ATTACHMENT 8

ALL-POINTS TECHNOLOGY CORPORATION

VISIBILITY ANALYSIS

CT1345
EAST LYME RELO
351A BOSTON POST ROAD
EAST LYME, CONNECTICUT

Prepared for:

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Project Introduction

New Cingular Wireless PCS, LLC (d/b/a "AT&T") is pursuing a Certificate of Environmental Compatibility and Public Need from the Connecticut Siting Council ("Council") for the development of a new wireless communications facility ("Facility") at 351A Boston Post Road in East Lyme, Connecticut (the "Property"). At the request of AT&T, All-Points Technology Corporation, P.C. ("APT") prepared this Visibility Analysis to evaluate the potential visual impacts associated with the proposed Facility from within an approximate two-mile radius (the "Study Area").

Site Description and Setting

The Property consists of an approximately ±7.23-acre residentially developed and forested parcel. The area proposed for the Facility (the "Site") is located in the northeast corner of the Property in an area that is currently comprised of mature upland hardwood forest on a moderate southeast facing slope at an approximate ground elevation of 199 feet Above Mean Sea Level ("AMSL"). The proposed Facility would consist of a 194-foot tall monopole within a 60-foot by 100-foot gravel based, fence-enclosed equipment compound. AT&T would install an approximately 11-foot tall, 12-foot by 20-foot equipment shelter within the compound. Additional space is also available for other service providers' antennas and equipment.

Land use within the immediate vicinity of the Property is primarily residential. The topography within the Study Area is characterized generally by steep hills and river valleys; ground elevations range from approximately 10 feet AMSL to 350 feet AMSL. The tree cover within the Study Area (consisting of mixed deciduous hardwoods with interspersed stands of conifers) occupies approximately 6,653 acres of the 8,042-acre study area (±83%).

Methodology

APT used the combination of a predictive computer model and in-field analysis to evaluate the visibility associated with the proposed Facility on both a quantitative and qualitative basis. The predictive model provides a measurable assessment of potential visibility throughout the entire Study Area including private properties and other areas inaccessible for direct observations. The in-field analyses included a balloon float and reconnaissance of the Study Area to record existing conditions, verify results of the model, inventory visible and nonvisible locations, and provide photographic documentation from publicly accessible areas. A description of the procedures used in the analysis is provided below.

Preliminary Computer Modeling

Computer modeling tools were used to predict those areas where at least a portion of the Facility is estimated to be visible including TerrSet, an image analysis program developed by Clark Labs at Clark University. Project- and Study Area-specific data were incorporated into the computer model, including the site location, its ground elevation and the proposed Facility height, as well as the surrounding topography and existing vegetation, which are the primary features that can block direct lines of sight.

Information used in the model included lidar[1]-based digital elevation data and customized land use data layers developed specifically for this analysis. Lidar is a remote-sensing technology that develops elevation data in meters 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," or "building." The system is also designed to capture many more data points than older radar-based systems. Thus, lidar-based digital elevation models ("DEM"s) have a much finer resolution and can also identify the different features of the landscape at the time that it was captured.

Viewshed analysis using lidar data provide a much more detailed view of the potential obstacles (especially trees and buildings), and therefore the viewshed modeling produces results with many smaller areas of visibility than those produced by using radar-based DEMs. Its precision makes lidar a superior source of data, but at present it is only available for limited areas of the state. The viewshed results are also checked against the most current aerial photographs in case significant changes (a new housing development, for example) have occurred since the time the lidar data was captured.

The lidar-based DEM created for this analysis represents topographic information for the state of Connecticut that was derived through the spatial interpolation of airborne LiDAR-based data collected in the years 2007 through 2012 and has a horizontal resolution of approximately two (2) feet. In addition, multiple land use data layers were created from the Natural Resources Conservation Service (through the USDA) aerial photography (1-meter resolution, flown in 2012) using IDRISI image processing tools. The IDRISI tools develops light reflective classes defined by statistical analysis of individual pixels, which are then grouped based on common reflective values such that distinctions can be made automatically between deciduous and coniferous tree species, as well as grassland, impervious surface areas, surface water and other distinct land use features.

