



AVIAN RESOURCES EVALUATION

Date: January 20, 2015

**Ms. Alexandria Carter
Verizon Wireless
99 East River Drive
East Hartford CT 06108**

APT Project No.: CT1412030

**Re: Proposed Plymouth West Relo. Facility
33 Keegan Road
Plymouth, Connecticut**

Cellco Partnership d/b/a Verizon Wireless (“Verizon”) proposes to construct a new wireless telecommunications Facility (“Facility”) at 33 Keegan Road in Plymouth, Connecticut (the “host Property”). The host Property consists of 12.4 acres and is currently an undeveloped wooded parcel. The area proposed for the wireless communications Facility is located at a local high point on a shallow to bedrock ‘nob’ in the general west-central portion of the host Property. Verizon proposes to install a 140-foot tall unguied monopine tower (total Facility height of 143 ft. A.G.L.) and ground equipment enclosure within a 50-foot by 50-foot gravel compound area surrounded by an 8-foot tall chain link fence. A 12-foot wide, approximately 3,211-foot long gravel access is proposed to be gained by traversing west through mature edge hardwood forest from Keegan Road.

The purpose of this evaluation is to document the proposed Facility’s proximity to avian resource areas and its compliance with recommended guidelines of the United States Fish and Wildlife Service for minimizing the potential for telecommunications towers to impact bird species.

All-Points Technology Corporation, P.C. (“APT”) reviewed several publicly-available sources of avian data for the state of Connecticut to provide the following information with respect to potential impacts on migratory birds associated with the proposed development. This desktop analysis and attached graphics identify avian resources and their proximities to the host Property. Information within an approximate 2-mile radius of the host Property is graphically depicted on the attached Avian Resources Map. Some of the avian data referenced herein are not located in proximity to the project area and are therefore not visible on the referenced map due to its scale. However, in those cases the distances separating the host Property from the resources are identified in the discussions below.

Proximity to Important Bird Areas

The National Audubon Society has identified 27 Important Bird Areas (“IBAs”) in the state of Connecticut. IBAs are sites that provide essential habitat for breeding, wintering, and/or migrating birds.

The IBA must support species of conservation concern, restricted-range species, species vulnerable due to concentration in one general habitat type or biome, or species vulnerable due to their occurrence at high densities as a result of their congregatory behavior¹. The closest IBA to the host Property is the White Memorial Foundation in Litchfield and Morris located approximately 6.6 miles to the northwest. White Memorial Foundation is home to The White Memorial Conservation Center, an environmental education center and nature museum located in the 4,000-acre wildlife sanctuary. Due to its distance from the site, this IBA would not experience an adverse impact resulting from the proposed development of the Facility.

Supporting Migratory Bird Data

Beyond Audubon's IBAs, the following analysis and attached graphics also identify several additional avian resources and their proximities to the host Property. Although these data sources may not represent habitat indicative of important bird areas, they may indicate possible bird concentrations² or migratory pathways.

Critical Habitat

Connecticut Critical Habitats depict the classification and distribution of 25 rare and specialized wildlife habitats in the state. It represents a compilation of ecological information collected over many years by state agencies, conservation organizations and individuals. Critical habitats range in size from areas less than one acre to areas that are tens of acres in extent. The Connecticut Critical Habitats information can serve to highlight ecologically significant areas and to target areas of species diversity for land conservation and protection but may not necessarily be indicative of habitat for bird species. The nearest Critical Habitat to the proposed Facility is a forested acidic rocky summit outcrop and scrub oak woodland located within the Mattatuck State Forest, approximately 2.42 miles to the southwest. Based on the distance separating this resource from the proposed Facility, no adverse impacts are anticipated.

