

Visual Assessment & Photo-Simulations

NEW BRITAIN CT0090 43 OSGOOD AVENUE NEW BRITAIN, CT

Prepared in March 2021 by: All-Points Technology Corporation, P.C. 567 Vauxhall Street Extension – Suite 311 Waterford, CT 06385

Prepared for ARX Wireless





VISUAL ASSESSMENT & PHOTO-SIMULATIONS

ARX Wireless ("ARX") is seeking approval for the development of a new wireless communications facility (the "Facility") at 43 Osgood Avenue in New Britain, 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 municipalities of Farmington and Plainville (to the west) and Newington (to the east).

Project Setting

The 2.62-acre Host Property is located at the northeast corner of Osgood Avenue and Beach Street. It is developed with a vacant one-story institutional building formerly used as an elementary school. Residential development surrounds the Host Property.

The topography within the Study Area consists of relatively hilly terrain. Ground elevations range from approximately 64 feet above mean sea level ("AMSL") in the southeastern portion of the Study Area to approximately 450 feet AMSL in the northwestern portion of the Study Area (in Farmington). Tree cover within the Study Area (consisting primarily of mixed deciduous hardwoods with interspersed stands of conifers) occupies approximately 2,481 acres (or $\pm 30.85\%$) of the 8,042-acre Study Area. Open water over Batterson Park Pond and Lower Pond occupies approximately 150 acres ($\pm 1.87\%$) of the Study Area. The majority of Batterson Park Pond is located in Farmington.

Project Undertaking

ARX plans to construct the proposed Facility on the northeastern portion of the Host Property (the "Site"). The proposed Facility would be located at a ground elevation of approximately 344 feet AMSL and include a 104-foot tall steel monopole with proposed panel antennas to be located at a centerline height of 100 feet above ground level ("AGL"). Associated ground-mounted equipment would be placed within a 50-foot by 50-foot fenced compound. The Facility has been designed to accommodate multiple service providers. Access to the Site would be gained over a new 12' wide gravel access drive that would extend onto the Host Property from Beach Street. Please refer to the Technical Report Drawings prepared by AECOM, dated September 2, 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 analysis consisted of a balloon float 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 LiDAR² LAS³ 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 cells⁴ 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 feature which was then overlaid onto aerial photograph and topographic base maps. Since the

¹ 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.

² Light Detection and Ranging

³ An LAS file is an industry-standard binary format for storing airborne LiDAR data.

⁴ Each DSM cell size is 1 square meter.

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.

Balloon Float and Field Reconnaissance

To supplement and fine tune the results of the computer modeling efforts, APT completed infield verification activities consisting of a balloon float, vehicular and pedestrian reconnaissance, and photo-documentation. The balloon float and field reconnaissance were completed on March 8, 2021. The balloon float involved raising a brightly-colored, approximately 4-foot diameter,

helium-filled balloon tethered to a string height of ±104 feet AGL⁵ at the proposed Site. Weather conditions were favorable for the in-field activities with light winds and clear skies.

APT conducted a Study Area reconnaissance by driving local and State roads and other publicly accessible locations to document and inventory where the balloon 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 balloon was – and was 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 body⁶ 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, five (5) photographs were taken at a 24mm focal length and four (4) 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 thirty-six (36) 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 photorendering 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 balloon) and the corresponding simulation (the Facility) is proportional to their surroundings.

For presentation purposes in this report, the photographs were produced in an approximate 7inch 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

⁶ 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.

⁵ The bottom of the balloon represented the top of the monopole.

(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 balloon 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 Facility occupied by three (3) commercial service providers (representing a future build-out scenario). 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 | Highview Avenue | East | ± 479 Feet | Year Round |
| 2 | Richmond Avenue* | South | ± 232 Feet | Year Round |
| 3 | Farmington Avenue | Southwest | ± 462 Feet | Year Round |
| 4 | Osgood Avenue* | Northwest | ± 241 Feet | Year Round |
| 5 | Osgood Avenue at Beach Street** | Northeast | ± 361 Feet | Year Round |
| 6 | Pierremount Avenue** | East | ± 0.14 Mile | Year Round |
| 7 | Pierremount Avenue | East | ± 0.22 Mile | Seasonal |
| 8 | Oakland Avenue | Southeast | ± 0.13 Mile | Seasonal |
| 9 | Oakland Avenue | South | ± 0.10 Mile | Year Round |
| 10 | Farmington Avenue at Overlook Avenue | Southwest | ± 0.16 Mile | Not Visible |
| 11 | Overlook Avenue | South | ± 0.14 Mile | Year Round |
| 12 | Governor Street | South | ± 0.19 Mile | Year Round |
| 13 | New Britain Memorial & Donald D. Sagarino Funeral Home Parking Lot 444 Farmington Avenue* | South | ± 0.32 Mile | Not Visible |
| 14 | Oakland Avenue at Selander Street | Southeast | ± 0.30 Mile | Seasonal |
| 15 | Pierremount Avenue | Southeast | ± 0.36 Mile | Seasonal |
| 16 | St. Mary's Ukrainian Orthodox Cemetery | East | ± 0.36 Mile | Seasonal |
| 17 | Osgood Avenue | Northeast | ± 0.27 Mile | Year Round |
| 18 | Sacred Heart Cemetery | Northeast | ± 0.39 Mile | Year Round |
| 19 | Acton Street | Northeast | ± 0.16 Mile | Seasonal |
| 20 | Eddy Glover Boulevard | Northwest | ± 0.23 Mile | Year Round |
| 21 | Beth Alom Cemetery | Northwest | ± 0.32 Mile | Seasonal |
| 22 | Eddy Glover Boulevard | Northwest | ± 0.25 Mile | Year Round |
| 23 | Eddy Glover Boulevard | West | ± 0.29 Mile | Seasonal |
| 24 | Eddy Glover Boulevard | Southwest | ± 0.34 Mile | Seasonal |
| 25 | Eddy Glover Boulevard* | Southwest | ± 0.36 Mile | Not Visible |
| 26 | Francis Street | Southwest | ± 0.50 Mile | Year Round |
| 27 | Francis Street | Southwest | ± 0.56 Mile | Not Visible |
| 28 | Hawthorne Street | West | ± 0.56 Mile | Not Visible |
| 29 | Hawthorne Street | West | ± 0.46 Mile | Year Round |
| 30 | Grandview Street | West | ± 0.42 Mile | Not Visible |
| 31 | Grandview Street | West | ± 0.37 Mile | Seasonal |

