

*Proposed Wireless
Telecommunications Facility*

640 Hilliard Street
Manchester, Connecticut

Prepared for **Optasite Towers LLC**
1 Research Drive, Suite 200C
Westborough, MA 01581

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

May 2007

Visual Resource Evaluation

Optasite Towers LLC ("Optasite") 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 640 Hilliard Street ("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 150-foot tall, brown monopole capable of accommodating up to four wireless service providers with the telecommunications antennas mounted flush to the exterior of the tower structure. Associated ground equipment would be located within a fenced enclosure at the base of the tower. Based on information provided by the Site engineers, Clough Harbour and Associates LLP, the proposed project area is located at ± 94 feet above mean sea level ("AMSL"). Access to the proposed Facility would follow an existing gravel driveway originating from the south side of Hilliard Street.

Site Description and Setting

Identified in the Town of Manchester lands records as Map 45\ Block 2920\ Lot 540, the host property includes 1.23-acres of land and is currently occupied by an approximate 83,349 square-foot mill building and associated parking area. The proposed Facility site is situated within an existing gravel parking area, approximately 70 feet east of the mill building. Land use within the general vicinity of the proposed Facility is comprised of commercial and industrial parcels to the north, east and west with medium-density residential parcels located to south, just beyond a wooded area that exists between the southern boundary of the host property and portions of Wedgwood Drive and Englewood Drive. Portions of the Study Area are traversed by several state-numbered routes and interstate highways including segments of I-84, I-384 I-291, Route 6, Route 30, Route 44, Route 83, and Route 502. In total, the Study Area contains roughly 142 linear miles of roadways.

The topography in the Study Area is generally characterized by gently rolling hills that range in ground elevation from approximately 80 feet AMSL to just over 280 feet AMSL. The tree cover within the Study Area consists mainly of mixed deciduous hardwood species. The tree canopy occupies approximately 3,300 acres of the 8,042-acre study area (41%). 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 60 feet. Lastly, the Study Area features approximately 142 acres of surface water, which includes portions of the Hockanum River.



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 are applied to the computer model to achieve an estimate of where the Facility will be visible. Initially, only topography is 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 this 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. An estimated 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, in this case 60 feet, is determined in the field using a hand-held infra-red laser range finder. The forested areas within the Study Area were then overlaid on the DEM with a height of 60 feet added and the visibility calculated. 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.

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 Manchester, it was determined that no roadways designated as scenic by the town and/or state traverse 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 April 23, 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 150 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 75 and 80 degrees Fahrenheit.

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 Adams Street adjacent to house #368.
2. View from Hilliard Street.
3. View from Wedgewood Drive adjacent to house #88.
4. View from West Middle Turnpike adjacent to building #515.
5. View from Adams Street adjacent to building #273.
6. View from New State Road adjacent to building #409.
7. View from New State Road adjacent to building #313.
8. View from Hilliard Street near intersection with New State road.
9. View from Hilliard Street adjacent to building #586.
10. View from Hoffman Road adjacent to house #1.

Photographs of the balloon from the view points listed above were taken with a Panasonic Digital Camera DMC-FZ5, 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." The optical zoom lens for the Panasonic DMC-FZ5 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 ten locations described above. The Photographic Simulations represent a scaled depiction of the proposed monopole with four flush-mounted antennae from these locations. The height of the Facility is determined based on the location of the balloon in the photographs and a proportional flush-mounted monopole image is simulated into the photographs. The simulations are contained in Attachment A.

CONCLUSIONS

Based on this analysis, areas from where the proposed 150-foot monopole would be visible above the tree canopy comprise approximately 45 acres, or less than one percent of the 8,042-acre Study Area. As depicted on the attached viewshed map (Attachment B), the year-round visibility associated with the proposed Facility is located within the immediate vicinity of the project area, generally within 0.25-mile the proposed Facility. These areas encompass