Avian Survey Routes and Points

Breeding Bird Survey Route

The North American Breeding Bird Survey is a cooperative effort between various agencies and volunteer groups to monitor the status and trends of North American bird populations. Routes are randomly located to sample habitats that are representative of an entire region. Each year during the height of the avian breeding season (June for most of the United States) participants skilled in avian identification collect bird population data along roadside survey routes. Each survey route is approximately 24.5 miles long and contains 50 stops located at 0.5-mile intervals. At each stop, a three-minute count is conducted. During each count, every bird seen or heard within a 0.25-mile radius is recorded. The resulting data is used by conservation managers, scientists, and the general public to estimate population trends and relative abundances and to assess bird conservation priorities.

¹ http://web4.audubon.org/bird/iba/iba_intro.html

² "bird concentrations" is related to the USFWS *Interim Guidance on the Siting, Construction, Operation and Decommissioning of Communications Towers* (September 14, 2000) analysis provided at the end of this document

The nearest survey route to the host Property is the Warren Breeding Bird Survey Route (Route #18012) located approximately 6.17 miles to the northwest. This ±23-mile long bird survey route begins at the center of Warren and generally winds its way east through Litchfield and Morris before terminating just east of the Morris/Litchfield town line. Since bird survey routes represent randomly selected data collection areas, they do not necessarily represent a potential restriction to development projects, including the proposed Facility.

Hawk Watch Site

The Hawk Migration Association of North America (“HMANA”) is a membership-based organization committed to the conservation of raptors through the scientific study, enjoyment and appreciation of raptor migration. HMANA collects hawk count data from almost 200 affiliated raptor monitoring sites throughout the United States, Canada and Mexico, identified as “Hawk Watch Sites.” In Connecticut, Hawk Watch Sites are typically situated on prominent hills and mountains that tend to concentrate migrating raptors and may be an indicator of secondary migratory routes that connect to the Atlantic Flyway. The nearest Hawk Watch Site, Taft School, is located in Watertown, approximately 5.38 miles to the southwest of the proposed Facility. Based on the distance separating this possible raptor migratory route from the proposed Facility, no adverse impacts are anticipated.

Bald Eagle Site

Bald Eagle Sites consist of locations of midwinter Bald Eagle counts from 1986 to 2005 with an update provided in 2008. This survey was initiated in 1979 by the National Wildlife Federation. This database includes information on statewide, regional and national trends. Survey routes are included in the database only if they were surveyed consistently in at least four years and where at least four eagles were counted in a single year. The Naugatuck River (Bald Eagle) Survey Route #14 generally follows the course of the river and passes within approximately 1.7 miles west of the host Property.

Flyways

The project area is located in Litchfield County, approximately 18 miles north of Long Island Sound. The Connecticut coast lies within the Atlantic Flyway, one of four generally recognized regional primary migratory bird flyways (Mississippi, Central and Pacific being the others). This regional flyway is used by migratory birds travelling to and from summering and wintering grounds. The Atlantic Flyway is particularly important for many species of migratory waterfowl and shorebirds, and Connecticut’s coast serves as vital stopover habitat. Migratory land birds also stop along coastal habitats before making their way inland. Smaller inland migratory flyways (“secondary flyways”) are often concentrated along major riparian areas as birds use these valuable stopover habitats to rest and refuel as they make their way further inland to their preferred breeding habitats. The Connecticut Migratory Bird Stopover Habitat Project (Stokowski, 2002)³ identified potential flyways along the Housatonic, Naugatuck, Thames, and Connecticut Rivers. This study paralleled a similar earlier study conducted by the Silvio O. Conte

³ Stokowski, J.T. 2002. Migratory Bird Stopover Habitat Project Finishes First Year. Connecticut Wildlife, November/December 2002. P.4.

National Fish & Wildlife Refuge (Neotropical Migrant Bird Stopover Habitat Survey⁴), which consisted of collection of migratory bird data along the Connecticut River and the following major Connecticut River tributaries: Farmington, Hockanum, Scantic, Park, Mattabeset, Salmon, and Eight Mile Rivers. These major riparian corridors may provide secondary flyways as they likely offer more food and protection than more exposed upland sites, particularly during the spring migration⁵.

