AGENDA

City of Sedona
Planning and Zoning Commission Meeting

5:30 PM | **Tuesday, August 1, 2017**

NOTICE:
Pursuant to A.R.S. 38-431.02 notice is hereby given to the members of the Planning and Zoning Commission and to the general public that the Planning and Zoning Commission will hold a public hearing open to the public on Tuesday, August 1, 2017 at 5:30 pm in the City Hall Council Chambers.

NOTES:

- Meeting room is wheelchair accessible. American Disabilities Act (ADA) accommodations are available upon request. Please phone 928-282-3113 at least 24 hours in advance.
- Planning & Zoning Commission Meeting Agenda Packets are available on the City's website at: www.SedonaAZ.gov/planning

GUIDELINES FOR PUBLIC COMMENT

PURPOSE:

- To allow the public to provide input to the Planning and Zoning Commission on a particular subject scheduled on the agenda.
- Please note that this is not a question/answer session.

PROCEDURES:

- Fill out a "Comment Card" and deliver it to the Recording Secretary.
- When recognized, use the podium/microphone.
- State your Name and City of Residence
- Limit comments to 3 MINUTES.
- Submit written comments to the Recording Secretary.

1. CALL TO ORDER, PLEDGE OF ALLEGIANCE, & ROLL CALL
2. ANNOUNCEMENTS & SUMMARY OF CURRENT EVENTS BY COMMISSIONERS & STAFF
3. PUBLIC FORUM: *(This is the time for the public to comment on matters not listed on the agenda. The Commission may not discuss items that are not specifically identified on the agenda. Therefore, pursuant to A.R.S. § 38-431.01(H), action taken as a result of public comment will be limited to directing staff to study the matter, responding to any criticism, or scheduling the matter for further consideration and decision at a later date.)*

Scan with your mobile device to access meeting documents online

4. CONSIDERATION OF THE FOLLOWING ITEMS THROUGH PUBLIC HEARING PROCEDURES (CONTINUED FROM JUNE 1, 2017 PUBLIC HEARING):
   a. Discussion/possible action regarding a recommendation to the Sedona City Council regarding amendments to the Sedona Wireless Communications Facilities Ordinance, Sedona Land Development Code, Article 17, Wireless Communications Facilities, to be consistent with changes in federal regulations. PZ17-00005 (LDC) Applicant: City of Sedona
   b. Discussion/possible action regarding a recommendation to the Sedona City Council regarding the draft Sedona Wireless Communications Master Plan. PZ17-00006 (MP) Applicant: City of Sedona
5. FUTURE MEETING DATES AND AGENDA ITEMS
   a. Thursday, August 10, 2017; 3:30 pm (Work Session/Site Visit)
   b. Tuesday, August 15, 2017; 3:30 pm (Public Hearing)
   c. Thursday, August 31, 2017; 3:30 pm (Work Session)
   d. Tuesday, September 5, 2017; 5:30 pm (Public Hearing)
6. EXECUTIVE SESSION

   If an Executive Session is necessary, it will be held in the Vultee Conference Room at 106 Roadrunner Drive. Upon a public majority vote of the members constituting a quorum, the Planning and Zoning Commission may hold an Executive Session that is not open to the public for the following purposes:

   a. To consult with legal counsel for advice on matters listed on this agenda per A.R.S. § 38-431.03(A)(3).
   b. Return to open session. Discussion/possible action on executive session items.
7. ADJOURNMENT

Physical Posting: July 27, 2017 By: DJ

Planning & Zoning Commission Meeting Agenda Packets are available on the City's website at: www.SedonaAZ.gov/planning or in the Community Development Office, 102 Roadrunner Drive approximately one week in advance of the meeting.

Note that members of the City Council and other City Commissions and Committees may attend the Planning and Zoning Commission meeting. While this is not an official City Council meeting, because of the potential that four or more Council members may be present at one time, public notice is therefore given for this meeting and/or event.

Staff Report

PZ17-00005 (LDC) Article 17, Wireless Communications
PZ17-00006 (MP) Wireless Master Plan
Summary Sheet

Community Development Department
102 Roadrunner Drive Sedona, AZ 86336
(928) 282-1154 · Fax: (928) 204-7124

Meeting Date:	**Work Session:** May 18, 2017 **Public Hearing:** June 1, 2017 ***Continued Public Hearing:*** *August 1, 2017*
Hearing Body:	**Planning and Zoning Commission**
Action Requested:	Recommend Approval to the City Council of Amendments to Sedona Land Development Code, Article 17, Wireless Communications Facilities and approval of the proposed Wireless Master Plan
Staff Recommendation:	Recommend Approval to the City Council of Amendments to Sedona Land Development Code, Article 17, Wireless Communications Facilities and the proposed Wireless Master Plan
Applicant:	City of Sedona
Project Summary:	Amendments to Sedona Land Development Code Article 17, Wireless Communications, to be consistent with changes in Federal regulations, and approval of a Wireless Communication Master Plan
Report Prepared By:	Karen Osburn, Assistant City Manager Audree Juhlin, Director Cari Meyer, Senior Planner

Attachments:

1. Sedona Land Development Code, Article 17, Draft amendments*, Updated July 3, 2017*
2. Wireless Master Plan, Draft
3. Public Comments*, Updated July 25, 2017*
4. *Maps of Properties in the Wireless Master Plan showing Residential/Non Residential Properties and Vacant Properties*
5. *Planning and Zoning Commission Minutes, June 1, 2017*

Community Development Department
102 Roadrunner Drive Sedona, AZ 86336
(928) 282-1154 · Fax: (928) 204-7124

The Planning and Zoning Commission held a work session on these items on May 18, 2017, and a public hearing on June 1, 2017. At the June 1, 2017, public hearing, the Commission voted to continue the public hearing to a future date. The August 1, 2017, public hearing with the Commission will be a continuation of the June 1, 2017, public hearing.

The materials provided here are identical to the materials provided for the June 1, 2017, public hearing, with the following exceptions:

1. *Attachment 1: Sedona Land Development Code, Article 17, Draft Amendments has been updated by the City's consultants. The version included with the packet is a "tracked changes" version to highlight where changes were made.*
2. *Attachment 3: Public Comments have been updated to include all public comments received as of July 25, 2017.*
3. *Attachment 4: This is a new attachment that includes a map of each of the properties listed in the proposed Master Plan, showing the properties within 300 feet and indicating whether they are residential, non-residential, and/or vacant. This was requested by the Commission at the June 1, 2017, public hearing.*
4. *Attachment 5: Minutes from the June 1, 2017, public hearing, including a summary of the Commission's discussion and the public comment received during that meeting.*

BACKGROUND

Recognizing that wireless connectivity is a City Council priority and is becoming a more essential need for residents, businesses, and visitors, than it has been in the past, the City contracted with CityScape Consultants, Inc., a professional firm with telecommunication expertise to assist in the development of a wireless master plan and with drafting amendments to Article 17, Wireless Communications, of the Sedona Land Development Code. On July 13, 2016, the City Council and the Planning and Zoning Commission held a joint meeting to discuss background information, initial research, and data relative to existing towers and wireless telecommunication antenna locations in Sedona. On September 14, 2016 another joint meeting was held to review propagation mapping done by CityScape, explore possible public land use solutions and solicit input on initial policy revisions so that CityScape staff would have the initial input necessary to complete the draft Article 17 revisions and the draft Master Plan.

Federal Legislation and Applicable Regulations

The following is a summary of federal legislation and applicable regulations for wireless facilities and infrastructure. These regulations provide the framework parameters for the City's regulations.

1. 47 USC Section 332 (c)(7), also known as Section 704 of the Telecommunications Act of 1996.
   i) Preserves local zoning authority but requires local government to regulate in a manner that does not:
      (1) unreasonably discriminate among providers of functionally equivalent services, and;

(2) prohibit, or have the effect of prohibiting, the provision of personal wireless services. Further, it requires local government to make written decisions on siting applications that are based on substantial evidence and not on speculation or because of federally preempted reasons, such as concerns about Radio Frequency (RF) radiation.

ii) Requires the following of local governments:
   (1) must allow for the carriers to deploy their systems
   (2) must act expeditiously in these requests
   (3) must treat providers equally by providing equal access to functionally equivalent services (cellular/PCS/data)
   (4) may not supersede or undermine areas of federal jurisdiction

iii) Enables Federal government to use Federal property, rights-of-way and easements for leasing for new telecommunication infrastructure

iv) Local governments are limited in regulating the following:
   (1) Requirements for tower lighting and markings (exclusively regulated by the FAA and FCC)
      (a) Local government may be able to require support structures to be lighted as long as they comply with FAA codes.

v) Local governemnts cannot regulate the following:
   (1) Radio Frequency (RF) emissions (exclusively regulated by federal standards)
      (a) Ionizing radiation
      (b) Non-ionizing radiation
      (c) World health organization and American Cancer Society findings
         (i) RF exposure is so low that human and animal health is not affected

2. FCC 2009 Declaratory ruling, “Shot Clock”
   i) Requires local government to make decisions on wireless applications within a specific timeframe from the date application is received:
      (1) 90 days for collocation applications
      (2) 150 days for new structures/towers
3. Congress 2012 Middle Class Tax Relief and Job Creation Act included a small paragraph in Section 6409 providing:
   i) In General. Notwithstanding Section 704 of the Telecommunications Act of 1996 (Public Law 104-104) or any other provision of law, a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station.
   ii) Eligible facilities request means any request for modification of any existing wireless tower or base station that involves –
      (1) collocation of new transmission equipment
      (2) removal of transmission equipment, or
      (3) replacement of transmission equipment

iii) Applicability of environmental laws. Nothing in paragraph (1) shall be construed to relieve the Commission from the requirements of the National Historic Preservation Act or the National Environmental Policy Act of 1969.

(1) Congress said requirements only applied to the collocation, removal or replacement of existing equipment that did not "Substantially change" the physical dimensions of such tower or base station – however, Congress did not define "substantially change"

4. FCC, January 2013 "Guidance. FCC's Wireless Telecommunication Bureau issued "informal guidance" on Section 6409 on January 25, 2013:

   i) Adopts a prior FCC definition of "substantial increase in the size of the tower" (referencing Appendix B to Part I of the National Programmatic Agreement for the Collocation of Wireless Antennas) for "substantially change" as what it thinks Congress intended to define.

   ii) Acknowledges that local government can still require land use/site applications, but must approve request that meet the criteria of Section 6409.

   iii) Appendix B to Part I of the National Programmatic Agreement for the Collocation of Wireless Antennas defines "substantial increase to the size of a tower" as:

   (1) Addition of antenna on a tower that would increase its height by the greater of 10% or 20 vertical feet, or

   (2) Addition of antenna that requires installation of more than standard number of equipment cabinets (not to exceed 4) or more than 1 new equipment shelter, or

   (3) Addition of antenna that would increase the girth (width) of the tower by more than 20 feet, or

   (4) Addition of the antenna would involve excavating around the tower site beyond the existing boundaries of the property associated with the facility.

5. United States Supreme Court June 2013 "Shot Clock Challenge. San Antonio and Arlington, Texas, challenged FCC's authority to impose shot clock timelines on local government. In June 2013, the US Supreme Court decided that the FCC had the authority to impose shot clock timelines on local governments (applicable where states have not imposed their own timelines).

6. FCC Wireless Infrastructure Report and Order. On September 26, 2013, the FCC issued a Notice of Proposed Rulemaking ("NPRM") for "Improving Wireless Siting Facility Policies". Through this Notice the FCC sought comment from all stakeholders (industry, public, local and state government) on a variety of siting issues and local regulation of the same. Hundreds of comments and responses were filed through June 2014 by various parties.

   On October 21, 2014, effective in its entirety on May 18, 2015, the FCC Wireless Infrastructure Report and Order was issued. This document:

   i) Streamlined federal rules on environmental review processing for towers and exempted temporary towers from environmental review processes

   ii) Re-defined substantial change and a host of other terms used in Section 6409

   iii) Clarified provisions of Section 704 and Shot Clock and definitions of terms used in connection with these rules

   iv) Provided remedies for failure to meet either Section 6409 requirements of Section 704 Shot Clock requirements

   v) Definitions and clarification of Federal law:

(1) Section 6409 – local governments shall approve and may not deny an eligible facilities request for collocation if there is not a "substantial change" in an existing "tower or base station"

(2) Base station is a structure or equipment at a fixed location that enables Commission-licensed or authorized wireless communications between user equipment and a communications network. The term does not encompass a tower as defined in this subpart or any equipment associated with a tower…the term includes any structure other than a tower that, at the time the relevant application is filed with the State or local government under this section, supports or houses equipment …that has been reviewed and approved under the applicable zoning or siting process, or under another State or local regulatory review process, even if the structure was not built for the sole or primary purpose of providing such support.

(3) Eligible facilities request is one that requests modification of an existing wireless tower or base station that involves (a) colocation of new transmission equipment; (b) removal of transmission equipment; (c) replacement of transmission equipment.

(4) Eligible support structure is any tower or base station as defined in this section, provided it is existing at the time the relevant application filed with the State or local government under this section.

(5) Tower is any structure built for the sole or primary purpose of support any Commission-licensed or authorized antennas and their associate facilities, including structures that are constructed for wireless communications services including, but not limited to, private, broadcast and public safety services, as well as unlicensed wireless services and fixed wireless services such as microwave backhaul, an the associated site.

(6) Transmission equipment – means any equipment used in connection with any Commission – authorized wireless

PROJECT PROPOSAL

The project the Commission is being asked to consider consists of two primary components: The Draft Wireless Master Plan and Draft Amendments to Article 17, Wireless Communications Facilities. These two components have been in development since May 2016, when the City of Sedona entered into a contract with CityScape. CityScape was tasked with providing wireless consulting services regarding the development of a citywide wireless master plan and zoning amendment recommendations to ensure the City's compliance with the provisions of existing and proposed federal regulations and legislation, to minimize aesthetic impact of these facilities on the City, and to maximize potential revenue available from the construction and operation of these facilities on City owned property.

A. Wireless Master Plan Proposal – Council Priority

The wireless master plan is intended to be a planning tool that provides information related to:

- Wireless telecommunications technology
- Network deployment practices
- Existing wireless infrastructure inventory
- Theoretical propagation mapping
- Ten-year projection maps of potential future network deployment patterns
- Recommendations designed to meet ten year network deployment objectives

- Identifying City owned properties that can be part of a network deployment solution for the wireless industry

As part of the master plan development process, CityScape provided detailed information about the existing wireless communication infrastructure and identified those City owned properties that may be suitable for possible "macro cell" wireless infrastructure. Those initially identified City owned properties were evaluated by CityScape utilizing propagation mapping to determine locations where wireless carriers are likely to want or need future infrastructure. As the development of the wireless master plan evolved, CityScape recommended that that the City also consider "small cell" technology. As a result, 10 additional City owned properties were identified in addition to those sites previously identified by CityScape.

City staff coordinated several tours to familiarize themselves and members of the City Council and Planning and Zoning Commission with all the identified sites. At each site, various considerations were discussed such as acceptable height, style (e.g. camouflaged, monopole, etc.), and appropriateness of the location. City owned properties that were deemed suitable for future facilities are included in the Draft Master Plan with detailed discussion of what aspects of the design are acceptable.

The City is attempting to select locations that minimize impacts on residential areas and Sedona's natural beauty. Siting on City owned property gives the community more say in the tower and equipment size and aesthetic, because as landlords the City can dictate much stricter terms than it could simply through regulatory powers it may have for other property locations.

B. Article 17, Wireless Communication Ordinance Proposed Amendments

Other than the wireless master plan, CityScape was also contracted to update the city's wireless ordinance, included in the Sedona Land Development Code as Article 17. This ordinance was originally adopted in 1998 and last underwent a comprehensive revision in 2003. In the 14 years since, there have been significant changes to wireless technologies and federal legislation. The update to the ordinance is needed to reflect those changes and ensure that the city's codes are reflective of modern technology and current federal law.

The majority of the updates done were to bring the city's ordinance into compliance with federal laws and regulations, as outlined in the background section above, and to incorporate current wireless technology. The remainder of the updates were done in areas identified by city staff as areas in the current wireless ordinance needing to be clarified. Over the years, in meeting with property owners, citizens, and potential applicants regarding potential wireless applications, Staff has identified a number of areas in the current ordinance that create confusion as to what is required. By clarifying these sections, the code will become more user friendly and provide a clearer expectation of requirements from all parties involved.

The more significant changes include the following:

1. Allowance for administrative review for applications that federal legislation requires that the City approve
2. Requirements specific to the type of facility proposed; newer types of facilities not contemplated in last comprehensive update added
3. Clarified review procedures
4. Updated definitions, clarified terms

PLANNING AND ZONING COMMISSION REVIEW

The Planning and Zoning Commission is scheduled to review this project at a work session on Thursday, May 18, 2017, at 3:30 pm, and a public hearing on Thursday, June 1, 2017, at 3:30 pm. CityScape representatives will be at both meetings to answer the Commission's questions and provide additional background information. In preparing for these meetings, the Commission should carefully review the Article 17 amendments along with the Wireless Master Plan, keeping in mind the federally mandated parameters that the City is working within. Due to the limitations on the availability of the CityScape representatives, Commissioners are encouraged to provide their questions to staff ahead of time, especially any questions of a more technical nature.

At the end of the public hearing the Commission will be expected to take action to recommend approval or denial of the proposed amendments to Article 17 of the Sedona Land Development Code and the proposed Wireless Master Plan to the City Council.

Community Development Department
102 Roadrunner Drive Sedona, AZ 86336
(928) 282-1154 · Fax: (928) 204-7124

Staff Recommendations

PZ17-00005 (LDC) Wireless Communications

Staff recommends approval of case number PZ17-00005 (LDC), updating Article 17 (Wireless Communications) of the Sedona Land Development Code, subject to all applicable ordinance requirements.

PZ17-00006 (MP) Wireless Master Plan

Staff recommends approval of case number PZ17-00006 (MP), adopting the Wireless Master Plan, subject to all applicable ordinance requirements

Sample Motions for Commission Use

(Please note that the below motions are offered as samples only and that the Commission may make other motions as appropriate.)

Recommended Motions for Approval

PZ17-00005 (LDC) Wireless Communications

I move to recommend to City Council approval of case number PZ17-00005 (LDC), updating Article 17 (Wireless Communications) of the Sedona Land Development Code.

PZ17-00006 (MP) Wireless Master Plan

I move to recommend to City Council approval of case number PZ17-00006 (MP), adopting the Wireless Master plan.

Alternative Motions for Denial

PZ17-00005 (LDC) Wireless Communications

I move to recommend to City Council denial of case number PZ17-00005 (LDC). (Please specify findings)

PZ17-00006 (MP) Wireless Master Plan.

I move to recommend to City Council denial of case number PZ17-00006 (MP). (Please specify findings)

Article 17 **WIRELESS COMMUNICATIONS F**

Sections:

1701 Title.

This article shall be known as the Sedona Wireless Communications Facilities Ordinance.

1702 Purpose.

The purpose of this article is to promote the following:

A. The City Council has adopted a Wireless Master Plan to provide long-term planning for an efficient and capable wireless telecommunications network throughout the City that promotes collocation and optimal new tower and base station locations to meet the current and future wireless telecommunications needs of the City's residents, businesses, industry and visitors. The Wireless Master Plan minimizes negative visual impacts so as to preserve the character and viewsheds of the community and its natural surroundings.

B. Protection of the unique natural beauty and small-town character of the city as specified in the Sedona Community Plan while meeting the needs of its citizens to enjoy the benefits of wireless communications services;

C. Promote the health, safety and general welfare of the public by regulating the siting of wireless communications facilities, including satellite earth stations;

C. Consideration of historical and environmentally sensitive areas as well as consideration of potential impacts on adjacent properties;

D. Minimize the impacts of wireless communications facilities on surrounding areas by establishing standards for location, structural integrity and compatibility;

E. Encourage the location and collocation of wireless communications equipment on existing structures thereby minimizing new visual, aesthetic and public safety impacts, effects upon the natural environment and wildlife, and to reduce the need for additional towers;

F. Antenna configurations, which minimize additional visual impact through careful and innovative siting, design, landscape and camouflage techniques;

G. Accommodate the growing need and demand for wireless communications services;

H. Encourage coordination between suppliers of wireless communications services in the city;

I. Respond to the policies embodied in the Telecommunications Act of 1996 and the 2012 Spectrum Act in such a manner as not to unreasonably discriminate between providers of functionally equivalent personal wireless service or to prohibit or have the effect of prohibiting personal wireless service in the

city;

J. Establish predictable and balanced regulations governing the construction and location of wireless communications facilities, within the confines of permissible local regulation and in accordance with the provisions of Arizona Revised Statutes Section 9-591 et seq.;

K. Establish review procedures to ensure that applications for wireless communications facilities are reviewed and acted upon within a reasonable period of time.

1703 Definitions

Amateur Radio Tower - A tower used for non-commercial amateur radio transmissions consistent with the "Complete FCC U.S. Amateur Part 97 Rules and Regulations" for amateur radio towers.

Ancillary Structure - For the purposes of this Section, any form of development associated with a telecommunications facility, including foundations, concrete slabs on grade, guy anchors, generators, and transmission cable supports, but excluding equipment cabinets.

Antenna - Any apparatus designed for the transmitting and/or receiving of electromagnetic waves, including telephonic, radio or television communications. Types of elements include omni-directional (whip) antennas, sectionalized (panel) antennas, multi or single bay (FM & TV), yagi, or parabolic (dish) antennas.

Antenna Array - A single or group of antenna elements and associated mounting hardware, transmission lines, or other appurtenances which share a common attachment device such as a mounting frame or mounting support structure for the sole purpose of transmitting or receiving electromagnetic waves.

Antenna Element - Any antenna or antenna array.

ASR - The Antenna Structure Registration Number as required by the FAA and FCC.

Base Station - Equipment and non-tower supporting structure at a fixed location that enable wireless telecommunications between user equipment and a communications network. Examples include transmission equipment mounted on a rooftop, water tank, silo or other above ground structure other than a tower. The term does not encompass a tower as defined herein or any equipment associated with a tower. "Base Station" includes, but is not limited to:

- equipment associated with wireless telecommunications services such as private, broadcast, and public safety services, as well as unlicensed wireless services and fixed wireless services such as microwave backhaul;
- radio transceivers, antennas, coaxial or fiber optic cable, regular and back up power supplies, and comparable equipment, regardless of technological configuration (including Distributed Antenna Systems and small-cell networks);
- any structure other than a tower that, at the time the application is filed under this Section, supports or houses equipment described in this definition that has been reviewed and approved under the applicable zoning or siting process, or under another City regulatory review process, even if the structure was not built for the sole or primary purpose of providing such support.

"Base station" does not include any structure that, at the time the application is filed under this Section, does not support or house any wireless communication equipment.

Breakpoint Technology - The engineering design of a monopole, or any applicable support structure, wherein a specified point on the monopole is designed to have stresses concentrated so that the point is at least five percent (5%) more susceptible to failure than any other point along the monopole so that in the event of a structural failure of the monopole, the failure will occur at the breakpoint rather than at the base plate, anchor bolts, or any other point on the monopole.

Broadband Facility - any infrastructure used to deliver broadband services or for the provision of broadband service.

Broadband Service - any technology identified by the US Secretary of Agriculture as having the capacity to transmit data to enable a subscriber to the service to originate and receive high-quality voice, data, graphics, and video. Broadband service includes:

- *Cable Service* - the one-way transmission to subscribers of video programming or other programming services and subscriber interaction required for the selection or use of such video programming or other programming service.
- *Telecommunications Service* - the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used.
- *Wireless Service* - data and telecommunications services, including commercial mobile services, commercial mobile data services, unlicensed wireless service and common carrier wireless exchange access services, as all of these terms are defined by federal law and regulations.

Collocation - The mounting or installation of transmission equipment on an eligible support structure for the purposes of transmitting and/or receiving radio frequency signals for communications purposes so that installation of a new support structure will not be required.

Concealed - A tower, base station, ancillary structure, or equipment compound that is not readily identifiable as a wireless service facility and that is designed to be aesthetically compatible with existing and proposed building(s) and uses on a site or in the neighborhood or area. There are two types of concealed facilities:

1) Base stations, including faux parapets, windows, dormers or other architectural features that blend with an existing or proposed building or structure and;

2) A freestanding concealed tower which looks like something else that is common in the geographic region such as a church steeple, windmill, bell tower, clock tower, light standard, flagpole with a flag that is proportional in size to the height and girth of the tower, or tree that grows naturally or is commonly found in the area.

DAS – Distributed Antenna System – A system consisting of: (1) a number of remote communications nodes deployed throughout the desired coverage area, each including at least one antenna for transmission and reception; (2) a high capacity signal transport medium (typically fiber optic cable) connecting each node to a central communications hub site; and (3) radio transceivers located at the hub site (rather than at each individual node as is the case for small cells) to process or control the communications signals transmitted and received through the antennas.

DAS Hub - Ancillary equipment usually contained in a shelter or other enclosure which does not have any wireless transmission or receive equipment contained therein but is utilized in the deployment and operation of wireless DAS receive/transmit infrastructure that is located elsewhere.

Development Area - The area occupied by a telecommunications facility including areas inside or under an antenna-support structure's framework, equipment cabinets, ancillary structures, and/or access ways.

Dual Purpose Facility – A banner pole, light stanchion, support tower for overhead electric lines, or other similar utility structure onto which one or more antenna(s) are or can be mounted or attached.

Eligible Facilities Request - Any request for modification of an existing tower or base station involving collocation of new transmission equipment; removal of transmission equipment; or replacement of transmission equipment that does not Substantially Change the physical dimensions of such tower or base station.

Eligible Facility - Existing tower or base station that has been approved through a local government land use review process prescribed for the tower or base station.

Eligible Support Structure - Any tower or base station existing at the time the application is filed with the City.

Existing - A constructed tower or base station is "existing" for purposes of this Section if it has been reviewed and approved under an applicable City land use review process. "Existing" also includes a tower that was lawfully constructed but not reviewed because it was not in a zoned area when it was built.

Equipment Compound- The fenced-in area surrounding, inside or under a ground-based wireless communication facility containing ancillary structures and equipment (such as cabinets, shelters, and pedestals) necessary to operate an antenna that is above the base flood elevation.

Equipment Cabinet- Any structure used exclusively to contain equipment necessary for the transmission or reception of communication signals.

Equipment Shelter – A self-contained building housing ancillary electronic equipment typically including a generator.

FAA – the Federal Aviation Administration.

FCC – the Federal Communications Commission.

Feed Lines- Cables or fiber optic lines used as the interconnecting media between the base station and the antenna.

Geographic Search Ring- An area designated by a wireless provider or operator for a new base station and/or tower produced in accordance with generally accepted principles of wireless engineering.

Handoff Candidate - A wireless communication facility that receives call transference from another wireless facility, usually located in an adjacent first "tier" surrounding the initial wireless facility.

Node – A single location as part of a larger antenna array which can consist of one or multiple antennas, such as part of a DAS network antenna array.

Non-concealed- A telecommunication facility that is readily identifiable as such (whether freestanding or attached).

OTARD – Over The Air Reception Devices, which are limited to either a "dish" antenna one meter (39.37 inches) or less in diameter designed to receive direct broadcast satellite service, including direct-to-home satellite service, or to receive or transmit fixed wireless signals via satellite, or an antenna that is one meter or less in diameter and is designed to receive video programming services via broadband radio service (wireless cable), or to receive or transmit fixed wireless signals other than via satellite or an antenna that is designed to receive local television broadcast signals.

PWSF - Personal Wireless Service Facility - Any staffed or unstaffed location for the transmission and/or reception of radio frequency signals or other personal wireless communications, including commercial mobile services, unlicensed wireless services, wireless broadband services, and common carrier wireless exchange access services as defined in the Telecommunications Act of 1996, and usually consisting of an antenna or group of antennas, transmission cables, feed lines, equipment cabinets or shelters, and may include a tower. Facilities may include new, replacement, or existing towers, replacement towers, collocation on existing towers, base station attached concealed and non-concealed antenna, dual purpose facilities, concealed towers, and non-concealed towers (monopoles, lattice and guyed), so long as those facilities are used in the provision of personal wireless services as that term is defined in the Telecommunications Act.

Qualified Collocation Request – collocation of PWSF on a tower or base station that creates a Substantial Change in the facility but is entitled to processing within 90 days under 47 U.S.C. §332(c)(7).

Radio Frequency Emissions- Any electromagnetic radiation or other communications signal emitted from an antenna or antenna-related equipment.

Radio Frequency Interference ("RFI") – Any electromagnetic radiation or other communications signal that causes reception or transmission interference with another electromagnetic radiation or communications signal.

Replacement- A modification of an existing tower to increase the height, or to improve its integrity, by replacing or removing one (1) or several tower(s) located in proximity to a proposed new tower in order to encourage compliance with this Section, or improve aesthetics or functionality of the overall wireless network.

Right of Way ("ROW") - means the area on, below or above a public roadway, highway, street, sidewalk, alley or utility easement. Right of Way does not include a federal interstate highway, a state highway or state route under the jurisdiction of the Arizona Department of Transportation, a private easement, property that is owned by a special taxing district, or a utility easement that does not specifically authorize deployment of wireless infrastructure.

Satellite Earth Station- A single or group of parabolic or dish antennas mounted to a support device that may be a pole or truss assembly attached to a foundation in the ground, or in some other configuration, including the associated separate equipment cabinets necessary for the transmission or reception of wireless communications signals with satellites.

Site - For towers other than towers in the public rights-of-way, the boundaries of the leased or owned property on which the Facilities are or are proposed to be situated.

SLDC – Sedona Land Development Code.

Small Cell Facility - means a wireless service facility that meets both following qualifications:

1. Each antenna is located inside an enclosure of no more than six (6) cubic feet in volume within a public City ROW or three (3) cubic feet in volume outside City ROW, or, in the case of an antenna that has exposed elements, the antenna and all its exposed elements

could fit within an enclosure of no more than six (6) cubic feet within a public City ROW and three (3) cubic feet outside public City ROW; and

2. Primary equipment enclosures are no larger than twenty-eight (28) cubic feet in volume in a public City ROW and seventeen (17) cubic feet in volume outside public City ROW. The following associated equipment may be located outside of the primary equipment enclosure and, if so located, is not included in the calculation of equipment volume: Electric meter, concealment, telecommunications demarcation box, ground-based enclosures, back-up power systems, grounding equipment, power transfer switch, vertical cable runs and cut-off switch.

Small Cell Network - a collection of interrelated small cell facilities designed to deliver wireless service.

Stanchion - A vertical support structure generally utilized to support exterior lighting elements.

Streamlined Processing- Expedited review process for collocations required by the federal government (Congress and/or the FCC) for PWSF.

Substantial Change - A modification or collocation constitutes a "substantial change" of an eligible support structure if it meets any of the following criteria:

1. A PWSF collocation or modification of an existing antenna-supporting structure not in a public right of way increases the overall height of the antenna-supporting structure, antenna and/or antenna array more than 10% or 20 feet, whichever is greater. A PWSF collocation on an existing antenna-supporting structure within a public right of way increases the overall height of the antenna-supporting structure, antenna and/or antenna array more than 10% or 10 feet, whichever is greater.
2. A PWSF collocation for towers not in a public right of way protrudes from the antenna-supporting structure more than 20 feet or the width of the structure at the elevation of the collocation, and for towers within a public right of way, protrudes from the antenna-supporting structure more than 6 feet.
3. A PWSF collocation on an existing antenna-supporting structure fails to meet current building code requirements (including windloading).
4. A PWSF collocation adds more than 4 additional equipment cabinets or 1 additional equipment shelter.
5. A PWSF collocation requires excavation outside of existing leased or owned parcel or existing easements.
6. A PWSF collocation defeats any existing concealment elements of the antenna-supporting structure.
7. A PWSF collocation fails to comply with all conditions associated with the prior approval of the antenna-supporting structure except for modification of parameters as permitted in this section.

Support Structure - Anything constructed or erected, the use of which requires permanent location on the ground, or attachment to something having a permanent location on the ground.

Temporary PWSF – A temporary tower or other structure that provides interim short-term telecommunications needed to meet an immediate demand for service in the event of an emergency or a public event where a permanent wireless network is unavailable or insufficient to satisfy the temporary increase in demand or when permanent PWSF equipment is temporarily unavailable or offline.

Transmission Equipment- Equipment that facilitates transmission of communication service (whether commercial, private, broadcast, microwave, public, public safety, licensed or unlicensed,

fixed or wireless), such as radio transceivers, antennas, coaxial or fiber-optic cable, and regular and backup power supply.

Tower- Any support structure built for the primary purpose of supporting any antennas and associated facilities for commercial, private, broadcast, microwave, public, public safety, licensed or unlicensed, and/or fixed or wireless services. A tower may be concealed or non-concealed. Non-concealed towers include:

Guyed - A style of tower consisting of a single truss assembly composed of sections with bracing incorporated. The sections are attached to each other, and the assembly is attached to a foundation and supported by a series of wires that are connected to anchors placed in the ground or on a building.

Lattice - A self supporting tapered style of tower that consists of vertical and horizontal supports with multiple legs and cross bracing, and metal crossed strips or bars to support antennas.

Monopole - A style of freestanding tower consisting of a single shaft usually composed of two (2) or more hollow sections that are in turn attached to a foundation. This type of tower is designed to support itself without the use of guy wires or other stabilization devices. These facilities are mounted to a foundation that rests on or in the ground or on a building's roof. All feed lines shall be installed within the shaft of the structure.

Tower Base- The foundation, usually concrete, on which the tower and other support equipment are situated. For measurement calculations, the tower base is that point on the foundation reached by dropping a perpendicular from the geometric center of the tower.

Tower Height- The vertical distance measured from the grade line to the highest point of the tower, including any antenna, lighting or other equipment affixed thereto.

Tower Site- The land area that contains, or will contain, a proposed tower, equipment compound, support structures and other related buildings and improvements.

Wireless Service Facility – At a specific physical location, one or more antenna, tower, base station, mechanical and/or electronic equipment, conduit, cable, and associated structures, enclosures, assemblages, devices and supporting elements that generate or transmit nonionizing electromagnetic radiation or light operating to produce a signal used for communication, including but not limited to all types of transmission equipment defined further herein.

1704 Administration.

1704.01 Applicability.

A. Except as provided for in subsection 1704.01(B) of this section, this section shall apply to development activities including installation, construction, or modification to all the following wireless communications facilities:

1. Existing towers, concealed and non-concealed; publicly and privately owned;

2. Proposed towers, concealed and non-concealed; publicly and privately owned;

3. Replacement of any existing tower

4. Collocation on any existing tower or base station;

5. Existing concealed and non-concealed base stations, publicly and privately owned;

6. Proposed concealed and non-concealed base stations, publicly and privately owned;

7. Proposed base stations and towers in public right-of-way and utility easements.

8. AM/FM/DTV broadcasting facilities.

9. Amateur Radio Facilities

B. The following items are exempt from the provisions of this section, notwithstanding any other regulations established in the Land Development Code of the city:

1. Noncommercial, amateur radio antennas which are less than 65 feet in height and attached to the rear or side of residential or commercial structures or freestanding in an area directly behind the rear structural wall of a residential or commercial structure. Noncommercial, amateur, ham radio or citizen's band towers, antennas or antenna arrays with heights greater than 65 feet or not located directly behind the rear structural wall of a residential or commercial structure, or attached to the rear or side of residential or commercial structures shall be regulated in accordance with SLDC 1705;

2. Regular maintenance of any existing wireless service facility that does not include an increase in the size or number of antenna; the addition of radio heads or other similar structures; the addition of coaxial cable; or the addition of equipment shelters, cabinets or generators;

3. The replacement of existing antennas, antenna panels, antenna elements or other equipment on an existing tower or base station by the same owner or wireless communications facility provider; provided, that the replaced antennas, antenna elements or equipment meet Building Code requirements (including wind loading) and provided such replacement does not increase the overall height or width of the structure;

4. A government-owned wireless service facility, upon the declaration of a state of emergency by federal, state, or local government, and a written determination of public necessity by the Chief of Police; except that such facility must comply with all federal and state requirements. No wireless service facility shall be exempt from the provisions of this section beyond the duration of the state of emergency;

5. Data, video or information transmission as part of the day-to-day operations of a commercial business, including, for example, processing of credit card sales, automatic inventory control, and the like which are mounted on and do not extend more than 2 meters (6.5 feet) above the roof surface of any building. Where technologically feasible, such antennas shall not be mounted on an exterior parapet wall facing a public or private right-of-way;

6. All users (such as both commercial and residential) of a wireless Internet service for which a send/receive antenna is required to be located at the point of use. Where technologically feasible, such antennas shall not be mounted on an exterior parapet wall facing a public or private ROW;

7. Over-the-air reception devices (OTARD), including satellite earth stations, so long as the device does not require construction of a tower or other structure exceeding 12 feet above the home or building and the device is no more than one meter in diameter in a residential zone or two meters in any other zone district. Where technologically feasible, such antennas shall not be mounted on an exterior parapet wall facing a public or private right-of-way;

8. Any antenna-supporting structure that is damaged or destroyed by fire, flood, explosion, earthquake, war, riot, or act of God may be reconstructed and used as before if done within 12

months of such calamity; provided, that there is no increase in structure height, width or number of antennas. If a new larger antenna-supporting structure is proposed as a replacement structure, then the requirements of subsection 1704.02 of this section shall be satisfied.

9. A Temporary PWSF, utilized for not more than 60 calendar days, which does not require FAA lighting or marking and does not require any kind of excavation.

C. **Siting Preferences for New Telecommunications Facilities.**

Siting of new PWSF of any type shall be in accordance with the Siting Preferences below and with the Use Table in Section 1704.04. Where a lower ranked alternative is proposed, the applicant must demonstrate through relevant information including, but not limited to, an affidavit by a radio frequency engineer demonstrating that despite diligent efforts to adhere to the established preferences within the geographic search area, higher ranked options are not technically feasible, practical or justified given the location of the proposed facilities, by clear and convincing evidence. The applicant must provide such evidence in its application in order for the application to be considered complete.

The Siting Preferences are, in order:

1. Concealed base station (macro, small cell, DAS, or node) outside of ROW

   a. City-owned property identified in the MP
   b. City-owned property not identified in the MP
   c. Other public property
   d. Private owned property zoned non-residential
   e. On private owned property zoned residential multi-family structures or non-residential structures in RS or RM districts.

2. Concealed collocation on an existing concealed tower or concealed base station

   a. City-owned property identified in the MP
   b. City-owned property not identified in the MP
   c. Other public property
   d. Private owned property

3. Replacement of existing non-concealed tower with a concealed tower

4. Concealed tower for small cell, DAS or node (not macro) outside the ROW

   a. City-owned property identified in the MP
   b. City-owned property not identified in the MP
   c. Other public property
   d. Private owned property

5. Concealed base station for Distributed Antenna System (DAS), small cell or node in ROW parallel to a: (as those terms are defined by the Arizona Department of Transportation):

a. Principal Arterial

b. Minor Arterial

c. Major Collector

d. Minor Collector

e. Local Road

DAS, small cell and nodes look similar; the difference is in network function and design - the antenna attachment is on the top of an existing light pole in the ROW.

6. Concealed tower for DAS, small cell or node in ROW parallel a: (as those terms are defined by the Arizona Department of Transportation)

a. Principal Arterial

b. Minor Arterial

c. Major Collector

d. Minor Collector

e. Local Road

Concealed tower, built for the purpose of wireless communications.

7. Concealed macro tower outside of ROW

a. City-owned property identified in the MP

b. City-owned property not identified in the MP

c. Other public property

d. Private owned property

8. Collocation on existing non-concealed tower

a. Public property

b. Private owned property

9. Non-concealed tower outside of ROW

a. Public property

i. Monopole

ii. Lattice

iii. Guyed

b. Private property

i. Monopole

ii. Lattice

iii. Guyed

D. The preferred order of alternative ranking, from highest to lowest, shall be 1, 2, 3, 4, 5, 6, 7, 8, and

9 ,(and within each ranking a, b, c, etc). Where a lower ranked alternative is proposed, the applicant shall file an affidavit demonstrating that despite diligent efforts to adhere to the established preferences within the geographic search ring, as determined by a qualified radio frequency engineer, higher ranked options are not technologically feasible.

1704.02 Approvals Required.

A. All applications for PWSF shall be considered by the Commission at a public hearing as set forth in SLDC 402, Conditional Uses, based on potential location, aesthetic or visually related impacts as a result of the proposed antenna's height, color, size, and the like, except as set forth below;

B. All applications for (i) either new concealed base station facilities, new concealed towers or collocations as listed in the Master Plan; (ii) concealed replacement tower collocations that do not constitute a "substantial change" on an existing tower or base station that has been designed and approved to accommodate multiple wireless collocations; or (iii) replacements of existing non-concealed towers with concealed towers; shall each be subject to review and approval by the Director, relative to the review criteria provided in subsection 1704.03 of this section. The Director may require an application for collocation outside of a public City right-of-way to be considered by the Commission at a public hearing as set forth in SLDC 402, Conditional Uses, based on potential location, aesthetic or visually related impacts.

C. All new non-concealed towers on lands outside of the properties listed in the Master Plan and non-concealed replacement towers intended for commercial use shall obtain a conditional use permit from the City Council following recommendation from the Commission (as indicated in the Use Table in Section 1704.04(C) below), as set forth in SLDC 402, Conditional Uses, after consideration of the review criteria provided in subsection 1704.03 of this section, prior to submittal for building permit approval and the initiation of construction related impacts as a result of the proposed concealed antenna's height, color, size, and the like.

1704.03 Approval Criteria. In considering any application for a conditional use permit for the establishment of a tower or base station, the Commission or City Council's decision shall be guided by the application of the following criteria:

A. Use of suitable existing towers or base stations is preferred over placement of new towers;

B. New base stations that do not exceed height limitations for the zoning district.

C. Concealed Wireless service facilities are preferred over non-concealed; non-concealed that cannot be readily observable by pedestrians on adjacent streets to such facility are preferred over non-concealed that are readily observable by pedestrians on adjacent streets;

D. Collocation of multiple uses on a single wireless service facility will have significant favorable weight in evaluating the application;

E. Network development plans that achieve the fewest number of wireless service facilities of all users reasonably necessary for commercial coverage;

F. Location in the least restrictive zoning district;

G. Suitability of the location for collocation of governmental public service wireless service facilities.

1704.04 Location by Zoning District.

A. Generally. No wireless service facilities shall be allowed in National Forest or Neighborhood

Commercial District. No wireless service facilities shall be allowed in any Open Space Districts except as provided in subsections 1704.04 (C) of this section. Wireless service facilities may be permitted in the following districts subject to approval by the Director or Commission or Council as set forth in subsection 1704.02 of this section:

B. Definitions of Zoning Districts:

OP	Office Professional District
C-1	General Commercial District
C-2	General Commercial District
C-3	Heavy Commercial/Light Manufacturing District
RC	Resort Commercial District
PD	Planned Development District
CF	Community Facilities District
L	Lodging District
P	Parking District
RS	Single Family Residential
RM	Multi Family Residential
NF	National Forest
OS	Open Space

C. Use Table

	RS		RM		OP	GC	C-3	L/RC	PD	CF	P	OS/NF
	R	NR	R	NR								
Concealed base station (macro, small cell, DAS or node) outside ROW												
City-owned property identified in the MP	A – See Master Plan for Site Specific Details											N
Other City-owned property	C	C	C	C	C	C	C	C	C	C	C	~~-~~N
Other public property	C	C	C	C	C	C	C	C	C	C	C	N
Private property	C	C	C	C	C	C	C	C	C	C	C	N
Concealed collocation on existing concealed tower or base station												
City-owned property identified in the MP	A – See Master Plan for Site Specific Details											N
Other City-owned property	N	C	C	C	C	C	C	C	C	C	C	N
Other public property	N	C	C	C	C	C	C	C	C	C	C	N
Private property	C	C	C	C	C	C	C	C	C	C	C	N
Replacement of existing non-concealed tower with a new concealed tower												
City-owned property	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	N
Public property	A	A	A	A	A	A	A	A	A	A	A	N
Private property	A	A	A	A	A	A	A	A	A	A	A	N
Concealed small cell tower, DAS or node (not macro) outside the ROW												
City-owned property identified in the MP	A – See Master Plan for Site Specific Details											
Other City-owned property	N	C	C	C	C	C	C	C	C	C	C	N
Other public property	N	C	C	C	C	C	C	C	C	C	C	N
Private property	N	C	C	C	C	C	C	C	C	C	C	N
Concealed base station or tower for DAS, small cell or node in ROW parallel to a												
Principal Arterial	C	C	C	C	C	C	C	C	C	C	C	N
Minor Arterial	C	C	C	C	C	C	C	C	C	C	C	N
Major Collector	C	C	C	C	C	C	C	C	C	C	C	N
Minor Collector	C	C	C	C	C	C	C	C	C	C	C	N
Local Road	C	C	C	C	C	C	C	C	C	C	C	N
Concealed macro tower outside ROW on												
Public property listed in Master Plan	A – See Master Plan for Site Specific Details											
Other City-owned property	N	C	N	C	C	C	C	C	C	C	C	N
Other public property	N	C	N	C	C	C	C	C	C	C	C	N
Private property	N	C	N	C	C	C	C	C	C	C	C	N
Collocation on eligible facility												
Non substantial change	A	A	A	A	A	A	A	A	A	A	A	N
Collocation on eligible facility with substantial change or on a non eligible facility												
City-owned property	C	C	C	C	C	C	C	C	C	C	C	N
Public property	C	C	C	C	C	C	C	C	C	C	C	N
Private property	C	C	C	C	C	C	C	C	C	C	C	N
Non-concealed tower outside ROW on												
Public property												
Monopole, Lattice, Guy	N	N	N	N	C-2	C-2	C-2	C-2	C-2	C-2	C-2	N
Private property												
Monopole, Lattice, Guy	N	N	N	N	C-2	C-2	C-2	C-2	C-2	C-2	C-2	N

Key A = Administrative Permit; C = Conditional Use Permit from Planning & Zoning Commission; C-2 = Conditional Use Permit from City Council, following recommendation from Planning & Zoning Commission; N= Not Permitted; NA = Not Applicable

D. City Parks. Concealed wireless service facilities may be permitted within city park areas. Consideration will be given to locating wireless service facilities on athletic field lighting standards, provided the equipment does not interfere with the primary purpose of the lights and does not detract from the overall aesthetics of the facility.

1704.05 Application Submittal Requirements.

A. Application. An application for a wireless service facility shall include the following information:

1. A completed application form and any appropriate fees.

2. An accurate inventory of applicant's existing wireless service facilities, which are existing or for which application for approval or permit has been submitted for zoning or construction, which are within the jurisdiction of this article or within 1 mile of the city limits. The inventory shall include the location, height, type, ownership and all tenants of each facility.

3. A map of all locations owned, leased or operated by the applicant and their coverage which are located within the jurisdiction of this article or within 1 mile of the city limits of the proposed site or which are capable of service with the proposed site by wireless means.

4. An accurate Site Plan of the proposed wireless service facility showing the means of access, all adjacent roadways, and a complete landscape plan.

5. A scaled drawing of the exterior of the proposed wireless service facility, clearly showing the method of fencing; coloration; materials; illumination; and camouflage.

6. Photo-simulated pre and post-construction renderings of the proposed wireless service facilities, equipment enclosures, and ancillary structures as they would look after construction from locations to be determined during the pre-application conference (but shall, at a minimum, include renderings from the vantage point of any adjacent roadways and occupied commercial or residential structures), as well as photo-simulations of the antenna-supporting structure after it has been fully developed with antenna structures (applicant may assume for the purpose of the simulation that other antenna structures on the facility will resemble their proposed structure in size and design).

7. Exterior paint or finish samples of the colors to be used in the construction of the wireless service facility.

8. Proof of ownership or a letter of authorization from the property owner stating that the applicant may install a wireless service facility on their property.

9. A signed statement from the wireless service facility owner or owner's agent stating that the radio frequency emissions comply with FCC standards for such emissions as set forth in 47 CFR 1.1307, 1.310, 2.091 or 2.093, as applicable (*Report and Order*, ET Docket 93-62 (Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation), 11 FCC Rcd 15123 (1996); *Second Memorandum Opinion and Order and Notice of Proposed Rule Making,* ET Docket 93-62 (WT Docket 97-192), 12 FCC Rcd 13494 (1997). In particular, the statement shall demonstrate the proposed facility, individually and cumulatively, will not exceed the maximum permissible exposure level to the general public of approximately 580 microwatts per square centimeter.

10. Proof of an FCC license to transmit and/or receive radio signals in the city.

11. Prior to issuance of a building permit, a stamped or sealed structural analysis of the proposed antenna-supporting structure prepared by a licensed Arizona engineer indicating the proposed and future loading capacity of the antenna-supporting structure.

12. Prior to issuance of a building permit, proof of FAA compliance with Subpart C of the Federal Aviation Regulations Part 77, Objects Affecting Navigable Airspace.

13. A signed statement from the wireless service facility owner agreeing to allow the collocation of other wireless equipment on the proposed antenna-supporting structure.

14. An ownership map of property owners within 300 feet of the exterior boundaries of the subject property as shown on the last assessment of the property. A list of these property owners shall also be provided on mailing labels and keyed to a map showing the location of the identified properties.

15. Cover letter describing the overall project and addressing in writing how the proposed wireless service facility satisfies the requirements of this article.

16. All other documentation, evidence, or materials necessary to demonstrate compliance with the applicable approval criteria set forth in this article, including where applicable:

a. Existing wireless service facilities to which the proposed facility will be a handoff candidate, including latitude, longitude, and power levels of each;

b. A radio frequency plot indicating the coverage of existing wireless service sites, and that of the proposed site sufficient to demonstrate radio frequency search area, coverage prediction with legend and signal levels, and design radius, together with a certification from the applicant's radio frequency engineer that the proposed facility's coverage or capacity potential cannot be achieved by any higher ranked alternative such as collocation, attached facility, replacement facility or concealed facility;

c. Prior to issuance of a building permit, a statement by a qualified professional engineer specifying the design structural failure modes of the proposed facility;

d. Antenna heights and power levels of the proposed facility and all other facilities on the subject property; and

e. A statement from the applicant that demonstrates that alternative locations, configurations, and facility types have been examined; and addresses in narrative form the feasibility of any alternatives that may have fewer adverse effects on adjacent properties than the facility, configuration, and location proposed including but not limited to:

i. Height;

ii. Mass and scale;

iii. Materials and color;

iv. Illumination;

v. Information addressing the following items:

(A) The extent of any commercial development within the geographic search ring of the proposed facility;

(B) The proximity of the structure to any residential dwellings;

(C) The proximity of the structure to any public buildings or facilities;

(D) The existence of tall and like structures within the geographic search ring of the proposed structure.

17. Citizen Participation Plan and Report as set forth in SLDC 408.

18. A statement that the proposed facility conforms with state of the art, as defined herein, or alternatively, that state of the art technology is unsuitable for the proposed facility. Costs of state of the art technology that exceed facility development costs shall not be presumed to render the technology unsuitable.

19. For a collocation of a small cell/DAS facility within a right-of-way, the applicant must provide an attestation that the proposed facility will be collocated on a utility pole or existing wireless support structure and that the proposed facility will be operational within 180 days after issuance of the permit, unless a later date is agreed upon by applicant and the City or there is a lack of adequate electrical service at the location.

20. Any other materials and data as may be required by the Director.

B. Pre-Application Conference.

1. A pre-application conference is required for any new wireless service facility.

2. Prior to such conference, an applicant shall send a notice substantially in the form below to all wireless service providers and interested parties indicated on a list provided by the City's Department of Community Development:

"Pursuant to the requirements of the SLDC, (name of provider) is hereby providing you with notice of our intent to meet with the City of Sedona Department of Community Development in a pre-application conference to discuss the location of a freestanding wireless service facility that would be located at _____ (location) _____. In general, we plan to construct a support structure of _____ feet in height for the purpose of providing _____(type of wireless service) _____. Please inform the City of Sedona Department of Community Development and us if you have any desire for placing additional wireless facilities or equipment within two (2) miles of our proposed facility. Please provide us with this information within twenty (20) business days after the date of this letter. Your cooperation is sincerely appreciated.

Sincerely, (pre-application applicant, wireless provider)"

3. Included with the notice shall be the latitude and longitude (NAD 83) of the proposed structure. Within 20 days of receiving a timely response from an interested potential co-applicant, the applicant shall inform the respondent and the Department of Community Development in writing as to whether the potential collocation is acceptable and under what conditions. If the collocation is not acceptable, then the applicant must provide the respondent and the Department of Community Development written justification as to why the collocation is not technologically feasible.

4. At the Pre-Application Conference, the applicant, City staff, other wireless providers and interested parties shall develop a Letter of Understanding to be signed by all parties which indicates the capacity of the proposed wireless service facility for collocation which can be accommodated by the proposed design and height.

1704.06 Expert Review.

A. Where due to the complexity of the methodology or analysis required to review an application for a wireless service facility requiring a conditional use permit, the Director may require a technical review by a third party expert. The costs of this review shall be payable in advance by the applicant, in accordance with the Fee Schedule of the City of Sedona and shall be in addition to applicable conditional use permit and building permit fees.

B. The expert review may address any or all the following:

1. The accuracy and completeness of submissions;

2. The applicability of analysis techniques and methodologies;

3. The validity of conclusions reached;

4. Whether the proposed wireless service facility complies with the applicable approval criteria set forth in these regulations;

5. Other matters deemed by the Director to be relevant to determining whether a proposed wireless service facility complies with the provisions of these regulations.

C. Based on the results of the expert review, the Director may require changes to the applicant's application or submittals.

1704.07 Essential Public Services.

A. Wireless service facilities shall be regulated and permitted pursuant to this article and shall not be regulated or permitted as essential services, public utilities, or private utilities.

B. Applicant agrees that their service is subordinate to essential public service services, and agrees to suspend use of any site, which may conflict with such services, regardless of the reason for such conflict, until such conflict is resolved.

1704.08 Enforcement. Wireless service facilities that are not in compliance with all portions of this article shall be removed at the owner's expense if not brought into compliance within thirty (30) days after written demand by the city.

1705 General development and design standards.

1705.01 New Concealed Base Station Facilities for Macro, Small cell, DAS or Nodes. The following standards apply to all new concealed base station facilities:

A. Height.

1. The overall height of any new base station facility on a rooftop shall not exceed more that ten (10) feet above the rooftop or parapet whichever is greater. "Height" for all purposes in this section shall mean the linear distance from the rooftop where the antenna is attached to the highest physical point on the wireless service facility.

2. The overall height of any new base station facility on an existing utility or light pole shall not exceed five (5) feet.

B. Structural Integrity.

1. Outside ROW - The base station and all appurtenances shall be designed pursuant to the design requirements of the most current edition of the IBC adopted by the City of Sedona. In addition, the entire base station and all appurtenances shall be designed pursuant to he design requirements of ASCE 7, including wind speed design requirements, and tower loading/wind design requirements of EIA/TIA 222-G, Series II, including any subsequent modification to those specifications.

2. Inside ROW - The structure shall not be installed within the recovery area width (clear zone) if placed in ROW. Placement of the structure shall meet minimum horizontal clearances as determined from the most recent edition of the AASHTO Policy on Geometric Design of Highways and Streets.

C. Antenna Mounting. Antennas and related service equipment for the antenna shall be mounted as close to the support structure as possible.

D. Color, Screening and Placement

1. Buildings Outside ROW

a Where feasible, antennas shall be placed directly above, below or incorporated with vertical design elements of a building or structure to maximize concealment.

b Base station facilities shall be concealed in some fashion; e.g. screened by a parapet or other device to minimize its visual impact as measured from the boundary line of the subject property. in accordance with the provisions of Article 9 SLDC.

c Base stations shall be designed in such a manner as to be compatible with the existing structure. The base station facility shall be constructed to integrate with the existing architecture. There shall be as little contrast as possible between the communications equipment and the structure.

2. Poles Outside or Inside ROW

a All cables shall be installed internally; but where internal mounting is not possible, surface mounted wires shall be enclosed within conduit or a similar cable cover which shall be painted to match the structure or building on which that DAS is mounted.

b Attached Equipment box and power meter is discouraged; however, if attachment is justified, equipment box and meter shall be located on the pole at a height that does not interfere with pedestrian or vehicular traffic or visibility and where applicable shall not interfere with street name signs or traffic lighting standards.

c Vaulting underground freestanding equipment box and/or power meter not attached to an existing structure is preferred. However, if the applicant can demonstrate that underground water table or floodplain issues prevent vaulting the supporting ground equipment then it may be placed on the ground. In no instance shall supporting group equipment be located farther than 2 feet from the base of the structure and it shall not interfere with pedestrian or vehicular traffic. Screening materials may be required if the equipment box and/or meter are adjacent to a public right-of-way or along a pedestrian sidewalk or pathway.

E. Radio Frequency Emissions. The radio frequency emissions shall comply with FCC standards for such emissions, as set forth in 47 CFR 1.1307, 1.310, 2.091 or 2.093, as applicable (*Report and Order*, ET Docket 93-62 (Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation), 11 FCC Rcd 15123 (1996); *Second Memorandum Opinion and Order and Notice of Proposed Rule Making,* ET Docket 93-62 (WT Docket 97-192), 12 FCC Rcd 13494 (1997) and shall not exceed the maximum permissible exposure level to the general public of approximately 580 microwatts per square centimeter.

F. Impact Fee Calculation.

1. For the purposes of impact fee calculation, the floor area for a wireless service facility shall be considered a commercial use and shall include the total square footage of all equipment enclosures and the areas of the antenna- supporting structure foundation at or above grade.

2. The following shall be considered as development area and shall be required to meet the setbacks and open space ratio requirements for the land use district where they are located:

a. The area beneath all equipment enclosures;

b. The area of the antenna-supporting structure foundation at or above grade;

c. The area beneath ancillary structures;

d. The area inside the antenna-supporting structure framework.

G. Signage.

1. Identification signage for each base station shall be required for the purpose of identifying the owner as well as the tenants, party responsible for the operation and maintenance of the facility, its current address and telephone number, ASR registration number, site name, security or safety signs, and property manager information (if applicable). Identification signage on wireless service facilities shall not exceed 4 square feet.

2. If more than 220 voltage is necessary for the operation of the facility and is present in a ground grid or in the structure, signs located every 20 feet and attached to an enclosing fence or wall shall display in large, bold, high contrast letters (minimum height of each letter: 4 inches) the following: "HIGH VOLTAGE – DANGER."

H. Sounds. No unusual sound emissions such as alarms, bells, buzzers, or the like are permitted and shall be consistent with City Code. Sounds shall not exceed 65 dba at any exterior line of a property in a commercial district and 55 dba at any exterior line of a property in a residential district.

I. Approval Process – if the proposed facility under this Section is within the Master Plan, approvals shall be pursuant to 1704.02 (B), if not, then pursuant to 1704.02 (A).

1705.02 Collocations

A. On Eligible Facility; Non-substantial Change

1. Collocations on existing eligible towers and existing eligible base stations shall meet and shall not exceed the definition of substantial change.

2. A collocation or modification on an eligible base station or tower in ROW shall also be subject to Title 12 of the Sedona City Code.

3. Approval Process outside City ROW

a. Complete: application, filing fee, building permit.

b. The Director shall review application and decide if the application meets the non-substantial change definitions and notify applicant in writing within thirty (30) days of submission if the application is incomplete or complete. If incomplete, the City shall specifically delineate the missing information. The applicant shall resubmit the missing information. The timeframe for review will begin running again when the applicant makes a supplemental submission. The City shall review and provide written notice to the applicant within ten (10) days if the application is approved or remains incomplete. If incomplete the City shall provide in writing specifically delineating the missing information.

c. City shall complete review process within sixty (60) days, accounting for any tolling, including any review to determine whether an application is complete unless there is a mutual agreements to an extension of time. The request will be deemed granted is not approved within the 60-day period, accounting for any tolling or mutually agreed upon extension of time.

d. Impact Fee Calculations.

i. For the purposes of impact fee calculation, the floor area for a wireless service facility shall be considered a commercial use and shall include the total square footage of all equipment enclosures and the areas of the antenna- supporting structure foundation at or above grade.

ii. The following shall be considered as development area and shall be required to meet the setbacks and open space ratio requirements for the land use district where they are located:

(A). The area beneath all equipment enclosures;

(B). The area of the antenna-supporting structure foundation at or above grade;

(C). The area beneath ancillary structures;

(D). The area inside the antenna-supporting structure framework.

4. Approval Process inside City ROW

a Complete: application, filing fee, building permit.

b The Director shall review application and decide if the application meets the non-substantial change definitions and notify applicant in writing within twenty (20) days of submission if the application is incomplete or complete of submittal of its application as to any deficiencies and request resubmittal. If no notice is given, the application shall be deemed complete. The City shall process such application once complete within seventy-five (75) days of receipt or the application will be deemed granted.

c Impact Fee Calculations.

i. For the purposes of impact fee calculation, the floor area for a wireless service facility shall be considered a commercial use and shall include the total square footage of all equipment enclosures and the areas of the antenna- supporting structure foundation at or above grade.

ii. The following shall be considered as development area and shall be required to meet the setbacks and open space ratio requirements for the land use district where they are located:

(A). The area beneath all equipment enclosures;

(B). The area of the antenna-supporting structure foundation at or above grade;

(C). The area beneath ancillary structures;

B. Collocation on Non Eligible Facility or A Substantial Change

1. Any and all collocations that exceed the parameters set forth in the Substantial Change definition or are on a non-eligible facility are subject to discretionary approval on a case by case and site specific basis through the Conditional Use Process. Applicants shall minimize substantial changes as much as possible.

2. Radio Frequency Emissions - The radio frequency emissions shall comply with FCC standards for such emissions, as set forth in 47 CFR 1.1307, 1.310, 2.091 or 2.093, as applicable (*Report and Order*, ET Docket 93-62 (Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation), 11 FCC Rcd 15123 (1996); *Second Memorandum*

Opinion and Order and Notice of Proposed Rule Making, ET Docket 93-62 (WT Docket 97-192), 12 FCC Rcd 13494 (1997), and shall not, individually or cumulatively, exceed the maximum permissible exposure level to the general public of approximately 580 microwatts per square centimeter.

3. Impact Fee Calculations

i. For the purposes of impact fee calculation, the floor area for a wireless service facility shall be considered a commercial use and shall include the total square footage of all equipment enclosures and the areas of the antenna- supporting structure foundation at or above grade.

ii. The following shall be considered as development area and shall be required to meet the setbacks and open space ratio requirements for the land use district where they are located:

(A). The area beneath all equipment enclosures;

(B). The area of the antenna-supporting structure foundation at or above grade;

(C). The area beneath ancillary structures;

4. Signage

a Identification signage shall be required for the purpose of identifying the owner as well as the tenants, party responsible for the operation and maintenance of the facility, its current address and telephone number, ASR registration number, site name, security or safety signs, and property manager information (if applicable). Identification signage on wireless service facilities shall not exceed 4 square feet.

b If more than 220 voltage is necessary for the operation of the facility and is present in a ground grid or in the tower, signs located every 20 feet and attached to the fence or wall shall display in large, bold, high contrast letters (minimum height of each letter: 4 inches) the following: “HIGH VOLTAGE – DANGER.”

5. Structural Integrity.

a. Outside ROW. The entire tower or base station and all appurtenances shall be designed pursuant to the design requirements of the most current edition of the IBC adopted by the City of Sedona. In addition, the entire tower or base station and all appurtenances shall be designed pursuant to the design requirements of ASCE 7, including wind speed design requirements, and tower loading/wind design requirements of EIA/TIA 222-G, Series II, including any subsequent modification to those specifications.

b. Inside ROW - The structure shall not be installed within the recovery area width (clear zone) if placed in ROW. Placement of the structure shall meet minimum horizontal clearances as determined from the most recent edition of the AASHTO Policy on Geometric Design of Highways and Streets.

6. Antenna Mounting. Antennas and related service equipment mounted on a service tower shall be mounted as close to the tower as possible.

7. Sounds. No unusual sound emissions such as alarms, bells, buzzers, or the like are permitted and shall be consistent with City Code. Sounds shall not exceed 65 dba at any exterior line of a property in a commercial district and 55 dba at any exterior line of a property in a residential district.

8. Approval Process for Substantial Change Collocations shall be in accordance with Section 1704.02 (A).

1705.03 Concealed Towers, DAS, Small Cell or Nodes located in or outside of Right of Way

A. New Freestanding Concealed DAS, Node & Concealed Small Cell Tower Development Standards.

1. Height.

(i) Within Right of Way - The total height of DAS facility/Small Cell Facility including antenna shall not exceed the height of existing public utility poles for power or light within five hundred feet of the proposed facility but in no event greater than forty (40) feet in height.

(ii) Outside Right of Way – the total height of a DAS facility/Small Cell facility including antenna shall not exceed thirty (30) feet.

2. Setbacks for DAS/Small Cell outside of the right-of-way shall meet the same setbacks of the underlying zoning district..

3. The use of foliage and vegetation around ground equipment may be required by the City based on conditions of the specific area where the ground equipment is to be located. In order to avoid the clustering of multiple items of ground equipment in a single area, a maximum of two ground equipment boxes may be grouped together in any single location. Individual ground equipment boxes shall not exceed the dimensions provided for in Section 1703 above for within or outside of a right of way.

4. Visibility of new DAS/Small Cell poles

   a. New DAS/Small Cell structures shall be configured and located in a manner that minimizes adverse effects on the landscape and adjacent properties, with specific design considerations as to height, scale, color, texture, and architectural design of the buildings on the same and adjacent zoned lots. Concealment design is required to minimize the visual impact of wireless communications facilities.

   b. All cables, conduits, electronics and wires shall be enclosed within the structure.

   c. Small Cell facilities shall be no larger in size than what is specified in the Section 1703 Definitions

   d. New DAS/Small Cell structures shall be located in Principal or Minor Arterial rights-of-way whenever possible. Placement of new DAS/Small Cell structures in rights-of-way other than Principal or Minor Arterials shall be justified by an engineering analysis from the applicant to the satisfaction of the city engineer prior to the issuance of any permit. Whenever new DAS/Small Cell structures must be placed in a right-of-way with residential uses on one or both sides of the street, no pole, equipment, antenna or other structure may be placed directly in front of a residential structure. If a right-of-way has residential structures on only one side of the street, the new DAS/Small Cell structure shall be located on the opposite side of the right-of-way whenever possible. All new DAS/Small Cell structures shall be located such that views from residential structures are not significantly impaired. Newly installed poles for new DAS/Small Cell structures should be located in areas with existing foliage or other aesthetic features in order to obscure the view of the pole.

   e. DAS and small cells in ROW shall be spaced a minimum of 500 linear feet of right-of-way apart from each other.

   f. New DAS/Small Cell structures located in rights-of-way shall be constructed and maintained so as not to interfere with, displace, damage, inhibit or destroy any other utilities or facilities, including but not limited to sewer, gas or water mains or service lines, storm drains, pipes, cables or conduits, or any other facilities lawfully occupying the right-of-way, whether public or private. All wireless

communications facilities shall be placed and maintained so as not to create interference with the operations of public safety telecommunications service. The City reserves the right to place and maintain, and permit to be placed or maintained, sewer, gas, water, electric, storm drainage, communications, and other utilities and facilities, cables or conduit, and to do, and to permit to be done, any underground and overhead installation or improvement that may be deemed necessary or proper by the City in public rights-of-way occupied by the new DAS/Small Cell structure.