Table 1 – Photo Locations Continued

| Photo | Location | Orientation | Distance to Site | Visibility | | | |
|---|--|-------------|---------------------|-------------|--|--|--|
| 32 | Kaiser Parking Lot Central Connecticut State University | Southwest | ± 1.58 Miles | Year Round | | | |
| 33 | National Iwo Jima Memorial | Southwest | ± 1.83 Miles | Not Visible | | | |
| 34 | Carmody Street adjacent to Washington School Apartments | Northwest | ± 0.59 Mile | Seasonal | | | |
| 35 | Carmody Street adjacent to Washington School Apartments | North | ± 0.57 Mile | Year Round | | | |
| 36 | Washington Bark Park Carmody Street | North | ± 0.56 Mile | Seasonal | | | |
| 37 | Washington Park | North | ± 0.56 Mile | Seasonal | | | |
| 38 | Booth Street | Northeast | ± 0.58 Mile | Not Visible | | | |
| 39 | Smith Street at Booth Street | Northeast | ± 0.71 Mile | Year Round | | | |
| 40 | Booth Street | Northeast | ± 0.73 Mile | Not Visible | | | |
| 41 | Smith Street | Northeast | ± 0.75 Mile | Not Visible | | | |
| 42 | Clinton Street at Corbin Avenue* | Northeast | ± 1.09 Miles | Not Visible | | | |
| 43 | Walnut Hill Park | North | ± 1.52 Miles | Not Visible | | | |
| 44 | Walnut Hill Park | North | ± 1.47 Miles | Year Round | | | |
| 45 | Walnut Hill Park | North | ± 1.35 Miles | Year Round | | | |
| 46 | Cedar Street at Lake Street | North | ± 1.22 Miles | Not Visible | | | |
| 47 | Slater Road | East | ± 0.86 Mile | Year Round | | | |
| 48 | Governor Street | Southeast | ± 0.47 Mile | Seasonal | | | |
| 49 | Walker Road at Dean Drive | Southeast | ± 0.72 Mile | Year Round | | | |
| 50 | Horse Plain Road** | Southeast | ± 0.80 Mile | Not Visible | | | |
| 51 | Farmington Avenue** | South | ± 0.73 Mile | Not Visible | | | |
| 52 | Blake Road | Southwest | ± 0.83 Mile | Not Visible | | | |
| *Photograph was taken at 24 mm focal length | | | | | | | |

^{*}Photograph was taken at 24 mm focal length.

^{**}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 locations within approximately 0.5 mile of the Site. Adjacent neighborhoods (within ± 0.25 mile of the Site) will experience both year-round and seasonal views. Photos 1 through 6, 9, 11 and 12 depict representative year-round views from adjacent neighborhoods. Photo 19 depicts a representative seasonal view from this area. Seasonal visibility is predicted to extend up to approximately 0.36 mile away, as depicted in photos 7, 8, 14, 15, and 16.

Intermittent seasonal views may extend to select locations between 0.4 mile and 0.6 mile away to the south, southeast, and east of the site. Representative views can be seen in photos 21, 23, 24, and 31 for views to the east and southeast of the site. Photos 34, 36, and 37 depict views to the south. Additional year-round views are anticipated at farther distances (between ± 0.86 mile to ± 1.58 miles from the Site) to the northeast, south, and northwest as seen in photos 32, 36, 39, 44, 45, 47 and 48.

Predicted seasonal visibility of the proposed Facility is estimated to include approximately 87 acres. Predicted year-round visibility is estimated to include an additional ± 47 acres. Collectively, this represents ± 1.66 percent of the 8,042-acre Study Area.