Of these potential flyways, the nearest to the host Property is the Naugatuck River, located approximately 1.7 miles to the west. The Todd Hollow Brook riparian corridor is located 0.25 miles east of the host Property. Although Todd Hollow Brook is not identified as a potential flyway, it potentially forms a secondary flyway as birds move from the Naugatuck River corridor during spring migration.

Siting of tower structures within flyways can be a concern, particularly for tall towers and even more particularly for tall towers with guy wires and lighting. The majority of studies on bird mortality due to towers focuses on very tall towers (greater than 1000 feet), illuminated with non-flashing lights, and guyed. These types of towers, particularly if sited in major migratory pathways, do result in significant bird mortality (Manville, 2005)⁶. The proposed Facility is not this type of tower, being an unlit, unguyed monopole structure only 97 feet in height. More recent studies of short communication towers (<300 feet) reveal that they rarely kill migratory birds⁷. Studies of mean flight altitude of migrating birds reveal flight altitudes of 410 meters (1350 feet), with flight altitudes on nights with bad weather between 200 and 300 meters above ground level (656 to 984 feet)⁸.

No adverse impacts to migrating bird species are anticipated with the Project, based on the design (unlit and unguyed) of the Facility, its relatively short (143 -foot) height, and the distances separating the host Property from both the Naugatuck River and Todd Hollow Brook potential flyway corridors.

Waterfowl Focus Areas

The Atlantic Coast Joint Venture (“ACJV”) is an affiliation of federal, state, regional and local partners working together to address bird conservation planning along the Atlantic Flyway. The ACJV has identified waterfowl focus areas recognizing the most important habitats for waterfowl along the Atlantic Flyway. Connecticut contains several of these waterfowl focus areas. The nearest waterfowl focus area to the host Property is the New Haven Harbor area, located approximately 18 miles to the southwest. Please refer to the attached Connecticut Waterfowl Focus Areas Map. Based on the distance of these resources to the project area, no direct impacts would occur from development of the proposed Facility.

⁴ The Silvio O. Conte National Fish & Wildlife Refuge Neotropical Migrant Bird Stopover Habitat Survey <http://www.science.smith.edu/stopoverbirds/index.html>

⁵ The Silvio O. Conte National Fish & Wildlife Refuge Neotropical Migrant Bird Stopover Habitat Survey. http://www.science.smith.edu/stopoverbirds/Chapter5_Conclusions&Recommendations.html

⁶ Manville, A.M. II. 2005. Bird strikes and electrocutions at power lines, communications towers, and wind turbines: state of the art and state of the science - next steps toward mitigation. Bird Conservation Implementation in the Americas: Proceedings 3rd International Partners in Flight Conference 2002. C.J. Ralph and T.D. Rich, editors. USDA Forest Service General Technical Report PSW-GTR-191. Pacific Southwest Research Station, Albany CA. pp. 1-51-1064.

⁷ Kerlinger, P. 2000. Avian Mortality at Communication Towers: A Review of Recent Literature, Research, and Methodology. Prepared for U.S. Fish and Wildlife Service Office of Migratory Bird Management.

⁸ Mabee, T.J., B.A. Cooper, J.H. Plissner, D.P. Young. 2006. Nocturnal bird migration over an Appalachian ridge at a proposed wind power project. Wildlife Society Bulletin 34:682-690.

CT DEEP Migratory Waterfowl Data

The Connecticut Department of Energy and Environmental Protection (“CT DEEP”) created a Geographic Information System (“GIS”) data layer in 1999 identifying concentration areas of migratory waterfowl at specific locations in Connecticut. The intent of this data layer is to assist in the identification of migratory waterfowl resource areas in the event of an oil spill or other condition that might be a threat to waterfowl species. This data layer identifies conditions at a particular point in time and has not been updated since 1999.

No migratory waterfowl areas are located within the Town of Plymouth. The nearest migratory waterfowl area (Bantam Lake, Litchfield-Morris) is located approximately 8.9 miles to the northwest of the proposed Facility. The associated species are identified as bufflehead, Canada geese, mallard duck, green wing teal, and wood duck. Based on its distance to the site, no impacts to migratory waterfowl habitat are anticipated to result from development of the proposed Facility.

