

# Visual Assessment & Photo-Simulations

CT0030 MILFORD 1063 BOSTON POST ROAD MILFORD, CT 06460

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Prepared for ARX Wireless





#### **VISUAL ASSESSMENT & PHOTO-SIMULATIONS**

ARX Wireless Infrastructure, LLC ("ARX") is seeking approval for the development of a new wireless communications facility (the "Facility") at 1063 Boston Post Road in Milford, Connecticut (the "Host Property"). At the request of ARX, All-Points Technology Corporation, P.C. ("APT") completed this assessment to evaluate the potential visual effects of the proposed Facility from within a 2-mile radius (the "Study Area"). The Study Area includes portions of the neighboring municipality of Orange to the northeast.

### **Project Setting**

The Host Property consists of a ±2.44-acre irregularly shaped parcel located south of the intersection of Boston Post Road and Home Acres Avenue. The parcel is developed with a Firestone Complete Auto Care and the Mexico Tipico restaurant. Residential neighborhoods are located to the southeast of the Host Property along Home Acres Road. King's Highway Cemetery is directly south of the Host Property; additional residential developments lie farther to the south beyond the cemetery. A large industrial warehouse is located to the east beyond the residential properties off Leighton Road. Commercial development extends along Boston Post Road in both directions from the Host Property. Interstate 95 ("I-95"; Exit 39 interchange) is north of the Host Property.

The topography within the Study Area consists of relatively level terrain. Ground elevations range from approximately one (1) foot above mean sea level ("AMSL") in the southern portion of the Study Area to approximately 208 feet AMSL in its northwestern portion. Tree cover within the Study Area (consisting primarily of mixed deciduous hardwoods) occupies approximately 1,396 acres (or  $\pm 17.35\%$ ) of the 8,042-acre Study Area. Open water over Long Island Sound, Milford Harbor, and Gulf Pond occupies approximately 511 acres ( $\pm 6.35\%$ ) of the Study Area.

## **Project Undertaking**

ARX plans to construct the proposed Facility on the southeastern portion of the Host Property (the "Site"). The proposed Facility would be located at a ground elevation of approximately 32 feet AMSL and include a 115-foot tall monopole with antennas extending to a height of 116' above ground level ("AGL") and associated ground-mounted equipment within a 60-foot by 60-foot fenced compound. The Facility has been designed to accommodate multiple service providers. Access to the Site would be gained over the existing paved driveway and parking lot associated with the Firestone Car Care and Mexico Tipico buildings. Please refer to the current Site Drawings prepared by AECOM, dated August 10, 2020, and provided under separate cover, for details regarding the proposed installation.

## Methodology

APT used the combination of a predictive computer model, in-field analysis, and a review of various data sources to evaluate the visibility associated with the proposed Facility on both a quantitative and qualitative basis. The predictive model provides a measurable assessment of visibility throughout the entire Area, including private properties and other areas inaccessible for direct observations. The in-field analyses consisted of a crane test and field reconnaissance of the Study Area to record existing conditions, verify results of the model, inventory seasonal and year-round view locations, and provide photographic documentation from publicly accessible areas. A description of the procedures used in the analysis is provided below.

## **Preliminary Computer Modeling**

To conduct this assessment, a predictive computer model was developed specifically for this project using ESRI's ArcMap GIS¹ software and available GIS data. The predictive model incorporates Project and Study Area-specific data, including the Site location, its ground elevation and the proposed Facility height, as well as the surrounding topography, existing vegetation, and structures (the primary features that can block direct lines of sight).

A digital surface model ("DSM"), capturing both the natural and built features on the Earth's surface, was generated for the extent of the Study Area utilizing State of Connecticut 2016 LiDAR<sup>2</sup> LAS<sup>3</sup> data points. LiDAR is a remote-sensing technology that develops elevation data by measuring the time it takes for laser light to return from the surface to the instrument's sensors. The varying reflectivity of objects also means that the "returns" can be classified based on the characteristics of the reflected light, normally into categories such as "bare earth," "vegetation," "road," "surface water" or "building." Derived from the 2016 LiDAR data, the LAS datasets contain the corresponding elevation point data and return classification values. The Study Area DSM incorporates the first return LAS dataset values that are associated with the highest feature in the landscape, typically a treetop, top of a building, and/or the highest point of other tall structures.