Proximity to Schools And Commercial Child Day Care Centers

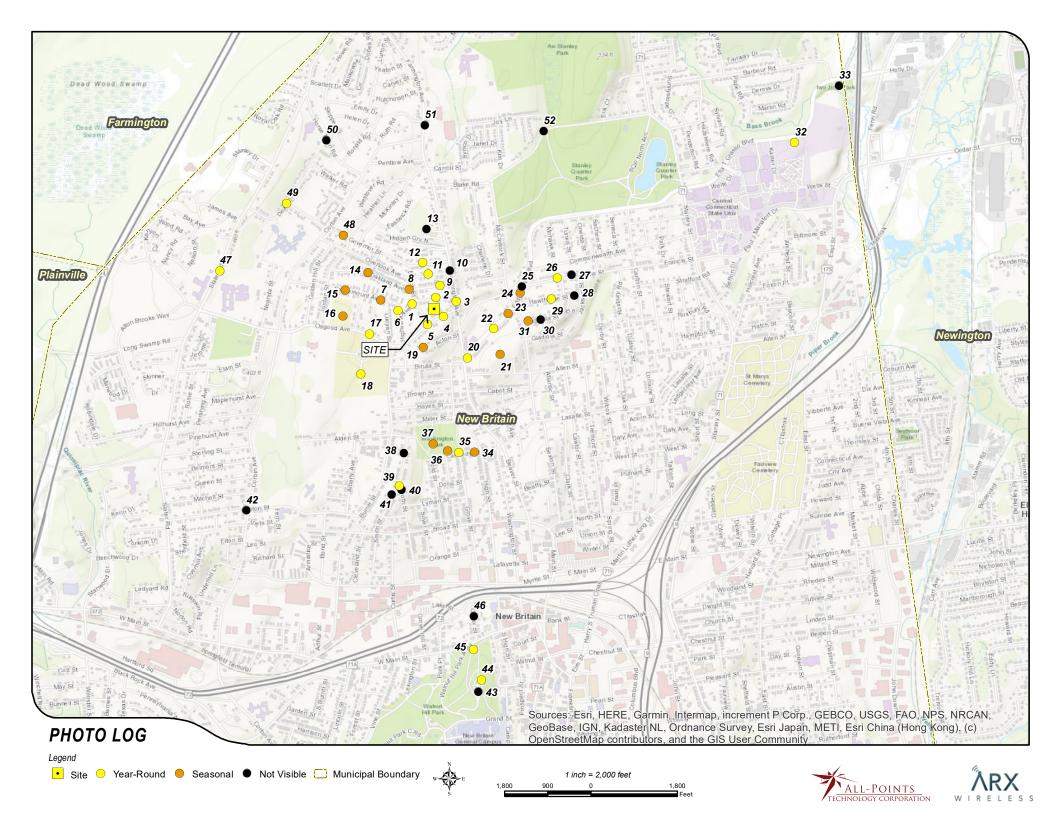
No schools or commercial child day care centers are located within 250 feet of the proposed Facility. E. C. Goodwin Technical High School is located approximately 0.73 mile west of the Site at 735 Slater Road in New Britain. A small area of year-round visibility is predicted from the northwestern portion of the school grounds. The nearest commercial child care center is Learn 'n Play Childcare approximately 0.82 mile to the east of the Site at 357 Allen Street in New Britain. 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 light winds and clear skies.

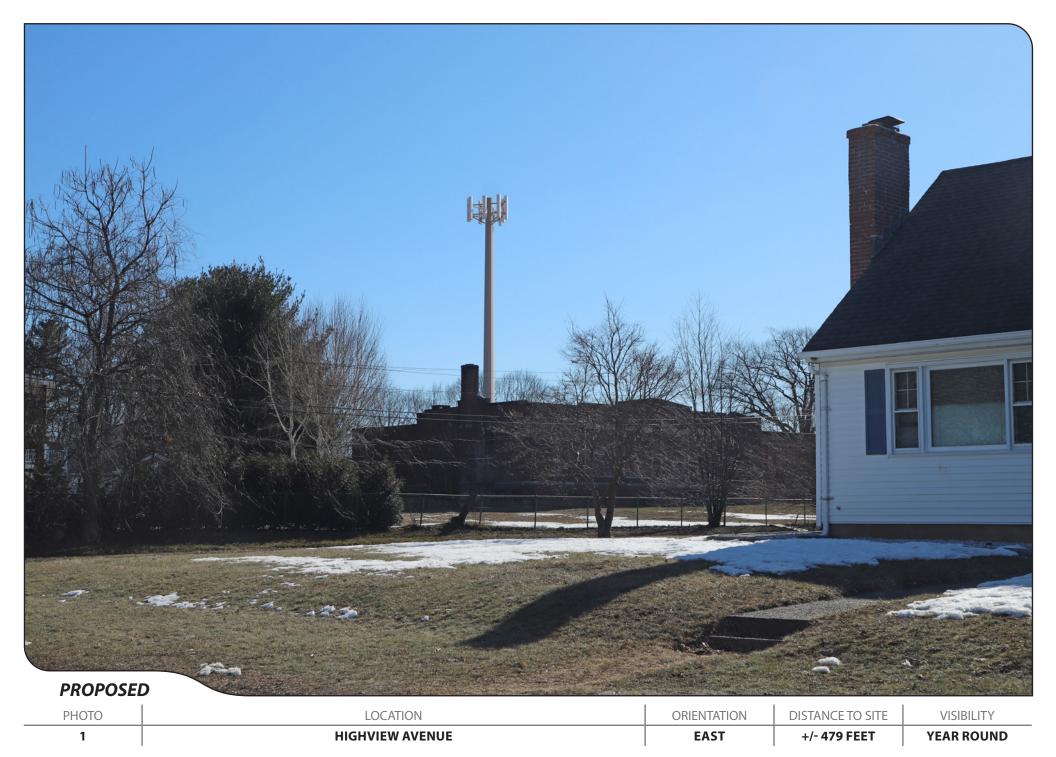
ATTACHMENTS









































































| 6 | PIERREMOUNT AVENUE | EAST | +/- 0.14 MILE | YEAR ROUND |
|-------|--------------------|-------------|------------------|------------|
| PHOTO | LOCATION | ORIENTATION | DISTANCE TO SITE | VISIBILITY |





























































