CT DEEP Natural Diversity Data Base

CT DEEP’s Natural Diversity Data Base (“NDDB”) program performs hundreds of environmental reviews each year to determine the impact of proposed development projects on state listed species and to help landowners conserve the state’s biodiversity. State agencies are required to ensure that any activity authorized, funded or performed by a state agency does not threaten the continued existence of endangered or threatened species. Maps have been developed to serve as a pre-screening tool to help applicants determine if there is a potential impact to state listed species.

The NDDB maps represent approximate locations of endangered, threatened and special concern species and significant natural communities in Connecticut. The locations of species and natural communities depicted on the maps are based on data collected over the years by CT DEEP staff, scientists, conservation groups, and landowners. In some cases an occurrence represents a location derived from literature, museum records and/or specimens. These data are compiled and maintained in the NDDB. The general locations of species and communities are symbolized as shaded areas on the maps. Exact locations have been masked to protect sensitive species from collection and disturbance and to protect landowner’s rights whenever species occur on private property.

According to the available NDDB maps, the proposed Project is not located within any shaded NDDB areas. The nearest buffered shaded area is located approximately 500 feet to the south and appears to be associated with Todd Hollow Brook. APT is currently in consultation with the CT DEEP NDDB with respect to this project to confirm that no known populations of federal or state Endangered or Threatened species, or Species of Special Concern occur on the host Property. At the time of this report, the CT DEEP had not responded.

USFWS Communications Towers Compliance

In 2013, the U.S Fish and Wildlife Service (“USFWS”) prepared its *Revised Voluntary Guidelines for Communication Tower Design, Siting, Construction, Operation, Retrofitting, and Decommissioning*⁹, which recommends the 13 voluntary guidelines below. These voluntary guidelines are designed to assist tower companies in developing their communication systems in a way which minimizes the risk to migratory birds and threatened and endangered species. APT offers the following responses to each of the USFWS recommendations which are abridged from the original document.

1. *Collocation of the communications equipment on an existing communication tower or other structure (e.g., billboard, water and transmission tower, distribution pole, or building mount) is strongly recommended. Depending on tower load factors and communication needs, from 6 to 10 providers should collocate on an existing tower or structure.*

Collocation opportunities on existing towers, buildings or non-tower structures are not available in the area while achieving the required radio frequency (“RF”) coverage objectives of Verizon.

2. *If collocation is not feasible and a new tower or towers are to be constructed, it is strongly recommended that the new tower(s) should be not more than 199 feet above ground level (“AGL”), and that construction techniques should not require wires. Such towers should be unlighted if Federal Administration (“FAA”) regulations and lighting standards permit. If lighting is required, no red-steady lights should be used. USFWS considers towers that are unlit, unguyed, monopole or lattice, and less than 200 feet AGL to be the environmentally preferred “gold standard”.*

The proposed Facility would consist of a 143-foot tall monopole structure which requires neither guy wires nor lighting and is therefore consistent with USFWS’ environmentally preferred “gold standard”.

3. *If constructing multiple towers, the cumulative impacts of all the towers to migratory birds – especially to Birds of Conservation Concern¹⁰ and threatened and endangered species, as well as the impacts of each individual tower, should be considered during development of a project.*

Multiple towers are not proposed as part of this project.

4. *The topography of the proposed tower site and surrounding habitat should be clearly noted, especially in regard to surrounding hills, mountains, mountain passes, ridge lines, rivers, lakes, wetlands, and other habitat types used by raptors, Birds of Conservation Concern, and state and federally listed species, and other birds of concern. Active raptor nests, especially those of Bald Eagles, should be noted, including known or suspected distances from proposed tower sites to nest locations.*

⁹ Manville, A.M., Ph.D., C.W.B. Suggestions Based on Previous USFWS Recommendations to FCC Regarding WT Docket No. 03-187, FCC 06-164, Notice of Proposed Rulemaking, “Effects of Communication Towers on Migratory Birds” (2007), Docket No. 08-61, FCC’s Antenna Structure Registration Program (2011), Service 2012 Wind Energy Guidelines, and Service 2013 Eagle Conservation Plan Guidance. September 27, 2013.