Once the DSM was generated, ESRI's Viewshed Tool was utilized to identify locations within the Study Area where the proposed Facility may be visible. ESRI's Viewshed Tool predicts visibility by identifying those cells<sup>4</sup> within the DSM that can be seen from an observer location. Cells where visibility was indicated were extracted and converted from a raster dataset to a polygon

<sup>&</sup>lt;sup>1</sup> ArcMap is a Geographic Information System desktop application developed by the Environmental Systems Research Institute for creating maps, performing spatial analysis, and managing geographic data.

<sup>&</sup>lt;sup>2</sup> Light Detection and Ranging

Light Detection and Ranging

<sup>&</sup>lt;sup>3</sup> An LAS file is an industry-standard binary format for storing airborne LiDAR data.

feature which was then overlaid onto aerial photograph and topographic base maps. Since the DSM includes the highest relative feature in the landscape, isolated "visible" cells are often indicated within heavily forested areas (e.g., from the top of the highest tree) or on building rooftops during the initial processing. It is recognized that these areas do not represent typical viewer locations and overstate visibility. As such, the resulting polygon feature is further refined by extracting those areas. The viewshed results are also cross-checked against the most current aerial photographs to assess whether significant changes (a new housing development, for example) have occurred since the time the LiDAR-based LAS datasets were captured.

The results of the preliminary analysis are intended to provide a representation of those areas where portions of the Facility may potentially be visible to the human eye without the aid of magnification, based on a viewer eye-height of five (5) feet above the ground and the combination of intervening topography, trees and other vegetation, and structures. However, the Facility may not necessarily be visible from all locations within those areas identified by the predictive model, which has its limitations. For instance, the computer model cannot account for mass density, tree diameters and branching variability of trees, or the degradation of views that occur with distance. As a result, some areas depicted on the viewshed maps as theoretically offering potential visibility of the Facility may be over-predictive because the quality of those views is not sufficient for the human eye to recognize the Facility or discriminate it from other surrounding or intervening objects.

# Seasonal Visibility

Visibility also varies seasonally with increased, albeit obstructed, views occurring during "leaf-off" conditions. Beyond the variabilities associated with density of woodland stands found within any given Study Area, each individual tree also has its own unique trunk, pole timber and branching patterns that provide varying degrees of screening in leafless conditions which, as introduced above, cannot be precisely modeled. Seasonal visibility is therefore estimated based on a combination of factors including the type, size, and density of trees within a given area; topographic constraints; and other visual obstructions that may be present. Taking into account these considerations, areas depicting seasonal visibility on the viewshed maps are intended to represent locations from where there is a potential for views through intervening trees, as opposed to indicating that leaf-off views will exist from within an entire seasonally-shaded area.

#### **Crane Test and Field Reconnaissance**

To supplement and fine tune the results of the computer modeling efforts, APT completed infield verification activities consisting of a crane test, vehicular and pedestrian reconnaissance,

3

<sup>&</sup>lt;sup>4</sup> Each DSM cell size is 1 square meter.

and photo-documentation. The crane test and field reconnaissance were completed on December 9, 2020. The crane test consisted of positioning a crane at the proposed Facility location and extending the crane boom with a brightly-colored flag to the top height of the monopole (±115 feet AGL). This provided a fixed object unaffected by the wind. Weather conditions were favorable for the in-field activities with partly cloudy skies.

APT conducted a Study Area reconnaissance by driving along local and State roads and other publicly accessible locations to document and inventory where the flag could be seen above and through the tree canopy and other visual obstructions. Visual observations from the reconnaissance were also used to evaluate the results of the preliminary visibility mapping and identify any discrepancies in the initial modeling.

## **Photographic Documentation and Simulations**

During the Study Area reconnaissance, APT obtained photo-documentation of representative locations where the crane boom and flag were – and were not - visible. At each photo location, the geographic coordinates of the camera's position were logged using global positioning system ("GPS") technology. Photographs were taken with a Canon EOS 6D digital camera body<sup>5</sup> and Canon EF 24 to 105 millimeter ("mm") zoom lens. APT typically uses a standard focal length of 50mm to present a consistent field of view. On occasion, photos are taken at lower focal lengths to provide a greater depth of field and to provide context to the scene by including surrounding features within the photograph. During this evaluation, two (2) photographs were taken at a 24mm focal length and six (6) photographs were taken at a 35mm focal length as noted in Table 1 – Photo Locations.

