

# *Proposed Wireless Telecommunications Facility*

CTNL813C  
166 Pawcatuck Avenue  
Stonington, Connecticut

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Prepared for 

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## Visual Resource Evaluation

Omni Point Communications, Inc., dba T-Mobile, 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 at 166 Pawcatuck Avenue, in the Town of Stonington, Connecticut (identified herein as the "host property"). This Visual Resource Evaluation was conducted to assess the visibility of the proposed Facility within a two-mile radius ("Study Area"). Attachment A contains 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. The eastern third of the Study Area includes land located within the Town of Westerly, Rhode Island.

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## Project Introduction

The proposed Facility includes the installation of a 120-foot tall monopole with associated ground equipment to be located at its base. Both the proposed monopole and ground equipment would be situated within a 30-foot by 60-foot fence-enclosed compound. The proposed Facility is located at approximately 51 feet Above Mean Sea Level ("AMSL"). Access to the Facility would initially follow an existing dirt driveway currently located on the host property with a proposed gravel driveway extending to the compound area in northeasterly direction from this existing access.

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## Site Description and Setting

Identified in the Town of Stonington land records as Map 26/Block 02/ Lot 09, the host property consists of approximately 5.02 acres of land and is currently occupied by a single-family residence and a two-story garage. The proposed Facility would be located in an open, undeveloped area immediately to the south of an existing Amtrak railroad corridor and associated overhead electrical infrastructure. Land use in the immediate vicinity of the host property consists of medium- and low-density residential development, agricultural land, undeveloped woodlands and the Amtrak railroad corridor identified above. Segments of US Route 1, Route 1A and Route 184 are contained within the Study Area. In total, the Study Area features approximately 105 linear miles of roadways and rail line.

The topography within the Study Area is characterized by gently rolling hills with ground elevations that range from sea level to approximately 220 feet AMSL. The Study Area contains approximately 567 acres of surface water, including Wequetequock Cove located to the southwest of the proposed Facility and portions of the Pawcatuck River which flows north to south through the eastern portion of the Study Area. The tree cover within the Study Area consists mainly of mixed deciduous hardwood species. The tree canopy occupies approximately 4,184 acres of the 8,042-acre study area (52%). During the in-field activities associated with this analysis, an infrared laser range finder was used to 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.

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## 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.

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### Visibility Analysis

Using ESRI’s ArcView® Spatial Analyst, a computer modeling tool, the areas from where 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 Connecticut LiDAR-based digital elevation data. The LiDAR data was produced by the University of Connecticut Center for Land Use Education and Research (CLEAR) in 2007 and has a horizontal resolution of 10 feet. In order to create the forest layer, 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 2006 and have a pixel resolution of one 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 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. The average height of the tree canopy was determined in the field using a 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 State of Connecticut 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. Lastly, based on a review of information published by both the State of Connecticut Department of Transportation and the Town of Stonington, it was determined that there are several locally-designated scenic roadways contained within the Study Area. These include segments of Barnes Road located approximately 1.87 miles to the northeast of the proposed Facility and North Anguilla Road located approximately 1.80 miles to the northwest. Route 1A, which traverses the Study Area in Westerly Rhode Island, is a state-designated scenic roadway.

A preliminary viewshed map (using topography only) is used during the in-field activity to assist in determining if significant land use changes have occurred since the aerial photographs used in this analysis were produced and to compare the results of the computer model with observations of the balloon float. Information obtained during the reconnaissance was then incorporated into the final visibility map.

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## Balloon Float and Study Area Reconnaissance

On September 21, 2009 Vanasse Hangen Brustlin Inc., (VHB) conducted a balloon float at the proposed Facility location to further evaluate the potential viewshed within the Study Area. The balloon float consisted of raising and maintaining an approximate five-foot diameter, helium-filled balloon at the proposed site location at a height of 120 feet. Once the balloon was 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 document where the balloon was, and was not, visible above and/or through the tree canopy. During the balloon float, the temperature was approximately 80 degrees Fahrenheit with calm wind conditions and sunny skies.

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## Photographic Documentation

During the balloon float, VHB personnel drove the public road system within the Study Area to inventory those areas where the balloon was visible. The balloon was photographed from several 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 US Route 1 at Stonington High School.
2. View from US Route 1 west of Stonington High School.
3. View from Stonington High School Soccer Field.
4. View from South Anguilla Road adjacent to house #117.
5. View from Route 184 adjacent to house #270.