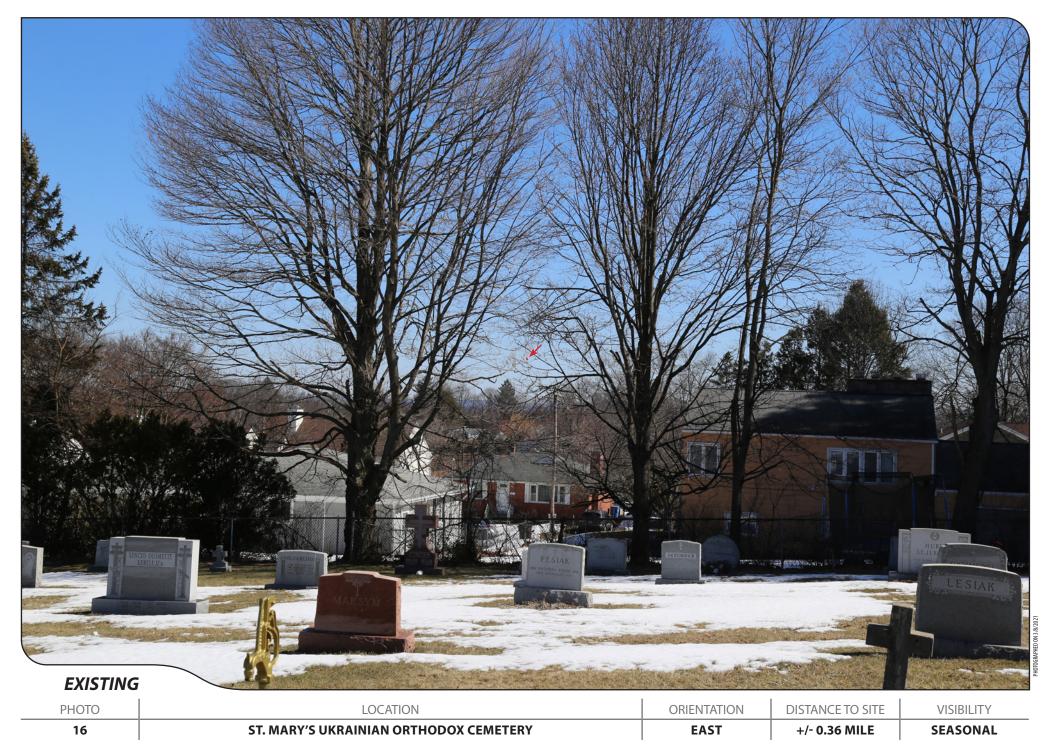






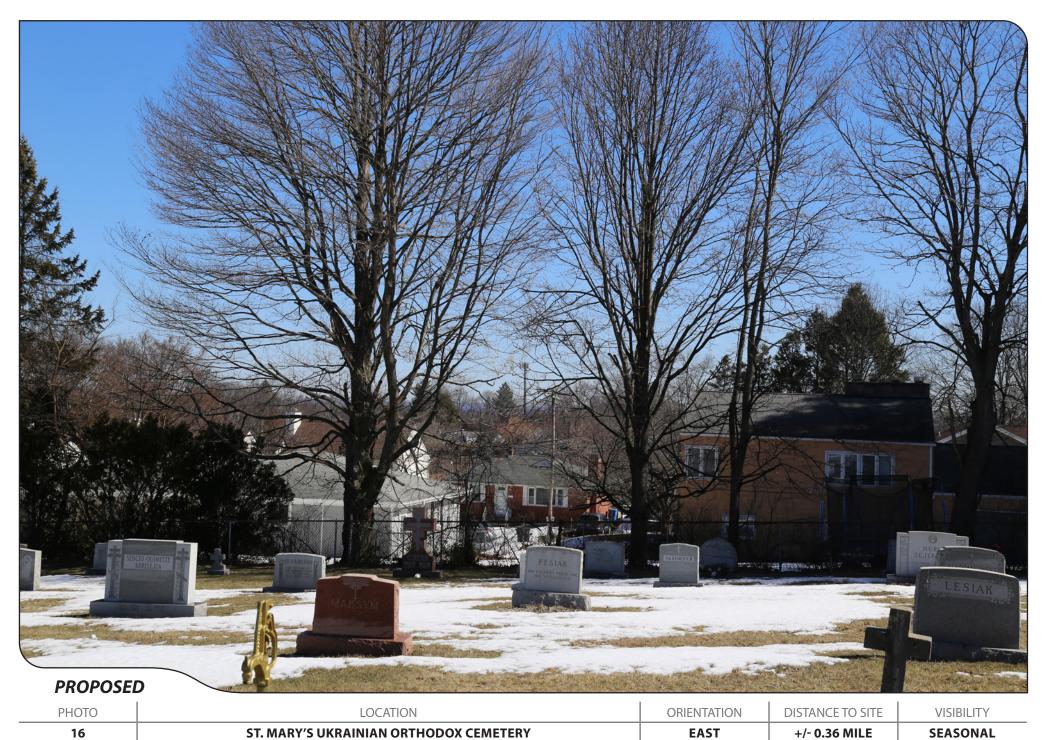




















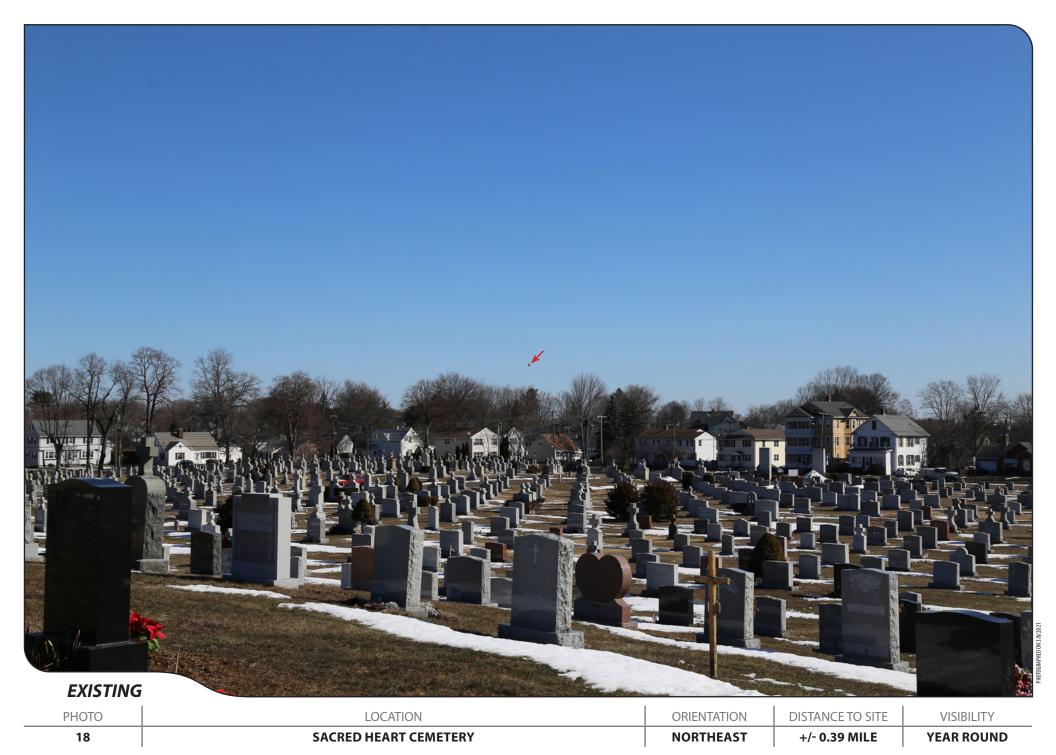






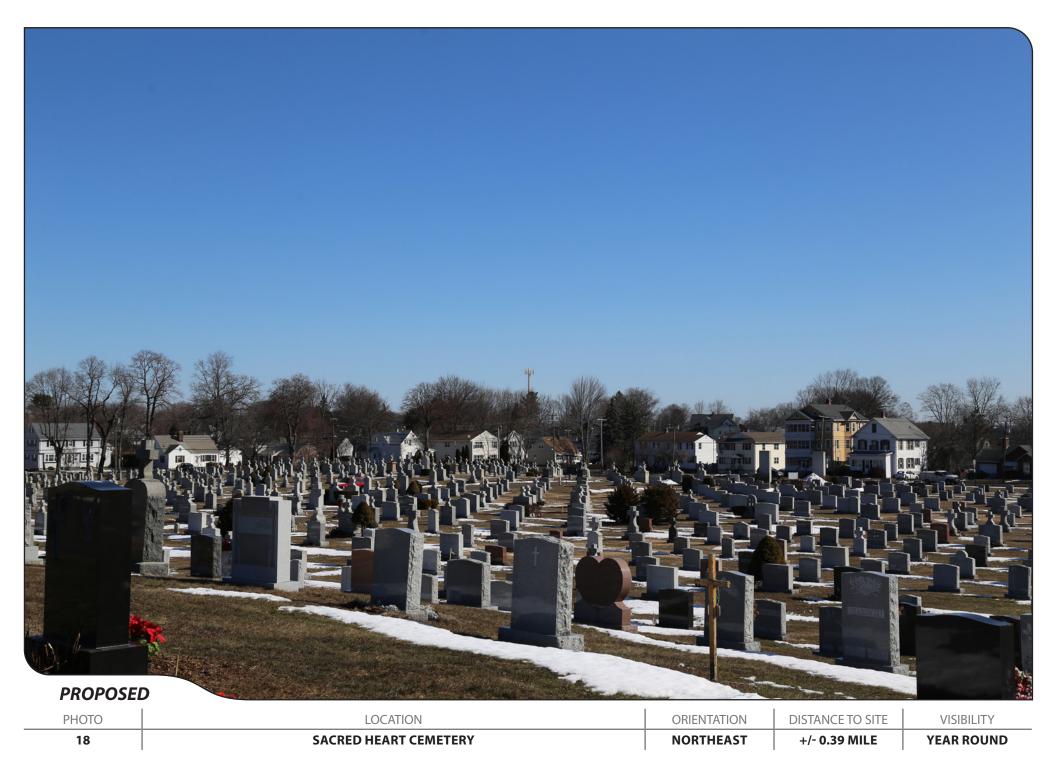






