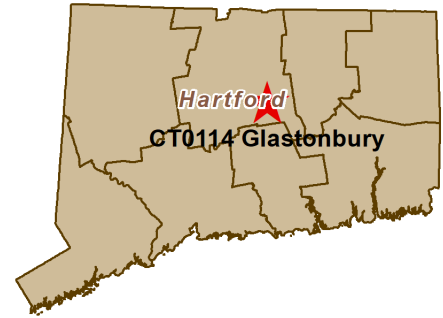


Preliminary Visibility Analysis Package

Proposed Wireless Telecommunications Facility:

CT0114 Glastonbury
Sequin Street
Glastonbury, CT 06033



- Proposed new 115 ft AGL antenna structure
- Viewshed map completed 12/18/2020

Viewshed analysis maps and representations contained herein depict where proposed facility may potentially be visible based on the best data available and site conditions at the time data was collected. This study does not claim to depict all locations from where the facility may be potentially visible.



Introduction

At the request of Arx Wireless, LLC, Virtual Site Simulations, LLC (VSS) was contracted to provide a Preliminary Viewshed Analysis Report for a proposed monopole type telecommunications facility located at Lot N-4 Sequin Drive, Glastonbury CT 06033. Hereafter referred to as “the Site”. The proposed tower facility would contain a 115 foot above ground level (“AGL”) monopole type antenna structure. Associated unmanned equipment will be contained within an approximately 50 ft x 50 ft fenced compound area immediately surrounding the base of the proposed tower.

Site Description and Setting

The proposed Monopole type telecommunications facility is located on a +/- 11.233 Acre property designated by the tax assessor as lot number F5-6200-N0004, owned by New Land of Glastonbury, LLC-. The Site is approximately .5 miles east of Ct. Route 2 at the Ct Route 64 Hebron Avenue overpass. The site is located within a Commercial/Industrial area and the subject property is currently used as a materials storage yard.

The Links Transition School/Links Academy, 628 Hebron Avenue, building 4, Glastonbury CT 06033 is located .46 miles to the west and is the closest school to the proposed facility. The YMCA Child Care Program/Preschool 95 Oakwood Drive, Glastonbury CT 06033 is located .43 miles to the southwest of the site and is the closest licensed daycare facility. There are no CT Blue Blazed Trails within the study area. There are no schools or licensed daycare facilities within 250 ft of the proposed facility.

Methodology

Determination of Study Area

In order to complete this analysis a study area must first be determined. For this site, a one-mile study area (2010.6 acre) was selected based on years of experience in modeling the visibility of telecommunication structures. Typical views from beyond this distance, in this type of Topography, are distant and partially obscured and are therefore omitted from the analysis. This is done to focus on areas within the defined study area that will have a larger visual impact.

The Preliminary Viewshed Analysis was conducted within the predefined study area using three-dimensional computer modeling software described below.

Computer Modeling – Data Processing

Once the study area is selected, a combination of Ortho Image based, and Lidar based datasets are assembled.

Ortho Imagery is remotely sensed imagery that has been geometrically corrected. This geometric correction, or orthorectification, is required to adjust for lens distortion, camera tilt, and topographical relief. An orthorectified image is an extremely accurate view of the surface of the Earth. This allows for the measurement of true distance, precise digitization, and the exact placement of geographic symbols and analysis results.

LiDAR, or light detection ranging is a remote sensing method that maps structure including vegetation height, density and other characteristics across a region. Think of it as radar using laser light instead of radio waves. LiDAR directly measures the height and density of vegetation on the ground as well as the bare-earth topology.

The datasets are clipped to the study area and processed to create the 3d models necessary to perform this analysis. For Leaf On/Leaf off analysis three different models need to be created:

- 1. A Digital Elevation Model (“DEM”)- a 3d model of existing bare earth topography (i.e. no surface features, like trees and buildings)**
- 2. A Leaf-On Digital Surface Model (“DSM “)- a 3d model of existing topography that includes all surface features measured (i.e. building and trees)**
- 3. A Leaf-Off Digital Surface Model- a 3d model of existing topography that includes all surface features measured with specific analysis done to remove datapoints from deciduous trees/bushes (see Leaf Off considerations section below).**

It is important to note that by using lidar data to create these models, building heights, existing tree canopy heights and other land cover is not averaged or assumed but measured from lidar dataset. Several different software packages are used in this processing, most notably, ESRI ArcGIS platform is used to interpret Lidar data, perform image analysis and create a Digital Surface Model (“DSM “) and a corresponding Digital Elevation Model (“DEM”). These datasets are then used to perform a viewshed analysis.

Image Analysis Leaf Off considerations

In this case where Leaf Off analysis is necessary, an extra step is required to adjust DSM to remove leaves. There are many different methods that can be used to perform this analysis. Image analysis of Ortho Imagery taken at the same time as lidar measurement data was chosen as the best approximation for the purposes of this analysis. It has been proven to yield a reasonable approximation of what views would be likely in the leaf off condition. This analysis is used to differentiate between deciduous and non-deciduous (coniferous) trees and ground cover.

Once completed the calculated deciduous areas are removed from the DSM. This Leaf Off DSM is then used to perform the Leaf Off viewshed analysis.