With these data inputs, the model is then queried to determine where the top of the Facility can be seen from any point(s) within the Study Area, given the intervening existing topography and vegetation. The results of the preliminary analysis are depicted on the attached maps and 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 5 feet above the ground and the combination of intervening

[1] Lidar (a word invented to mean "light radar") may also be referred to as LiDAR, an acronym for Light Detection and Ranging. It is a technology that utilized lasers to determine the distance to an object or surface. LiDAR is similar to radar, but incorporates laser pulses rather than sound waves. It measures the time delay between transmission and reflection of the laser pulse.

topography and tree canopy (year-round) and tree trunks (seasonally, when the leaves are off the deciduous trees). The shaded areas of predicted visibility shown on the map denote locations from within the Study Area which the proposed Facility may potentially be visible year-round (in yellow) above the tree canopy and/or seasonally, through the trees (during "leaf-off" conditions; depicted in orange). The Facility however may not necessarily be visible from all locations within those shaded areas. It is important to note that the computer model cannot account for mass density, the height, diameter and branching variability of the trees, or the degradation of views that occur with distance. In addition, each point – or pixel - represents about one square meter in area, and thus is not predicting visibility from all viewpoints through all possible obstacles. Although large portions of the predicted viewshed may theoretically offer visibility of the Facility, because of these unavoidable limitations the quality of those views may not be sufficient for the human eye to recognize the tower or discriminate it from other surrounding objects. Visibility also varies seasonally with increased, albeit obstructed, views occurring during "leaf-off" conditions. Beyond the density of woodlands found within the given Study Area, each individual tree has its own unique trunk, pole timber and branching pattern characteristics that provide varying degrees of screening in leafless conditions which cannot be precisely modeled.

Once the data layers were entered, image processing tools were applied and overlaid onto USGS topographic base maps and aerial photographs to achieve an estimate of locations where the Facility might be visible. Additional data was reviewed and incorporated into the visibility analysis, including protected private and public open space, parks, recreational facilities, hiking trails, schools, and historic districts. No trail systems are located within the Study Area. Based on a review of publicly-available information, no designated state scenic roads exist within the Study Area.

Field Reconnaissance

To supplement and fine tune the results of the computer modeling efforts, APT completed in-field verification activities consisting of a balloon float, vehicular and pedestrian reconnaissance, and photo-documentation.

Balloon Float and Field Reconnaissance

A balloon float and field reconnaissance were conducted June 30, 2015 to evaluate the visibility associated with the proposed Facility and to obtain photographs for use in this report. The balloon float consisted of raising an approximately 5.5-foot diameter, yellow helium-filled balloon tethered to a string height of 194 feet above ground level ("AGL") at the proposed Facility location. Weather conditions were favorable for the in-field activities, with calm winds (less than 5 miles per hour) and mostly sunny skies. Once the balloon was secured, APT conducted a Study Area reconnaissance by driving along the local and State roads and other publicly-accessible locations to document and inventory where the balloon could be seen above/through the tree canopy. 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 balloon float and field reconnaissance, APT drove the public roads within the Study Area and recorded observations, including photo-documentation, of those areas where the balloon was and was not visible. Photographs were obtained from several vantage points to document the views of a proposed

Facility. The geographic coordinates of the camera's position at each photo location were logged using global positioning system ("GPS") technology. Photographs were taken with a Canon EOS 6D digital camera body and Canon EF 24 to 105 millimeter ("mm") zoom lens, with the lens 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.*[2]*"*

Final Visibility Mapping

Information obtained during the field reconnaissance was incorporated into the mapping data layers, including observations of the balloon float, the photo locations, areas that experienced recent land use changes and those places where the initial model was found to over-predict visibility. Once the additional data was integrated into the model, APT re-calculated the visibility of the proposed Facility from within the Study Area to assist in producing the final viewshed map.

Photographic Simulations

Photographic simulations were generated to portray scaled renderings of the proposed Facility from representative locations where the proposed Facility would be visible on a year-round basis. Using field data, site plan information and 3-dimension (3D) modeling software, spatially referenced models of the site area 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[3].

For presentation purposes in this report, the photographs were taken with a 50 mm focal length and produced in an approximate 7-inch by 10.5-inch format. When viewing in this format size, we believe it is important to provide the largest representational image while maintaining an accurate relation of sizes between objects within the frame of the photograph.

Photo-documentation of the balloon float and photo-simulations of the proposed Facility are presented in the attachment at the end of this report. The balloon float photos provide visual reference points for the approximate height and location of the proposed Facility relative to the scene. The photo-simulations are intended to provide the reader with a general understanding of the different views that might be achieved of the Facility. It is important to consider that the publicly-accessible locations selected are typically representative of a "worst case" scenario. They were chosen to present unobstructed view lines (wherever possible), are static in nature and do not necessarily fairly characterize the prevailing views from all locations within a given area. From several locations, moving a few feet in any direction will result in a far different perspective of the Facility than what is presented in the photographs. In several cases, a view of the Facility may be limited to the immediate area of the specific photo location.