¹⁰ U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, VA. 85 pp. <http://www.fws.gov/migratorybirds/>

The topography of the proposed tower site and surrounding habitat is provided in the attached Avian Resources Map. No Bald Eagle nests, foraging areas or roost sites are known to be located at or within close proximity to the proposed tower site.¹¹ A Bald Eagle survey route associated with the Naugatuck River, which likely provides foraging and roosting habitat and potential nesting habitat, is located approximately 1.7 miles west of the proposed Facility site.

- If at all possible, new towers should be sited within existing “antenna farms” (i.e., clusters of towers), in degraded areas (e.g., strip mines or other heavily industrialized areas), in commercial agricultural lands, in Superfund sites, or other areas where bird habitat is poor or marginal. Towers should not be sited in or near wetlands, or other known bird concentration areas (e.g., state or Federal refuges, staging areas, rookeries, and Important Bird Areas), in known migratory or daily movement flyways, areas of breeding concentration, in habitat of threatened or endangered species, or key habitats for Birds of Conservation Concern. Additionally, towers should not be sited in areas with a high incidence of fog, mist, and low ceilings.*

There are no existing “antenna farms”, degraded or commercial areas in the vicinity of the proposed tower site that would satisfy the RF coverage objectives. The proposed Facility is not within wetlands, known bird concentration area, migratory or daily movement flyway, threatened/endangered species habitat or key habitats for Birds of Conservation Concern. According to the available NDDDB maps, the proposed Project is not located within any shaded NDDDB areas. APT is consulting with the CT DEEP NDDDB with respect to this project to confirm that no known populations of federal or state Endangered or Threatened species or Special Concern Species occur on the host Property. The CT DEEP has not provided confirmation as of this time.

In Connecticut, seasonal atmospheric conditions can occasionally produce fog, mist and/or low ceilings. However, high incidences of these meteorological conditions, relative to the region, are not known to exist in the vicinity of the host Property.

- If taller (>199 feet AGL) towers requiring lights for aviation safety must be constructed, the minimum amount of pilot warning and obstruction avoidance lighting required by the FAA should be used. The use of solid (non-flashing) warning lights at night should be avoided to minimize bird fatalities.*

The proposed Facility height (143 feet AGL) is less than 199 feet and would not require any aviation safety lighting.

- Tower designs using guy wires for support, which are proposed to be located in known raptor or waterbird concentration areas, daily movement routes, major diurnal migratory bird movement routes, staging areas, or stopover sites, should have daytime visual markers or bird deterrent devices installed on the wires to prevent collisions by these diurnally moving species.*

The proposed Facility would be free-standing and would not require guy wires or visual marking.

¹¹ U.S. Fish and Wildlife Service. 2007. National Bald Eagle Management Guidelines. United States Department of Interior, Fish and Wildlife Service, 23 pp. <http://www.fws.gov/southdakotafieldoffice/NationalBaldEagleManagementGuidelines.pdf>

8. *Towers and appendant facilities should be sited, designed and constructed so as to avoid or minimize habitat loss within and adjacent to the tower "footprint." However, a larger tower footprint is preferable to the use of guy wires in construction. Road access and fencing should be minimized to reduce or prevent habitat fragmentation, disturbance, and the creation of barriers, and to reduce above ground obstacles to birds in flight.*

The proposed Facility is sited, designed, and would be constructed to accommodate proposed equipment and to allow for future collocations within the smallest footprint possible. The site is located proximate to existing developed parcels and therefore would not result in habitat fragmentation or the creation of barriers or excessive disturbance.