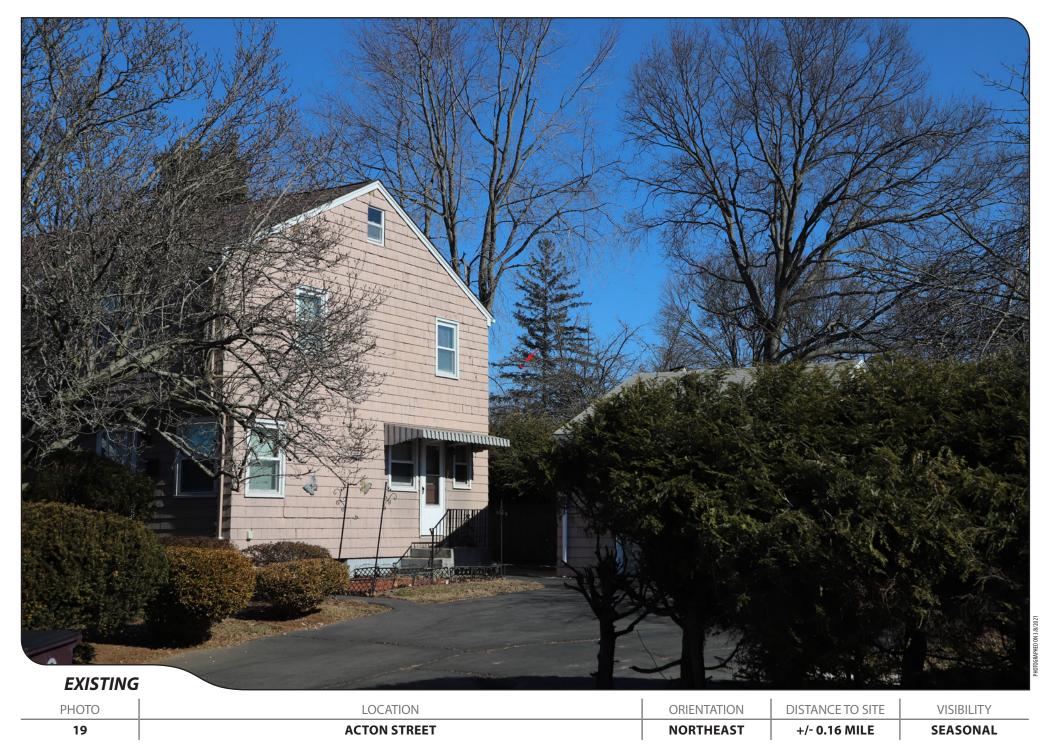






























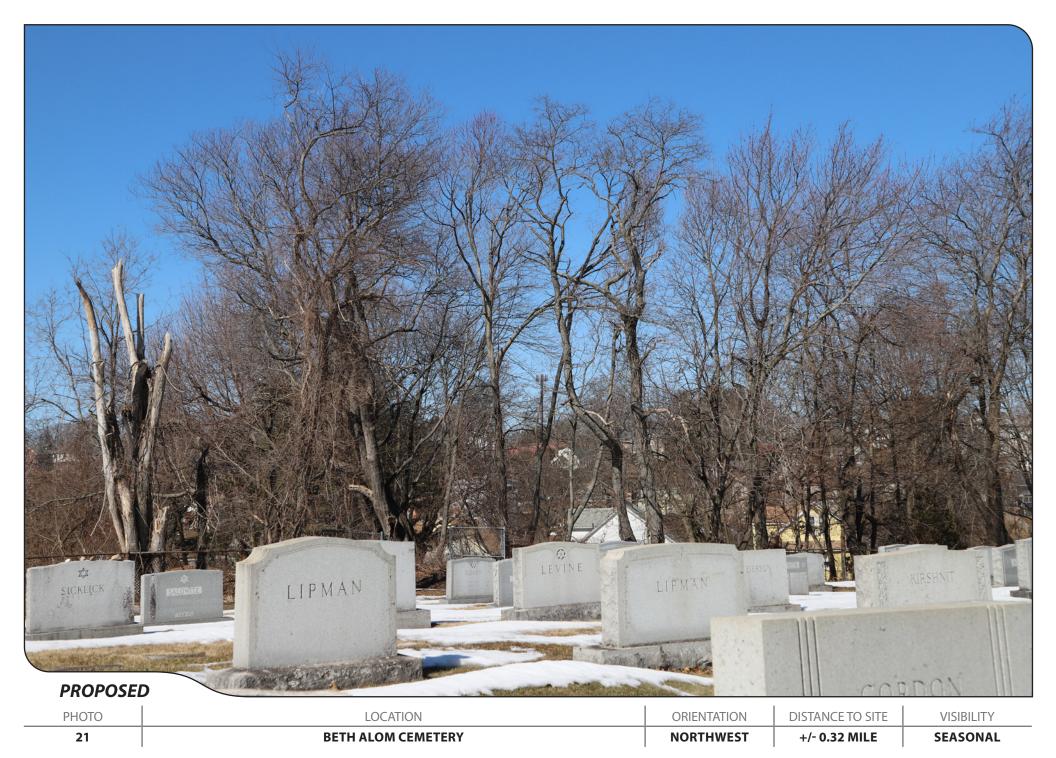
























| 22 | EDDY GLOVER BOULEVARD | NORTHWEST | +/- 0.25 MILE | YEAR ROUND |
|-------|-----------------------|-------------|------------------|------------|
| PHOTO | LOCATION | ORIENTATION | DISTANCE TO SITE | VISIBILITY |











































