6. View from Hawley Street south of Pawcatuck Avenue.
7. View from Route 1A at Westerly Yacht Club.
8. View from Pawcatuck Avenue adjacent to house #124.
9. View from Broad Street over Pawcatuck River.
10. View from Buckingham Street at Pawcatuck Avenue.
11. View from Stonington High School Athletic Fields/Tennis Courts.

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 50 mm. "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."<sup>1</sup>

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.

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## Photographic Simulation

Photographic simulations were generated for the eight representative locations where the balloon was visible during the in-field activities. The photographic simulations represent a scaled depiction of the proposed Facility (a 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 120-foot tall monopole may be visible comprise approximately 99 acres within the 8,042-acre Study Area. This represents just over one percent of the total land contained within the Study Area. As depicted on the attached viewshed map, the majority of the potential year-round visibility occurs on the host property and immediate vicinity thereof; over portions of the Stonington High School athletic fields located to the northwest of the proposed Facility; and over open water on the Pawcatuck River and its adjacent shoreline to the southeast. The viewshed map also depicts areas of year-round visibility along select portions of US Route 1, Route 1A (Rhode Island), South Anguilla Road, Route 184 and several smaller areas located on private and/or otherwise inaccessible land to the northwest and northeast of the proposed Facility. Overall, potential year-round visibility associated with the proposed Facility is limited to the areas described above by a combination of the mature vegetation, particularly to the north of the host property, and the topography contained within the Study Area which is somewhat flat with

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

the exception of a few rolling hills. VHB estimates that at least partial year-round views of the proposed Facility may be achieved from portions of approximately 12 residential properties located within the Study Area. This includes four residences located along Pawcatuck Avenue within the immediate vicinity of the host property; two properties located along Hawley Street; two properties located along South Anguilla Road; two properties located along Route 184; and two properties located along Green Haven Road.

The viewshed map also depicts several additional areas where seasonal (i.e. during "leaf off" conditions) views are anticipated. These areas comprise approximately 51 additional acres and are located within the general vicinity of the host property (typically within 0.25-mile). VHB estimates that seasonal views of the proposed monopole may be achieved from portions of approximately nine additional residential properties. This includes eight properties located along Pawcatuck Avenue and one property along Hawley Street.