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

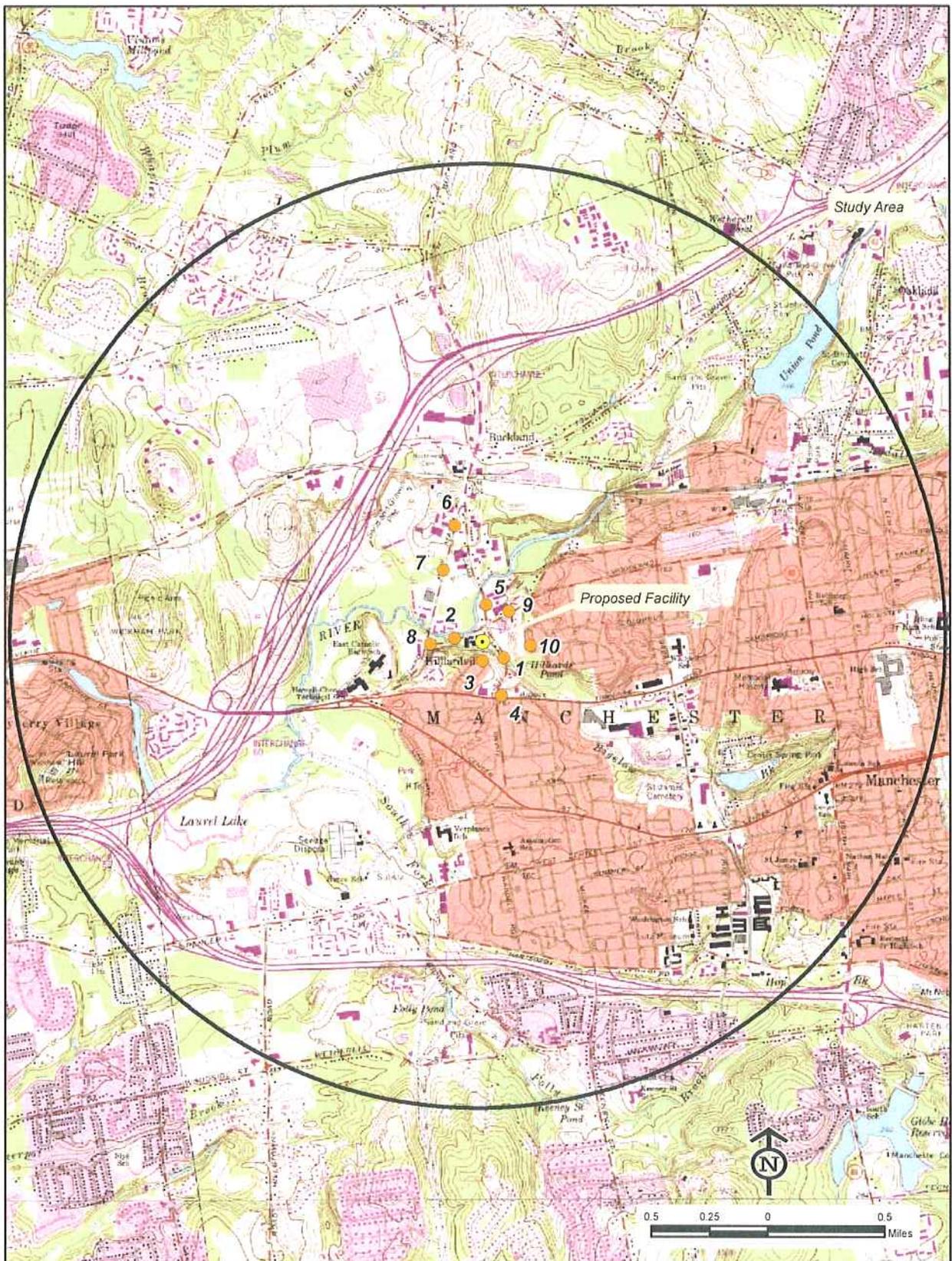
portions of New State Road, Hilliard Street and Adams Street to the north\ northeast and portions of Wedgewood Drive, Englewood Drive and Middle Turnpike East to the south. The viewshed map also depicts select areas of year-round visibility along and to the west of the Interstate 84 corridor as well as several smaller areas to the east and northeast. These areas are located on private properties, primarily at higher elevations with aspects towards the Site area, and are over one mile away from the proposed Facility. In total, VHB estimates that at least partial views of the proposed Facility would be achieved from select portions of approximately 16 residential properties within the Study Area. Specifically, this includes two residences along Adams Street south of the proposed Facility; four residences located adjacent to the intersection of Adams Street and Middle Turnpike East; three residences along Wedgewood Drive and four properties along Englewood Drive. described above. The majority of the photographs contained in Attachment A of this report indicate that year-round views of the proposed Facility would generally be limited to upper portions of the tower structure. The predominant land use within the general vicinity of the host property, mainly industrial and commercial, minimizes the number of potential residential receptors. The taller buildings and structures generally associated with these land uses, in addition to the topography and tree canopy, all serve to minimize the Facility's viewshed. It also important to note that a flush-mounted monopole, as is being proposed by Optasite, presents a slimmer visual profile in comparison to a traditional monopole that typically includes wider, antenna platforms. The viewshed map also depicts additional areas where seasonal (i.e. during "leaf off" conditions) views through the trees are anticipated. These areas comprise approximately 17 additional acres and are mostly limited to the immediate vicinity of the proposed host property, generally within approximately 0.25 mile. In total, VHB anticipates that approximately 12 additional residences will achieve seasonal views of the proposed Facility from select portions of their respective properties. This includes four residential properties along Hoffman Road to the east; four properties along Wedgewood Drive to the south; and four properties located along Englewood Drive also to the south.

Attachment A

Photolog Documentation Map, Balloon Float Photographs and Photographic Simulations