PHOTO LOCATION ORIENTATION DISTANCE TO SITE VISIBILITY

30 GRANDVIEW STREET WEST +/- 0.42 MILE NOT VISIBLE

























































| 35 | CARMODY STREET ADJACENT TO WASHINGTON SCHOOL APARTMENTS | NORTH | +/- 0.57 MILE | YEAR ROUND |
|-------|---|-------------|------------------|------------|
| PHOTO | LOCATION | ORIENTATION | DISTANCE TO SITE | VISIBILITY |

























































































































| PHOTO | LOCATION | ORIENTATION | DISTANCE TO SITE | VISIBILITY |
|-------|-----------------|-------------|------------------|------------|
| 48 | GOVERNOR STREET | SOUTHEAST | +/- 0.47 MILE | SEASONAL |

























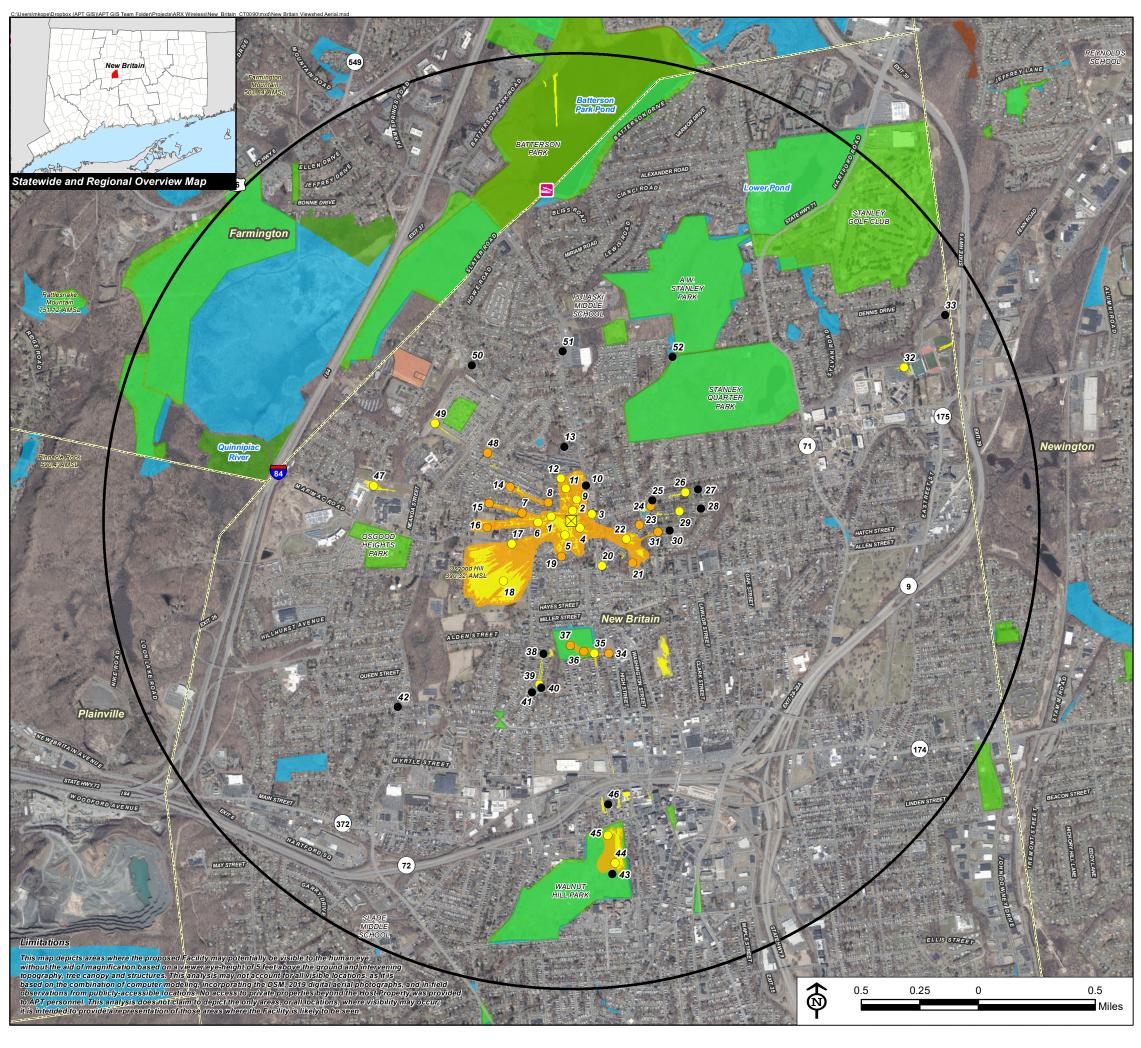


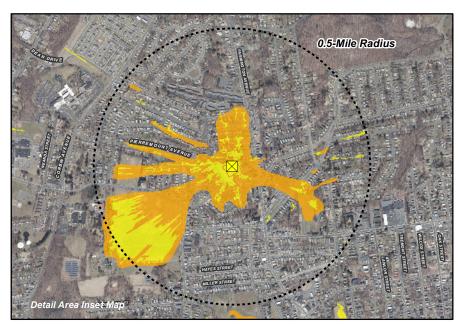












Viewshed Analysis Map

Proposed Wireless Telecommunications Facility
CT0090-New Britain
43 Osgood Avenue
New Britain, Connecticut