5. Equipment cabinets including small cell towers. Equipment shelters or cabinets shall be consistent with the general character of the neighborhood and historic character if applicable. Equipment shelters or cabinets shall be screened from the public view by using landscaping, or materials and colors consistent with the surrounding backdrop.

    a. Screening enclosures shall be allowed when the design is architecturally compatible with the building.

    b. Screening materials shall consist of materials and colors consistent with the surrounding backdrop and/or textured to match the existing structure.

    c. The use of foliage and vegetation around ground equipment may be required based on conditions of the specific area where the ground equipment is to be located.

6. Sounds. No unusual sound emissions such as alarms, bells, buzzers, or the like are permitted and shall be consistent with City Code. Sounds shall not exceed 65 dba at any exterior line of a property in a commercial district and 55 dba at any exterior line of a property in a residential district.

7. Streamlined processing for DAS/Concealed small cell facilities within public right-of-way. An applicant for a DAS/Concealed small cell facility within a public right-of-way shall be notified by the City within thirty (30) days of submittal of its application as to any deficiencies and request resubmittal. If no notice is given, the application shall be deemed complete. The City shall process such application once complete within one hundred fifty (150) days of receipt or the application will be deemed granted. New freestanding DAS and Concealed small cell facilities located outside of a right-of-way shall be reviewed in accordance with 1705.04 (17) below.

8. Impact Fee Calculations.

    a. For the purposes of impact fee calculation, the floor area for a wireless service facility shall be considered a commercial use and shall include the total square footage of all equipment enclosures and the areas of the antenna- supporting structure foundation at or above grade.

    b. The following shall be considered as development area and shall be required to meet the setbacks and open space ratio requirements for the land use district where they are located:

        i. The area beneath all equipment enclosures;

        ii. The area of the antenna-supporting structure foundation at or above grade;

        iii. The area beneath ancillary structures;

        iv. The area inside the antenna-supporting structure framework.

B. DAS Hub Development Standards Setbacks for DAS hubs outside of the right-of-way shall meet the setback standards of the underlying zoning district.

9. DAS Hub. Equipment shelters or cabinets shall be consistent with the general character of the neighborhood and historic character if applicable. Equipment shelters or cabinets shall be screened from the public view by using landscaping, or materials and colors consistent with the surrounding backdrop.

    a. Screening enclosures shall be allowed when the design is architecturally compatible with the building

    b. Screening materials shall consist of materials and colors consistent with the surrounding backdrop and/or textured to match the existing structure.

    c. The use of foliage and vegetation around ground equipment may be required based on conditions of the specific area where the ground equipment is to be located.

1705.04 Concealed macro or replacement tower outside the right-of-way.

A. The following standards apply to new or replacement concealed wireless service facilities:

1. Setbacks. Concealed facilities shall meet the minimum setback requirements for the zoning district. Notwithstanding the above requirement, if a concealed antenna is to be located on a utility pole, light standard or similar pole within a right-of-way, and an increase in height is required to accommodate the concealed antenna, then provided that the increase in height (including antennas and antenna arrays) is less than or equal to the greater of 10% of the existing pole height or 10 feet, then minimum setbacks for the zoning district within which it is located would not have to be met. However, if an increase in pole height within a right-of-way is greater than 10% of the existing pole height or 10 feet, (including antennas and antenna arrays) is required, then the minimum setbacks for the zoning district shall be satisfied. If a concealed antenna is to be located on a utility pole, light standard or similar pole outside a right-of-way, and an increase in height is required to accommodate the concealed antenna, then provided that the increase in height (including antennas and antenna arrays) is less than or equal to the greater of 10% of the existing pole height or 20 feet, then minimum setbacks for the zoning district within which it is located would not have to be met. However, if an increase in pole height outside a right-of-way is greater than 10% of the existing pole height or 20 feet, (including antennas and antenna arrays) is required, then the minimum setbacks for the zoning district shall be satisfied.

2. Construction. No new or replacement concealed wireless service facilities shall be guyed or have a lattice type construction.

3. Structural Integrity.

    a. The entire tower and all appurtenances shall be designed pursuant to the design requirements of the most current edition of the IBC adopted by the City of Sedona. In addition, the entire tower or base station and all appurtenances shall be designed pursuant to the design requirements of ASCE 7, including wind speed design requirements, and tower loading/wind design requirements of EIA/TIA 222-G, Series II, including any subsequent modification to those specifications.

    b. The new tower shall be designed to accommodate the maximum amount of wireless service equipment, including that of other wireless service providers. The exact amount of potential additional equipment to be accommodated shall be agreed upon during a pre-application conference and recorded in a Letter of Understanding resulting from the conference. In all cases, the minimum number of collocated facilities on a new tower between 60 and 70 feet shall be 3.

4. Aesthetics.

a. No concealed facility, whether fully enclosed within a building or otherwise, shall have antennas, antenna arrays, transmission lines, equipment enclosures or other ancillary equipment that is readily identifiable from the public domain as wireless communications equipment. Examples of concealed facilities include, but are not limited to, flagpoles, light standards, utility poles, church steeples, bell towers, clock towers, chimneys, louvers, and artificial trees.

b. Concealed wireless service facilities shall be placed and constructed in such a manner as to be compatible with the existing structure or surrounding natural terrain. There shall be as little contrast as possible between the communications equipment and the structure or natural terrain.

5. Placement of Equipment for Pole-Mounted Antennas. Any ground-mounted equipment and equipment shelters shall be located outside of the public right-of-way. Such ground-mounted equipment and equipment shelters shall be painted to comply with the color requirements of SLDC 904, and shall be screened from public view with appropriate landscaping. In the alternative, equipment may be mounted on the pole; provided, that access to the pole and to any other services or equipment above it is not impeded. Pole-mounted equipment shall also be designed and placed to be aesthetically compatible with existing and proposed uses and as visually inconspicuous as possible.

6. Structural Integrity.

a. The entire tower or base station and all appurtenances shall be designed pursuant to the design requirements of the most current edition of the IBC adopted by the City of Sedona. In addition, the entire tower or base station and all appurtenances shall be designed pursuant to the design requirements of ASCE 7, including wind speed design requirements, and tower loading/wind design requirements of EIA/TIA 222-G, Series II, including any subsequent modification to those specifications.

b. The new tower shall be designed to accommodate the maximum amount of wireless service equipment, including that of other wireless service providers. The exact amount of potential additional equipment to be accommodated shall be agreed upon during a pre-application conference and recorded in a Letter of Understanding resulting from the conference. In all cases, the minimum number of collocated facilities on a new tower between 60 and 70 feet shall be 3.

7. Sounds. Sounds. No unusual sound emissions such as alarms, bells, buzzers, or the like are permitted and shall be consistent with City Code. Sounds shall not exceed 65 dba at any exterior line of a property in a commercial district and 55 dba at any exterior line of a property in a residential district.

8. Radio Frequency Emissions. The radio frequency emissions shall comply with FCC standards for such emissions, as set forth in 47 CFR 1.1307, 1.310, 2.091 or 2.093, as applicable (*Report and Order*, ET Docket 93-62 (Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation), 11 FCC Rcd 15123 (1996); *Second Memorandum Opinion and Order and Notice of Proposed Rule Making*, ET Docket 93-62 (WT Docket 97-192), 12 FCC Rcd 13494 (1997). In particular, the proposed facility, individually and cumulatively, shall not exceed the maximum permissible exposure level to the general public of approximately 580 microwatts per square centimeter.

9. Security. An opaque fence or masonry wall no greater than 8 feet in height from finished grade shall be provided around the perimeter of all development areas for ground-mounted wireless service facilities. The decision to provide either a fence or a wall shall rest with the Commission or Council, as applicable. If a fence is used to enclose the site, the fence shall be constructed of wire mesh, metal picket, or an alternative material as

recommended by the Director and approved by Commission or Council. If a wall is used to enclose the site, the wall shall have a decorative finish of native stone, stucco, split-faced block, brick, or an alternative material as recommended by the Director and approved by Commission or Council. Access to the development area shall be through a locked gate.

10. Landscaping. Landscaping and buffering shall be required around the perimeter of development areas, except that the Planning and Zoning Commission may waive the any applicable landscaping requirements as outlined in SLDC on 1 or more sides of the development areas or allow the placement of required landscaping elsewhere on the development area when the required landscape area is located adjacent to undevelopable lands or lands not in public view. Landscaping shall be installed on the outside of the perimeter fence or wall. Existing vegetation shall be preserved to the maximum extent practicable and may be used as a substitute for or in supplement towards meeting the landscaping requirements, subject to approval by the Planning and Zoning Commission or City Council, as applicable. Landscaping shall be placed in a manner so as to maximize the screening between residential areas and the wireless service facility and minimize the view of the facility from any residential areas.

11. Signage.

    a. The only signage that is permitted at each tower and base station shall be informational (and shall be required), for the purpose of identifying the tower or base station (such as ASR registration number), as well as the tenants, party responsible for the operation and maintenance of the facility, its current address and telephone number, security or safety signs, and property manager signs (if applicable). Identification signage shall not exceed 4 square feet on wireless service facilities.

    b. If more than 220 voltage is necessary for the operation of the facility and is present in a ground grid or in the tower, signs located every 20 feet and attached to the fence or wall shall display in large, bold, high contrast letters (minimum height of each letter: 4 inches) the following: “HIGH VOLTAGE – DANGER.”

12. Control Buildings and Ground Mounted Equipment

    a. The control buildings shall be designed to be architecturally compatible with adjacent buildings and shall comply with the provisions of Articles 9 and 10 SLDC. The control buildings shall not be placed in minimum setback areas as required in Article 6 SLDC, nor shall they encroach into required landscape areas.

    b. Ground-mounted equipment shall not be visible from beyond the boundaries of the site and shall be screened by a solid wall or fence and dense landscaping materials as described in subsections 1705.01(K) and (L) of this section.

13. Maintenance. Wireless service facilities shall be maintained in compliance with standards contained in applicable state or local Building Codes and the applicable health and safety standards established by the FCC or other bodies having jurisdiction, as amended from time to time.

14. Impact Fee Calculations.

    a. For the purposes of impact fee calculation, the floor area for a wireless service facility shall be considered a commercial use and shall include the total square footage of all equipment enclosures and the areas of the antenna- supporting structure foundation at or above grade.

b. The following shall be considered as development area and shall be required in order to meet the setbacks and open space ratio requirements for the zoning district where they are located:

i. The area beneath all equipment enclosures;

ii. The area of the antenna-supporting structure foundation at or above grade;

iii. The area beneath ancillary structures;

iv. The area inside the antenna-supporting structure framework.

1705.05 New Non-Concealed Macro Towers.

A. The following standards apply to new towers:

1. Setbacks. New towers shall be located as follows:

a For new wireless service facilities outside of the ROW, the set back shall be away from public ROW by a minimum distance of 1 foot for each 1 foot of tower height.

b Away from single family residential use properties by a minimum distance of 100% of the tower height;

c Notwithstanding the above requirements, if the antenna-supporting structure has been constructed using "breakpoint" design technology, the minimum setback distance shall be equal to 110% of the distance from the top of the structure to the "breakpoint" level of the structure. For example, on a 100-foot-tall monopole with a "breakpoint" at 80 feet, the minimum setback distance would be 22 feet (110% of 20 feet, the distance from the top of the monopole to the "breakpoint"). Certification by an Arizona professional engineer of the "breakpoint" design and the design's fall radius shall be provided together with the other information required in SLDC 1704.05

2. Height. The overall height of any tower, antenna and/or base station outside of the ROW shall not be greater than a maximum of 70 feet. "Height" for all purposes in this section shall mean the linear distance from the ground to the highest physical point on the antenna-supporting structure, including all antennas and antenna arrays.

3. Construction. New towers and base stations shall be in accordance with the prescribed preferences in SLDC1704.01(C)

4. Structural Integrity.

a. The entire tower or base station and all appurtenances shall be designed pursuant to the design requirements of the most current edition of the IBC adopted by the City of Sedona. In addition, the entire tower or base station and all appurtenances shall be designed pursuant to the design requirements of ASCE 7, including wind speed design requirements, and tower loading/wind design requirements of EIA/TIA 222-G, Series II, including any subsequent modification to those specifications.

b. The new tower shall be designed to accommodate the maximum amount of wireless service equipment, including that of other wireless service providers. The exact amount of potential additional equipment to be accommodated shall be agreed upon during a pre-application conference and recorded in a Letter of Understanding resulting from the conference. In all cases, the minimum number of collocated facilities on a new tower between 60 and 70 feet shall be 3.

5. Antenna Mounting. Antennas and related service equipment mounted on a structure other than a tower shall be mounted as close to the structure as possible.

6. Lighting.

   a. New towers shall be illuminated in accordance with FAA requirements to provide aircraft obstruction lighting, where required.

   b. All other on-site lighting required for security or emergency purposes shall be in accordance with SLDC 911 and be activated by timers or motion detectors.

7. Collocation Feasibility

   a. No new tower or new base station shall be permitted unless the applicant demonstrates that no existing base station or tower can accommodate the applicant's proposed facility; or that use of such existing facilities would prohibit personal wireless services in the area of the city to be served by the proposed antenna-supporting structure.

   b. Evidence submitted to demonstrate that no existing wireless service facility could accommodate the applicant's proposed facility may consist of any of the following:

      i. No existing wireless service facilities located within the geographic search ring or a ½ mile around the geographic search ring meet the applicant's engineering requirements.

      ii. Existing wireless service facilities are not of sufficient height to meet the applicant's engineering requirements.

      iii. Existing wireless service facilities do not have sufficient structural strength to support the applicant's proposed wireless service facilities and related equipment.

      iv. The applicant demonstrates that there are other limiting factors that render existing wireless service facilities unsuitable.

v.

8. Color.

   a. New non-concealed towers shall be painted to match the background or other accepted contextual or compatible color in accordance with the requirements of Article 9 SLDC, except as required by federal rules or regulations

   b. If permitted, non-concealed antenna and related service equipment attached to towers and base stations shall be of a color compatible with the color of the supporting structure so as to make the antenna and related service equipment visually unobtrusive in accordance with the provisions of Article 9 SLDC.

9. Radio Frequency Emissions. The radio frequency emissions shall comply with FCC standards for such emissions as set forth in 47 CFR 1.1307, 1.310, 2.091 or 2.093, as applicable (*Report and Order*, ET Docket 93-62 (Guidelines for Evaluating the Environmental Effects of Radiofrequency Radiation), 11 FCC Rcd 15123 (1996); *Second Memorandum Opinion and Order and Notice of Proposed Rule Making*, ET Docket 93-62 (WT Docket 97-192), 12 FCC Rcd 13494 (1997). In particular, the proposed facility, individually and cumulatively, shall not exceed the maximum permissible exposure level to the general public of approximately 580 microwatts per square centimeter.

10. Impact Fee Calculations.

    a. For the purposes of impact fee calculation, the floor area for a wireless service facility shall be considered a commercial use and shall include the total square footage of all equipment enclosures and the areas of the antenna- supporting structure foundation at or above grade.

b. The following shall be considered as development area and shall be required in order to meet the setbacks and open space ratio requirements for the zoning district where they are located:

v. The area beneath all equipment enclosures;

vi. The area of the antenna-supporting structure foundation at or above grade;

vii. The area beneath ancillary structures;

viii. The area inside the antenna-supporting structure framework.

11. Security. An opaque fence or masonry wall no greater than 8 feet in height from finished grade shall be provided around the perimeter of all development areas for ground-mounted wireless service facilities. The decision to provide either a fence or a wall shall rest with the Commission or Council, as applicable. If a fence is used to enclose the site, the fence shall be constructed of wire mesh, metal picket, or an alternative material as recommended by the Director and approved by Commission or Council. If a wall is used to enclose the site, the wall shall have a decorative finish of native stone, stucco, split-faced block, brick, or an alternative material as recommended by the Director and approved by Commission or Council. Access to the development area shall be through a locked gate.

12. Landscaping. Landscaping and buffering shall be required around the perimeter of development areas, except that the Planning and Zoning Commission may waive the any applicable landscaping requirements as outlined in SLDC on 1 or more sides of the development areas or allow the placement of required landscaping elsewhere on the development area when the required landscape area is located adjacent to undevelopable lands or lands not in public view. Landscaping shall be installed on the outside of the perimeter fence or wall. Existing vegetation shall be preserved to the maximum extent practicable and may be used as a substitute for or in supplement towards meeting the landscaping requirements, subject to approval by the Planning and Zoning Commission or City Council, as applicable. Landscaping shall be placed in a manner so as to maximize the screening between residential areas and the wireless service facility and minimize the view of the facility from any residential areas.

13. Signage.

a. The only signage that is permitted at each tower and base station shall be informational (and shall be required), for the purpose of identifying the tower or base station (such as ASR registration number), as well as the tenants, party responsible for the operation and maintenance of the facility, its current address and telephone number, security or safety signs, and property manager signs (if applicable). Identification signage shall not exceed 4 square feet on wireless service facilities.

b. If more than 220 voltage is necessary for the operation of the facility and is present in a ground grid or in the tower, signs located every 20 feet and attached to the fence or wall shall display in large, bold, high contrast letters (minimum height of each letter: 4 inches) the following: “HIGH VOLTAGE – DANGER.”

14. Control Buildings and Ground Mounted Equipment

a. The control buildings shall be designed to be architecturally compatible with adjacent buildings and shall comply with the provisions of Articles 9 and 10 SLDC. The control buildings shall not be placed in minimum setback areas as required in Article 6 SLDC, nor shall they encroach into required landscape areas.

b. Ground-mounted equipment shall not be visible from beyond the boundaries of the site and shall be screened by a solid wall or fence and dense landscaping materials as described in subsections 1705.01(K) and (L) of this section.

15. Maintenance. Wireless service facilities shall be maintained in compliance with standards contained in applicable state or local Building Codes and the applicable health and safety standards established by the FCC or other bodies having jurisdiction, as amended from time to time.

16. Adverse Effects on Properties.

a. New towers and base stations shall be configured and located in a manner that shall minimize adverse effects including visual impacts on adjacent properties. The applicant shall demonstrate that alternative locations, configurations, and facility types have been examined and shall address in narrative and graphic form the feasibility of any alternatives that may have fewer adverse effects on adjacent properties than the facility, configuration, and location proposed.

b. An applicant shall demonstrate through the photo-simulation requirements under SLDC 1704.05 that the project design employs each of these attributes in a manner that minimizes adverse effects to the greatest extent feasible.

c. The following attributes shall be considered from vantage points at adjacent properties, roadways and occupied structures:

i. a. Height and location;

ii. b. Mass and scale;

iii. c. Materials and color;

iv. d. Illumination;

v. e. Existing and proposed vegetation and intervening structures.

17. Sounds. Sounds. No unusual sound emissions such as alarms, bells, buzzers, or the like are permitted and shall be consistent with City Code. Sounds shall not exceed 65 dba at any exterior line of a property in a commercial district and 55 dba at any exterior line of a property in a residential district.

18. Timing for Review of New Tower Applications. A new PWSF tower, whether concealed or non-concealed, shall be reviewed and a decision rendered within one hundred and fifty (150) days of receipt of the application, subject to any applicable tolling for application deficiencies and resubmissions, so long as the applicant demonstrates that the facilities will be used, immediately upon completion of construction, to provide personal wireless services, or within such other mutually agreed upon time. ("Spec" towers are not entitled to review and decision within 150 days, or to any of the other protections of the Telecommunications Act.) Construction permits issued for new PWSF towers shall be valid for a term of one hundred eighty (180) days and shall lapse and be void if construction of the contemplated PWSF tower is not completed within that time.

1705.06 AM/FM/TV/DTV Broadcasting Facilities. The following standards apply to new AM/FM/DTV broadcasting facilities:

A. An antenna, antenna array and/or antenna-supporting structure for AM/FM/TV/DTV facilities licensed by the Federal Communications Commission shall only be permitted in zoning districts C-1, C-2 or C-3 in the city.

B. Any applicant for the construction or installation of any antenna, antenna array and/or antenna-supporting structure for use as an AM, FM, TV, or DTV broadcasting facility must demonstrate, prior to submitting an application, a valid FCC construction permit for the proposed location (showing NAD

27 coordinates and appropriate conversion to NAD 83 coordinates) together with an FAA Determination of No Hazard to Air Navigation (Form 7460) for the same coordinates.

C. An antenna, antenna array and/or antenna-supporting structure for use as an AM, FM, TV or DTV broadcasting facility shall, in no event, exceed 299 feet in height.

D. Any antenna-supporting structure, equipment enclosures and ancillary structures shall meet the minimum setback requirements for the land use district where they are located, except that where the minimum setback distance for an antenna-supporting structure from any property line or public right-of-way is less than the height of the proposed antenna-supporting structure, the minimum setback distance shall be increased to equal the height of the proposed antenna-supporting structure. However, in all instances, the minimum setback distance from the setback line of any residentially zoned property, with a constructed residence or potential residence, shall be at least 200% of the height of the entire proposed structure.

E. The entire antenna-supporting structure and all appurtenances shall be designed pursuant to the wind speed design requirements of ASCE 7-95, including any subsequent modification to those specifications.

F. Any facility shall be illuminated in accordance with FAA requirements to provide aircraft obstruction lighting, where required. Any lighting required by the FAA must be of the minimum intensity and number of flashes per minute (such as the longest duration between flashes) allowable by the FAA. No strobes or other lighting shall be permitted unless required by the FAA.

G. New towers shall maintain a galvanized gray finish or other accepted contextual or compatible color, except as required by federal rules or regulations.

H. The radio frequency emissions shall comply with FCC standards for such emissions on an individual and cumulative basis with any adjacent facilities. The applicant shall certify that any and all new services shall cause no harmful interference to the existing City of Sedona Public Safety Communications equipment.

I. Applicants shall provide for a fence or wall around the proposed facility that meets the requirements of subsection 1705.01(K) of this section.

J. Landscaping and buffering shall be required around the perimeter of development areas, as required by SLDC 910, except that the Planning and Zoning Commission may waive the required landscaping otherwise required under SLDC 910 on 1 or more sides of the development areas or allow the placement of required landscaping elsewhere on the development area when the required landscape area is located adjacent to undevelopable lands or lands not in public view. Alternative landscaping may be approved by the Planning and Zoning Commission. Landscaping shall be installed on the outside of the perimeter fence or wall.

K. The only signage that is permitted upon an antenna-supporting structure, equipment enclosures, or fence (if applicable) shall be informational, and for the purpose of identifying the tower (such as ASR registration number), as well as the party responsible for the operation and maintenance of the facility, its current address and telephone number, security or safety signs, and property manager signs (if applicable). If more than 220 voltage is necessary for the operation of the facility and is present in a ground grid or in the tower, signs located every 20 feet and attached to the fence or wall shall display in large, bold, high contrast letters (minimum height of each letter: 4 inches) the following: “HIGH VOLTAGE – DANGER.”

L. Grading and Drainage - Applicant shall furnish evidence that the proposed facility does not violate requirements in SLDC Article 8.

M. Adverse Effects on Adjacent Properties.

1. New towers shall be configured and located in a manner that shall minimize adverse effects including visual impacts on adjacent properties. The applicant shall demonstrate that alternative locations, configurations, and facility types have been examined and shall address in narrative and graphic form the feasibility of any alternatives that may have fewer adverse effects on adjacent properties than the facility, configuration, and location proposed.

2. The following attributes shall be considered from vantage points at adjacent properties, roadways and occupied structures:

a. Height and location;

b. Mass and scale;

c. Materials and color;

d. Illumination;

e. Existing and proposed vegetation and intervening structures; and

f. Overall aesthetics of the proposed structure.

1706 Noncommercial amateur wireless facility.

An applicant proposing an amateur wireless facility which is 65 feet or greater in all zoning districts or is not located either directly behind the rear structural wall of a residential or commercial structure, or is attached to the rear or side of a residential or commercial structure, shall obtain a conditional use permit as set forth in SLDC 402, Conditional uses, relative to the review criteria provided in SLDC 1704.03, prior to submittal for building permit approval and the initiation of construction.

A. Application Requirements.

1. Site Plan application in accordance with the Site Plan requirements of the codes of the city.

2. Applicant's copy of current, valid FCC license for amateur radio operation.

3. Site Plan sketch showing all proposed structures (such as support structures, anchorage) and setbacks from such structures to property boundaries.

B. Approval Standards. Approval standards for amateur wireless facility in excess of 65 feet in all zoning districts:

1. The facility shall be accessory to a legal, principal use on site (such as a residence).

2. Structures, including towers, shall meet the setback requirements for primary structures for the zoning district in which the proposed facility shall be located.

3. Applicant shall commit in writing that the facility will be erected in accordance with manufacturer's recommendations.

4. If more than 220 voltage is present in the ground grid or in the tower, a sign shall be attached to the tower and shall display in large bold letters the following: "HIGH VOLTAGE – DANGER."

5. Applicant shall furnish evidence that the proposed facility meets or exceeds FCC guidelines for radio frequency radiation exposure.

6. Applicant shall furnish evidence that the proposed facility does not violate requirements in SLDC Article 8.C. Collocation Prohibited. Collocation of any antenna, antenna arrays, microwave or similar

type equipment not used for the purposes of the amateur wireless facility is prohibited.

1707 Interference with public safety communications.

In order to ensure that the city's public safety radio services will be free from objectionable technical interference, all applicants requesting a permit for a wireless communications facility or an AM/FM/TV/DTV facility shall agree, in addition to any other requirements:

A. To demonstrate compliance with good engineering practices;

B. To provide the city a copy of all inter-modulation studies submitted to the FCC;

C. Not to induce objectionable technical interference to the city's public safety radio services;

D. To comply with FCC regulations regarding susceptibility to radio frequency interference, frequency coordination requirements, general technical standards for power, antenna, bandwidth limitations, frequency stability, transmitter measurements, operating requirements, and any and all other federal statutory and regulatory requirements relating to radio frequency interference (RFI);

E. In the case of collocation of telecommunications facilities either in the same location or on the same tower as the city's, to not cause or permit to be caused by its transmissions or other activities on the premises, objectionable technical interference of any kind whatsoever to the broadcasting transmissions, reception, or electromagnetic communications of the city; and

F. To pay for any studies requested by the City's Director to determine if the applicant's telecommunications facilities are causing objectionable technical interference; and

G. Upon notification by the Director, if the operations of the applicant are causing objectionable technical interference, to immediately undertake all steps necessary to determine the cause of and eliminate such interference utilizing the procedures set forth in the joint wireless industry-public safety "Enhanced Best Practices Guide," released by the FCC in Appendix D of FCC 04-168 (released August 6, 2004), including the "Good Engineering Practices," as may be amended or revised by the FCC from time to time in any successor regulations, at the cost of the applicant. If said interference continues for a period in excess of 48 hours after notice from the Director, the city shall have the right to cause the applicant to cease operating the equipment that is causing the objectionable technical interference or to reduce the power sufficiently to ameliorate the objectionable technical interference until the condition causing said interference has abated.

1708 Abandonment and removal.

A. Towers and base stations shall be removed, at the owner's expense, within 180 days of cessation of use unless the abandonment is associated with a mitigation as provided in the 'Mitigation' section of this Ordinance, in which case the removal shall occur within ninety (90) days of cessation of use.

B. An owner wishing to extend the time for removal or reactivation shall submit an application stating the reason for such extension. The Director may extend the time for removal or reactivation up to sixty (60) additional days upon a showing of good and unique cause. If the tower or base station is not removed within this time, the city may give notice that it will contract for removal within thirty (30) days following written notice to the owner. Thereafter, the city may cause removal at the cost of the owner.

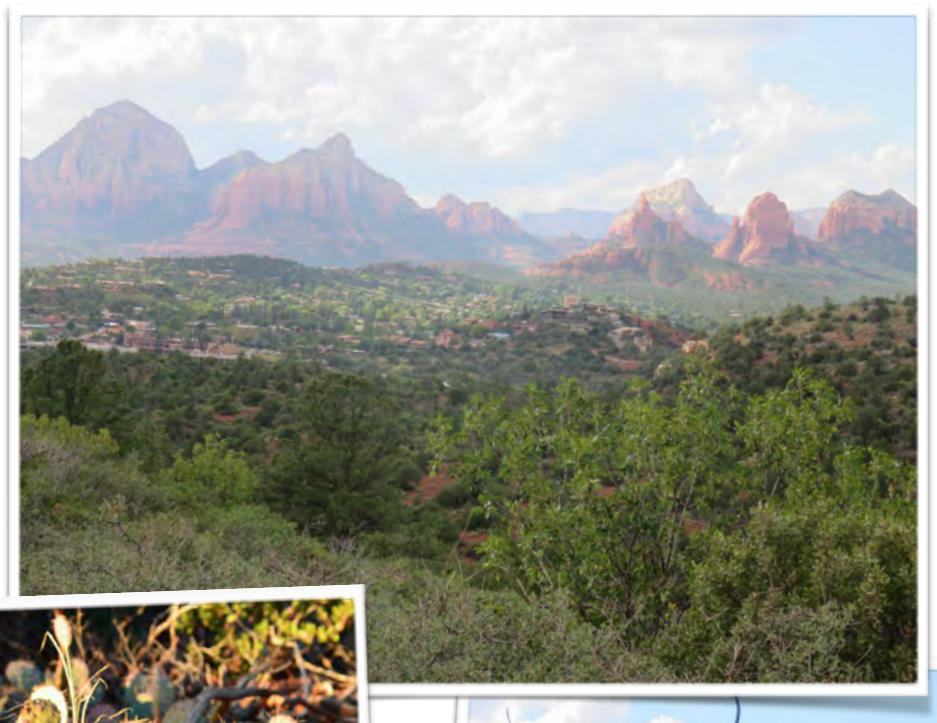
C. Upon removal of the tower or base station, the site shall be returned to its natural state and topography and vegetation consistent with the natural surroundings or consistent with the current uses of the surrounding or adjacent land at the time of removal, excluding the foundation, which does not have to be

removed. The Director may extend the time for returning the site to its natural state, topography and vegetation up to sixty (60) additional days upon a showing of good and unique cause. If the site improvements are not made, the city may give notice that it will contract for the improvements within thirty (30) days following written notice to the owner. Thereafter, the city may contract the improvements at the cost of the owner.

Back to Staff Report

Wireless Master Plan

City of Sedona, Arizona



Draft

May 4, 2017

Acknowledgements

(inserted at final draft)

Back to Staff Report

Table of Contents

(inserted at final draft)

Preface

Purpose of the Wireless Master Plan

Background

The City of Sedona contracted with CityScape Consultants, Inc., (CityScape) to develop a Wireless Master Plan (WMP), to best identify the most appropriate locations for future siting of wireless infrastructure. CityScape was contracted to update the City's Land Development Code (LDC) to ensure the local ordinance complies with federal regulations, but still exercises the City's limited authority to influence certain aspects of the infrastructure's placement and appearance.

CityScape developed the Wireless Master Plan in partnership with City staff, local elected and appointed officials, citizenry and industry stakeholders. The WMP is designed to balance the goals of providing good wireless network services throughout the City while minimizing the visual impacts of wireless infrastructure.

The WMP is an illustrative planning tool which includes:

- A short history on wireless telecommunications technology; and
- An overview on network deployment practices; and
- An inventory of existing wireless infrastructure throughout the City; and
- Theoretical propagation mapping; and
- Ten-year projection maps of potential future network deployment patterns; and
- Recommendations designed to meet ten year network deployment objectives; and
- City-owned properties that can be part of a network deployment solution for the wireless industry.

The scope of services for the WMP includes the following five tasks:

- **Task A**: Preliminary research for data assessments and base mapping.
- **Task B**: Infrastructure assessments; kick-off meeting; and initial theoretical root mean square (RMS) mapping.
- **Task C**: Inventory catalogue of existing towers and base stations assessed during the site assessment process.
- **Task D**: Design and development of draft WMP; existing ordinance review and ordinance amendment recommendations.
- **Task E**: Final documents based on review and approval by City staff, appointed and elected officials.

Back to Staff Report

Dual Purpose Concealed Small Cell Facility
Red Rocks Church

Chapter 1

The Telecommunications Industry

Telecommunications is defined as the exchange of information over distances by electronic means and refers to all types of voice, data and or video transmission. Telecommunications includes the transmission of such data via wires or wirelessly and includes a wide range of transmitting technology such as telegraph, telephones, microwave, fiber optics, satellite, radio and television broadcasting and the Internet.

Traditional landline telephone service utilizes an extensive network of copper lines to transmit and receive phone calls between parties. Wireless telephony, also known as wireless communications, includes mobile phones, pagers, and two-way enhanced radio systems. It relies on the combination of landlines, cable and an extensive network of elevated antennas most typically found on communication towers to transmit voice and data information.

The current evolution of personal wireless technology is benchmarked by the underlying network platforms and referenced as first, second, third, fourth and fifth generations of wireless deployment (1G, 2G, 3G, 4G and 5G respectively). Copper based connectivity has been the mainstay of the initial wireless technology evolution. With the evolution to 3G and beyond copper wire based technology is no longer sufficient. The popularity of the Smartphone, the demand for faster Internet speed and more bandwidth is leading to the migration from copper to fiber optic communications. Fiber optic communications is a method of transmitting the information by sending pulses of light through an optical fiber. Fiber optics is preferred when high bandwidth or long distance is required. Wireless microwave is used when fiber optics is not available or economical.

Satellite technology, while initially promising, currently cannot compete well with ground-based services due to the physics of speed of light and the long delays created by the great distance between the satellites and end user. Present demand for large data usage compounds complications with this type of technology.

The development of 5G wireless technologies will exponentially expand wireless network capacity by incorporating multiple-input and multiple-output (MIMO) antenna technologies and a wide range of frequency spectrum between 5 and 95 gigahertz (GHz). Fifth Generation advanced technologies will result in much faster download speeds for all devices including Smartphones, other smart devices, and machine-to-machine (M2M) data transmission between automotive vehicles other interconnected equipment such as transportation and logistics, home health care, manufacturing and public safety.

Wireless Handset Device Evolution

1G, 1984 Mobria Cell Phone
(Image: J Bundy)

During the early 1980's, the first generation, operating in 850 megahertz (MHz) band cellular system, was launched nationwide. The 1G portable cell phones were boxy in shape and operated much like a small AM or FM radio station. The 850 MHz frequency also known as low band, allows the radio signal from the antenna on the tower to travel beyond five miles provided the transmitting signal has a clear line of sight. Customers using a cell phone knew when they traveled outside of the service area because they would hear a static sound on the phone similar to the sound of a weak AM radio station. The signal either faded or remained crackling until the subscriber was within range of another facility.

Originally, the 850 MHz band only supported an analog radio signal. By 2010, 1G was phased out of network design in most urban markets, but still serves as a platform of initial coverage in remote and undeveloped areas.

Early 1992 marked the deployment of 2G technologies operating in the 1900 MHz frequency. The 1900 MHz frequency, also known as high band, converted the technology from an analog to digital signal and primarily allowed for simultaneous phone calls over the digital signal. Calls placed on the 1900 MHz system were audibly clearer than those made on an analog signal. The handsets were much smaller than the 1G cellular phones and the first handsets provided low speed data services such as paging and limited text messaging through the handheld unit. However, 2G had some network functionality trade-offs. The use of high band frequency offers a static free signal but the technology change reduces the service area causing a higher rate of disconnects or dropped calls. The network solution to reduce the number and frequency of dropped calls required significantly more infrastructure for several reasons. First, the propagation signal in the high band does not travel as far as the low band signal. Thus, the number of required facilities almost tripled just to provide basic 2G coverage in the same geographic area as a 1G service area. Second, the industry was reluctant to share tower space with a competitor and many service providers resisted collocating on the same tower. And third, subscriber base and usage grew rapidly so the industry needed more sites to improve network coverage demands by their customers.

2G and 4G devices
(Image: Answers.com)

Third generation wireless was launched in the early 2000's and offered improved mobile download speeds and increased penetration of signal strength for indoor environments. This technology also permitted multi-media messaging (MMS) which increased the character limit on text messaging, allowed photo transfer and provided elementary applications and video conferencing.

Fourth generation (4G) wireless handsets were introduced in 2010 and with the implementation of the Smartphone it offered a wide variety of new tools and services that provided access to e-mail, news, music and videos. Newer technologies incorporated better cameras for still photos and video, global positioning services (GPS), Internet commerce, and millions of downloadable applications for just about any use.

One of 4G's greatest advancements is the transition to Long Term Evolution (LTE) services as the global cellular network operating standard. Network operating platforms, nationally and internationally, were inconsistent between markets during the implementation of 3G networks because of the adoption of Time Division Multiple Access (TDMA) and Code Division Multiple Access (CDMA) as competing operating platforms. The new universal LTE and LTE-Advanced platforms promote efficient use of spectrum, faster download speeds and continued use of smart devices. The need for additional 4G infrastructure is significant nationwide and the continued deployment of new towers and base stations will be necessary as the industry transitions to 5G networks.

Technology advancements in 2015 resulted in leading edge Smartphones and devices that support video streaming and remote access to Internet based cloud data storage requiring large amounts of bandwidth. Service providers continue to upgrade existing networks by: 1) adding additional infrastructure to improve and increase network capacity; 2) purchasing additional licenses in the 700, 1700-1800, and 2100-2400 MHz frequencies; 3) upgrading equipment at the towers and base stations by adding more antennas and feed lines; and 4) adding remote radio units (RRU) on existing towers to increase efficiency, signal strength and capacity.

In summary, first and second generations provided the initial launch of personal wireless service. Third generation improved data transfer with the addition of MMS and provided some simple applications and games. Fourth generation substantially increased download speeds allowing interactive services on the Smartphone.

Network design and testing for 5G technology is currently underway. Deployments will expand wireless services to the next level and focus on implementation into full broadband service. Developments of 5G at the time of this publication are in the early testing processes therefore network standards are not finalized. Opportunities of 5G will open for additional providers beyond those currently authorized in Sedona. The implementation is highly technical and while many of the same frequencies will be used, all providers will expand into the Super High Frequencies (SHF) between 3 gigahertz (GHz) to 30 GHz and Extremely High Frequencies (EHF), between 30 GHz and 300 GHz spectrum. Fifth generation networks will require lower antenna elevations and facilities to be spaced closer together utilizing smaller antenna. The spacing between facilities is predicted to be between 165 feet to 1,650 feet

5G Technology
(Image hsc.com)

depending on the population density of the area to be served. Fifth generation networks are anticipated to be sufficient to compete directly with today's fastest computer networks with download speeds above the 100 Megabits per second (Mbps). Fifth generation technologies and beyond will allow all forms of communications and entertainment to be streamed, resulting in the eventual elimination of digital subscriber lines (DSL) and cable/satellite TV and will provide the underlying communication technology that will allow vehicles to drive themselves. Like all previous generations, 5G and beyond will require more wireless infrastructure.

Antennas and Antenna Arrays

Antennas are used for both transmitting and receiving signals. A single omni-directional (whip) antenna, see Figure 1, can be used to transmit and or receive two-way radio, cellular, Personal Communication Systems (PCS), Enhanced Specialized Mobile Radio (ESMR) or Specialized Mobile Radio (SMR) signals. A sectionalized panel antenna array is used to transmit and receive cellular, digital or ESMR wireless telecommunication signals, see Figure 2.

Figure 1:
Omni Whip Antenna

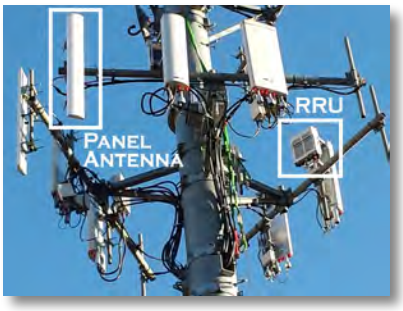


Figure 2:
Panel Antennas with RRU's

Most service providers are now mounting a power amplifier unit on the tower close to the antenna. The top mounted amplifiers (TMA) and remote radio units (RRU), see Figure 2, provide greater efficiencies and better service in both transmitting and receiving modes. However, these improvements come at the cost of higher visual impacts and space allocation caused by the increased amount of tower mounted equipment on the infrastructure.

Microwave dish antennas, as shown in Figure 3, are used by service providers to send the signal received by the antenna to the supporting network and vice versa. Point-to-point microwave antennas are used to provide wireless coverage over greater distances and when fiber optics is unavailable. Microwave is frequently used to connect towers in remote locations like Schnebly Hill to the urban areas of Sedona.

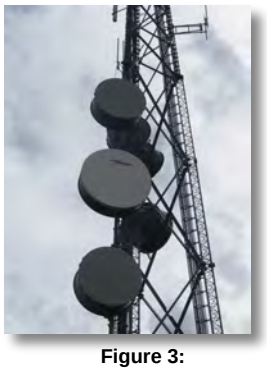


Figure 3:
Microwave Dish Antennas

Macro Towers

As defined in the Federal Communications Commission (FCC) Report and Order, released October 21, 2014 in WT Docket 13-283, commonly referenced as Report and Order, a wireless tower is "a structure built for the sole or primary purpose of supporting any commission licensed or authorized antennas and their associated facilities". Macro towers are high powered sites intended to cover sizable geographic areas for basic voice service, texting capabilities and Internet access. These taller towers require a strong structure and have large antenna with coaxial

cables connecting the antenna to the ground equipment. The macro cell site footprint is large with infrastructure spaced between one and three miles apart. These facilities can accommodate between 1,750 and 2,500 devices simultaneously for voice and texting, but many less devices when large amounts of data, such as streaming video is being used. Macro towers can either be concealed or non-concealed and comprise the majority of the towers deployed and constructed to date within Sedona.

Concealed towers as shown in Figure 4 includes:

Guyed - A style of tower consisting of a single truss assembly composed of sections with bracing incorporated. The sections are attached to each other, and the assembly is attached to a foundation and supported by a series of wires that are connected to anchors placed in the ground or on a building.

Lattice - A self-supporting tapered style of tower that consists of vertical and horizontal supports with multiple legs, cross bracing and metal strips or bars to support antennas. This type of tower is designed to support itself without the use of guy wires or other stabilization devices.

Monopole - A style of freestanding tower consisting of a single shaft usually composed of two (2) or more hollow sections attached to a foundation. This type of tower is designed to support itself without the use of guy wires or other stabilization devices. Monopoles are mounted to a foundation that rests on or in the ground. They are designed so that all feed lines can be installed within the shaft of the structure so they are not visible.

Figure 4: Non-concealed Macro Towers - Guyed - Lattice - Monopole

A concealed tower is one that is not readily identifiable as a wireless facility and is designed to visually blend in with its surroundings. Concealed towers are disguised to look like something other than a tower. For example in Figure 5 a faux tree is painted and have manufactured branches covering the monopole and antenna while fiberglass shields cover the antenna on the flagpole and bell tower. There are many other designs of camouflaged sites and many are often difficult to detect.

Figure 5: Concealed Macro Towers - Monopine, Flag Pole - Bell Tower

Base Stations

A base station as defined in the FCC Report and Order is, "equipment and non-tower, supporting structure at a fixed location that enables commission licensed or authorized wireless communications between user equipment and a communications network". Examples include transmission equipment mounted on top of buildings, water tanks, tall signage, light poles, silos or any other above ground structure not built for the sole purpose of supporting wireless equipment. Similar to macro towers, base stations can also be concealed. Some types of antenna concealment include faux dormers and chimneys, elevator shafts encasing the antenna feed lines and equipment cabinet, and painted antenna and feed lines to match the color of a building or structure. Examples of base station concealment techniques are shown in Figure 6.

Figure 6: Concealed Base Stations - Light Stanchion - Building Concealment

Electronic Equipment Cabinet and Feed Lines

The electronic equipment used to transmit and receive the radio signals from the antenna is installed within an equipment facility and are either cabinets, shelters, pedestals or other similar enclosures. Copper coaxial cable (coax) or fiber optic (fiber) feed lines are used to connect the antenna on the tower or base station to the ground based equipment. The equipment cabinets shown in Figure 7 are typical for service providers operating in the high band frequencies and ground space requirements for this equipment is estimated to be around ten square feet.

Figure 7: High Band Facility

The electronics equipment used with low band systems generates substantial heat, and therefore the shelters which house the ground equipment are much larger and generally need a minimum of four hundred (400) square feet. The only noise that would typically be generated in the vicinity of any tower or base station would be from an air conditioner or a backup generator that automatically starts in the event of a power failure. Figure 8 shows a typical configuration for low band ground equipment.

Figure 8: Low Band Facility

Network Footprint

Theoretical Root Mean Squared (RMS) maps as depicted in Figure 9 represent cell sites with a connected pattern of overlapping circles that illustrate the coverage area for a tower or base station. A wireless device trying to communicate with another device or with the Internet must be within this network coverage area. Wireless devices outside the cell site coverage area will not function reliably. To design the wireless network, radio frequency (RF) engineers overlay circular cells over the geographic area intended for wireless service. The center dot in the middle of the smaller circle is the theoretical ideal location for a tower or base station to serve an intended coverage area while the outer circles represent the overall coverage area. The smaller circle within each larger circle is called the search area and is considered to be the best location for a new facility. In reality, many cell site patterns are not circular because the coverage area is affected by topography, land cover, climate, type of cell site being constructed and the size and location of the subscriber base.

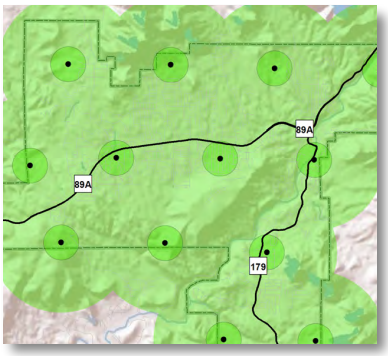


Figure 9: Theoretical RMS Map

Small Cell Sites

There are multiple types of infrastructure that is considered in the small cell category with many options for small cell design. Small cell sites, also known as microcell sites, are connected to form a "mini-network" and are lower powered sites that cover a geographic area less than one mile in diameter. Picocells and femtocells have a much smaller footprint generally less than 820 feet in diameter. All small cell sites accommodate a much lower number of subscribers and simultaneous devices.

Small cell site antennas and feed lines along with any associated equipment is smaller in design and should be mounted at lower elevations and are typically found on light poles, street lights or buildings. Small cell sites can be concealed or non-concealed as shown in Figure 10. The ground equipment consumes less space and can be mounted on the ground, vaulted underground or in or on the structure itself. Small cell sites and nodes are typically installed in densely populated environments such as downtowns, sporting stadiums, malls, office buildings and convention centers.

Figure 10: Small Cell Facilities - Single Node

Also in the small cell category are Distributed Antenna Systems (DAS). DAS is a series of low powered antennas, as shown in Figure 11, connected by fiber optics and often used in higher density populated areas. Distributed antenna systems may be deployed indoors (iDAS) or outdoors (oDAS).

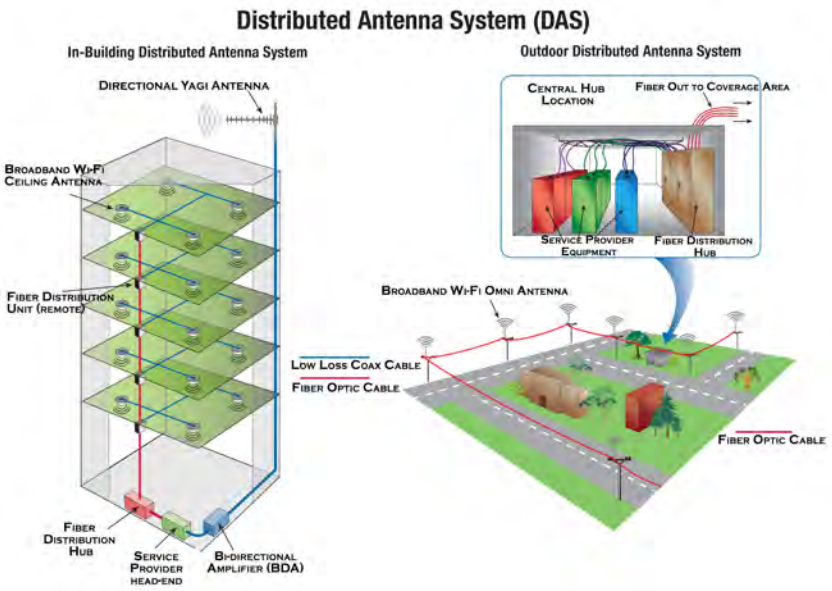


Figure 11: DAS (Image L-Com Global Connectivity)

Technological advances and predicted demand for small cell sites have many infrastructure developers racing to obtain leasing rights and approvals for small cell sites in right-of-ways (ROW's). These companies are looking for quicker approval processes and less cost for deployment. There are pros and cons to these types of installations. The pros of small cells in ROW's is that they can be in closer proximity to residential dwellings and vehicles, they can attach to existing infrastructure and provide much needed capacity relief. A downside to this approach is that ROW applicants may try to bypass the local municipalities in an effort to circumvent the ordinance and aesthetic requirements. Also, depending on what regulations the ROW controller enforces (typically the State) the possibilities of a tall structure in a residential front yard maybe imminent. This scenario has brought a lot of recent attention to the proposed ROW deployment all over the United States. Many local communities are resisting this approach because the idea of a cellular tower in a residential yard is not appealing. More aesthetically pleasing infrastructure would be the street light poles that have a concealed antenna within the structure. Small cells will be needed in residential districts with the coming of the 5G deployment. The wireless industry and local communities must find a middle ground as robust wireless networks will require a combination of both small cell and macro sites to make a complete wireless network system.

Wireless Broadband

The goal for wireless broadband technology is to provide high-speed wireless Internet access or computer networking access over a wide area. However, this technology is using the same medium that was previously intended for voice communications only. High-speed broadband is necessary for Smartphones and tablets but is also laptops, computers and many other wireless devices. The FCC recently revised the definition of broadband to mean Internet access with download speeds of at least 25 megabits per second (Mbps) and upload speeds of at least 3 Mbps. Because of this revised standard there are few wireless service providers that can effectively meet present access speeds. The coverage area for wireless broadband will be smaller

in size in order to meet FCC defined download speed for subscribers. This will result in the need for more wireless infrastructure. For purposes of the WMP, the term broadband will be referenced as wireless Internet since it does not meet the new definition.

For illustrative purposes only and without consideration of any variables the number of tower sites needed to cover an area of approximately five square miles would be:

- 1G - Analog (1 macro site)
- 2G - Digital TDMA (3 macro sites)
- 3G - CDMA/Email/MMS (5 macro sites)
- 4G - LTE/AWS (8 macro or a combination of macro and small sites)
- 5G - Platform TBD (approximately 80 nodes in addition to above)

Wireless Telecommunications Summary

Wireless handset devices used for personal wireless services have changed significantly from the initial launch of cellular phones in the 1980's. From a visual perspective the traditional infrastructure that serves as the network backbone has changed very little. To function best, the service providers still need antennas elevated above tree lines, rooftops and many manmade or natural obstructions. Moisture contained within foliage absorb and refract the signal and create an unpredictable propagation variable. These variable will always be a factor when designing wireless systems. Wireless antennas can function below the tree line but not at the same performance level when compared to antennas placed above the tree line at the same location. For this reason, the industry will continue to prefer placement of their antenna arrays above the tree line or in a favorable location with few manmade obstructions to achieve optimal propagation from the infrastructure so as to maximize their investment in the communities they are servicing. The antenna sizes used have changed minimally over the years. Recent inclusion of remote radio heads and tower mounted amplifiers on the antenna mounting structure will generally result in larger and more complex antenna arrays as compared to the earlier 2G and 3G installations.

The monopole and lattice towers remain the most widely used macro tower nationwide. Concealment techniques continue to be used to mitigate the visual impact of infrastructure in areas identified by local governments with visual concerns. As the industry begins to migrate towards 5G many more small cell sites will be implemented especially in high density areas to meet the demands of the service subscribers.

Mergers and acquisitions will continue and the industry will continue to need more infrastructure for the transition to 5G and beyond.

Chapter 2

Master Plan Development

The WMP Design Process

Many considerations and variables go into the design of the WMP including the size of the area, seasons, tourism, year round residents, topography and location of existing infrastructure in and around the City.

The WMP development process includes:

- Engineering a search radii template and applying it over the jurisdictional boundary of the City to evaluate theoretical build-out conditions; and
- Identifying, assessing, cataloguing and mapping exiting transmission equipment; and
- Forecasting future wireless infrastructure needs based on existing locations, terrain, climate, demographics, gap analysis, population trends, gaps in network coverage and anticipated continued evolution of the industry.

Search Rings For Proposed Coverage Areas

The search area or search ring is part of a site search package provided to a site acquisition consultant who looks for property or existing infrastructure that can be leased to accommodate the required new wireless infrastructure. From an engineering perspective, any location within the search ring is considered to be acceptable however, many times finding an acceptable location within the search ring can be challenging. The relative location of the selected property to the ideal location within the search ring can dictate the required antenna height.

Generally, in areas where signal coverage is the objective, taller macro towers allow the antennas to mount at a higher elevation to serve a larger geographic coverage area and provide collocation opportunity by other service providers. Shorter macro towers limit antenna mounting to lower elevations thus the geographic coverage area is smaller. Additionally shorter macro, micro and small cell towers reduce the number of possible collocations on that tower resulting in a greater number of towers or base stations required within each search ring.

Search Area Radii

Search ring calculations for the low and high band frequencies are shown in Tables 1 and 2. The tables utilize the "Okumura-Hata" propagation path loss formula for low band frequencies, and the "COST-231" formula for high band frequencies. Maximum coverage radii for typical in-vehicle coverage is calculated for various tower heights, reduced by twenty percent to account for a reasonable handoff zone, then divided by four to obtain a search ring radius for each tower height. For example, according to the information in the following tables, a low band antenna

mounted at the 100 foot elevation would have a search ring radius of 0.72 miles, and a radius of 0.36 miles for high band antennas.

ANTENNA MOUNTING HEIGHT	40'	50'	100'	115'
Radius, miles	2.28	2.53	3.6	3.88
Allow for handoff	1.84	2.03	2.88	3.1
Search ring, miles	0.47	0.51	0.72	0.78

Table 1: Okumura-Hata Propagation Path Loss Formula for Low Band Frequencies

ANTENNA MOUNTING HEIGHT	40'	50'	100'	115'
Radius, miles	1.21	1.33	1.82	1.95
Allow for handoff	0.98	1.07	1.46	1.56
Search ring, miles	0.25	0.27	0.36	0.39

Table 2: Cost 231 Formula for High Band Frequencies

The service providers primary objective of the first phase of network development is creating coverage over a projected service area. When network coverage is achieved wireless service providers begin to monitor the number of calls. Once the number of simultaneous calls reaches a predetermined maximum number and the facility cannot support the subscriber base, the wireless network exceeds the capacity design of the system. Exceeding network capacity equates to overloading the network which results in lost service, dropped calls, and the inability to make calls or use the Internet on the wireless device.

Theoretical Root Mean Square Maps

CityScape is often asked to estimate how many towers and base stations it may take to cover a particular geographic area. CityScape uses RMS maps to help the client visualize the number of antenna locations that may be necessary to provide wireless communications coverage for a given geographic study area. This hypothetical network identifies the minimum number of tower or base station locations required for one service provider to provide complete coverage without any considerations for terrain, vegetative cover or subscriber base.

One of the key variables affecting the theoretical coverage analysis is the assumed height of the antennas on the tower or structure. CityScape reviewed the existing tower and base station inventory and applicable height regulations for the City and determined the average tower height used for wireless telecommunications purposes to be around fifty (50) feet. Therefore, the antenna mounting elevation of fifty (50) feet was chosen for the development of the theoretical RMS coverage maps.

The following examples represent a theoretical build-out of equally apportioned antennas mounted at a tower height of 50-feet for a single service provider that excludes topographic, vegetative cover and population density considerations. The black dot within each larger circle indicates the ideal antenna location while the smaller circle within the larger circle represents the acceptable search ring for locating the tower and antennas. Figure 12 illustrates that three (3) towers or base stations equally distributed throughout the City would provide complete low frequency coverage to the defined study area.

Figure 13 illustrates that thirteen (13) locations would be needed to provide complete high frequency coverage to the same geographic area.

Topographic Variable on Theoretical Coverage

As previously described in flat terrain and sparsely populated areas, infrastructure prediction is easier. The service area is dramatically impacted by the type of terrain within the signal line-of-sight. Line-of-sight technology works best with an unobstructed path between the facility and the device, however, typically there are obstructions in the way of the wireless signal as it travels from point A to point B. An analogy to consider would be similar to that of a light bulb. The area closest to the bulb is illuminated the brightest. Once obstructions get in the way i.e: lampshade, walls or doors, the light becomes dimmer. Similarly the line-of-sight for wireless technology becomes a reflected or refracted signal and will fill in some geographic areas, but at a reduced power level.

As shown in Figures 14 and 15 adding the topographical variations have a significant impact on the coverage in and around the City. Areas shaded in gray show no coverage due to the affects of the local terrain. These gray areas represent large pockets of coverage gaps making additional infrastructure needed to close in the gaps in coverage.

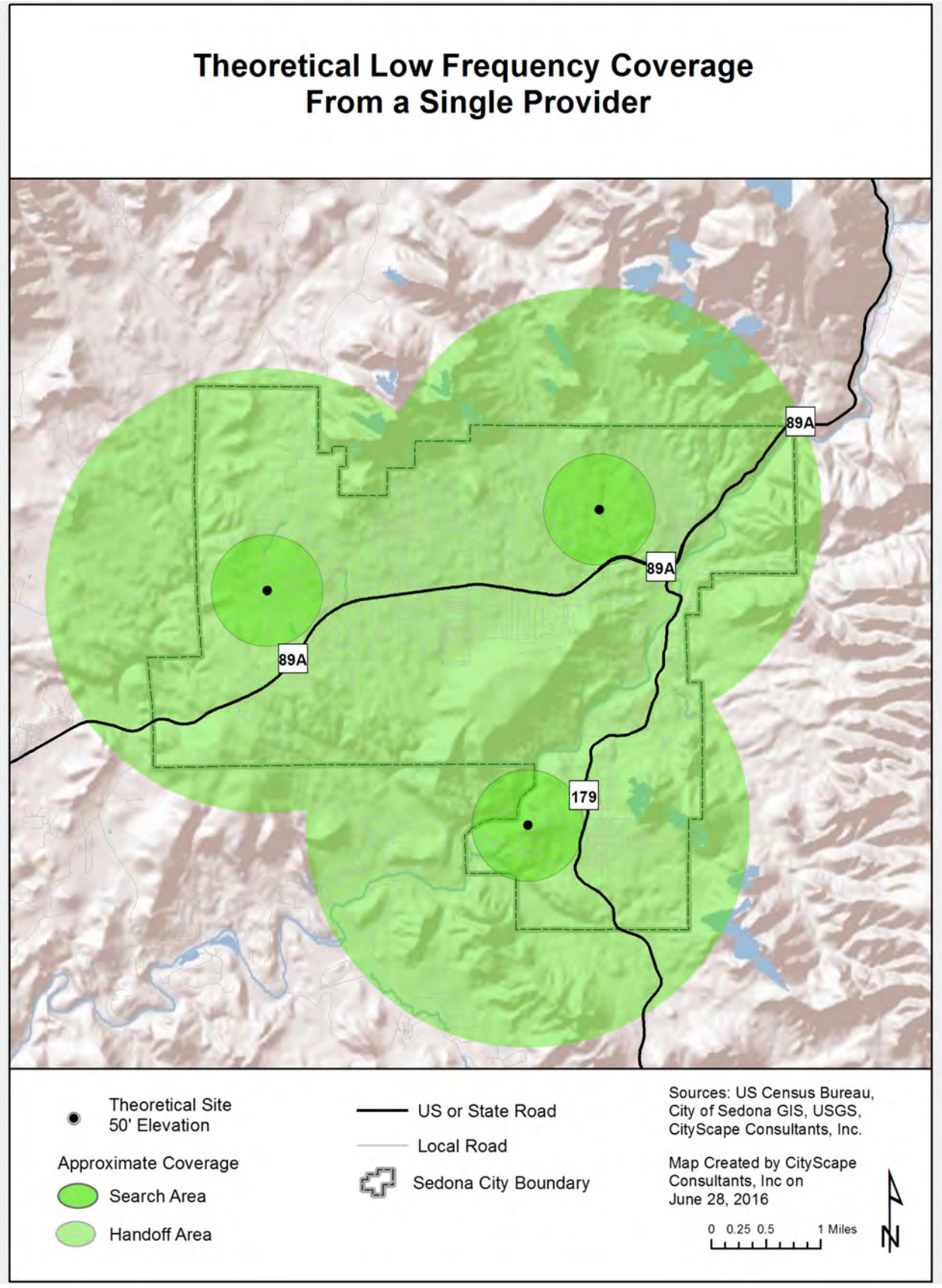


Figure 12: Theoretical Low Frequency From Single Provider

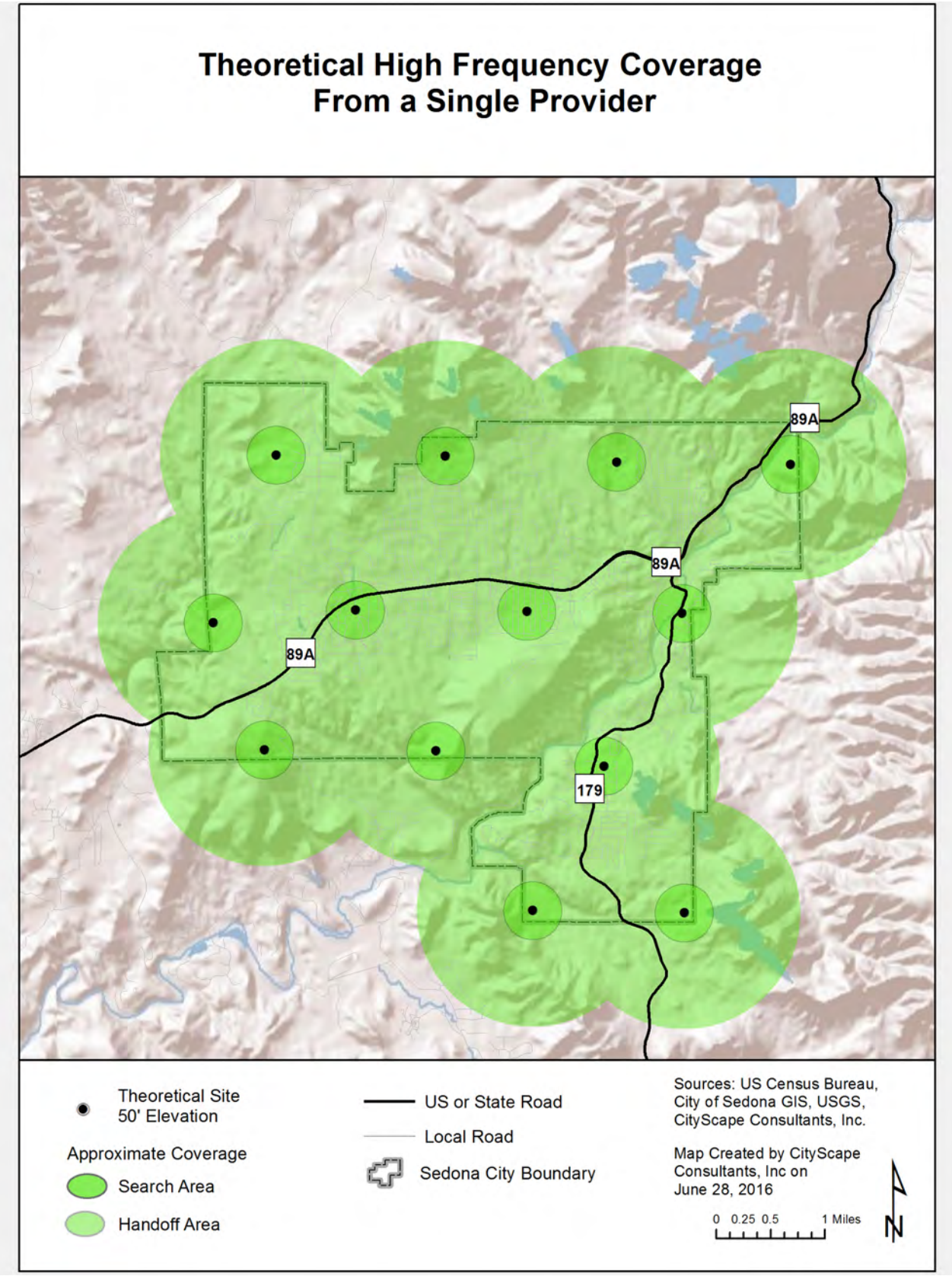


Figure 13: Theoretical High Frequency From Single Provider

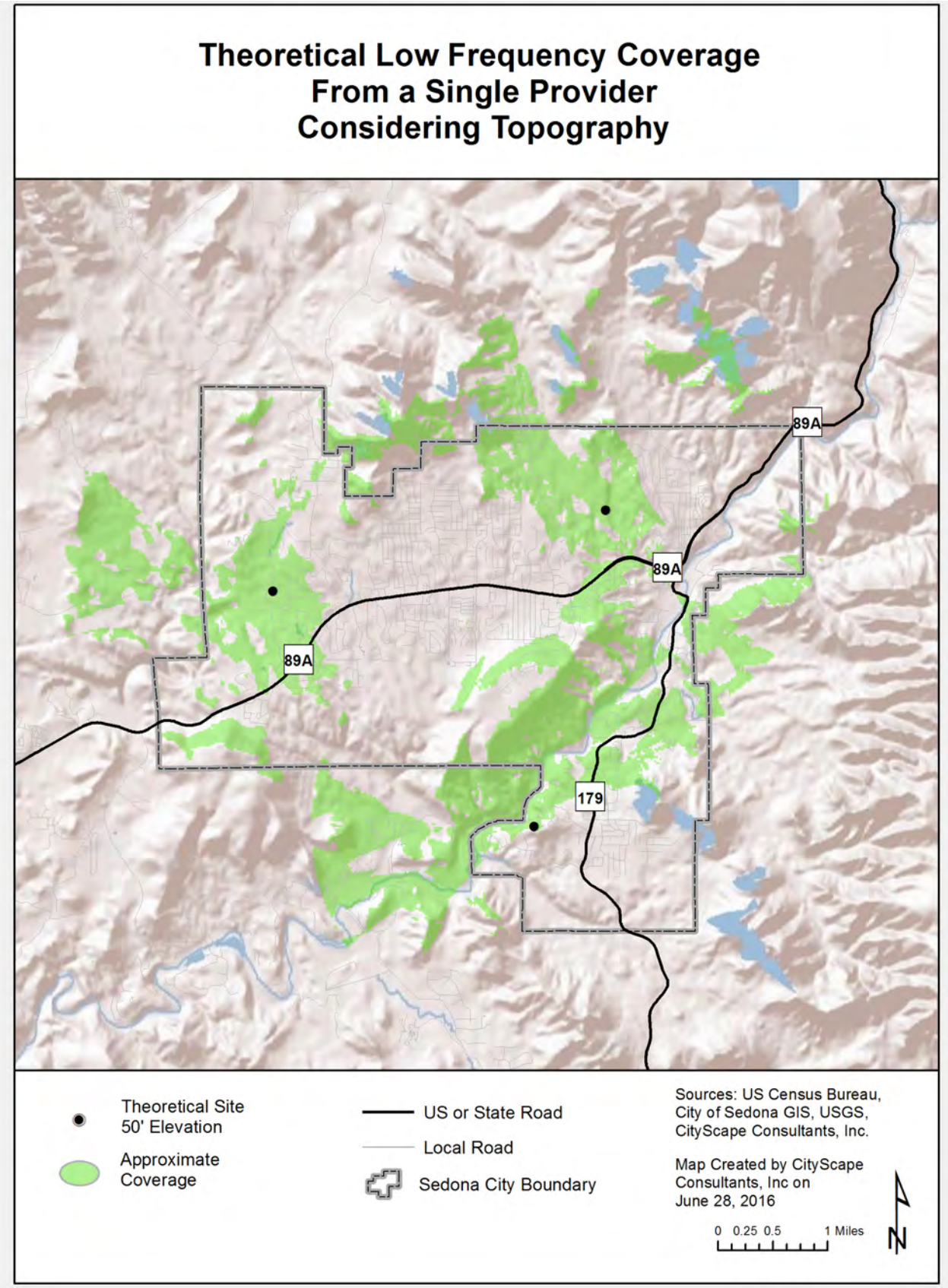


Figure 14: Theoretical Low Frequency From Single Provider with Topography

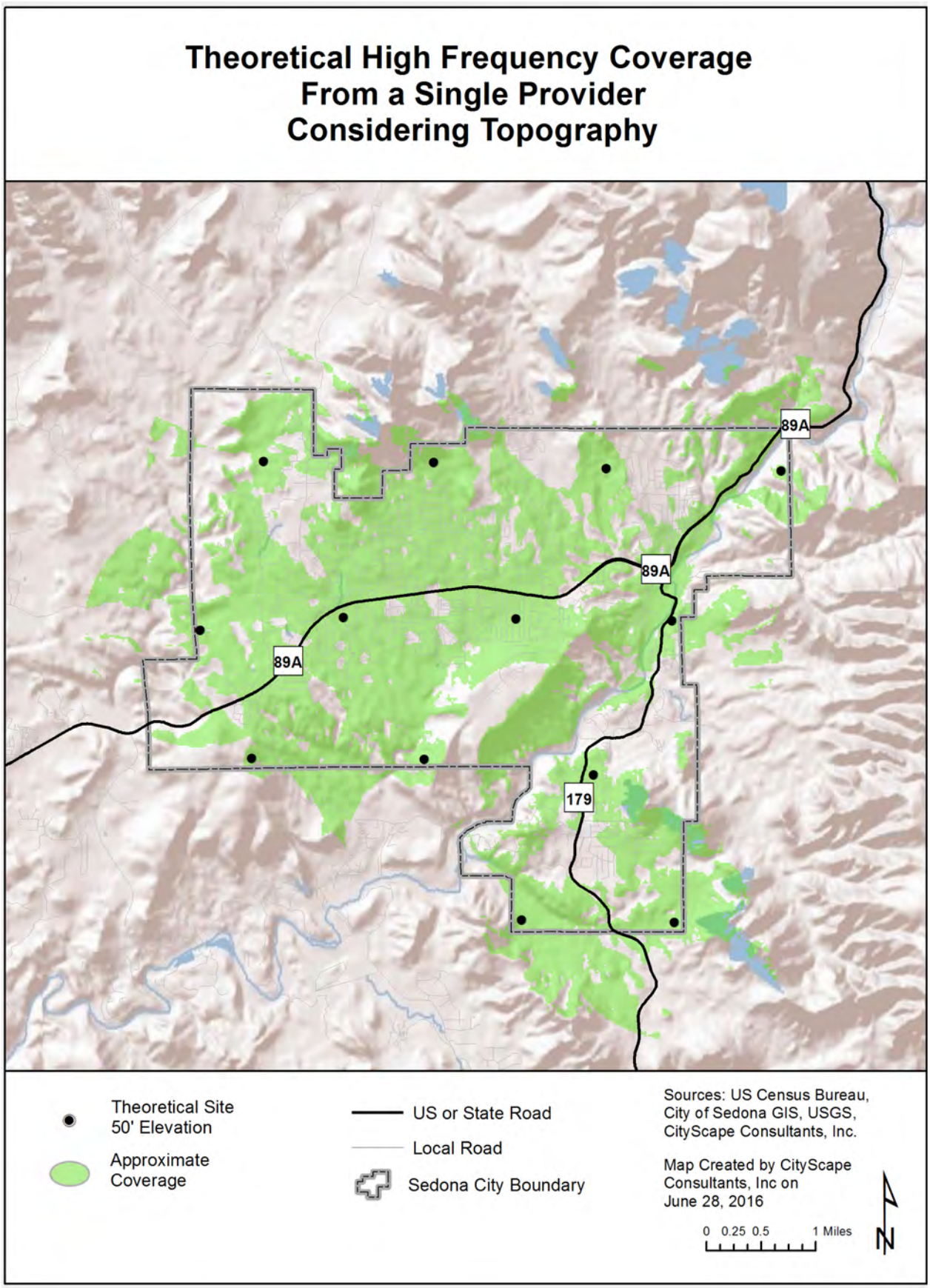


Figure 15: Theoretical High Frequency From Single Provider with Topography

Signal Strength on Theoretical Coverage

Propagation mapping is a process that illustrates the level of coverage from an individual antenna site. Signal strength, in this application, is a term used to describe the level of operability of a wireless device. The stronger the signal between the elevated antenna and the wireless device the more likely the device and all the built-in features will work. A reduced signal causes unsatisfactory service due to dropped calls or data interruption on the wireless device. Distance between elevated antennas and the physical location of the person (indoors or outdoors) using the wireless device along with any obstructions are variables that affect signal strength.