# Attachment A

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



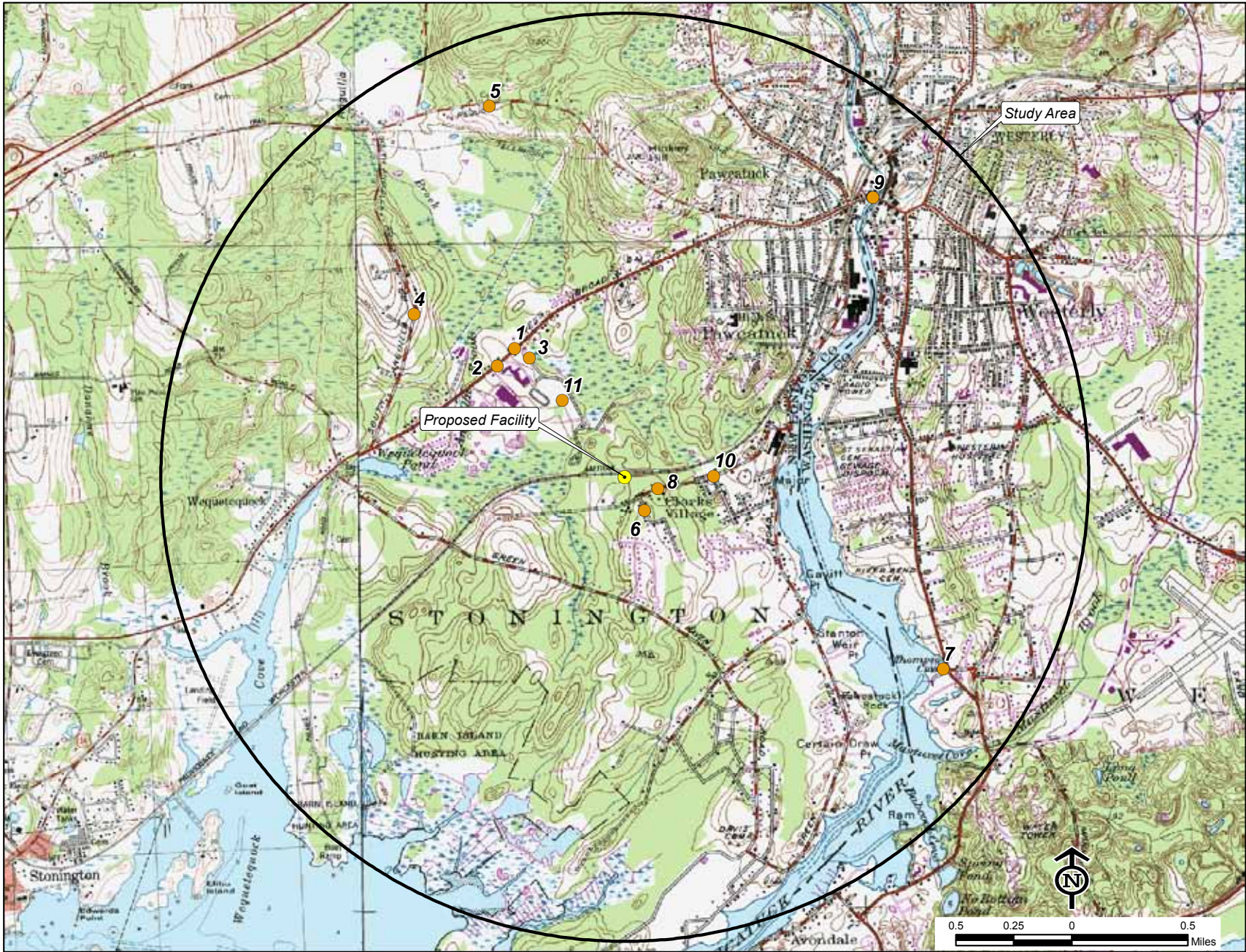


**PROPOSED PROJECT AREA**

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# PHOTOLOG MAP



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VIEW 1



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**PHOTO TAKEN FROM US ROUTE 1 AT STONINGTON HIGH SCHOOL, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.72 MILE +/-**

VIEW 1



**PHOTO TAKEN FROM US ROUTE 1 AT STONINGTON HIGH SCHOOL, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.72 MILE +/-**

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VIEW 2



**PHOTO TAKEN FROM US ROUTE 1 WEST OF STONINGTON HIGH SCHOOL, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.72 MILE +/-**

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VIEW 2



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**PHOTO TAKEN FROM US ROUTE 1 WEST OF STONINGTON HIGH SCHOOL, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.72 MILE +/-**



VIEW 3



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**PHOTO TAKEN FROM STONINGTON HIGH SCHOOL SOCCER FIELD, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.65 MILE +/-**

**VIEW 3**



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**PHOTO TAKEN FROM STONINGTON HIGH SCHOOL SOCCER FIELD, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.65 MILE +/-**



VIEW 4



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**PHOTO TAKEN FROM SOUTH ANGUILLA ROAD ADJACENT TO HOUSE #117, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 1.14 MILES +/-**

VIEW 4



**PHOTO TAKEN FROM SOUTH ANGUILLA ROAD ADJACENT TO HOUSE #117, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 1.14 MILES +/-**

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VIEW 5



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**PHOTO TAKEN FROM ROUTE 184 ADJACENT TO HOUSE #270, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 1.69 MILES +/-**



VIEW 5



**PHOTO TAKEN FROM ROUTE 184 ADJACENT TO HOUSE #270, LOOKING SOUTHEAST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 1.69 MILES +/-**

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VIEW 6



**PHOTO TAKEN FROM HAWLEY STREET SOUTH OF PAWCATUCK AVENUE, LOOKING NORTHWEST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.17 MILE +/-**

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VIEW 6



**PHOTO TAKEN FROM HAWLEY STREET SOUTH OF PAWCATUCK AVENUE, LOOKING NORTHWEST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.17 MILE +/-**

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VIEW 7



**PHOTO TAKEN FROM ROUTE 1A AT WESTERLY YACHT CLUB, LOOKING NORTHWEST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 1.60 MILES +/-**

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VIEW 7



**PHOTO TAKEN FROM ROUTE 1A AT WESTERLY YACHT CLUB, LOOKING NORTHWEST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 1.60 MILES +/-**