Viewshed Analysis- IVSview®

The primary software used for the viewshed analysis is IVSview® VVS, LLC’s proprietary Interactive Viewshed Analysis Tool. This software allows the user to perform viewshed analysis on imported maps and datasets on multiple levels at the same time. These calculations determine not only if the tower will be seen, but also how much of the

tower will be visible from those locations. The IVSview® results have been field verified at thousands of locations with all topography types (i.e. urban, rural, mixed etc..) throughout New England. And, when compared to other viewshed analysis software packages, it has proven to provide a more realistic comprehensive representation of potential views.

The datasets are imported as layers within the software mapping program. Once imported, spatial analysis tools are used to evaluate each position within those layers from which the proposed facility may be visible. These tools allow for the input of viewing reference height (assumed to be 5 Ft AGL) and tower height(s). The tools also consider any layers that have been imported that may affect viewing location (i.e. topography, tree canopy, ground cover, buildings, roads etc.) IVSview® is then applied, and visibility models are created. The results of this computer model are then graphically layered on topographic and aerial maps.

These maps can be found in Attachment A.

Preliminary Visibility Analysis Results

The preliminary results of the of viewshed analysis for the proposed telecommunications facility are provided on the visibility analysis maps attached at the end of this report within Attachment A. The maps are provided in two ways, one set of maps comparing leaf-on, leaf-off conditions (single color for each) and a second set of maps showing proposed total visibility by height (IVSview® multi-level viewshed) as an overview.

Year-Round Visibility:

Predicted estimate of year-round views (Summer, leaf-on condition) of the proposed tower facility are from approximately 22.6 acres or approximately 1.13 % of the 1-mile radius, 2010.6 Acre study area. The majority of those specific views (10.3 Acres) are of the upper most portion of the proposed tower. (see Attachment A - IVSview® for multi-level viewshed leaf-on prediction)

Seasonal Visibility:

Predicted estimate seasonal views (Winter, leaf-off condition) of the proposed facility are from an additional 4.2 acres (.2 %). Total predicted seasonal views 26.8 Acres (1.33%). The majority of the additional leaf-off views are along the edges of predicted leaf-on visibility. (see - IVSview® leaf-off prediction)

Documentation

Sources used for Visibility Analysis located at:

**CT0114 Glastonbury
Lot N-4 Sequin Drive,
Glastonbury CT 06033**

Maps and datasets /consulting documents:

United States Geological Survey - USGS Topographical quadrangles (2011-2012)

National Resource Conservation Service -NAIP aerial photography (2010, 2012)

CRCOG Ortho-imagery – (2017)

UCONN- Center for Land Use Education and Research

- **LiDAR data (2016)**

DEEP- Connecticut Department of Energy and Environmental Protection

- **Open Space (2010)**
- **DEEP Property (2017)**
- **Historic Places (2008)**

United States Census (2010) – Landmark Polygon Features

Connecticut Forest & Park Association (CFPA) – Blue Blazed Trails (2016)

Connecticut.Gov eLicensing Website – Child Daycare & Group Daycare Homes Roster (2017)

Environmental Systems Research Institute Inc (ERSI) – CT state boundaries/counties (2010)

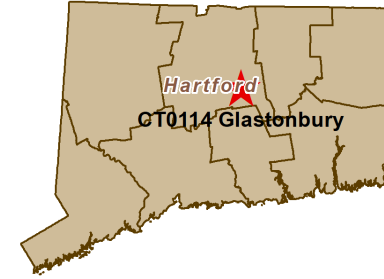
Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo

Limitations:

This report and the analysis herein does not claim to depict all locations, or the only locations from which the proposed facility will be visible; it is intended to provide a representation of those areas where proposed facility is likely to be visible.

Attachment A - Preliminary Viewshed Mapping Package

Proposed Wireless Telecommunications Facility:



CT0114 Glastonbury
Sequin Street
Glastonbury, CT 06033

- Proposed new 115 ft AGL antenna structure
- Viewshed map completed 12/18/2020

Package prepared by:

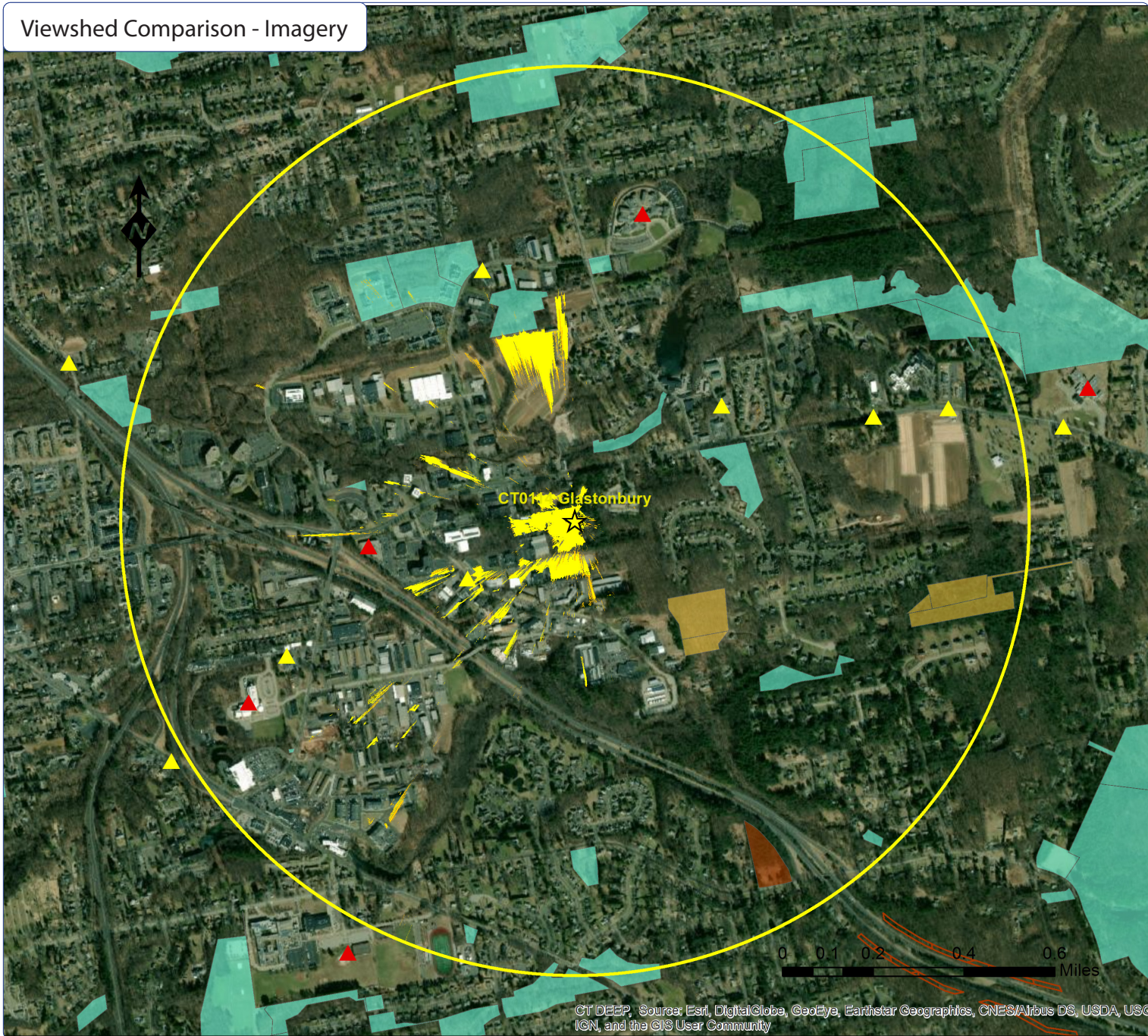
Virtual Site Simulations, LLC
24 Salt Pond Road
Suite C3
South Kingstown, Rhode Island 02879

www.VirtualSiteSimulations.com
www.ThinkVSSFirst.com

Viewshed analysis maps and representations contained herein depict where proposed facility may potentially be visible based on the best data available and site conditions at the time data was collected. This study does not claim to depict all locations from where the facility may be potentially visible.



Viewshed Comparison - Imagery



Proposed Facility:
CT0114 Glastonbury
Sequin Street
Glastonbury, CT 06033

- ☆ Facility Location ○ 1 Mile Radius
- ▲ School Facilities ▲ Daycare Facilities
- CT Open Space (Conservation Land)
- CT Open Space (Municipal Land)
- CT Open Space (State Land)
- Predicted Visibility-Year Round(Leaf On)
- Predicted Visibility-Seasonal(Leaf Off)

Statistics:
 PROJ_DESC=Geographic (Lat/Long) / WGS84 / arc degrees
 PROJ_DATUM=WGS84 PROJ_UNITS=arc degrees
 PIXEL WIDTH=0.0000013 arc degrees (+/- .6 ft)
 PIXEL HEIGHT=0.0000014 arc degrees(+/- .6 ft)
 RADIUS (FT)= 1 Mile
 TRANSMITTER_HEIGHT (Ft-AGL)= 115
 RECEIVER_HEIGHT (Ft-AGL)= 5 Ft
 PERCENT_VISIBLE (%) Year Round (Leaf On)= 1.13%
 PERCENT_VISIBLE (%) Seasonal (Leaf Off)= 1.33%