9. *If, prior to tower design, siting and construction, it has been determined that a significant number of breeding, feeding, or roosting birds, especially of Birds of Conservation Concern, state or federally-listed bird species, and eagles are known to habitually use the proposed tower construction area, relocation to an alternate site is highly recommended. If this is not an option, seasonal; restrictions on construction may be advisable in order to avoid disturbance, site and nest abandonment, especially during breeding, rearing and other periods of high bird activity.*

Significant numbers of breeding, feeding, or roosting Birds of Conservation Concern, state or federally-listed birds species, or eagles are not known to habitually use the proposed tower construction areas at the host Property.

10. *Security lighting for on-ground facilities, equipment and infrastructure should be motion- or heat-sensitive, down-shielded, and of a minimum intensity to reduce nighttime bird attraction and eliminate constant nighttime illumination, but still allow for safe nighttime access to the site.¹²¹³*

Security lighting for on-ground facilities would be down-shielded using Dark Sky compliant fixtures set on motion sensor with timer to eliminate constant nighttime illumination.

11. *Representatives from the USFWS or researchers from the Research Subcommittee of the Communication Tower Working Group ("CTWG") should be allowed access to the site to evaluate bird use; conduct dead-bird searches; place above ground net catchments below the towers; and to perform studies using radar, Global Positioning System, infrared, thermal imagery, and acoustical monitoring equipment, as necessary to assess and verify bird movements and to gain information on the impacts of various tower sizes, configurations, and lighting systems.*

With prior written notification to and approval by Verizon, USFWS or CTWG research personnel would be allowed access to the proposed Facility to conduct evaluations.

¹² Manville, A.M., II. 2011. Comments of the U.S. Fish and Wildlife Service's Division of Migratory Bird Management Filed Electronically on WT Docket No. 08-61 and WT Docket No. 03-187, Regarding the Environmental Effects of the Federal Communication's Antenna Structure Registration Program. January 14, 2011. 12 pp.

¹³ U.S. Fish and Wildlife Service. 2012. U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines. March, 82 pp.

12. *Towers no longer in use, not re-licensed by the FCC for use, or determined to be obsolete should be removed within 12 months of cessation of use.*

If the proposed Facility was no longer in use, not re-licensed by the FCC for use, or determined to be obsolete, it would be removed within 12 months of cessation of use.

13. *In order to obtain information on the usefulness of these guidelines in preventing bird strikes and better understanding impacts from habitat fragmentation, please advise USFWS personnel of the final location and specifications of the proposed tower, and which measures recommended in these guidelines were implemented.*