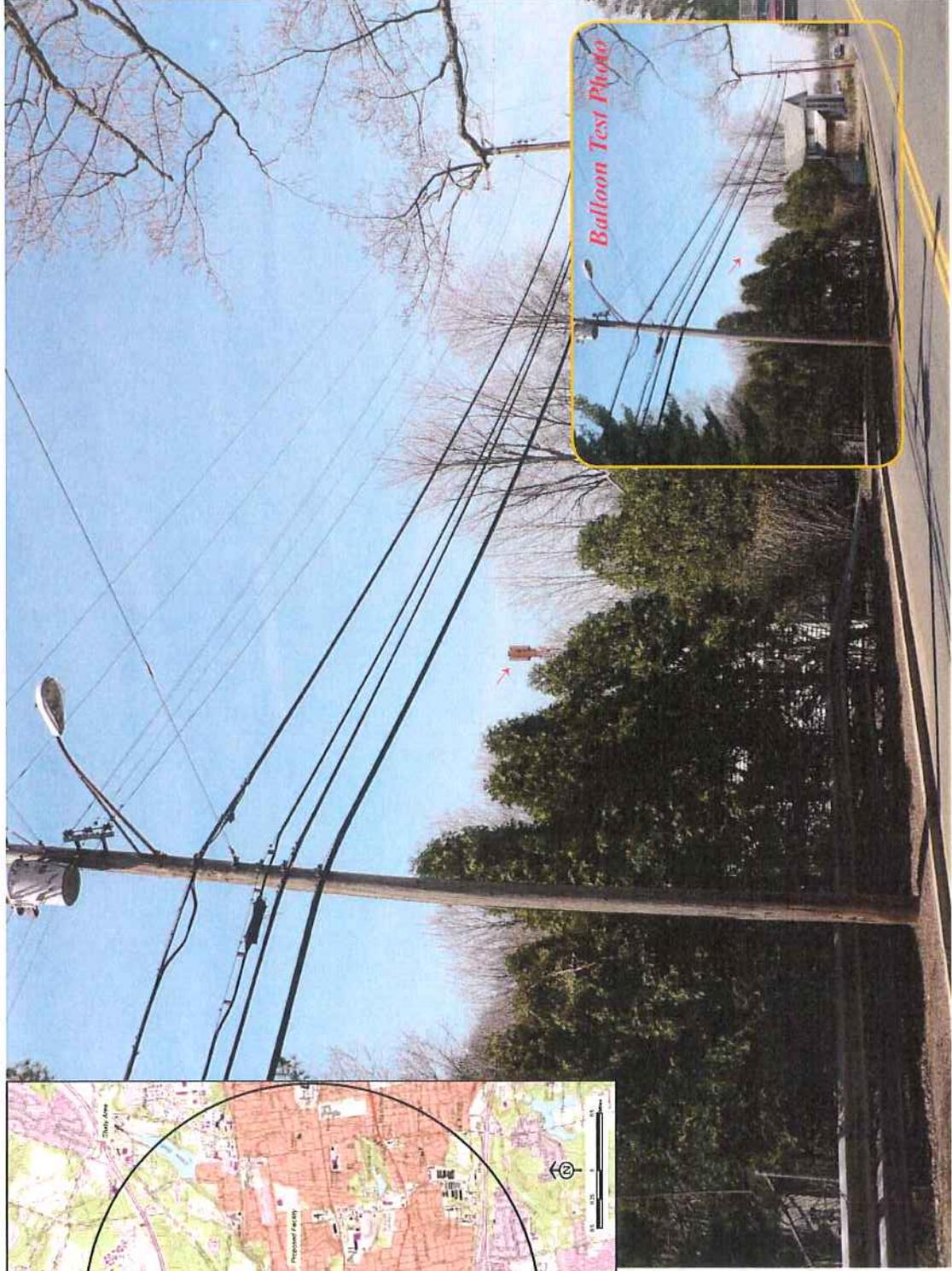
Photolog Documentation

Town of
Manchester
Connecticut



cmddanrj\0220_19\graphics\photos\0220_19_photos.mxd

Photographic Documentation and Simulation *View 1*

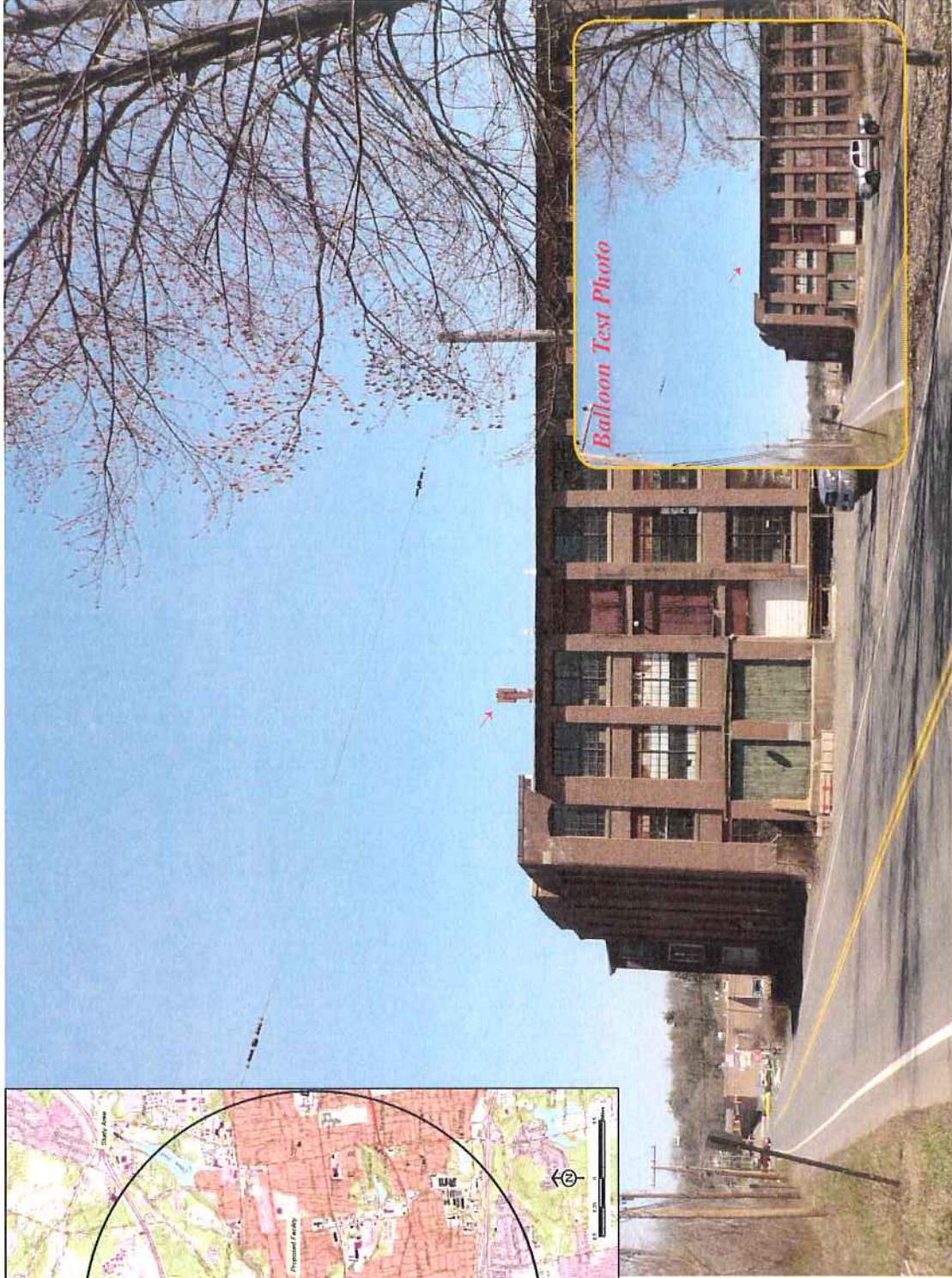
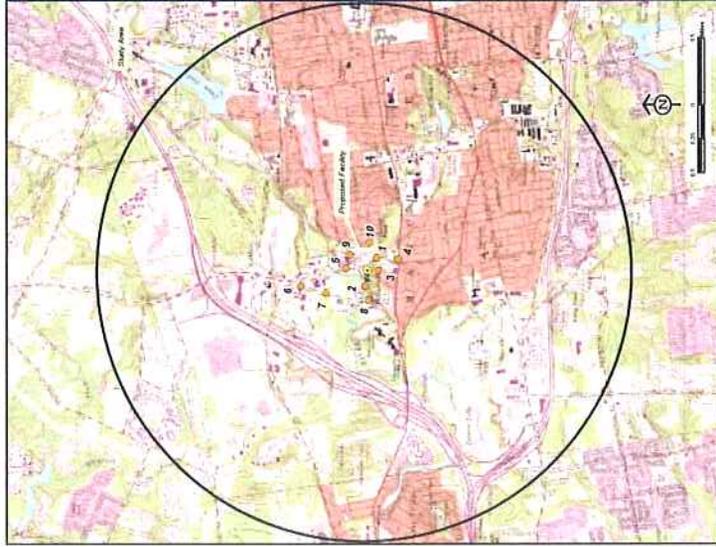