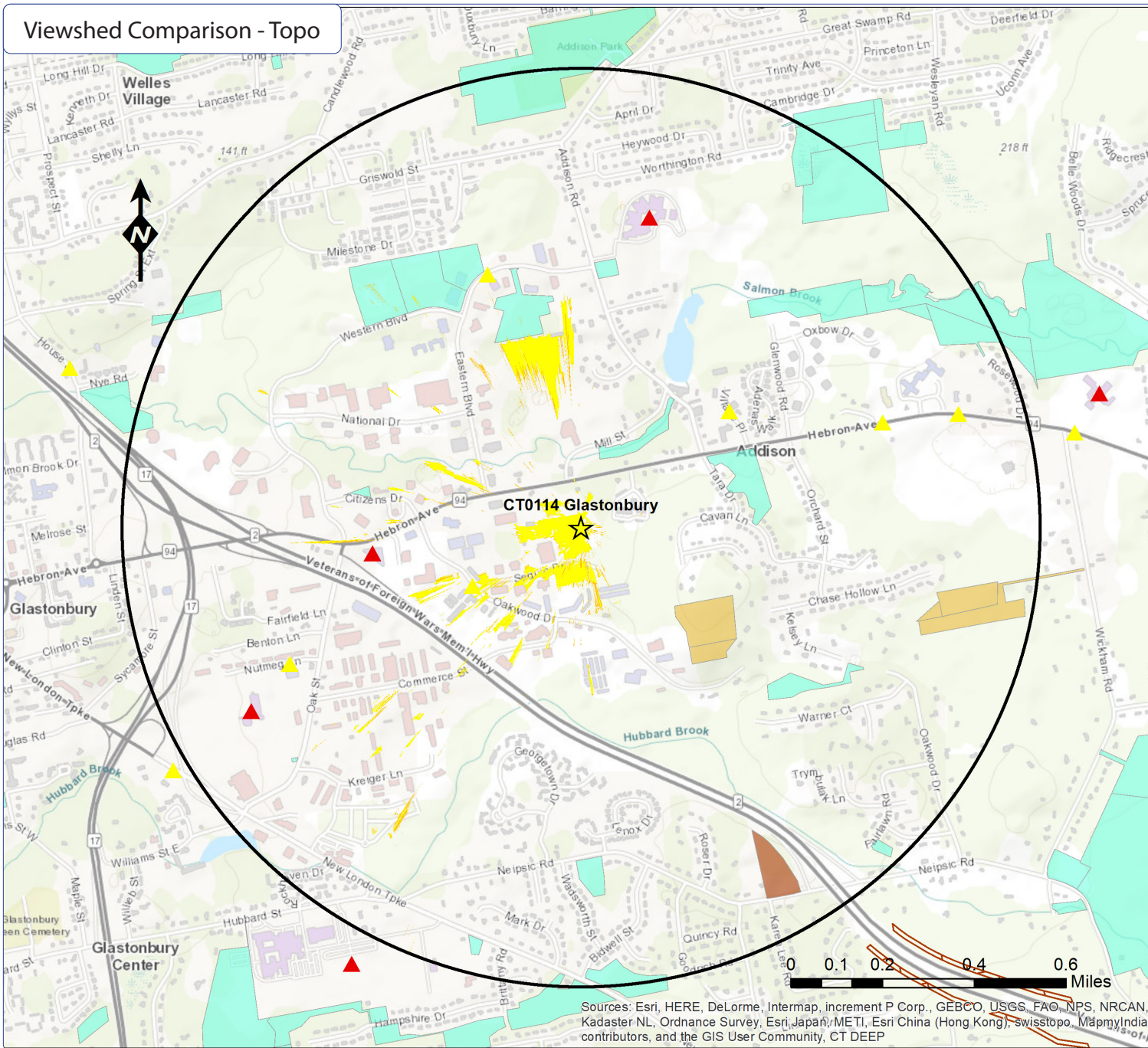
Notes:
 - map compiled by VSS, LLC on : 12/18/2020
 - Tower location(lat/long NAD 83): 41.714652 -72.580755
 - Data Sources noted on documentation page attached



Viewshed analysis maps and representations contained herein depict where proposed facility may potentially be visible based on the best data available and site conditions at the time data was collected. This study does not claim to depict all locations from where the facility may be potentially visible.



Viewshed Comparison - Topo



Proposed Facility:

CT0114 Glastonbury
Sequin Street
Glastonbury, CT 06033

☆ Facility Location ○ 1 Mile Radius

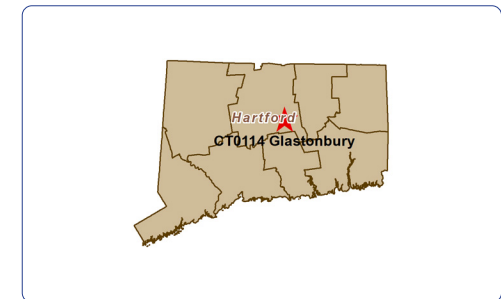
- ▲ School Facilities ▲ Daycare Facilities
- CT Open Space (Conservation Land)
- CT Open Space (Municipal Land)
- CT Open Space (State Land)
- Predicted Visibility-Year Round(Leaf On)
- Predicted Visibility-Seasonal(Leaf Off)

Statistics:

PROJ_DESC=Geographic (Lat/Long) / WGS84 / arc degrees
 PROJ_DATUM=WGS84 PROJ_UNITS=arc degrees
 PIXEL WIDTH=0.0000013 arc degrees (+/- .6 ft)
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 RADIUS (FT)= 1 Mile
 TRANSMITTER_HEIGHT (Ft-AGL)= 115
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 PERCENT_VISIBLE (%) Year Round (Leaf On)= 1.13%
 PERCENT_VISIBLE (%) Seasonal (Leaf Off)= 1.33%

Notes:

- map compiled by VSS, LLC on : 12/18/2020
- Tower location(lat/long NAD 83): 41.714652 -72.580755
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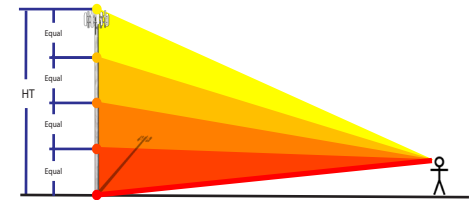
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Proposed Facility:
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IVS Leaf On - Image

IVSview® Color Legend



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- CT Open Space (Municipal Land)
- CT Open Space (State Land)

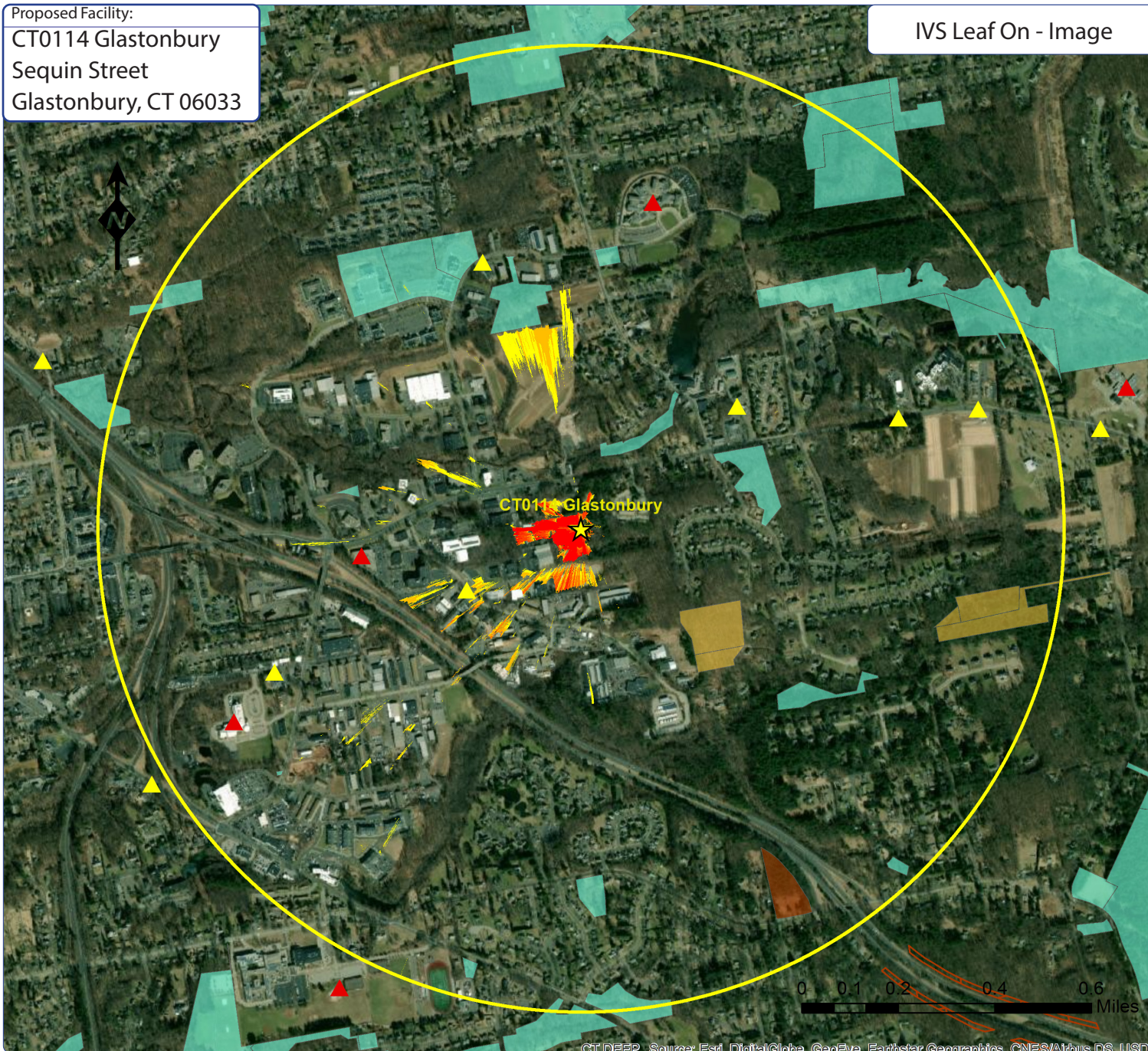
Tower Visibility			
Color	Location	% Vis	Acres
Yellow	Top 25%	0.51%	10.3
Orange	Top 50%	0.25%	5.0
Light Orange	Top 75%	0.09%	1.8
Red-Orange	Top 100%	0.09%	1.8
Red	Base	0.18%	3.7
TOTAL		1.13%	22.6 Acres

Statistics:

PROJ_DESC=Geographic (Lat/Long) / WGS84 / arc degrees
 PROJ_DATUM=WGS84 PROJ_UNITS=arc degrees
 PIXEL_WIDTH=0.0000013 arc degrees (+/- .6 ft)
 PIXEL_HEIGHT=0.0000014 arc degrees (+/- .6 ft)
 RADIUS (FT)= 1 Mile
 TRANSMITTER_HEIGHT (Ft-AGL)= 115
 RECEIVER_HEIGHT (Ft-AGL)= 5 Ft
 PERCENT_VISIBLE (%)=1.13%