The level of propagation signal strength is shown through the gradation of colors from yellow to blue. The geographic areas in yellow identify superior signal strength; green equates to areas with average signal strength; shades of blue symbolize acceptable signal strength; and gray shades show marginal or no signal strength. Generally, the closer the proximity to the antenna the brighter shades of yellow within the geographic service area, which means the quality of service is better. As distance increases between the device and the antenna, the green, blue and gray shades appear indicating geographic service areas with average, acceptable and or no signal strength, respectively. Table 3 provides further explanation of the color coding relative to propagation signals.

SIGNAL STRENGTH COLOR	SIGNAL STRENGTH TITLE	SIGNAL STRENGTH DESCRIPTION
Yellow	Superior	Strong enough to operate within most buildings
Green	Average	Strong enough to operate in a vehicle, but not inside most buildings
Blue	Acceptable	Strong enough to operate outsides, but not in a vehicle or building
Gray	No Service	Marginal or no service

Table 3: Propagation Signal Description

Using the same antenna locations identified in the previous figures, Figures 16 and 17 illustrate the various levels of signal coverage from the site locations including terrain, network capacity and environmental variables. The areas in yellow identify geographic areas with superior signal strength; green equates to areas with average signal strength; shades of blue symbolize acceptable signal strength; and gray shades show marginal or no signal strength. While the industry standards identify green and blue shades as “average” and “acceptable” coverage; customers tend to indicate otherwise. Most early twenty-first century wireless subscribers are demanding superior signal strength (yellow) in their residences, schools, offices, and places frequented for shopping and entertainment. As consumers continue the trend of terminating traditional landline phone services and using the wireless handset as the primary mode of communication having signal strength inside buildings is paramount to meeting these

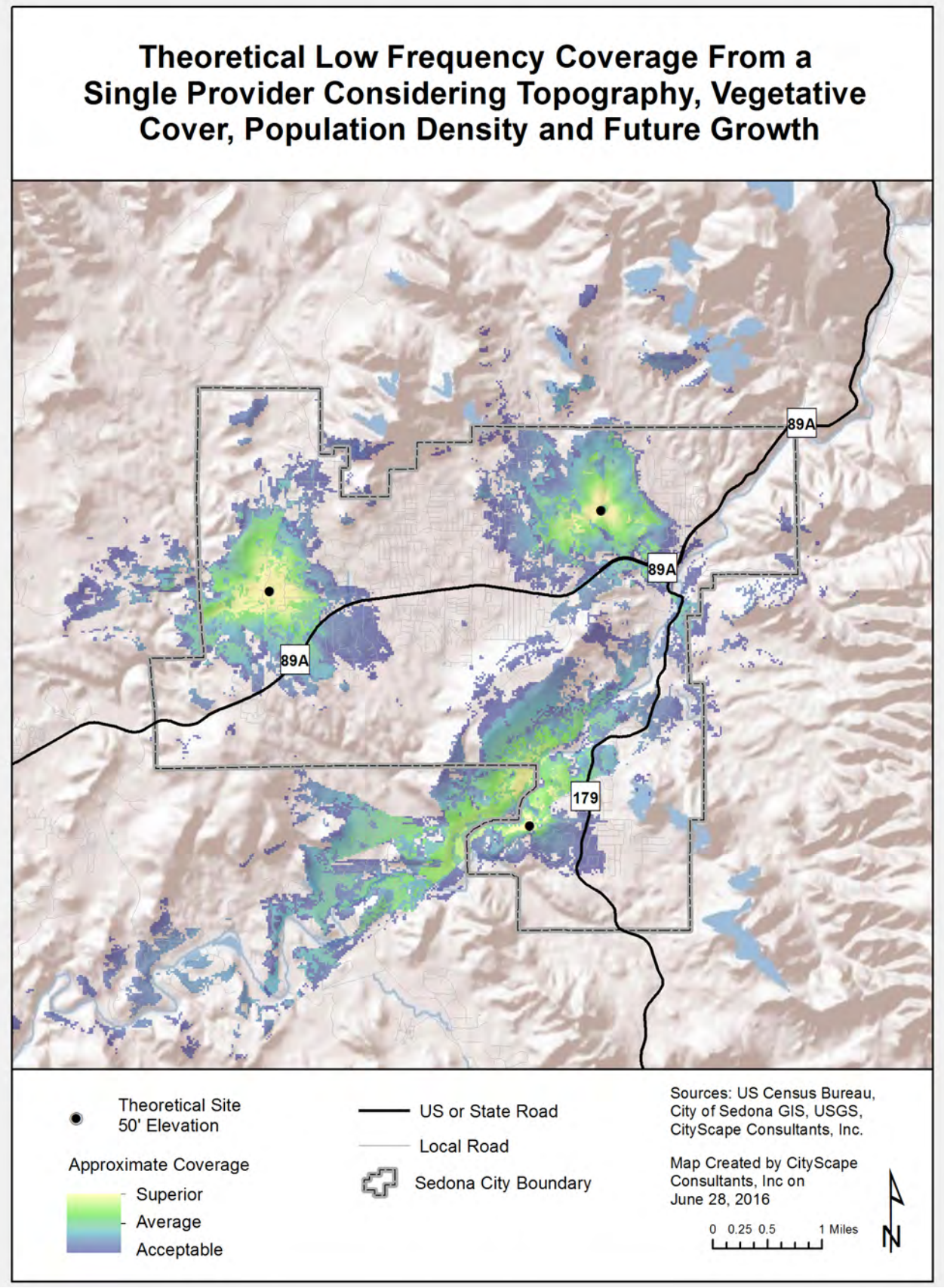


Figure 16: Future Growth Theoretical Low Frequency with Variables

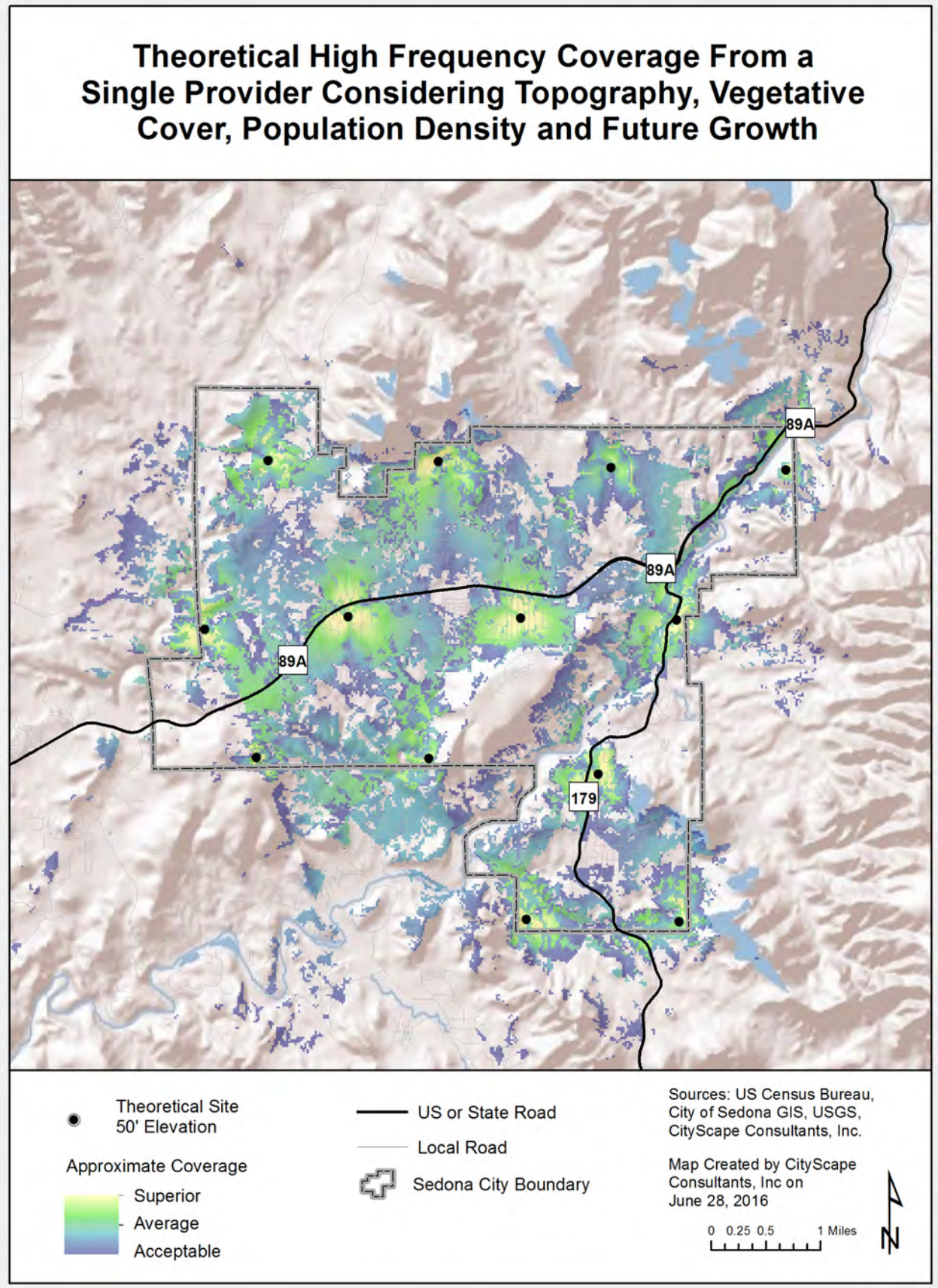


Figure 17: Future Growth Theoretical High Frequency with Variables

expectations. Therefore the industries "average" and "acceptable" coverage variables do not necessarily meet current customer demands and expectations.

You will note that these figures show very little yellow or superior signal coverage throughout the geographic area from these theoretical sites. This indicates the significant need for additional infrastructure to improve the quality of network coverage.

Existing Transmission Equipment

Prior to granting the cellular licenses in 1980 for the first phase of deployment, the United States was divided into 51 regions by Rand McNally and Company. These regions are described as Metropolitan Trading Areas (MTA). The spectrum auction conducted by the Federal Government for the 1900 MHz bands for 2G (PCS) further divided the United States into 493 geographic areas called Basic Trading Areas (BTA). The City of Sedona is located in the Phoenix MTA (MTA 27) and the Flagstaff, AZ and Prescott, AZ BTAs (BTA 144 and BTA 362, respectively). Service providers acquire the rights to deploy their networks by service area and range of spectrum frequency.

Per Section 704 of the Telecommunications Act of 1996, all service providers will require uninterrupted and continuous handoff service throughout the City. There are at least fifteen known wireless service providers that each want to compete for the subscriber base in and around Sedona. Each wireless provider will need towers and or elevated antenna mounting locations to improve network coverage and capacity demands resulting in an ongoing need for infrastructure especially in greater residential density areas.

The following service providers have purchased licenses to serve the City in the lower frequency ranges of 700 - 900 MHz: Allele Communications Southwest Holdings; AT&T; Access 700, LLC; Atlantic Tele-Network; Dish (Manifest Wireless, LLC); NTUA Wireless; SAL Spectrum, LLC; Smith Bagley (Cellular One of NE AZ); T-Mobile and Verizon Wireless.

Personal Communications Services (PCS) licensees and service providers for wireless phone and broadband operating in the higher frequencies of 1700 - 2700 MHz bands include: AT&T Wireless; Cable One; Clearwire Spectrum Holdings III, LLC; CommSpeed, LLC; Commnet Wireless, LLC; MCG PCS; NTUA Wireless, LLC; Smith Bagley (Cellular One of NE AZ); Sprint, (Alamosa PCS, Nextel License Holding 4, Inc.); T-Mobile; Telecom North American Mobile and Verizon Wireless.

Most network service providers do not own the antenna mounting structure on which they attach their equipment. Tower companies typically construct and own the tower and lease tower and ground space to service providers. A service provider may also contract with a tower builder to construct a tower in a particular location and once the facility is constructed lease space from the tower owner. Currently there are a number of tower companies within the City who lease their vertical real estate to the service providers including: American Tower Corporation (ATC) and Crown Castle International (CCI).

Existing Antenna Locations

A base map with the existing tower and base station sites allows for observations and analysis of current and future deployment patterns. Task B of the Scope of Services includes research to identify the location of existing towers and base stations, the assessment of the facility and cataloguing the pictures and data from the assessment process. A complete data base of facilities was compiled from various databases including but not limited to the the City, FCC, American Tower, Crown Castle International, SBA and TowerCo. Each location was individually assessed and validated for:

- Physical location
- Type of infrastructure
- Ownership of the infrastructure
- Wireless tenants at each facility
- Potential for future collocation

There are many types of antennas used for a variety of communication purposes throughout the defined study area including but not limited dispatch, wi-fi hot spots, and data links. CityScape generally only included infrastructure sites in the inventory that met the following criteria:

- Towers and base stations that currently support wireless phone, wireless Internet and microwave infrastructure meeting the FCC definition of a Personal Wireless Service Facility (PWSF)
    - PWSF meaning, any staffed or unstaffed location for the transmission and/or reception of radio frequency signals or other wireless communications, including commercial mobile services, unlicensed wireless services, wireless broadband services, and common carrier wireless exchange access services as defined in the Telecommunications Act of 1996, and usually consisting of an antenna or group of antennas, transmission cables, feed lines, equipment cabinets or shelters, and may include a tower. The following developments shall be deemed a PWSF: new, replacement, or existing towers, public towers, replacement towers, collocation on existing towers, base station attached concealed and non-concealed antenna, concealed towers, and non-concealed towers (monopoles, lattice and guyed)
- Towers and base stations with microwave dish antenna because of their potential to promote collocation
- Broadcast towers because of their potential to promote collocation
- Towers in remote locations because of their potential to either promote collocation or to be reconstructed to accommodate future collocations

The wireless infrastructure assessment identified twenty-two (22) existing transmission equipment sites that meet the prescribed criteria. Sixteen (16) of the sites are within the City's

jurisdiction and six (6) sites are outside the City's boundary but have an impact on the wireless networks within the City.

The following Tables 4 and 5 provide a summary of the total number of types of antenna mounting structures found throughout the study area and there varying heights. Table 6 identifies the known infrastructure ownership as of November 2016.

INFRASTRUCTURE TYPE	TOTAL
Concealed Base Station	1
Non-Concealed Base Station (rooftop or attached tower)	6
Concealed Tower	2
Monopole Tower	2
Lattice Tower	7
Guyed Tower	4
TOTAL	22

Table 4: Infrastructure Type

INFRASTRUCTURE HEIGHT	TOTAL
25′ - 30′	5
42′ - 86′	7
90′ - 100′	3
175′-190	3
Unknown height	4
TOTAL	22

Table 5: Infrastructure Height

INFRASTRUCTURE OWNER	TOTAL
Unknown	6
Others (building owner for base station)	6
Fire District	4
Tabback Broadcast Companies	2
American Tower Corporation	2
Crown Castle International	2
TOTAL	22

Table 6: Infrastructure Owner

Most of the wireless infrastructure is generally located parallel to the Highway 179 and Highway 89A corridors. Two (2) macro tower clusters are found at significant elevations both at the airport and on top of Schnebly Hill. It is likely the tower clusters are network anchor sites servicing the vast part of the City providing mostly coverage needs while minimally addressing capacity issues.

Figure 18 identifies the location of the base stations and towers assessed for the WMP. The nine (9) towers and base stations with PWSF are identified by a black dot. The site numbers are: 1, 2, 6, 8, 13, 14, 16, 20 and 22. The remaining 13 towers and base stations have no PWSF and are identified with a purple dot. Of the 13 non PWSF facilities, two towers are used for radio broadcasting; five are used for public safety purposes; three are used for private mobile radio purposes; and three have no signage therefore the purpose of those antennas cannot be identified. Table 7 provides an overview of the inventory. More specific details for each site are available in the inventory catalogue in Chapter 4.

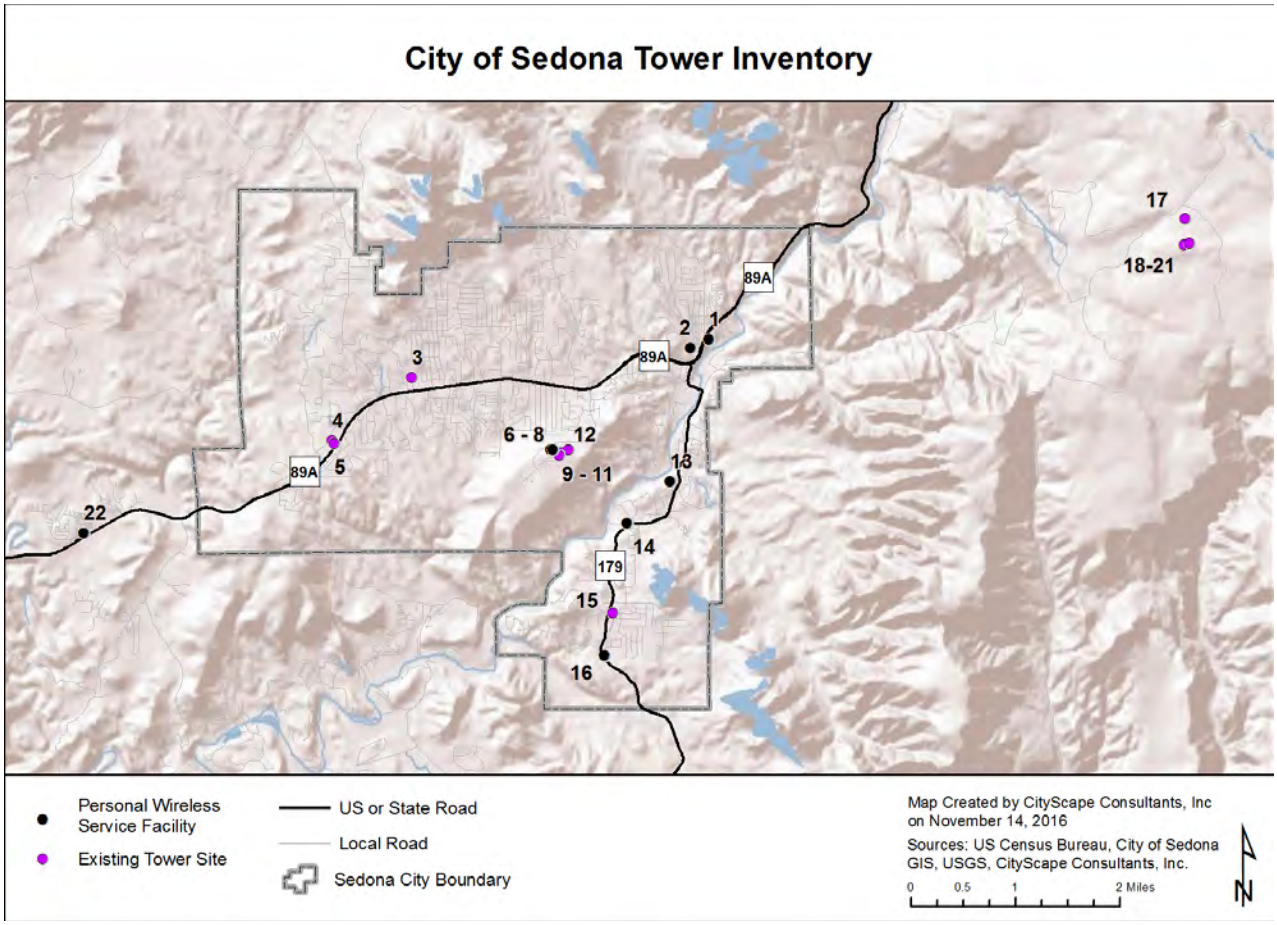


Figure 18: Tower Inventory

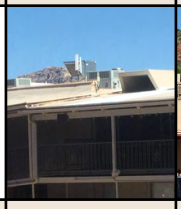
TYPE	SITE NUMBERS				
	2	6	8	20	22
Macro Towers with PWSFs (Site 2 is also Public Safety)					
	1	14	16		
Base Stations with PWSFs					
	3	7	15	17	21
Public Safety Only - Towers and Base Station					
	4	5			
Broadcast Tower					
	9	10	11		
Base Stations Not PWSF with Private Mobile Radio Use					
	12	18	19		
Towers Other					
	13				
Small Cell Tower with PWSF					

Table 7: Infrastructure by Category

Estimating The Wireless Subscriber Base

Population, location and density are important variables in wireless network design considerations. CityScape uses the United States Census Bureau (US Census) and local data for subscriber base data as growth rates vary between local community estimates and the US Census. According to the US Census the City is approximately 19.14 square miles and the 2015 estimated population for the City is 10,388 (2016 population estimates for the City were not available at this time). The population estimates for the City in 2000 was 10,036. Based on this information the City has seen a 3.5 percent growth rate over the five year timeframe.

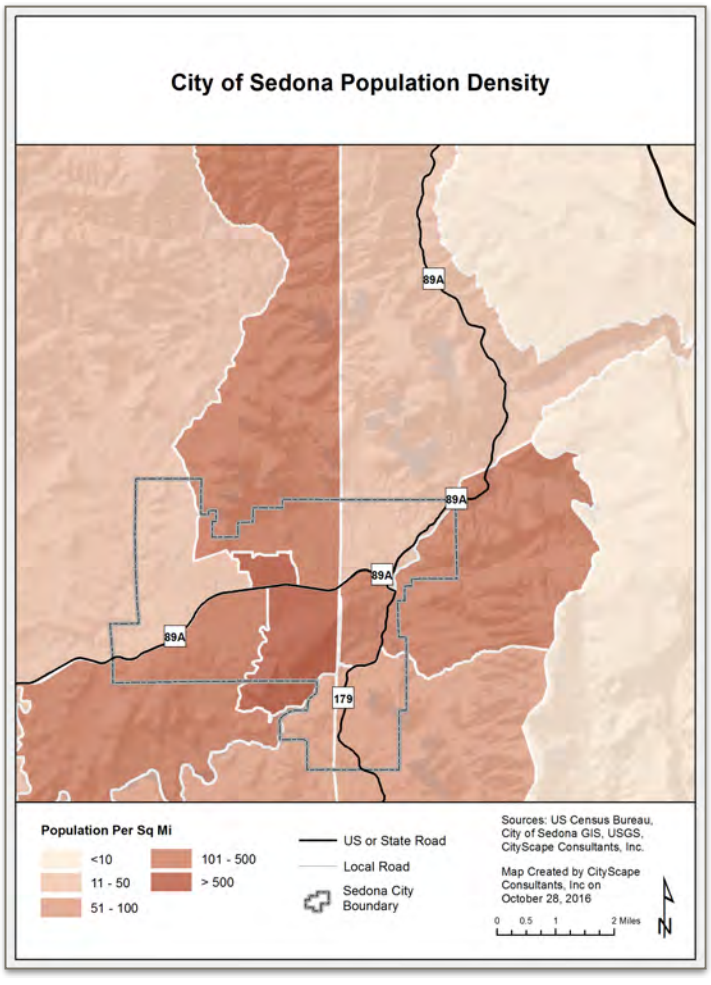


Figure 19: Population Density

Figure 19 illustrates the 2015 US Census Bureau's population densities by block group for the City. The highest population densities are in the southern half of the City; south of Highway 89A; parallel to Highway 179 and north of Highway 89A just west of the Yavapai County line.

The block group population covers a vast geographic area and goes beyond the City jurisdiction making the density look much smaller than it is in actuality. In fact, the majority of the population in the census blocks are in Sedona and not spread throughout the block group as shown on the US Census map. The map is misleading because it makes it look like fewer people are residing within the City limits.

In order to gain a more accurate understanding of the City's population density, CityScape queried Census Quick Facts for the estimated population of only the City of Sedona and distributed the population around the City based on land use. The maps in Figures 20 and 21 are more realistic and are the basis for the comparative analysis between wireless coverage and subscriber base. Figure 20 reflects a representation of the City's population density of year round residences distributed across residential parcels.

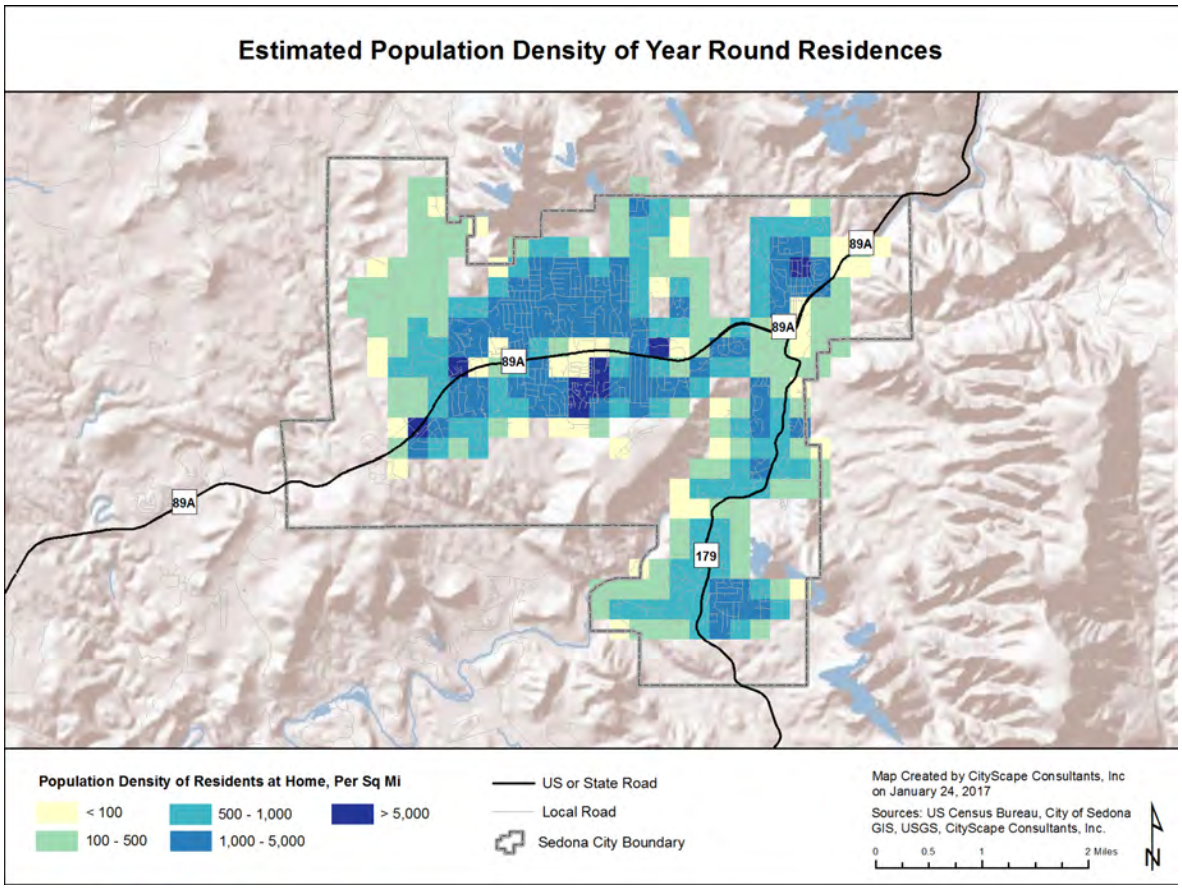


Figure 20: Population Density - Year Round Residents

Additionally, CityScape contacted the Sedona Chamber of Commerce (Chamber) for information on commuter workforce and seasonal tourist data. Data from the Chamber was attained from phone calls, reports online and the "Annual Report to the City of Sedona" dated October 2016. The map titled Estimated Population Density During Peak Tourism Daytime in Figure 21, simulates:

1) Commuters that drive into the City to their workplaces; and
2) Peak months (March and April) for tourists in the City's resorts and hotels; and
3) Routes used by the employed workforce from their homes to workplaces.

The areas in navy and dark blue illustrate the most densely populated areas of the City during peak times of the day and year and the geographic areas that CityScape identifies as the greatest need for wireless infrastructure over the next ten years.

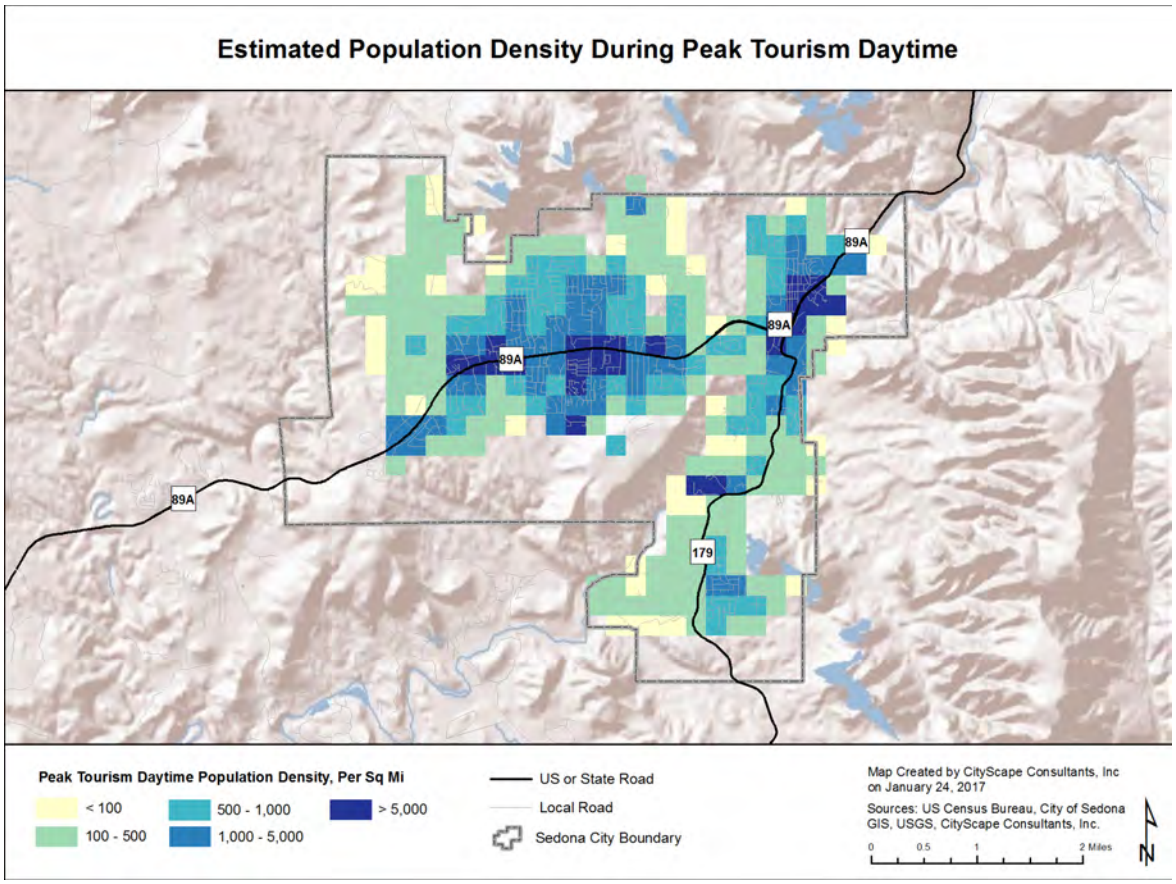


Figure 21: Population Density - Peak Tourism

Network coverage

With the exponential growth of Smartphones and other wireless devices, the demands for improved level of services requires more information to be interchanged between the service providers facilities and the wireless subscriber's device. In the function of the network the signal density becomes substantially more important in 4G and 5G networks. Improvement of the signal quality is paramount to proximity of the antenna or node to the wireless device. For this reason dozens to hundreds of smaller nodes located in the 20 to 30 foot elevation will be needed to saturate the City to meet future wireless network traffic, especially high speed wireless Internet and other broadband devices, even if the population growth differs from the expected scenario for the City.

Because 5G technology is still in development the exact launch date is not known, however it is predicted to be within the next three to seven years for Sedona. True high speed data with download speeds in excess of 100Mbps is expected to be implemented with 5G technology. With download speeds in this range most types of communications and video entertainment will be streamed over wireless systems. The primary objective and criteria of the network design will be the proximity from the wireless source to the customer. In residential areas the expectation is

one wireless node each 10-12 households or 165 to 1,650 feet.

The next step in the wireless network evaluation process is to examine existing coverage from all known existing PWSF facilities and all other existing towers and compare that to the population maps to determine where coverage gaps are now and will be within the City. Coverage gaps will need to be filled in with new or additional infrastructure to meet the wireless saturation objectives of the industry.

CityScape asks the following questions:

1) Would network coverage gaps be visible if a single high frequency (1900-2600 MHz) service provider was utilizing all identified antenna locations; and

2) Does the City have adequate existing infrastructure suitable for providers to meet complete network coverage objectives?

CityScape acknowledges that the existing towers and base stations do not have the same service provider at each site and not all existing infrastructure has sufficient support capacity for all service providers. For planning purposes, CityScape uses high frequency modeling because of its smaller propagation pattern. Network designs based on the objectives of high frequency will also work for low frequency service providers. The converse does not work because as shown in the following theoretical high and low frequency mapping, high frequency providers will need more sites than the lower frequency service providers.

Figure 22 demonstrates the theoretical coverage for a single high frequency service provider with antennas mounted at the top mounting position of all known PWSF support structures throughout the City. Figure 23 illustrates theoretical coverage for a single high frequency service provider from every known tower and antenna location. Both maps include the following variables: existing tower heights, Chamber population data, subscriber rate data, terrain, environmental variables and signal strength. The mapping exercise illustrates that most of the Highway 89A and Highway 179 corridors to the downtown areas could be well served by utilizing the existing PWSF wireless infrastructure, provided the same service provider was at each location. It is noted that a large geographic area to the north and south of Highway 89A west of downtown has some superior and average coverage without any towers or base stations in the immediate area.

This coverage is believed to be coming from the towers at Schnebly Hill and the towers at the Sedona Airport. The signal is projecting from those sites and bouncing off the mountain walls collecting in that geographic area.

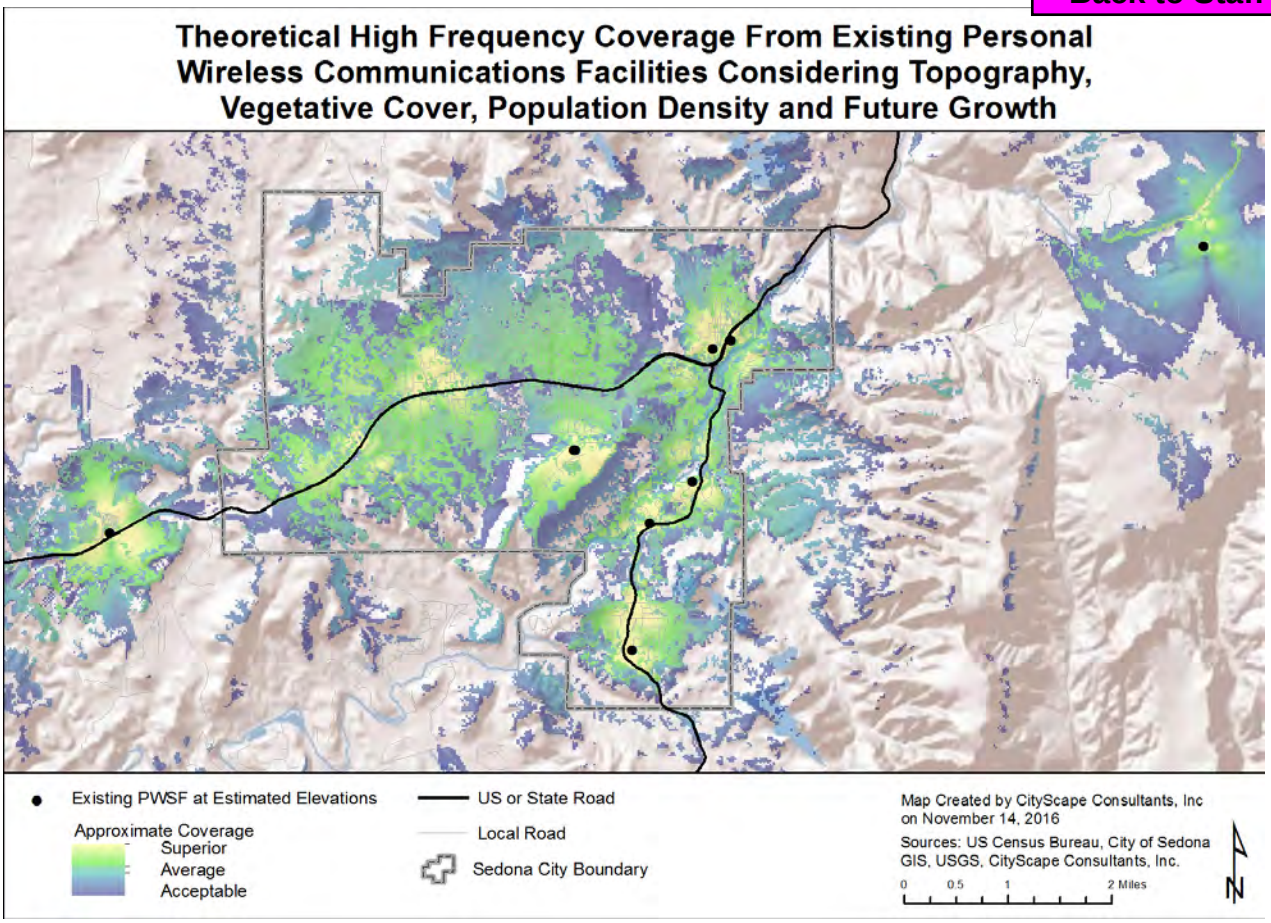


Figure 22: Theoretical High Frequency PWSF with Variables

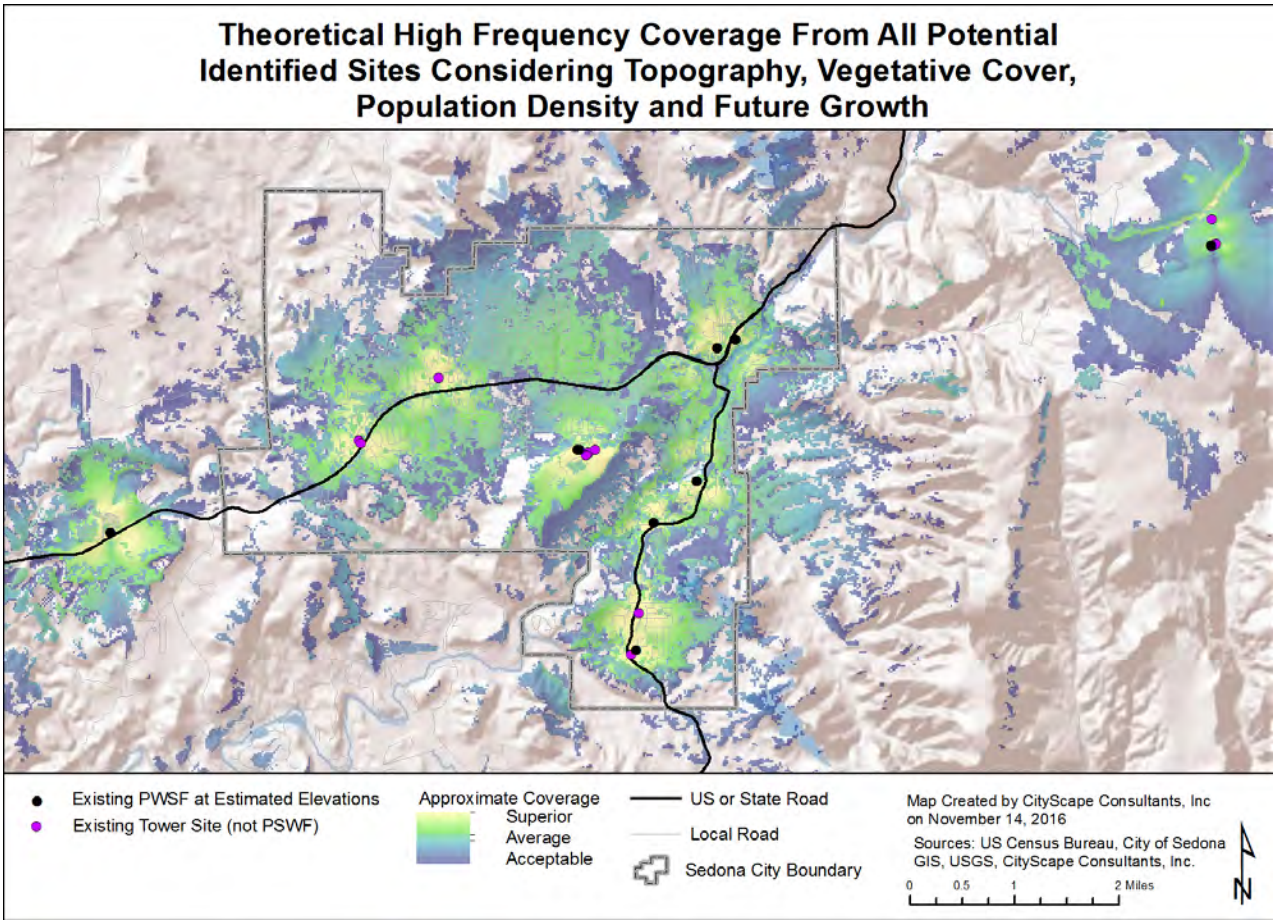


Figure 23: Theoretical High Frequency All Identified Facilities with Variables

10-Year Plan Estimates

Cityscape estimates that it will require between seventeen (17) and twenty-five (25) new antenna and node locations at a mounting elevation of 35 feet to fulfill the wireless coverage and capacity needs for Sedona over the next ten (10) years. That total number is in addition to the existing facilities and represents a combination of new macro tower facilities together with small cells and node antenna locations. Antenna location estimates include collocations on existing infrastructure along with new towers and base stations. Regular year to year progressive increases cannot be anticipated as new technologies and customer network demands affect the timing of future deployments. Over the next three to five years the City can anticipate three to five new sites until the transition to 5G technology is complete, after which the City can expect greater numbers of small cells and node sites throughout the higher populated areas. This estimate is based on the mathematics of the population density; subscriber base and usage; transient movement throughout the City and how the number of calls per site can simultaneously be served at any given time.

It is important to emphasize that the mounting elevation of thirty-five (35) feet would be for a single service provider. If the proposed facility is a neutral host facility, then multiple service providers would be able to share the same technology platform or set of antennas and additional height to the structure would not be necessary. If collocation is encouraged, then the initial structure will need to be taller than thirty-five (35) feet in order to accommodate any potential additional tenants on that facility. Pursuant to federal law (47 USC §1455(a)), if the initial tower is constructed at thirty-five (35) feet a collocation that meets certain federal standards has the absolute right to increase the height of the tower a single time by twenty (20) feet, making it a fifty-five (55) foot tower. If the infrastructure is located in a ROW and meets the same standards, then a single ten (10) foot increase would be permitted, making it a forty-five (45) foot tower. Notwithstanding the foregoing, it is possible by contract or covenant, depending on the parties involved, to limit a tower or base station to a fixed height (e.g. where the City is the lessor of the property).

Public Properties as Fill-in Sites for Network Gaps

When publicly owned property is used for infrastructure, the community can be assured that concealed and non-concealed preferences for designs would be met. As public properties are developed, the infrastructure installed also becomes a precedent for how future sites should be developed on both public and private land. For example, many creative concealment techniques are available to the industry and some are more aesthetically pleasing and more practical than other types. As local government adopts preferred designs on publicly owned property, their installations become the standard for future sites developed on public or private land within their zoning jurisdiction. Leasing public properties for new wireless infrastructure can also create new sources of public revenue. Additionally, locating infrastructure on public property can result in an

asset for the City with potential availability for the use of emergency services and public safety equipment.

Figure 24 is an illustration of potential coverage gap fill-in solutions. Areas colored with yellow to green gradients shows theoretical coverage from existing towers and base stations with PWSF equipment.Areas colored with light to dark shades of red gradients represent the projected theoretical coverage from existing towers and base stations without current PWSF that could be utilized or upgraded for PWSF collocations. Areas colored with pink gradients represent proposed new fill-in sites from vetted City-owned property. Areas colored with light to dark orange gradients are gaps that will need fill in from other public properties, privately owned lands or ROW's. The two (2) gray shaded patches are areas with commuter and tourism capacity concerns. The areas identified in gray could benefit from temporary tower facilities during peak events or by installing two to three additional microcells in these specific geographic areas.

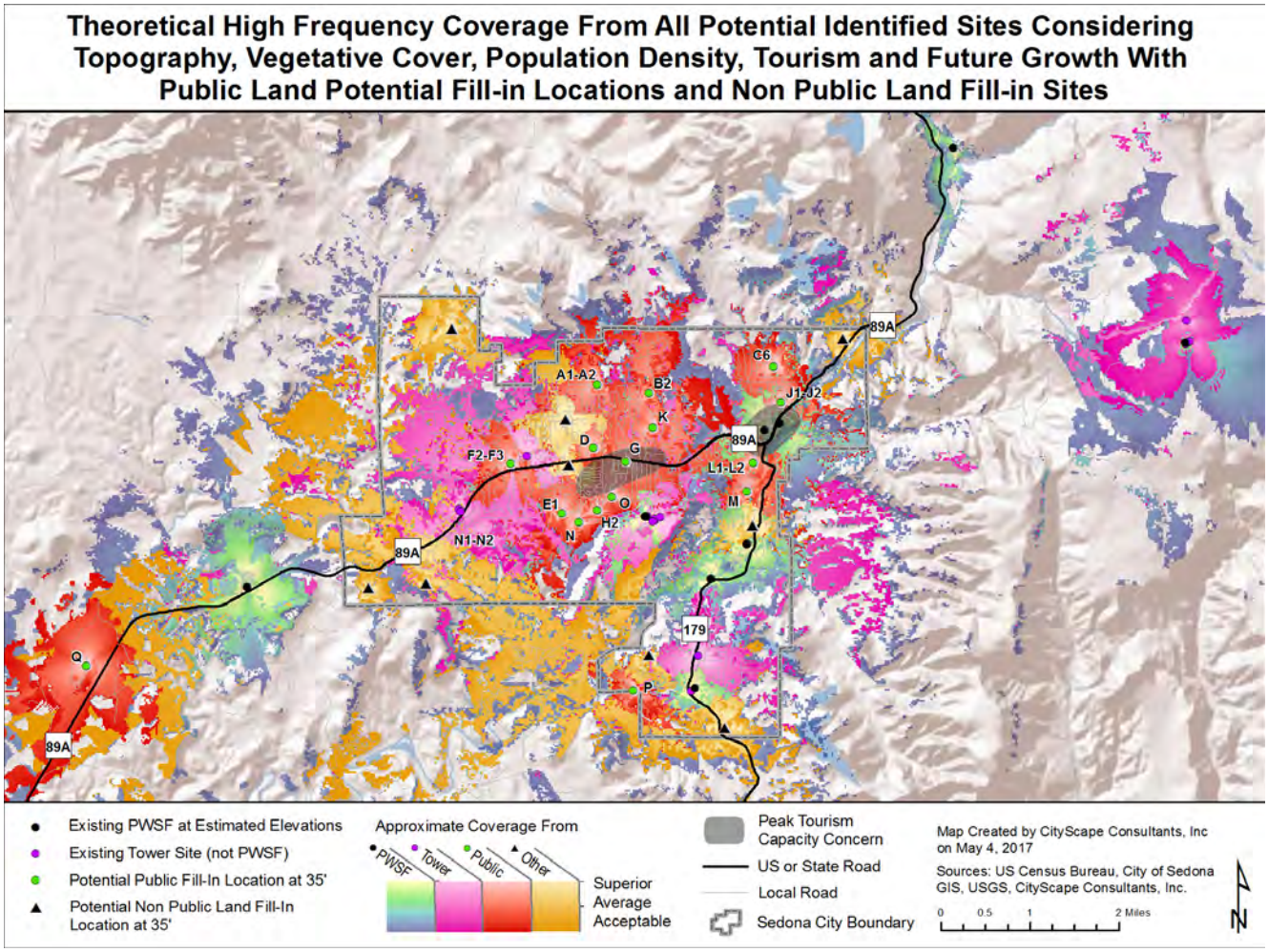


Figure 24: Theoretical High Frequency with Variables Fill-in

Chapter 3

Wireless Master Planning and Public Policy

Wireless Deployment and Public Policy

With the deployment of first generation wireless, there were only two competing wireless cellular providers. With the deployment of 2G, six (6) competing PCS providers were added to the marketshare and the wireless marketplace became furiously competitive. "Speed to market" and "location, location, location" became the slogans for the competing 1G and 2G providers. The concept of sharing facilities was not part of the strategy as each provider sought to have the fastest deployment, so as to develop the largest customer base. This would result in a quick return on their cost of deployment. However, this meant that there now was an extraneous amount of new tower construction happening without the benefit of local land use management.

As local governments began to adopt development standards for the wireless communications industry, the industry strategy changed yet again. The cost associated with each provider developing an autonomous inventory of facilities put a financial strain on their ability to deploy their networks. Consequently, most of the wireless providers divested their internal real estate departments and tower inventories. This change gave birth to the new industry of vertical real estate and it includes a consortium of tower builders, tower owners, site acquisition and site management firms.

No longer was a tower being built for an individual wireless service provider, but for a multitude of potential new tenants who would share the tower without enduring the individual cost of building, owning and maintaining the facility. Sharing antenna space on a tower between wireless providers is called collocation.

This industry change benefited local governments who adopted new tower ordinances requiring collocation as a way to reduce the number of new towers. But, *initially* it did not work as intended. As a result, local landscapes became dotted with all types of towers and communities started adopting regulations to prohibit or have the effect of prohibiting all wireless communication towers within their jurisdictional boundaries.

Wireless deployment came to a halt in many geographical areas and all involved in the process of wireless deployment became equally frustrated with the situation. So the FCC stepped in and with the issuance of Section 704 of the Telecommunications Act mandated the networks be deployed within a specific time period and local government agencies cannot slow down or prohibit wireless deployment.

Section 704 Facilities Siting; Radio Frequency Emission Standards

Fortunately Section 704(a) 322(c)(47 U.S.C.332(c))(7) titled Preservation of Local Zoning Authority of the Federal Telecommunications Act of 1996 (Section 704 or The Act), provides local governments zoning authority over the deployment of wireless telecommunication facilities subject to several specific guidelines:

- Land use development standards may not unreasonably discriminate among the wireless providers, and may not prohibit or have the effect of prohibiting the deployment of wireless infrastructure. For example, some communities adopted development standards restricting the distance between towers to three or more miles. In some geographic locations with sparse populations this might be adequate for 1G deployment; however the Laws of Physics make it impossible for 2G wireless deployments to meet this spacing requirement. And unintentionally some local governments prohibited the deployment of 2G; and
- Must act on applications for new wireless infrastructure within a "reasonable" amount of time; and
- Land use policies may be adopted to promote the location and siting of telecommunications facilities in certain designated areas; and
- Encourages the use of third party professional review of site applications; and
- Prohibits local government from denying an application for a new wireless facility or the expansion of an existing facility on the grounds that radio frequency emissions are harmful to human health provided federal standards are met by the wireless provider.

The Shot Clock Ruling

After obtaining some relief from Congress with Section 704, the wireless industry, specifically the infrastructure companies, became frustrated with the time that it took for local government to act on siting requests. Consequently they petitioned the FCC for relief. The FCC issued a Declaratory Ruling in 2009 (the "Shot Clock"). The Shot Clock ruling requires collocation decisions to be made in 90 days and new tower decisions to be made in 150 days. This puts an administrative burden on local government to make decisions expeditiously, or otherwise the application will be deemed approved. Some communities have challenged the FCC's authority to impose these timelines, but the US Supreme Court ultimately decided the FCC was within its authority to impose the Shot Clock on local government.

Image FCC.Gov

The Spectrum Act

Section 6409(a) of the Middle Class Tax Relief and Job Creation Act of 2012, referenced as the "Spectrum Act" was enacted by Congress to promote wireless deployments of broadband for public safety and commercial purposes. As stated in the Spectrum Act,

> "…a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station."

Much debate arose between the wireless industry and local government agencies nationwide on the meaning of this passage. After acknowledging that Congress did not provide much guidance on what it meant by some of the terms used in Section 6409(a), the FCC decided to provide some definitions and rules of interpretation, saying that "that clarifying the terms in Section 6409(a) will eliminate ambiguities in interpretation and thus facilitate the zoning process for collocations and other modifications to existing towers and base stations." This resulted in the FCC issuing a response clarifying definitions and meaning to the Spectrum Act in a Report and Order released October 21, 2014 in W.T. Docket 13-238 commonly called Report and Order.

In the Introduction of the Report and Order the FCC states,

> "Demand for wireless capacity is booming: more consumers are accessing mobile broadband every year, driving more innovation and expanding access to public safety. But our ability to meet this demand depends on the infrastructure that supports the services. We therefore take concrete steps to facilitate the deployment of the infrastructure necessary to support surging demand, expand broadband access, support innovation and wireless opportunity, and enhance public safety - all to the benefit of consumers and the communities in which they live. (Paragraph 2)… Accordingly, our actions are intended to encourage deployments on existing towers and structures - rather then entirely new towers in recognition that collocations almost always result in less impact or no impact at all." (Paragraph 3)

So what does this mean and how does it affect local planning agencies nationwide?

> First, "[n]otwithstanding section 704 of the Telecommunications Act of 1996 or any other provision of law, a State or local government may not deny, and shall approve, any *eligible facilities request* for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station. An *eligible facilities request* is one that requests modification of an existing wireless tower or base station that involves (a) collocation of new transmission equipment; (b) removal of transmission equipment; or (c) replacement of transmission equipment.

Second, it is important to understand how the FCC in the Report and Order defines base station, eligible support structure and tower.

- *Base Station*, "a structure or equipment at a fixed location that enables Commission-licensed or authorized wireless communication between user equipment an a communications network. There term does not encompass a tower as defined in this subpart or any equipment associated with a tower. This term includes any structure other than a tower, at the time the relevant application is filed with the State or local government."

- E*ligible support structure,* "any tower or base station as defined in this section, provided that it is existing at the time the relevant application is filed with the State or local government under this section."

- *Tower* means, "any structure built for the sole or primary purpose of support any Commission licensed or authorized antennas and their associated facilities, including structures that are constructed for wireless communications services including, but not limited to, private, broadcast, and public safety services, as well as unlicensed wireless services and fixed wireless services such as microwave backhaul, and the associated site."

The Report and Order reaffirms that broadcasting infrastructure is also considered a wireless tower or base station for purposes of Section 6409(a) and that transmission equipment includes antennas, cables, and auxiliary power equipment, such as generators.

The FCC further clarified:

> "…the term "existing" requires that wireless towers or base stations have been reviewed and approved under the applicable local zoning or siting process or that the deployment of existing transmission equipment on the structure received another form of affirmative State or local regulatory approval (*e.g.*, authorization from a State public utility commission). Thus, if a tower or base station was constructed or deployed without proper review, was not required to undergo siting review, or does not support transmission equipment that received another form of affirmative State or local regulatory approval, the governing authority is not obligated to grant a collocation application under Section 6409(a)."

A wireless tower that does not have a permit because it was not in a zoned area when it was built, but was lawfully constructed is considered an "existing" tower. In other words, a collocation application that "shall be approved" under Section 6409(a) has to be for a location that has been previously reviewed and approved through the local regulatory approval process and is not a "substantial change" to the original approval.

Under the new FCC definition a "substantial change" to an eligible tower or base station is as follows:

> (1) (a) for towers outside of public rights-of-way, it increases the height of the tower by more than 10%, or by the height of one additional antenna array with separation from the nearest existing antenna not to exceed twenty feet, whichever is greater; (b) for those towers in the rights-of-way

> and for all base stations, it increases the height of the tower or base station by more than 10% or 10 feet, whichever is greater; or
>
> (2) (a) for towers outside of public rights-of-way, it protrudes from the edge of the tower more than twenty feet, or more than the width of the tower structure at the level of the appurtenance, whichever is greater; (b) for those towers in the rights-of-way and for all base stations, it protrudes from the edge of the structure more than six feet; or
>
> (3) it involves installation of more than the standard number of new equipment cabinets for the technology involved, but not to exceed four cabinets; or
>
> (4) it entails any excavation or deployment outside the current site of the tower or base station;
>
> (5) it would defeat the existing concealment elements of the tower or base station; or
>
> (6) it does not comply with conditions associated with the prior approval of construction or modification of the tower or base station unless the non-compliance is due to an increase in height, increase in width, addition of cabinets, or new excavation that does not exceed the corresponding "substantial change" thresholds identified above. We further provide that the changes in height resulting from a modification should be measured from the original support structure in cases where the deployments are or will be separated horizontally, such as on buildings' rooftops; in other circumstances, changes in height should be measured from the dimensions of the tower or base station inclusive of originally approved appurtenances and any modifications that were approved prior to the passage of Section 6409(a).

For example, provided the request is not a substantial change then, if the City previously approved a non ROW (a.k.a. eligible facility) to be constructed at 100 feet then under Section 6409(a) that tower height can be increased by ten (10) percent or by twenty (20) feet, whichever is greater. In this case 20 feet is the greater so an eligible 100-foot tower could be increased to 120 feet in height to accommodate an additional collocation provided the modification does not exceed the six substantial change criteria. For eligible towers in the ROW and for all eligible base stations the height can be increased by ten (10) percent or ten (10) feet, whichever is greater. Thus an existing eligible 100-foot tower in the ROW or any eligible 100-foot base station could be increased in height by right to 110 feet.

The Report and Order affirms that these standards apply equally to legally nonconforming structures in your jurisdiction. They too will be eligible for Section 6409(a) modifications.

Finally, the FCC points out that wireless facility modifications under Section 6409(a) should remain subject to building codes and other non-discretionary structural and safety codes. In particular, they clarified that Section 6409(a) does not "preclude States and localities from continuing to require compliance with generally applicable health and safety requirements on the placement and operation of backup power sources, including noise control ordinances if any."

As to timeline, local government has sixty (60) days to review a new collocation application for an eligible facility under Section 6409(a). The timeline starts when the application is submitted. Local government can then "stop" or "toll" the clock within the initial thirty (30) days if the the application is incomplete. The local government's request for additional information "must specify the code provision, ordinance, application instruction, or otherwise publicly stated procedures that require the information to be submitted."

The time clock restarts when the applicant resubmits with the missing information. If the application is still incomplete local government can then "stop" or "toll" the process again by again identifying, in writing, missing information. The clock will restart again upon the second resubmission. After that local government cannot stop the clock because of incompleteness.

If the local government does not complete the application review within sixty (60) days (subject to the tolling provisions above), the Report and Order adopts a "deemed granted" remedy.

If, after reviewing a proposed Section 6409(a) application, the local government determines that the application request is not eligible for Section 6409(a) processing because it constitutes a "substantial change", then the ninety (90) day timeline from the 2009 Shot Clock ruling applies, starting from the day the City decides the application is not Section 6409(a) eligible. (However, certain applications may need to be processed in accordance with Arizona statutory law which differs from the federal rules above. For example, non-substantial collocations of "small cells" within a City right of way must be reviewed upon receipt to determine if they meet the non-substantial change definitions and the City must notify applicant in writing within twenty (20) days of submission if the application is incomplete and advise as to any deficiencies and request resubmittal. If no notice is given, the application shall be deemed complete. The City shall process such application once complete within seventy-five (75) days of receipt or the application will be deemed granted. For new small cells within a City right of way, the applicant must be notified by the City within thirty (30) days of submittal of its application as to any deficiencies and request resubmittal. If no notice is given, the application shall be deemed complete. The City shall process such application once complete within one hundred fifty (150) days of receipt or the application will be deemed granted.)[1]

The Report and Order does suggest that the "deemed granted" isn't necessarily the last word on the subject. Acknowledging that judicial determination may be necessary, the Report and Order states:

> "…. a State or local authority may challenge an applicant's written assertion of a deemed grant in any court of competent jurisdiction when it believes the underlying application did not meet the criteria in [Section 6409(a)] for mandatory approval, would not comply with applicable building codes or other non-discretionary structural and safety codes, or for other reasons is not appropriately "deemed granted".

[1] See Arizona Revised Statutes, Title 9, Chapter 5, Article 8, Sections 9-593 and 9-594

The takeaway from this part of the Report and Order is that Section 6409(a) applications must be tailored to request permissible information and then must be acted upon quickly in order to avoid a "deemed granted" remedy.

The Report and Order continues by pointing out that Section 6409(a) applies only to local government in its regulatory capacity and NOT as a landlord. Should the City choose, in the capacity as landlord, to limit the number and type of applicants on City property infrastructure, then there will not be a burden by Section 6409(a).

In an important nod to local government, the FCC said in the Report and Order that it would *NOT* find establishment of a preference for siting on public property in local regulations to be a per se violation of Section 704's requirements to not discriminate amongst providers. The Report and Order said while some preferences coupled with onerous regulations could have that effect those decisions would have to be made on a case by case basis.

Standards that should be included in the City's land use development standards are the Telecommunications Act of 1996, the Shot Clock, and Section 6409(a) of the Middle Class Tax and Job Creation Act of 2012.

State of Arizona House Bill 2365 (Arizona Revised Statutes, Title 9, Chapter 5, Article 8)

Article 8 titled, "Use of Public Highways by Wireless Providers" was amended through House Bill (HB) 2365 passed by the Legislature and signed by the Governor on March 31, 2017. It states that,

> "Right-Of-Way means the area on, below or above a public roadway, highway, street, sidewalk, alley or utility easement. Right-Of-Way does not include a Federal Interstate Highway, State Highway or State Route under the jurisdiction of the Department of Transportation, a private easement, property that is owned by a Special Taxing District, or a utility easement that does not authorize the deployment sought by the wireless provider."