Photographic simulations were generated to portray scaled renderings of the proposed Facility from 21 locations presented herein where the Facility may be recognizable above or through the trees. Using field data, site plan information and 3-dimensional (3D) modeling software, spatially referenced models of the Site and Facility were generated and merged. The geographic coordinates obtained in the field for the photograph locations were incorporated into the model to produce virtual camera positions within the spatial 3D model. Photo-simulations were then created using a combination of renderings generated in the 3D model and photo-rendering software programs, which were ultimately composited and merged with the existing conditions photographs (using Adobe Photoshop image editing software). The scale of the subjects in the photograph (the crane boom/flag) and the corresponding simulation (the Facility) is proportional to their surroundings.

<sup>&</sup>lt;sup>5</sup> The Canon EOS 6D is a full-framed camera which includes a lens receptor of the same size as the film used in 35mm cameras. As such, the images produced are comparable to those taken with a conventional 35mm camera.

For presentation purposes in this report, the photographs were produced in an approximate 7-inch by 10.5-inch format. When reproducing the images in this format size, we believe it is important to present the largest view while providing key contextual landscape elements (existing developments, street signs, utility poles, etc.) so that the viewer can determine the proportionate scale of each object within the scene. Photo-documentation of the field reconnaissance and photo-simulations of the proposed Facility are presented in the attachment at the end of this report. The field reconnaissance photos that include the crane boom in the view provide visual reference points for the approximate height and location of the proposed Facility relative to the scene. All simulations were created to represent the proposed monopole and antennas (extending to a top height of 116' AGL). The photo-simulations are intended to provide the reader with a general understanding of the different view characteristics associated with the Facility from various locations. Photographs were taken from publicly-accessible areas and unobstructed view lines were chosen wherever possible.

<u>Table 1 – Photo Locations</u> summarizes the photographs and simulations presented in the attachment to this report, and includes a description of each location, view orientation, distance from where the photo was taken relative to the Site, and the general characteristics of the view. The photo locations are depicted on the photolog and viewshed maps provided as attachments to this report.

Table 1 - Photo Locations

Photo	Location	Orientation	Distance to Site	Visibility	
1	Home Acres Avenue*	Northwest	± 0.35 Mile	Seasonal	
2	Home Acres Avenue	Northwest	± 0.23 Mile	Year Round	
3	Home Acres Avenue	Northwest	± 0.12 Mile	Year Round	
4	Leighton Road	Southwest	± 0.20 Mile	Year Round	
5	Home Acres Avenue**	South	± 380 Feet	Year Round	
6	Athenian Diner III Parking Lot – 1064 Boston Post Road	Southeast	± 0.10 Mile	Year Round	
7	King's Highway Cemetery	Northeast	± 0.11 Mile	Year Round	
8	Corona Drive	North	± 0.23 Mile	Year Round	
9	Corona Drive	Northeast	± 0.24 Mile	Seasonal	
10	Corona Drive	Northeast	± 0.33 Mile	Year Round	
11	Boston Post Road	East	± 0.53 Mile	Year Round	
*Photograph was taken at 24 mm focal length					

<sup>\*</sup>Photograph was taken at 24 mm focal length.

<sup>\*\*</sup>Photograph was taken at 35 mm focal length.

