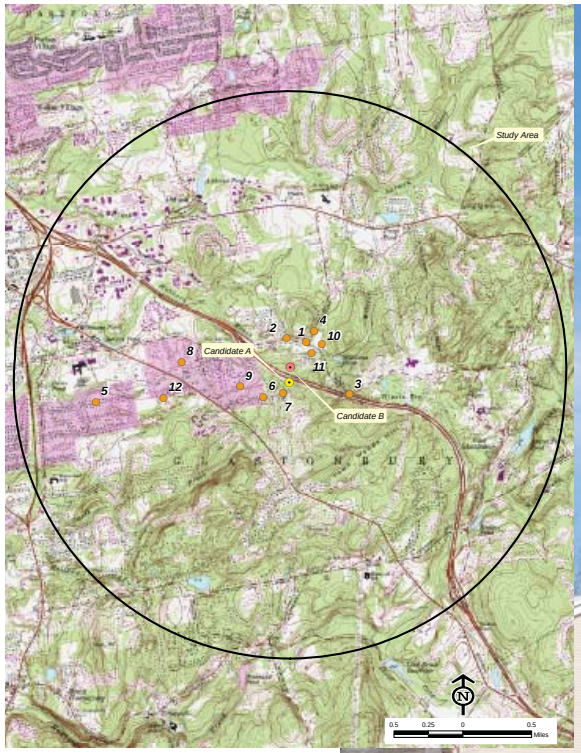
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation

View 8

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM BIDWELL STREET AT BROADLEAF CIRCLE, LOOKING SOUTHEAST - BALLOONS ARE NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.79 MILE +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 0.79 MILE +/-

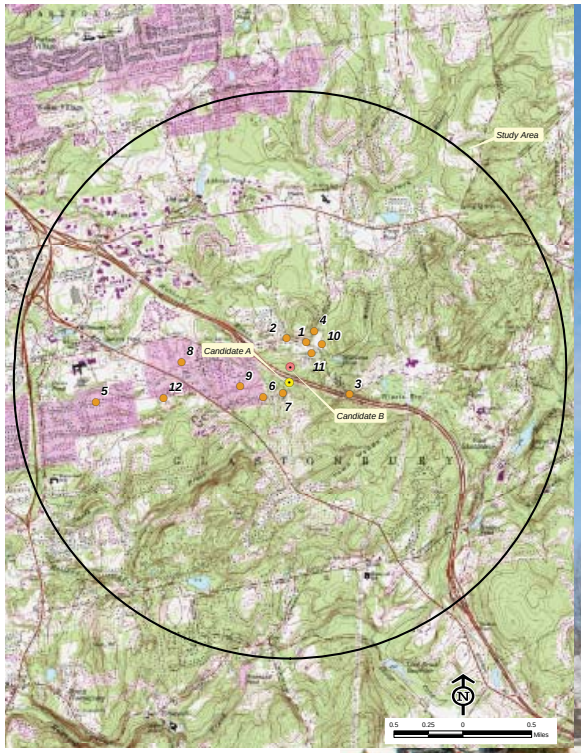
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation

View 9

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM LINCOLN DRIVE ADJACENT TO HOUSE #168, LOOKING NORTHEAST - BALLOONS ARE NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.35 MILE +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 0.38 MILE +/-

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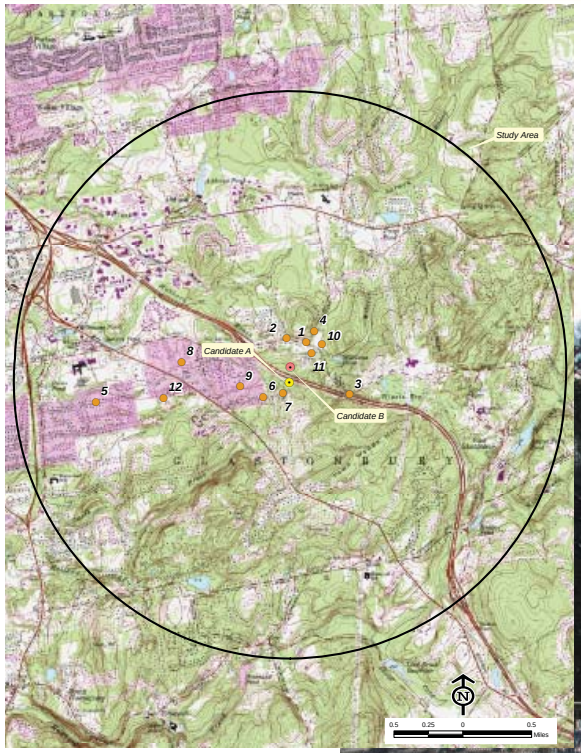
VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation

View 10

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM JB WILLIAMS PARK, LOOKING SOUTHWEST -
BALLOONS ARE NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.38 MILE +/-

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

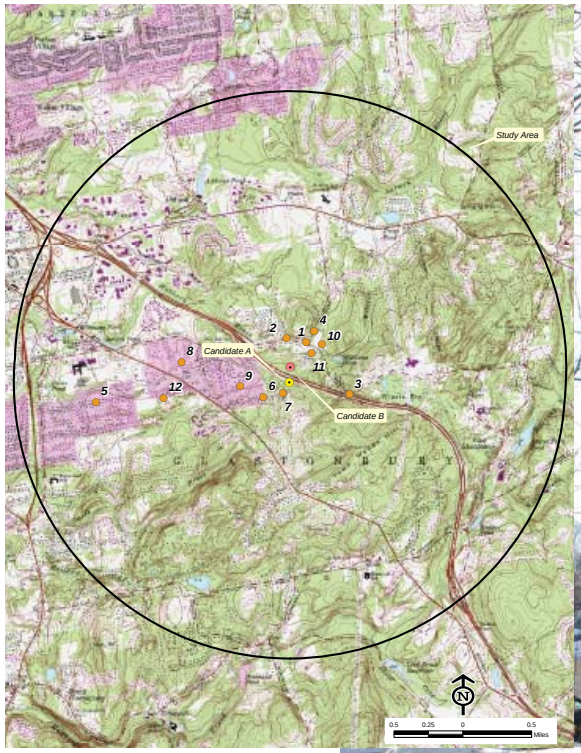
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation

View 11

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM END OF WICKHAM ROAD, LOOKING SOUTHWEST - BALLOONS ARE NOT VISIBLE FROM THIS LOCATION

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

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

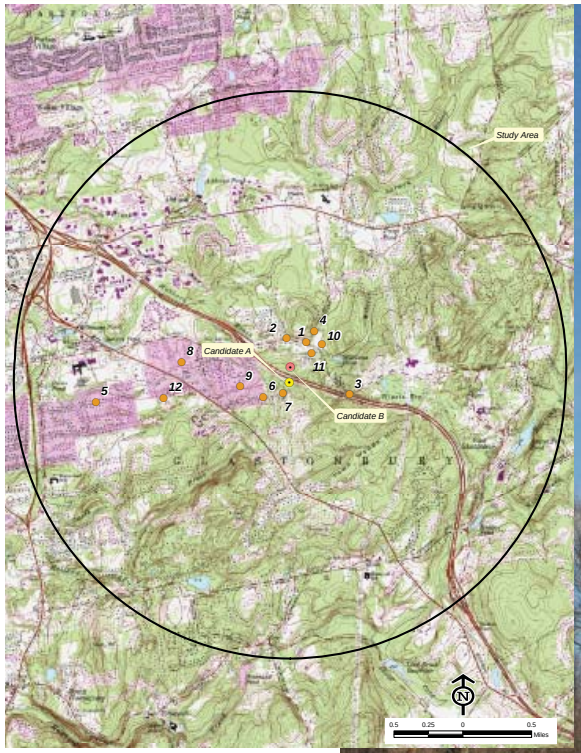
Optasite

VHB Vanasse Hangen Brustlin, Inc.

Photographic Documentation

View 12

Town of
Glastonbury
Connecticut



Optasite Installation
Two Candidate Locations
55 Montano Road
497A Wickham Road
Glastonbury, CT

Single Carrier Monopole

PHOTO TAKEN FROM ROTARY FIELDS, LOOKING NORTHEAST -
BALLOONS ARE NOT VISIBLE FROM THIS LOCATION

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE A IS 0.92 MILE +/-

DISTANCE FROM THE PHOTOGRAPH LOCATION TO CANDIDATE SITE B IS 0.96 MILE +/-

Optasite

VHB Vanasse Hangen Brustlin, Inc.