The two (2) main throughways in Sedona are both under the jurisdiction of the Department of Transportation (89A and 179) and by definition are exempted from HB 2365. The public City street Right-Of-Ways affected by HB 2365 are identified by black lines in Figure 25.

Section 9-593 titled, "Applicability: collocation of small wireless facilities; permits; application; fee "outlines the standards the City is required to follow when allowing a collocation within the City ROW. Generally this Section requires the City to approve collocations of small wireless facilities in the City's ROW within twenty (20) days after receiving an application, provide the application is complete. Per the Spectrum Act and the City's proposed ordinance changes, a collocation is allowed on an eligible tower or base station in City's public ROW, by right, subject to application approval.

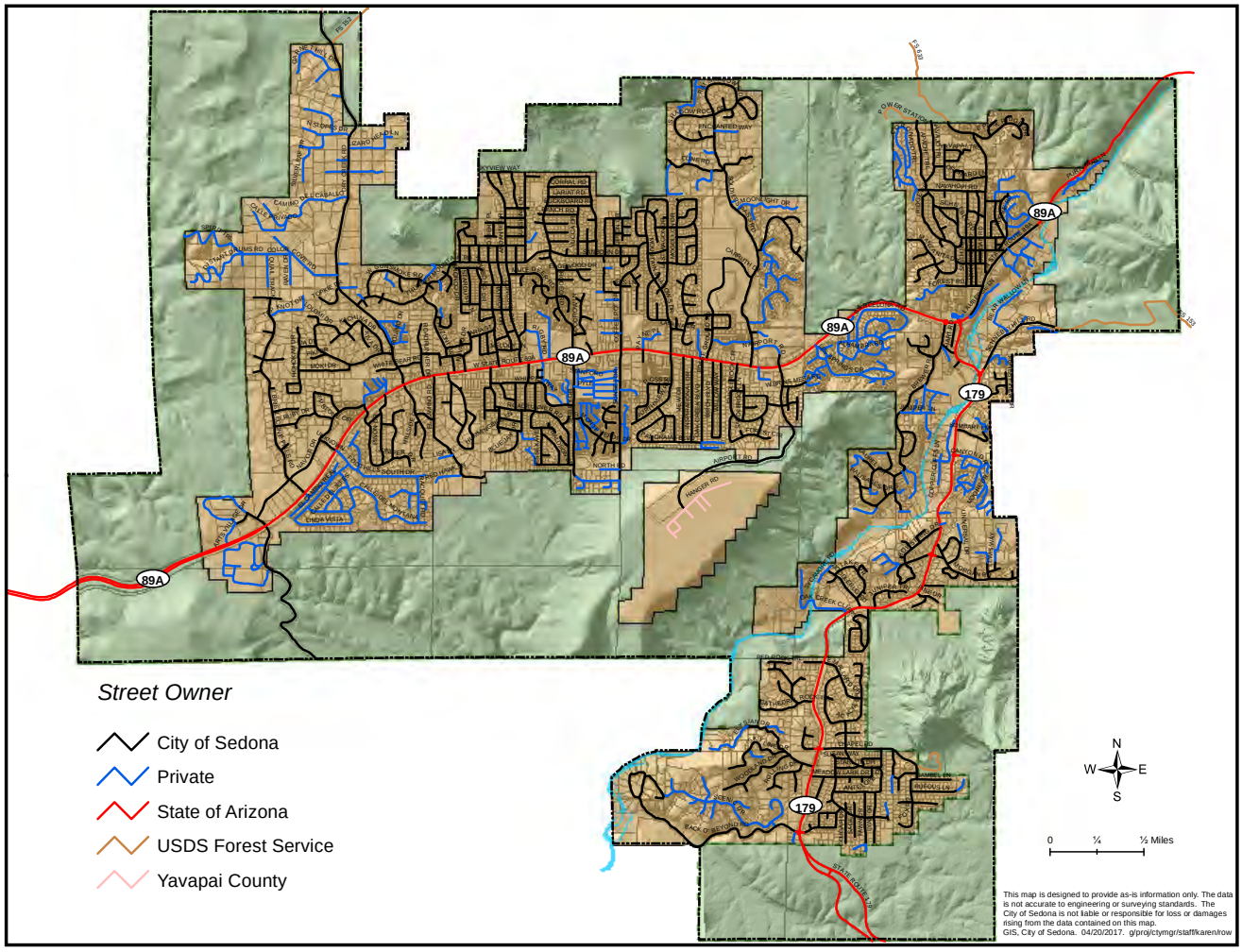


Figure 25: City of Sedona Public Right-Of-Ways

Per the FCC's definition in the Report and Order, existing poles and other structures in the ROW that, at the time of the effective date of the revised City ordinance, does not support or house wireless equipment (radio transceivers, antenna, coaxial or fiber optic cable, DAS, small cell networks…) are not an existing eligible base station or tower. Existing poles in the ROW without wireless equipment on them at the time of the effective date of the Spectrum Act are not eligible facilities and not subject to collocation by right until first approved as a new base station. All existing poles within the City's public ROW will be subject to full review as a new base station per development standards of the new Ordinance prior to any additional collocations by right.

Section 9-594 titled, "Structures subject to zoning: time frames: application; fees" provides that construction, installation, maintenance, modification, operation or replacement of a monopole or associated wireless facility in a ROW is subject to all of the City's codes and regulations. The City's proposed Ordinance address towers in the City's public ROW similarly.

Wireless Master Planning and Public Policy

Wireless telecommunications master planning is an approach taken to reveal how the wireless service industry has initiated deployment patterns throughout the community and revealing the gaps in their coverage. The industry needs complete network coverage and the goal of the City is to allow that fill-in to occur with the least amount of visual impact on the community.

Addressing the engineering gap analysis within the federal guideline parameters and developing public policy based on these two items is the final step in the wireless master planning process. Primary goals identified by the City regarding future wireless infrastructure installations within the identified gaps include:

- Providing wireless connectivity for residents, businesses, visitors and emergency management personnel; and
- Protection of community aesthetics by planning for well sited, well designed, concealed facilities so that the infrastructure aesthetically fits into the landscape of the community; and
- Management over the number and placement of all base stations, towers and associated equipment (including buildings and compound areas) and ancillary equipment to promote efficient wireless voice, broadband and public safety service delivery; and
- Addressing safety of telecommunication facilities and avoid potential damage to people and property; and
- Maximizing City-owned and other publicly owned assets in order to control design standards and to create a revenue opportunity for the City and other public agencies for the overall use by the citizenry.

Public Participation Process

Public participation is a critical element of the master planning process. The goal of the public participation process is to obtain input from citizens, elected and appointed officials, the wireless industry and other interested parties regarding current and future deployment practices of wireless infrastructure within the City. The feedback from these stakeholders helps the City and its consultants to build consensus on how to provide good cell phone and wireless broadband services, while minimizing impacts from telecommunication facilities on neighborhoods and viewsheds. To be as inclusive as possible, City staff and CityScape devised a public participation process that included a kickoff meeting, follow-up presentations, site visits , online polling, direct outreach to key stakeholders, the distribution of educational materials and a series of public hearings.

CityScape conducted a WMP kick-off meeting with the City Council and Planning and Zoning Commission on July 13, 2016 and participants were asked to vote on their preferences of

different types of infrastructure including non-concealed and concealed towers and base stations. In an effort to reach a larger audience, City staff prepared and posted online the same presentation of the survey conducted at the Kickoff meeting. For those interested parties unable to attend the meeting, the online survey remained open for several weeks allowing for participation. Between the two survey methods staff received around 30-35 responses to the survey and the results are as follows in Table 8:

PREFERENCES	TYPE OF INFRASTRUCTURE	TOTAL VOTES
Preferred Base Station	Concealed	27
Preferred Non-concealed	Monopole	25
Preferred Concealed	Faux Tree	23
Preferred Small Cell	Concealed dual purpose light post	11
Preferred Utility Installation	Base station in ROW or easement	8

Table 8: Infrastructure Preferences

CityScape facilitated another public meeting with the City Council and Planning and Zoning Commission on September 14, 2016 where propagation mapping results were presented, showing likely locations for future in-fill sites. This led to discussions for potential land use solutions for future infrastructure requirements.

Once the initial list of City-owned properties was developed, in the general locations identified within the propagation mapping, City Councilors and Planning and Zoning Commissioners conducted site visits to preliminarily assess suitability of those locations for fill-in sites. Forty out of sixty sites were eliminated by combining certain parcels of land or they were deemed unsuitable for this type of infrastructure. Therefore 20 sites remained under consideration.

[2]The City conducted a more intensive public participation process to further vet those sites by notifying all property owners within 300 feet of each of those potential sites under consideration for future wireless siting. These property owners were invited to provide input through the Planning and Zoning Commission's public meetings, or by contacting staff directly.

Public hearings were held with both Planning and Zoning and City Council discussing the proposed, City-owned properties, LDC suggested revisions and the Draft WMP. An informational video discussing the WMP was created and promoted on the City's

[2] At this time this process is on-going and may change before final adoption

website at www.sedonaaz.gov/wirelessmasterplan as well as through City social media and local print media.

Stakeholders have considered the options for filling in the gaps in wireless coverage and developed a list of preferred types and locations for future wireless infrastructure based on the feedback from the kick-off meeting, follow-up meeting , site visits, public outreach, and public hearings. The overall goal of the listing of preferred locations is to locate and design facilities as inconspicuously as possible. Based on the citizenry comments the preferences are as follows:

- Use of public land over private land is preferred because of the benefit to the entire community, specifically controlling location and aesthetics; and
- Concealed base stations (antennas mounted on existing structures) are preferred over new non-concealed base stations or towers; and
- Non-residential locations are better than residential locations for new infrastructure because such facilities are less noticeable and more accepted by the public; and
- Use of right-of-ways (ROW) with concealed small cells, DAS and nodes are now allowed by right per Arizona state law, so the City expects the industry to use this method to get high speed Internet and broadband to residential areas; and
- Base stations on residential buildings, if carefully designed to look like faux chimneys, louvers or dormers might be preferred over the use of the ROW.

After final review the City qualified a total of twenty (20) City-owned properties for fill-in locations including site-specific infrastructure that will be allowed on each property. All 20 City-owned properties meet the following criteria:

- Have vehicular access to an improved public right-of-way;
- Have access to utilities;
- Contain adequate area outside the 100 year flood plain to accommodate wireless infrastructure.

Additionally, any new tower, base station or node facility on any of these 20 properties must meet all City development standards and be subject to all regulations of the zoning code. Should an applicant request any variation from what is proposed and accepted at the time of the WMP vetting process that application will require a Conditional Use Permit (CUP).

The map in Figure 26 shows the location of the vetted City-owned properties and Table 9 identifies the City-owned properties on the map alphabetically and provides the site address,

parcel number, acreage and site specific recommendation for future facilities. Use of these public fill-in sites is encouraged and promoted in the City's LDC.

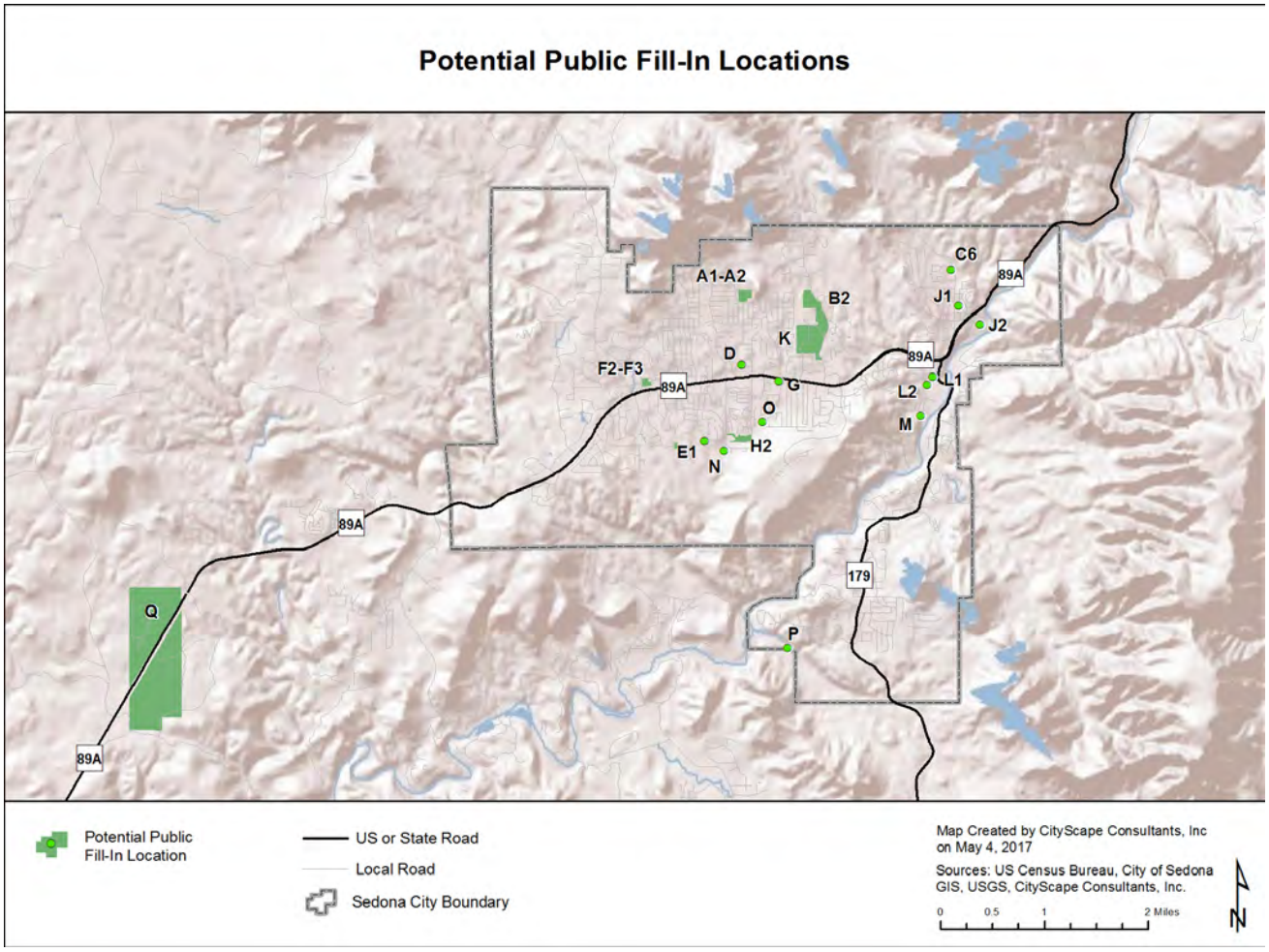


Figure 26 City-Owned Fill-in Sites (Subject to Change)

CITY PRIORITY SITE ID	ADDRESS	PARCEL NUMBER	ACREAGE	SITE SPECIFIC RECOMMENDATION
A1	2070 Buena Vista Drive	408-24-117F	8.380	Faux tree only preferred
A2	Sugarloaf Trailhead 20150 Buena Vista Drive	408-24-117C	0.406	Faux tree or concealed small cell if by parking lot
B2	City of Sedona	408-25-341D	25.866	Faux tree behind West Sedona School close to bus lot
C6	Jordan Park Overflow Parking Lot 735 Jordan Road	401-03-001K	1.0	Faux tree to the west of parcel or west of parking lot
D	Maintenance Yard 20170 Contractors Road	408-24-037A	0.853	Concealed base station on rooftop; monopole or pole
E1	El Camino Pump Station 700 El Camino Road	408-28-343	1.198	Faux tree or concealed base station on rooftop
F2	Singagua Former Real Estate Building 55 Sinagua Drive	408-24-325	0.801	Concealed small cell light pole or concealed base station on rooftop
F3	City Hall Complex 102 Roadrunner Drive	408-020116	2.919	Concealed small cell light pole or concealed base station on rooftop
G	Jack Jameson Park 25 Northview Rd	408-26-498	0.388	Faux tree or flagpole with underground equipment cabinets at south end of property
H2	Recycle Center/Pump Station 2260 Shelby Drive	408-28-103B	0.837	Tower, base station on rooftop on WW building; not on recycle center
J1	Municipal Parking Lot 260 Schnebly Rd	408-14-011, 401-14-093 through 401-14-099	2.01	Concealed small cell
J2	Lift Station 90 Art Barn Lane	401-13-060H	0.06	Concealed small cell
K	Possee Grounds Park 505 and 525 Posse Ground Rd	408-25-339B and 408-25-043A	45.64	Concealed macro at ball park or concealed small cell
L1	Lift Station 41 Ranger Rd	408-25-340	0.33	Concealed small cell or concealed base station
L2	Old Ranger Station- Brewer Property 250 Brewer Rd	408-13-022L	3.38	Concealed macro or concealed small cell
M	Lift Station 11 New Castle Ln	401-20-026M	0.15	Concealed small cell
N	Drainage culvert 60 Finley Drive	401-28-344E	0.11	Concealed small cell
O	Lift Station 160 Panorama Blvd	408-26-195A	0.05	Concealed small cell
P	Cathedral Rock Parking Lot 515 Back O'Beyond Rd	408-13-022L	0.33	Concealed small cell
Q	Waste Water Treatment Plant 7420 and 7500 W State Route 89A	408-21-010A, 408-21-382A, 408-21-463E, 408-21-011D, E, F, 408-21-383A, 408-21-463B, D, F	400.12	Possible concealed macro site subject to County zoning

Table 9: Vetted City-Owned Properties (Subject to Change)

Article 17 Wireless Communications Facilities

Title, Purpose and Definitions

Article 17 of the City's Land Use Development Code is titled as the Sedona Wireless Communications Facilities Ordinance (Ordinance). There are twelve (12) items listed as purposes and intents of Article 17. In summary the purpose of the development standards is to provide for and allow continual wireless deployment Citywide, especially in the identified gaps. These are consistent with Section 704, the Spectrum Act, and Arizona Revised Statutes, Title 9, Chapter 5, Article 8 with strong emphasis on collocation and concealment options to minimize visual impacts throughout the City. The Ordinance promotes wireless connectivity within the legal parameters provided by the FCC and State, protecting as much as possible the unique natural beauty and small-town character of the City as specified in the Sedona Community Plan.

The definitions provided in the Ordinance are consistent with terms commonly used in the industry and in Section 704 and the Spectrum Act. The definitions provide clarity to the industry, staff and citizenry on the meaning and expectations of the development standards.

Administration and General Development and Design Standards

The Administration section of the Ordinance specifies the type of wireless infrastructure subject to the development standards and the infrastructure and identifies situations that are exempt from the Ordinance. The following policies and development standards addressed throughout this section are indented to:

- Promote properties identified in the WMP as the most suitable for siting telecommunication facilities and create incentives for their use; and
- Provide guidance and assistance to telecommunication facility applicants in the siting and design of proposed facilities, consistent with the hierarchy of preferred locations listed in this plan; and
- Identify other potential locations for siting telecommunication facilities consistent with the hierarchy of preferred locations and telecommunication facility types; and
- Provide a streamlined process for facilities that meet siting and design standards. Require pre-application discussions and/or meetings to review, comment on, and guide the applicant on the submittal process; and
- Establish a tiered approval process that incentivizes applicants to propose telecommunication facilities in preferred locations using a preferred design with administrative approval, while requiring other proposals to secure a CUP.

This section provides siting preferences for new telecommunications facilities. The overall goal of the listing of preferred types of infrastructure and preferred locations is to locate and design facilities so they are as inconspicuous as possible. In general, concealed antennas mounted on existing base stations and concealed new base stations are preferred to new non-concealed

antennas mounted on new non-concealed facilities. Non-residential locations are preferred over residential locations because such facilities are less noticeable and more accepted by the public. And the use of public land over private land is beneficial to the entire community so it is listed as a preference before private land sites.

Utilizing City-owned lands assures the community the preference of concealment materials and technologies presently available to the industry. As City properties are developed with concealed wireless facilities that infrastructure installed becomes the precedent of how future sites should be developed on private land. For example, many slick sticks and "flag pole" towers are available to the industry, as well as other creative ideas for concealment towers; some are more aesthetically pleasing and more practical than other types. As the City utilizes these products their applications become the standard for future tower sites on both public and private land. As public land sites are considered and utilized for these purposes, staff gains invaluable knowledge on how wireless sites are constructed, which will aid them in reviewing and processing future site plan designs and evaluations on both public and private properties. Leasing public lands for purposes of new wireless infrastructure can create new sources of public revenue. As new sites are developed on public land, the community generates lease revenue from that tower owner and tenant.

The most preferred option is listed first with the least preferred option last. When a lower ranked alternative is proposed the applicant must demonstrate through relevant information why the higher ranked options are not technically feasible, practical or justified given the location of the proposed facilities. This includes, but is not limited to, an affidavit by a radio frequency engineer demonstrating that despite diligent efforts to adhere to the established preferences within the geographic search area and by clear and convincing evidence it is not possible. The applicant must provide such evidence in its application in order for the application to be considered complete.

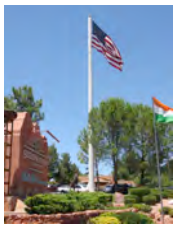
The City developed the siting preferences for future wireless communications infrastructure from the information gathered during individual site visits, online polling, the kick-off meeting, and a second public meeting, held September 14, 2016.

The siting preference is as follows:

1. Concealed base station (macro, small cell, DAS, or node) outside of ROW

a. City-owned property identified in the WMP
b. City-owned property not identified in the WMP
c. Other public property
d. Private owned property zoned non-residential
e. Private owned property zoned residential multi-family structures or non-residential structures in RS or RM districts.

2. Concealed collocation on an existing concealed tower or concealed base station



a. City-owned property identified in the WMP
b. City-owned property not identified in the WMP
c. Other public property
d. Private owned property

3. Replacement of existing non-concealed tower with a concealed tower

4. Concealed tower for small cell, DAS or node (not macro) outside the ROW

a. City-owned property identified in the WMP
b. City-owned property not identified in the WMP
c. Other public property
d. Private owned property

5. Concealed base station for Distributed Antenna System (DAS), small cell base station or node in ROW parallel to a: (as those terms are defined by the Arizona Department of Transportation)

a. Principal Arterial
b. Minor Arterial
c. Major Collector
d. Minor Collector
e. Local Road

6. Concealed tower for DAS, small cell or node in ROW parallel to a: (as those terms are defined by the Arizona Department of Transportation)

a. Principal Arterial
b. Minor Arterial
c. Major Collector
d. Minor Collector
e. Local Road

7. Concealed macro tower outside of ROW

a. City-owned property identified in the WMP
b. City-owned property not identified in the WMP
c. Other public property
d. Private owned property

8. Collocation on existing non-concealed tower
    a. Public property
    b. Private owned property
9. Non-concealed tower outside of ROW

    a. City-owned property
        i. Monopole
        ii. Lattice
        iii. Guyed
    b. Private property
        i. Monopole
        ii. Lattice
        iii. Guyed

The City developed a Definitions of Zoning Districts as shown in Table 10 and a Preferred Use Table shown in Table 11 that pairs with the list of preferred sites and depicts at a glance which types of infrastructures are permitted in the City's zoning districts and the approval process for each scenario. The goal is to incentivize the wireless industry to deploy preferred types of infrastructure in preferred locations by allowing speed to market through a more streamlined review process with a more stringent review process for less desired types of infrastructure.

DEFINITIONS OF ZONING DISTRICTS	
OP	Office Professional District
C-1	General Commercial District
C-2	General Commercial District
C-3	Heavy Commercial/Light Manufacturing District
RC	Resort Commercial District
PD	Planned Development District
CF	Community Facilities District
L	Lodging District
P	Parking District
RS	Single Family Residential
RM	Multi Family Residential

Table 10: Zoning Districts

	RS		RM		OP	GC	C-3	L/RC	PD	CF	P
	R	NR	R	NR							
Concealed base station (macro, small cell, DAS or node) outside ROW											
City-owned property identified in the MP	A – See Master Plan for Site Specific Details										
Other City-owned property	C	C	C	C	C	C	C	C	C	C	C
Other public property	C	C	C	C	C	C	C	C	C	C	C
Private property	C	C	C	C	C	C	C	C	C	C	C
Concealed collocation on existing concealed tower or base station											
City-owned property identified in the MP	A – See Master Plan for Site Specific Details										
Other City-owned property	N	C	C	C	C	C	C	C	C	C	C
Other public property	N	C	C	C	C	C	C	C	C	C	C
Private property	C	C	C	C	C	C	C	C	C	C	C
Replacement of existing non-concealed tower with a new concealed tower											
City-owned property identified in the MP	A – See Master Plan for Site Specific Details										
Other City-owned property	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Other public property	A	A	A	A	A	A	A	A	A	A	A
Private property	A	A	A	A	A	A	A	A	A	A	A
Concealed small cell tower, DAS or node (not macro) outside the ROW											
City-owned property identified in the MP	A – See Master Plan for Site Specific Details										
Other City-owned property	N	C	C	C	C	C	C	C	C	C	C
Other public property	N	C	C	C	C	C	C	C	C	C	C
Private property	N	C	C	C	C	C	C	C	C	C	C
Concealed base station or tower for DAS, small cell or node in ROW parallel to											
Principal arterial	C	C	C	C	C	C	C	C	C	C	C
Minor arterial	C	C	C	C	C	C	C	C	C	C	C
Major collector	C	C	C	C	C	C	C	C	C	C	C
Minor collector	C	C	C	C	C	C	C	C	C	C	C
Local road	C	C	C	C	C	C	C	C	C	C	C
Concealed macro tower outside ROW											
Public property listed in MP	A – See Master Plan for Site Specific Details										
Other City-owned property	N	C	N	C	C	C	C	C	C	C	C
Other public property	N	C	N	C	C	C	C	C	C	C	C
Private property	N	C	N	C	C	C	C	C	C	C	C
Collocation on eligible facility											
Non substantial change	A	A	A	A	A	A	A	A	A	A	A
Collocation on eligible facility with substantial change or on non eligible facility											
City-owned property	C	C	C	C	C	C	C	C	C	C	C
Public property	C	C	C	C	C	C	C	C	C	C	C
Private property	C	C	C	C	C	C	C	C	C	C	C
Non-concealed tower outside ROW on											
Public property											
Monople, Lattice, Guy	N	N	N	N	C-2	C-2	C-2	C-2	C-2	C-2	C-2
Private property											
Monople, Lattice, Guy	N	N	N	N	C-2	C-2	C-2	C-2	C-2	C-2	C-2

Table 11: Preferred Use Table

Key for Table 11 is as follows: A=Administrative Permit; C=Conditional Use Permit from Planning & Zoning Commission; C-2=Conditional Use Permit from City Council following recommendation from Planning & Zoning Commission; N=Not Permitted

The applicability section also provides application submittal requirements and application review processes. Each request for any type of new infrastructure requires a completed application form, fee, site plan, scaled drawing, photo simulated pre and post renderings, and many other documents intended to meet safety and aesthetic concerns. This section also includes provisions for third party expert review of all submitted materials from a radio frequency engineering perspective.

Future wireless facilities not in compliance with all portions of the Ordinance shall be removed if not brought into compliance within thirty (30) day after written demand of the City.

The General Development and Design Standards section lists required design guidelines in addition to those required in the application process. These additional development standards are intended to further meet the goals and objectives identified during the kick-off and follow-up meetings.

To minimize the visual impacts and promote safety of telecommunication facilities applicants are required to:

- Minimize heights to maintain appropriate mass and scale with the surrounding property, neighborhood, and community. Provide identification signage on nameplate size signs; and
- Comply with radio frequency emissions; and
- Address structural integrity guidelines; and
- Follow impact fee requirements; and
- Require security fencing and landscape screening material around the compound area to match that found in the vicinity (where applicable).

New tower applicants are also required to:

- Protect people and property near telecommunication facilities from structural failure by maintaining the minimum/maximum setback requirements based on the adjoining land use; and
- Incorporate breakpoint technology if applicable; and
- Minimize the sound from power generators or other noise sources; and
- Monitor all facilities to ensure they are being properly maintained.

Applicants should make the best effort for the appearance of towers and base stations to blend into its surroundings. The guidelines set forth in the WMP are not all inclusive and applicants are encouraged to propose creative solutions that would be most appropriate for each site.

In general:

- Concealed facilities are preferred; and
- New concealed facilities should blend with the surroundings and avoid being conspicuous, such as concealed base station, a tree or a concealed dual functioning pole; and
- The surrounding environment (e.g. trees, landscaping, fencing and buildings) should be used to the maximum extent possible to conceal the telecommunication compound area; and
- Concealed telecommunication facility types should vary in the City to avoid too many of any one particular type; and
- Equipment cabinets should be vaulted underground whenever feasible.
- Base stations on rooftops should be screened with materials that are transparent to the RF signal, and mitigate the visual impact; and
- Base stations in the right-of-way should not interfere with street lighting, street signage, vehicular or pedestrian access or visibility; and
- A monopole tower is preferred over a lattice and guy tower. The non-concealed tower should be sited among other elements to reduce its visibility, such as, among a stand of trees or behind the principal building on the same zone lot (if applicable); and
- As appropriate, monopoles should be colored to match their foreground or background elements; and
- Cable along the ground should be placed underground; and
- If the cable runs are located above ground, they should be hidden from public view; and
- Cables and feed lines should not be mounted to the exterior of a building or structure; and
- In monopole type facilities (e.g. slick stick, faux tree, painted pole, etc.) cables and feed lines shall be installed inside the pole.

Regarding Equipment Cabinets and Compound Areas:

- Interiors of existing adjacent buildings can be a location for equipment cabinets; and
- Access to equipment cabinets and compound areas shall be limited to authorized personal only and remain gated and locked at all times; and
- Building base station compound areas should be concealed and architecturally compatible with the building; and
- Most ground level equipment must be screened with opaque security fencing and landscaping; and

- The landscape material should match or compliment the surrounding material; and
- Ground level compound areas should be of sufficient height to screen the equipment and, if applicable, match the material(s) and color(s) of the adjoining building; and
- Ground level compound areas should not remove any required parking spaces, required buffer areas, or encroach into any easements; and
- Pole–mounted base station equipment cabinets should be vaulted, placed within the pole on which the antennas or nodes are attaching and if on the ground be small, low profile and flush to the base of the pole; and
- If the equipment cabinet is mounted to the pole is should be mounted high enough off the ground to not interfere with pedestrian, bicycle, and vehicle traffic.

The Ordinance provides application requirements for approval standards for noncommercial amateur wireless facilities. Towers or base stations in excess of 65′ have seven (7) development standards and no wireless communication antennas are allowed on any noncommercial amateur wireless facility.

Additionally the Ordinance provides guidelines for compliance as it relates to ensuring the City's public safety radio services are free from objectionable technical interference and guidelines for compliance with FCC regulations.

Abandoned towers and base stations will be required to be removed at the owner's expense within 180 days of cessations of use and the site area returned to its natural state prior to the tower or base station being built, or if applicable, to match existing new development in the immediate vicinity.

Chapter 4
Inventory Catalog

Creation of Inventory Catalog; Existing Infrastructure

Procedure

Data for the assessments was obtained from a number of sources including actual permits obtained from the City for wireless infrastructure, research of FCC registered site locations, direct information from existing wireless service providers and tower owners active in and around the City, the City's GIS, and through actual site visits to each location. CityScape visited each location and gathered as much information as possible about the facility ownership and tenants.

Evaluation

Based on a visual inspection of antenna arrays already on existing antenna support structures, CityScape made a judgment as to whether each support structure is likely to physically accommodate more antennas. In this consideration, adding antennas equates to adding other wireless antenna platform(s) consisting of several antennas, ancillary equipment and associated cables. Prior to mounting new antennas and related equipment, the structure must be analyzed by a structural engineer for its ability to support the proposed addition(s).

Representation

The towers and base stations are listed in numeric order and are shown on the map in Figure 27. A catalog of the wireless infrastructure inventory follows and includes photographs of the exiting tower or base station, site map of the location and detailed information gathered from the on-site visits as well as from the above referenced sources.

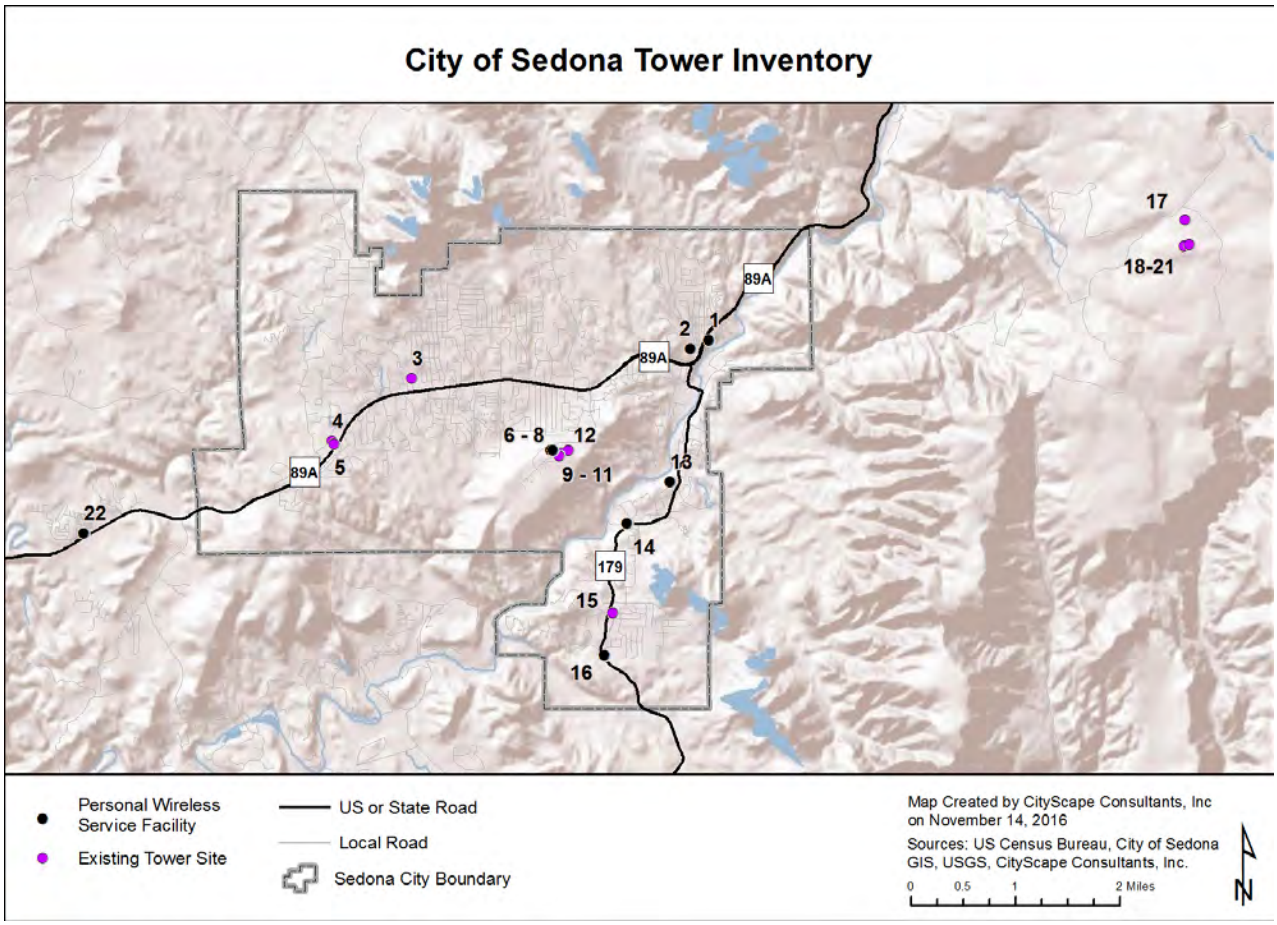
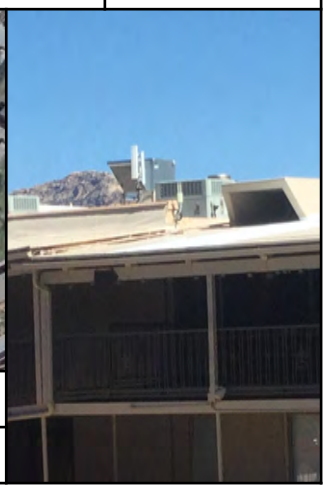


Figure 27: Existing Infrastructure Inventory

Existing Infrastructure Inventory

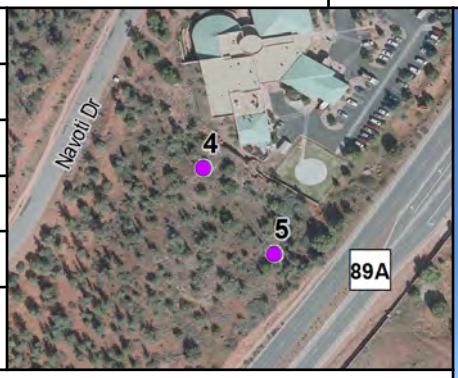
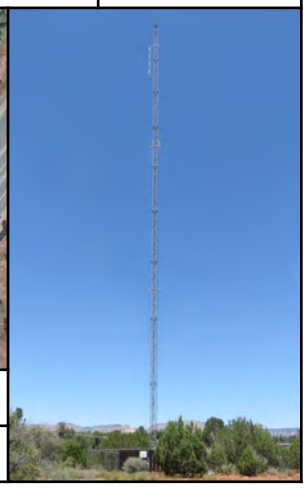
Back to Staff Report

SITE 1: BASE STATION WITH PWSF				
PROPERTY OWNER:	Orchards NewCo, LLC		**ELIGIBLE:**	Yes
FACILITY OWNER:	T-Moblie		**LATITUDE:**	34.86942 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:** T-Mobile	**LONGITUDE:**	-111.76026 W
SITE ADDRESS:	254 N SR 89A		**ZONING:**	PD
SITE NAME:	L'Auberge Resort			
TYPE:	Rooftop			
HEIGHT:	26'			
ANTENNA TYPES:	PWSF			
SERVICE PROVIDER:	T-Mobile West LLC			
POTENTIAL COLLOCATIONS:	Yes			
PARCEL ID:	401-12-001A			
COMMENTS:	Multiple service providers could use the same rooftop.			

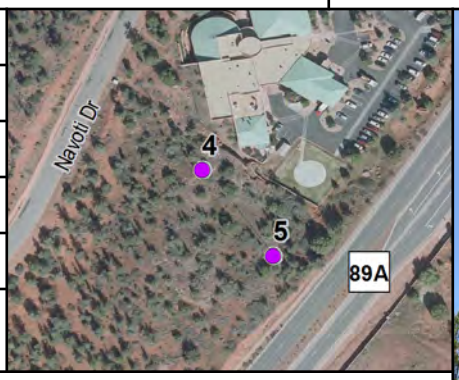
SITE 2: TOWER WITH PWSF				
PROPERTY OWNER:	Sedona-Oak Creek Fire District		**ELIGIBLE:**	Yes
FACILITY OWNER:	Sedona Fire District Station 4		**LATITUDE:**	34.868222 N
IDENTIFICATION:	**ASR**:	**FACILITY OWNER ID**:	**LONGITUDE:**	-111.76329 W
SITE ADDRESS:	431 Forest Road		**ZONING:**	C-1
SITE NAME:				
TYPE:	Lattice			
HEIGHT:	85'			
ANTENNA TYPES:	PWSF; Microwave			
SERVICE PROVIDERS:	Alamosa PCS; AT&T; Verizon; Sedona Fire District			
POTENTIAL COLLOCATIONS:	No			
PARCEL ID:	401-17-019N			
COMMENTS:	Tower is full and likely needs more height for collocations.			

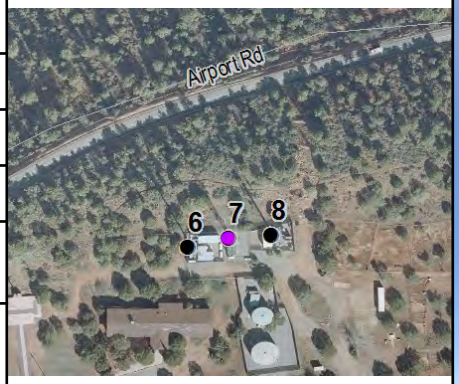
Back to Staff Report

SITE 3: TOWER WITH NO PWSF				
PROPERTY OWNER:	Sedona Red Rock Fire District		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Sedona Fire District Station 1		**LATITUDE:**	34.864106 N
IDENTIFICATION:	**ASR**:	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.81034 W
SITE ADDRESS:	2855 Hopi Drive		**ZONING:**	C-2
SITE NAME:				
TYPE:	Lattice			
HEIGHT:	60’			
ANTENNA TYPES:	Public Safety; Microwave			
SERVICE PROVIDER:	Sedona Fire District			
POTENTIAL COLLOCATIONS:	Maybe			
PARCEL ID:	408-24-351A			
COMMENTS:	Tower height increase would necessary for collocations.			

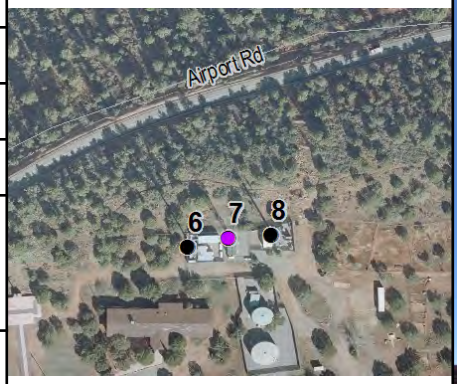
SITE 4: TOWER WITH NO PWSF				
PROPERTY OWNER:	Northern Arizona Healthcare Corporation		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Tabback Broadcasting Company		**LATITUDE:**	34.855436 N
IDENTIFICATION:	**ASR**: 1003530	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.8238 W
SITE ADDRESS:	60 Bristlecone Pines Road		**ZONING:**	PD
SITE NAME:	Unknown			
TYPE:	Guyed			
HEIGHT:	187'			
ANTENNA TYPES:	Broadcast Radio			
SERVICE PROVIDER:	AM 780 KAZM			
POTENTIAL COLLOCATIONS:	Yes			
PARCEL ID:	408-11-177Q			
COMMENTS:	FCC ASR is not posted at tower facility.			

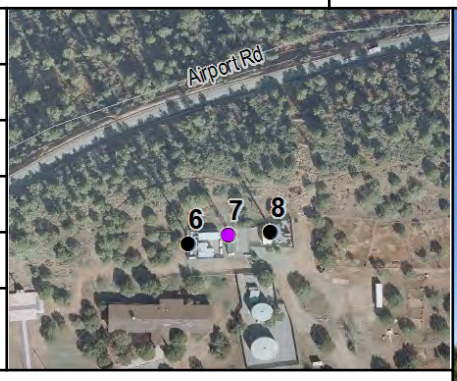
Back to Staff Report

SITE 5: TOWER WITH NO PWSF				
PROPERTY OWNER:	Northern Arizona Healthcare Corporation		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Tabback Broadcasting Company		**LATITUDE:**	34.855037 N
IDENTIFICATION:	**ASR**: 1003531	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.82349 W
SITE ADDRESS:	60 Bristlecone Pines Road		**ZONING:**	PD
SITE NAME:	Unknown			
TYPE:	Guyed			
HEIGHT:	187’			
ANTENNA TYPES:	Broadcast Radio			
SERVICE PROVIDER:	AM 780 KAZM			
POTENTIAL COLLOCATIONS:	Yes			
PARCEL ID:	408-11-177Q			
COMMENTS:	FCC ASR is not posted at tower facility.			

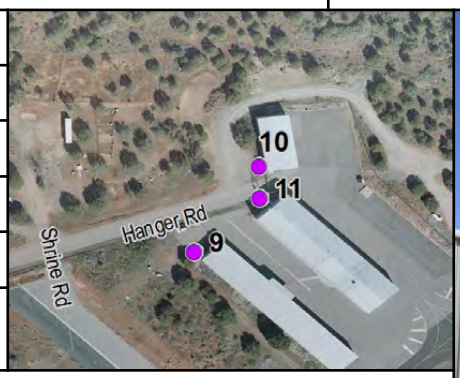
SITE 6: TOWER WITH PWSF				
PROPERTY OWNER:	Yavapai County		**ELIGIBLE:**	Yes
FACILITY OWNER:	Crown Castle International		**LATITUDE:**	34.854108 N
IDENTIFICATION:	**ASR**: 1033331	**FACILITY OWNER ID:** 807412	**LONGITUDE:**	-111.78691 W
SITE ADDRESS:	Airport Road		**ZONING:**	CF
SITE NAME:	Sedona Airport			
TYPE:	Monopole			
HEIGHT:	86’			
ANTENNA TYPES:	PWSF			
SERVICE PROVIDER:	T-Mobile West, LLC; Verizon			
POTENTIAL COLLOCATIONS:	Yes			
PARCEL ID:	408-27-001A			
COMMENTS:	Site indicates Nextel but Nextel was purchased by Sprint and Sprint is now on Site 8. Bottom array appears disconnected.			

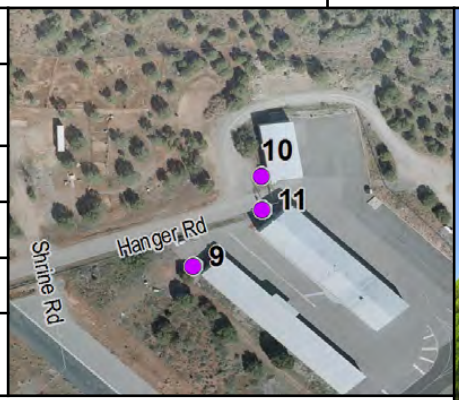
Back to Staff Report

SITE 7: TOWER WITH PWSF				
PROPERTY OWNER:	Yavapai County		**ELIGIBLE:**	Yes
FACILITY OWNER:	Sedona Fire District		**LATITUDE:**	34.854153 N
IDENTIFICATION:	**ASR:** 1227514	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.78673 W
SITE ADDRESS:	Airport Road		**ZONING:**	CF
SITE NAME:	Airport			
TYPE:	Lattice			
HEIGHT:	99’			
ANTENNA TYPES:	Microwave, 2-Way			
SERVICE PROVIDER:	Sedona Fire District; E-Sedona Wireless; LLC; CommSpeed			
POTENTIAL COLLOCATIONS:	No			
PARCEL ID:	408-27-001A			
COMMENTS:	FAA Registration is not posted at this facility.			

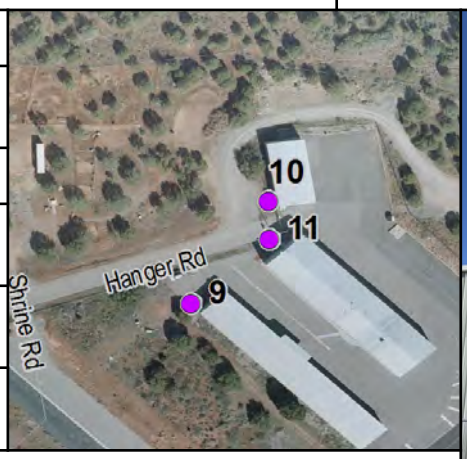
SITE 8: TOWER WITH PWSF				
PROPERTY OWNER:	Yavapai County		**ELIGIBLE:**	Yes
FACILITY OWNER:	American Tower Company		**LATITUDE:**	34.854164 N
IDENTIFICATION:	**ASR:** 1211976	**FACILITY OWNER ID:** 40103	**LONGITUDE:**	-111.78653 W
SITE ADDRESS:	Airport Road		**ZONING:**	CF
SITE NAME:	Sedona Airport			
TYPE:	Monopole			
HEIGHT:	70’			
ANTENNA TYPES:	PWSF			
SERVICE PROVIDER:	AT&T; Sprint			
POTENTIAL COLLOCATIONS:	Maybe			
PARCEL ID:	408-27-001A			
COMMENTS:	Tower signage on site.			

Back to Staff Report

SITE 9: BASE STATION WITH NO PWSF				
PROPERTY OWNER:	Yavapai County		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Unknown		**LATITUDE:**	34.853308 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.78545 W
SITE ADDRESS:	Airport Road		**ZONING:**	CF
SITE NAME:				
TYPE:	Attached Pole			
HEIGHT:	30’			
ANTENNA TYPES:	2-Way			
SERVICE PROVIDER:	Private mobile radio			
POTENTIAL COLLOCATIONS:	No			
PARCEL ID:	408-27-001A			
COMMENTS:	No signage at site. Tower could be replaced for future PWSF.			

SITE 10: BASE STATION WITH NO PWSF				
PROPERTY OWNER:	Yavapai County		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Unknown		**LATITUDE:**	34.853699 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.78515 W
SITE ADDRESS:	Airport Road		**ZONING:**	CF
SITE NAME:	Unknown			
TYPE:	Attached Lattice Tower			
HEIGHT:	25’			
ANTENNA TYPES:	Utility Relay			
SERVICE PROVIDER:	Private mobile radio			
POTENTIAL COLLOCATIONS:	No			
PARCEL ID:	408-27-001A			
COMMENTS:	No signage at site. Tower could be replaced for future PWSF.			

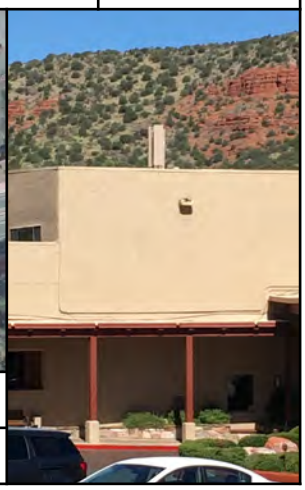
Back to Staff Report

SITE 11: TOWER WITH NO PWSF				
PROPERTY OWNER:	Yavapai County		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Unknown		**LATITUDE:**	34.853555 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.78515 W
SITE ADDRESS:	Airport Road		**ZONING:**	CF
SITE NAME:	Unknown			
TYPE:	Two Attached Lattice Towers			
HEIGHT:	30’			
ANTENNA TYPES:	Possibly 2-Way; Microwave			
SERVICE PROVIDER:	Private mobile radio			
POTENTIAL COLLOCATIONS:	No			
PARCEL ID:	408-27-001A			
COMMENTS:	No signage at site. Towers could be replaced for future PWSF.			

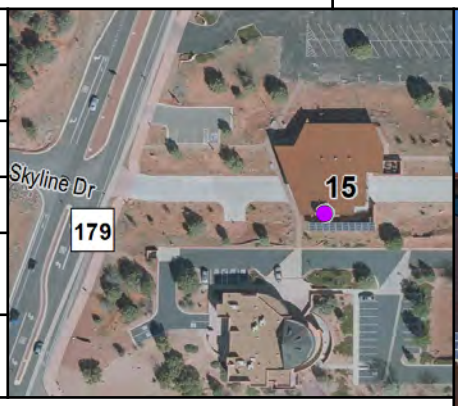
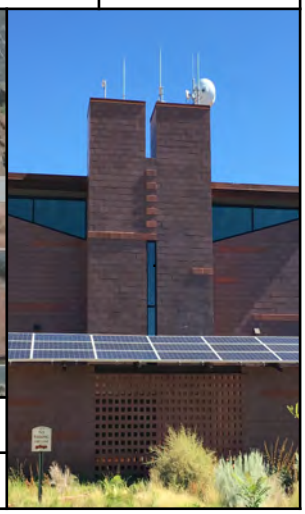
SITE 12: TOWER WITH NO PWSF				
PROPERTY OWNER:	Yavapai County		**ELIGIBLE:**	Yes
FACILITY OWNER:	Unknown		**LATITUDE:**	34.854074 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.78398 W
SITE ADDRESS:	Airport Road		**ZONING:**	CF
SITE NAME:	Unknown			
TYPE:	Lattice			
HEIGHT:	30’			
ANTENNA TYPES:	Microwave			
SERVICE PROVIDERS:	Speed Connect			
POTENTIAL COLLOCATIONS:	No			
PARCEL ID:	408-27-001A			
COMMENTS:	No signage at site. Tower would need to be replaced for future a PWSF subject to FAA approval.			

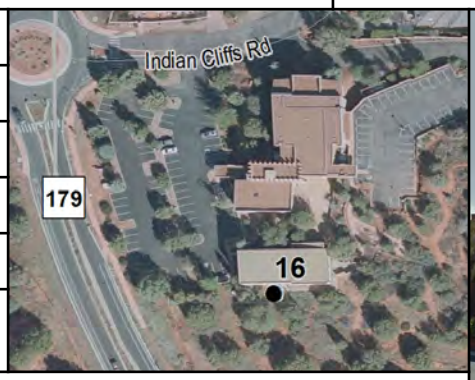
Back to Staff Report

SITE 13: TOWER WITH PWSF				
PROPERTY OWNER:	Church of the Red Rocks		**ELIGIBLE:**	Yes
FACILITY OWNER:	Crown Castle International		**LATITUDE:**	34.849647 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:** 855978	**LONGITUDE:**	-111.7668 W
SITE ADDRESS:	54 Bowstring Drive		**ZONING:**	RS-18b
SITE NAME:	Church of the Red Rocks			
TYPE:	Dual Purpose Concealed			
HEIGHT:	27’			
ANTENNA TYPES:	PWSF			
SERVICE PROVIDER:	AT&T			
POTENTIAL COLLOCATIONS:	Maybe			
PARCEL ID:	401-25-037C			
COMMENTS:	Nice site, well marked and good example of small cell dual purpose (small cell and light standard) pole.			

SITE 14: BASE STATION WITH PWSF				
PROPERTY OWNER:	Poco Diablo Resort, LLC		**ELIGIBLE:**	Yes
FACILITY OWNER:	T-Mobile West LLC		**LATITUDE:**	34.843891 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.77402 W
SITE ADDRESS:	1752 SR 179		**ZONING:**	RC
SITE NAME:	Unknown			
TYPE:	Rooftop			
HEIGHT:	30’			
ANTENNA TYPES:	PWSF			
SERVICE PROVIDER:	T-Mobile West LLC			
POTENTIAL COLLOCATIONS:	Yes			
PARCEL ID:	401-30-004A			
COMMENTS:	Multiple tenants could go on rooftop.			

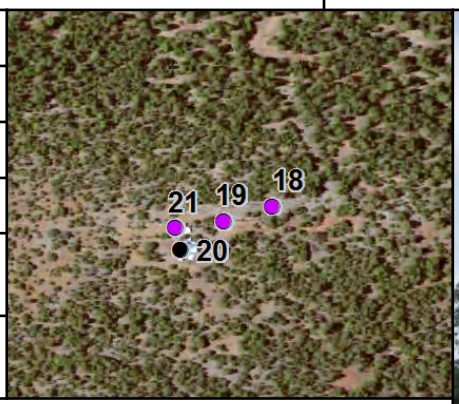
Back to Staff Report

SITE 15: BASE STATION WITH NO PWSF				
PROPERTY OWNER:	Sedona Fire District		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Sedona Fire District Station 6		**LATITUDE:**	34.831397 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.77653 W
SITE ADDRESS:	2675 SR 179		**ZONING:**	RS-10b
SITE NAME:				
TYPE:	Base Station			
HEIGHT:				
ANTENNA TYPES:	2-Way?			
SERVICE PROVIDER:	Sedona Fire District			
POTENTIAL COLLOCATIONS:	Maybe			
PARCEL ID:	401-34-001J			
COMMENTS::				

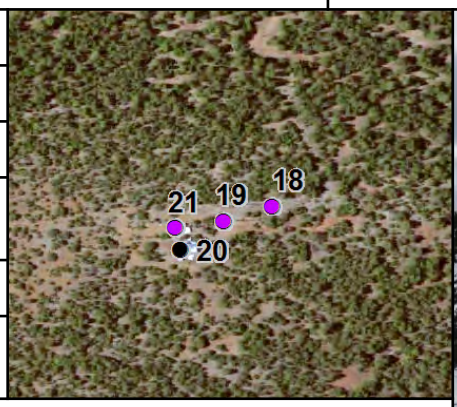
SITE 16: BASE STATION WITH PWSF				
PROPERTY OWNER:	Sedona United Methodist Church		**ELIGIBLE:**	Yes
FACILITY OWNER:	AT&T		**LATITUDE:**	34.826116 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.77714 W
SITE ADDRESS:	110 Indian Cliffs Road		**ZONING:**	RS-10b
SITE NAME:				
TYPE:	Concealed			
HEIGHT:	30’			
ANTENNA TYPES:	PWSF			
SERVICE PROVIDER:	AT&T			
POTENTIAL COLLOCATIONS:	Yes			
PARCEL ID:	401-34-011Z			
COMMENTS:	Insite locational photo will be replaced after reassessment.			

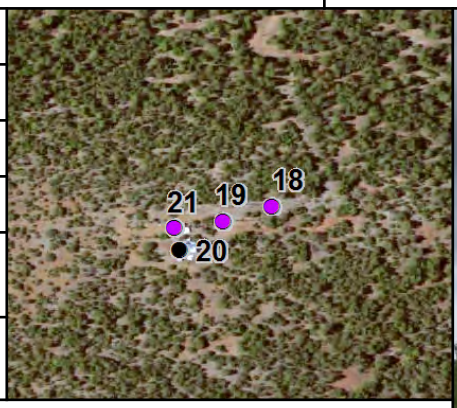
Back to Staff Report

SITE 17: TOWER WITH NO PWSF				
PROPERTY OWNER:	US Forest Service		**ELIGIBLE:**	Unknown
FACILITY OWNER:	US Forest Service		**LATITUDE:**	34.886016 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.67979 W
SITE ADDRESS:	Atop Schnebly Hill		**ZONING:**	Unknown
SITE NAME:	Unknown			
TYPE:	Lattice			
HEIGHT:	100’			
ANTENNA TYPES:	Unknown			
SERVICE PROVIDER:	Public Safety			
POTENTIAL COLLOCATIONS:	Unknown			
PARCEL ID:	Unknown			
COMMENTS:	Tower is outside City’s zoning jurisdiction and poorly marked.			

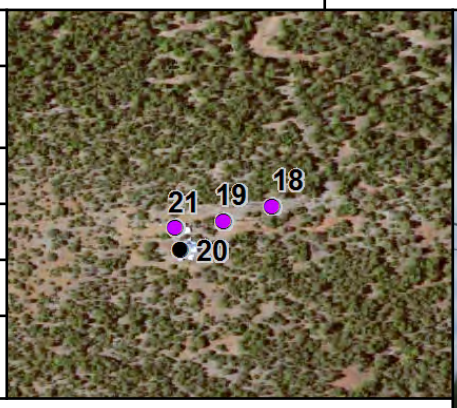
SITE 18: TOWER WITH NO PWSF				
PROPERTY OWNER:	US Forest Service		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Arizona Water Company		**LATITUDE:**	34.882405 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID**:	**LONGITUDE:**	-111.67995 W
SITE ADDRESS:	Atop Schnebly Hill		**ZONING:**	Unknown
SITE NAME:	Unknown			
TYPE:	Guyed			
HEIGHT:	42’ or 80’			
ANTENNA TYPES:	Unknown			
SERVICE PROVIDERS:	Private mobile radio			
POTENTIAL COLLOCATIONS:	Unknown			
PARCEL ID:	Unknown			
COMMENTS:	Tower is outside City’s zoning jurisdiction and poorly marked.			

Back to Staff Report

SITE 19: TOWER WITH NO PWSF				
PROPERTY OWNER:	US Forest Service		**ELIGIBLE:**	Unknown
FACILITY OWNER:	GOVNET, Inc.		**LATITUDE:**	34.882457 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.67954 W
SITE ADDRESS:	Atop Schnebly Hill		**ZONING:**	
SITE NAME:	Unknown			
TYPE:	Lattice			
HEIGHT:	96’			
ANTENNA TYPES:	Unknown			
SERVICE PROVIDER:	Microwave			
POTENTIAL COLLOCATIONS:	Unknown			
PARCEL ID:	Unknown			
COMMENTS:	Tower is outside City’s zoning jurisdiction and poorly marked. Prior use included broadcast radio.			

SITE 20: TOWER WITH PWSF				
PROPERTY OWNER:	US Forest Service		**ELIGIBLE:**	Unknown
FACILITY OWNER:	American Tower Corporation		**LATITUDE:**	34.88223 N
IDENTIFICATION:	**ASR**: 1007629	**FACILITY OWNER ID:** 82468	**LONGITUDE:**	-111.67991 W
SITE ADDRESS:	Atop Schnebly Hill		**ZONING:**	Unknown
SITE NAME:	Sunset Rest Area			
TYPE:	Lattice			
HEIGHT:	175’			
ANTENNA TYPES:	Microwave; PWSF			
SERVICE PROVIDER:	Nextel;Verizon; Coconino CO Sheriff; Sedona Fire District; Arizona DPS			
POTENTIAL COLLOCATIONS:	Maybe			
PARCEL ID:	Unknown			
COMMENTS:	Tower is outside City’s zoning jurisdiction.Tower is well marked by ATC.			

Back to Staff Report

SITE 21: TOWER WITH NO PWSF				
PROPERTY OWNER:	US Forest Service		**ELIGIBLE:**	Unknown
FACILITY OWNER:	Arizona Department of Public Safety		**LATITUDE:**	34.882402 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.67996 W
SITE ADDRESS:	6701 W Hwy 89A		**ZONING:**	Unknown
SITE NAME:	Unknown			
TYPE:	Guyed			
HEIGHT:	73’			
ANTENNA TYPES:	Unknown			
SERVICE PROVIDER:	Unknown			
POTENTIAL COLLOCATIONS:	Unknown			
PARCEL ID:	Unknown			
COMMENTS:	Tower is outside City’s zoning jurisdiction and poorly marked.			

SITE: 22: TOWER WITH PWSF				
PROPERTY OWNER:	Sedona Pines Resort		**ELIGIBLE:**	Yes
FACILITY OWNER:			**LATITUDE:**	34.842627 N
IDENTIFICATION:	**ASR:**	**FACILITY OWNER ID:**	**LONGITUDE:**	-111.86569 W
SITE ADDRESS:	6701 W Hwy 89A		**ZONING:**	
SITE NAME:				
TYPE:	Concealed Flag Pole			
HEIGHT:	80’			
ANTENNA TYPES:	PWSF			
SERVICE PROVIDERS:	Alamos PCS; Sprint			
POTENTIAL COLLOCATIONS:	No			
PARCEL ID:				
COMMENTS:	Tower is outside the City so minimal information is available.			

Creation of City-Owned Property

The City-owned sites for future telecommunications facilities are listed alphabetically following the examples of concealment options. These particular properties have been visited and vetted by City staff and many members of the City Council and Planning and Zoning Commission. In total twenty (20) City-owned properties are provided in the inventory. Each site was reviewed individually for tower or base station type, height and best general location on the property for the potential new infrastructure, see Figure 28.

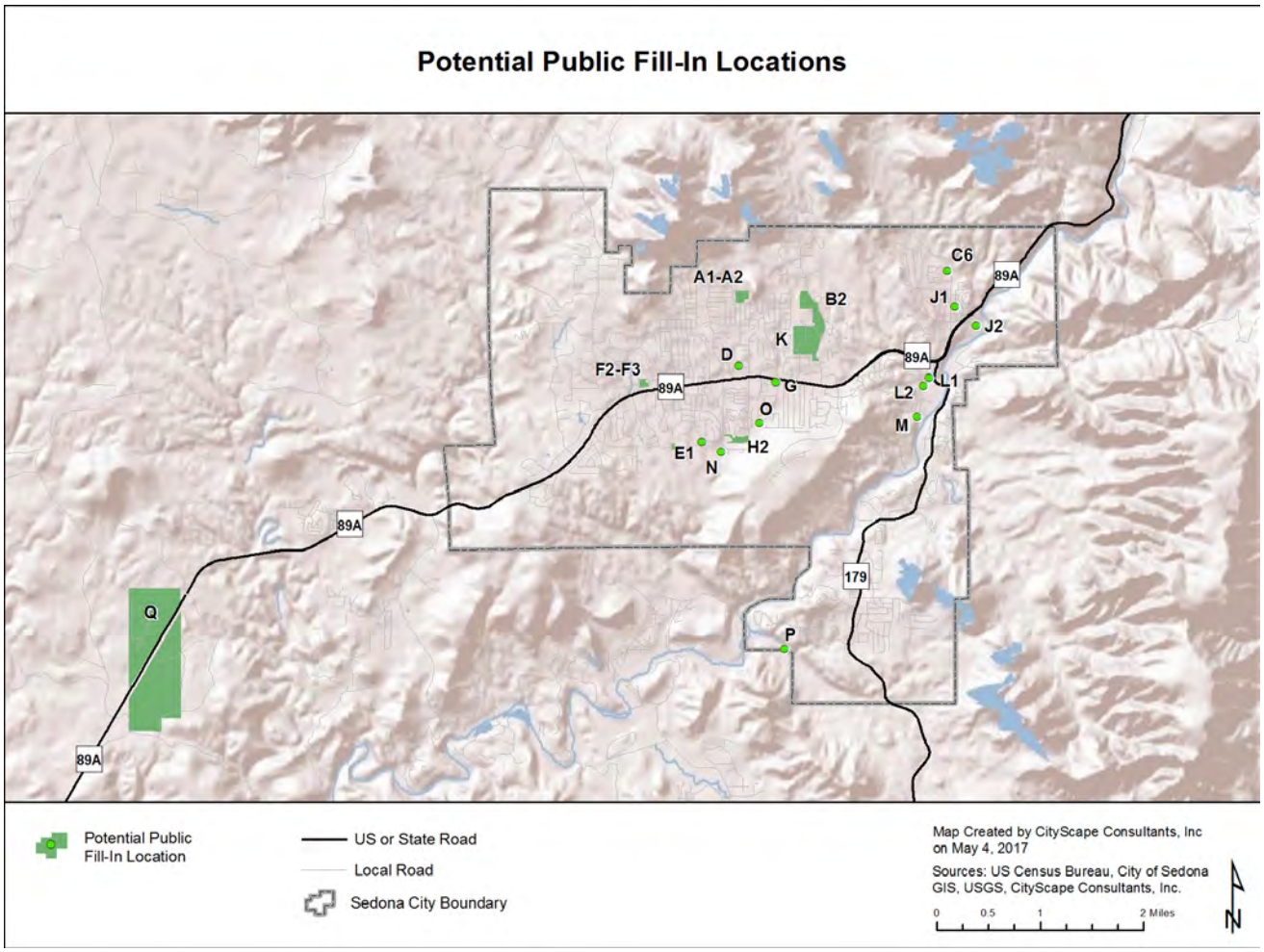


Figure 28 City-Owned Fill-in Sites (Subject to Change)

All the notes were compiled, studied and the consensus for site specific tower or base station appropriateness was determined. Some City-owned sites have more than one possibility due to the land use. For example, site A-2 is the Sugarloaf Trailhead has two possible options; a concealed light pole in the parking lot or a faux tree if closer to the trailhead.

Sugarloaf Trailhead
(Image: City of Sedona)

Additionally, as concealment options continue to improve the City may find it prefers a different style of concealment. For this reason the City promotes creativity by the industry and allows for flexibility on the exact type of concealment options for each property. This thereby prevents repetitive structures appearing throughout the City.

Examples of options for possible concealed sites are shown in Table 11 below.