Notes:

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CT DEEP Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA

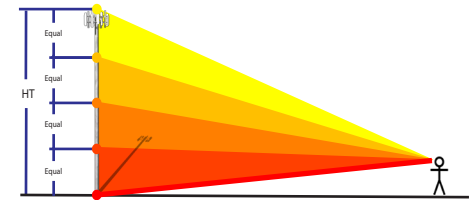
VSS-IVS- Interactive Viewshed Analysis output maps contained herein depict where proposed facility may potentially be visible based on the best and newest data publicly available at the time the data was collected. VSS does not claim to depict all locations from where the facility may potentially be visible and calculated output should be confirmed via site testing as needed.



Proposed Facility:
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IVS Leaf Off - Imagery

IVSview® Color Legend



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- CT Open Space (State Land)

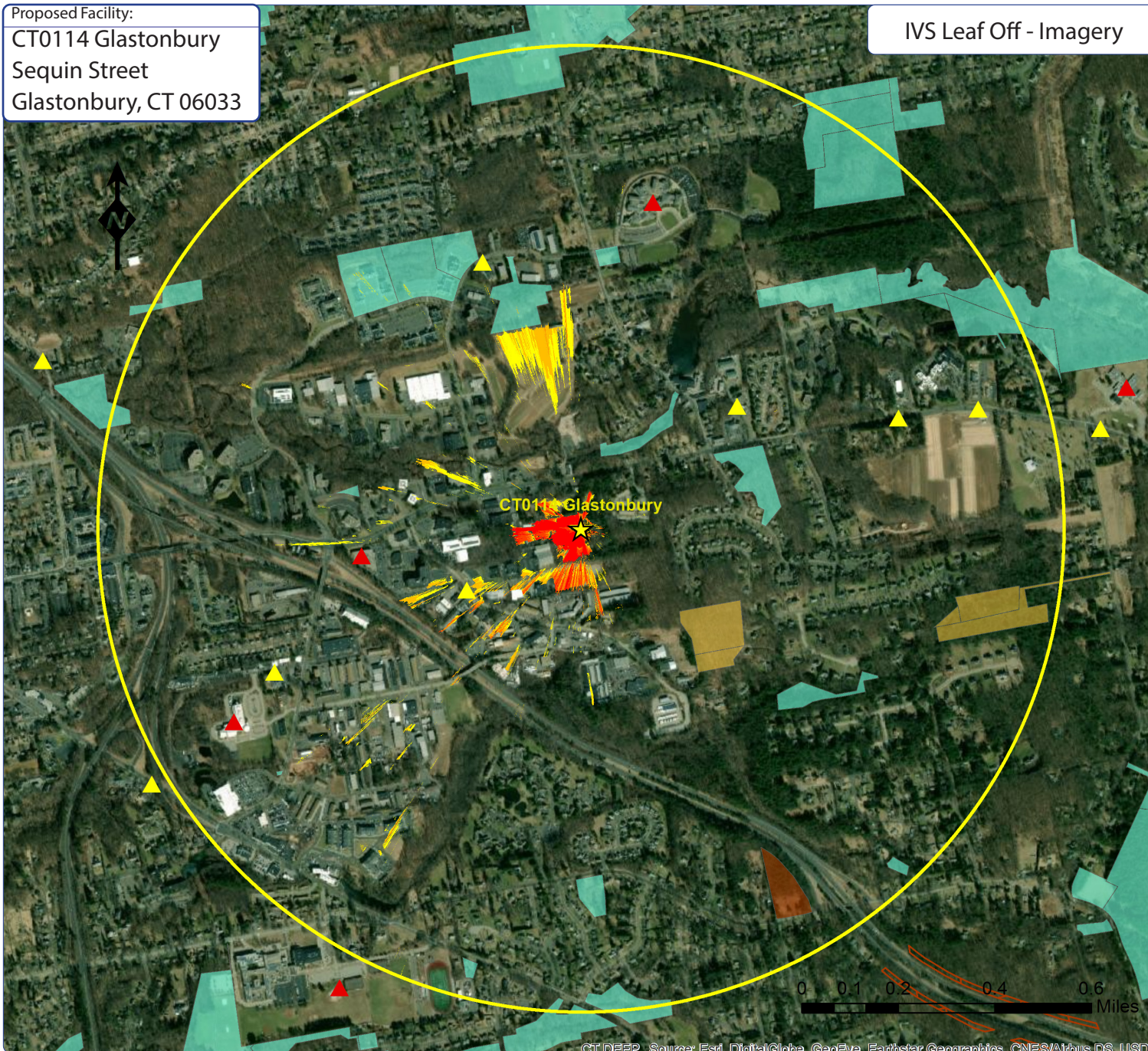
Tower Visibility			
Color	Location	% Vis	Acres
Yellow	Top 25%	0.56%	11.4
Orange	Top 50%	0.34%	6.8
Red-Orange	Top 75%	0.12%	2.3
Red	Top 100%	0.11%	2.2
Red	Base	0.21%	4.1
TOTAL		1.33%	26.8 Acres