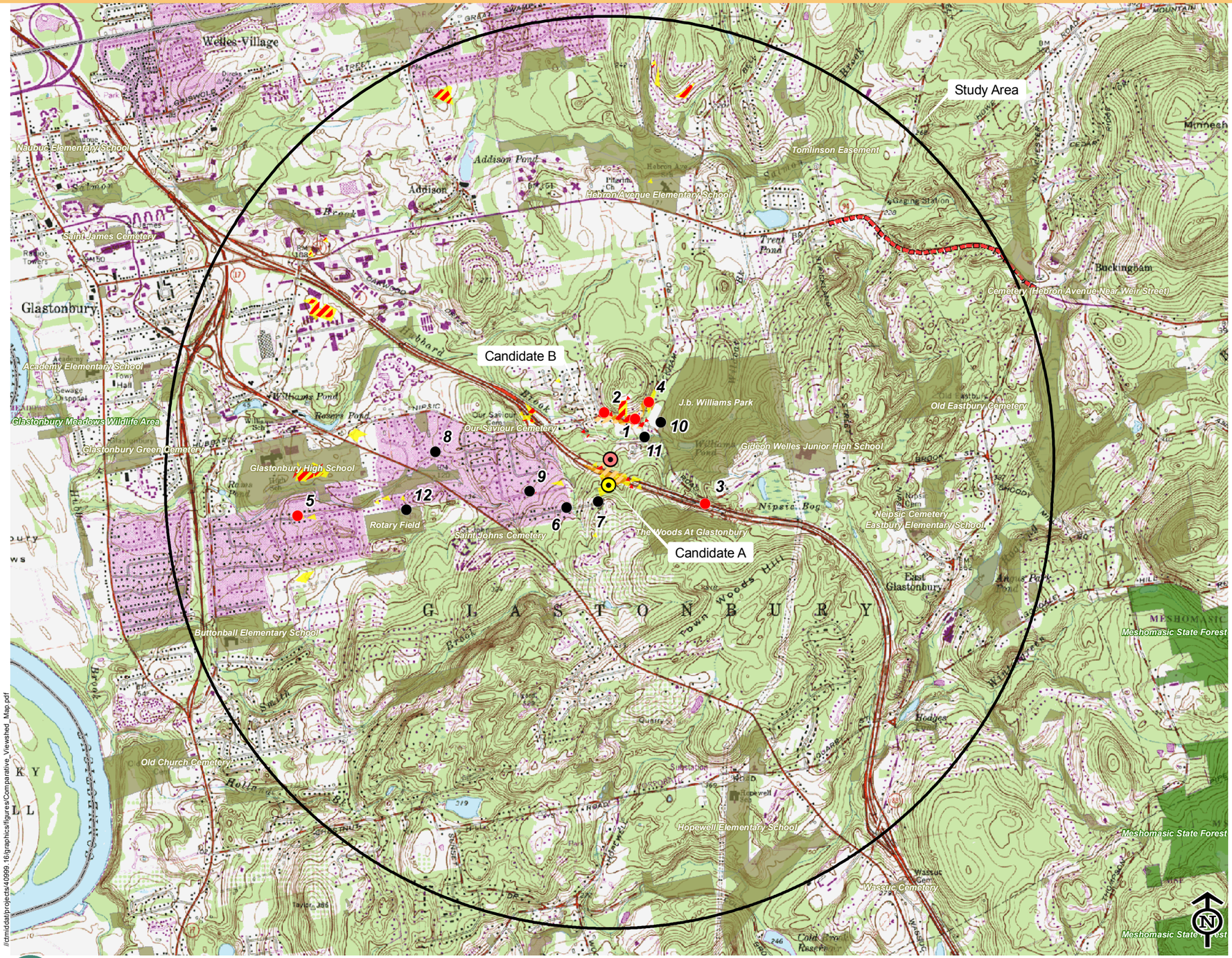
Attachment B

Viewshed Map

Comparative Viewshed Map

Two Site Candidates - Candidate A and Candidate B

Town of Glastonbury Connecticut



Proposed Telecommunications Facility
CT-999-0101
Two Site Candidates
Candidate A - 58 Montano Road
Candidate B- 618 Neipsic Road
(a/k/a 497A Wickham Road)
Glastonbury, Connecticut

NOTE:
- Candidate A proposed Facility height is 120 feet.
  Candidate B proposed Facility height is 130 feet.
- Existing tree canopy height estimated at 65 feet.

DATA SOURCES:
- Digital elevation model (DEM) derived from USGS National Elevation Dataset (NED) with a resolution of one arc-second (approximately 30 meters) produced by the USGS, 1925 - 1999
- Forest areas derived from 2006 digital color orthophotos with 1-foot pixel resolution; digitized by VHB, 2007
- Base map comprised of Glastonbury (1992) USGS Quadrangle Map
- Protected properties data layer provided CTDEP; May, 2007
- Scenic Roads layer derived from available State and Local listings.

Map Compiled March, 2008

Legend

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

Photographs - February 24, 2008
- Balloons are not visible
- Balloon visible above trees

- Candidate A Approximate Seasonal Visibility (+/- 7 Acres)
- Candidate B Approximate Seasonal Visibility (+/- 10 Acres)
- Candidate A Approximate Year-Round Visibility (+/- 24 Acres)
- Candidate B Approximate Year-Round Visibility (+/- 19 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
- Town Line
- Multi-Use Path

0.5 0.25 0 0.5 Miles

//ctmidata/projects/40999.16/graphics/figures/Comparative_Viewshed_Map.pdf

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

Optasite