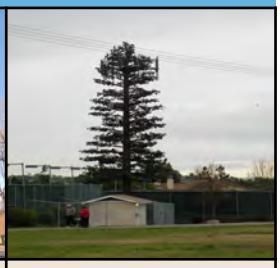
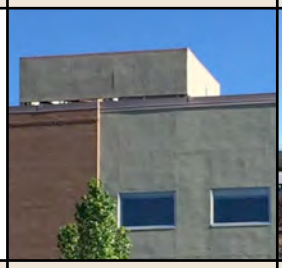
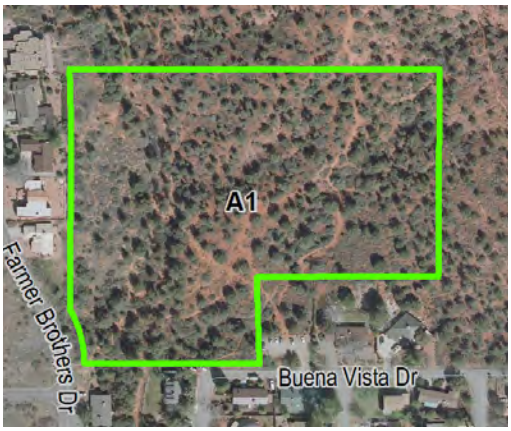
TYPE	EXAMPLES			
FAUX TREES				
FLAG POLES				
CONCEALED BASE STATIONS				
CONCEALED SMALL CELLS				
OTHER CREATIVE OPTIONS				

Table 11:Examples of Concealment Options
***other concealment options may be considered if deemed appropriate for surroundings**

City-Owned Property Inventory

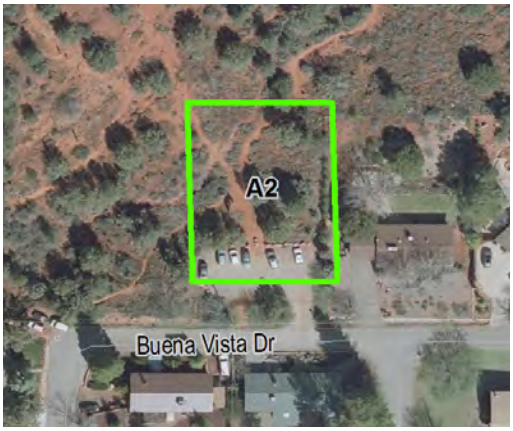
Back to Staff Report

SITE A1 — 2070 Buena Vista Drive



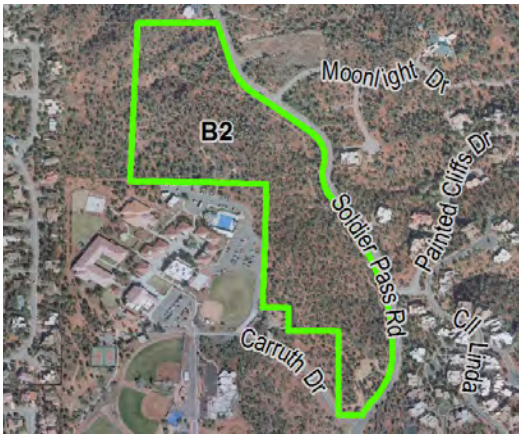
SITE NAME:			
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	8.380
PARCEL ID:	408-24-117F	**ZONING:**	
SITE SPECIFIC RECOMMENDATION:	Faux tree only preferred at this site		

SITE A2 — 2050 Buena Vista Drive



SITE NAME:	Sugarloaf Trailhead		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.406
PARCEL ID:	408-24-117C	**ZONING:**	RS-10a
SITE SPECIFIC RECOMMENDATION:	Faux tree or concealed small cell if by parking lot		

SITE B2



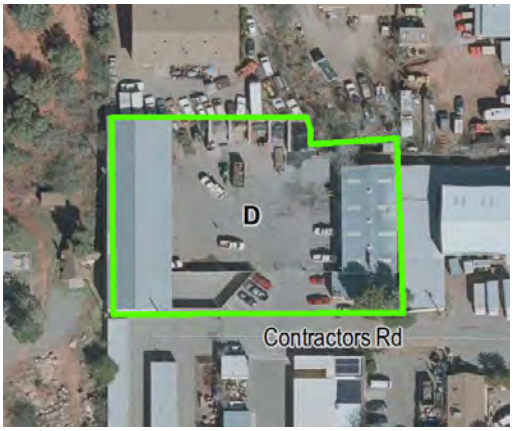
SITE NAME:			
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	25.866
PARCEL ID:	408-25-341D	**ZONING:**	CF
SITE SPECIFIC RECOMMENDATION:	Faux tree behind West Sedona School close to the bus lot		

Back to Staff Report

SITE C6 — 735 Jordan Road

SITE NAME:	Jordan Park Overflow Parking Lot		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	1.00
PARCEL ID:	401-03-001K	**ZONING:**	RM-2
SITE SPECIFIC RECOMMENDATION:	Faux tree to the west of parcel or west of parking lot		

SITE D — 2070 Contractors Road



SITE NAME:	Contractors Road Maintenance Yard		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.853
PARCEL ID:	408-24-037A	**ZONING:**	C-3
SITE SPECIFIC RECOMMENDATION:	Concealed base station on rooftop, monopole or pole		

SITE E1 — 700 El Camino Road

SITE NAME:	El Camino Pump Station		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	1.198
PARCEL ID:	408-28-343	**ZONING:**	CF
SITE SPECIFIC RECOMMENDATION:	Faux tree or concealed base station on rooftop		

Back to Staff Report

SITE F2 — 55 Sinagua Drive

SITE NAME:	Sinagua Former Real Estate Building		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.801
PARCEL ID:	408-24-325	**ZONING:**	C-2
SITE SPECIFIC RECOMMENDATION:	Concealed small cell light pole or concealed base station on rooftop		

SITE F3 — 102 Roadrunner Drive

SITE NAME:	City Hall Complex		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	2.919
PARCEL ID:	408-02-116	**ZONING:**	OP
SITE SPECIFIC RECOMMENDATION:	Concealed small cell light pole or concealed base station on rooftop		

SITE G — 25 Northview Road

SITE NAME:	Jack Jameson Park		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.388
PARCEL ID:	408-26-498	**ZONING:**	C-1
SITE SPECIFIC RECOMMENDATION:	Faux tree or flagpole with underground equipment cabinets at south end of property		

Back to Staff Report

SITE H2 — 2260 Shelby Drive

SITE NAME:	Recycle Center Pump Station		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.837
PARCEL ID:	408-28-103B	**ZONING:**	C-3
SITE SPECIFIC RECOMMENDATION:	Tower, base station on rooftop on WW building not on recycle center		

SITE J1 — 260 Schnebly Road

SITE NAME:	Municipal Parking Lot		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	2.01
PARCEL ID:	408-14-011; 401-14-093 through 401-14-099	**ZONING:**	P
SITE SPECIFIC RECOMMENDATION:	Concealed small cell		

SITE J2 — 90 Art Barn Lane

SITE NAME:	Lift Station		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.06
PARCEL ID:	401-13-060H	**ZONING:**	C-1
SITE SPECIFIC RECOMMENDATION:	Concealed small cell		

Back to Staff Report

SITE K — 505 & 525 Posse Ground Road

SITE NAME:	Posse Grounds Park		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	45.64
PARCEL ID:	408-25-339B; 408-25-043A	**ZONING:**	CF
SITE SPECIFIC RECOMMENDATION:	Concealed macro at ball park or concealed small cell		

SITE L1 — 41 Ranger Road

SITE NAME:	Lift Station		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.33
PARCEL ID:	000-00-002	**ZONING:**	CF
SITE SPECIFIC RECOMMENDATION:	Concealed small cell or concealed base station		

SITE L2 — 250 Brewer Road

SITE NAME:	Old Ranger Station Brewer Property		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	3.38
PARCEL ID:	401-38-0123D	**ZONING:**	CF
SITE SPECIFIC RECOMMENDATION:	Concealed macro or concealed small cell		

Back to Staff Report

SITE M — 11 New Castle Lane

SITE NAME:	Lift Station		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.15
PARCEL ID:	401-20-026M	**ZONING:**	RS-10b
SITE SPECIFIC RECOMMENDATION:	Concealed small cell		

SITE N — 60 Finley Drive

SITE NAME:	Drainage Culvert		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.11
PARCEL ID:	408-28-344E	**ZONING:**	C-3
SITE SPECIFIC RECOMMENDATION:	Concealed small cell		

SITE O — 160 Panorama Blvd

SITE NAME:	Lift Station		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.05
PARCEL ID:	408-26-195A	**ZONING:**	RS-10a
SITE SPECIFIC RECOMMENDATION:	Concealed small cell		

Back to Staff Report

SITE P — 515 Back O'Beyond Road

SITE NAME:	Cathedral Rock Parking Lot		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	0.33
PARCEL ID:	408-13-022L	**ZONING:**	RS-35
SITE SPECIFIC RECOMMENDATION:	Concealed small cell		

SITE Q — 7420 and 7500 W State Road 89A

SITE NAME:	Waste Water Treatment Plant		
PROPERTY OWNER:	City of Sedona	**ACREAGE:**	400.12
PARCEL ID:	408-21-010A; 408-21-382A; 408-21-463E; 408-21-011D, E, F; 408-21-383A; 408-21-463B, D, F	**ZONING:**	
SITE SPECIFIC RECOMMENDATION:	Possible macro site subject to County zoning		

Back to Staff Report

Feedback Received - Wireless Master Plan												
Date	Rcvd by	**Site**	Phone	Walk In	Email	Mail	Name	Address	Description	Yes	No	Neutral
5/4/17	Karen	O	X				Gary Muise		Owner of one of properties adjacent to Panorama Blvd. lift station. Opposed to any wireless structure adjacent to his property. The lot is currently vacant, but it's a residential lot and he intends to build a house there in the future. The lift station is between 2 residential parcels & even a small cell, depending on size, may be too obtrusive.		X	
5/4/17	Karen	F2, F3		X			Sal DiGiovanni		Supportive of city's efforts to be proactive in this area and to protect the scenic beauty by controlling location and aesthetic.	X		
5/4/17	Karen				X		Stephen Stobinski		Would like to participate in P&Z meetings to improve reception in city	X		
5/3/17	Karen				X		Mike Ulissey	[redacted] Sedona	I'm glad you guys are being proactive and would be happy to lend my support in any way I can.	X		
5/3/17	Karen	A1, A2			X		John West	[redacted] Sedona	Erect as far away as possible from residents homes. **Parcel 408-04-[redacted]: A2 option bad & remove**; A1 option put back away from houses. **Parcel 408-25[redacted]: Option 1 bad & remove**; Option 2 put tower away from houses and out of view	X		
5/15/17	Karen				X		Thomas Brennan		My understanding of this proposed project is that it would be a 75 foot tall plastic tree…it will be completely out of place. The location is at one of the busiest trailheads in Sedona. It would detract from our natural beauty resource… The detrimental health effects of resideing in proximity to an RF/MW transmitting antenna are well established.		X	
5/15/17	Karen	A1, A2	X				Jana West	[redacted], Sedona	Concerned about RF, but also concerned about the visual impact of any new towers and having them so close to residential and having to look at them vs. their unobstructed views now. Especially site A2.		X	
5/14/17	Audree	A1, A2			X		John O'Brien	[redacted], Sedona	Concern about concealment & aesthetics. Would like to know timing, whether currently adequate coverage in Sedona, if possible to use softball field lights at Posse Grounds Park instead, what the height would be.			X
5/13/17	Council	A2			X		Casey & Marcee Osmonovich	[redacted], Sedona	We strongly oppose any kind of cell phone tower being erected ANYWHERE near our home.		X	
5/17/17	CommDev				X		Joyce Towfighia		Via Comm Dev Help Desk: As a visitor, previous part time resident of Sedona and still a resident of Arizona that frequently visits Sedona, I would like to say I am opposed to the cell phone tower proposed for Sugar Loaf. Don't chase people away from what draws them to your beautiful city...thanks for listening.			
5/18/17	Dianne		X				Lorie McClure	[redacted], Sedona	Does not want a tower near Sugar Loaf trailhead or in nature. Might be o.k. to put tower near water tank since there is already infrastructure there. Basically no metal, electrical, phone line in nature areas. Many of my neighbors feel the same.			
5/25/17	Karen		X				Jana West	[redacted], Sedona	Was unable to attend first P&Z meeting. Calling to find out whether Sugar Loaf/Little Elf sites were removed from the list. Wondering what her neighborhood could do (petitions, lawyers, etc.) to get off the list. She heard that Posse Grounds and Chapel area sites were removed from list and wondering if that is true.			
5/30/17	Karen		X				Patty Popp	[redacted] Lane, Sedona; Permanent mailing address: [redacted]. Tucson, AZ 85715	I am the owner of the property at [redacted] Newcastle Lane, in Sedona, Arizona. I reside part time at this property, and do not receive mail here. I have owned the property since 2009. I wish to protest the fact that I never received a letter about the Sedona Wireless Master Plan. I feel that the pumping station at 11 Newcastle Lane is extremely poor choice of a site for a cell tower location for reasons that may not be obvious to non-residents…Roads: this tower would have to be constructed and maintained through the use of private roads in the area….To sum up: the COS wants to propose a cell tower location that is only accessible by private roads that are NOT maintained by the city, are impassable most times, and for whose maintenance and upkeep the cell company will not be obligated to contribute financially. Physical location: The pumping station is located at the bottom of the large hill…It makes no logical sense to locate a tower in an area where most of us have great difficulty even receiving signals for radio stations. The hill will block at least half of the broadcast ability of a cell tower; instead of it broadcasting in a 360° range, it appears that it would only be able to broadcast in a 180° range. Power lines: The power lines in this part of Sedona are aerial (for the most part), old, and are in a heavily wooded area. They are simply not reliable. APS does what it can to keep the lines clear of branches, but the strong potential exists for power lines and poles to be down after strong winds.		X	
5/30/17	Karen	401-03-001K	X				Tim Cummings		My residence + a vacant lot (I own) is adjacent to the Historical Society parking lot. I would like to object to placement of a tower as it would have severe negative consequences on my property values. Please advise if the June 1 meeting is the correct venue to voice my objection?			
5/31/17	Lauren				X		Gail & John West	[redacted], Sedona	We ask that you REMOVE Buena Vista lots sites as POTENTIAL future sites for following reasons: 1) There are other potential sites available. 2) Opposition is expressed by the residents. 3) Health and noise concerns have not been addressed, putting towers in neighborhoods is a huge concern for the citizens. 4) It has not been established that new towers are needed. The recommendation should include: LIMITING the available sites to locations that: 1) Have no citizen objection. 2) Existing sites used first. 3) Establish policy guidelines that reflect Sedona principles (less is more)…		X	
5/31/17	Lauren				X		Joe and Suzanne Jenniches		Thank you for the rapid response! We have forwarded the document to our Arizona architect, Gary Hassen of KIVA Architect in Prescott. We look to him for advice as we are in Delaware and will not make it to Sedona until the Fall.			

Back to Staff Report

Feedback Received - Wireless Master Plan												
Date	Rcvd by	**Site**	Phone	Walk In	Email	Mail	Name	Address	Description	Yes	No	Neutral
5/31/17	Karen				X		Kimberly Lillyblad	[redacted], Sedona	In regards to the proposed wireless tower site at 11 Newcastle Lane, the neighboring property at 70 Newcastle Lane is a historic property in this historical area….The lift station property the city is proposing for a 20' wireless tower is in a valley on a mountainside in this historical area of Oak Creek…it is next to the historically designated irrigation ditch and is less than 100 feet from my creekside property and home. A historical creekside home with irrigation is a rare and special place in the desert, this must be considered in accordance with Article 17 WIRELESS COMMUNICATIONS FACILITIES, section C, which states "Consideration of historical and environmentally sensitive areas as well as consideration of potential impacts on adjacent properties; ". This article indicates that the City of Sedona is being negligent and has not in any way taken into consideration the impact of the proposed wireless tower on this historical creekside area…The geographical maps that were presented by the city do not represent what the coverage would potentially look like from the proposed sites….			
5/31/17	Karen				X		Lucy Monica George		Please don't build cell tower at Sugarloaf Trailhead			
5/31/17	Karen					X	Fred & Diane Miller	[redacted] Spirit Lake IA 51360	Opposition to the placement of a cell tower on the city-owned site on New Castle Lane. They object to the obstruction of their views that a tower may cause and the subsequent perceived devaluation of their property as a result.		X	
7/17/17	Karen		X				Ann Cunningham	[redacted], Sedona	Against proposed cell tower on El Camino Road.			
7/17/17	Karen		X				Christina Paley	[redacted], Sedona	Against proposed cell tower on El Camino Road. Location is in a valley and would blast people with radiation. 19 out of 21 neighbors against this. Petition circulating with over 100 signatures against.			
5/3/17	Webpage						James Curry		registered on webpage to receive updates			
5/3/17	Webpage						Michael Sanders		registered on webpage to receive updates			
5/3/17	Webpage	A1					Larry & Sharon Turner		registered on webpage to receive updates			
5/4/17	Webpage						Gail & John West		registered on webpage to receive updates			
5/4/17	Webpage						Stephen Stobinski		registered on webpage to receive updates			
5/4/17	Webpage	C6					Mike Ulissey		registered on webpage to receive updates			
5/4/17	Webpage						David ODonnell		registered on webpage to receive updates			
5/5/17	Webpage						Brion Tyler		registered on webpage to receive updates			
5/5/17	Webpage						John Samish		registered on webpage to receive updates			
5/6/17	Webpage						Priscilla		registered on webpage to receive updates			
5/6/17	Webpage						Steve Schliebs		registered on webpage to receive updates			
5/6/17	Webpage	K					Ron Maassen		registered on webpage to receive updates			
5/7/17	Webpage						Dewey Akers		registered on webpage to receive updates			
5/7/17	Webpage						Patricia Steiner		registered on webpage to receive updates			
5/8/17	Webpage						Donna		registered on webpage to receive updates			
5/8/17	Webpage						Audrey Sepe		registered on webpage to receive updates			
5/9/17	Webpage								registered on webpage to receive updates			
5/10/17	Webpage						Barbara Baker		registered on webpage to receive updates			
5/10/17	Webpage						Airen Sapp		registered on webpage to receive updates			
5/11/17	Webpage						M DiPalma		registered on webpage to receive updates			
5/11/17	Webpage	K					John DiBiasi		registered on webpage to receive updates			
5/11/17	Webpage						Kathleen Oconnell		registered on webpage to receive updates			
5/11/17	Webpage								registered on webpage to receive updates			
5/12/17	Webpage								registered on webpage to receive updates			
5/13/17	Webpage						Dean Gain		registered on webpage to receive updates			
5/13/17	Webpage	K					Rebekah Fairlight		registered on webpage to receive updates			
5/13/17	Webpage						Diane Petrusich		registered on webpage to receive updates			

Back to Staff Report

Feedback Received - Wireless Master Plan												
Date	Rcvd by	**Site**	Phone	Walk In	Email	Mail	Name	Address	Description	Yes	No	Neutral
5/13/17	Webpage						Carol Kurimsky		registered on webpage to receive updates			
5/13/17	Webpage						Becky Pearson		registered on webpage to receive updates			
5/14/17	Webpage						Janet Casey		registered on webpage to receive updates			
5/14/17	Webpage						Randy Smith		registered on webpage to receive updates			
5/14/17	Webpage						Barbara Litrell		registered on webpage to receive updates			
5/14/17	Webpage						Sharyn Yuloff		registered on webpage to receive updates			
5/14/17	Webpage						Pamela Delay		registered on webpage to receive updates			
5/14/17	Webpage						Lindhurst		registered on webpage to receive updates			
5/14/17	Webpage						Charles Delay		registered on webpage to receive updates			
5/15/17	Webpage						Jenny Jahraus		registered on webpage to receive updates			
5/15/17	Webpage						Heidi Schroeder		registered on webpage to receive updates			
5/15/17	Webpage	F2					Richard Factor		registered on webpage to receive updates			
5/16/17	Webpage						Mitchell		registered on webpage to receive updates			
6/26/17	Molly				X		Ronald J. Logsdon		I thought you should be very aware of the facts that are so suppressed. The truth is just getting out now. Sedona can EASY market Sedona as "Safe Zone" if it is not destroyed by this technology.. Be aware many came to Sedona because they are "Sensitive" and a good share of Sedona commerce is people coming to meet with them. https://www.youtube.com/watch?v=AEOcB7Svhvw&feature=youtu.be		X	

Back to Staff Report

Cari Meyer - Fwd: Internet Message Sent To: Mayor Sandy Moriarty;

From: Sandy Moriarty <SMoriarty@sedonaaz.gov>
To: Justin Clifton; Karen Osburn
Date: 5/23/2017 4:02 PM
Subject: Fwd: Internet Message Sent To: Mayor Sandy Moriarty;

FYI

Sandy

Please note that comments above are mine alone and do not necessarily reflect the views of the City Council.

Begin forwarded message:

From: "James Curry" <jtcurry@me.com>
Date: May 22, 2017 at 11:20:41 AM MST
To: "D oNotReply" <DoNotReply@sedonaaz.gov>
Subject: Internet Message Sent To: Mayor Sandy Moriarty;

Name:	James Curry
E-Mail Address:	jtcurry@me.com
Phone Number:	954-727-5966
Address:	960 Jordan Road SEDONA, AZ 86336
Message:	Ms. Mayor: After attending the recent Wireless Master Plan meeting, I want to share the following helpful suggestion: A city-wide Mesh Network may both solve citizen concerns and allow the City to effectively control and mange potential wireless infrastructure expansion. A Mesh Network may also allow for the removal of most if not all existing cellular installations. As I am not an expert in this technology area I will only provide a brief background here and encourage the City to seek more insight from those that are. Mesh Networks differ from current cellular networks primarily because they are highly

Back to Staff Report

	decentralized. Where as cellular networks use centralized towers to distribute their signal, Mesh Networks use very small radios distributed throughout an area. Typically these radios are the size of a medium sized shipping box and usually are placed on existing utility poles. If no poles exist in an area a radio can be hung from a building or purpose built pole. They are much smaller than the cellular hardware featured in the meeting and are low power. Using a Mesh Network should solve the citizen concerns of visual blight and perceived health risks. The latest cell phones can send voice via cell systems or wifi systems to the Internet. In fact, major TELCO providers encourage users to use WIFI Calling so that the traffic is carried over the Internet via existing access points (think Starbucks) rather than the cell system. They do this to minimize their cost of building and maintaining cellular infrastructure. Mesh Networks send all traffic over the Internet so they fit in with this behavior. Mesh Networks provide both voice and data access to and via the Internet, not a cell system. So besides providing low impact mobile phone service, a Mesh Network could also provide city-wide wireless Internet service as well. The business model for this could be private or private/public with rents being paid by the TELCO providers or the users or both. While the City's current consultants for this matter have done a fine job to-date, I would encourage the City to also seek comment form others who may be more knowledgeable in this tech area. This perhaps should include presentations from Mesh Network providers. If I can be of any additional help on this matter please do not hesitate to call on me. I will also attend the second, upcoming Wireless Master Plan meeting. I hope you find this useful, James Curry

American Academy of Environmental Medicine

6505 E Central • Ste 296 • Wichita, KS 67206
Tel: (316) 684-5500 • Fax: (316) 684-5709
www.aaemonline.org

American Academy of Environmental Medicine Recommendations Regarding Electromagnetic and Radiofrequency Exposure

Physicians of the American Academy of Environmental Medicine recognize that patients are being adversely impacted by electromagnetic frequency (EMF) and radiofrequency (RF) fields and are becoming more electromagnetically sensitive.

The AAEM recommends that physicians consider patients' total electromagnetic exposure in their diagnosis and treatment, as well as recognition that electromagnetic and radiofrequency field exposure may be an underlying cause of a patient's disease process.

Based on double-blinded, placebo controlled research in humans,[1] medical conditions and disabilities that would more than likely benefit from avoiding electromagnetic and radiofrequency exposure include, but are not limited to:

- Neurological conditions such as paresthesias, somnolence, cephalgia, dizziness, unconsciousness, depression
- Musculoskeletal effects including pain, muscle tightness, spasm, fibrillation
- Heart disease and vascular effects including arrhythmia, tachycardia, flushing, edema
- Pulmonary conditions including chest tightness, dyspnea, decreased pulmonary function
- Gastrointestinal conditions including nausea, belching
- Ocular (burning)
- Oral (pressure in ears, tooth pain)
- Dermal (itching, burning, pain)
- Autonomic nervous system dysfunction (dysautonomia).

Based on numerous studies showing harmful biological effects from EMF and RF exposure, medical conditions and disabilities that would more than likely benefit from avoiding exposure include, but are not limited to:

- Neurodegenerative diseases (Parkinson's Disease, Alzheimer's Disease, and Amyotrophic Lateral Sclerosis). [2-6]
- Neurological conditions (Headaches, depression, sleep disruption, fatigue, dizziness, tremors, autonomic nervous system dysfunction, decreased memory, attention deficit disorder, anxiety, visual disruption). [7-10]
- Fetal abnormalities and pregnancy. [11,12]
- Genetic defects and cancer.[2,3,13-19]
- Liver disease and genitourinary disease.[12,20]

Because Smart Meters produce Radiofrequency emissions, it is recommended that patients with the above conditions and disabilities be accommodated to protect their health. The AAEM recommends that no Smart Meters be on these patients' homes, that Smart Meters be removed within a reasonable distance of patients' homes depending on the patients' perception and/or symptoms, and that no collection meters be placed near patients' homes depending on patients' perception and/or symptoms.

Submitted by: Amy L. Dean, DO and William J. Rea, MD

Approved July 12, 2012 by the Executive Committee of the American Academy of Environmental Medicine

Bibliography

1. Rea WJ, Pan Y, Fenyves EJ, et al. Electromagnetic field sensitivity. Journal of Bioelectricity. 1991; 10(1 &2): 243-256.

2. Xu S, Zhou Z, Zhang L, et al. Exposure to 1800 MHZ radiofrequency radiation induces oxidative damage to mitochondrial DNA in primary cultured neurons. Brain Research. 2010; 1311: 189-196.

3. Zhao T, Zou S, Knapp P. Exposure to cell phone radiation up-regulates apoptosis genes in primary cultures of neurons and astrocytes. Neurosci Lett. 2007; 412(1): 34-38.

4. Nittby H, Brun A, Eberhardt J, et al. Increased blood-brain barrier permeability in mammalian brain 7 days after exposure to the radiation from a GSM-900 mobile phone. Pathophysiology. 2009; 16: 103-112.

5. Awad SM, Hassan NS. Health Risks of electromagnetic radiation from mobile phone on brain of rats. J. Appl. Sci. Res. 2008; 4(12): 1994-2000.

6. Leszczynski D, Joenvaara S. Non-thermal activation of the hsp27/p38MAPK stress pathway by mobile phone radiation in human endothelial cells: Molecular mechanism for cancer - and blood-brain barrier - related effects. Differentiation. 2002; 70: 120-129.

7. Santini R, Santini P, Danze JM, et al. Study of the health of people living in the vicinity of mobile phone base stations: 1. Influences of distance and sex. Pathol Biol. 2002; 50: 369-373.

8. Abdel-Rassoul G, Abou El-Fateh O, Abou Salem M, et al. Neurobehavioral effects among inhabitants around mobile phone base stations. Neurotox. 2007; 28(2): 434-440.

9. Hutter HP, Moshammer H, Wallner P, Kundi M. Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations. Occup. Environ. Med. 2006; 63: 307-313.

10. Kolodynski AA, Kolodynska VV. Motor and psychological functions of school children living in the area of the Skrunda Radio Location Station in Latvia. Sci. Total Environ. 1996; 180: 87-93.

11. Magras IN, Xenos TD. RF radiation-induced changes in the prenatal development of mice. Bioelectromagnetics. 1997; 18:455-461.

12. Ingole IV, Ghosh SK. Cell phone radiation and developing tissues in chick embryo - a light microscopic study of kidneys. J. Anat. Soc. India. 2006; 55(2): 19-23.

13. Phillips JL, Singh NP, Lai H. Electromagnetic fields and DNA damage. Pathophysiology. 2009; 16: 79-88.

14. Ruediger HW. Genotoxic effects of radiofrequency electromagnetic fields. Pathophysiology. 2009; 16(2): 89-102.

15. Lee S, Johnson D, Dunbar K. 2.45 GHz radiofrequency fields alter gene expression on cultured human cells. FEBS Letters. 2005; 579: 4829-4836.

16. Demsia G, Vlastos D, Matthopoulos DP. Effect of 910-MHz electromagnetic field on rat bone marrow. The Scientific World Journal. 2004; 4(S2): 48-54.

17. Lai H, Singh NP. Magnetic-field-induced DNA strand breaks in brain cells of the rat. Environmental Health Perspectives. 2004; 112(6): 687-694. Available from: http://ehp03.niehs.nih.gov/article/info:doi/10.1289/ehp.6355

18. Mashevich M, Foldman D, Kesar, et al. Exposure of human peripheral blood lymphocytes to electromagnetic fields associated with cellular phones leads to chromosomal instability. Bioelectromagnetics. 2003; 24: 82-90.

19. Ban R, Grosse Y, Lauby-Secretan B, et al. Carcinogenicity of radiofrequency electromagnetic fields. The Lancet Oncology. 2011; 12(7): 624-626. Available from: http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(11)70147-4/fulltext?_eventId=login

20. Lubec G, Wolf C. Bartosch B. Amino acid isomerisation and microwave exposure. Lancet. 1989; 334: 1392-1393.

American Academy of Environmental Medicine

6505 E Central • Ste 296 • Wichita, KS 67206
Tel: (316) 684-5500 • Fax: (316) 684-5709
www.aaemonline.org

November 14, 2013

Wireless Radiofrequency Radiation in Schools

Founded in 1965 as a non-profit medical association, the American Academy of Environmental Medicine (AAEM) is an international organization of physicians and scientists interested in the complex relationships between the environment and health. For forty years the Academy has trained Physicians to treat the most difficult, complex patients who are often left behind by our medical system, because their illness, rather than stemming from traditionally understood factors, is related to underlying environmental causes, including (bio)chemical or radiation exposures. AAEM physicians, and physicians world-wide, are treating patients who report adverse, debilitating health effects associated with exposure to radiofrequency energy (RF).

The AAEM strongly supports the use of wired Internet connections, and encourages avoidance of radiofrequency such as from WiFi, cellular and mobile phones and towers, and "smart meters."

The peer reviewed, scientific literature demonstrates the correlation between RF exposure and neurological, cardiac, and pulmonary disease as well as reproductive and developmental disorders, immune dysfunction, cancer and other health conditions. The evidence is irrefutable. Despite this research, claims have been made that studies correlating emissions from WiFi, phones, smart meters, etc. with adverse health effects do not exist.

In May 2011 the World Health Organization elevated exposure to wireless radiation, including WiFi, into the Class 2b list of Carcinogens; recent research strengthens the level of evidence regarding carcinogenicity.

There is consistent, emerging science that shows people, especially children who are more vulnerable due to developing brains and thinner skulls, are being affected by the increasing exposure to wireless radiation. In September 2010, the Journal of the American Society for Reproductive Medicine-Fertility and Sterility, reported that only four hours of exposure to a standard laptop using WiFi caused DNA damage to human sperm.

In December 2012 the American Academy of Pediatrics, representing 60,000 pediatricians, wrote to Congress requesting that it update the safety levels of microwave radiation exposure especially for children and pregnant women.

With WiFi in public facilities as well as schools, children would be exposed to WiFi for unprecedented periods of time, for their entire childhood. Some of these signals will be much more powerful than would be received at home, due to the need for the signals to go through thick walls and to serve many computers

Back to Staff Report

Back to Staff Report

simultaneously. Signals in institutions are dozens of times more powerful than café and restaurant systems.

To install WiFi in schools plus public spaces risks a widespread public health hazard that the medical system is not yet prepared to address. Statistics show that you can expect to see an immediate reaction in 3% and delayed effects in 30% of citizens of all ages.

It is better to exercise caution and substitute with a safe alternate such as a wired connection. While more research is being conducted, children must be protected. Wired technology is not only safer, it also stronger and more secure.

While the debate ensues about the dangers of RF, it is the doctors who must deal with the after effects. Until we can determine why some get sick and others do not, and some are debilitated for indeterminate amounts of time, we implore you to not take the risk, particularly with the health of so many children with whose safety you have been entrusted. Avoidance will always be the best policy. It should be reflected by minimizing RF exposures in public spaces.

Respectfully,

The Board of Directors of the American Academy of Environmental Medicine

American Academy of Environmental Medicine

6505 E Central • Ste 296 • Wichita, KS 67206
Tel: (316) 684-5500 • Fax: (316) 684-5709
www.aaemonline.org

Back to Staff Report

American Academy of Environmental Medicine

Electromagnetic and Radiofrequency Fields Effect on Human Health

For over 50 years, the American Academy of Environmental Medicine (AAEM) has been studying and treating the effects of the environment on human health. In the last 20 years, our physicians began seeing patients who reported that electric power lines, televisions and other electrical devices caused a wide variety of symptoms. By the mid 1990's, it became clear that patients were adversely affected by electromagnetic fields and becoming more electrically sensitive. In the last five years with the advent of wireless devices, there has been a massive increase in radiofrequency (RF) exposure from wireless devices as well as reports of hypersensitivity and diseases related to electromagnetic field and RF exposure. Multiple studies correlate RF exposure with diseases such as cancer, neurological disease, reproductive disorders, immune dysfunction, and electromagnetic hypersensitivity.

The electromagnetic wave spectrum is divided into ionizing radiation such as ultraviolet and X-rays and non-ionizing radiation such as radiofrequency (RF), which includes WiFi, cell phones, and Smart Meter wireless communication. It has long been recognized that ionizing radiation can have a negative impact on health. However, the effects of non-ionizing radiation on human health recently have been seen. Discussions and research of non-ionizing radiation effects centers around thermal and non-thermal effects. According to the FCC and other regulatory agencies, only thermal effects are relevant regarding health implications and consequently, exposure limits are based on thermal effects only.[1]

While it was practical to regulate thermal bioeffects, it was also stated that non-thermal effects are not well understood and no conclusive scientific evidence points to non-thermal based negative health effects.[1] Further arguments are made with respect to RF exposure from WiFi, cell towers and smart meters that

due to distance, exposure to these wavelengths are negligible.[2] However, many *in vitro*, *in vivo* and epidemiological studies demonstrate that significant harmful biological effects occur from non-thermal RF exposure and satisfy Hill's criteria of causality.[3] Genetic damage, reproductive defects, cancer, neurological degeneration and nervous system dysfunction, immune system dysfunction, cognitive effects, protein and peptide damage, kidney damage, and developmental effects have all been reported in the peer-reviewed scientific literature.

Genotoxic effects from RF exposure, including studies of non-thermal levels of exposure, consistently and specifically show chromosomal instability, altered gene expression, gene mutations, DNA fragmentation and DNA structural breaks.[4-11] A statistically significant dose response effect was demonstrated by Maschevich *et al.* , who reported a linear increase in aneuploidy as a function of the Specific Absorption Rate(SAR) of RF exposure.[11] Genotoxic effects are documented to occur in neurons, blood lymphocytes, sperm, red blood cells, epithelial cells, hematopoietic tissue, lung cells and bone marrow. Adverse developmental effects due to non-thermal RF exposure have been shown with decreased litter size in mice from RF exposure well below safety standards.[12] The World Health Organization has classified RF emissions as a group 2 B carcinogen.[13] Cellular telephone use in rural areas was also shown to be associated with an increased risk for malignant brain tumors. [14]

The fact that RF exposure causes neurological damage has been documented repeatedly. Increased blood-brain barrier permeability and oxidative damage, which are associated with brain cancer and neurodegenerative diseases, have been found.[4,7,15-17] Nittby *et al.* demonstrated a statistically significant dose-response effect between non-thermal RF exposure and occurrence of albumin leak across the blood-brain barrier.[15] Changes associated with degenerative neurological diseases such as Alzheimer's, Parkinson's and Amyotrophic Lateral Sclerosis (ALS) have been reported.[4,10] Other neurological and cognitive disorders such as headaches, dizziness, tremors, decreased memory and attention, autonomic nervous system dysfunction, decreased reaction times, sleep disturbances and visual disruption have been reported to be statistically significant in multiple epidemiological studies with RF exposure occurring non-locally.[18-21]

Nephrotoxic effects from RF exposure also have been reported. A dose response effect was observed by Ingole and Ghosh in which RF exposure resulted in mild to extensive degenerative changes in chick embryo kidneys based on duration of RF exposure.[24] RF emissions have also been shown to cause isomeric changes in amino acids that can result in nephrotoxicity as well as hepatotoxicity.[25]

Back to Staff Report

Electromagnetic field (EMF) hypersensitivity has been documented in controlled and double blind studies with exposure to various EMF frequencies. Rea *et al.* demonstrated that under double blind placebo controlled conditions, 100% of subjects showed reproducible reactions to that frequency to which they were most sensitive.[22] Pulsed electromagnetic frequencies were shown to consistently provoke neurological symptoms in a blinded subject while exposure to continuous frequencies did not.[23]

Although these studies clearly show causality and disprove the claim that health effects from RF exposure are uncertain, there is another mechanism that proves electromagnetic frequencies, including radiofrequencies, can negatively impact human health. Government agencies and industry set safety standards based on the narrow scope of Newtonian or "classical" physics reasoning that the effects of atoms and molecules are confined in space and time. This model supports the theory that a mechanical force acts on a physical object and thus, long-range exposure to EMF and RF cannot have an impact on health if no significant heating occurs. However, this is an incomplete model. A quantum physics model is necessary to fully understand and appreciate how and why EMF and RF fields are harmful to humans.[26,27] In quantum physics and quantum field theory, matter can behave as a particle or as a wave with wave-like properties. Matter and electromagnetic fields encompass quantum fields that fluctuate in space and time. These interactions can have long-range effects which cannot be shielded, are non-linear and by their quantum nature have uncertainty. Living systems, including the human body, interact with the magnetic vector potential component of an electromagnetic field such as the field near a toroidal coil.[26,28,29] The magnetic vector potential is the coupling pathway between biological systems and electromagnetic fields.[26,27] Once a patient's specific threshold of intensity has been exceeded, it is the frequency which triggers the patient's reactions.

Long range EMF or RF forces can act over large distances setting a biological system oscillating in phase with the frequency of the electromagnetic field so it adapts with consequences to other body systems. This also may produce an electromagnetic frequency imprint into the living system that can be long lasting.[26,27,30] Research using objective instrumentation has shown that even passive resonant circuits can imprint a frequency into water and biological systems.[31] These quantum electrodynamic effects do exist and may explain the adverse health effects seen with EMF and RF exposure. These EMF and RF quantum field effects have not been adequately studied and are not fully understood regarding human health.

Back to Staff Report

Because of the well documented studies showing adverse effects on health and the not fully understood quantum field effect, AAEM calls for exercising precaution with regard to EMF, RF and general frequency exposure. In an era when all society relies on the benefits of electronics, we must find ideas and technologies that do not disturb bodily function. It is clear that the human body uses electricity from the chemical bond to the nerve impulse and obviously this orderly sequence can be disturbed by an individual-specific electromagnetic frequency environment. Neighbors and whole communities are already exercising precaution, demanding abstention from wireless in their homes and businesses.

Furthermore, the AAEM asks for:

- An immediate caution on Smart Meter installation due to potentially harmful RF exposure.
- Accommodation for health considerations regarding EMF and RF exposure, including exposure to wireless Smart Meter technology.
- Independent studies to further understand the health effects from EMF and RF exposure.
- Recognition that electromagnetic hypersensitivity is a growing problem worldwide.
- Understanding and control of this electrical environmental bombardment for the protection of society.
- Consideration and independent research regarding the quantum effects of EMF and RF on human health.
- Use of safer technology, including for Smart Meters, such as hard-wiring, fiber optics or other non-harmful methods of data transmission.

Submitted by: Amy L. Dean, DO, William J. Rea, MD, Cyril W. Smith, PhD, Alvis L. Barrier, MD

Back to Staff Report

Bibliography: Electromagnetic and Radiofrequency Fields Effect on Human Health

1. California Council on Science and Technology. (Internet). (2011). Health Impacts of Radiofrequency Exposure from Smart Meters. Available from: http://www.ccst.us/publications/2011/2011smartA.pdf
2. Electric Power Research Institute. (Internet). (2011). Radio-Frequency Exposure Levels from Smart Meters: A Case Study of One Model. Available from: https://www.nvenergy.com/NVEnergize/documents/EPRI_1022270_caseStudy.pdf
3. Hill, AB. The Environment and Disease: Association or Causation? Proceedings of the Royal Society of Medicine. 1965; 58: 295-300.
4. Xu S, Zhou Z, Zhang L, et al. Exposure to 1800 MHZ radiofrequency radiation induces oxidative damage to mitochondrial DNA in primary cultured neurons. Brain Research. 2010; 1311: 189-196.
5. Phillips JL, Singh NP, Lai H. Electromagnetic fields and DNA damage. Pathophysiology. 2009; 16: 79-88.
6. Ruediger HW. Genotoxic effects of radiofrequency electromagnetic fields. Pathophysiology. 2009; 16(2): 89-102.
7. Zhao T, Zou S, Knapp P. Exposure to cell phone radiation up-regulates apoptosis genes in primary cultures of neurons and astrocytes. Neurosci Lett. 2007; 412(1): 34-38.
8. Lee S, Johnson D, Dunbar K. 2.45 GHz radiofrequency fields alter gene expression on cultured human cells. FEBS Letters. 2005; 579: 4829-4836.
9. Demsia G, Vlastos D, Matthopoulos DP. Effect of 910-MHz electromagnetic field on rat bone marrow. The Scientific World Journal. 2004; 4(S2): 48-54.
10. Lai H, Singh NP. Magnetic-field-induced DNA strand breaks in brain cells of the rat. Environmental Health Perspectives. 2004; 112(6): 687-694. Available from: http://ehp03.niehs.nih.gov/article/info:doi/10.1289/ehp.6355
11. Mashevich M, Foldman D, Kesar, et al. Exposure of human peripheral blood lymphocytes to electromagnetic fields associated with cellular phones leads to chromosomal instability. Bioelectromagnetics. 2003; 24: 82-90.
12. Magras IN, Xenos TD. RF radiation-induced changes in the prenatal development of mice. Bioelectromagnetics. 1997; 18:455-461.

13. Ban R, Grosse Y, Lauby-Secretan B, et al. Carcinogenicity of radiofrequency electromagnetic fields. The Lancet Oncology. 2011; 12(7): 624-626. Available from: http://www.thelancet.com/journals/lanonc/article/PIIS1470-2045(11)70147-4/fulltext?_eventId=login
14. Hardell L, Carlberg M, Hansson Mild K. Use of cellular telephones and brain tumour risk in urban and rural areas. Occup. Environ. Med. 2005; 62: 390-394.
15. Nittby H, Brun A, Eberhardt J, et al. Increased blood-brain barrier permeability in mammalian brain 7 days after exposure to the radiation from a GSM-900 mobile phone. Pathophysiology. 2009; 16: 103-112.
16. Awad SM, Hassan NS. Health Risks of electromagnetic radiation from mobile phone on brain of rats. J. Appl. Sci. Res. 2008; 4(12): 1994-2000.
17. Leszczynski D, Joenvaara S. Non-thermal activation of the hsp27/p38MAPK stress pathway by mobile phone radiation in human endothelial cells: Molecular mechanism for cancer - and blood-brain barrier – related effects. Differentiation. 2002; 70: 120-129.
18. Santini R, Santini P, Danze JM, et al. Study of the health of people living in the vicinity of mobile phone base stations: 1. Influences of distance and sex. Pathol Biol. 2002; 50: 369-373.
19. Abdel-Rassoul G, Abou El-Fateh O, Abou Salem M, et al. Neurobehavioral effects among inhabitants around mobile phone base stations. Neurotox. 2007; 28(2): 434-440.
20. Hutter HP, Moshammer H, Wallner P, Kundi M. Subjective symptoms, sleeping problems, and cognitive performance in subjects living near mobile phone base stations. Occup. Environ. Med. 2006; 63: 307-313.
21. Kolodynski AA, Kolodynska VV. Motor and psychological functions of school children living in the area of the Skrunda Radio Location Station in Latvia. Sci. Total Environ. 1996; 180: 87-93.
22. Rea WJ, Pan Y, Fenyves EJ, et al. Electromagnetic field sensitivity. Journal of Bioelectricity. 1991; 10(1 &2): 243-256.
23. McCarty DE, Carrubba S, Chesson AL, et al. Electromagnetic hypersensitivity: Evidence for a novel neurological syndrome. Int. J. Neurosci. 2011; 121(12): 670-676.
24. Ingole IV, Ghosh SK. Cell phone radiation and developing tissues in chick embryo – a light microscopic study of kidneys. J. Anat. Soc. India. 2006; 55(2): 19-23.

25. Lubec G, Wolf C. Bartosch B. Amino acid isomerisation and microwave exposure. Lancet. 1989; 334: 1392-1393.
26. Smith CW. Quanta and coherence effects in water and living systems. Journal of Alternative and Complimentary Medicine. 2004; 10(1): 69-78.
27. Smith CW (2008) Fröhlich's Interpretation of Biology through Theoretical Physics. In: Hyland GJ and Rowlands P (Eds.) Herbert Fröhlich FRS: A physicist ahead of his time. Liverpool: University of Liverpool, 2nd edition, pp 107-154.
28. Del Giudice E, Doglia S, Milani M, et al. Magnetic flux quantization and Josephson behavior in living systems. Physica Scripta. 1989; 40: 786-791.
29. Tonomura A, Osakabe N, Matsuda T, et al. Evidence for Aharonov-Bohm effect with magnetic field completely shielded from electron wave. Phys. Rev. Let. 1986; 56(8):792-75.
30. Del Giudice E, De Ninno A, Fleischmann, et al. Coherent quantum electrodynamics in living matter. Electromagn. Biol. Med. 2005; 24: 199-210.
31. Cardella C, de Magistris L, Florio E, Smith C. Permanent changes in the physic-chemical properties of water following exposure to resonant circuits. Journal of Scientific Exploration. 2001; 15(4): 501-518.

Back to Staff Report

Back to Staff Report

American Academy of Environmental Medicine

6505 E Central • Ste 296 • Wichita, KS 67206
Tel: (316) 684-5500 • Fax: (316) 684-5709
www.aaemonline.org

August 30, 2013

Office of the Secretary
Federal Communications Commission
445 12th Street, SW
Washington, D.C. 20554

Re: ET Docket No. 13-84

Dear Federal Communications Commission Commissioners:

The American Academy of Environmental Medicine is writing to request that the FCC review radiofrequency (RF) exposure limits (reference is made to the FCC's NOI sections 48, 51, 52, 53, 56, 60, 65 and 69), recognize non-thermal effects of RF exposure (NOI sections 66 and 69), and lower limits of RF exposure to protect the public from the adverse health effects of radiofrequency emissions (NOI sections 48, 52, 54, 65 and 71).

Founded in 1965 as a non-profit medical association, the AAEM is an international association of physicians and scientists who study and treat the effects of the environment on human health. With an elite membership of highly trained physicians and clinicians, AAEM is committed to education, public awareness and research regarding Environmental Medicine.

It became clear to AAEM physicians that by the mid 1990's patients were experiencing adverse health reactions and disease as a result of exposure to electromagnetic fields. In the last five years with the advent of wireless devices, there has been an exponential increase in the number of patients with radiofrequency induced disease and hypersensitivity.

Numerous peer reviewed, published studies correlate radiofrequency exposure with a wide range of health conditions and diseases. (NOI sections 54, 59, 60 and 65) These include neurological and neurodegenerative diseases such as Parkinson's Disease, ALS, paresthesias, dizziness, headaches and sleep disruption as well as cardiac, gastrointestinal and immune disease, cancer, developmental and reproductive disorders, and electromagnetic sensitivity. The World Health Organization has classified RF emissions as a group 2 B carcinogen. This research is reviewed and cited in the following attached documents: *AAEM Electromagnetic and Radiofrequency Fields Effect on Human Health* and *AAEM Recommendations Regarding Electromagnetic and Radiofrequency Exposure*.

The scientific literature proves that non-thermal adverse effects of RF exposure exist and negatively impact health and physiology. New guidelines based on measurements of non-thermal effects and lowering limits of exposure are needed and critical to protect public health.

In fact, electromagnetic sensitivity and the health effects of low level RF exposure have already been acknowledged by the federal government. In 2002, the Architectural and Transportation Barriers Compliance Board stated:

> *"The Board recognizes...electromagnetic sensitivities may be considered disabilities under the ADA if they so severely impair the neurological, respiratory or other functions on an individual that it substantially limits one or more of the individual's major life activities"*

Additionally, in 2005, the National Institute of Building Sciences, an organization established by the U.S. Congress in 1974, issued an Indoor Environmental Quality Report which concluded:

> *"For people who are electromagnetically sensitive, the presence of cell phones and towers, portable telephones, computers,... wireless devices, security and scanning equipment, microwave ovens, electric ranges and numerous other electrical appliances can make a building inaccessible."*

By recognizing electromagnetic sensitivity, the federal government and affiliated organizations are clearly acknowledging the existence of non-thermal effects. The AAEM urges the FCC to recognize that non-thermal effects of RF exposure exist and cause symptoms and disease. (NOI sections 66 and 69) The AAEM also requests that the FCC base guidelines of RF exposure on measurements of non-thermal effects and lower the limits of RF exposure to protect the health of the public. (NOI sections 48, 52, 54, 65 and 71)

Sincerely ,

Amy L. Dean, DO, FAAEM, DABEM, DAOBIM
President

American Journal of
EPIDEMIOLOGY

Volume 145
Number 1
January 1, 1997

Sponsored by the Society for Epidemiologic Research

ORIGINAL CONTRIBUTIONS

Cancer Incidence near Radio and Television Transmitters in Great Britain

I. Sutton Coldfield Transmitter

Helen Dolk,[1] Gavin Shaddick,[1] Peter Walls,[1] Chris Grundy,[1] Bharat Thakrar,[1] Immo Kleinschmidt,[1] and Paul Elliott[2]

A small area study of cancer incidence in 1974–1986 was carried out to investigate an unconfirmed report of a "cluster" of leukemias and lymphomas near the Sutton Coldfield television (TV) and frequency modulation (FM) radio transmitter in the West Midlands, England. The study used a national database of postcoded cancer registrations, and population and socioeconomic data from the 1981 census. Selected cancers were hematopoietic and lymphatic, brain, skin, eye, male breast, female breast, lung, colorectal, stomach, prostate, and bladder. Expected numbers of cancers in small areas were calculated by indirect standardization, with stratification for a small area socioeconomic index. The study area was defined as a 10 km radius circle around the transmitter, within which 10 bands of increasing distance from the transmitter were defined as a basis for testing for a decline in risk with distance, and an inner area was arbitrarily defined for descriptive purposes as a 2 km radius circle. The risk of adult leukemia within 2 km was 1.83 (95% confidence interval 1.22–2.74), and there was a significant decline in risk with distance from the transmitter ($p = 0.001$). These findings appeared to be consistent over the periods 1974–1980 and 1981–1986, and were probably largely independent of the initially reported cluster, which appeared to concern mainly a later period. In the context of variability of leukemia risk across census wards in the West Midlands as a whole, the Sutton Coldfield findings were unusual. A significant decline in risk with distance was also found for skin cancer, possibly related to residual socioeconomic confounding, and for bladder cancer. Study of other radio and TV transmitters in Great Britain is required to put the present results in wider context. No causal implications can be made from a single cluster investigation of this kind. *Am J Epidemiol* 1997;145:1–9.

electromagnetic fields; leukemia; neoplasms; radio waves

There has been considerable public and scientific debate concerning the possible adverse health effects associated with environmental exposure to extremely low frequency (0–300 Hz) non-ionizing radiation, as emitted by power cables and electric substations (1–5). Exposure to extremely low frequency radiation has most commonly been associated with leukemia, particularly acute myeloid and childhood leukemia, and also brain cancer, male breast cancer, and skin and eye melanoma (1, 3, 6–12), although there is currently no agreement as to causality (2–5).

Far less attention has been paid to environmental

Received for publication December 13, 1995, and accepted for publication August 12, 1996.

Abbreviations: CI, confidence interval; erp, effective radiated power; FM, frequency modulation; ICD, *International Classification of Diseases*; O/E ratio, observed/expected ratio; TV, television.

[1] Environmental Epidemiology Unit, Department of Public Health and Policy, London School of Hygiene and Tropical Medicine, London, England.

[2] Small Area Health Statistics Unit, Department of Epidemiology and Public Health, Imperial College of Science, Technology and Medicine, Imperial College School of Medicine at St Mary's, London, England.

Reprint requests to Dr. Helen Dolk, Environmental Epidemiology Unit, Department of Public Health and Policy, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1 7HT, England.

exposure to radiation in the radiofrequency range (100 kHz to 300 GHz), including television (TV) and frequency modulation (FM) broadcast frequencies (30 MHz to 1 GHz), at field strengths below those required to produce thermal effects. The few epidemiologic studies that have reported on cancer incidence in relation to radiofrequency radiation (mainly from occupational exposure including microwave and radar) have generally presented negative or inconsistent results, or were subject to possible confounding from other exposures (2, 13–22). A study of residential exposure in Hawaii examined cancer incidence for census tracts with broadcasting antennae (22). A significantly increased relative risk of all cancers was found (standard incidence ratio (SIR) = 1.36 based on 905 cases, $p < 0.01$), and there was a nonsignificant excess of leukemias (SIR = 1.56 based on 23 cases, $p > 0.01$). However, there was only limited control for possible confounding.

Nevertheless, concerns have been expressed about the possible health effects of living near high power radio transmitters. Following a claim (see Appendix) of an excess of cases of leukemia and lymphoma near the Sutton Coldfield radio and television transmitter in the West Midlands, England, the Small Area Health Statistics Unit in the United Kingdom (23) was asked to investigate the incidence of selected cancers in the vicinity. The results of those analyses are reported here.

MATERIALS AND METHODS

The Sutton Coldfield transmitter is sited at the northern edge of the city of Birmingham. It first came into service in 1949 for television. High power transmission at 1 megawatt effective radiated power (erp) per frequency began with one frequency in 1964, rose to 3 frequencies in 1969, and then 4 frequencies in 1982. Three frequencies of very high frequency (VHF) radio began in 1957, at 250 kW erp per frequency. The mast is 240 m high. There are no big hills (above the height of the transmitter) in the study area. Nearby industrial processes registered with Her Majesty's Inspectorate of Pollution include a mineral works 3 km east, a copper works 6.5 km west, and a lead works 7 km west (Department of the Environment, personal communication, 1993).

Cancer incidence data postcoded to address at diagnosis were examined from 1974 to 1986. Population statistics were from the 1981 census enumeration districts and wards. The study area was defined by a circle of 10 km radius centered on the transmitter, grid reference SK 113003 (figure 1). The population within 10 km was around 408,000. Within the study area, ten bands of outer radius 0.5, 1, 2, 3, 4.9, 6.3, 7.4, 8.3, 9.2, and 10 km were defined (giving equal areas beyond 3 km). Populations and cases were located in the study area via the postcode of residence (which refers to an average of 14 households in Great Britain) according to methods described elsewhere (23). The completeness of postcoding of cancer registrations is high both nationally (96.6 percent) and in the West Midlands region (98.7 percent).

The following cancers at ages 15 years and over were considered as a priori groupings according to the 8th and 9th revisions of the *International Classification of Diseases* (ICD):

1) all cancers, excluding non-melanoma skin cancer (ICD-8/9 code 173);

2) cancers of the type stated in the initial cluster report, i.e., hematopoietic and lymphatic cancers: all leukemias (ICD-8/9 code 204–207 + ICD-9 code 208); multiple myeloma (ICD-8/9 code 203 + ICD-9 code 238.6), non-Hodgkin's lymphoma (ICD-8/9 code 200 + ICD-8 code 202 + ICD-9 codes 202.0, 201.1, 202.8); all hematopoietic and lymphatic (all leukemias, multiple myeloma, non-Hodgkin's lymphoma and ICD-8/9 code 201); all leukemias and non-Hodgkin's lymphoma combined; all leukemias; acute leukemia, i.e., acute myeloid leukemia (205.0) and acute lymphatic leukemia (204.0) separately, and combined with ICD-8/9 code 206.0 + ICD-9 codes 204.2, 205.2, 206.2, 208.0, 208.2 + ICD-8 code 207.0; chronic myeloid leukemia (205.1); chronic lymphatic leukemia (204.1);

3) cancers possibly associated with non-ionizing radiation (1, 3, 6–12), i.e., malignant brain and nervous system cancers (ICD-8/9 codes 191, 192); brain and nervous system cancers of malignant, benign, and uncertain behavior (ICD-8/9 codes 191, 192 + ICD-8/9 code 225 + ICD-9 codes 237.5, 237.6, 237.9); skin melanoma (ICD-8/9 code 172); eye (mainly melanoma) (ICD-8/9 code 190); male breast (ICD-8 codes 174.0–2, ICD-9 code 175);

4) common cancers (examined separately), i.e., lung (162), colon (ICD-8 codes 153.0–3, 153.7–8, ICD-9 code 153), rectal (154), colorectal (colon + rectal), stomach (ICD-8/9 code 151), bladder (ICD-8/9 code 188), prostate (ICD-8/9 code 185), female breast (ICD-8 codes 174.0–2, ICD-9 code 174).

Childhood cancer (0–14 years) was restricted to all cancers and all leukemias.

To allow for possible socioeconomic confounding, a deprivation score, shown elsewhere to be a powerful predictor of cancer rates (24), was calculated for each census enumeration district in Great Britain using 1981 census data on unemployment, overcrowding, and social class of head of household. The scores were grouped into quintiles, with a small sixth category for unclassifiable enumeration districts, mostly with institutional populations. According to this deprivation score, the areas closer to the transmitter were more affluent than those further away, i.e., at 1–2 km, 67 percent of the population was in the two most affluent

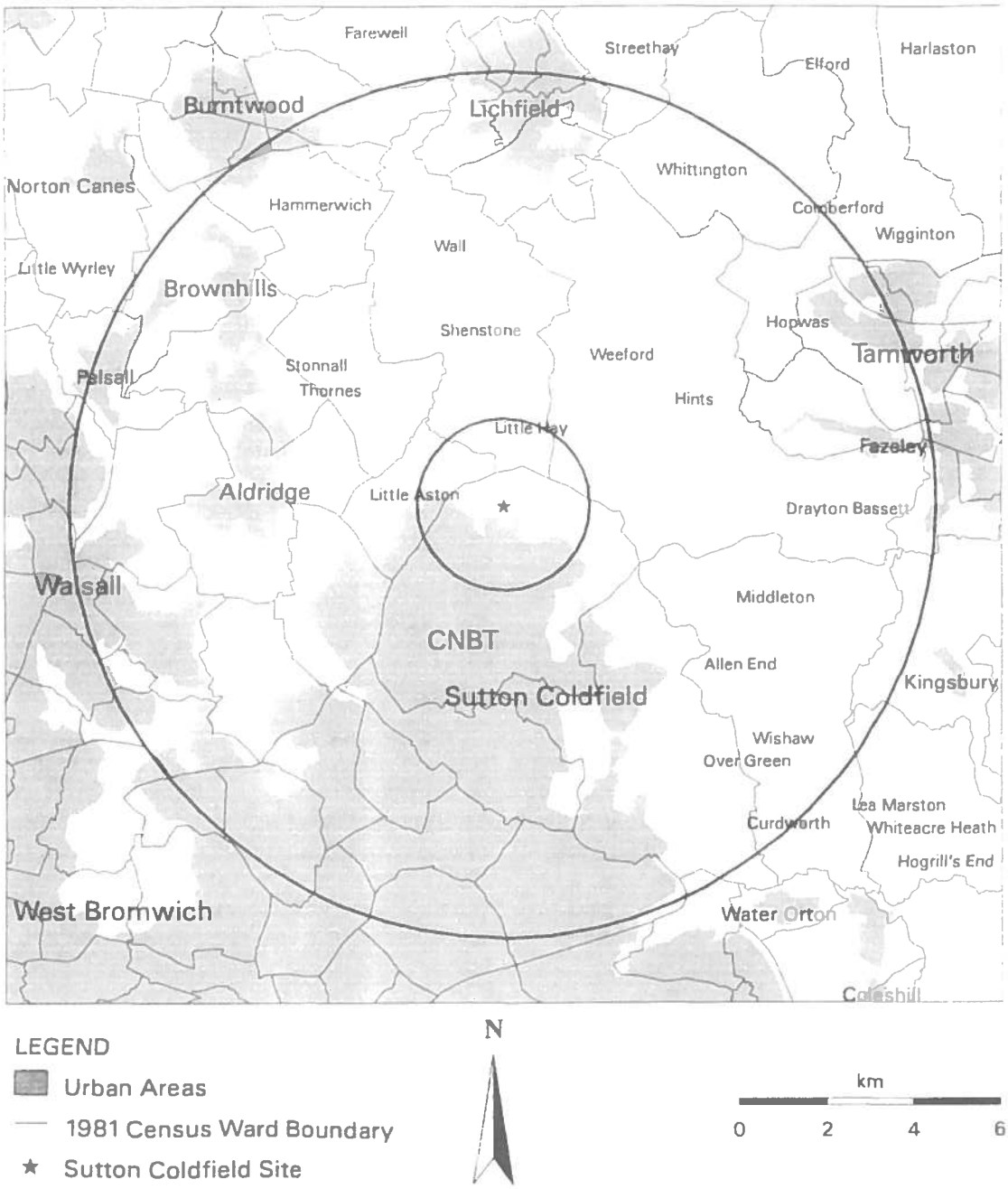


FIGURE 1. Map of 2 and 10 km circles surrounding Sutton Coldfield television and FM radio transmitter, showing position of census ward "CNBT." (Map data copyright Automobile Association.)

quintiles, compared with 28 percent at 9.2–10 km. For many cancers (e.g., lung), lower incidence rates would be expected in the more affluent areas; for some other cancers (e.g., leukemia), there is essentially no relation between incidence and deprivation thus measured, whereas for others (e.g., skin melanoma), higher disease rates are found in the more affluent areas (24).

Statistical analysis was based on the comparison of observed and expected numbers of cancer cases; the expected numbers were calculated from national incidence rates stratified by 5-year age group, sex, year, and deprivation quintile, and regionally adjusted, as described in detail elsewhere (25). Compared with national rates, the West Midlands region had standardized incidence ratios of 0.95 for all cancers and 0.80 for leukemias (0.65 for chronic lymphatic leukemia).

For descriptive purposes, observed and expected values, observed/expected (O/E) ratios, and their 95

percent confidence intervals (calculated assuming a Poisson distribution) are reported for the entire study area (0–10 km) and for an area close to the source, arbitrarily chosen to be 0–2 km. Formal tests of significance were based on those proposed by Stone (26) for isotonic decline in risk with distance from the source. These tests give due weight to the smaller populations near the site, and do not prespecify the shape of the decline, or boundaries between "exposed" and "unexposed" populations. Both an unconditional and a conditional test were performed (25, 27, 28). For the unconditional test, the null hypothesis is that the relative risk is one in each of the bands. An isotonic alternative includes any pattern of non-increasing risk over the study area. The data were further explored by use of the conditional test that corrects for the overall level of risk over the 10 km study area, thereby specifying a null hypothesis where all relative risks are equal to a constant, not necessarily one (25, 27). Significance levels were obtained by Monte Carlo methods based on 999 simulations and the nominal statistical significance level taken to be $p = 0.05$. Stone's tests were in all cases performed on the data in the ten predefined distance bands. For presentation purposes only, we give some data collapsed into four distance bands.

A geographic analysis to investigate the background variability of leukemia incidence in the West Midlands region was also done, in order to place in context the size of any excess found in the vicinity of the transmitter. This analysis was done at census ward level relating to around 10,000 people on average and included supplementary postcoding to reduce the percentage of unpostcoded cases of leukemias from 2.5 percent to 0.3 percent. Observed and expected numbers per ward were calculated as for the main analysis. Departure from Poisson variability was tested by the Pothoff-Whittinghill test (29) and a 5th to 95th percentile range in O/E ratios was calculated using a likelihood method that removes the random component of variability (30). O/E ratios were "smoothed" using an empirical Bayesian method (31). This method produces a set of smoothed estimates on the basis of a compromise between the observed relative risks and the overall regional mean, with the amount of "shrinkage to the mean" being determined by the population size of each ward, thereby removing variability in O/E ratios due to small population sizes. Both raw and smoothed values of the O/E ratio for each of the 832 wards were ranked, and the rank of the census ward containing the transmitter (ward designated as "CNBT" in figure 1) was determined. This ward included 90 percent of the population within 2 km of the transmitter, but with half its population outside the 2 km circle.

RESULTS

At a distance of 0–10 km from the transmitter, there was a 3 percent excess in all cancers with significant unconditional but not conditional Stone's test (table 1). Examination of the data for all ten bands (table 2) demonstrates this overall excess but lack of trend of decreasing risk with distance. Non-Hodgkin's lymphoma showed an excess from 0–10 km (table 1) but no excess at 0–2 km. The Stone's conditional test and

TABLE 1. Selected cancers near the Sutton Coldfield transmitter, West Midlands, England: observed and expected numbers of cases, observed/expected (O/E) ratios, and 95% confidence intervals (CI), by distance of residence from transmitter, in persons aged ≥15 years, 1974–1986

Type of cancer	Distance from transmitter (km)								Stone's p value*	
	0–2				0–10					
	Observed	Expected	O/E ratio	95% CI	Observed	Expected	O/E ratio	95% CI	U	C
All cancers†	703	647.49	1.09	1.01–1.17	17,409	16,861.22	1.03	1.02–1.05	0.001	0.462
Hematopoietic and lymphatic	45	37.08	1.21	0.91–1.62	935	895.83	1.04	0.98–1.11	0.153	
All leukemias and non-Hodgkin's lymphomas	31	24.76	1.25	0.88–1.78	661	592.84	1.11	1.03–1.20	0.018	0.161
All leukemias	23	12.59	1.83	1.22–2.74	304	302.34	1.01	0.90–1.13	0.001	0.001
All acute	10	5.38	1.86	0.89–3.42	116	131.75	0.88	0.73–1.06	0.003	0.004
Acute myeloid	4	3.94	1.02	0.28–2.60	81	95.60	0.85	0.68–1.05	0.024	0.045
Acute lymphatic	3	0.84	3.57	0.74–10.43	21	20.62	1.02	0.67–1.56	0.201	
Chronic myeloid	2	1.63	1.23	0.15–4.43	42	39.95	1.05	0.78–1.42	0.257	
Chronic lymphatic	8	3.12	2.56	1.11–5.05	96	72.56	1.32	1.08–1.62	0.002	0.007
Non-Hodgkin's lymphomas	8	12.17	0.66	0.28–1.30	357	290.50	1.23	1.11–1.36	0.005	0.958
Multiple myeloma	10	6.51	1.54	0.74–2.83	174	154.52	1.13	0.97–1.31	0.156	

* p values given by Stone's unconditional (U) and conditional (C) tests.
† All cancers excluding non-melanoma skin cancer.