650 Hilliard Street
Manchester, CT

Brown Flush Mount
installation with 4
carriers

PHOTO TAKEN FROM ADAMS STREET ADJACENT TO HOUSE #368, LOOKING NORTHWEST
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.12 MILE +/-

Photographic Documentation and Simulation View 2



650 Hilliard Street
Manchester, CT

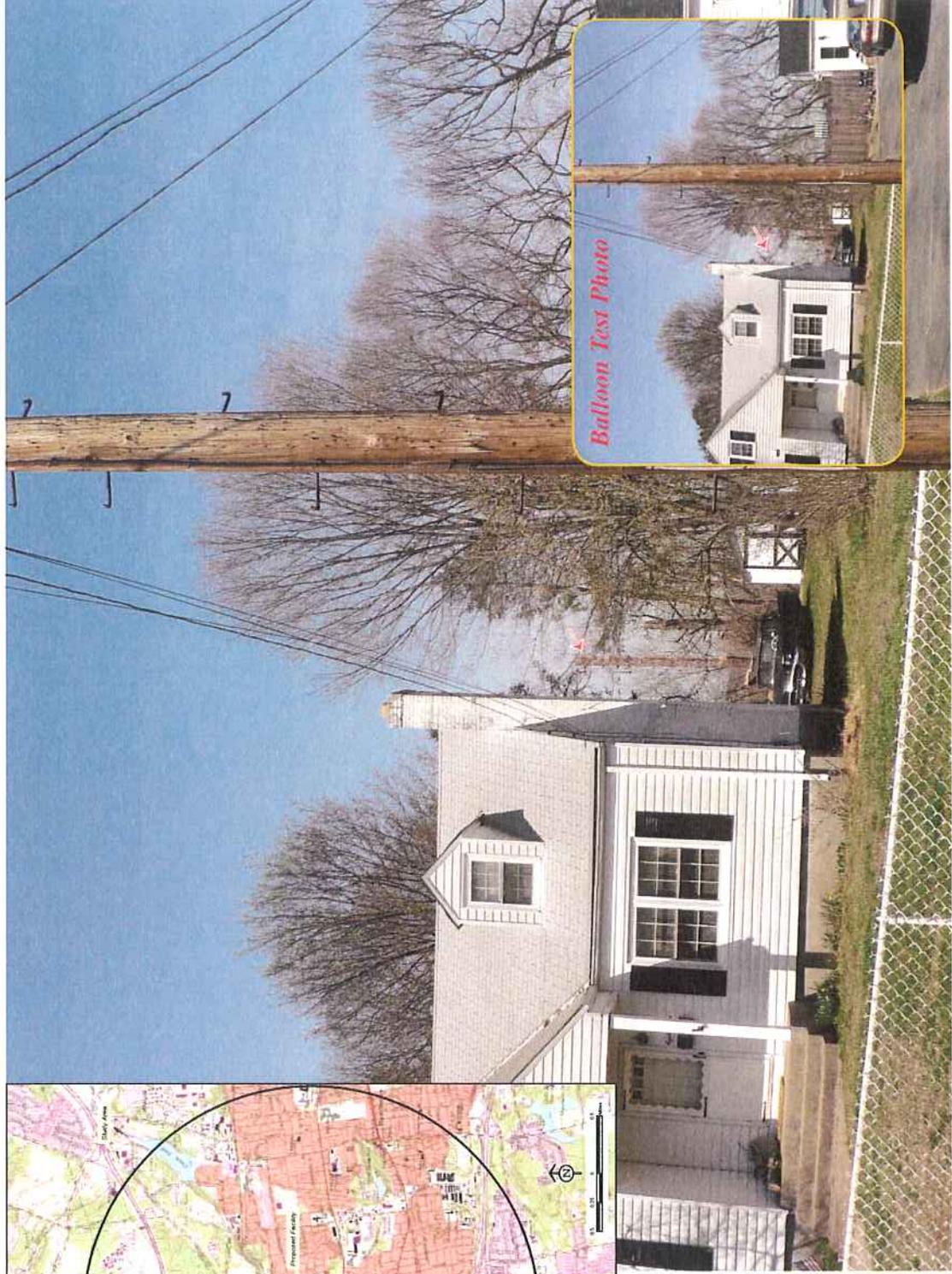
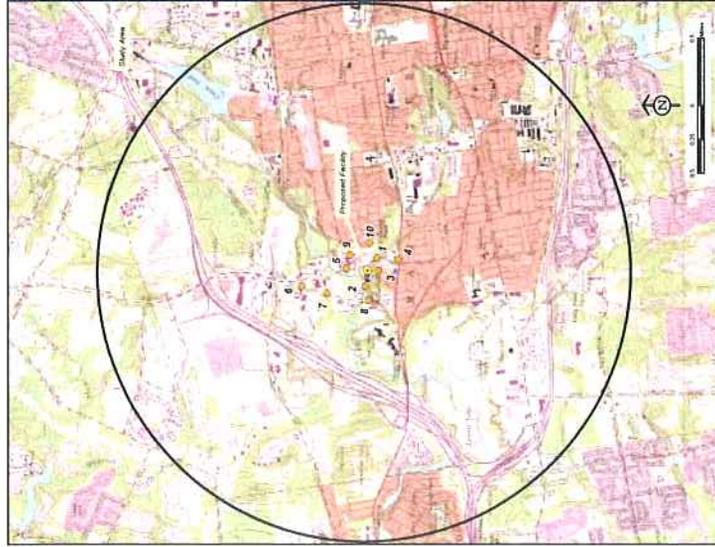
Brown Flush Mount
installation with 4
carriers