**Table 1 – Photo Locations Continued** 

Photo	Location	Orientation	Distance to Site	Visibility
12	Forest Road	Southeast	± 0.20 Mile	Year Round
13	Forest Road	Southeast	± 0.27 Mile	Year Round
14	Forest Road	Southeast	± 0.33 Mile	Seasonal
15	Forest Road at Cinnamon Road	Southeast	± 0.37 Mile	Not Visible
16	North Street at Platt Lane**	Southeast	± 0.93 Mile	Not Visible
17	Burnt Plains Road	South	± 0.94 Mile	Not Visible
18	Boston Post Road	Southwest	± 0.38 Mile	Year Round
19	Boston Post Road	Southwest	± 0.53 Mile	Year Round
20	Connecticut Post Mall	Southwest	± 0.61 Mile	Year Round
21	Boston Post Road	Southwest	± 1.06 Miles	Not Visible
22	Research Drive*	Southwest	± 1.26 Miles	Not Visible
23	Pepes Farm Road	West	± 1.33 Miles	Not Visible
24	Entrance to Hilton Garden Inn – 291 Old Gate Lane	West	± 0.93 Mile	Year Round
25	The Edge Fitness Club Parking Lot – 125 Old Gate Lane	West	± 0.68 Mile	Seasonal
26	Marino Drive	Northwest	± 1.28 Miles	Not Visible
27	Pond Point Avenue	Northwest	± 0.85 Mile	Not Visible
28	Buckingham Avenue	Northwest	± 1.04 Miles	Not Visible
29	Buckingham Avenue	Northwest	± 1.03 Miles	Year Round
30	Goodie's Restaurant Parking Lot – 635 Gulf Street	North	± 1.04 Miles	Not Visible
31	New Haven Avenue**	North	± 0.60 Mile	Not Visible
32	Eels Stow House – 34 High Street**	Northeast	± 1.12 Miles	Not Visible
33	Taylor Memorial Library – 5 Broad Street	Northeast	± 0.99 Mile	Not Visible
34	River Street	Northeast	± 0.87 Mile	Not Visible
35	North Street at Governors Avenue**	Northeast	± 0.75 Mile	Not Visible
36	Boston Post Road at High Street**	East	± 1.30 Miles	Not Visible
37	Gulf Street	Southeast	± 0.54 Mile	Year Round
38	Milford Plaza	Northeast	± 0.44 Mile	Not Visible

<sup>\*\*</sup>Photograph was taken at 35 mm focal length.

## **Final Visibility Mapping**

Information obtained during the field reconnaissance was incorporated into the mapping data layers, including observations of the field reconnaissance, the photograph locations, areas that experienced recent land use changes and those places where the initial model was found to over or under-predict visibility. Once the additional data was integrated into the model, APT recalculated the visibility of the proposed Facility within the Study Area.

#### **Conclusions**

As presented on the attached viewshed maps, views of the Facility would be limited primarily to the areas immediately surrounding the Site (within  $\pm 0.5$ -mile or less). The nearest year-round views of the Facility would be north and west along Home Acres Avenue and west and northwest along Boston Post Road. Photo locations 2 and 3 depict representative year-round views from the area on Home Acres Avenue, at distances ranging from approximately 0.12 to 0.23 mile away. Photo locations 5, 6 and 12 depict representative year-round views from Boston Post Road.

Seasonally, when the leaves are off the deciduous trees, additional areas of obstructed visibility are predicted in the area surrounding the Facility and extending up to approximately 0.68 mile from the Site.

Both year-round and seasonal visibility is primarily surrounding the Facility up to approximately 0.54 mile, with additional intermittent points of visibility extending to  $\pm 1.03$  miles from the Facility. Predicted year-round visibility of the proposed Facility is estimated to include approximately 74 acres. Predicted seasonal visibility is estimated to include an additional  $\pm 90$  acres. Collectively, the total acreage of visibility represents  $\pm 2$  percent of the Study Area.

#### **Proximity to Schools And Commercial Child Day Care Centers**

No schools or commercial day care centers are located within 250 feet of the proposed Facility. Orange Avenue Elementary School is located approximately 0.59-mile northwest of the Site at 260 Orange Avenue in Milford. No visibility is predicted from the school grounds. The nearest commercial child care center is Sedona Daycare & Learning Center approximately 0.82 mile to the southwest of the Site at 21 Plymouth Place in Milford. No visibility is predicted from or in the vicinity of the day care center.

#### Limitations

The viewshed maps presented in the attachment to this report depict areas where the proposed Facility may potentially be visible to the human eye without the aid of magnification based on a viewer eye-height of five (5) feet above the ground and intervening topography, tree canopy, and structures. This analysis may not account for all visible locations, as it is based on the combination of computer modeling, incorporating aerial photographs, and in-field observations from publicly-accessible locations. No access to private properties was provided to APT personnel. This analysis does not claim to depict the only areas, or all locations, where visibility may occur; it is intended to provide a representation of those areas where the Facility is likely to be seen.

The photo-simulations provide a representation of the Facility under similar settings as those encountered during the field review and reconnaissance. Views of the Facility can change throughout the seasons and the time of day, and are dependent on weather and other atmospheric conditions (e.g., haze, fog, clouds); the location, angle and intensity of the sun; and the specific viewer location. Weather conditions on the day of the field review included partly cloudy skies.