TABLE 2. All cancers, all leukemias, and non-Hodgkin's lymphomas near the Sutton Coldfield transmitter, West Midlands, England: observed and expected numbers of cases, observed/expected (O/E) ratios, and cumulative O/E ratios, by distance of residence from transmitter, in persons aged ≥15 years, 1974–1986

Distance from transmitter (km)	All cancers*				All leukemias				Non-Hodgkin's lymphomas			
	Observed	Expected	O/E ratio	Cumulative O/E ratio	Observed	Expected	O/E ratio	Cumulative O/E ratio	Observed	Expected	O/E ratio	Cumulative O/E ratio
0–0.5	2	5.61	0.36	0.36	1	0.11	9.09	9.09	0	0.11	0.00	0.00
0.5–1.0	96	137.19	0.70	0.69	5	2.72	1.84	2.12	3	2.60	1.15	1.11
1.0–2.0	605	504.59	1.20	1.09	17	9.76	1.74	1.83	5	9.46	0.53	0.66
2.0–3.0	282	279.01	1.01	1.06	9	5.56	1.62	1.76	9	5.76	1.56	0.95
3.0–4.9	1,002	1,050.86	0.95	1.00	25	20.22	1.24	1.49	20	20.25	0.99	0.97
4.9–6.3	2,414	2,301.25	1.05	1.03	54	41.96	1.29	1.38	45	40.60	1.11	1.04
6.3–7.4	2,734	2,650.62	1.03	1.03	48	46.54	1.03	1.25	57	43.95	1.30	1.13
7.4–8.3	2,827	2,798.65	1.01	1.02	51	49.22	1.04	1.19	52	47.19	1.10	1.12
8.3–9.2	3,363	3,213.75	1.05	1.03	40	57.35	0.70	1.07	80	54.56	1.47	1.21
9.2–10	4,084	3,919.59	1.04	1.03	54	68.90	0.78	1.01	86	68.02	1.30	1.23

* All cancers excluding non-melanoma skin cancer.

examination of the data over the ten bands (table 2) do not indicate a decline in risk with distance. Excesses within 2 or 10 km of the transmitter for hematopoietic and lymphatic cancers and multiple myeloma, were not statistically significant (table 1), nor was there evidence of a significant decline in risk with distance.

For adult leukemias from 0–2 km, the O/E ratio was 1.83 (95 percent confidence interval (CI) 1.22–2.74), based on 23 cases (table 1). The Stone's tests indicated a significant ($p = 0.001$) decline in risk with distance; data for all ten bands (table 2) were consistent with a decline in risk extending over the entire 10 km. Risk fell below 1.0 in the outer bands so that there was no overall excess over the 10 km area (O/E ratio = 1.01, 95 percent CI 0.90–1.13) (table 1). A pattern of decline with significant Stone's conditional tests was also found at ages 15–64 and ≥65 years, and for each sex separately (table 3). Acute leukemias, acute myeloid leukemia, and chronic lymphatic leukemia showed significant declines in risk with distance, as indicated by Stone's tests (table 1) and inspection of the data (table 4).

The leukemia excess at 0–2 km was apparent in both the earlier (1974–1980) and later (1981–1986) periods; there were 11 leukemia cases in the first period and 12 leukemia cases in the second period, and O/E ratios of 1.80 and 1.85, respectively. Stone's tests were significant in both periods. Twenty-one of the 23 cases within 2 km are known to have died, as verified by death certificates, and all but one had died by 1988. The stated occupations at diagnosis of the 23 adult leukemia cases were as follows: of 10 females, 4 housewives, 1 clerk/cashier, and 5 unstated; of 13 males, 2 clerk/cashiers, 3 managers, 1 printer, 1 gardener, 1 teacher, 1 farmer, 1 driver/foreman of roads goods vehicles, 1 inadequately described, and 2 unstated.

Among children, there were 97 cancers within 0–10 km of the transmitter (106.1 expected), including 34 leukemia cases (29.7 expected), of which 2 cases were at 0–2 km (1.1 expected); Stone's tests were not significant (leukemia conditional test $p = 0.173$).

Among other adult cancers, there was a significant decline in risk for skin melanoma and for bladder

TABLE 3. Leukemia near the Sutton Coldfield transmitter, West Midlands, England, by age and sex: observed and expected numbers of cases, observed/expected (O/E) ratios, and 95% confidence intervals (CI), by distance of residence from transmitter, in persons aged ≥15 years, 1974–1986

Sex and age (years)	Distance from transmitter (km)								Stone's p value*	
	0–2				0–10					
	Observed	Expected	O/E ratio	95% CI	Observed	Expected	O/E ratio	95% CI	U	C
Both sexes										
15–64	10	4.75	2.11	1.01–3.87	132	121.71	1.08	0.91–1.29	0.003	0.001
≥65	13	7.84	1.66	0.97–2.84	172	180.63	0.95	0.82–1.11	0.009	0.008
Males										
≥15	13	6.72	1.93	1.13–3.31	162	164.72	0.98	0.84–1.15	0.002	0.000
Females										
≥15	10	5.86	1.71	0.82–3.14	142	137.60	1.03	0.88–1.22	0.014	0.006

* p values given by Stone's unconditional (U) and conditional (C) tests.

TABLE 4. Acute leukemias and acute myeloid, acute lymphatic, chronic myeloid, and chronic lymphatic leukemias near the Sutton Coldfield transmitter, West Midlands, England: observed numbers of cases and observed/expected (O/E) ratios, by distance of residence from transmitter, in persons aged ≥15 years, 1974–1986

Leukemia subtype	Distance from transmitter (km)							
	0–2		2–4.9		4.9–7.4		7.4–10	
	Observed	O/E ratio	Observed	O/E ratio	Observed	O/E ratio	Observed	O/E ratio
Acute leukemias	10	1.86	11	0.95	38	0.99	57	0.75
Acute myeloid	4	1.02	8	0.97	28	1.00	41	0.74
Acute lymphatic	3	3.57	3	1.52	5	0.83	10	0.85
Chronic myeloid	2	1.23	3	0.87	19	1.62	18	0.78
Chronic lymphatic	8	2.56	14	2.31	27	1.27	47	1.12

cancer (table 5), although point estimates of O/E ratios were not in excess within 1 km for these cancers (table 6); none of the other Stone's tests were significant.

The ward level geographic analysis of adult leukemia in the West Midlands region showed significant extra-Poisson variability (Pothoff-Whittinghill $z = 2.67$, $p = 0.004$). The 5th to 95th percentile range of O/E ratios was estimated as 0.70 to 1.35 after removing random fluctuation. Census ward "CNBT," containing 90 percent of the population within 2 km of the transmitter, had a raw O/E ratio of 1.55, which ranked 154 out of 832 wards. After smoothing, the ratio was 1.25, ranking second. The highest ranking ward for smoothed values had 26 observed cases and a raw O/E ratio of 1.74, which after smoothing was reduced to 1.26. This analysis therefore indicates that the excess in the 0–2 km circle around Sutton Coldfield, with 23 cases observed and 12.6 expected, was unusual, even in the presence of significant geographic variation in leukemia incidence in the West Midlands region. However, the magnitude of excess was not much greater than that found elsewhere in the region.

DISCUSSION

The main finding was the confirmation of a reported excess of leukemias near the Sutton Coldfield radio and television transmitter, and a decline in risk with distance from the site. Because all but one of the leukemia cases included in our study had died by 1988, this would seem to be independent of the seven apparently current cases reported in the media in 1992, although unfortunately further details of those cases were not made available to us or to the health authorities. Our findings appear to be consistent over two independent time periods (1974–1980 and 1981–

TABLE 5. Other cancers near the Sutton Coldfield transmitter, West Midlands, England: observed and expected numbers of cases, observed/expected (O/E) ratios, and 95% confidence intervals (CI), by distance of residence from transmitter, in persons aged ≥15 years, 1974–1986

Type of cancer	Distance from transmitter (km)								Stone's *p* value*	
	0–2				0–10					
	Observed	Expected	O/E ratio	95% CI	Observed	Expected	O/E ratio	95% CI	U	C
Cancers possibly associated with non-ionizing radiation										
Brain										
Malignant and benign	17	13.20	1.29	0.80–2.06	332	317.74	1.04	0.94–1.16	0.612	
Malignant	12	9.18	1.31	0.75–2.29	218	223.27	0.98	0.86–1.11	0.717	
Skin melanoma	13	9.10	1.43	0.83–2.44	189	196.53	0.96	0.83–1.11	0.027	0.018
Eye melanoma	0	0.71	0	0–4.22	20	17.19	1.16	0.75–1.80	0.849	
Male breast	1	0.61	1.64	0.04–9.13	15	15.08	0.99	0.60–1.64	0.889	
Common cancers										
Female breast	107	98.67	1.08	0.90–1.31	2,412	2,288.30	1.05	1.01–1.10	0.131	
Lung	113	112.31	1.01	0.84–1.21	3,466	3,418.60	1.01	0.98–1.05	0.875	
Colorectal	112	99.48	1.13	0.94–1.35	2,529	2,454.93	1.03	0.99–1.07	0.330	
Stomach	33	43.75	0.75	0.54–1.06	1,326	1,248.40	1.06	1.01–1.12	0.246	
Prostate	37	32.81	1.13	0.82–1.55	785	760.45	1.03	0.96–1.11	0.466	
Bladder	43	28.37	1.52	1.13–2.04	788	728.96	1.08	1.01–1.16	0.008	0.040

* *p* values given by Stone's unconditional (U) and conditional (C) tests.

TABLE 6. Skin melanoma and bladder cancers in the vicinity of the Sutton Coldfield transmitter, West Midlands, England: observed and expected numbers of cases, observed/expected (O/E) ratios, and cumulative O/E ratios, by distance of residence from transmitter, in persons aged ≥15 years, 1974–1986

Distance from transmitter (km)	Skin melanoma				Bladder cancer			
	Observed	Expected	O/E ratio	Cumulative O/E ratio	Observed	Expected	O/E ratio	Cumulative O/E ratio
0–0.5	0	0.09	0.00	0.00	0	0.24	0.00	0.00
0.5–1.0	2	2.02	0.99	0.95	4	5.96	0.67	0.65
1.0–2.0	11	6.99	1.57	1.43	39	22.17	1.76	1.52
2.0–3.0	12	5.03	2.39	1.77	11	11.94	0.92	1.34
3.0–4.9	16	16.16	0.99	1.35	43	45.27	0.95	1.13
4.9–6.3	26	28.77	0.90	1.13	119	100.31	1.19	1.16
6.3–7.4	28	27.93	1.00	1.09	131	114.85	1.14	1.15
7.4–8.3	32	30.90	1.04	1.08	117	120.64	0.97	1.10
8.3–9.2	28	35.66	0.79	1.01	169	140.13	1.21	1.13
9.2–10	34	43.08	0.79	0.96	155	167.45	0.93	1.08

1986). Within the context of some unexplained variability in leukemia incidence across census wards in the West Midlands region, the excess near Sutton Coldfield can be considered unusual.

Possible methodological artefacts to explain the leukemia findings were explored. First, the lower registration of cancers, and particularly leukemias, in West Midlands relative to the country as a whole, is unexplained, but there was no suggestion that the level of registration varied systematically within the region; nor would it seem likely that any such registration artefact could produce local trends in risk of the order seen around Sutton Coldfield. Second, there are known problems of leukemia diagnosis and registration, particularly at older ages, but we found similar results in the younger and older age groups. Third, the study spanned 1974–1986, but relied on population data from the 1981 census, i.e., around the midpoint of the study period. Estimates were made of the extent to which population change over the period (including ageing of the population) may have led to bias in the calculation of the expected numbers of cancers. Based on data from the 1971 and 1991 censuses, there appeared to be a tendency for overestimation of the O/E ratios close to the site (within 2 km), but the bias, estimated at less than 5 percent, was not sufficient to explain the excesses of leukemia observed.

Secondary findings of the study were declines in skin melanoma and bladder cancer with distance from the transmitter site. Because skin melanoma is strongly inversely related to level of deprivation (24), and because this transmitter is located in a relatively affluent area, control for socioeconomic confounding, as expected, reduced the size of the excess—by 11 percent within 2 km. However, it is possible that further socioeconomic confounding could explain at least part of the residual excess of skin melanoma near the site. Bladder cancer was examined along with other causes to explore the small general excess in all cancers, and there was no a priori hypothesis linking it to the exposure under consideration. The results should be viewed in the context of the large number of statistical tests performed and hence may be chance findings.

Field strength measurements have been made in the vicinity of the transmitter (British Broadcasting Corporation, internal report, 1994). In general, both measured and predicted field strength values tended to show a decline in average field strength or power density with distance from the transmitter, although there are undulations in predicted field strength up to distances of about 6 km from the transmitter resulting from the vertical radiation pattern. The maximum total power density equivalent summed across frequencies at any one measurement point (at 2.5 m above ground) was 0.013 W/m^2 for TV, and 0.057 W/m^2 for FM. However, there was considerable variability between different measurement points at any one distance from the transmitter, as would be expected from the impact of reflections from the ground and buildings, and this variability was as great as that related to distance. Power density on average declines by a factor of at least 5 to 10 over 10 km. Field strength varies as the square root of power density, thus declining less steeply, and it is not clear which exposure measure would be biologically more relevant for athermal effects. These measurements cannot of course be converted to personal dose to residents, which depends on numerous factors, including building type, the amount of time spent inside the home as well as away from home, and the number of years spent at the residence. It can nevertheless be assumed that, on average, residents in higher exposure areas receive higher doses unless this is obscured by the combination of patterns

of population density and of variable field strengths at any one distance from the transmitter. The exposures near Sutton Coldfield appear to be much lower than those in other epidemiologic studies where the health effects of radiofrequency exposure have been examined (2, 13, 14, 22). They are well within current guidelines based on the thermal effects of radiofrequency exposure (15, 32).

In conclusion, the results of this study confirm that there was an excess of adult leukemia within the vicinity of the Sutton Coldfield TV/FM transmitter in the period 1974–1986, accompanied by a decline in risk with distance from the transmitter. Further monitoring of cancer statistics in the area appears warranted. No causal implications regarding radio and TV transmitters can be drawn from this finding, based as it is on a single "cluster" investigation. Results of a study of cancer incidence around all other high power radio and TV transmitters in Great Britain are given in the accompanying paper (33) in order to put the present results in wider context.

ACKNOWLEDGMENTS

The Small Area Health Statistics Unit is funded by grants from the Department of Health, Department of the Environment, Health and Safety Executive, Scottish Office Home and Health Department, Welsh Office, and Northern Ireland Department of Health and Social Services.

The authors thank the Office of Population Censuses and Surveys (OPCS) (now the Office of National Statistics) and the Information and Statistics Division of the Scottish Health Service, who made the postcoded cancer data available. They also thank OPCS for checking registration details of specific cases and for providing copies of death certificates. They are grateful to the West Midlands cancer registry for checking individual cases. In addition, they acknowledge the cooperation of the British Broadcasting Corporation for providing field measurements and predicted field strengths in the area of the Sutton Coldfield transmitter.

REFERENCES

1. Electromagnetic fields and the risk of cancer. Report of an advisory group on non-ionising radiation. Documents of the NRPB. Vol 3, no. 1. London: National Radiation Protection Board, 1992.
2. Dennis JA, Muirhead CR, Ennis JR. Human health and exposure to electromagnetic radiation. National Radiation Protection Board, Report NRPB-R241, July 1992.
3. Thériault GP. Health effects of electromagnetic radiation on workers: epidemiologic studies. In: Bierbaum PJ, Peters JM, eds. Proceedings of the Scientific Workshop on the Health Effects of Electric and Magnetic Fields on Workers, January 30–31, 1991. Cincinnati, OH: US Department of Health and Human Services, 1991. (DHHS (NIOSH) publication no. 91–111):91–124.
4. Cartwright RA. Low frequency alternating electromagnetic fields and leukaemia: the saga so far. Br J Cancer 1989;60: 649–51.
5. Coleman B, Beral V. A review of epidemiological studies of the health effects of living near or working with electricity generation and transmission equipment. Int J Epidemiol 1988; 17:1–13.
6. Guénel P, Raskmark P, Anderson JB, et al. Incidence of cancer in persons with occupational exposure to electromagnetic fields in Denmark. Br J Ind Med 1993;50:758–64.
7. Demers PA, Thomas DB, Rosenblatt KA, et al. Occupational exposure to electromagnetic fields and breast cancer in men. Am J Epidemiol 1991;134:340–7.
8. Törnqvist A, Knave B, Ahlbom A, et al. Incidence of leukaemia and brain tumours in some "electrical occupations." Br J Ind Med 1991;48:597–603.
9. Savitz DA, Calle EE. Leukaemia and occupational exposure to electromagnetic fields: review of epidemiologic surveys. J Occup Med 1987;29:47–51.
10. Feychting M, Ahlbom A. Magnetic fields and cancer in children residing near Swedish high-voltage power lines. Am J Epidemiol 1993;138:467–81.
11. Savitz DA, Wachtel H, Barnes FA, et al. Case-control study of childhood cancer and exposure to 60-Hz magnetic fields. Am J Epidemiol 1988;128:21–38.
12. Wertheimer N, Leeper E. Electrical wiring configurations and childhood cancer. Am J Epidemiol 1979;109:273–84.
13. Pollack H. Epidemiological data on American personnel in the Moscow Embassy. Bull NY Acad Med 1979;55:1182–6.
14. Silvermann C. Epidemiologic studies of microwave effects. Proceedings of the IEEE 1980;68:78–84.
15. World Health Organization. Electromagnetic fields (300 Hz to 300 GHz). Environmental Health Criteria 137. Geneva: World Health Organization, 1993.
16. Robinette CD, Silverman C, Jablon S. Effects upon health of occupational exposure to microwave radiation (radar). Am J Epidemiol 1980;112:39–53.
17. Lester JR, Moore DF. Cancer mortality and Air Force bases. J Bioelectricity 1982;1:77–82.
18. Polsen P, Merritt JH. Cancer mortality and Air Force bases: a re-evaluation. J Bioelectricity 1985;4:121–7.
19. Lester JR. Reply to "Cancer Mortality and Air Force Bases: a re-evaluation." J Bioelectricity 1985;4:129–31.
20. Milham S Jr. Increased mortality in amateur radio operators due to lymphatic and hematopoietic malignancies. Am J Epidemiol 1988;127:50–4.
21. Kraut A, Chan E, Lioy PJ, et al. Epidemiologic investigation of a cancer cluster in professional football players. Environ Res 1991;56:131–43.
22. Cancer incidence in census tracts with broadcasting towers in Honolulu, Hawaii. Report submitted to the Honolulu City Council. Honolulu, HI: Environmental Epidemiology Program, Hawaii, October 1986.
23. Elliott P, Westlake AJ, Kleinschmidt I, et al. The Small Area Health Statistics Unit: a national facility for investigating health around point sources of environmental pollution in the United Kingdom. J Epidemiol Community Health 1992;46: 345–9.
24. Elliott P. Small area studies. In: Bertollini R, Lebovitz MD, Saracci R, et al. Environmental epidemiology: exposure and disease. Boca Raton, FL: CRC Press, 1996:187–99.
25. Shaddick G, Elliott P. Use of Stone's method in studies of disease risk around point sources of environmental pollution. Stat Med 1996;15:1927–34.
26. Stone RA. Investigations of excess environmental risks

around putative sources: statistical problems and a proposed test. Stat Med 1988;7:649–60.
27. Hills M. Some comments on methods for investigating disease risk around a point source. In: Elliott P, Cuzick J, English D, et al, eds. Geographical and environmental epidemiology: methods for small-area studies. Oxford: Oxford University Press, 1992:231–7.
28. Bithell JF, Stone RA. On statistical methods for analysing the geographical distribution of cancer cases near nuclear installations. J Epidemiol Community Health 1989;43:79–85.
29. Pothoff RF, Whittinghill M. Testing for homogeneity. II. The Poisson distribution. Biometrika 1966;53:183–90.
30. Martuzzi M, Hills M. Estimating the degree of heterogeneity between event rates using likelihood. Am J Epidemiol 1995; 141:369–74.
31. Clayton D, Kaldor J. Empirical Bayes estimates of age-standardised relative risks for use in disease mapping. Biometrics 1987;43:671–81.
32. Guidance on standards. Guidance as to restrictions on exposures to time varying electromagnetic fields and the 1988 recommendations of the International Non-Ionizing Radiation Committee Report NRPB-GS11. London: National Radiation Protection Board, May 1989.
33. Dolk H, Elliott P, Shaddick G, et al. Cancer incidence near radio and television transmitters in Great Britain. II. All high power transmitters. Am J Epidemiol 1997;145:10–17.
34. Cancer "link with TV transmitter." The Guardian, March 30, 1992:3.

APPENDIX

On March 30, 1992, the *Guardian* newspaper (34) reported that Dr. Mark Payne of Solihull, Birmingham, had collected data on cancer cases from a north Birmingham general practitioner with 2,600 patients. According to the report, seven existing cases of leukemia and lymphoma, five men and two women aged 18–66 years, were identified, living 400 to 1,500 m from the Sutton Coldfield transmitter. All but one of the cases had lived in the region for 14–25 years; the remaining case had lived there for only 2 years. As a rough guide, in a population with the same age structure as England and Wales, one could expect 2.5 cases per 10,000 persons per year to be newly diagnosed with leukemia or lymphoma. Dr. Payne explained later (Dr. M. Payne, Alternative Medicine Centre, Solihull, Birmingham, personal communication, 1993) that his attention had been drawn to the area because of his concerns that non-ionizing radiation is harmful to health, although it is not clear how the particular general practice was chosen for study (the practice population forms approximately 16 percent of the population within 2 km of the transmitter). Details of the study have not subsequently been published outside the popular press.

New study: direct link to 4,924 cancer deaths from cellular antennas radiation.

May 17, 2011

The electromagnetic radiation emitted by transmitting cell phone antennas is linked to the occurrence of some types of cancer, according to a study by Brazilian researchers.

The study established a direct link between cancer deaths in Belo Horizonte, the third largest city, with the antennae of the mobile telephone network, reported in Science Hoje site, the news portal of the Brazilian Society for Progress Science (Sociedad Brasileña para el Progreso de la Ciencia.)

Federal University of Minas Gerais (UFMG) Belo Horizonte - Brazil

The research was conducted by scientists at the Federal University of Minas Gerais (UFMG), Brazil's southeastern state whose capital is Belo Horizonte.

The results give a warning in a country where, according to the latest data available, at least one person has a cell phone in 82 percent of the residences.

According to the engineer Adilza Condessa Dode, PhD, UFMG researcher and coordinator of the study, repeated exposure of cell phone users to the electromagnetic radiation transmitted by the device and the antennas is not as safe as indicated by other research.

According to the study, more than 80 percent of people who die in Belo Horizonte by specific types of cancer live less than 500 meters away from the 300 identified cell phone antennas in the city.

Scientists found between 1996 and 2006 died in Belo Horizonte a total of 4924 victims of cancer types that may be caused by electromagnetic radiation, such as tumors in the prostate, breast, lung, kidneys and liver.

After finding on the map nearly 300 points antennas of cellular phone networks in the city, the researcher found that 80 percent of those victims lived within 500 meters away from one of these premises.

According to estimates quoted by the researcher, the level of local radiation in excess of 300 GHz antennas considered maximum under Brazilian law of 2009.

"These levels are already high and dangerous to human health. In the closer you live on an antenna, the greater the contact with the electromagnetic field," said Dode.

The researcher claims that the antennas of the devices themselves are also dangerous.

"The power emitted by the cell phone is continuous and exacerbated by the position of the antennas that are directed toward the user's brain," he said.

The engineer said that the legislation setting emission limits for electromagnetic radiation is not based upon health criteria, but solely upon industrial, economic and technological criteria.

Dode cited countries such as Switzerland and Italy, with more restrictive laws, and suggested that each Brazilian municipality set limits as it deems appropriate.

"This is a precaution. I think we will succeed only with social mobilization and must wait for a change in the law," he said.

Until the legislation does guarantee the health of the population, the engineer suggested that consumers just use the phones for emergency calls and to give more preference to text messaging rather than to speaking on their cell phones.

Researcher Dode also recommended the use of a cellular headset to keep the unit away from the body, and to ban the use of mobiles by children and in places such as schools and hospitals. (Xinhua)

PDF UK: 12 BASIC PRECAUTION to minimise exposure o radiation when using a mobile phone.

PDF De: 12 grundlegende Vorsichtsmaßnahmen um die Strahlungsbelastung bei Nutzung eines Handys zu minimieren.

PDF Sp: 12 Consejos elementales de prevención con el fin de limitar la exposición del usuario a las radiaciones del Teléfono Móvil.

PDF Nl: 12 BASISVOORZORGSMAATREGELEN om blootstelling aan straling te minimaliseren bij het gebruik van een mobiele telefoon

PDF It : 12 semplici consigli di prevenzione per limitare l'esposizione alle radiazioni del cellulare in chi lo usa.

INCREASED INCIDENCE OF CANCER NEAR A CELL-PHONE TRANSMITTER STATION.

RONNI WOLF MD[1]

DANNY WOLF MD[2]

From:

The Dermatology Unit, Kaplan Medical Center, Rechovot, and the Sackler Faculty of Medicine, Tel-Aviv University, Tel-Aviv, ISRAEL.

The Pediatric Outpatient Clinic, Hasharon Region, Kupat Holim, ISRAEL.

Running title: Cancer near a cell-phone transmitter station.

Address for correspondence: Ronni Wolf, MD, Dermatology Unit, Kaplan Medical Center, Rechovot 76100, ISRAEL.

Fax 972-9-9560978. E-mail: wolf_r@netvision.net.il

International Journal of Cancer Prevention

VOLUME 1, NUMBER 2, APRIL 2004

Increased Incidence of Cancer near a Cell-Phone Transmitter Station

by Ronni Wolf and Danny Wolf

Abstract

Significant concern has been raised about possible health effects from exposure to radiofrequency (RF) electromagnetic fields, especially after the rapid introduction of mobile telecommunications systems. Parents are especially concerned with the possibility that children might develop cancer after exposure to the RF emissions from mobile telephone base stations erected in or near schools. The few epidemiologic studies that did report on cancer incidence in relation to RF radiation have generally presented negative or inconsistent results, and thus emphasize the need for more studies that should investigate cohorts with high RF exposure for changes in cancer incidence. The aim of this study is to investigate whether there is an increased cancer incidence in populations, living in a small area, and exposed to RF radiation from a cell-phone transmitter station.

This is an epidemiologic assessment, to determine whether the incidence of cancer cases among individuals exposed to a cell-phone transmitter station is different from that expected in Israel, in Netanya, or as compared to people who lived in a nearby area. Participants are people (n=622) living in the area near a cell-phone transmitter station for 3-7 years who were patients of one health clinic (of DW). The exposure began 1 year before the start of the study when the station first came into service. A second cohort of individuals (n=1222) who get their medical services in a clinic located nearby with very closely matched, environment, workplace and occupational characteristics was used for comparison.

In the area of exposure (area A) eight cases of different kinds of cancer were diagnosed in a period of only one year. This rate of cancers was compared both with the rate of 31 cases per 10,000 per year in the general population and the 2/1222 rate recorded in the nearby clinic (area B). Relative cancer rates for females were 10.5 for area A, 0.6 for area B and 1 for the whole town of Netanya. Cancer incidence of women in area A was thus significantly higher ($p<0.0001$) compared with that of area B and the whole city. A comparison of the relative risk revealed that there were 4.15 times more cases in area A than in the entire population.

The study indicates an association between increased incidence of cancer and living in proximity to a cell-phone transmitter station.

Key Words:

Radiofrequency radiation; Cell-phone transmitter station (cell-phone antenna); Cancer incidence study; Netanya.

Back to Staff Report

Introduction

Much concern has been expressed about possible health effects from exposure to radiofrequency (RF) electromagnetic fields, particularly following publication of scientific reports suggesting that residence near high voltage power lines may be associated with an increased risk of developing childhood leukemia. While interest tended to focus on microwave ovens and radar equipment in the past, it is now mobile telecommunication that attracts the most attention. The rapid introduction of mobile telecommunications systems, the exponential increase in the use of such phones, and the many base stations needed for serving them have engendered renewed concerns about exposure to RF radiation.

The biological effects of low level electromagnetic fields and a possible potential relation to cancer causation are controversial. There have been several epidemiological studies of the possible adverse health effects associated with environmental exposure to extremely low frequency (0-300 Hz) non-ionizing radiation, such as that emitted by power cables and electric substations, linking such exposure to leukemia, brain cancer, male breast cancer and skin and eye melanoma (1-11).

Far less attention has been paid to health hazards from environmental exposure to radiation in the RF range (100 kHz to 300 GHz), including the radiation emitted from cell-phone equipment, in the frequencies of 850 MHz, at field strengths much below those required to produce thermal effects. The few epidemiologic studies that did report on cancer incidence in relation to RF radiation (mainly from occupational exposure including microwave and radar and from living in proximity to TV towers) have generally presented negative or inconsistent results, or were subject to possible confounding from other exposures (12-20).

Laboratory studies in this area have also been confusing and conflicting. While some animal studies suggested that RF fields accelerate the development of cancers, other studies found no carcinogenic effect (21).

Obviously, there is an urgent need for extensive, well-conducted epidemiological and laboratory studies (21-24).

An opportunity for studying the effect of RF radiation presented itself in South Netanya, where a cell-phone transmitter station was located in the middle of a small area. We took advantage of the fact, that most of the population in the investigated area belong to one outpatient clinic (of DW), and undertook an epidemiologic assessment, in which we compared the cancer incidence of this area to those of a nearby clinic, to the national incidence rates of the whole country and to the incidence rates in the whole town of Netanya.

Material and methods

Radio-frequency radiation

The cell-phone transmitter unit is located at the south of the city of Netanya in an area called Irus (area A). It first came into service in 7/96. The people in this area live in half a circle with a 350 meter radius centered on the transmitter.

The antenna is 10 meters high. The antenna bears total maximum transmission power at frequencies of 850 MHz of 1500 watt when working at full power.

Both measured and predicted power density (for the frequencies of 850 MHz) in the whole exposed area were far below 0.53 $\mu w/cm^2$ thus the power density is far below the current guidelines which are based on *the thermal effects of RF exposure.* Exact measured power density in each house are described in table 1.

The current Israeli standard uses 50 packets/sec with Time-Division-Multiple-Access (TDMA) quadrature modulation. The antenna produces 50 packets/sec, using a 3:1 multiplexed Time-Division-Multiple-Access (TDMA) modulation with a 33% duty cycle.

Statistical analysis:

We conducted a cancer incidence study to investigate the incidence of cancer cases of individuals exposed to a cell-phone transmitter station, in comparison to those of a nearby clinic, to the national incidence rates of the whole country and to the incidence rates in the whole town of Netanya.

The cohort included 622 people living in the Irus area (area A) for at least 3-7 years and were patients of one health clinic (of DW). The exposure began in 7/96 which was 1 year before the start of our study.

Statistical analysis was based on the comparison of observed and expected numbers of cancer cases.

In order to compare incidence rates, 95% confidence intervals were computed.

The observed number of cancer cases is the number of all the cancer cases in the exposed cohort in the period between 7/97 - 6/98.

In order to estimate relative risk, rate ratios were computed using the rate of 3 different cohorts as the base (the expected values):

The rate in a nearby clinic (which serves a population of 1222 people, all of them living in area B) during the same period of time, i.e. 7/97 - 6/98. In order to compare area A and area B populations we used:

χ^2 test to compare origin and sex division

t- test to compare age means

The national incidence rates of the whole country.

The incidence rates in the whole town of Netanya where the 2 clinics (of area A and B) are located. The data of 2 and 3 were given to us by the Israel cancer registry and are updated to the years 91-94.

We also examined the history of the exposed cohort (of the A area) for malignancies in the 5 years before the exposure began and found only 2 cases in comparison to 8 cases detected one year after the transmitter station came into service.

Results

Of the 622 people of area A, eight cases of different kinds of cancer were diagnosed in a period of only one year (from July 1997 to June 1998). Details on these cases are presented in Table 1. Briefly, we found 3 cases of breast carcinoma, and one case of ovary carcinoma, lung carcinoma, Hodgkin's disease, osteoid osteoma, and hypernephroma.

This rate of cancers in the population of area A was compared both with the rate of 31 cases per 10,000 per year in the general population and the 2/1222 rate recorded in a nearby clinic. To each one of the rates, a 95 percent confidence interval was calculated (Table 2): the rates in area A were significantly higher than both those in area B, and the population as a whole.

A comparison of the relative risk revealed that there were 4.15 times more cases in area A than in the entire population.

The population characteristics of areas A and B were very similar (Table 2-5). The χ^2 test for comparing gender and origin frequencies showed no significant differences in these parameters between the two areas. Age means, as compared by t-test and age distribution stratum also showed no significant difference between the two groups.

Table 2a lists the rates of cancer incidence of areas A and B compared to data of the whole town of Netanya. The comparison clearly indicated that the cancer incidence of women in area A is significantly higher ($p<0.0001$) compared with that of the whole city.

Discussion

Our study indicates an association between an increased incidence of cancer and living in proximity to a cell-phone transmitter station.

Studies of this type are prone to biases. Possible methodological artefacts to explain our alarming results were considered:

Differences in socioeconomic class and employment status, and demographic heterogeneity due to differences in age, sex and ethnicity were excluded. The two areas that were compared have very closely matched environment, workplace and occupational characteristics.

Confounding variables affecting individuals could not be absolutely adjusted for, however, there was no ionizing radiation that could affect the whole community except the previously mentioned mobile antenna station. There is no traffic density in this area, neither is there any industry or any other air pollution. The population of area A

(on which adequate data could be gathered) did not suffer from uncommon genetic conditions, nor did they receive carcinogenic medications.

Differences in diagnosis and registration of cancer cases. Although we cannot altogether exclude the possibility that higher awareness of the physician responsible for area A led to an artificial increase in cancer cases in this area, this possibility seems to us very unlikely, since both are qualified family physicians.

Several findings are of particular interest:

The measured level of RF radiation (power density) in the area was low; far below the current guidelines based on the thermal effects of RF exposure. We suggest, therefore, that the current guidelines be re-evaluated.

The enormous short latency period; less than 2 years, indicates that if there is a real causal association between RF radiation emitted from the cell-phone base station and the cancer cases (which we strongly believe there is), then the RF radiation should have a very strong promoting effect on cancer at very low radiation!

Although the possibility remains that this clustering of cancer cases in one year was a chance event, the unusual sex pattern of these cases, the 6 different cancer kinds, and the fact that only one patient smoked make this possibility very improbable and remote. It should be noted that 7 out of 8 cancer cases were women, like in the work of Maskarinec (25) who found 6 out of 7 leukemia cases in proximity to radio towers to occur in girls. Such unusual appearances of cancer cases due to one accused factor on two completely different occasions is alarming.

We are aware of at least 2 areas in which a drastic increase in the incidence of cancer cases occurred near a cell-phone antenna, however, the setup was not suitable for a well design study of those cases. In one of them (which also got publication in the daily newspapers) there were 6 out of 7 cancer cases in women working in a store in close proximity to a cell-phone antenna.

In conclusion, the results of this study showed that there was a significantly greater incidence of cancers of all kinds within the vicinity of a cell-phone transmitter station.

It would be certainly too premature to draw any conclusions from our results before they are confirmed and repeated by other studies from other areas, particularly in view of the fact that a great majority of papers on this subject showed that RF fields and mobile telephone frequencies were not genotoxic, did not induce genetic effects in vitro and in vivo, and were not found to be teratogenic or to induce cancers (24). The results of this paper should, however, serve as an alarm and emphasize the need for further investigations.

Addendum

At one year following the close of the study, 8 new cases of cancer were diagnosed in area A and two cases in area B. Among the cases diagnosed in area A was one of osteoid osteoma, the second case from the beginning of the study.

References

1. Cartwright R (1989) Low frequency alternating electromagnetic fields and leukaemia: the saga so far. *Br J Cancer* 60:649-651.

2. Demers PA et al (1991) Occupational exposure to electromagnetic fields and breast cancer in men. *Am J Epidemiol.* 134:340-347.

3. Dolk H et al (1997) Cancer incidence near radio and television transmitters in Great Britain. *Am J Epidemiol* 145:1-9.

4. Elliott P et al (1992) The Small Area Health Statistics Unit: a national facility for investigating health around point sources of environmental pollution in the United Kingdom. *J Epidemiol.Community Health* 46:345-349.

5. Feychting M and Ahlbom A (1993) Magnetic fields and cancer in children residing near Swedish high-voltage power lines. *Am J Epidemiol* 138:467-481.

6. Goldsmith J (1995) Epidemiologic evidence of radio-frequency (microwave) effects on health in military broadcasting and occupational studies. *Int J Occup Med Environ Health* 1:47-57.

7. Guenel P et al (1993) Incidence of cancer in persons with occupational exposure to electromagnetic fields in Denmark. *Br.J Ind.Med* 50:758-764.

8. Hocking B et al (1996) Cancer incidence and mortlity and proximity to TV towers. *Med J Aust* 165:601-615.

9. Kraut A et al (1991) Epidemiologic investigation of a cancer cluster in professional football players. *Environ.Res.* 56:131-143.

10. Lester J and Moore D (1982) Cancer mortality and Air Force bases. *J Bioelectricity* 1:77-82.

11. Maskarinec G et al (1994) Investigation of increased incidence in childhood leukaemia near radio towers in Hawaii: preliminary observations. *J Environ Pathol Toxicol Oncol* 13:33-37.

12. McGregor A (1998) WHO launches mobile-phone hazards study. *Lancet* 351:276.

13. Milham S Jr (1988) Increased mortality in amateur radio operators due to lymphatic and hematopoietic malignancies. *Am J Epidemiol.* 127:50-54.

14. Pollack H (1979) Epidemiologic data on American personnel in the Moscow embassy. *Bull N.Y.Acad.Med* 55:1182-1186.

15. Polsen P and Merritt J (1985) Cancer mortality and Air Force bases: a re-evaluation. *J Bioelectricity* 4:121-127.

16. Repacholi M (1997) Radiofrequency field exposure and cancer: what do the laboratory studies suggest. *Environ Health Perspect* 105 (Suppl 6):1565-1568.

17. Repacholi M (1998) Low-level exposure to radiofrequency electromagnetic fields: health effects and research needs. *Bioelectromagnetics* 19:1-19.

18. Robinette C, Silvermann C, and Jablon S (1980) Effects upon health of occupational exposure to microwave radiation (radar). *Am J Epidemiol* 112:39-53.

19. Savitz DA et al (1988) Case-control study of childhood cancer and exposure to 60-Hz magnetic fields. *Am J Epidemiol.* 128:21-38.

20. Savitz D, Ahlbom A (1994) Epidemiologic evidence of cancer in relation to residential and occupational exposure. In Carpenter D, Ayrapetyan S (eds) Biological effects of electric and magnetic fields. Sydney: Academic Press.

21. Savitz D and Calle E (1987) Leukaemia and occupational exposure to electromagnetic fields: review of epidemiologic surveys. *J Occup Med* 29:47-51.

22. Theriault, GP. Health effects of electromagnetic radiation on workers: epidemiologic studies. Bierbaum, PJ and Peters, JM. 91-124. 1991. Cincinnati, OH, US Department of Health and Human Services. Proceedings of the Scientific

Workshop on the health Effects of Electric and Magnetic Fields on Workers. Ref Type: Conference Proceeding

23. Tornqvist S et al (1991) Incidence of leukaemia and brain tumours in some "electrical occupations". *Br.J Ind.Med* 48:597-603.

24. Verschaeve L and Maes A (1998) Genetic, carcinogenic and teratogenic effects of radiofrequency fields. *Mutat Res* 410:141-165.

25. Wertheimer N and Leeper E (1979) Electrical wiring configurations and childhood cancer. *Am J Epidemiol.* 109:273-284.

Acknowledgment

The authors are grateful to Aviva Zeer M.Sc from the Zinman College of Phisical Education and Sport Sciences At the Wingate Institute, Israel, for help with the statistical analysis.

The opinions expressed herein are solely those of the writers and do not necessarily reflect the opinions of the institutions with which the writers are associated.

Table 1: Cancer cases in area A

NAME	AGE	SEX	ORI-GIN[1]	SMO-KING	CANCER TYPE	Measured power density in $\mu w/cm^2$
Hemda	52	f	ash	No	Ovary ca stage 1	$0.3\mu w/cm^2$
Edna	42	f	sph	No	Breast ca in situ	$0.4\mu w/cm^2$
Tania	54	f	ash	No	Breast ca	$0.5\mu w/cm^2$
Neli	67	f	ash	Yes	Breast ca	$0.4\mu w/cm^2$
Galit	24	f	ash	No	Hodgkins	$0.5\mu w/cm^2$
Miriam	61	f	sph	No	Lung ca	$0.3\mu w/cm^2$
Masal	37	f	sph	No	Osteoid osteoma	$0.4\mu w/cm^2$
Max	78	m	ash	No	Hypernephroma	$0.3\mu w/cm^2$

1. Origin: ash - Ashkenazien Jews sph - Spharadic Jews

Table 2: Cancer rates in area A, B and the total population.

	No. of cancer cases	populati on size	Rate per year per 10,000	confide interval lower limit	ce (95%) upper limit	relative risk
Area A	8	622	129	40.1	217.2	4.15
Area B	2	1222	16	-6.3	39.0	0.53
total populat	31	10,000	31	20.1	41.9	1.00

Table 2a: Cancer rates in area A, B and the whole town.

	Male		Female	
	rate	Relative rate	rate	relative rate
Area A	33	1.4	262	10.5
Area B	17	0.7	16	0.6
Whole town	24	1	25	1

Back to Staff Report

Table 3: Comparing area A to area B by gender.

Gender	Area A		Area B	
	N	%	N	%
male	290	49	669	49
female	305	51	685	51

Back to Staff Report

Table 4: Comparing area A to area B by origin.

Origin	Area		Area	
	N	%	N	%
Sfaradic	340	55	551	45
Ashkenaz	239	38	620	51
Russian	41	7	51	4

Back to Staff Report

Table 5: Comparing age means in both areas.

	Area A		Area B	
	mean	Std	mean	std
age	26.5	17.9	25.5	12.4

Table 5: Age distribution by stratum.

	0-1	**1-10**	**10-20**	**20-30**	**30-40**	**40-50**	**50-60**	**60-70**	**>70**
IRUS	16	143	157	65	70	88	41	21	21
POLEG	31	285	257	139	180	158	83	55	34

The Influence of Being Physically Near to a Cell Phone Transmission Mast on the Incidence of Cancer

Horst Eger, Klaus Uwe Hagen, Birgitt Lucas, Peter Vogel, Helmut Voit

Published in *Umwelt·Medizin·Gesellschaft* 17,4 2004, as:
'Einfluss der räumlichen Nähe von Mobilfunksendeanlagen auf die Krebsinzidenz'

Summary

Following the call by Wolfram König, President of the Bundesamt für Strahlenschutz (Federal Agency for radiation protection), to all doctors of medicine to collaborate actively in the assessment of the risk posed by cellular radiation, the aim of our study was to examine whether people living close to cellular transmitter antennas were exposed to a heightened risk of taking ill with malignant tumors.

The basis of the data used for the survey were PC files of the case histories of patients between the years 1994 and 2004. While adhering to data protection, the personal data of almost 1,000 patients were evaluated for this study, which was completed without any external financial support. It is intended to continue the project in the form of a register.

The result of the study shows that the proportion of newly developing cancer cases was significantly higher among those patients who had lived during the past ten years at a distance of up to 400 metres from the cellular transmitter site, which has been in operation since 1993, compared to those patients living further away, and that the patients fell ill on average 8 years earlier.

In the years 1999-2004, *ie* after five years' operation of the transmitting installation, the relative risk of getting cancer had trebled for the residents of the area in the proximity of the installation compared to the inhabitants of Naila outside the area.

Key words: cellular radiation, cellular transmitter antennas, malignant tumours

The rapid increase in the use of mobile telephony in the last few years has led to an increasing number of cell phone transmission masts being positioned in or near to residential areas. With this in mind, the president of the German governmental department for protection against electromagnetic radiation (Bundesamtes für Strahlenschutz) Wolfram König, has challenged all doctors to actively help in the work to estimate the risks from such cell phone masts. The goal of this investigation was therefore to prove whether on not people living near to cell phone masts have a higher risk of developing cancerous tumours.

The basic data was taken from the medical records held by the local medical authority (Krankenkasse) for the years 1994 to 2004. This material is stored on computer. In this voluntary study the records of roughly 1,000 patients from Naila (Oberfranken) were used, respecting the associated data protection laws. The results from this study show a significantly increased likelihood of developing cancer for the patients that have lived within 400 metres of the cell phone transmission mast (active since 1993) over the last ten years, in comparison to those patients that live further away. In addition, the patients that live within 400 metres tend to develop the cancers at a younger age. For the years 1999 to 2004 (*ie* after five or more years of living with the cell phone transmission mast), the risk of developing cancer for those living within 400 metres of the mast in comparison to those living outside this area, was three times as high.

Introduction

A series of studies available before this investigation provided strong evidence of health risks and increased cancer risk associated with physical proximity to radio transmission masts. Haider *et al.* reported in 1993 in the Moosbrunn study frequent psychovegetive symptoms below the current safety limit for electromagnetic waves (1). In 1995, Abelin *et al.* in the Swiss- Schwarzenburg study found dose dependent sleep problems (5:1) and depression (4:1) at a shortwave transmitter station that has been in operation since 1939 (2).

In many studies an increased risk of developing leukaemia has been found; in children near transmitter antennas for Radio and Television in Hawaii (3); increased cancer cases and general mortality in the area of Radio and Television transmitter antennas in Australia (4); and in England, 9 times more leukaemia cases were diagnosed in people who live in a nearby

area to the Sutton Coldfield transmitter antennas (5). In a second study, concentrating on 20 transmitter antennas in England, a significant increased leukaemia risk was found (6). The Cherry study (7) indicates an association between an increase in cancer and living in proximity to a transmitter station. According to a study of the transmitter station of Radio Vatican, there were 2.2 times more leukaemia cases in children within a radius of 6 km, and adult mortality from leukaemia also increased (8).

In 1997 Goldsmith published the Lilienfeld-study that indicated 4 times more cancer cases in the staff of the American Embassy in Moscow following microwave radiation during the cold war. The dose was low and below the German limit (9).

The three studies of symptoms indicated a significant correlation between illness and physical proximity to radio transmission masts. A study by Santini *et al.* in France resulted in an association between irritability, depression, dizziness (within 100m) and tiredness within 300m of a cell phone transmitter station (10).

In Austria there was an association between field strength and cardiovascular symptoms (11) and in Spain a study indicates an association between radiation, headache, nausea, loss of appetite, unwellness, sleep disturbance, depression, lack of concentration and dizziness (12).

The human body physically absorbs microwaves. This leads to rotation of dipole molecules and to inversion transitions (13), causing a warming effect. The fact that the human body transmits microwave radiation at a very low intensity means that since every transmitter represents a receiver and transmitter at the same time, we know the human body also acts as a receiver.

In Germany, the maximum safe limit for high frequency microwave radiation is based on purely thermal effects. These limits are one thousand billion times higher than the natural radiation in these frequencies that reaches us from the sun.

The following study examines whether there is also an increased cancer risk close to cellular transmitter antennas in the frequency range 900 to 1800 MHz. Prior to this study there were no published results for long-term exposure (10 years) for this frequency range and its associated effects to be revealed. So far, no follow-up monitoring of the state of health of such a residential population has been systematically undertaken.

Materials and Methods

Study area

In June 1993, cellular transmitter antennas were permitted by the Federal Postal Administration in the Southern German city of Naila and became operational in September 1993.

The GSM transmitter antenna has a power of 15 dbW per channel in the 935MHz frequency range. The total

Fig. 1: Schematic plan of the antenna sites

transmission time for the study period is ca. 90,000 hours. In December 1997 there followed an additional installation from another company. The details are found in an unpublished report, appendix page 1-3 (14).

To compare results an 'inner' and 'outer' area were defined. The inner area covered the land that was within a distance of 400 metres from the cellular transmitter site. The outer area covered the land beyond 400 metres. The average distance of roads surveyed in the inner area (nearer than 400m) was 266m and in the outer area (further than 400m) 1,026m. Fig. 1 shows the position of the cellular transmitter sites I and 2, surrounded by circle of radius 400 metres. The geographical situation shows the transmitter sites (560m) are the highest point of the landscape, which falls away to 525m at a distance of 450m. From the height and tilt angle of the transmitter it is possible to calculate the distance where the transmitter's beam of greatest intensity strikes the ground (see Fig. 2).

The highest radiation values are in areas of the main

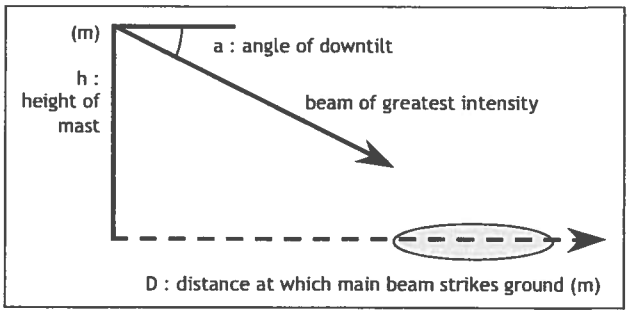


Fig. 2: From the mast height h and the downtilt angle a, the distance D at which the main beam reaches ground is given by D = tan(90-a) × h

beam where it hits the ground and from the expected associated local reflection; from this point the intensity of radiation falls off with the square of the distance from the transmitter.

In Naila the main beam hits the ground at 350m with a beam angle of 6 degrees (15). In the inner area, additional emissions are caused by the secondary lobes of the transmitter; this means in comparison that from purely mathematical calculations the outer area has significantly reduced radiation intensity.

The calculations from computer simulations and the measurements from the Bavaria agency for the environmental protection, both found that the intensity of radiation was a factor of 100 higher in the inner area as compared to the outer area. The measurements of all transmitter stations show that the intensity of radiation from the cell phone transmitter station in Naila in the inner area was higher than the other measurement shown in the previous studies of electromagnetic fields from radio, television or radar (14).

The study StSch 4314 from the ECOLOG Institute indicates an association between a vertical and horizontal distance from the transmitter station and expected radiation intensity on the local people (16). The reason for setting a distance of 400m for the differentiation point is partly due to physical considerations, and partly due to the study of Santini *et al.* who chose 300m (10).

Data Gathering

Similar residential streets in the inner area and outer areas were selected at random. The large old people's home in the inner area was excluded from the study because of the age of the inhabitants. Data gathering covered nearly 90% of the local residents, because all four GPs in Naila took part in this study over 10 years. Every team researched the names of the patients from the selected streets that had been ill with tumours since 1994. The condition was that all patients had been living during the entire observation time of 10 years at the same address.

The data from patients was handled according to data protection in an anonymous way. The data was evaluated for gender, age, tumour type and start of illness. All cases in the study were based on concrete results from tissue analysis. The selection of patents for the study was always done in exactly the same way. Self-selection was not allowed. Also the subjective opinion of patients that the radio mast detrimentally affected their health has not affected this study. Since patients with cancer do not keep this secret from GPs, it was possible to gain a complete data set.

Population study

In the areas where data was collected 1,045 residents were registered in 31.12.2003. The registration statistics for Naila at the beginning of the study (1.1.1994) show the number of old people in the inner and outer areas, as shown in Table 1. The average age at the beginning of the study (1.1.1994) in both the inner and outer areas was 40.2 years. In the study period between 1994-2004, 34 new cases of cancer where documented out of 967 patients (Table 3). The study covered nearly 90% of local residents.

	female	male	total
Inner area	41.48	38.70	40.21
Outer area	41.93	38.12	40.20
Naila total	43.55	39.13	41.45

Table 1 : Overview of average ages at the beginning of the study in 1994

1994	inner 22.4%	outer 2.8%	Naila total 24.8%
2004	inner 26.3%	outer 26.7%	

Table 2 : Proportion of patients aged over 60

The average age of the residents in Naila is one year more than that of the study due to the effects of the old people's home. From the 9,472 residents who are registered in Naila, 4,979 (52.6%) are women and 4,493 (47.4%) are men. According to the register office, in 1.1.1994 in the outer area, the percentage was 45.4% male and 54.5% female, and in the inner area 45.3% male and 54.6% female. The number of people who are over 60 years old is shown in Table 2.

The social differences in Naila are small. Big social differences like in the USA do not exist here. There is also no ethnic diversity. In 1994 in Naila the percentage of foreigners was 4%. Naila has no heavy industry, and in the inner area there are neither high voltage cable nor electric trains.

Results

Results are first shown for the entire 10 year period from 1994 until 2004. Secondly, the last five-year period 1999 to 2004 is considered separately.

Period 1994 to 2004

As a null hypothesis it was checked to see if the physical distance from the mobile transmission mast had no effect on the number cancer cases in the selected population, *ie* that for both the group nearer than 400 metres and the group further than 400 metres the chance of developing cancer was the same. The relative frequencies of cancer in the form of a matrix are shown in Table 3. The statistical test method used on this data was the chi-squared test with Yates's correction. Using this method we obtained the value of 6.27, which is over the critical value of 3.84 for a

Period 1994-2004	Inner area	Outer area	total
new cases of cancers	18	16	34
with no new cancer	302	631	933
total	320	647	967

Table 3 : numbers of patients with and without cancers, 1994-2004

statistical significance of 0.05).

This means the null hypothesis that both groups within the 400-metre radius of the mast and beyond the 400 metre radius, have the same chance of developing cancer, can be rejected with a 95% level of confidence. With a statistical significance of 0.05, an even more significant difference was observed in the rate of new cancer cases between the two groups.

Calculating over the entire study period of 1994 until 2004, based on the incidence matrix (Table 3) we arrive at a relative risk factor of 2.27 (quotient of proportion for each group, *eg* 18/320 in the strongly exposed inner area, against 16/647 in the lower exposed comparison group). If expressed as an odds ratio, the relationship of the chance of getting cancer between strongly exposed and the less exposed is 2.35.

The following results show clearly that inhabitants who live close to transmitter antennas compared to inhabitants who live outside the 400m zone, double their risk of developing cancer. In addition, the average age of developing cancer was 64.1 years in the inner area whereas in the outer area the average age was 72.6 years, a difference of 8.5 years. That means during the 10 year study that in the inner area (within 400 metres of the radio mast) tumours appear at a younger age.

In Germany the average age of developing cancer is approximately 66.5 years, among men it is approximately 66 and among women, 67 (18).

Over the years of the study the time trend for new cancer cases shows a high annual constant value (Table 4). It should be noted that the number of people in the inner area is only half that of the outer area, and therefore the absolute numbers of cases is smaller.

Table 7 shows the types of tumour that have developed in the cases of the inner area.

Period 1994 to 1999

No. of cases of tumours per year of study	inner area: of the 320 people		outer area: of the 647 people	
	total cases	per 1,000	total cases	per 1,000
1994	—	—	I	1.5
1995	—	—	—	—
1996	II	6.3	I	1.5
1997	I	3.1	III	4.6
1998	II	6.3	III	4.6
1999	II	6.3	I	1.5
2000	IIIII	15.6	I	1.5
2001	II	6.3	II	3.1
2002	II	6.3	II	3.1
2003-3/2004	II	6.3	II	3.1

Table 4 : Summary of the total tumours occurring per year (no. and per thousand)

Period 1994-1999	Inner area	Outer area	total
new cases of cancers	5	8	13
with no new cancer	315	639	954
total	320	647	967

Table 5 : numbers of patients with and without cancers, 1994-1999

For the first five years of the radio transmission mast operation (1994-1998) there was no significant increased risk of getting cancer within the inner area as compared to the outer area (Table 5).

Period 1999 to 2004

Under the biologically plausible assumption that cancer caused by detrimental external factors will require a time of several years before it will be diagnosed, we now concentrate on the last five years of the study between 1999 and 2004. At the start of this period the transmitter had been in operation for 5 years. The results for this period are shown in Table 6. The chi-squared test result for this data (with Yates's correction) is 6.77 and is over the critical value of 6.67 (statistical significance 0.01). This means, with 99% level of confidence, that there is a statistically proven difference between development of cancer between the inner group and outer group. The relative risk of 3.29 revealed that there was 3 times more risk of developing cancer in the inner area than the outer area during this time period.

Period 1999-2004	Inner area	Outer area	total
new cases of cancers	13	8	31
with no new cancer	307	639	946
total	320	647	967

Table 6 : numbers of patients with and without cancers, 1999-2004

The odds-ratio 3.38 (VI 95% 1.39-8.25, 99% 1.05-10.91) allows us with 99% confidence to say that the difference observed here is not due to some random statistical effect.

Discussion

Exactly the same system was used to gather data in the inner area and outer areas. The medical chip card, which has been in use for 10 years, enables the data to be processed easily. The four participating GPs examined the illness of 90% of Naila's inhabitants over the last 10 years. The basic data for this study were based on direct examination results of patients extracted from the medical chip cards, which record also the diagnosis and treatment. The study population is (in regards to age, sex and cancer risk) comparable, and therefore statistically neutral. The study deals only with people who have been living permanently at the same address for the entire study period and therefore

Type of tumour (organ)	no. of tumours found	total expected	incidence per 100,000	ratio inner: outer
breast	8	5.6	112	5:3
ovary	1	1.1	23	0:1
prostate	5	4.6	101	2:3
pancreas	m 3 f 2	0.6 0.9	14 18	2:1 1:1
bowel	m 4 f 0	3.7 4.0	81 81	2:2 0:0
skin melanoma	m 1 f 0	0.6 0.7	13 14	1:0 0:0
lung	m 3 f 0	3.6 1.2	79 24	2:1 0:0
kidney	m 2 f 1	1.0 0.7	22 15	1:1 1:0
stomach	m 1 f 1	1.2 1.1	27 23	0:1 0:1
bladder	m 1 f 0	2.0 0.8	44 16	0:1 0:0
blood	m 0 f 1	0.6 0.7	14 15	0:0 1:0

Table 7 : Summary of tumours occurring in Naila, compared with incidence expected from the Saarland cancer register

have the same duration of exposure regardless of whether they are in the inner area or outer area.

The result of the study shows that the proportion of newly developing cancer cases was significantly higher ($p<0.05$) among those patients who had lived during the past ten years within a distance of 400 metres from the cellular transmitter site, which has been in operation since 1993, in comparison to people who live further away. Compared to those patients living further away, the patients developed cancer on average 8.5 years earlier. This means the doubled risk of cancer in the inner area cannot be explained by an average age difference between the two groups. That the transmitter has the effect that speeds up the clinical manifestations of the illness and general development of the cancer cannot be ruled out.

In the years 1999-2004, *ie* after five years and more of transmitter operation, the relative risk of getting cancer had trebled for the residents of the area in the proximity of the mast compared to the inhabitants of Naila in the outer area ($p>0.01$). The division into inner area and outer area groups was clearly defined at the beginning of the study by the distance to the cell phone transmission mast. According to physical considerations people living close to cellular transmitter antennas were exposed to heightened transmitted radiation intensity.

Both calculated and empirical measurements revealed that the intensity of radiation is 100 times higher in the inner area compared to the outer area. According to the research StSch 4314 the horizontal and vertical position in regards to the transmitter antenna is the most important criterion in defining the radiation intensity area on inhabitants (16).

The layered epidemiological assessment method used in this study is also used in assessment of possible chemical environmental effects. In this case the layering is performed in regards to the distance from the cell phone transmitter station. Using this method it has been shown that there is a significant difference in probability of developing new cancers depending on the exposure intensity.

The number of patients examined was high enough according to statistical rules that the effects of other factors (such as use of DECT phones) should be normalised across the inner area and outer area groups. From experience the disruption caused by a statistical confounding factor is in the range between 20% and 30%. Such a factor could therefore in no way explain the 300% increase in new cancer cases. If structural factors such as smoking or excessive alcohol consumption are unevenly distributed between the different groups this should be visible from the specific type of cancers to have developed (*ie* lung, pharyngeal or oesophageal). In the study inner area there were two lung cancers (one smoker, one non-smoker), and one in the outer area (a smoker), but no oesophageal cancers. This rate of lung cancer is twice what is statistically to be expected and cannot be explained by a confounding factor alone. None of the patients who developed cancer was from a family with such a genetic propensity.

Through the many years experience of the GPs involved in this study, the social structures in Naila are well known. Through this experience we can say there was no significant social difference in the examined groups that might explain the increased risk of cancer.

The type and number of the diagnosed cancers are shown in Table 7. In the inner area the number of cancers associated with blood formation and tumour-controlling endocrine systems (pancreas), were more frequent than in the outer area (77% inner area and 69% outer area).

From Table 7, the relative risk of getting breast cancer is significantly increased to 3.4. The average age of patients that developed breast cancer in the inner area was 50.8 years. In comparison, in the outer area the average age was 69.9 years, approximately 20 years less. In Germany the average age for developing breast cancer is about 63 years. The incidence of breast cancer has increased from 80 per 100,000 in the year 1970 to 112 per 100,000 in the year 2000. A possible question for future research is whether breast cancer can be used as a 'marker cancer' for areas where there is high contamination from electromagnetic radiation. The report of Tynes *et al.* described an increased risk of breast cancer in Norwegian female radio and telegraph operators (20).

To further validate the results the data gathered were compared with the Saarland cancer register (21). In this register all newly developed cancers cases since 1970 are recorded for each Bundesland. These data are accessible via the Internet. Patents that suffer two separate tumours were registered twice, which increases the overall incidence up to 10%. In this

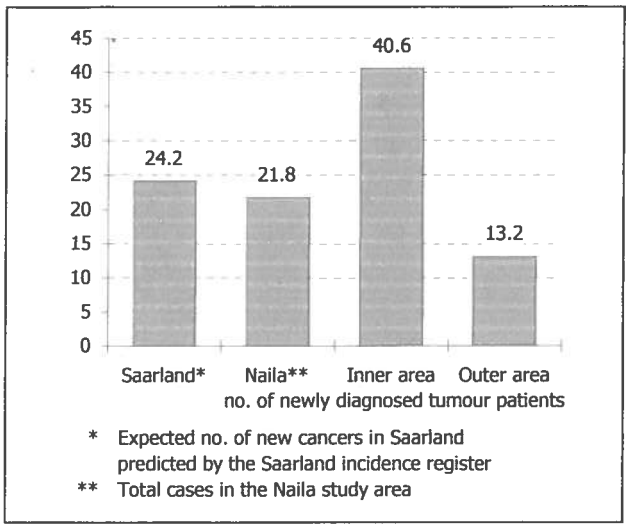


Fig. 3 : Number of new cancer cases 1999 to 2004, adjusted for age and gender, calculated for the 5,000 patient years

register there is no location-specific information, for instance proximity to cell phone transmission masts. The data in the cancer register therefore reflect no real control group but rather the effect of the average radiation on the total population.

From the Saarland cancer register for the year 2000 the incidence of new cancer cases was 498 per 100,000 for men and 462 per 100,000 for women. When adjusted for age and sex one would expect a rate of between 480 and 500 per 100,000 in Naila. For the years 1999 to 2004 there were 21 new cases of cancer among 967 patients. The expected number was 24 cases per 1,000 patients.

The results of the study are shown graphically in Fig. 3. The bars of the chart represent the number of new cancer cases per 1,000 patients in the separate areas, over the five years (bars 2 to 4). The first bar represents the expected number from the Saarland cancer register.

In spite of a possible underestimation, the number of newly developed cancer cases in the inner area is more than the expected number taken from the cancer register, which represents the total population being irradiated. The group who had lived during the past five years within a distance of 400 m from the cellular transmitter have a two times higher risk of developing cancer than that of the average population. The relative risk of getting cancer in the inner area compared with the Saarland cancer register is 1.7 (see to Table 7).

Conclusion

The result of this retrospective study in Naila shows that the risk of newly developing cancer was three times higher among those patients who had lived during past ten years (1994-2004), within a distance of 400m from the cellular transmitter, in comparison to those who had lived further away.

Cross-sectional studies can be used to provide the decisive empirical information to identify real problems. In the 1960s just three observations of birth deformities were enough to uncover what is today an academically indisputable Thalidomide problem.

This study, which was completed without any external financial support is a pilot project. Measurements of individual exposure as well as the focused search for further side effects would provide a useful extension to this work, however such research would need the appropriate financial support.

The concept of this study is simple and can be used everywhere, where there it a long-term electromagnetic radiation from a transmitting station.

The results presented are a first concrete epidemiological sign of a temporal and spatial connection between exposure to GSM base station radiation and cancer disease.

These results are, according to the literature relating to high frequency electromagnetic fields, not only plausible and possible, but also likely.

From both an ethical and legal standpoint it is necessary to immediately start to monitor the health of the residents living in areas of high radio frequency emissions from mobile telephone base stations with epidemiological studies. This is necessary because this study has shown that it is no longer safely possible to assume that there is no causal link between radio frequency transmissions and increased cancer rates.

Acknowledgements

Our thanks go to all those involved in developing this study, in particular, Herrn Professor Frentzel-Beyme for his advice on all the epidemiological questions.

(Received 14.09.2004; Accepted 08.10.2004)

Footnotes

(1) HAIDER, M., KUNDI, M., KNASMÜLLER. S., HAIDER,T., GROLL KNAPP, E. & G. OBERMEIER (1993): Medizinisch-hygienische Untersuchungen und Beurteilungen der Kurzwellensendeanlage Moosbrunn, Institut für Umwelthygiene,Universität Wien.

(2) ABELIN, T., ALTPETER, E.S., PFLUGER, D.H., KREBS, T., KÄNEL, J.V., STÄRK, K. & C. GRIOT (1995): Gesundheitliche Auswirkungen des Kurzwellensenders Schwarzenburg, BEW Schriftenreihe Studie Nr. 56 (BEW: Bundesamt für Energiewirtschaft).

(3) MASKARINEC, G., COOPER, J. & L. SWYGERT (1994): Investigation of increased incidence in childhood leukemia near radio towers in Hawaii: Preliminary observations, J. Environ. Pathol.Toxicol. and Oncol. 13: 33-37.

(4) HOCKING, B., GORDON, IR., GRAIN HL. et al. (1996): Cancer Incidence and Mortality and Proximity to TV-Towers. Med. J. Australia 165, 11-12: 601-605.

(5) DOLK, H., SHADDICK, G.,WALLS, P., GRUNDY, C., THAKRAR, B., KLEINSCHMIDT, I. & P. ELLIOT (1997a):Cancer Incidence Near Radio and Television Transmitters in Great Britain, Part 1. Sutton Coldfield Transmitter, Am. J. Epidemiol. 145: 1-9.

(6) DOLK, H., ELLIOT, G., SHADDICK, G., WALLS, P. & B. THAKRAR (1997b): Cancer Incidence Near Radio and Television Transmitters in Great Britain, Part 2. All High Tower Transmitters, Am. J. Epidemiol. 145: 10-17.

(7) CHERRY, N. (1999): Critism of the proposal to adopt the ICNIRP guidelines for cellsites in New Zealand, ICNIRP Guideline Critique, Lincoln University, Environmental Management and Design Division, Canterbury, NZ.

(8) MICHELOZZI, P., CAPON, A., KIRCHMAYER, U., FORASTIERE, F., BIGGERI, A., BARCA, A. & C.A.PERUCCI (2001):Department of Epidemiology.Local Health Authority RME Rom, Italy.

(9) GOLDSMITH, JR. (1997): European EpiMarker 2(4): 4-7; Lilienfeld 1978 Final report US Dept. of State, NTIS PB-288163, 1978.

(10) SANTINI, R., SANTINI, P., DANZE, J. M., LE RUZ, P. & SEIGNE,M. (2002): Symptoms experienced by people living in vicinity of cell phone base stations: I. Incidences of distance and sex, Pathol. Biol. 50: 369-373.