PHOTO TAKEN FROM HILLIARD STREET, LOOKING EAST

DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.12 MILE +/-

Photographic Documentation and Simulation View 3

Town of
Manchester
Connecticut



650 Hilliard Street
Manchester, CT

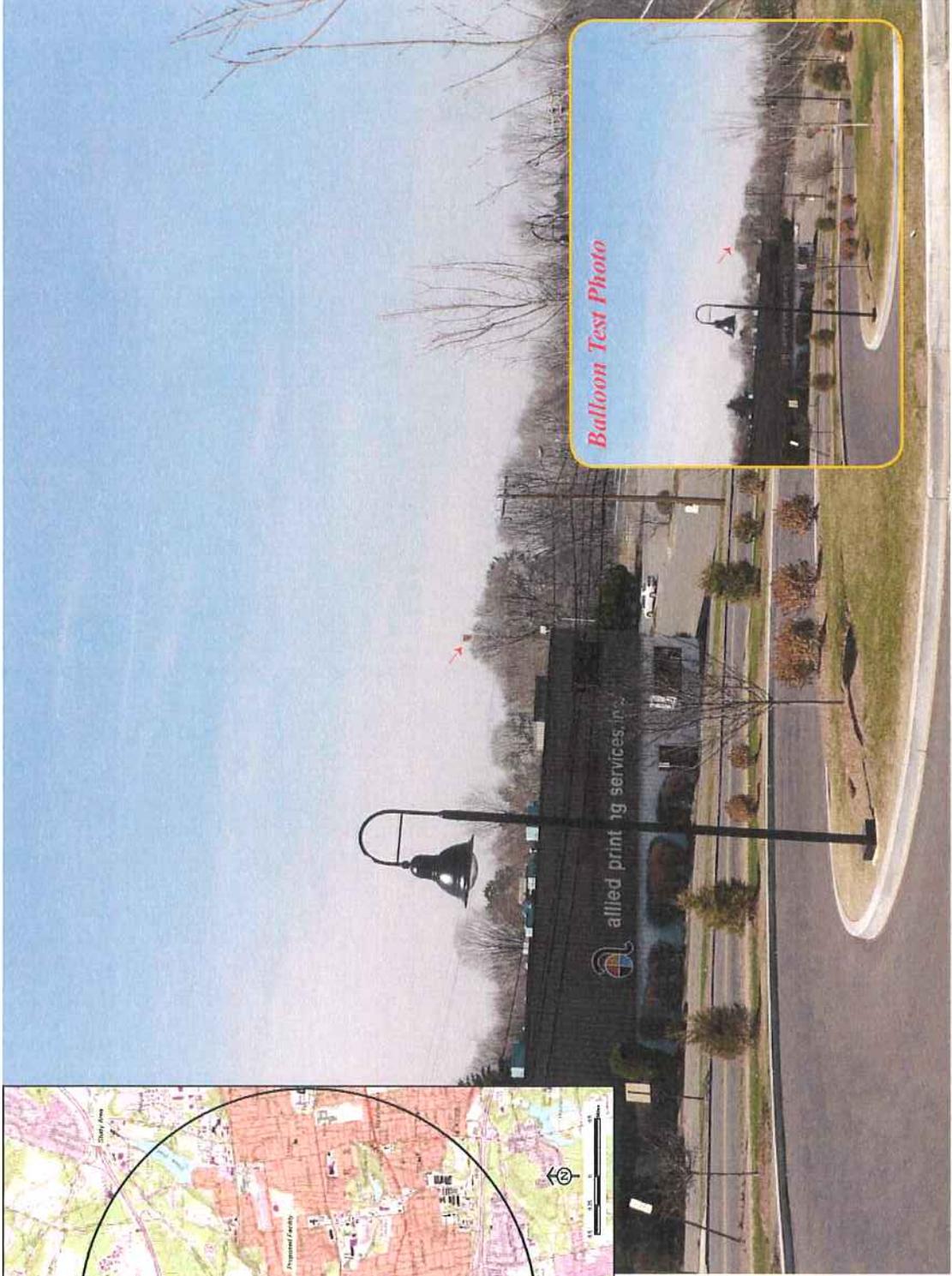
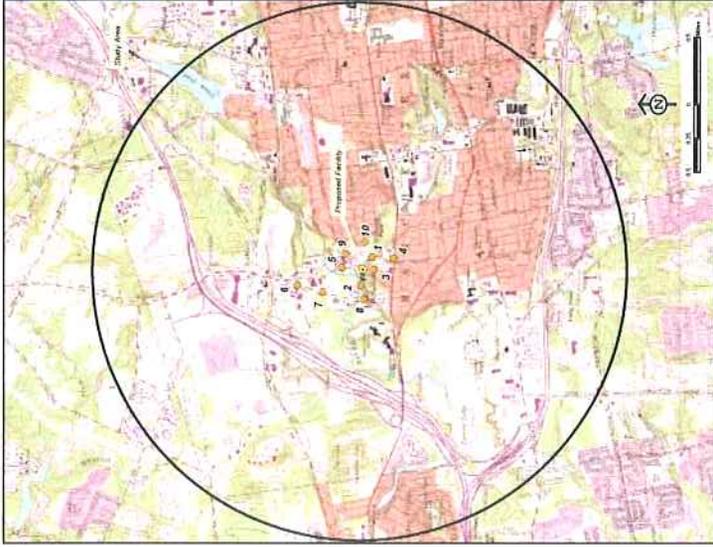
Brown Flush Mount
installation with 4
carriers