# **ATTACHMENTS**

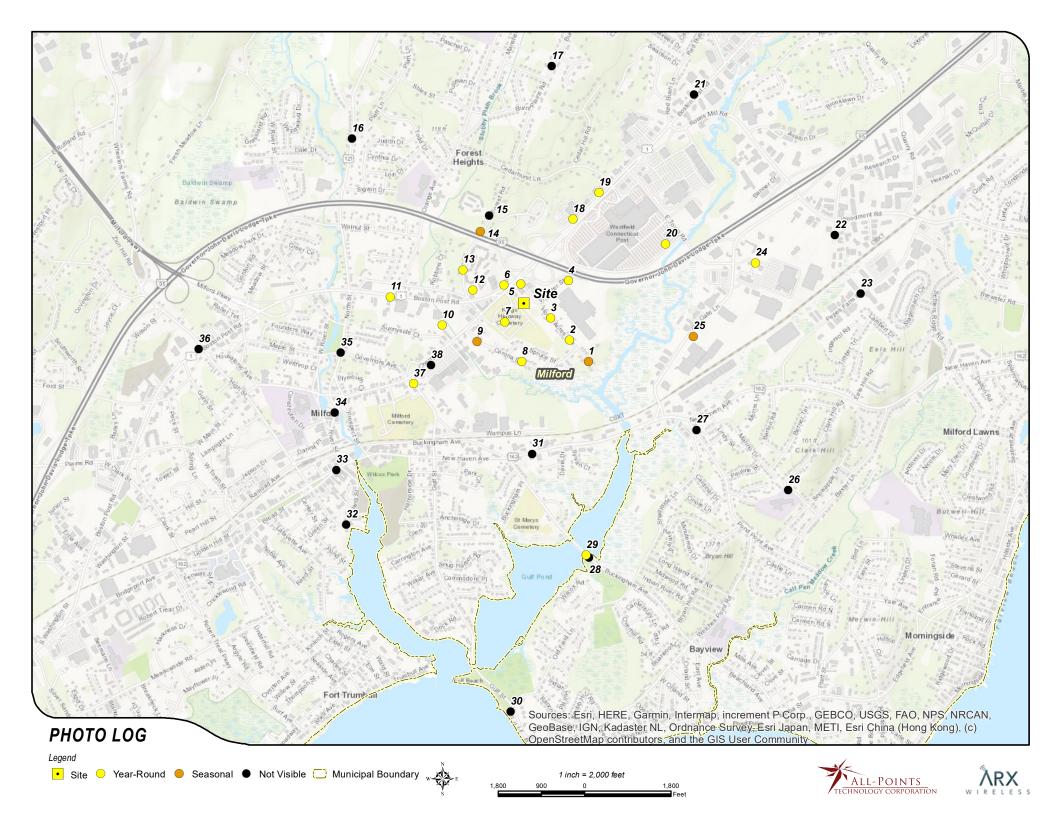




























PHOTO LOCATION ORIENTATION DISTANCE TO SITE VISIBILITY

3 HOME ACRES AVENUE NORTHWEST +/- 0.12 MILE YEAR ROUND





















PHOTO LOCATION ORIENTATION DISTANCE TO SITE VISIBILITY

4 LEIGHTON ROAD SOUTHWEST +/- 0.20 MILE YEAR ROUND















































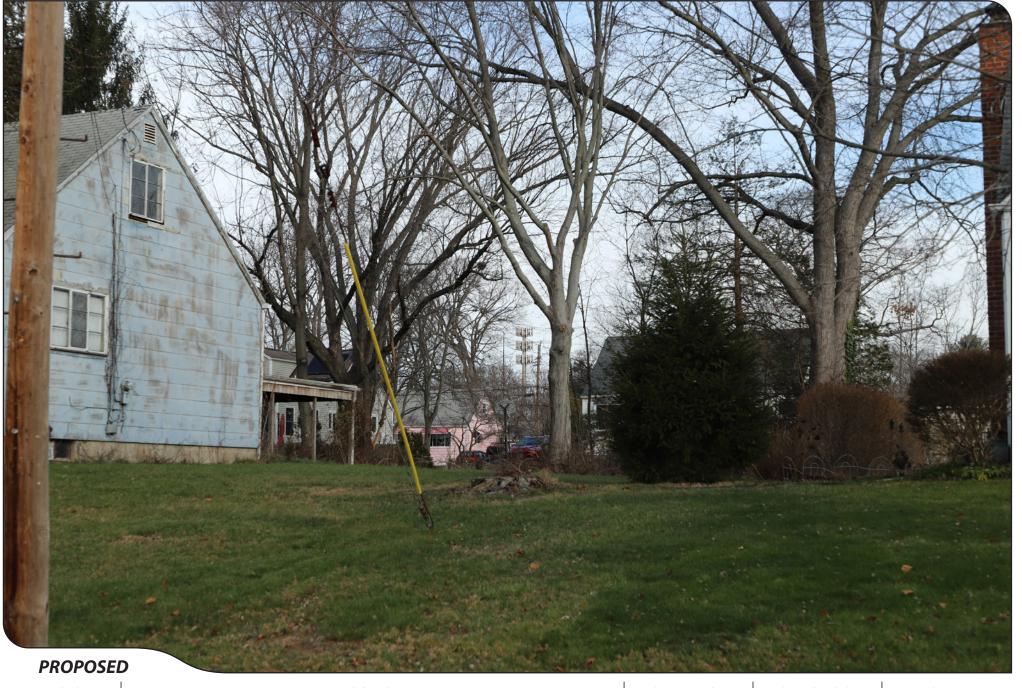














































PHOTO LOCATION ORIENTATION DISTANCE TO SITE VISIBILITY

12 FOREST ROAD SOUTHEAST +/- 0.20 MILE YEAR ROUND







12	FOREST ROAD	SOUTHEAST	+/- 0.20 MILE	YEAR ROUND
PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY













PHOTO LOCATION ORIENTATION DISTANCE TO SITE VISIBILITY

13 FOREST ROAD SOUTHEAST +/- 0.27 MILE YEAR ROUND

































































































































































































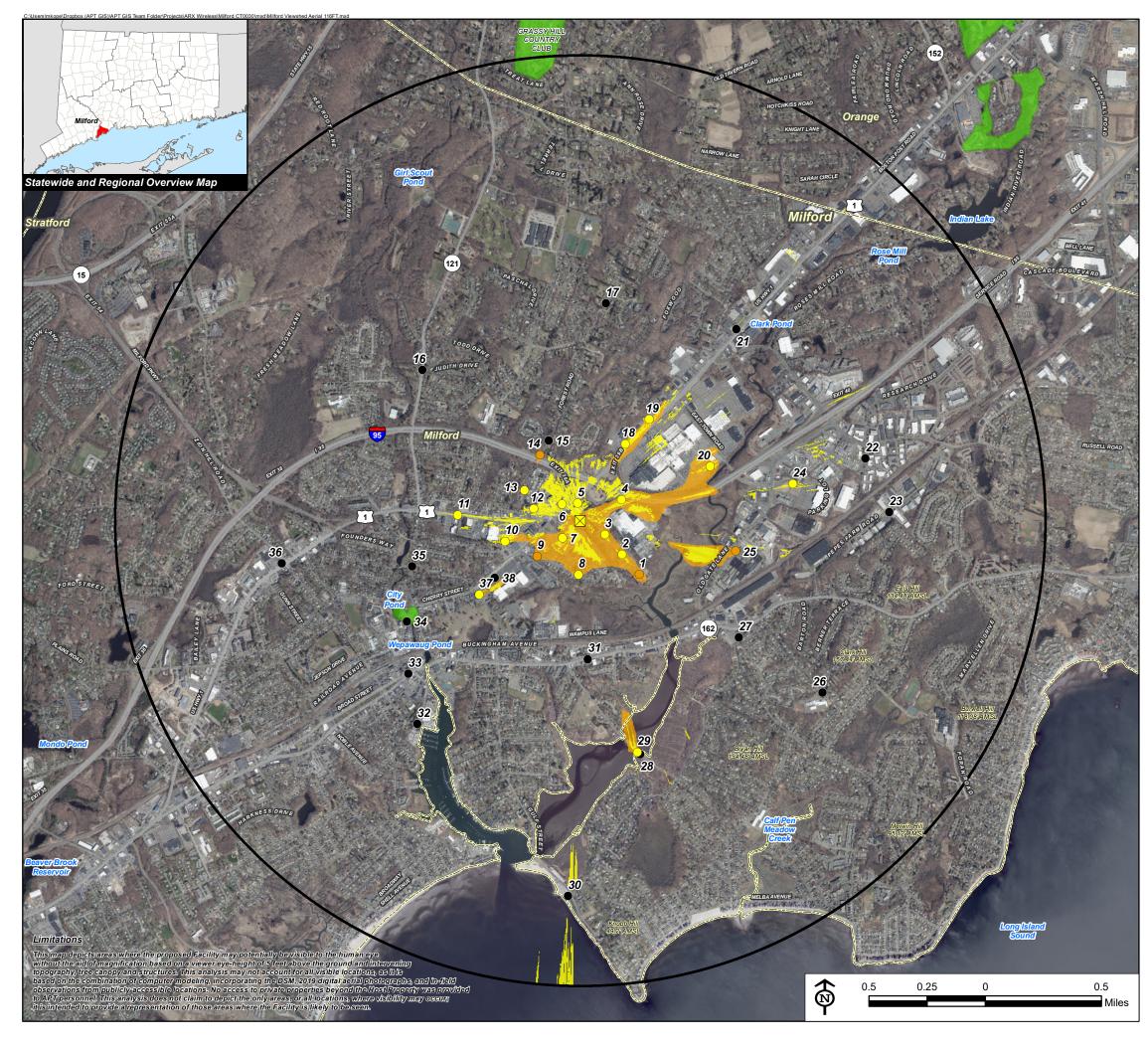














# **Viewshed Analysis Map**

Proposed Wireless Telecommunications Facility CT0030/Milford 1063 Boston Post Road Milford, Connecticut

Proposed facility height is 116 feet AGL.
Forest canopy height is derived from LiDAR data.
Study area encompasses a two-mile radius and includes 8,042 acres.
Map information field verified by APT on December 9, 2020
Base Map Source: 2019 Acres Photograph (CTECO) Map Date: December 2020

## Proposed Site Study Area (2-Mile Radius) Predicted Year-Round Visibility (74 Acres) Areas of Potential Seasonal Visibility (90 Acres)





### Data Sources:

Legend

### Physical Geography / Background Data

A digital surface model (DSM) was created from the State of Connecticut 2016 LiDAR LAS data points. The DSM captures

Municipal Open Space, State Recreation Areas, Trails, County Recreation Areas, and Town Boundary data obtained from CT DEEP. Scenic Roads: CTDOT State Scenic Highways (2015); Municipal Scenic Roads (compiled by APT)