Statistics:

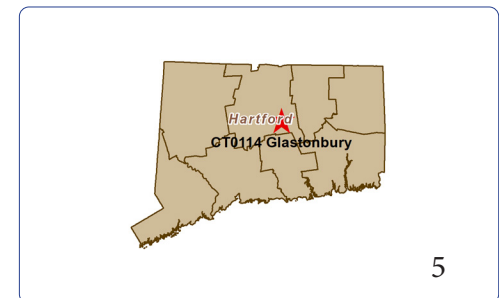
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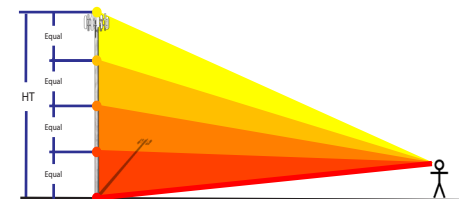
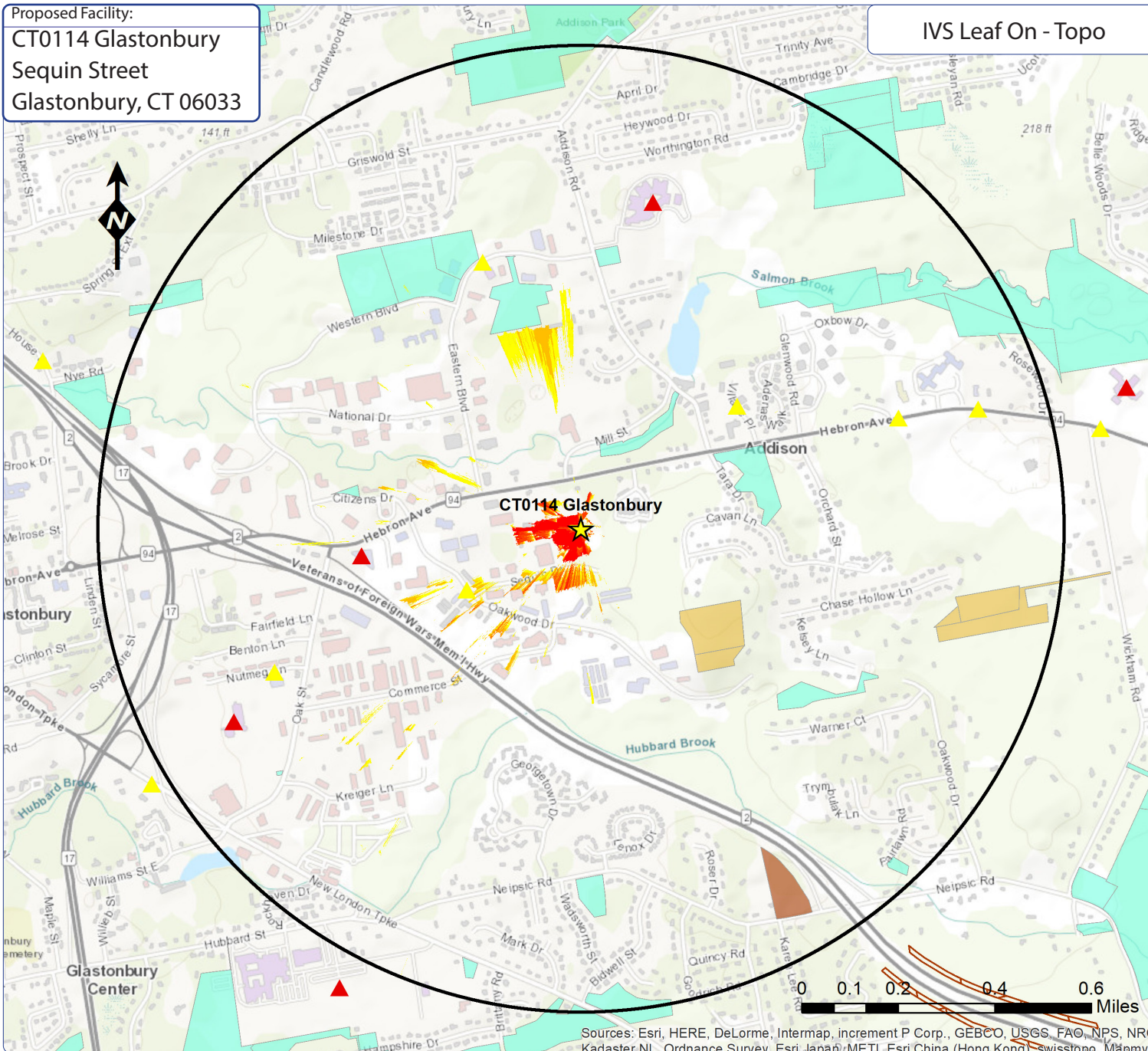
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Proposed Facility:
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IVS Leaf On - Topo