PHOTO TAKEN FROM WEDGEWOOD DRIVE ADJACENT TO HOUSE #88, LOOKING NORTH - BALLOON IS VISIBLE THROUGH TREES
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 466 FEET +/-



Photographic Documentation and Simulation View 4

Town of
Manchester
Connecticut

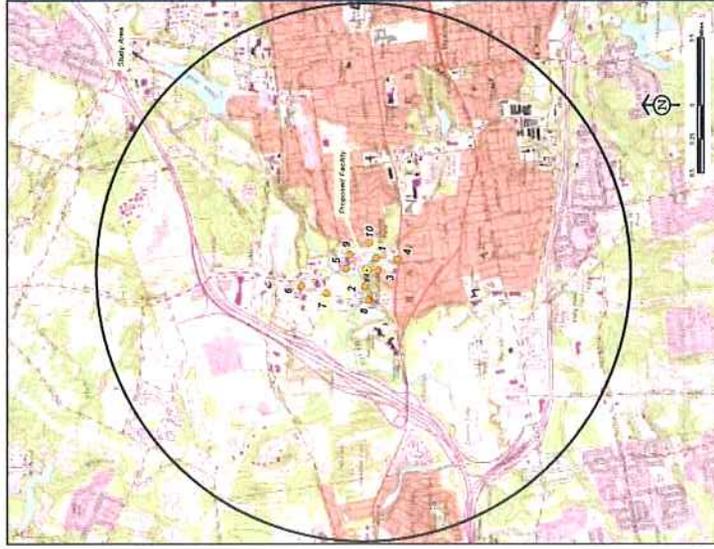


650 Hilliard Street
Manchester, CT

Brown Flush Mount
installation with 4
carriers

PHOTO TAKEN FROM WEST MIDDLE TURNPIKE ADJACENT TO BUILDING #515, LOOKING NORTH
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.25 MILE +/-

Photographic Documentation and Simulation *View 5*



650 Hilliard Street
Manchester, CT

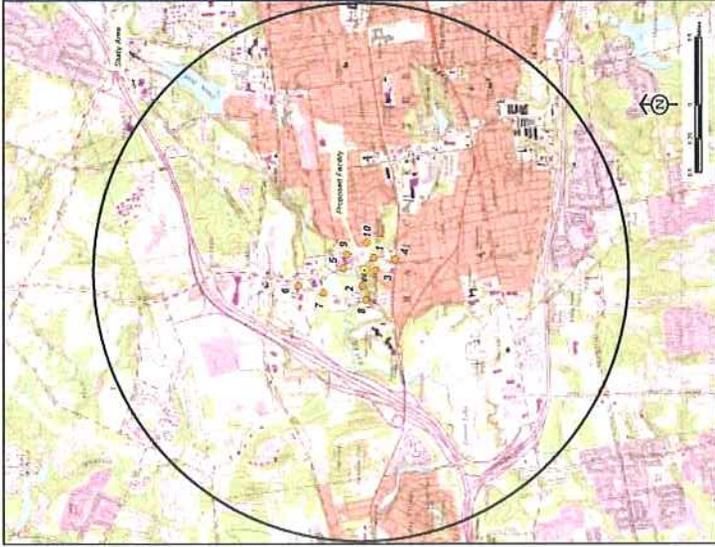
Brown Flush Mount
installation with 4
carriers



PHOTO TAKEN FROM ADAMS STREET ADJACENT TO BUILDING #273, LOOKING SOUTH
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.15 MILE +/-