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[2] Warren, Bruce. Photography, West Publishing Company, Eagan, MN, c. 1993, (page 70).

[3] As a final step, the accuracy and scale of select simulations are tested against photographs of similar existing facilities with recorded camera position, focal length, photo location, and tower location.

Photograph Locations

The table below summarizes characteristics of the photographs and simulations presented in the attachment to this report including a description of each location, view orientation, the distance from where the photo was taken relative to the proposed Facility and the general characteristics of that view. The photo locations are depicted on the visibility analysis maps provided as attachments to this report.

View	Location	Orientation	Distance to Site	View Characteristics
1	East Lyme High School	Southwest	±1.47 Miles	Not Visible
2	Chesterfield Road	Southwest	±1.65 Miles	Year-round
3	Chesterfield Road	Southwest	±1.65 Miles	Year-round
4	Flanders Road	Northwest	±2.39 Miles	Year-round
5	Maplewood Drive	Northwest	±0.32 Mile	Year-round
6	MacKinnon Place at Morris Lane	Northwest	±0.36 Mile	Year-round
7	Parker Drive	Southwest	±0.65 Mile	Year-round
8	Boston Post Road	Southwest	±0.39 Mile	Year-round
9	Upper Pattagansett Road	Southwest	±1.07 Miles	Year-round
10	Island Campground and Cottages	Southwest	±0.69 Mile	Year-round

Visibility Analysis Results

Results of this analysis are graphically displayed on the viewshed maps provided in the attachment at the end of this report. Areas from where the proposed Facility would be visible above the tree canopy year-round comprise a total of approximately 144 acres. When the leaves are off the trees, seasonal views through intervening tree trunks and branches are anticipated to occur over some locations within an area of 851± additional acres.

In general, year-round views of portions of the Facility appear limited primarily to locations east of the Property. The majority of these views are a distance of 0.75 mile and beyond. At nearer locations (within 0.5± mile of the Site), large portions of the monopole may be visible from select areas with unobstructed views towards the Site. From most visible locations beyond 0.5 mile, views become limited to the upper portion of the Facility as it eclipses the tree canopy anywhere from 25 feet down to less than 10 feet. The Site's location on the east shoulder of Pond Hill assists in limiting views to the west, as the hills broad peak (topping out at 350+ feet ASML) effectively shields near-views on the opposite side. During the reconnaissance, the balloon could not be seen for any publicly-accessible areas to the west.

Seasonally, during leaf-off conditions, most views of the Facility are anticipated to be heavily obscured by intervening trees and branches.

The proposed Facility is designed to replace a similar structure located near the top of Pond Hill. Its overall visibility, in terms of acreage, is similar to the proposed Facility. By comparison, the existing tower is more visible westward and somewhat less visible to the east.

Proximity to Schools And Commercial Child Day Care Centers

No schools or commercial child day care centers are located within 250 feet of the Property. The nearest school, the Flanders School (167 Boston Post Road) is located approximately 1.65 mile to the east-northeast. The nearest commercial child day care center, the Kiddie Kampus Learning Center, is located at 245 Flanders Road, over two (2) miles to the east-southeast. No views of the Facility are anticipated from either of these locations.

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 5 feet above the ground and intervening topography and tree canopy. This analysis may not necessarily account for all visible locations, as it is based on the combination of computer modeling, incorporating 2012 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 simulations provide a representation of the Facility under similar settings as those encountered during the balloon floats 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 balloon float included partly cloudy skies and the photo-simulations presented in this report provide an accurate portrayal of the Facility during comparable conditions.