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VIEW 8



**PHOTO TAKEN FROM PAWCATUCK AVENUE ADJACENT TO HOUSE #124, LOOKING NORTHWEST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.14 MILE +/-**

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VIEW 8



c:\mddat\40505.11\graphics\FIGURES\40505.11\_Photosim.indd

**PHOTO TAKEN FROM PAWCATUCK AVENUE ADJACENT TO HOUSE #124, LOOKING NORTHWEST  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.14 MILE +/-**

VIEW 9



c:\mddat\40505.11\graphics\FIGURES\40505.11\_Photosim.indd

**PHOTO TAKEN FROM BROAD STREET OVER THE PAWCATUCK RIVER, LOOKING SOUTHWEST - BALLOON IS NOT VISIBLE  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 1.60 MILES +/-**



VIEW 10



**PHOTO TAKEN FROM BUCKINGHAM STREET AT PAWCATUCK AVENUE, LOOKING WEST - BALLOON IS NOT VISIBLE  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.38 MILE +/-**

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VIEW 11



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**PHOTO TAKEN FROM STONINGTON HIGH SCHOOL ATHLETIC FIELDS / TENNIS COURTS, LOOKING SOUTHEAST - BALLOON IS NOT VISIBLE  
DISTANCE FROM THE PHOTOGRAPH LOCATION TO SITE IS 0.41 MILE +/-**

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# Attachment B

## Viewshed Map



Viewshed Analysis  
Proposed T-Mobile Wireless  
Telecommunications Facility  
CTNL813C  
166 Pawcatuck Avenue  
Stonington, Connecticut