### Dedicated Open Space & Recreation Areas

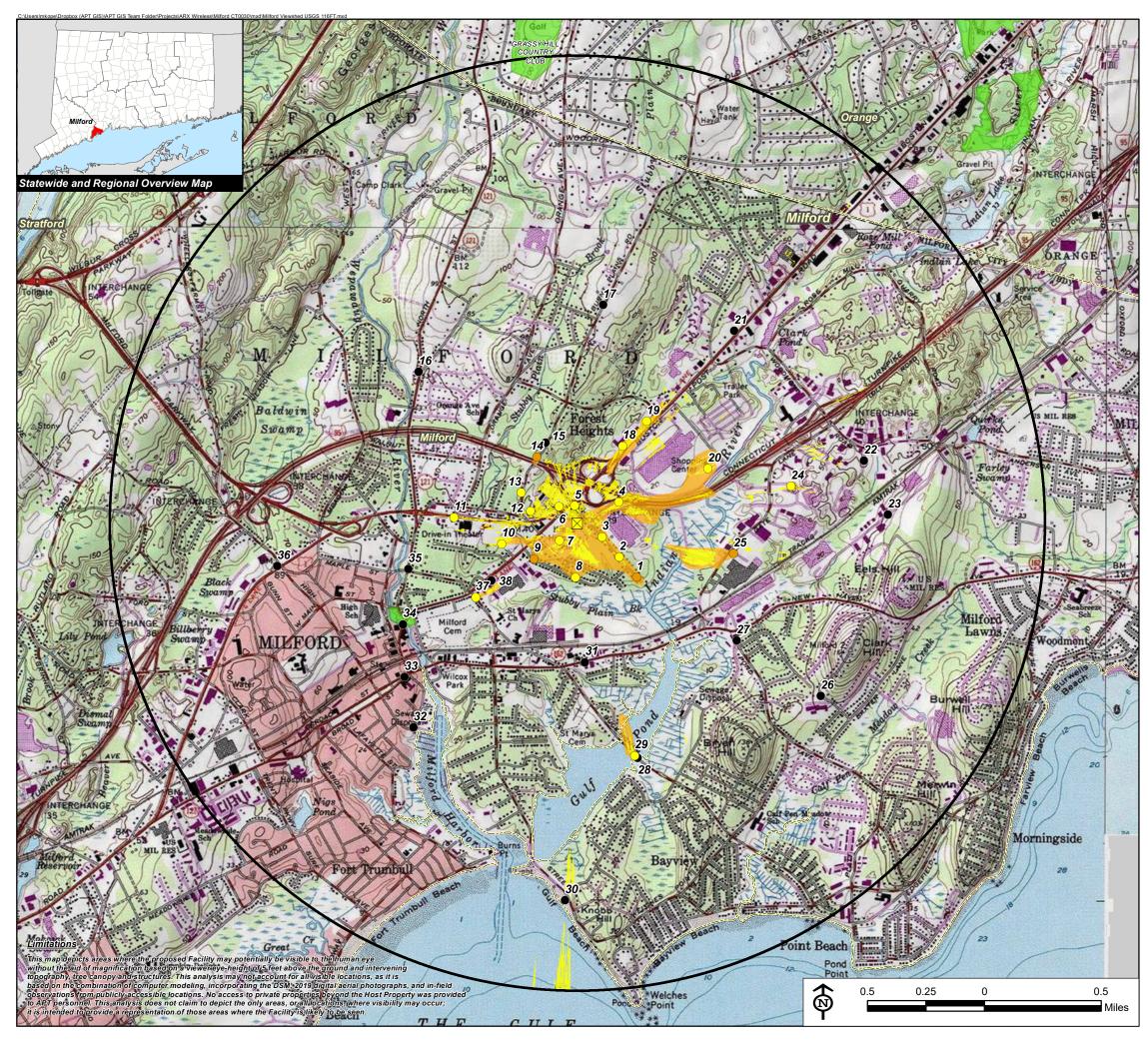
Connecticut Department of Energy and Environmental Protection (DEEP): DEEP Property (May 2007; Federal Open Space (1997); Municipal and Private Open Space (1997); DEEP Boat Launches (1994)

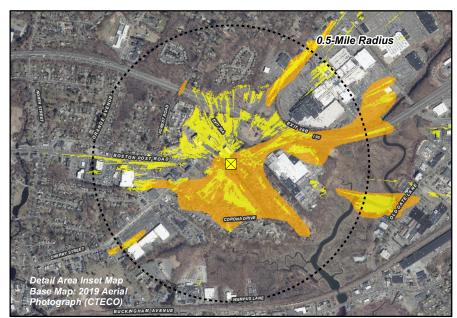
Connecticut Forest & Parks Association, Connecticut Walk Books East & West

CTDOT Scenic Strips (based on Department of Transportation data)

\*\*Not all the sources listed above appear on the Viewshed Maps. Only those features within the scale of the graphic are shown.







# Viewshed Analysis Map

Proposed Wireless Telecommunications Facility
CT0030/Milford
1063 Boston Post Road
Milford, Connecticut

Proposed facility height is 116 feet AGL.
Forest canopy height is derived from LiDAR data.
Study area encompasses a two-mile radius and includes 8,042 acres.
Map information field verified by APT on December 9, 2020
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Maps,
Ansonia, CT (1984) and Milford, CT (1984)
Map Date: December 2020

### Legend



### Data Sources:

### Physical Geography / Background Data

A digital surface model (DSM) was created from the State of Connecticut 2016 LiDAR LAS data points. The DSM captures the natural and built features on the Earth's surface.

Municipal Open Space, State Recreation Areas, Trails, County Recreation Areas, and Town Boundary data obtained from CT DEEP. Scenic Roads: CTDOT State Scenic Highways (2015); Municipal Scenic Roads (compiled by APT)

### Dedicated Open Space & Recreation Areas

Connecticut Department of Energy and Environmental Protection (DEEP): DEEP Property (May 2007; Federal Open Space (1997); Municipal and Private Open Space (1997); DEEP Boat Launches (1994)

Connecticut Forest & Parks Association, Connecticut Walk Books East & West

### <u>Other</u>

CTDOT Scenic Strips (based on Department of Transportation data)

### Not

\*\*Not all the sources listed above appear on the Viewshed Maps. Only those features within the scale of the graphic are shown.