Proposed facility height is 104 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 March 8, 2021
Base Map Source: 2019 Aerial Photograph (CTECO)
Map Date: March 2021

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

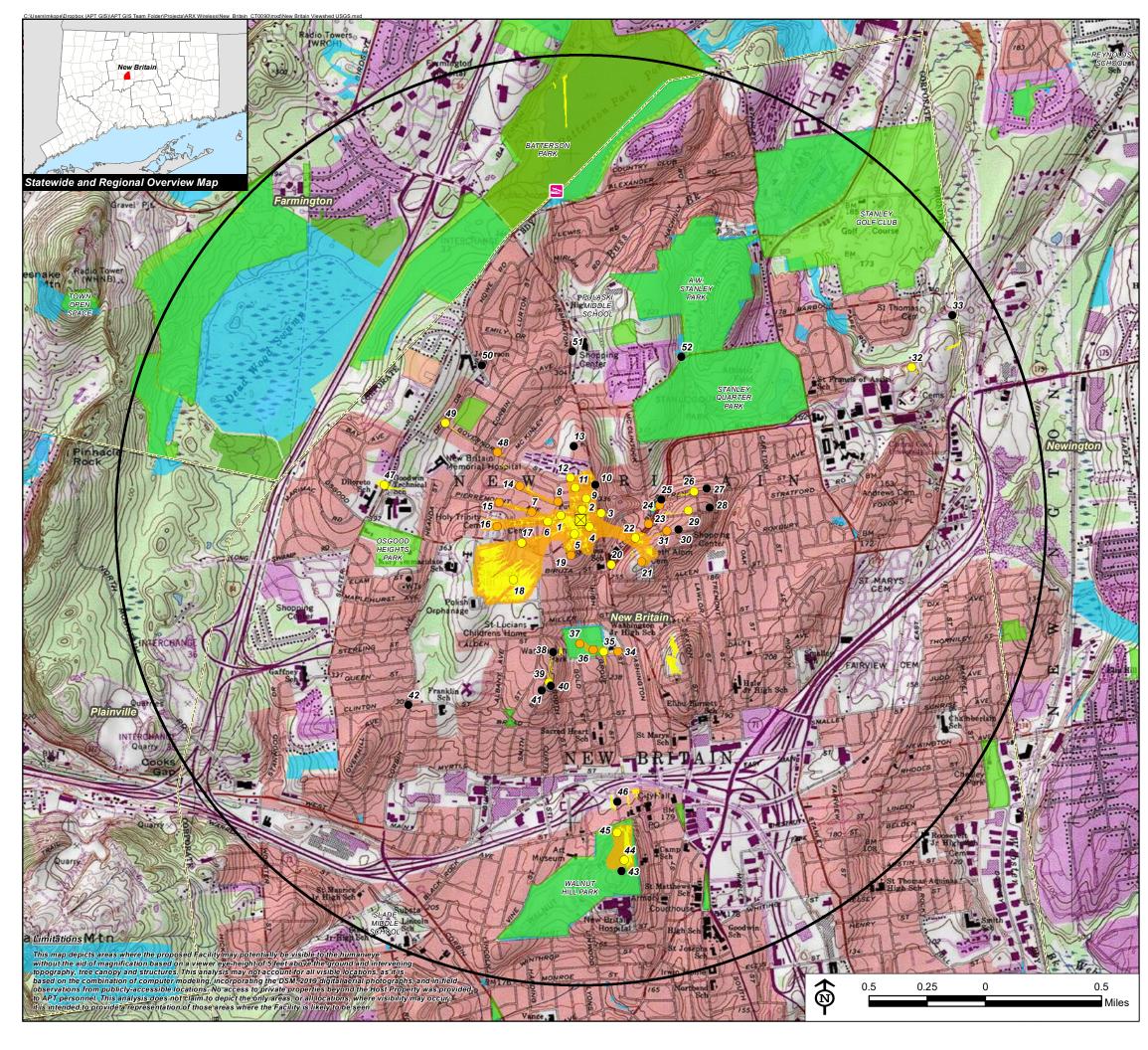
<u>Other</u>

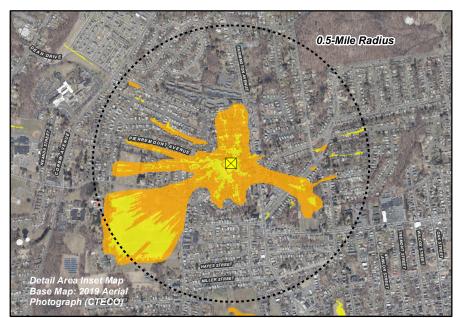
CTDOT Scenic Strips (based on Department of Transportation data)

Not

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







Viewshed Analysis Map

Proposed Wireless Telecommunications Facility CT0090-New Britain 43 Osgood Avenue New Britain, Connecticut

Proposed facility height is 104 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 March 8, 2021
Base Map Source: USGS 7.5 Minute Topographic Quadrangle Maps,
Hartford South, CT (1992) and New Britain, CT (1992) Map Date: March 2021

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

Other
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