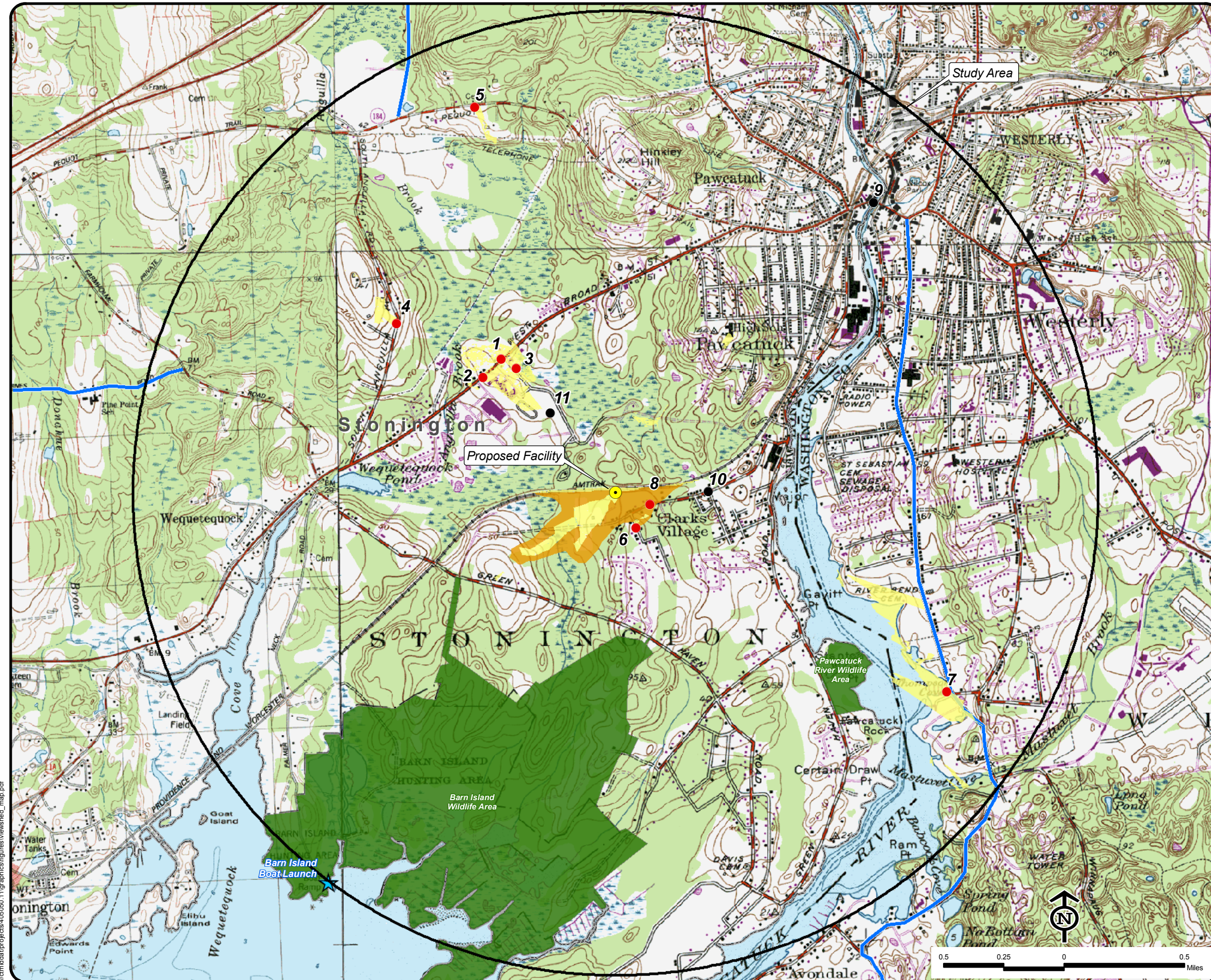
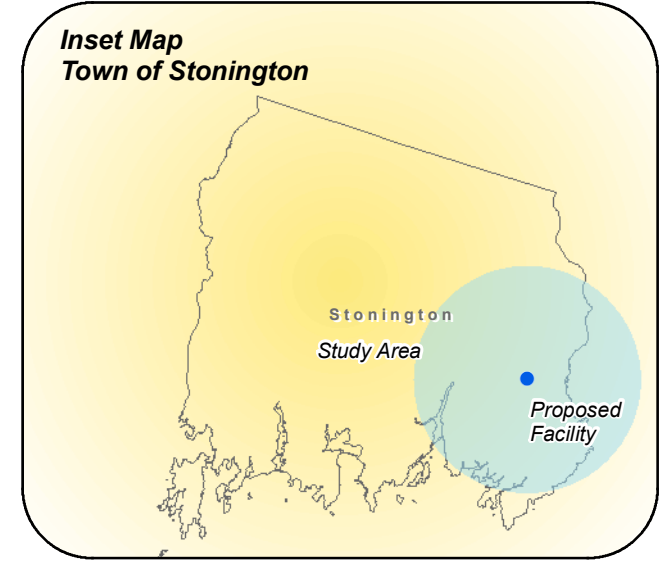
NOTE:  
 - Viewshed analysis conducted using ESRI's Spatial Analyst.  
 - Proposed Facility height is 120 feet.  
 - Existing tree canopy height estimated at 65 feet.  
 - Study Area is comprised of a two-mile radius surrounding the proposed facility and includes 8,042 acres of land.

DATA SOURCES:  
 - Digital elevation model (DEM) derived from Connecticut LiDAR-based Digital Elevation Data (collected in 2000) with a 10-foot spatial resolution produced by the University of Connecticut and the Center for Land Use Education and Research (CLEAR); 2007  
 - Forest areas derived from 2006 digital orthophotos with 1-foot pixel resolution; digitized by VHB, 2009  
 - Base map comprised of Ashaway (1984), Mystic (1984) Old Mystic (1984) and Old Lyme (1970) USGS Quadrangle Maps  
 - Protected municipal and private open space properties and federal protected properties and data layers provided by CT DEP, 1997  
 - Protected CT DEP properties data layer provided by CTDEP, May 2007  
 - CT DEP boat launches data layer provided by CT DEP, 1994  
 - Scenic Roads layer derived from available State and Local listings.

Map Compiled September, 2009

**Legend**

-  Proposed Site Location
-  Photographs - September 21, 2009
-  Balloon is not visible
-  Balloon visible above trees
-  Year-Round Visibility (Approximately 99 acres)
-  Seasonal Visibility (Approximately 51 acres)
-  Protected Municipal and Private Open Space Properties, CT (1997)
-  Cemetery
-  Preservation
-  Conservation
-  Existing Preserved Open Space
-  Recreation
-  General Recreation
-  School
-  Uncategorized
-  CT DEP Protected Properties (2007)
-  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
-  Federal Protected Properties, CT (1997)
-  CT DEP Boat Launches (1994)
-  Scenic Road (State and Local)
-  Town Line



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