(11) KUNDI, M. (2002): Erste Ergebnisse der Studie über Auswirkungen von Mobilfunk-Basisstationen auf Gesundheit und Wohlbefinden. Bericht des Instituts für Umwelthygiene der Universität Wien.

(12) NAVARRO EA., SEGURA J., PORTOLES M., GOMEZ-PERRETTA de MATEO C. (2003): Das Mikrowellensyndrom: Eine vorläufige Studie in Spanien. Electromagnetic Biology an Medicine (früher: Electro- and Magnetobiology) 22(2): 161-169,www.grn.es/electropolucio/TheMicrowaveSyndrome.doc.

(13) BROCKHAUS (1973): abc Physik, VEB F.A. Brockhaus Verlag, Leipzig: 991 ff.

(14) EGER, H., HAGEN, K.U., LUCAS, B., VOGEL, P. & H. VOIT (2004): Einfluss der räumlichen Nähe von Mobilfunk-sendeanlagen auf die Krebsinzidenz,Tabellarischer Teil, unveröffentlicht, Naila

(15) Regulierungsbehörde für Post und Telekom (oJ): Standortbescheinigungen,

(16) ECOLOG-INSTITUT (2003): Bestimmung der Exposition von Personengruppen, die im Rahmen des Projektes "Querschnitts-studie zur Erfassung und Bewertung möglicher gesund-heitlicher Beeinträchtigungen durch die Felder von Mobilfunkbasisstationen" untersucht werden, Berichtszeitraum: 1.2.2003 bis 31.5.2003, Förderkennzeichen: StSch 4314, ECOLOG-Institut für sozial-ökologische Forschung und Bildung gGmbH, Hannover.

(17) KLEINBAUM, D.G., KLEIN, M. (2002): Logistic Regression - A. Self - learning text, Springer Verlag

(18) AG BEVÖLKERUNGSBEZOGENER KREBSREGISTER IN DEUTSCHLAND (Hrsg.) (2004):Krebs in Deutschland, 4. überarb., akt.Ausgabe, Arbeitsgemeinschaft bevölkerungs-bezogener Krebsregister in Deutschland in Zusammenarbeit mit dem Robert Koch-Institut, Saarbrücken.

(19) LEGATOR, M.S. & B. STRAWN (1998): Umwelt-Risiko: Chemie, Haug-Verlag.

(20) TYNES, I., HANNEVIK, M., ANDERSEN, A., VISTNES, AI. & HALDORSEN T. (1996): Incidence of breast cancer in Norwegian female radio and telegraph operators. Cancer Causes Control 7: 197-204.

(21) www.krebsregister.saarland.de

Kontakt:

Dr. med. Klaus Uwe Hagen
Birgitt Lucas
Peter Vogel
Dr. med.Helmut Voit

Korrespondenz:
Dr. med.Horst Eger
Marktplatz 16
95119 Naila
Tel.: 09282-1304
horst.eger@arcormail.de

Back to Staff Report

AVE SUGARLOAF FROM CELL PHONE TOWER(

NAME	DATE	ADDRESS
Eric Williams		P.O Box 2029 Sedona 86339
Chikaki Myers	5/8/17	30 Concho Way Sedona 86351
Debbie Smith-Cowie	5/8/17	65 Amberly Dr. Sedona 86336
Cynthia Kapp	5/8/17	2680 Big Sony Circle 86336
Ellen Ferreira	5/8/17	95 Silverleaf Dr.
Rick Lopez	5/8/17	" "
Sandy Immerso	5/8/17	15 N Slopes Sedona
Peter Perihanos	5/8/17	15 N Slopes Sedona
Elisa Andreis	5/8/17	100 Carol Canyon dr Sedona
Allen Wunder	5/8/17	PO Box 146 Sedona 86339
Rina Bocqogni	5/8/17	3150 W. 89A
Rachel Tucker	5/12/17	371 Cedar St. #1 Sedona AZ 86336
Kayla Clements	5/12/17	145 Navajo Drive, Sedona AZ
Melissa Akers	5/12/17	5 Caswell Dr, Sedona 86336
KRISTINA PALEY	5/18/17	280 Arroyo Pinon Drive

Thank You!

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Samson Love	5/8/17	2030 Sanborn Dr (west Sedona)
Pamela Malone	5/8/17	190 Hummingbird Ln Sedona
Cheryl Brenman	5/8/17	270 MT SHADOWS DR. AZ
HUGO COHEN	5/8/17	460 Mogan Rd
Jen Burns	5-11-17	482 Smith RD Sedona
Rick Lewis	5-12-17	P.O. Box 198 2380 W 89A Sedona
~~Savanah Van Black~~	~~5-12-17~~	~~1965 Bueno Vista Drive, Sedona, AZ~~
Hunter Jackson	5/12/17	70 Concho Wash, AZ
~~Jackie Thompson~~	5-13-17	280 Windsong Dr Sedona AZ 86336
~~Natara Moon~~	5-15-17	1395 Vista Montana #418

SAVE SUGARLOAF FROM CELL PHONE TOWER!

15

NAME	DATE	ADDRESS
JolyNN Greenfield	5.6.17	20 Roadrunner Sedona, AZ
Steve A. MACK	5/6/17	120 CASWELL DR
BRENDA G. REYNOLDS	5/6/17	120 Caswell Dr.
LINDA MATHES	5-6-17	55 Caswell DR
JOHN C. WAHNON	5-6-17	2010 MAXWELL HOUSE Dr SEDONA
Robert DeMayo	5-6-17	95 Lipton Dr. Sedona, AZ
MICHAEL DALLY	5-6-17	50 LIPTON DR. SEDONA, AZ
Lucy Mgeorge	5.6.17	1980 Del Monte Dr Sedona AZ 86336
Sitara Van Block	5.6.17	1965 Buena Vista Dr, Sedona AZ 86336
Zoe VanBlock	5/6/17	1965 Buena Vista Dr, Sedona AZ 863
Savannah Van Block	5/6/17	1965 Buena Vista Dr, Sedona
Cynthia Rosenblum	5/6/17	2045 Dr Maxwell House Dr.
KEN SCHNITKER	5/6/17	145 LITTLE ELF DR
Randy Shams	5/6/17	100 Little Elf Dr.
Patty Thorne	5-6-17	2035 Maxwell House

Back to Staff Report

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Magdalena Dotson	May 6th	120 ARBUTUS DR.
David R Lindsey	May 6 17	2055 Maxwell House Dr
Donna Gibson	May 6 17	105 Caswell Dr
John Lowe	5/6/17	45 Caswell Dr.
Valerie Neal	5-6-17	50 Caswell Dr.
Bonnie Kelly	5-6-17	85 Caswell Dr
MARTY JOHNSON	5-6-17	1955 HILLS DR
THOMAS REAVIS	5-6-17	1980 DEL MONTE DRIVE
Arsella Mervis	5/6/17	1965 Buena Vista Dr.
Jacob Green	5/6/17	1965 Buena Vista Dr
Randy Smith	5/6/17	2065 Buena Vista Dr.
Janni Smith	5/6/17	2065 Buena Vista Dr.
Karl Wiseman	5/6/17	75 Little Elf Dr
Jane Backus	5/6/17	35 Little Elf. Dr.
[illegible]	5/6/17	2060 Sanborn Dr.
Paul Ingraham	5/6/17	1945 Maxwell House Dr
Paula Medrow	5/6/17	2010 Buena Vista Dr.
Mike Medrow	5/6/17	2010 Buena Vista Dr

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Tatiana Temple	05/08/2017	55 Borden DR Sedona AZ
Robert Sardis	5/8/2017	40 Borden Sedona
DEVIN NORRIS	5/8/2017	35 BORDEN DR SEDONA AZ
Brandy ROE	5/8/2017	35 Borden DR sedona
Johnine C. Norris	5/8/2017	35 Borden Dr. Sedona 86336
Jeff Kekala	5/8/2017	10 Borden Dr. Sedona 86336
Jared Cram	5/8/2017	230 Table top Rd Sedona AZ 86336
Barbara Griffin	5/8/2017	175 Goodrock Lane Sedona
RICHARD WINDSOR	5/8/2017	2195 NESCAFE DR. Sedona AZ
M.L. Nock	5/8/2017	115 Yucca Dr. Sedona
Chris Kinsel	5-8-2017	110 Yucca Drive Sedona
Nisay mizrahi	5-8-17	135 Yucca Dr Sedona
Paul Blanchard	5-8-17	150 Yucca Dr. -Sedona
Tracy Greer	5-8-17	170 Yucca Dr. Sedona
RAYMOND RODRIGUEZ	5.8.17	175 YUCCA DR. SEDONA
NICK Paletic	5-8-17	190 Yucca Dr. Sedona

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

20

NAME	DATE	ADDRESS
Patty Herrmann Juda	5-7-2017	370 Farmer Brothers Dr. Sedona
ROY JUDA	5/7/2017	370 FARMER BROS DR SEDONA 86336
Amy Lienhart	5/8/17	Country lane, Sedona
ALAN DE ANDRA	5/8/17	2575 Red Rock Loop Rd 8633
JOEL EGAN	5/8/17	155 El CAMINO RD SEDONA
DANIEL HARMSWORTH	5/8/17.	2,370 W. Hwy 89A, Suite #1, Sedona
WILLIAM H LANDAU	5/8/17	1124 VISTA MONTANA RD, SEDONA
JOSEPH Bergen	5/8/17	230 CAMINO DEL CABALLO, Sedona
Joanna Conway	5/8/17	50 stations west Dr Sedona
CINDY DYAR	5/8/17	80 STUTZ BEARCAT DR.
Jason Thompson	5/8/17	60 Pinion DR
[illegible]	5/8/17	20 Farmer Bros
[illegible]	5/8/17	70 Farmer Bros.
[illegible]	5/8/17	70 FARMER BROS
[illegible]	5/8/17	P.O. Box 3033 Sedona
[illegible]	5/8/17	110 FARMER BROS SEDONA AZ
Madeleine Callachan	5/8/17	180 Farmer Bros Sedona AZ
[illegible]		
[illegible]	"	105 Farmer Brothers Dr. Sedona AZ
Jackie Ayala	5/8/17	50 Border Dr. Sedona, AZ
		Thank You!

Back to Staff Report

SAVE SUGARLOAF FROM CELL PHONE TOWER!

23

NAME	DATE	ADDRESS
Kirk Landauer	May 6 17	2045 Buena Vista Dr
Laura Pratt	5-6-17	115 Caswell Dr
Airen Sapp	5-6-17	90 Caswell DR
Debb Carll	5.6.17	90 Caswell DR.
Robert A. Gilliman	5/6/17	85 Caswell Dr
[illegible]		40 Caswell Dr
Tammy Newton	5-6-17	35 Caswell Dr. Sedona Az 86336
Bannye Marie	5/6-17	35 Caswell Dr Sedona 86336
John Osgood	5/6/17	2035 Grasshopper Ln, Sedona, AZ
Laren Madjidi / Rodvick	5/6/17	450 coffee pot dr Sedona Az
Dewey Akers	5/6/17	5 Caswell DR Sedona 86336
Barbara Bailey	5/6/17	2060 Maxwell House Sedona
Chris Gruneberg	5/6/17	45 Little Elf Dr Sedona
Noël Dupree	5/6/17	65 Little Elf Dr Sedona
Lynn Gentile	5/6/17	2270 Vista Sedona
Steve Gentile	5/6/17	2270 Vista Sedona
Lauren McCue	5/6/17	110 Little Elf Dr Sedona
Cindy Anderson	5/6/17	115 Little Elf Dr
Carol Bettinger	5-6-17	135 Little Elf Dr. Sedona
Tarra Walter	5-6-17	
Mary Hofmann	5/5/17	160 Little Elf Drive
Richard W. [illegible]	5 May 17	155 " " "
Jean [illegible]	5/5/17	" " " "

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Diana Sparks	5/14/17	Sedona West Sub
George Sparks	5/14/17	" "
Amanda Rigg	5/14/17	Sedona, West
ARTHUR POOLE	5/14/17	SEDONA, WEST
SIERRA McKENNA	5/14/17	SEDONA WEST
Robert Ade	5/14/17	OCC
Cheree Dahl	5-14-17	OCC
KEITH PEIRCE	5/14/17	VILLAGE OF OAK CREEK
Leane LeBlanc	14-05-17	NB Canada
Janelle Ripley	14/5/17	New Brunswick, Canada
SAMANTHA HARDY	5-14-17	SCOTTSDALE, AZ
Lara Michele	5/15/17	Sedona, AZ
James Madison	5/15/17	Sedona, AZ
Gil Waldo	5/15/17	Prescott AZ
Justin Whittaker	5/16/17	West Sedona
Carol Riney	5/16/17	Little Elf Dr
Kristy Kimsey	5/14/17	" " "
Leah Jan LINDNER	5/15/17	75 Caswell Drive
PAUL V WAND	5/15/17	445 coffeepot DR
Helen Proctor	5/16/17	West Sedona

Thank You!

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Gail West	5/11/17	265 Flaming Arrow Way
Cindy Lee	5/12/17	2000 Maxwell House Dr
Carol Landauer	5/12/17	40 Coffee Cup Dr.
Vera Hendrix	5-12-17	325 Coffee Pot
Cynthia Mabry	5-12-17	39532 S. Hwy 89
[illegible]	5/12/17	30 Maxwell House Dr
E. Bussa	5/12/17	30 Maxwell House Dr
L. Hudak	5/13/17	115 Stutz Bearcat
H. Hudak	"	"
B. Ernst	5/13/17	11363 W. Smooth Pumice Sk
Mark Huebner	5/13/17	80 Caswell.
Kelly Boeddeker	5/13/17	Sedona
Helen Lassen	5/13/17	Flagstaff
LAURA KOLLER	5/13/17	SEDONA
RON TRUMAN	5-13-17	Sedona Western Hills
JANINE JENNINGS	5-13-17	400 FARMER BROS DR
RICHARD BRENNICH	5-13-17	400 FARMER BROS. DR
Benjamin Walls	5-13-17	1935 Maxwell House Dr.
Vicky George	5/17-17	2280 E Mule Deer

Thank You!

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Ty Hudnall	5/6/17	775 Andante Dr.
Tina Penman	5/6/17	775 Andante Dr.
Jeanne Yancer	5/6/17	155 FARMER Brothers Dr.
Kimberly Trefz	5/6/17	115 Farmer Brothers Drive.
R. Swan	5/6/17	75 HARMONY
Suzanne Wilson	5/7/17	75 GROUNDS DR
Ben Tannin	5/7/17	535 Rodeo Rd
AL NEMOFF	5/7/17	~~SANTA~~ 230 MISSION
SHELLEY BURKE	5/7/17	230 MISSION
Leslie Kelly	5/7/17	1630 Fabulous Texan
David Kelly	5/17/17	1630 Fabulous Texan
Sharon Stapleton	5/7/17	1530 Sanborn Dr
Erica Swain	5/7/17	1530 Sanborn Dr.
Danielle Baker	5-7-17	237 McAllister St.
Rebekah Lucero	05/07/2017	7008 E Gold Dust Ave
Sherry Cooley	05/07/2017	13248 N. 39th Ave
Tara Valentine	5/7/17	410 [illegible] Jordan Rd.
RYAN DEFOREST	5/7/17	15 SANTA BARBARA Drive
Shana Paredes	5/12/17	15 Santa Barbara Dr.
Alexander Mazzone	5/12/17	15 SANTA BARBARA DR.

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
L. Gale	5/11/17	Grounds Drive
Terry McKibben	5/11/17	2020 Buena Vista
KIRSTEN EDIN	(5/11	Sugarloaf
Kristi Johnson	5/11/17	230 Juniper dr.
Doug Johnson	5/11/17	230 Juniper Dr.
Megan Johnson	5/11/17	165 New Castle In #17
Matt Switzer	5/11/17	165 New Castle In #17
Bryan Smith	5/11/17	75 Caswell Dr
Evelyn Guadalupe	5/11/17	2900 Hopi Dr.
Colette Wallisch	5/11/17	170 Farmer Bros. Dr.
Carolyn Anderson	5/11/17	255 El Camino Rd.
Chenoa White	5/11/17	255 EL Camino Rd
LORNA JACKSON	5.11.17	195 Little Elf DR
Ben Singer	5.11.17	85 Last Wagon Dr
Jann Martin	5.11.17	130 VISTA BONITA DR.
Joel Casey	5/11/17	P.O. Box 391
Roger Clark	5/11/17	260 Coffee Pot Dr Sedona
Bonnie Hudgins	5/12/17	85 little ELF Sedona
Nadia Terra	5/12/17	85 little ELF Sedona
Charity Cigal	5/12/17	480 Coffee Pot Dr
Joyce Pittman	5/18/17	240 Ross Rd Sedona AZ

Thank You!

Back to Staff Report

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Emily Harding	5-14-2017	4928 PAULA Ave, ClarkstonMI
Jake McNeil	5-14-0'17	13880 rattalee lk rd clarksburg MI 48346
Scott Hays	5-14-17	17155 HIDDEN POINT DR. OH. 44023
Jordyn Hays	5/14/17	" "
Carlyn Hays	5/14/17	
Christy Hays	5/14/17	
Gavin Cianci	5/14/17	" "
BILL ARENDT	5/14/17	10224 BRITTENFORD DR. VIENNA VA 22182
MARIA runkt	5/14/17	" " "
MARCEE OSMONOVICH	5/14/17	85 Lipton Drive, Sedona
CASEY OSMONOVICH	5/14/17	85 Lipton Drive Sedona
HANS RAHM	5/14/17	BASEL SWITZERLAND
Ruth Rahm	5/14/17	BASEL Switzerland
R. Mann	5/14/17	MANITOBA CANADA
Gail Brooks	5/14/17	Manitoba, CANADA
J. RAINWATER	5.14.17	P.O. BOX 2317, PHOENIX 85002
M. Mendenhall	5-14-17	1045 N 11th PL Unit1 Phoenix, AZ 85021
Bonnie Grace	5.14.17	1985 Maxwell House Dr, Sedona 86336
Jeanne Wolf	5-14-17	3810 Windward Rd GB, WI 5302
Renée Ummus	5.14.17	1244 Pond View - DePere, WI
Joyce Dudek	5-14-17	525 E. Eagle Ter, Green Bay, WI
[illegible]	5-14-17	380 N. Irwin Ave Green Bay WI 54302

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
[illegible]	5/14/17	1240 E Linda Vista FLAGSTAFF
[illegible]	5/14/17	1240 E Linda Vista
[illegible]	5/14/17	42 Sienna ct Sedona
[illegible]	5-14-17	PO Box 401 Sedona AZ 86339
[illegible]	5/14/17	PO Box 442 JACKSON NH 03846
Robert T. [illegible]	5/14/17	PO Box 1028, GLEN, NH 03838
Trance Kelley	5/14/17	85 Caswell
Madelyn Gonzales	5/14/17	85 Caswell
[illegible]	5/14/17	2502 E. Browning Pl Chandler AZ
[illegible]	5/14/17	2502 E Browning PL Chand AZ
Kevin McEnaney	05/14/17	17 Attitash Woods Rd. Bartlett, NH 03812
Darlene McEnaney	5/14/17	17 Attitash Woods Rd. Bartlett NH 03812
Lauren Lewis	5/14/17	200 Calle Del Norte Sedona AZ
Barbara Lepper	5/14/17	45 Caswell Drive
[illegible]	5/14/17	45 Caswell Drive

Back to Staff Report

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
Allyson Waak	5/8/2017	495 Smith Road, Sedona.

Thank You!

SAVE SUGARLOAF FROM CELL PHONE TOWER(

Back to Staff Report

NAME	DATE	ADDRESS
Mary Paquette		120 Thunderbird Dr.
Brent Paquette		" " "
MeliAnna Anastasiadis		105 castle rock trail
Lee Ann Berner	5-6	120 Carroll Canyon Dr.
Adriana Holland	5-6	345 Van Deren Rd
Kim Chisholm	5-6	537 SCHNEBLY RD
Jerry O Burgdorf	5-6	3661 E. Comanche Dr.
Jane Sierra	5/6	965 Rodeo Road Sedona
Linda Carter	5/6	330 El Camino Rd Sedona 86336
Dave Bolger	5/6	PO B 1776 Sedona 86339
Bobbi Steinmetz	5/6/17	2675 W. SR 89A #1244 Sedona 86336
Sarah Brown	5/6/17	250 Manzanita Dr. Sedona 86331
Rain Laudisio	5/6/17	305 Oak creek Blv. Sedona, 86336
Crystal Sun	5/7/17.	365 View dr. Sedona AZ 86336
Laura Schappert	5-7-17	35 Sunshine Ct Sedona AZ 86336
Rita Harding	5/8/17	603 Sweet Sage Ln Sedona 86336
Cristy Clouse	5/8/17	50 Cortico Way Sedona
DAVID RAMIREZ	5-8-17	85 RIMROCK RIDE.
Lee Ann B	5-8	
Kathy Featherstone	5/9	330 Apple Ave, Sedona, AZ
Marci Taylor	5/10	2060 Grasshopper Lane, Sedona AZ

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
Debra Fleegs	5/10/17	465 Little Scout Rd.
Shari Ham	5/10/17	55 Cindy Lane 86336
Kandy Shaoul	5-19-17	51 Calle Del Arboles 86336

Back to Staff Report

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
Garrett Jayal	May 16, 2017	500 Washington St. Hoboken NJ 07030
Melissa Faiza	May 16, 2017	500 Washington St. Hoboken, NJ 07030
Kendra Mark	May 16, 2017	130 Canyon Wren Dr. Sedona
Blair Darby	May 17, 2017	100 El Camino Rd 86336

SAVE SUGARLOAF FROM CELL PHONE TOWER(

NAME	DATE	ADDRESS
Jackie Berger	5/17/17	1910 Sanborn Dr
Paul Berger	5/17/17	"
Peter Ney	5/17/17	300 Pony Soldier Rd Sedona
Yvonne Ney	5/17/17	"
Lorie McClure	5/17/17	674 Mountain Shadows Dr
Frans Jentoft	5/17/17	674 Mountain Shadows Dr.
Wm. Watkins	5/17/17	230 Last Wagon Dr.
Samantha Malinski	5/17/17	426 W Gila St Cottonwood, AZ
Gavin Krause	5/17/17	
Bailey Belanger	5/17/17	145 Navajo Dr. #F2 Sedona
CHRISTIAN COFF	5/17/17	145 NAVAJO DR.
Peggy Sands	5/17/17	80 Caswell Dr Sedona
KAREN PUCKETT	5/18/17	650 Mtn. Shadows Sedona
BARBARA MARCUS	5/18/17	1845 Gun Fury Sedona
David Marcus	5/18/17	1845 Gun Fury Sedona
Jim Burkett	5/18/17	650 MOUNTAIN SHADOWS

Thank You!

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Hannah MISchler	5/16/17	809 Nesbitt Rd Maple PA 19002
Austin Joyal	5/16/17	53d Horizon Way Branchburg NJ 08853
Lauren Broekemeier	5/16/17	1950 Maxwell House Dr Sedona, AZ
Stephanie Smith	5/16/17	#8 Sedona Shadows Sedona 86336
Brianna Solis	5/17/17	55 Birch Blvd, Sedona AZ 86336
MARIA TONELLO	5-17-17	2870 W 89th SEDONA 86336
Diane Nowak	5-17-2017	400 Bart River Rd Clarkdale AZ 86324
Erika Netzband	5-17-17	1901 W. Madison St. Apt. 17, Phoenix, AZ 85009
Briana Diaz	5/17/17	220 Stardust hvn. Sedona AZ 86336
Amy Carter	5/17/17	200 E Cortez Dr #42 Sedona 86351
Zac Timmons	5/17/17	50 Sombast Ln, #209, Sedona, 86336
Mara Leake	5/17/17	330 Zane Grey Dr Sedona 86336
Shayla DeAment	5/18/17	180 Harmony Dr.

SAVE SUGARLOAF FROM CELL PHONE TOWER!

129 SIGNATURES

Back to Staff Report

NAME	DATE	ADDRESS Need to put full address
Matthew Reid	5/19/2017	89a
John Lakowski	5/19/17	
Alan Lakowski	5/19/17	
Kathryn Wilson	5-19-17	89A
[illegible]	5-19-17	"
Jenn Strattmeyer	5-19-17	"
Laura Toito	5-19-17	"
[illegible]	5-19-17	"
[illegible]	5/19/17	
[illegible]	5/19/17	"
Cheryl Lee	5/20/17	"
James Lucy	5/20/17	Lytton Drive
Ginnie Murphy	5/20/17	Texas
Teri Murphy	5/20/17	Texas
Sean Haines	5/20/17	Tofocto
Olivia Haines	5/20/17	Toronto
Shaye Mann	5/20/17	Mt. Shadows, Sedona
Debra May	5/20/17	2271 Roadrunner Rd. Sedona
Gary Hendrickson	5/20/17	15 Windmill Dr. Sedona 86336

Thank You!

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
Robin Welty	5/19/17	77 Morning Sun Dr Sedona 86336
Melissa Thomas	5/19/17	125 Mt Shadows
Don Burns	5/19/17	750 Rolling Hills Rd.
Jim Hanlee	5/19/17	160 Wild Flower Circle Sedona AZ
Thomas Messina	5/20/17	240 Mountain Shadows Sedona
JEFFREY JONES	5/20/17	240 Mountain Shadows Sedona
Ehren Moler	5/20/17	6635 N. Jamison Blvd, Flagstaff, A
Cassandra GEORGE	5/20/2017	7339 E NORTHLAND DR, Scottsdale, AZ
ELIZABETH GEORGE	5/20/2017	372 ELK TRAIL, whitefish, MT 59937 85263
Daniel Appel	5/20/17	445 Coffee Pot Dr
Sean Bark	5/20/17	445 Coffee Pot Dr
Clay Bonekemeier	5/21/17	1594 Black Eagle Dr San Diego CA
JANE CONLON	5/21/17	813 Dusty Rose Dr Sedona AZ
DAVID J SPERO	5/21/17	P.O. Box 4098 SEDONA, AZ 86340
Barbara Hofmann	5/21/17	160 Little Elf Sedona AZ 86336
Lauren Welsh	5/21/17	835 Dusty Rose Dr. Sedona 86336
Matt Bernsdorf	5/21/17	1152 Oakwood Ln. Westerville, OH 43229

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
CHARLES VAN BLOCK	5/21	560 SUNSHINE LANE
[illegible]	5/22/17	80 Grounds Dr
[illegible]	"	"
Alexander	05/20/17	300 N Willard Ck
CHRISTI KASPAR	5/22/17	AUSTIN, TX
KEN DALE	"	"
Thomas Kroner	5/22	2925 W RANCHO, PHX, AZ
Serena HSIEH	5/22	2925 W RANCHO, PHX, AZ
Doug Bowen	5/22	245 Ross, SEDONA
Diana Doran	5-22	2109 Sanborn Dr
Necole Zeigler	5-22	75 Birch Blvd #X1
Chandler Lozano	5/22	5925 N. Bentley Dr. Rimrock
Mary Patton	5/23	3223 Calle Del Montana
Don Jaggi	5/23	265 Jackrabbit Lane
[illegible]	5/23	" " "
PATRICIA STUART	5/23	" " "
ALEX [illegible]	9/23	15 Caswell C
Sudie Shipman	5/23	140 CAMINO Del Sol Sedona
Bevin McCabe	5/23	53 Bell Rock Dr, Sedona, AZ

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
MARK RUSSELL	5-23-17	Cuneo's Talisa Mexico
[illegible] RUSSELL	5-23-17	Cuneo's Talisa Mexico
Cindy Braun	5-23-17	65 Ranch Rd Sedona
Dayle Dodge	5-24-17	2555 Leisure Ln, Sedona
Charles Ness	5-24-17	910 N Cactus Cottonwood
Deb Rae	5/24/17	910 N. Cactus St. Cottonwood
Keith Dedenbach	5-25-17	2015 Maxwell House dr. SDA
EVAN GRIGGS	5-25-17	137 TIGER LN. ROERUCK S.C.
George Braun	5-25-17	275 Goodrow, Sedona
Linda Braam	5-25-17	275 Goodrow Sedona
Jim Reich	5-25-17	PO Box 1280 86339
Megan Rineheart	5-26-17	1010 Beards Hill Rd M-119
JOHN BUXBAUM	5-26-17	35 JOHNNY GUITAR SEDONA
CAROLYN BUXBAUM	5-26-17	35 Johnny Guitar SEDONA
Leoni Winter	5-26-17	123 W Gorham Street, Madison (WI)
Sylvia Horne	5/26/17	25658 W Apple Rd. Buckeye AZ
Kevin and Angela Restivo	5/26/17	07676 New Jersey
Julie Randolph	5-27-17	2222 Marconi Galveston TX
ANN DONOHUE	"	VANCOUVER, BC

Back to Staff Report

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
Jonathan Sprague	5/27/17	2020 sanborn Dr. 86336
Darius Rustam	5/27/17	2675 W. SR89A, #1323, Sedona
TIFFANY DAVIS-RUSTAM	5/27/17	2740 SANBORN DR 86336
Lawrence Meaghen	5/27/17	1012 Calle Figue, Rio 86324
Jasmina Henley	5.27.17	208 Diaz St Jerome 86331
Tiffany Donibon	5/27/17	2105 Sanborn dr 963356
Bonnie Perry	5/27/17	510 Coffee Pot Dr 86336
Will Hanson-Regan	5/27/17	37.0 Jarboe St, KCMO 64
Christa Christian	5/27/17	5444 E Dragoon Ave Mesa AZ
Brittany Peña	5/28/17	4120 Dawn Ave, SD, CA 92116
Brooke Birrenkott	5/28/17	4616 Campus Ave, SD, CA
Reimi Cohen	5/28/17	11340 coma linda, cir Elp, tx
Ryan Sands	5/28/17	11340 coma linda Cir elp, tx
Jamie Chou	5/28/17	3819 18th St SF, CA
Wez Holder	5/28/17	3819 18th St SF CA
Marlize DiBenedetto	5/28/17	918 Hemlock Dr Prescott, A
YESAI SELLASSIE	5/28/17	77 LEUPP FLAGSTAFF AZ
Mother EArth GAIA	5/28/17	77 leupp FlAgStAFFAZ
DAncing leAF	5/28/17	77 leupp
MiA Bella Sunshine	5/28/17	77 leupp
QuestAFAri	5/28/17	77 leupp
Pedro Briaire	5/28/17	77 leupp

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
Dan Gardner	5 28 17	Anthem AZ
KARTHICK NATARAJAN	5/28/17 5 28 17	Charlotte NC
ANAMIKA KAK	5/28/17	CHARLOTTE NC
Sarica Shekhar	5/28/17	California (Walnut Creek)
MUKUL Shekhar	5/28/17	" "
KRISTEN HANSON	5/28/17	KANSAS CITY MO 64111
Denise Kast	5/28/17	Canton, Ohio 4478
Derek Daugherty	5/29/17	380 coffee Pot DRIVE
Heather Fairfield	5/29/17	Yucca Dr
Elinna Ortiz	5/29/17	Pastoral Pl.
Wren Putnam	5/29/17	Ross Rd.
Dimitri Lee	5/29/17	Pickling Pear
Vicky Tsai	5/29/17	STONE WAY
Arielle Bowness	5/30/17	PO Box 3554 Sedona, AZ 86340
Azael Gonzalez	5/30/17	460 concord Dr Sedona AZ 86336
Cris Lara	5/30/17	35 Grey mountain Dr

Thank You!

Back to Staff Report

SAVE SUGARLOAF FROM CELL PHONE TOWER!

NAME	DATE	ADDRESS
Allison Davis	5-17-17	150 BUDD WAY Sedona
Tyler Davis	5-17-17	150 BUDD WAY Sedona
Eliana Frim	5-18-17	445 Coffee pot Drive
Adam Vallequette	5-18-17	445 Coffee pot Drive
Paul Ward	5-18-17	445 Coffee pot Drive
Paul Berard	5-16-	1910 5th Ave
Kim Rein	5-18-17	1660 Gambell St Anchorage AK
Chalon Rein	5-18-17	Same " "
Tina Lenn	5/18/17	775 Andante
Kurt Schmidt	5/18/17	Andante
Trevor Lancaster	5/18/17	5310 Park Ave NC
Jessica Patrick	5/18/17	5310 Park Ave NC
Charles Vissa	5/18/17	15 Sycamore Canyon Rd Sedona

Thank You!

Back to Staff Report

SAVE SUGARLOAF FROM CELL PHONE TOWER!

Back to Staff Report

NAME	DATE	ADDRESS
Rich + Judy Berg	5-31-17	370 Indian Cliffs
Ben Beck	5 31 17	Phoenix AZ
Sean Sullivan	5-31-17	550 Oak Creek Blvd.
Kieran Kael	5-31-17	Parrish FL

Back to Staff Report

In regards to the proposed wireless tower site at 11 Newcastle Lane,

The neighboring property at 70 Newcastle Lane is a historic property in this historical area. It was home to the salvage of the Call of the Canyon, a Creekside Cabin and Oak Creek Bait and Tackle. The historically designated Owneby Irrigation Ditch runs through the property and was incorporated by the previous residents Kay and Clyde Tillotson. There is a tranquility here that is offered by the sensitivity of the area, the established wildlife reside in this area because of this sensitivity.

The lift station property the city is proposing for a 20' wireless tower is in a valley on a mountainside in this historical area of Oak Creek, the property is near the creek surrounded by established natural wildlife such as rookeries, it is next to the historically designated irrigation ditch and is less than 100 feet from my creekside property and home. A historical creekside home with irrigation is a rare and special place in the desert, this must be considered in accordance with Article 17 WIRELESS COMMUNICATIONS FACILITIES, section C, which states " Consideration of historical and environmentally sensitive areas as well as consideration of potential impacts on adjacent properties; ". This article indicates that the City of Sedona is being negligent and has not in any way taken into consideration the impact of the proposed wireless tower on this historical creekside area.

The geographical maps that were presented by the city do not represent what the coverage would potentially look like from the proposed sites. The mapping does not accurately show the actual amount of coverage that would be gained by these specific proposed sites. This came to my attention and was confirmed, it seems impossible for a 20' tower placed at 11 Newcastle Lane to actually be effective as it is in a creekside valley nestled up against a mountainside which would give it a maximum of a 180 degree coverage radius, all this is clear when visiting this specific proposed site. Of course, if the city adds the allotted 20' addition and turns the proposed 20' tower into a 40' tower perhaps they will achieve more than 180 degrees of coverage radius. This is not the ideal location for an additional tower to support the area around Highway 179, it is simply a city site in this general area. Perhaps there is a private location or a place in the nexus that is better suited, with less impact if any and offers more coverage because it is in an ideal geographical location.

In regards to the lift station that was put in at 11 Newcastle Lane, the City of Sedona has already neglected their part of the road and drainage maintenance which has caused me a great deal of flooding damage and this neglect is an on going issue at this point. This area can flood during heavy rains making it impossible to get a utility vehicle down the road for repairs during and after a storm, a wireless tower placed here could go out and become inaccessible to fix due to the sensitivity and vulnerability of the area.

People are always making decisions that affect our lives without even asking us what we think. On a local level we'd like to think that our ideas are actually considered, actually valued, as we work towards building a community we enjoy living in. Yes, we would like to be considered when decisions are being made that directly affect us and could cause great change for us. We'd like to know that important decisions are being made with care, that they are being re-evaluated and re-considered until there is only benefit to the city and those who call it home. When the local authorities make decisions that threaten the survival of the life we have and continue to work to create within the community, what are we meant to do?

Ron Eland of the Red Rock News and city officials have expressed that they are vetting the city's choices. As I experience the city exercising control, they are my neighbor and they are proposing to eventually put up a wireless tower less than 100 feet from my creekside home. Seven homes in the Newcastle Lane area are directly affected by this decision. If a tower goes up, the views and property values will be compromised as well as the historical and sensitive nature of this area. This decision will affect all the residents who live and enjoy these private tree lined roads everyday. The City of Sedona will in essence make us bear a burden that doesn't make sense or even need to be born. When entrusted to the city this area and my property have already suffered due to their negligence, so at this point it makes more sense to trust my neighborhood, the carriers and the federal government to choose, perhaps they won't even come near this historical, creekside, mountainside valley that I call home.

Kind regards, Kimberly

Back to Staff Report

Dear Sedona Officials: June 1, 2017

I present today no matter of mere concern, but solely matters of substance, fact and law.

It is essential that you vote NO on all 5G wireless proposals and applications. 5G is an unnecessary taking of public funds and property values, alongside losses of public health and safety, and human and agricultural productivity. Sedona has strong interest in protecting its economic base and residents' and visitors' freedom from physical injury and impairment. The 4G/5G Distributed Antenna System (DAS) would result in scientifically established hazardous radiation exposure with often immediate and therefore provable adverse effects, particularly immediate neurological and cardiologic effects.

DAS 5G involves telecoms installing powerful microwave radiation antennae, misleadingly called "small cells" to conceal their radiation power and concentration, on light poles and utility poles in the public right of way. Poles may be only 15-20 feet from homes and offices. Thousands of these antennae and large power supplies would be placed on residential blocks and farms, deploying radio frequency / microwave (RF/MW) radiation penetrating homes and bodies 24/7/365 forever.

Pulse-modulated RF/MW radiation, particularly this close to homes, offices and farm animals, is a "hazard", as acknowledged by IEEE and FCC in 1991 in the guideline-setting process.

Although proponents claim a financial bonanza from DAS 5G deployment, there is no evidence to support it. In fact, the Russians refused 5G as badly engineered (as also US engineers have admitted) and instead provided fiberoptics, which works much better, to all homes and apartments in large cities. Furthermore, cell phones are a mature industry: everyone who wants a cell phone already has one.

We oppose 5G based on health and agricultural science, with human and animal physical injuries and impairments, violation of federal and state laws, and violation of the powers of local government.

Health and agricultural science, and physical injury/impairments to human, animals, insects:

The Chair of the original FCC guideline Committee himself (John Osepchuk) acknowledges >20,000 scientific studies, with immediate, short-term and/or long-term adverse effects from RF/MW radiation.

5G RF/MW radiation has a 20-inch wave that penetrates the body deeply and is particularly harmful to babies and children. Four wavelengths, each 2-4 inches, are optimally absorbed by the human brain, heart, liver, thyroid, kidneys, and reproductive organs, impairing their functions. Effects include headaches, insomnia, tinnitus, heart

arhythmia, suppressed melatonin production (essential for sleep, productivity and the immune system), DNA damage and much more. The final ten simultaneous wavelengths of 1/10 to ½ inch target the eyes, ears and skin, and fall within the resonance of pollinating insects' antennae, producing bee colony collapse. The U.S. National Institutes of Health, National Toxicology Program's 16-year, $25 million study concluded in 2016 that cell phone RF/MW radiation causes cancer of the brain (glioma) and the heart (schwannoma). 5G radiation is even worse.

Incredibly, no monitoring of actual radiation emissions from 5G antennae in homes or public places is intended. The relevant FCC guideline was based in fraud from the start and has not been updated since 1996 to reflect current scientific knowledge. It does not protect against biological harm, and is based on a false absorption model of a doll head filled with water! It utterly fails to protect children, whose brains are still developing and whose skulls are thinner than an adult skull. Studies show that RF/MW radiation even less potent than 5G is harmful to every human, animal, insect and plant.

Proponents misrepresent the Telecommunications Act of 1996 (TCA) as preempting all state and local regulation of wireless facilities. State and local governances are preempted only from regulating the "placement, construction, and modification" of wireless facilities based on their "environmental effects". Preemption includes neither health effects nor health science. Nor is regulation of operations preempted on any basis. State and local governments remain authorized and obligated to regulate every activity not preempted by TCA, and on every basis not preempted.

Violation of federal laws:

Allowance of any 5G wireless facilities would not only violate TCA: it would violate the Americans with Disabilities Act (ADA) and the Federal Fair Housing Act. These laws guarantee equal access for all, but 5G would make public places and federal housing, not to mention *all* housing, uninhabitable for already injured, impaired and/or electromagnetically sensitive (EMS) persons. Sedona says it requires compliance with ADA, but given 5G's multiple simultaneous wavelengths, its intensities, and its15-degree, near-maser (direct-energy weapon) arc of radiation concentration, compliance is impossible.

Sedona must protect health, safety, agriculture and its own economy. 5G would sacrifice it all, with resulting chronic health problems and loss of productivity by some degree to all Sedonans, right where they live and work, and the permanent loss of agricultural pollinators. Please oppose 5G throughout Sedona now. The Federal TCA authorizes you so to do.

Thank you.

Richard Sacks, Independent holistic health scientist since 1965
richardatlostartsradio.com or richard at globalleadersconsulting.com

Back to Staff Report

July 18th, 2017

Dear City Councilors,

This letter and the attached petition are to express the concern of us Sedona residents who live in the vicinity of 700 El Camino Road. We are aware that this location is one of 20 sites that the City is considering leasing for the purpose of a new cell phone tower installation. We are opposed to this line of action.

Urban Density vs. Rural Density Models: We understand that the City is embracing an urban density model rather than a rural density model for the placement of these towers in our small town. We don't think this is appropriate. We dispute that there will be much of an increased demand for cell phone coverage in the future - especially since census data shows that the city population has decreased from 11,436 (2009) to 10,388 (2016). The urban density model requires twice the number of wireless infrastructure sites than the rural model and increases the negative effects on health and safety, aesthetics, and property values.

Existing Sites: According to the FCC cell tower database, there are already at least 44 cell phone and antenna towers registered in Sedona. If increased coverage is truly necessary, why not build on these existing sites, instead of establishing new ones? Utilizing newer and safer technology solutions on the existing sites would mean that additional towers would no longer be necessary to build up our wireless infrastructure.

Not an Optimal Site: The site at 700 El Camino is in a valley or depression. Thus a cell tower there would have to "work harder" in order to disseminate its signal, thereby increasing the electromagnetic pollution in the vicinity. This is not an optimal site for a proposed new tower because it would increase public exposure to health hazards.

Health Concerns: We are aware that federal regulations prohibit health concerns from being used as reasons to disallow the installation of new cell phone towers. However, there is a very real health risk to people living near these towers. The majority of worldwide studies on this subject conclude that cancer rates and numerous neurological problems (headaches, memory changes, dizziness, sleep disturbances etc.) increase among populations close to cell phone towers. Towers emit radio frequencies for up to 2 ½ miles; and negative health changes have been verified up to 1,600 feet away.

An overwhelming majority of the residents we polled in our affected neighborhood was very concerned and signed the attached petition. We urge you as our public representatives to reconsider this issue and not to allow the installation of any more cell phone towers in our town. It is a matter of public health. Specifically we ask that you remove 700 El Camino Road from the list of possible new installation sites. Thank you for your time and consideration of this matter.

Sincerely,
Residents of El Camino Road, Arroyo Pinon Drive, Arroyo Drive, Carol Canyon Drive, Table Top Road, Thunderbird hills and Sedona meadows.

Back to Staff Report

Save Arroyo Pinon and El Camino from Cell Phone Tower !

Name	Date	Address & Email or phone #
Kristina Paley	6/20/17	280 Arroyo Pinon Drive, Sedona 86336 paleyk@gmail.com
Steven Paley	6/20/17	280 Arroyo Pinon Drive, Sedona 86336 chorold1@yahoo.com
Lorna Menard	6/21/17	295 Arroyo Pinon Dr. lornamenard Sedona, Az. 86336 @gmail.com
Richard Menard	6/21-17	295 Arroyo Pinon Dr Sedona Az 86336
Sahar Paydar	6,21,17	410 Arroyo Pinon Dr Sedona, AZ 86336 Saharp@msn.com
Farshid Paydar	6,21,17	410 Arroyo Pinon Dr Sedona, AZ 86336
Rhonda Peck	6/21/17	(no mail) 425 Arroyo Pinon Dr. Sedona 86336 drpck@npgcable.com
Ron Raimonde	6/21/17	510 Juniper Dr Northwall65@Gmail Sedona, 86336 .com.
Kimberly Tucker	6/21/17	260 Arroyo Pinon Dr. Sedona AZ 86336 kimmyjtucker@yahoo.com
Sally Moore	6-21-17	370 Arroyo Pinon Dr. Sedona, Az 86336 92Sal@cox.net
Don Moore	6-21-17	370 Arroyo Pinon Dr. Sedona, Az 86336 pt Safety@cox.net lovefromgabriel@gmail.com
Gabriel Fiedler	6-21-17	390 Arroyo Pinon Dr. Sedona Az 86336
Kate Macharen	6-21-17	AFLESCH@CENTURYLINK.NET. 325 Arroyo Pinon Dr. Sedona AZ 86336
Anthony Flesch	6-21-17	325 " Arroyo Pinon Drive Sedona AZ 86336
Amy Tedrick	6/23/17	210 Arroy Pinon Dr Sedona, AZ 86336
Steve Tedrick	6/23/17	210 Arroyo Pinon Sedona 86336
Ethan Tedrick	6/23/17	210 Arroyo Pinon Sedona 86336
Janice Roeder	6/23/17	390 Arroyo Pinon Dr. 86336 janicebennett935@gmail.com
Patricia Dimillo	6/24/17	edimillo@yahoo.com 385 Arroyo Pinon Dr. 86336
Ernest Dimillo	6/24/17	edimillo@yahoo.com 385 Arroyo Pinon Dr. 86334

Back to Staff Report

Save Arroyo Pinon and El Camino from Cell Phone Tower !

Name	Date	Address & Email or phone #
Henry Twombly	6/23/17	350 Arroyo Pinon Dr Sedona AZ
Evan Danger	6/23/17	420 Arroyo Pinion Dr.
Pamela Jasmine	6/23/17	355 Arroyo Penon Dr
William R	6/23/17	355 Arroyo Pinon Drive
Anne	6/24/17	375 Arroyo Pinon Dr
Matt Sells	6/24/17	165 Arroyo Piñon Sedona
Alice Martin	6/24/17	155 Arroyo Pinon
Jonas Rodarus/s	6-24-17	220 El Camino Rd.
Rowdy Pace	6-24-17	258 El Camino Rd.
Scott Carter	6-24-17	330 El camino Sedona
Linda Carter	6/24/17	330 El Camino Rd Sedona 86336
Marc Maddux	6/24/17	5 Lisa Ln Sedona 86336 marc.maddux@yahoo.com
Krysta Kirsten	6/24/17	483 El Camino Rd 206 795-1617
Nicholas Kirsten	6/24/17	483 El Camino Rd 206-300-9029
James Hackley	6/24/17	90 El camino Rd
Mary Keller	6/24/17	170 El Camino Rd

Back to Staff Report

Save Arroyo Pinon and El Camino from Cell Phone Tower !

Name	Date	Address & Email or phone #
MIKE SOUZA	6/24/17	430 ARROYO PINON DR SEDONA, AZ 86336
Dag Shields	6/24/17	70 Arroyo Dr. 86336 928-606-1876
Chenoa White	6/24/17	255 El Camino Rd 928-203 1778
Carolyn Anderson	6/24/17	255 El Camino Rd 928 300-8206 86336
Evelyn Rowland	6/24/17	325 El Camino Rd 282-0039 86336
William Rowland	6/24/17	325 El Camino Rd. 282-0039 86336
Russ Honeyer	6/24/17	600 El Camino Rd. 928 554119
George Gutierrez	6-24-17	105 El Camino Rd. 928-301 6302
Shelley Holiday	6/24/17	70 Arroyo Dr. 928-274-4787
Stephanie Maciel	7/15/17	75 Arroyo R - 928300-0775
Stella Vasquez	7/15/17	75 Arroyo Dr 928 301-5045
Mark Navarro	7/15/17	75 Arroyo Dr 928 2823700
James Cathell	7/15/17	545 El Camino Rd
Chris Redish	7/15/17	credish@aol.com 180 Carol Canyon Dr.
Carl Dalio	7/15/17	210 Table Top Rd 7209885348
Linda Henry	7/15/17	210 Table Top Rd. Lhenry sedona Cgmail

Back to Staff Report

Save Arroyo Pinon and El Camino from Cell Phone Tower !

Name	Date	Address & Email or phone #
David Sunfellow	06/24/17	325 Arroyo Pinon Drive
"	"	david.sunfellow@gmail.com 928-592-2732
John Dean	7/15/17	100 Hillside Ct (928) 301-4155
Mary Kay Egan	7/15/17	305 El Camino 282-5515
[signature]	7/15/17	305 EL CAMINO RD 282-5515
Sandra Baldwin	7/15/17	400 El Camino Rd. 928-274-1078
Jan Bradley	7/15/17	400 EL CAMINO 970-209-7159
[signature]	7/15/17	114 Deer Trail Lilhuman@cox.net
[signature]	7/15/17	311 DEER TRL DR. 9282244667
PEGGY DICKISON	7/15/17	165 TABLETOP RD. 282-3714
Cheryl Fleet	7/15/17	200 Carol Canyon 282-0916
Patricia Bronstein	7/15/17	200 Carol Canyon 301-0257 1585
Regina Maja Mueller Bronstein	7/16/17	503 El Camino Rd 928 821 1187
Gerald Bronstein	7/16/17	503 El Camino Rd 928-821-2743
[signature]	7/17/17	430 Arroyo Pinon Dr 928 351-7472

Back to Staff Report

Save Arroyo Pinon and El Camino from Cell Phone Tower !

Name	Date	Address & Email or phone #
SHIRA GELLER	6/24/17	275 EL CAMINO RD SHIRA@LARRYGELLER.NE
Leanne Marco	6/24/17	310 El Camino - ~~602~~ 928 - 554-1470
Joseph Cosgrave	6/24/17	310 El Camino 602 550-7735
Fred Wight	6/24/17	315 El Camino 928-821-5480
Kimberly Wight	6/24/17	315 El Camino 928-300-0452
Laura Vida	6/24/17	421 El Camino Rd 300-0180
Jeffrey Klistenicz	6/24/17	421 El Camino Rd
Lucinda Evans	6/24/17	485 El Camino Rd 928-862 2812
Diana Shiloh	6/24/17	100 El Camino Rd 300 2267
Michael deKoning	6/24/17	140. El. Camino Rd. 847/257/5287
Jeff McGrath	6/24/17	35 Arroyo Drive 928.301.4060

Back to Staff Report

Save Arroyo Pinon and El Camino from Cell Phone Tower !

Name	Date	Address & Email or phone #
Doug Wade	6/24/17	360 Arroyo Pinon 928 300 1370
Cristina Wade	6/24/17	360 Arroyo Pinon 928 300 6070
Frank Fowsky	06-24-2017	405 Arroyo Pinon Dr. 214-708-7580
Becky "	"	"
Doug Copp	6-24-17	230 Arroyo Pinon Dr
Carol Copp	6-24-17	230 Arroyo Pinon Dr.
Susanna Bear + child	6-24-17	260 Arroyo Pinon Dr. 808-634-0957

Back to Staff Report

Save Thunderbird Hills, Whippet, Stutz Bearcat, Road Runner, Hummingbird, Blue Jay, Canyon Wren, Prairie Falcon, Timber Owl and Golden Eagle, from Cell Phone Tower!

Name	Date	Address & Email or phone #
Ann Carpenter	6-15-17	170 Hummingbird Ln
Galen Carpenter	6-15-17	170 Hummingbird Ln.
CHERYL FULLER	6-17-17	210 Stutz Bearcat
BRIAN FULLER	6-17-17	210 STUTZ BEARCAT
KATHY RUDD	6-17-17	45 FARMER BROS. RD
DAVID RUDD	6-17-17	45 FARMER BROS RD
Pamela Richards	6-17-17	25 Blue Jay
RAMAZAN MENEKSE	06.17.17	95 ALLOYO DR.
Kendra Mark	06/18/17	130 Canyon Wren Dr.
David Castelli	06/18/17	130 Canyon Wren Dr.
Adam DaVirro	6/18/17	30 Emerald Ct.
ANDY BONNETT	6/18/17	255 PAGE PARKWAY
Austin Gates		DUSTIDENT014@GMAIL.COM
" "	6/18/17	95 Roadrunner Rd
Christina Verquer	6/18/17	175 Canyon Wren Dr
Aneela Mahmud	6-18-17	2610 Whippet Way
Lesa Peterson	6-18-17	70 Essex Ave Sedona AZ
MELODY MILLER	6/18/17	125 GOLDEN EAGLE DR
Robt Elschner Enterprises @ panara.net	6/18/17	125 Golden Eagle Dr. SEDONA, AZ

928 554 4089 6-18-17 125 GOLDEN EAGLE

MONICA RICETTO

Graham Innskeep 6-18-17 125 Golden Eagle

Marc Maddux 6/18/2017 145 Golden Eagle
(5 Lisa Ln) marc.maddux@yahoo.com
(928)301-7716

Keri Oskar 6/18/17 sunshineker@gmail.com

Pamela Malone 6/18/17 190 west Hummingbird

JOU MARIA MINASSIAN 30 ROLLS RD SEDONA AZ 86336

Sin Dhora 6-18-17 190 west Hummingbird
sedonatinny@gmail.com

* Back side of Previous Page

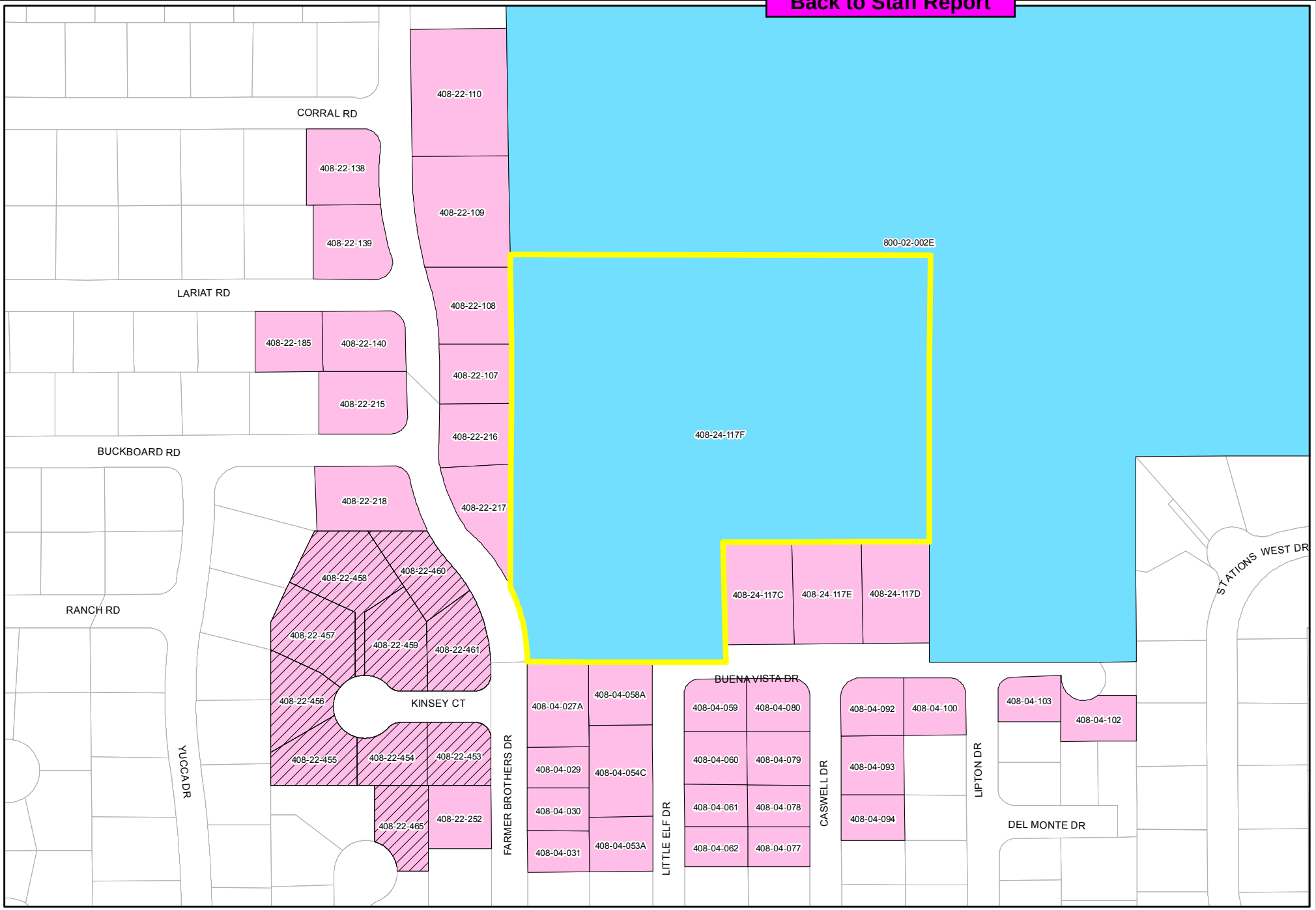
Back to Staff Report

Back to Staff Report

Save Thunderbird Hills, Whippet, Stutz Bearcat, Road Runner, Hummingbird, Blue Jay, Canyon Wren, Prairie Falcon, Timber Owl and Golden Eagle, from Cell Phone Tower!

Name	Date	Address & Email or phone #
Greg Van Dam	6/15/17	40 Blue Jay Dr.
Jerry Austin	7/18/17	20 Hummingbird Ln
[illegible]	7/18/17	25 70 Timber Owl
Rachel Grant	7/18/17	2570 Timber Owl
Veronica Swallow	7-18-17	190 hummingbird lane
Ron Whipple##	"	95 Canyon Wren Dr
Marlene McCoy	7/19/17	10 N Hummingbird Ln
Barry McCoy	"	"
Paula Starcher	"	"
Gary Corey Damaskos	7/18/17	mgary@gmail.com 80 Roadrunner Rd
Mara Davis	7/18/17	80 Roadrunner Rd.
Ed Cruz	7/18/17	105 Blue Jay Dr.
RDK	7/18/17	125 Blue Jay Dr.
Eli Bachar	7-18-17	125 Blue Jay Dr.
Josh Bachar	7-18-17	125 Blue Jay Dr.