IVSview® Color Legend



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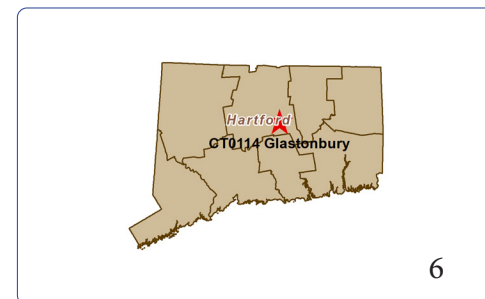
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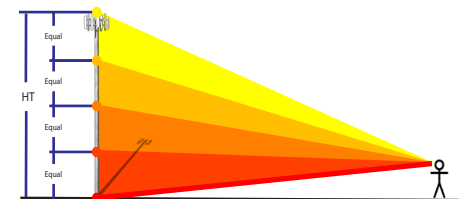
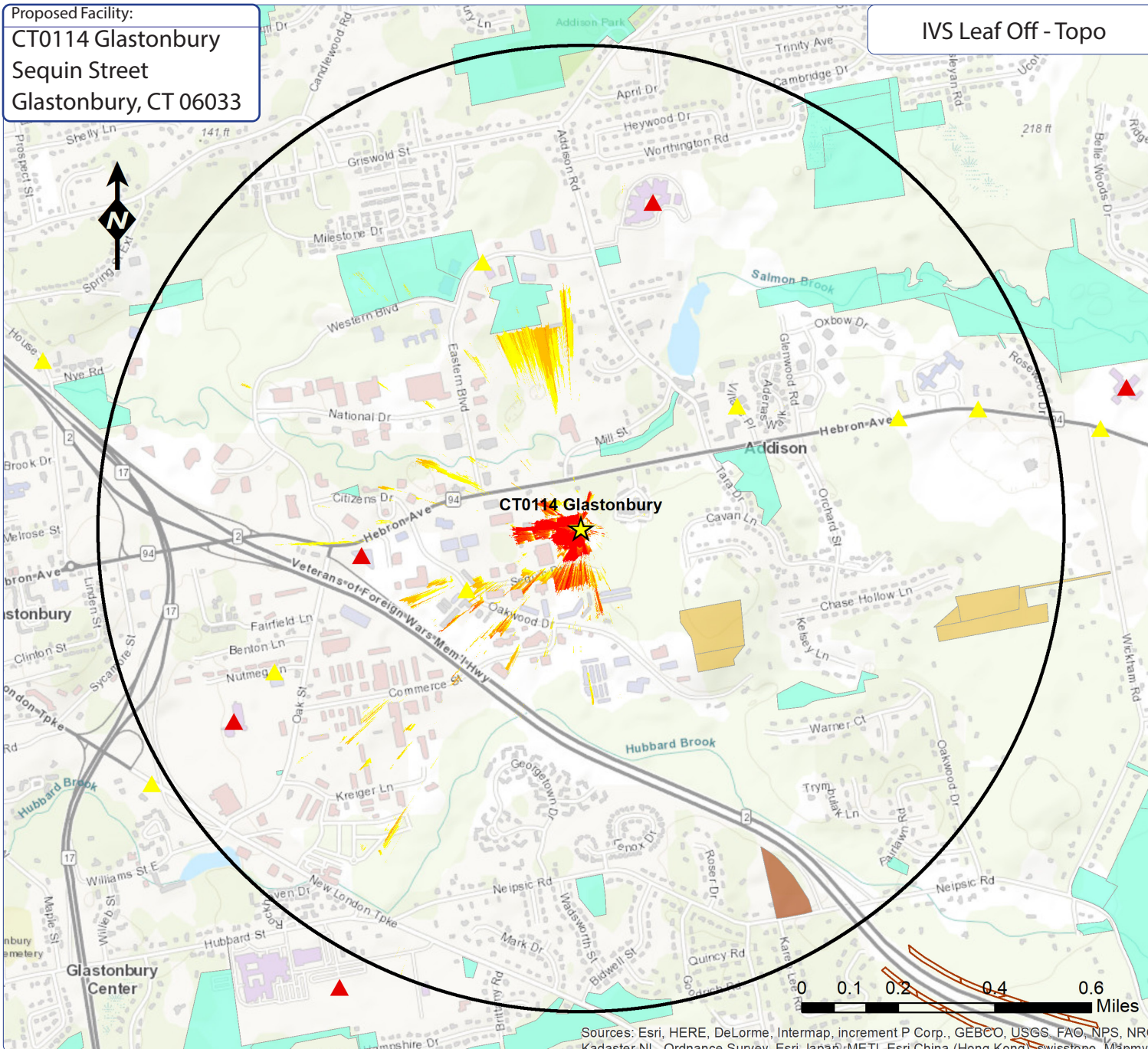


Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRC/Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, Mapbox

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IVS Leaf Off - Topo

IVSview® Color Legend



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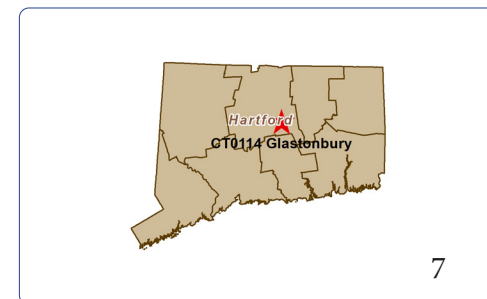
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