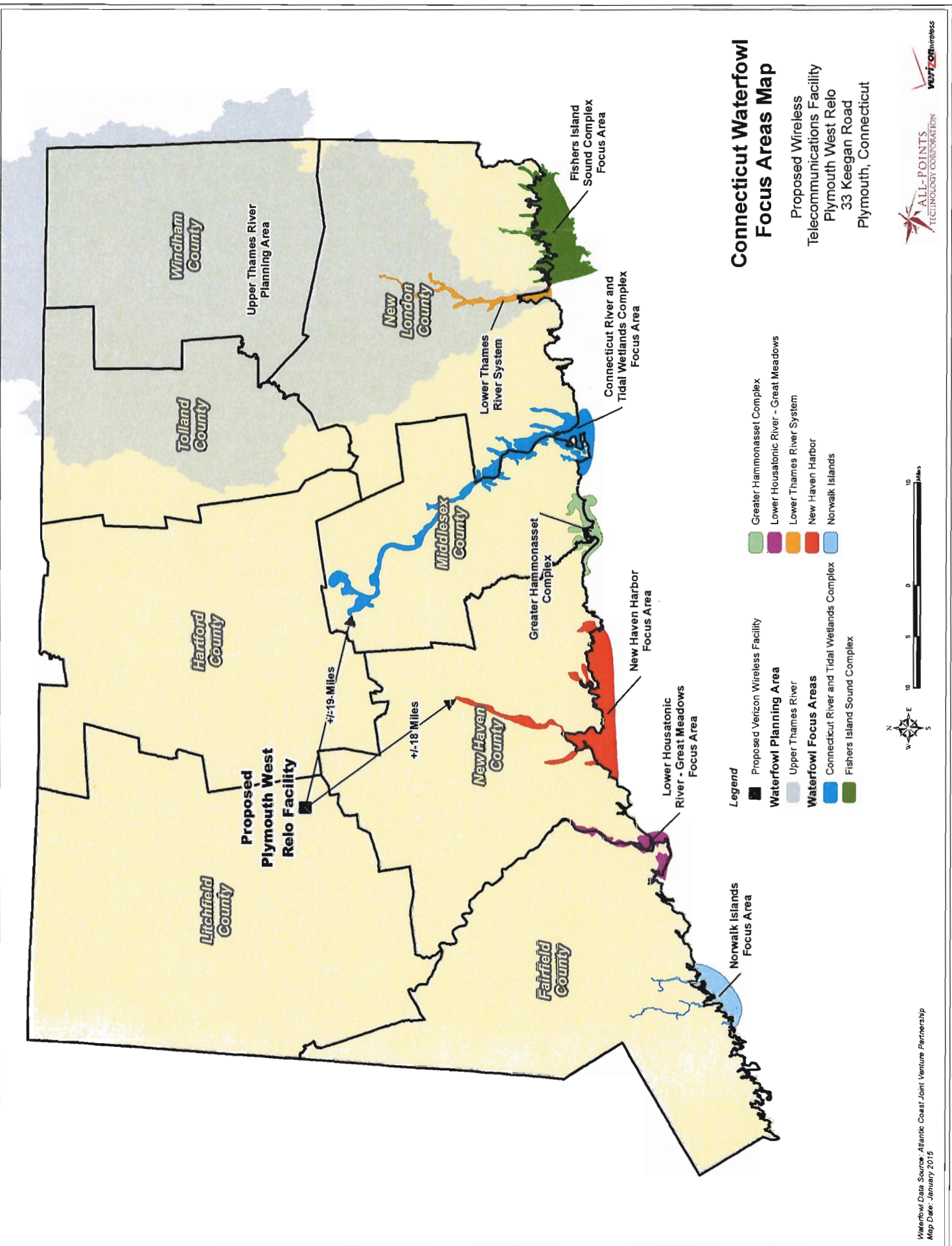
The location and specification of the proposed tower have been provided in this report and accompanying maps. A detailed review of implemented measures recommended in the *Revised Voluntary Guidance for Communication Tower Design, Siting, Construction, Operation, Retrofitting, and Decommissioning* (September 27, 2013) are provided herein. The proposed Facility is not proximate to an Important Bird Area and would comply with the USFWS guidelines for minimizing the potential impacts to birds being an unlit, unguyed monopole structure only 143 feet in height. APT recommends that a copy of this report be submitted to USFWS if the proposed Facility is constructed. Should the final location and specification of the proposed Facility be modified as part of the siting process, this report will be updated accordingly.

Summary and Conclusions

Based on the results of this desk-top evaluation, no migratory bird species are anticipated to be impacted by Verizon's proposed development. The proposed Facility is not proximate to an Important Bird Area and would comply with the USFWS guidelines for minimizing the potential impacts to birds.

Figures

- Avian Resources Map
- Connecticut Waterfowl Focus Areas Map



Connecticut Waterfowl Focus Areas Map

Proposed Wireless
Telecommunications Facility
Plymouth West Relo
33 Keegan Road
Plymouth, Connecticut

- Legend**
- Proposed Verizon Wireless Facility
 - Greater Hammonasset Complex
 - Lower Housatonic River - Great Meadows
 - Lower Thames River System
 - New Haven Harbor
 - Norwalk Islands
 - Upper Thames River
 - Connecticut River and Tidal Wetlands Complex
 - Fishers Island Sound Complex
- Waterfowl Planning Area**
- Upper Thames River
- Waterfowl Focus Areas**
- Connecticut River and Tidal Wetlands Complex
 - Fishers Island Sound Complex