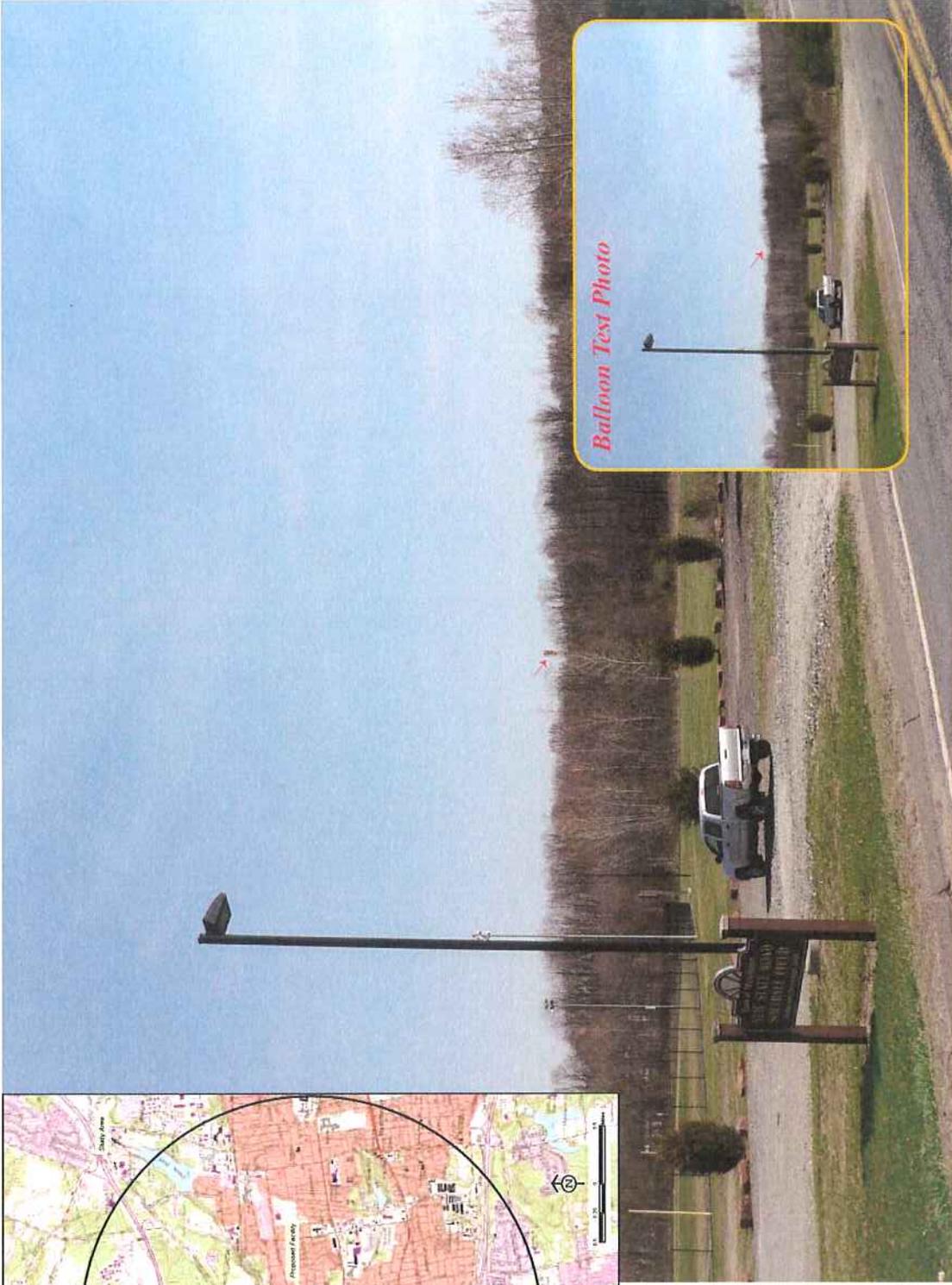
Photographic Documentation and Simulation View 7

Town of
Manchester
Connecticut



650 Hilliard Street
Manchester, CT

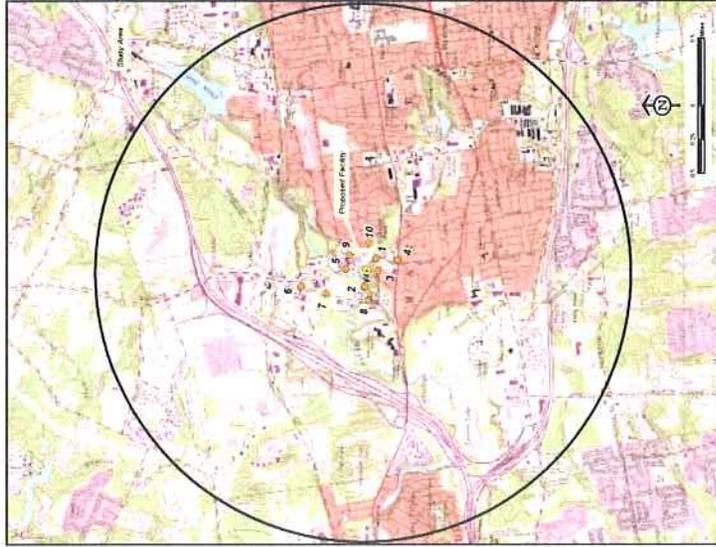
Brown Flush Mount
installation with 4
carriers



Balloon Test Photo

PHOTO TAKEN FROM NEW STATE ROAD ADJACENT TO BUILDING #313, LOOKING SOUTH
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.34 MILE +/-

Photographic Documentation and Simulation View 9



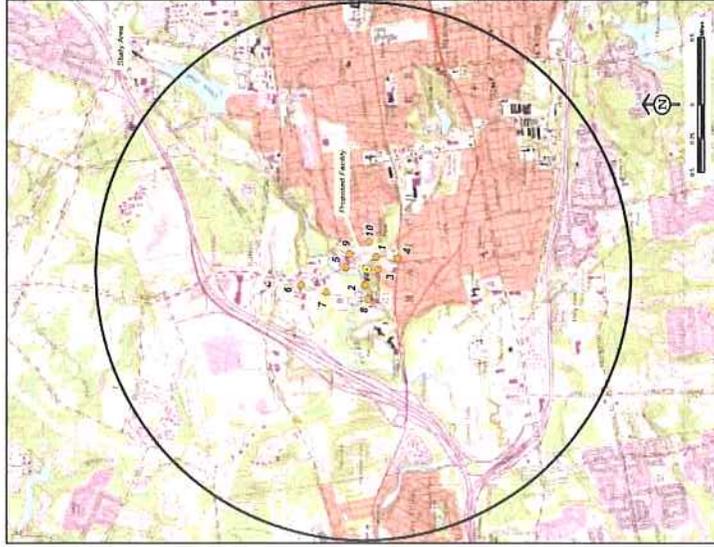
650 Hilliard Street
Manchester, CT

Brown Flush Mount
installation with 4
carriers

PHOTO TAKEN FROM HILLIARD STREET NEAR BUILDING #586, LOOKING SOUTHWEST
DISTANCE FROM THE PHOTOGRAPH LOCATION TO THE PROPOSED SITE IS 0.17 MILE +/-