ATTACHMENTS

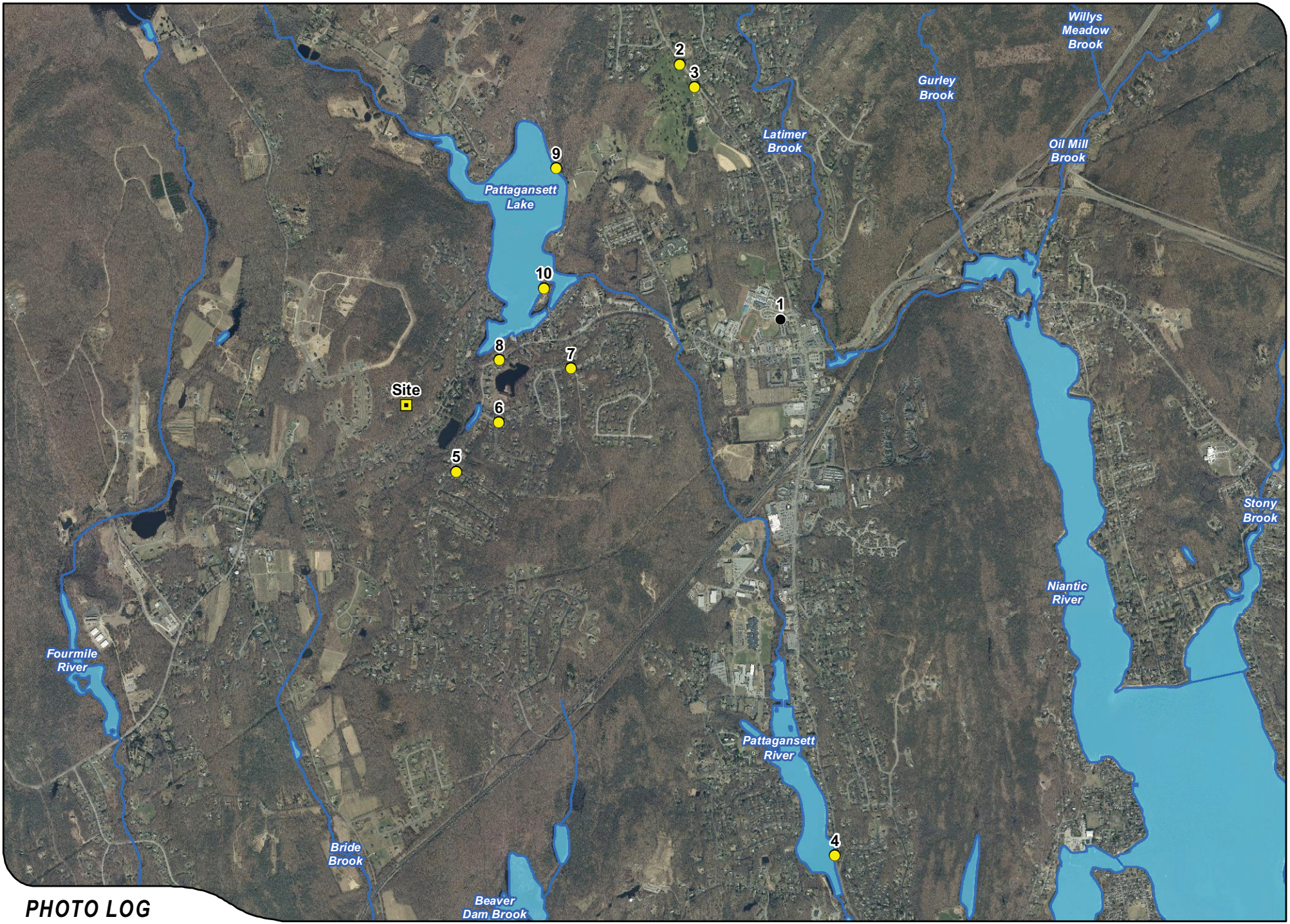

PHOTO LOG

Legend

Site | Year-Round Visibility | No Visible | Watercourse (CTDEEP) | Waterbody (CTDEEP)

N W E S

2,500 1,250 0 2,500 Feet

1 inch = 2,500 feet

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EXISTING

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
1	**EAST LYME HIGH SCHOOL**	**SOUTHWEST**	**+/- 1.47 MILES**	**NOT VISIBLE**

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EXISTING

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
2	**CHESTERFIELD ROAD**	**SOUTHWEST**	**+/- 1.65 MILES**	**YEAR ROUND**

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PROPOSED

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
2	**CHESTERFIELD ROAD**	**SOUTHWEST**	**+/- 1.65 MILES**	**YEAR ROUND**

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EXISTING

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
3	**CHESTERFIELD ROAD**	**SOUTHWEST**	**+/- 1.67 MILES**	**YEAR ROUND**

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PROPOSED

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
3	**CHESTERFIELD ROAD**	**SOUTHWEST**	**+/- 1.67 MILES**	**YEAR ROUND**

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EXISTING

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
4	**FLANDERS ROAD**	**NORTHWEST**	**+/- 2.39 MILES**	**YEAR ROUND**

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PROPOSED

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
4	**FLANDERS ROAD**	**NORTHWEST**	**+/- 2.39 MILES**	**YEAR ROUND**

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EXISTING

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
5	**MAPLEWOOD DRIVE**	**NORTHWEST**	**+/- 0.32 MILE**	**YEAR ROUND**

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PROPOSED

PHOTO	LOCATION	ORIENTATION	DISTANCE TO SITE	VISIBILITY
5	**MAPLEWOOD DRIVE**	**NORTHWEST**	**+/- 0.32 MILE**	**YEAR ROUND**

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