Photographic Documentation and Simulation View 10

Town of
Manchester
Connecticut



650 Hilliard Street
Manchester, CT

Brown Flush Mount
installation with 4
carriers



PHOTO TAKEN FROM HOFFMAN ROAD ADJACENT TO HOUSE #1, LOOKING WEST - BALLOON IS VISIBLE THROUGH TREES

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

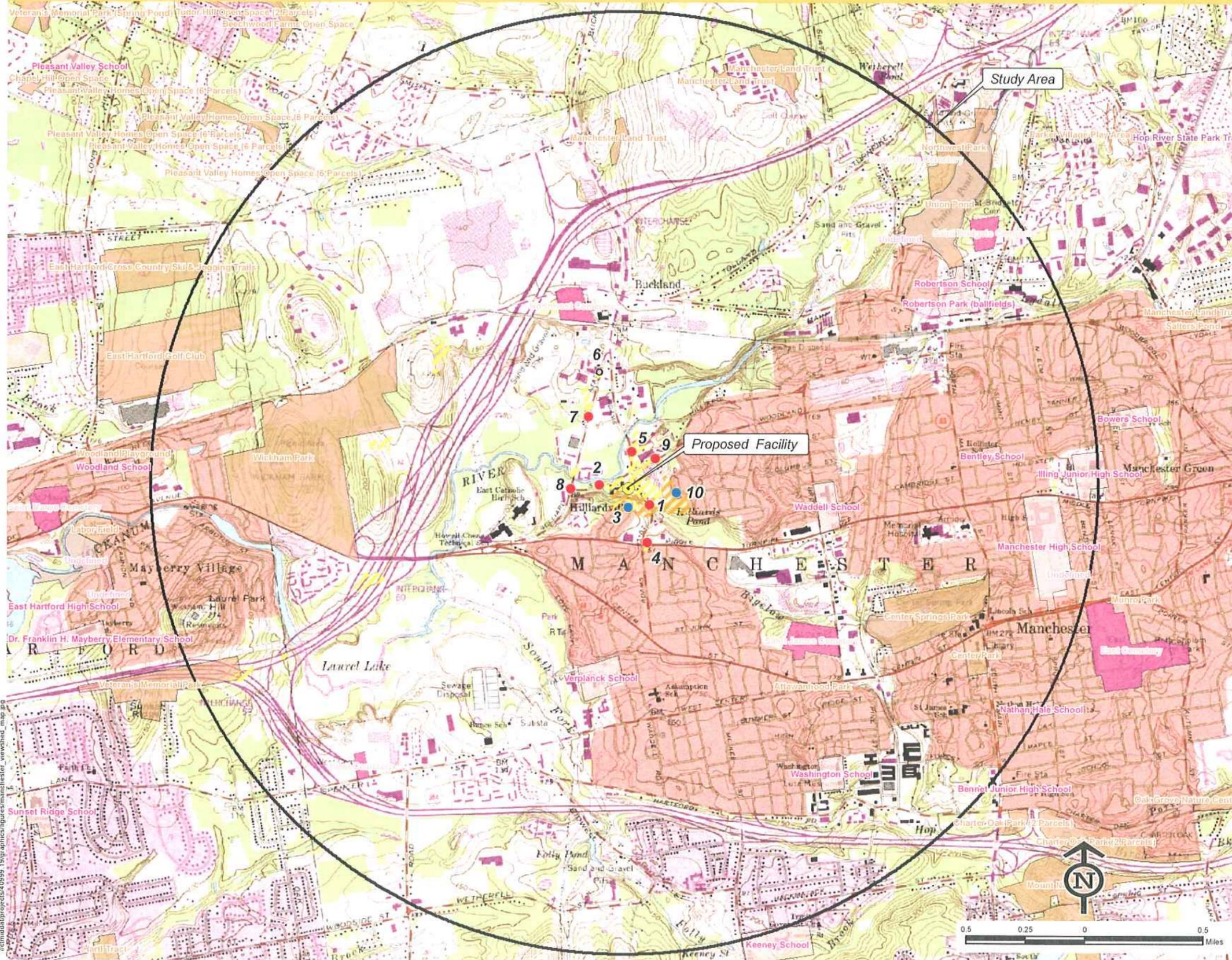
Attachment B

Viewshed Map

Viewshed Map

Topography and Forest Cover as Constraints

Town of
Manchester
Connecticut



Proposed Optasite Facility 999-0075 640 Hilliard Street Manchester, Connecticut

NOTE:

- Viewshed analysis conducted using ESRI's Spatial Analyst.
- Proposed Facility height is 150 feet.
- Existing tree canopy height estimated at 60 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; digitized by VHB November, 2006
- Base map comprised of Manchester USGS Quadrangle Map
- Protected properties data layer provided CTDEP, 2003
- Scenic Roads layer derived from available State and Local listings.

Map Compiled May 2007

Legend

- Proposed Monopole Location (Includes select areas of visibility approximately 500 feet around facility)
- Photographs - April 23, 2007
- Balloon Visible Through Trees
- Balloon Visible Above Trees
- Year Round Visibility (Approximately 45 Acres)
- Anticipated Seasonal Visibility (Approximately 17 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)
- Protected Properties (Municipal)
 - Cemetery
 - Preservation
 - Conservation
 - Existing Preserved Open Space
 - Recreation
 - General Recreation
 - School
 - Uncategorized