Back to Staff Report



SITE A1

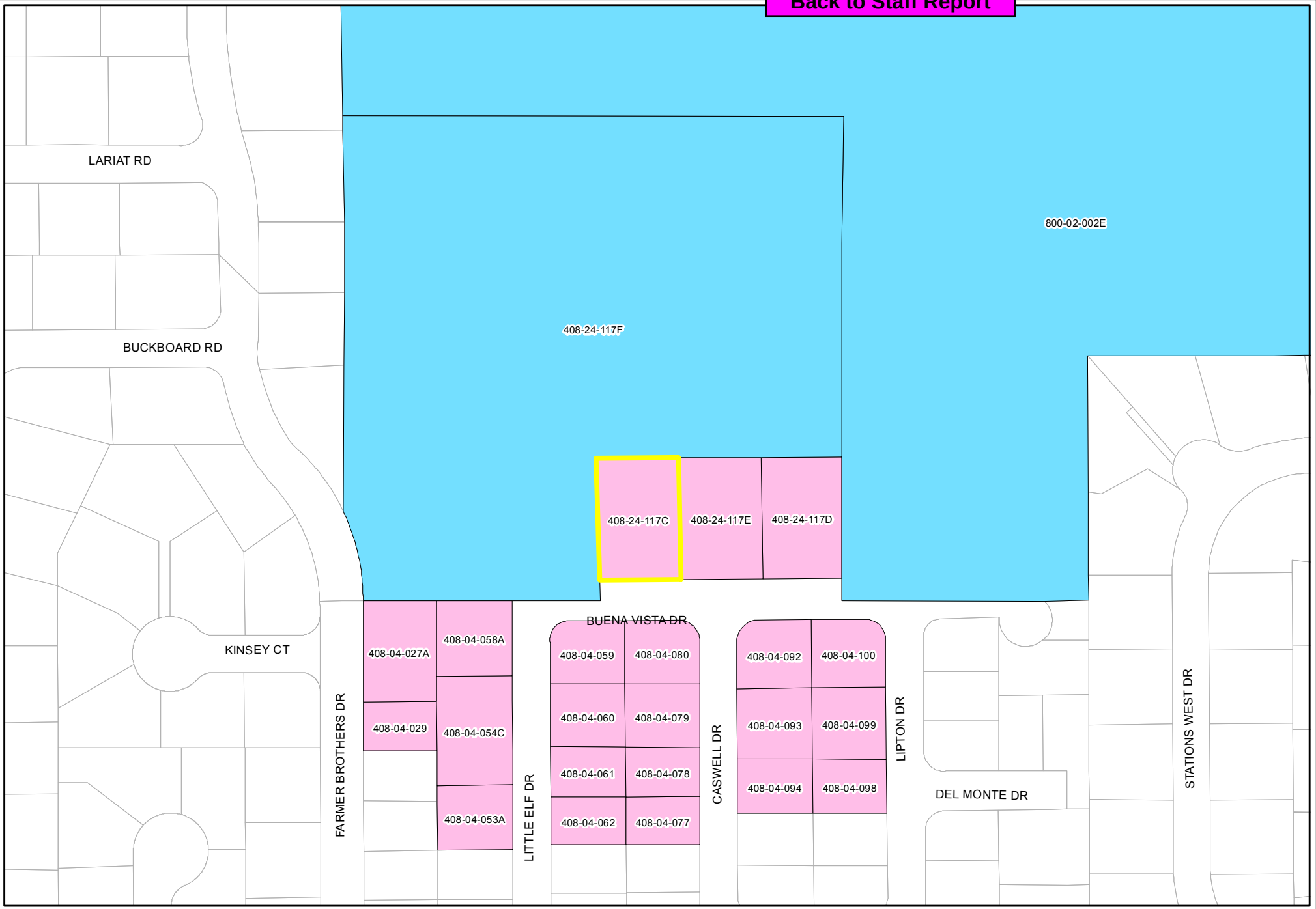
- Site A1
- Parcels within 300ft
- Parcel Boundary
- Residential (47)
- Non-Residential (2)
- Vacant (10)

0 112.5 225 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/06/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



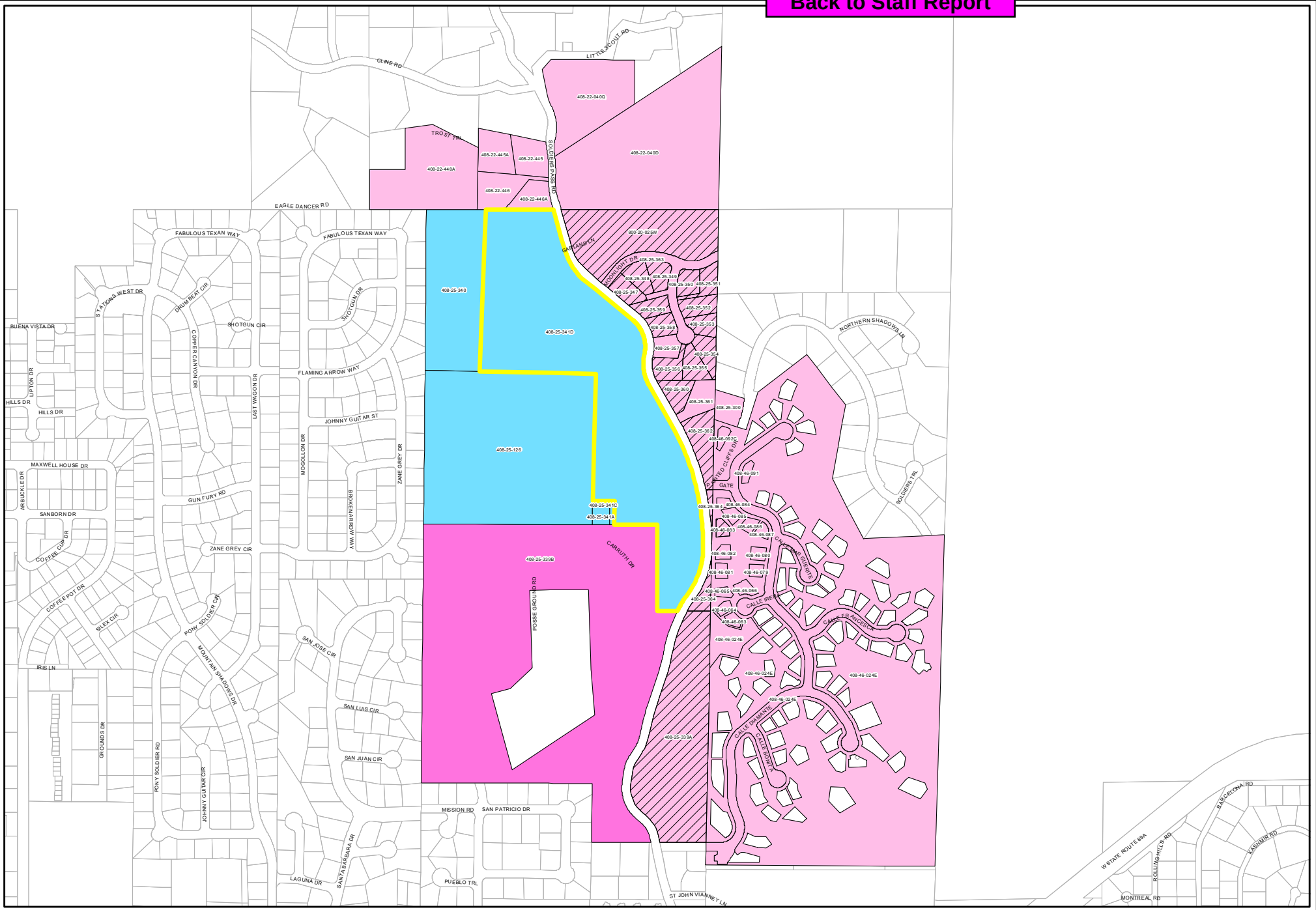
SITE A2

- Site A2
- Parcels within 300ft
- Parcel Boundary
- Residential (22)
- Non-Residential (2)

0 90 180 Feet

N

Back to Staff Report



SITE B2

- Site B2
- Parcels within 300ft
- Parcel Boundary

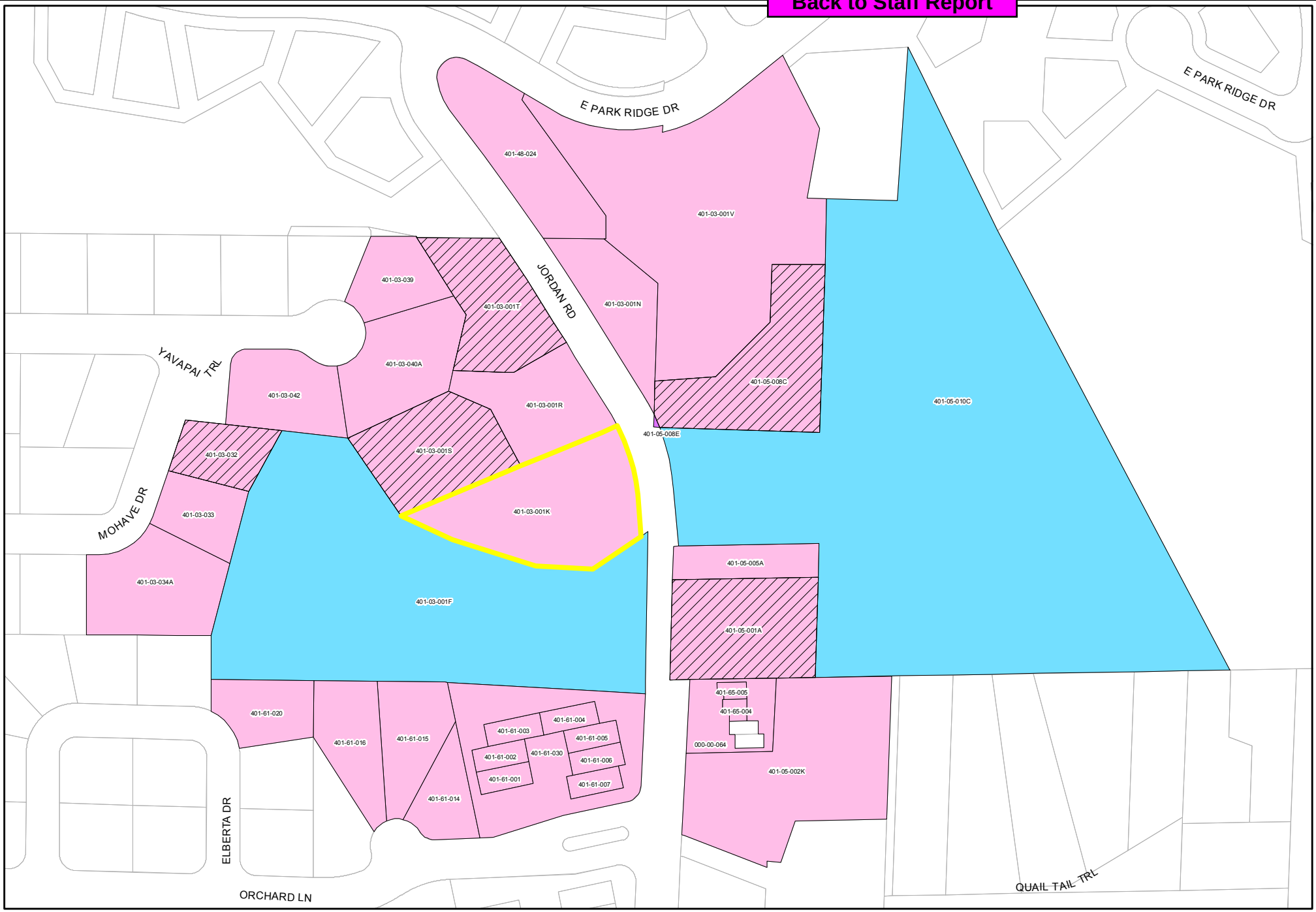
- Residential (48)
- Residential / Non-Residential (1)
- Non-Residential (5)
- Vacant (19)

0 400 800 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/06/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE C6

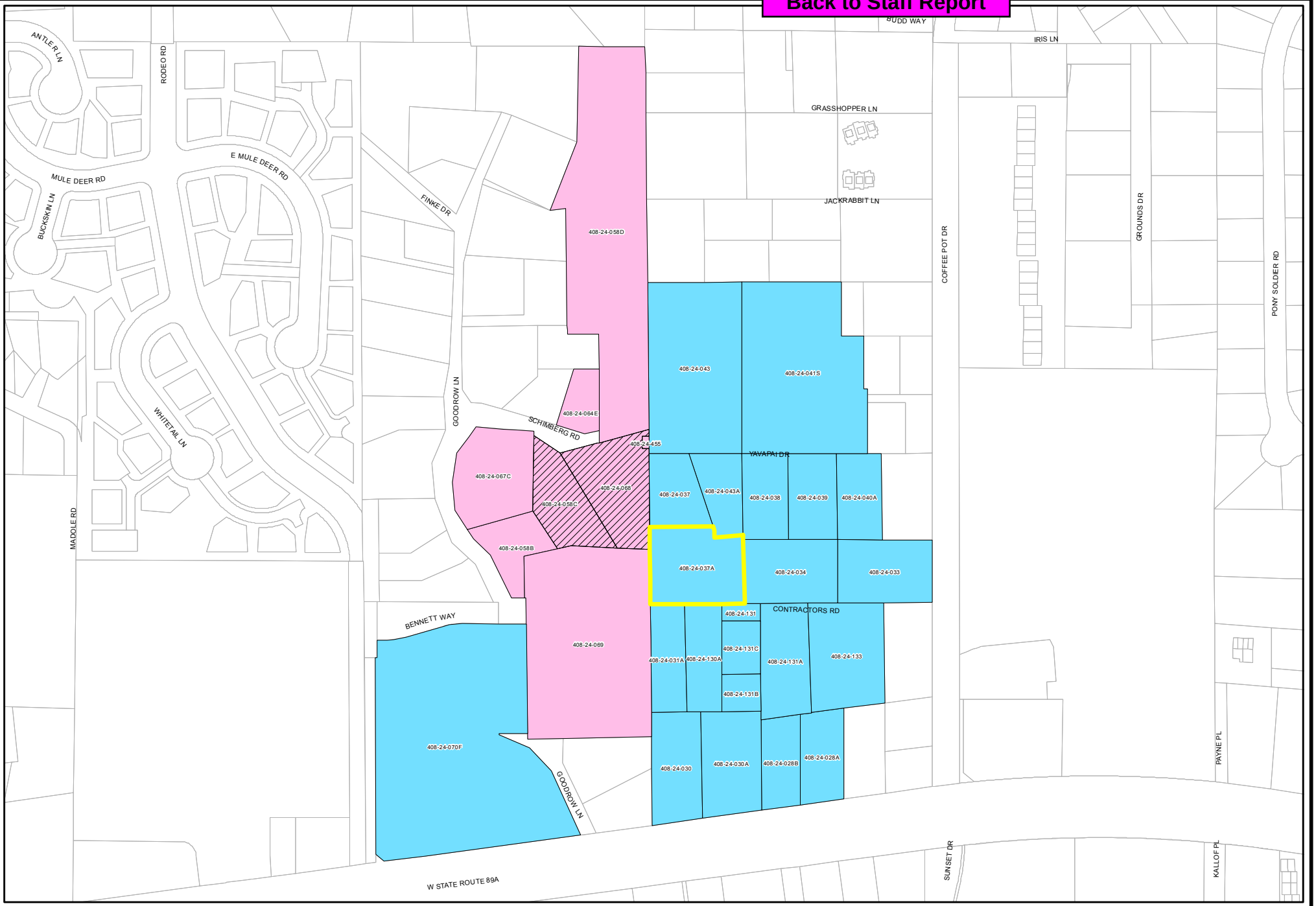
- Site C6
- Parcels within 300ft
- Parcel Boundary
- Residential (32)
- Residential / Non-Residential (1)
- Non-Residential (2)
- Vacant (5)

0 105 210 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/06/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE D

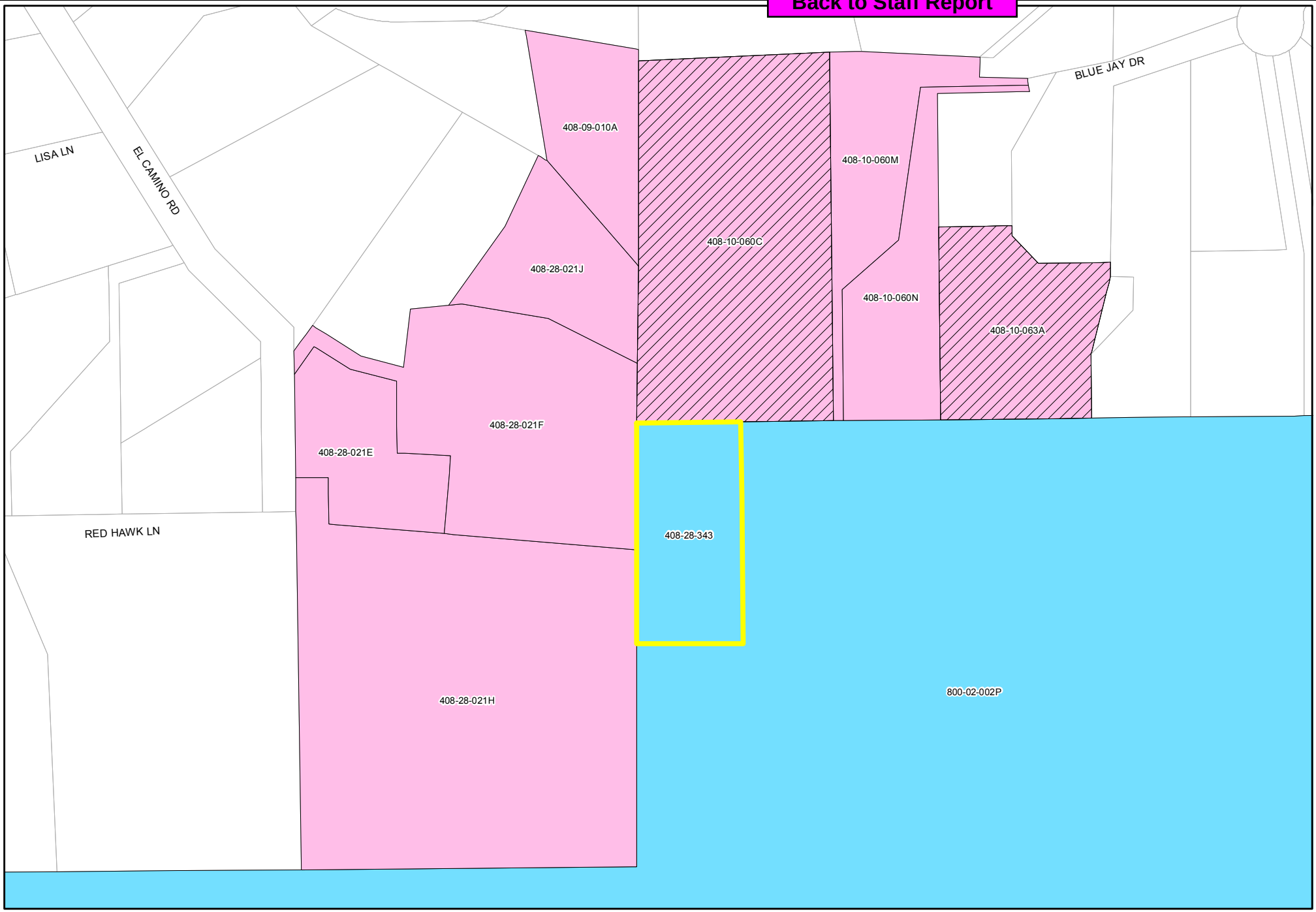
- Site D
- Parcels within 300ft
- Parcel Boundary
- Residential (8)
- Non-Residential (22)
- Vacant (2)

0 162.5 325 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/06/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE E1

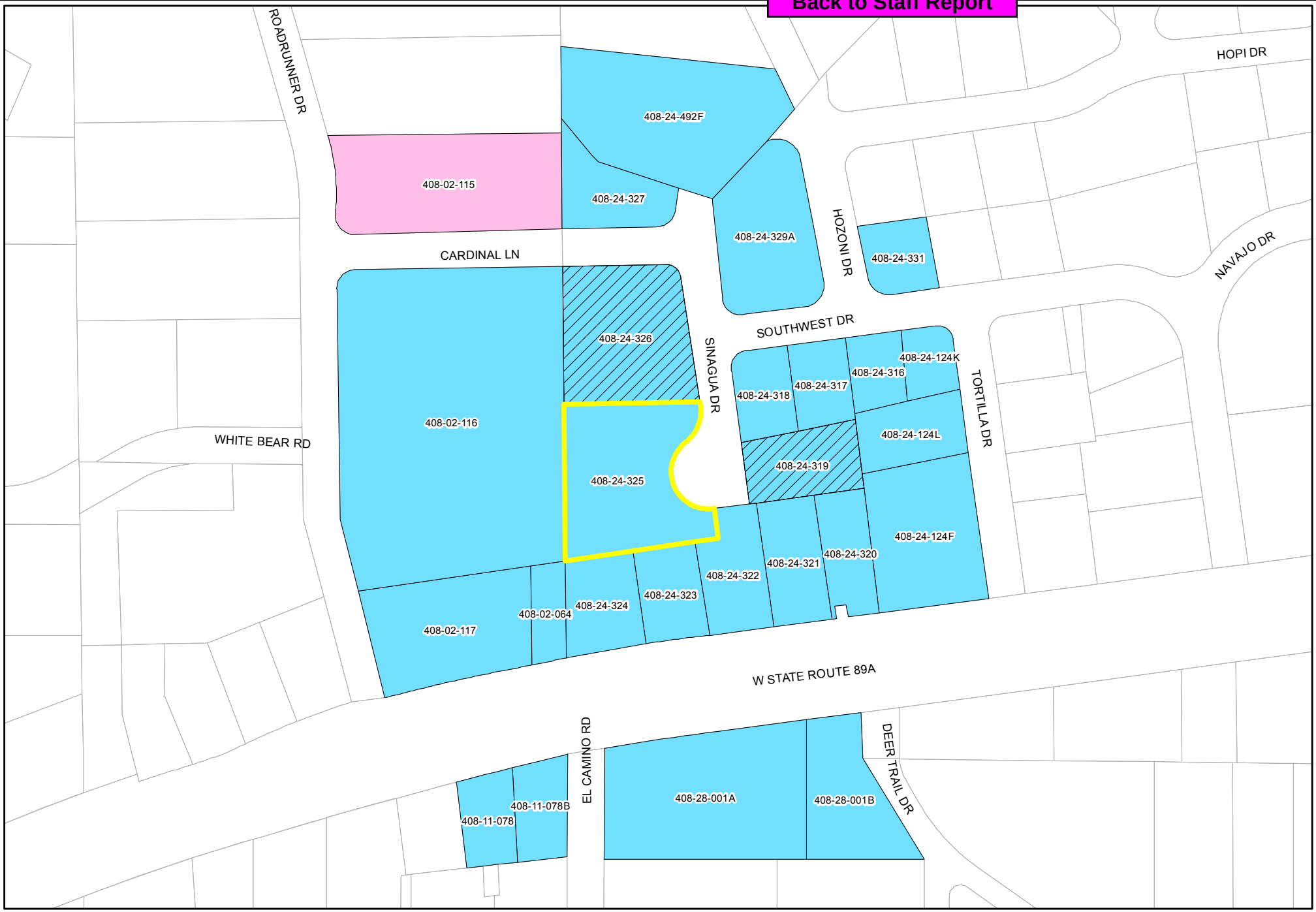
- Site E1
- Parcels within 300ft
- Parcel Boundary
- Residential (9)
- Non-Residential (2)
- Vacant (2)

0 105 210 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/06/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



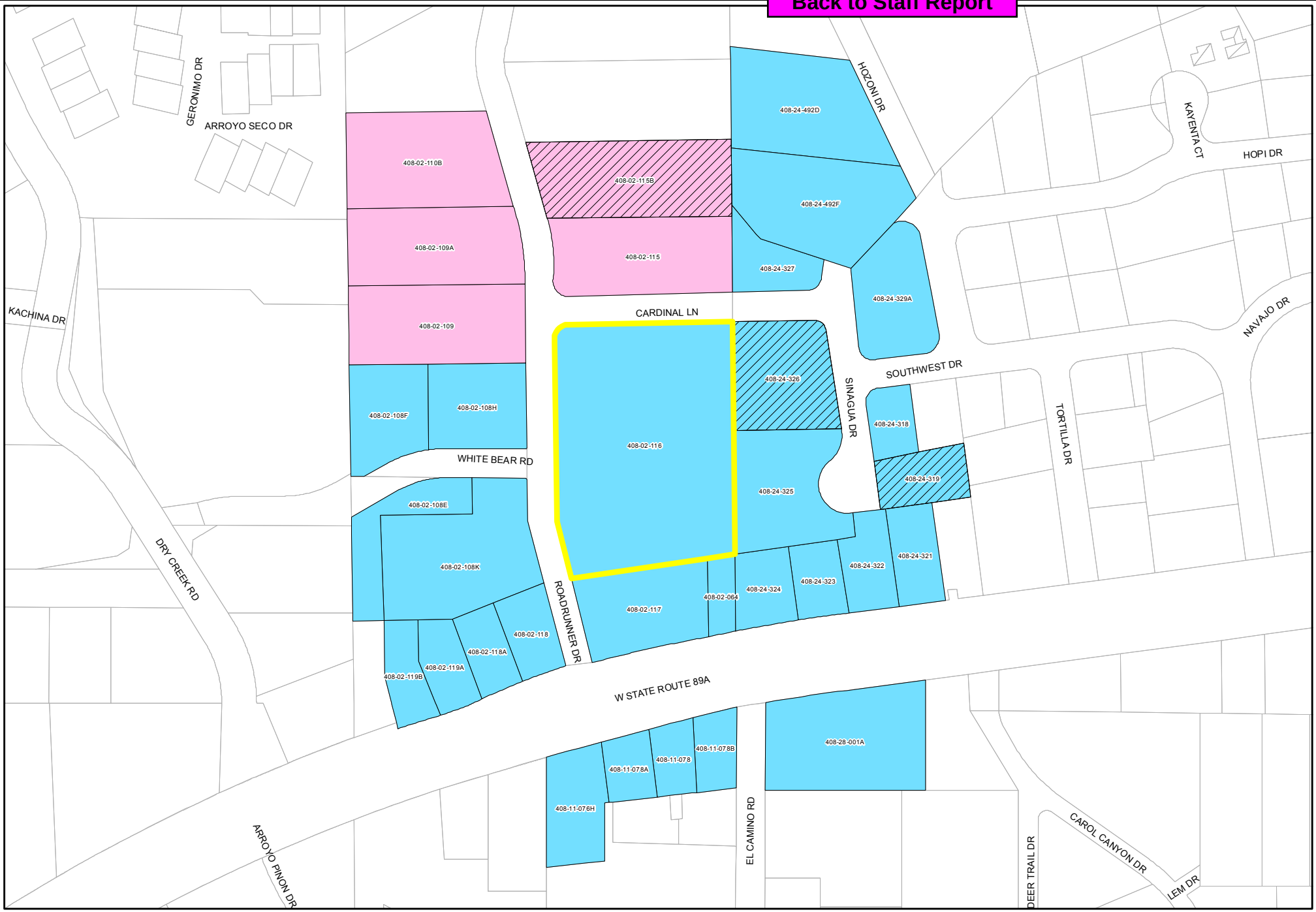
SITE F2

- Site F2
- Parcels within 300ft
- Parcel Boundary
- Residential (1)
- Non-Residential (25)
- Vacant (2)

0 95 190 Feet

N

Back to Staff Report



SITE F3

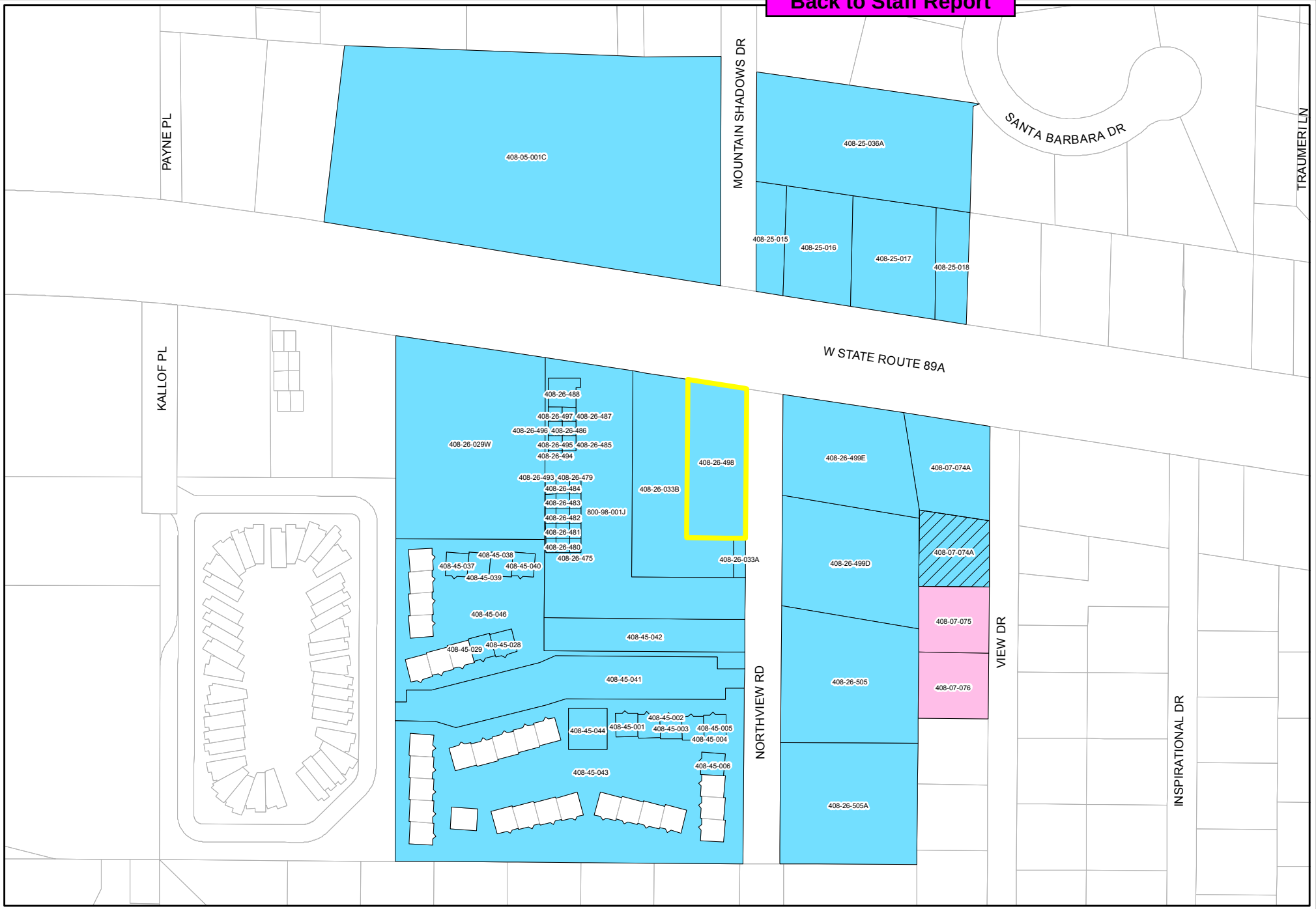
- Site F3
- Parcels within 300ft
- Parcel Boundary
- Residential (5)
- Non-Residential (28)
- Vacant (3)

0 120 240 Feet

N

GIS, City of Sedona. 06/06/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report

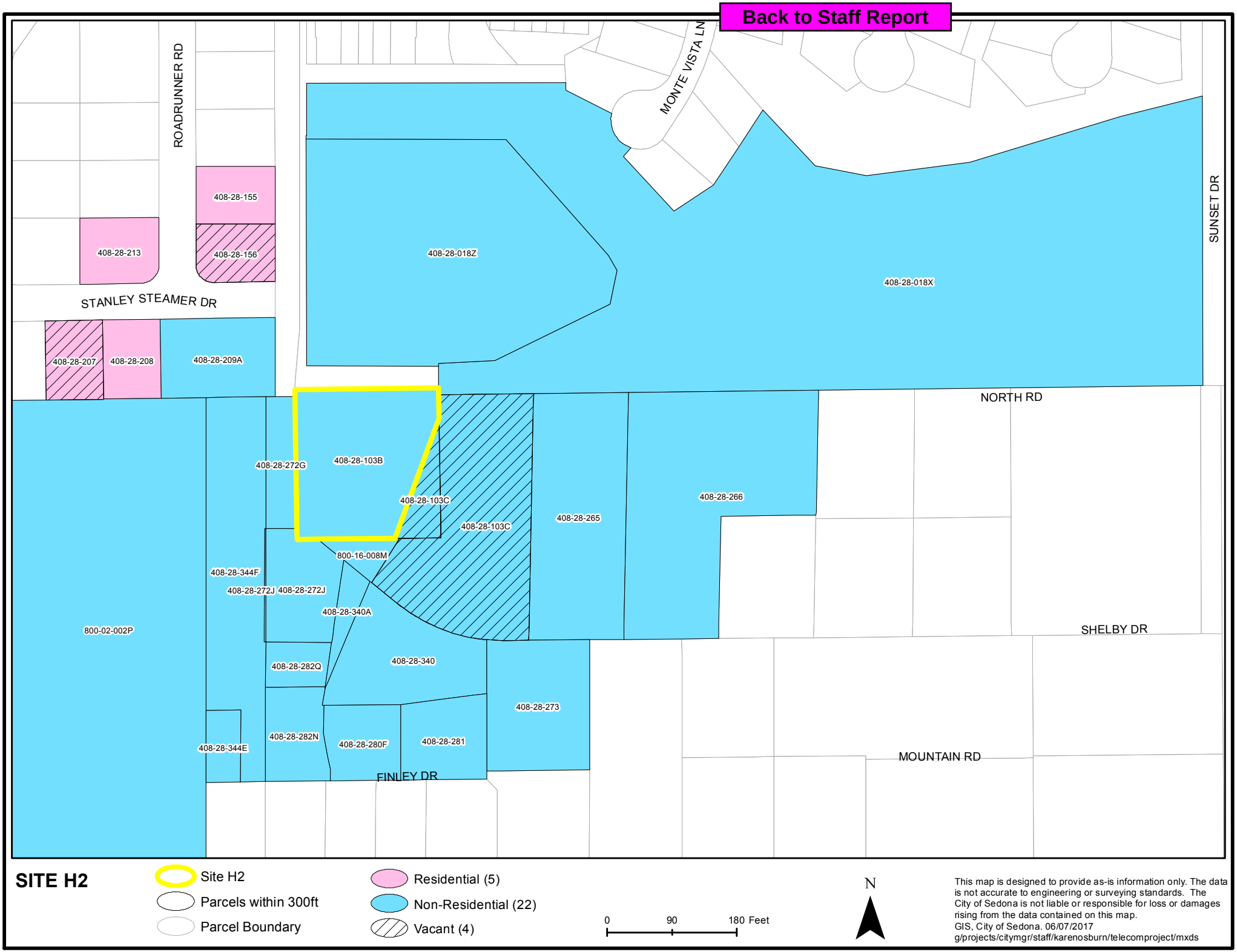


SITE G

- Site G
- Parcels within 300ft
- Parcel Boundary
- Residential (2)
- Non-Residential (57)
- Vacant (1)

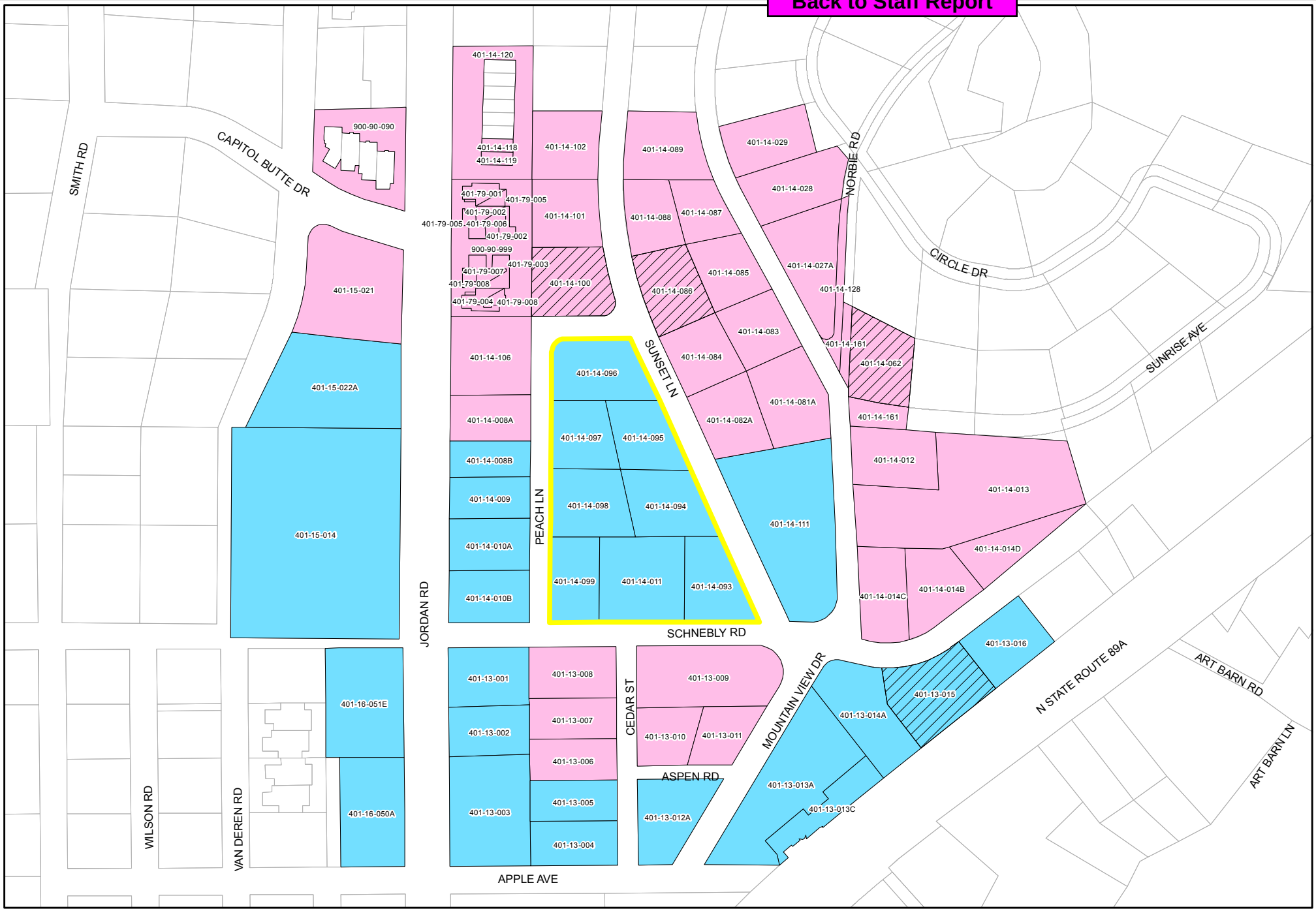
0 95 190 Feet

N



This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE J1

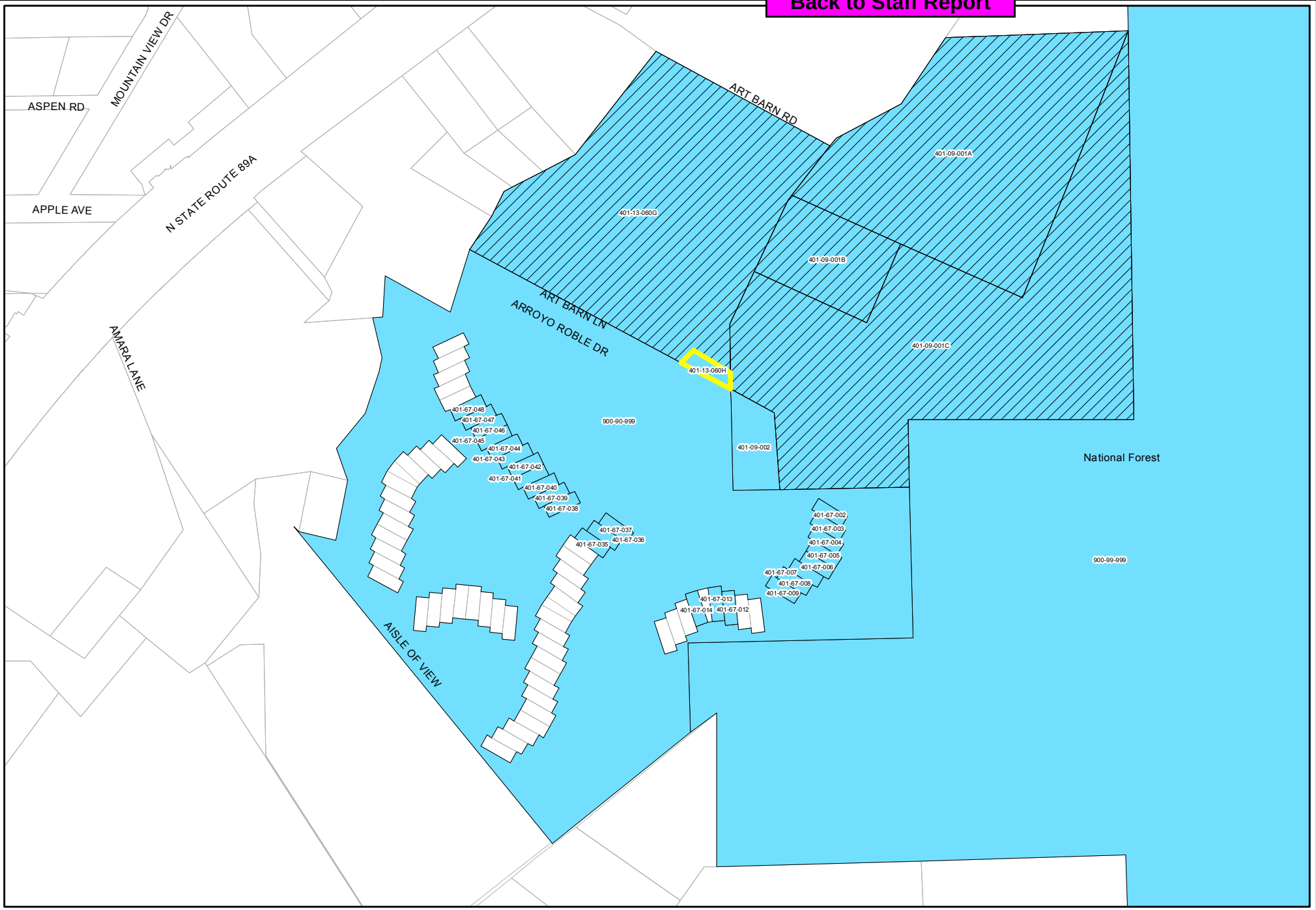
- Site J1
- Parcels within 300ft
- Parcel Boundary
- Residential (46)
- Non-Residential (28)
- Vacant (4)

0 100 200 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE J2

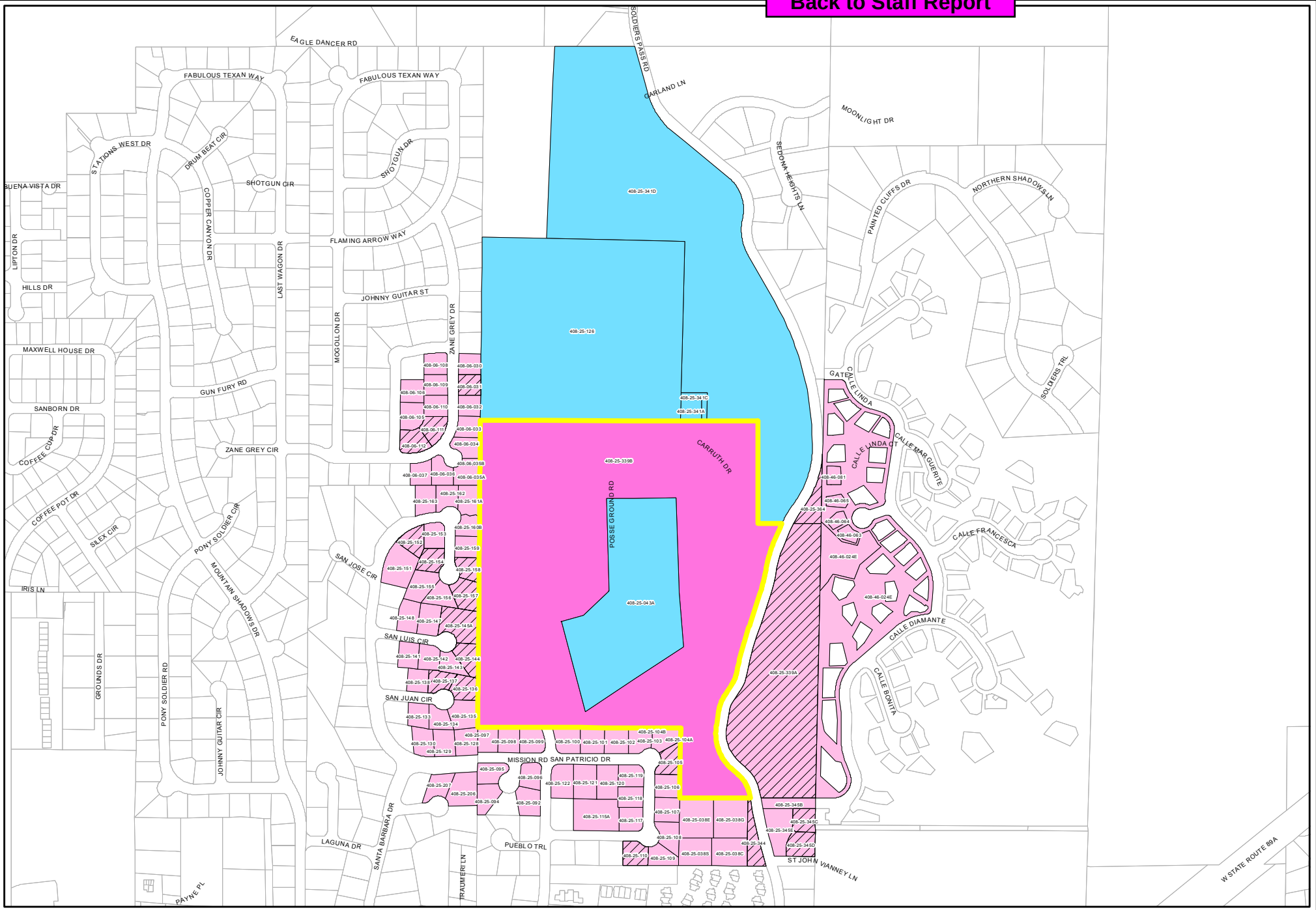
- Site J2
- Parcels within 300ft
- Parcel Boundary
- Non-Residential (33)
- Vacant (4)

0 100 200 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE K

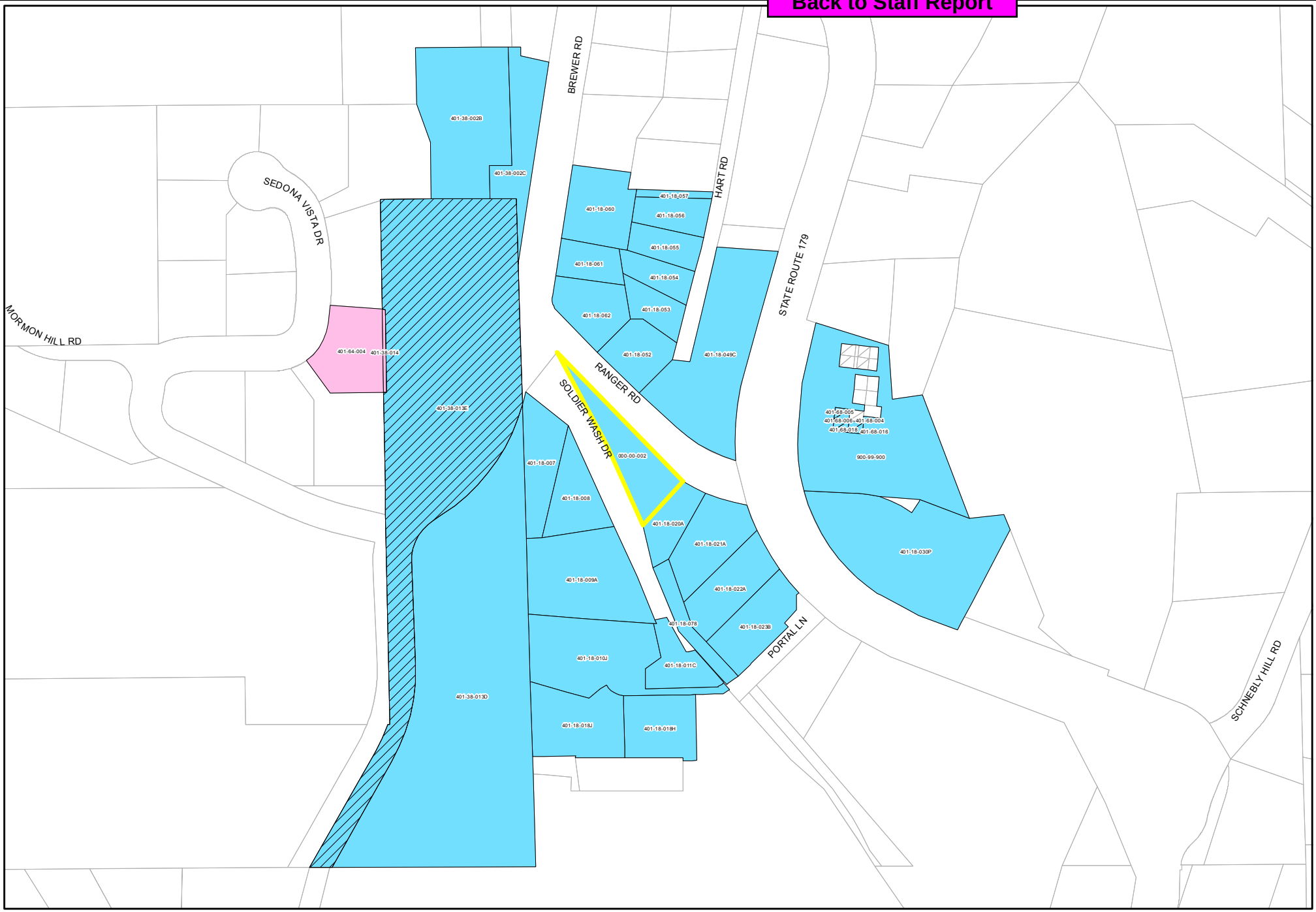
- Site K
- Parcels within 300ft
- Parcel Boundary
- Residential (91)
- Residential / Non-Residential (1)
- Non-Residential (5)
- Vacant (18)

0 337.5 675 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE L1

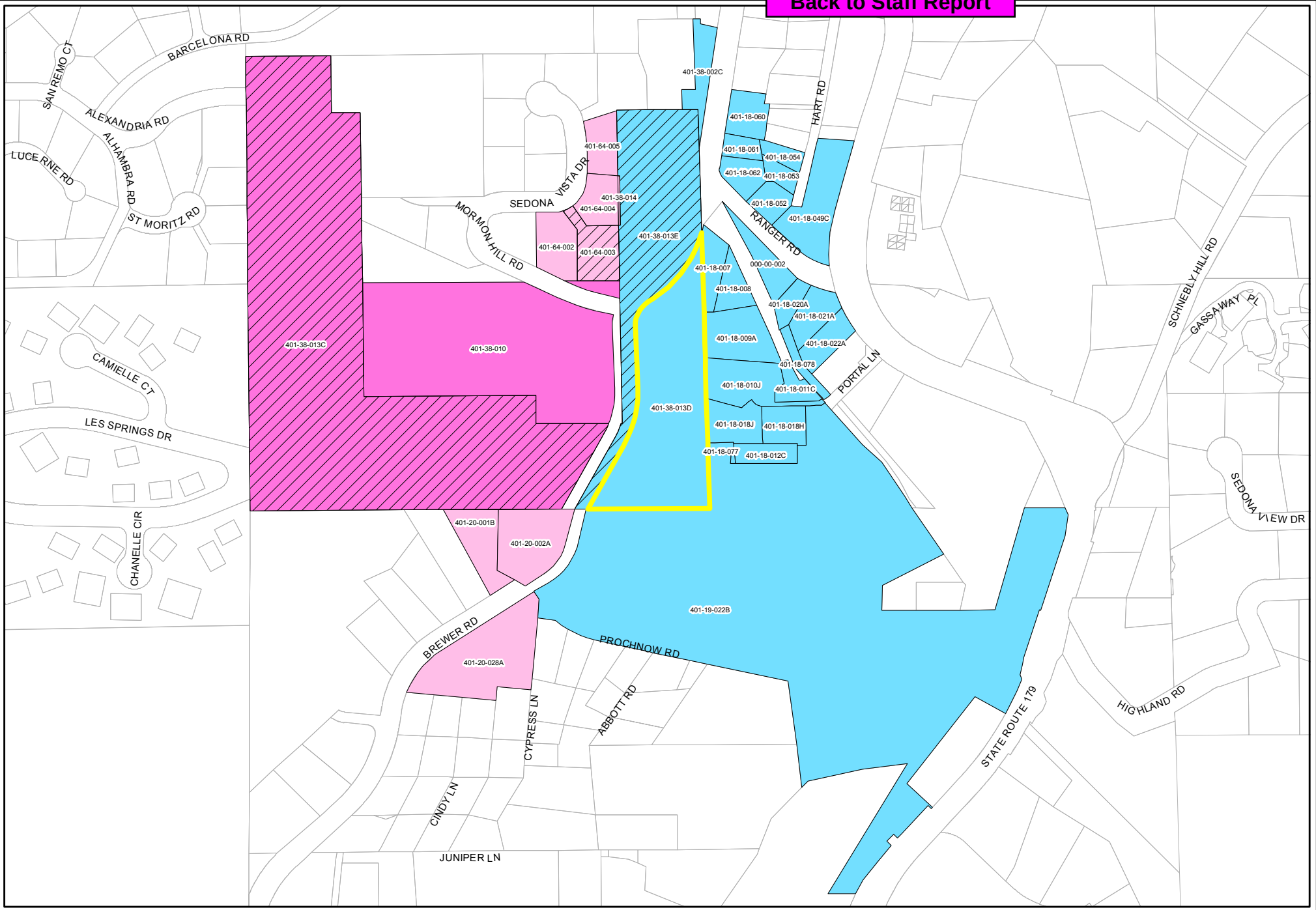
- Site L1
- Parcels within 300ft
- Parcel Boundary
- Residential (2)
- Non-Residential (35)
- Vacant (1)

0 120 240 Feet

N

GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE L2

- Site L2
- Parcels within 300ft
- Parcel Boundary

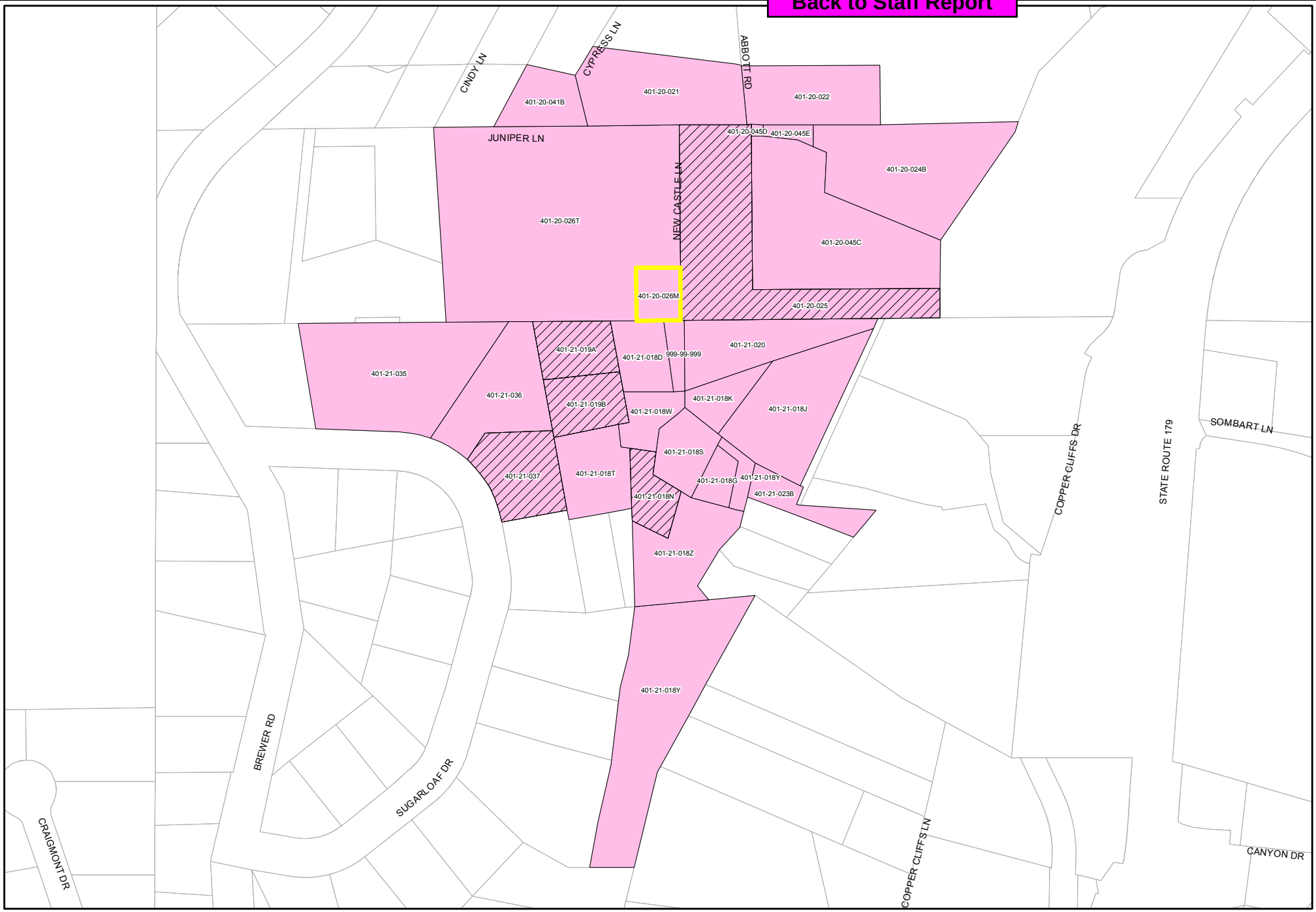
- Residential (8)
- Residential / Non-Residential (2)
- Non-Residential (25)
- Vacant (3)

0 200 400 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE M

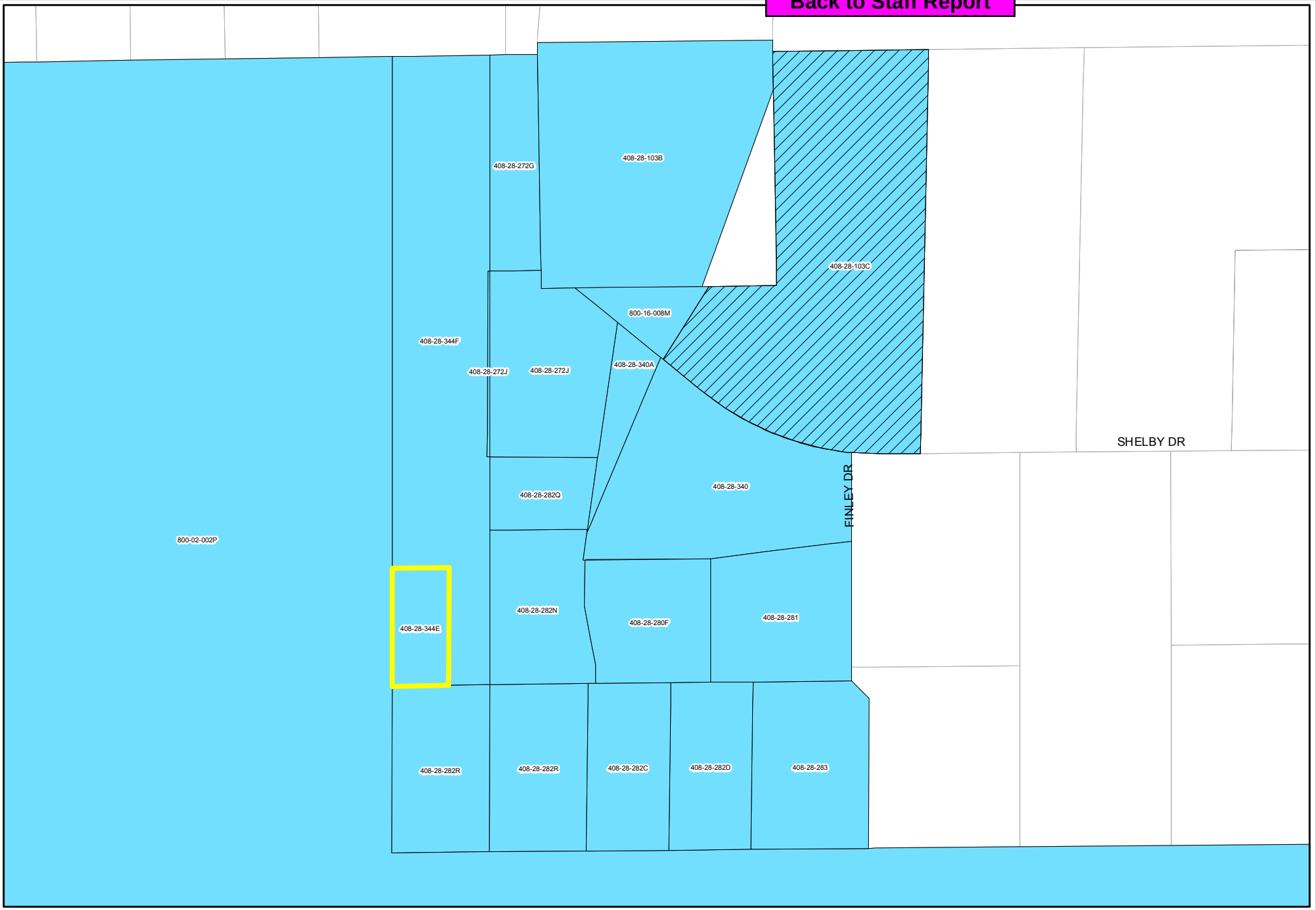
- Site M
- Parcels within 300ft
- Parcel Boundary
- Residential (28)
- Vacant (5)

0 120 240 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE N

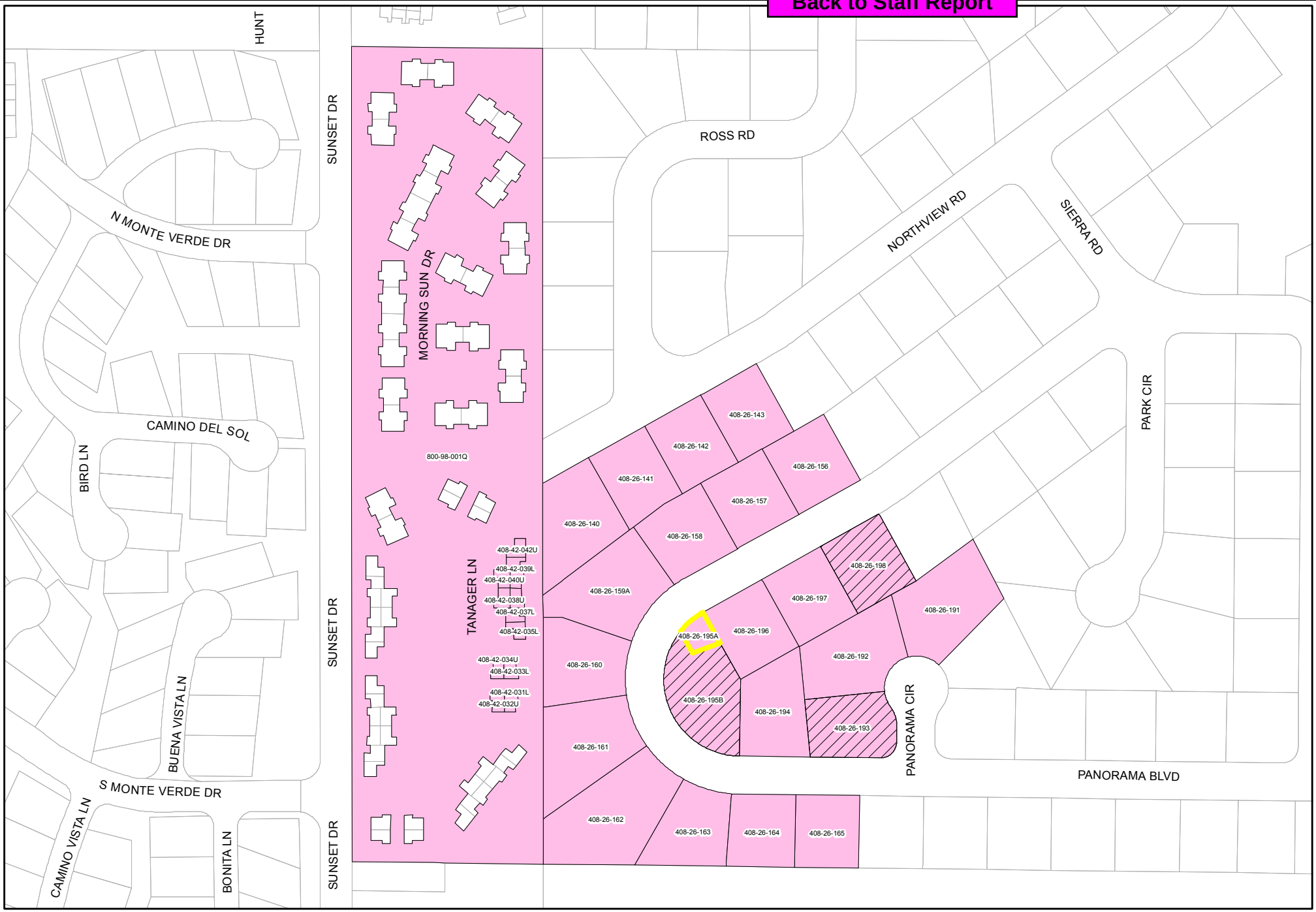
- Site N
- Parcels within 300ft
- Parcel Boundary
- Non-Residential (20)
- Vacant (1)

0 60 120 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE O

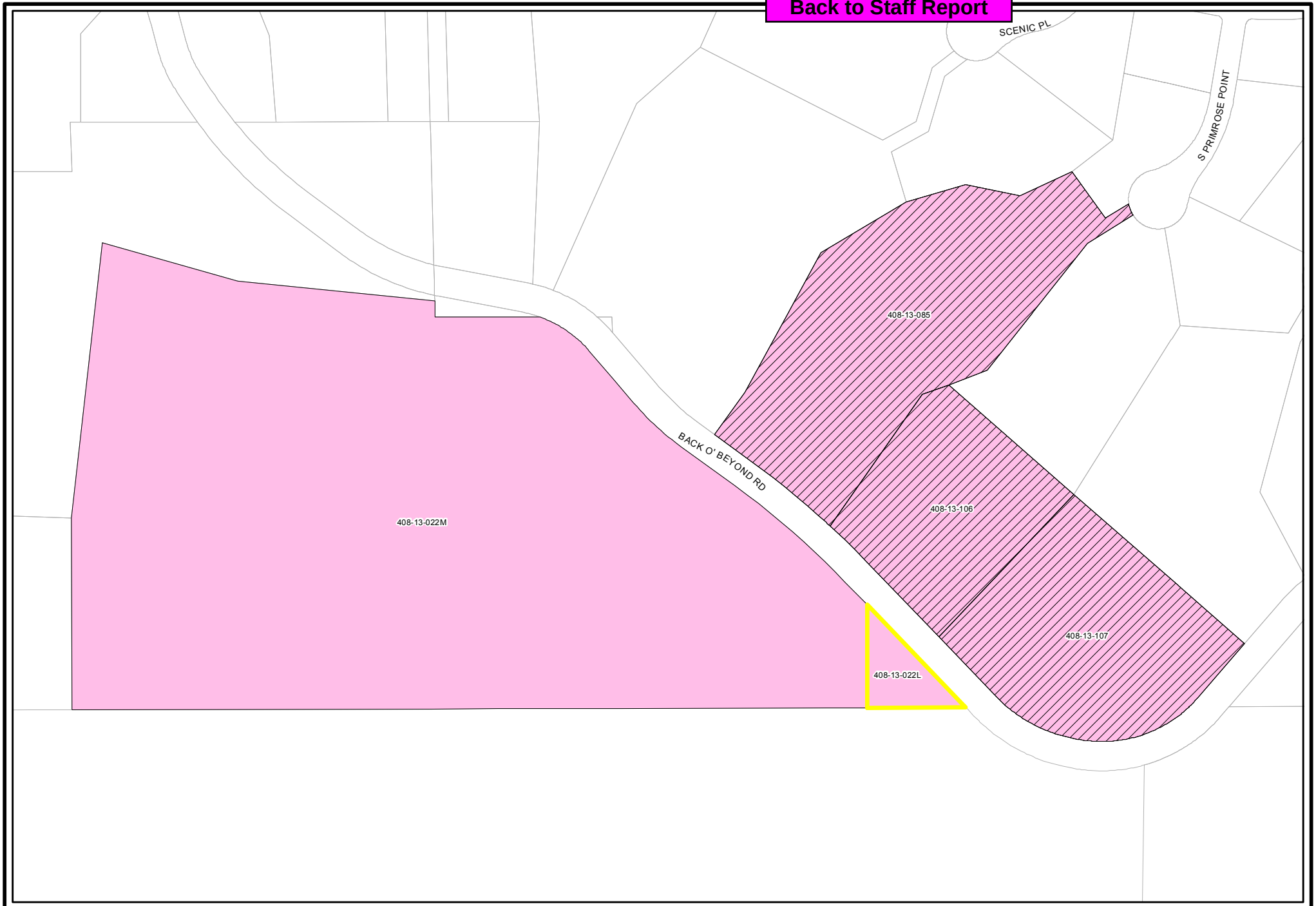
- Site O
- Parcels within 300ft
- Parcel Boundary
- Residential (36)
- Vacant (3)

0 110 220 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report



SITE P

Site P
Parcels within 300ft
Parcel Boundary

Residential (5)
Vacant (3)

0 115 230 Feet

N

This map is designed to provide as-is information only. The data is not accurate to engineering or surveying standards. The City of Sedona is not liable or responsible for loss or damages rising from the data contained on this map.
GIS, City of Sedona. 06/07/2017
g/projects/citymgr/staff/karenosburn/telecomproject/mxds

Back to Staff Report

Summary Minutes
City of Sedona
Planning & Zoning Commission Meeting
Council Chambers, 102 Roadrunner Drive, Sedona, AZ
Thursday, June 1, 2017 - 3:30 p.m.

1. CALL TO ORDER & ROLL CALL

Commissioner Barcus, as Acting Chair, called the meeting to order at 3:30 p.m.

Roll Call:

Planning & Zoning Commissioners Present: Commissioners Randy Barcus, Eric Brandt, Avrum Cohen and Larry Klein. Chair Marty Losoff and Vice Chair Kathy Levin were excused and Commissioner Mayer was unexcused.

Staff Present: Warren Campbell, Roxanne Holland, Audree Juhlin, Cari Meyer, Karen Osburn, Robert Pickels and Donna Puckett

Councilor(s) Present: Mayor Sandy Moriarty, Vice Mayor John Martinez and Councilor Scott Jablow

2. ANNOUNCEMENTS & SUMMARY OF CURRENT EVENTS

There were no announcements.

3. APPROVAL OF THE FOLLOWING MINUTES:

a. April 18, 2017 (R)

Commissioner Barcus indicated that the Commission needed to approve the minutes of April 18th, and Commissioner Klein noted that he may not have been present, so there may not be a quorum to vote; however, Robert Pickels explained that you do not need to have been present to vote.

MOTION: Commissioner Cohen so moved. Commissioner Klein seconded the motion. Motion carried, four (4) for and zero (0) opposed. Chair Losoff and Vice Chair Levin were excused and Commissioner Mayer was unexcused.

4. PUBLIC FORUM: *(This is the time for the public to comment on matters not listed on the agenda. The Commission may not discuss items that are not specifically identified on the agenda. Therefore, pursuant to A.R.S. § 38-431.01(H), action taken as a result of public comment will be limited to directing staff to study the matter, responding to any criticism, or scheduling the matter for further consideration and decision at a later date.)*

Commissioner Barcus opened the public forum and, having no requests to speak, closed the public forum.

5. CONSIDERATION OF THE FOLLOWING ITEMS THROUGH PUBLIC HEARING PROCEDURES:

a. Discussion/possible action regarding a recommendation to the Sedona City Council regarding amendments to the Sedona Wireless Communications Facilities Ordinance, Sedona Land Development Code, Article 17, Wireless Communications Facilities, to be consistent with changes in federal regulations.

Commissioner Barcus read agenda item 5.a above and asked Karen Osburn if she wanted to open the discussion.

Presentation, Karen Osburn: Karen explained that she wanted to start by revisiting why this planning process was initiated, what some of the goals are, and follow-up on how things have

changed with the new Arizona law, which allows wireless to locate in the City's rights-of-way and does impact this planning process. Karen then introduced Anthony Lepore, Director of Regulatory Affairs and Susan Rabold, Project Manager, with CityScape and indicated that they will also give a brief presentation.

Karen explained that despite the speculation over the City's motives for undertaking this effort, it was done in an attempt to be proactive and to get in front of and direct the wireless industry as they build out their network in Sedona. The Plan was developed to ensure we get improved service while protecting Sedona's visual beauty. We know that the wireless industry will need to expand their coverage in Sedona, and at some point, they also are going to need to deploy new technology.

Karen acknowledged that we have heard from residents who claim that their service is adequate and no infrastructure is needed, but we have also heard from residents who are concerned about the lack of coverage, the speed and the capacity. CityScape did do propagation mapping and found existing gaps, and there were quite a few of them. They also projected what is going to happen with the demand, and as that continues to increase, there will be more need for additional capacity, plus there are the new technologies, which Ms. Rabold and Mr. Lepore will talk more about, but the new technologies are coming and the industry will want to add that new infrastructure as well.

Karen indicated that the Plan is an effort to allow that infrastructure to come to Sedona with the least negative impact to the community and to ensure that the infrastructure is well concealed, fits with the landscape and preserves the natural beauty as much as possible. We do have to allow the infrastructure to come in. We don't have to put it on City property, but the Federal Government says that we have to allow it if the carriers need it to provide service to their customers. If we don't select any sites for the providers, they will negotiate leases with private property owners, and they will go where they decide to go, so we take our chances. Those might be appropriate sites, but they may not be. We also know that if we are the landlord, we can dictate much stricter terms on where they are built, what types are built, the heights, size, etc., than if we are simply serving as the regulatory agency reacting to the application, when they have already negotiated their leases and they are just bringing in an application for approval.

Karen stated that as far as the 20 city-owned sites, if any of them are included in the Plan, that means that if a company wants to put a facility in that area, there are some already vetted locations, where if they follow specific appearance and size requirements, and all of the other things stipulated in the Plan, it will be an easier approval process for them, which is time and money to the industry, so that really means something to them. We are trying to incentivize them into going where we prefer and for them to look the way we want.

Karen also wanted to make it clear, since this is a point of confusion, that we have no applications and we haven't even talked to any providers about any of the sites. The City is in no way driving these things to be built, we are really just trying to get ahead of those providers that we know are going to come. The facilities are only going to be built if the cell phone providers need the infrastructure to provide that service in those specific locations, and maybe they will want to go there and maybe they won't. CityScape did the best job they could to make those educated predictions about where the gaps are and where the industry will need to go, but none of us have a crystal ball, so we don't know for sure.

Karen explained that with no plan in place and no city-owned sites to offer, a wireless provider can put a tower in whatever location they would like, as long as they have the property owner's approval and it meets our zoning and building code requirements, so that is why we wanted to develop the Plan with city-owned options included. With that being said, since the last meeting, our City Attorney Robert Pickels has spent a great deal of time trying to further understand and obtain clarification on the new House Bill 2365, which is now law in Arizona. To interpret what that means for us, if the City had known that this was coming and the Arizona Legislature was going to bring this out, introduce it and approve it into law, we probably wouldn't have embarked on this planning

effort, because it makes what we are offering the industry, that expedited planning process if they go where we want, etc., something that the industry no longer needs with this new law. The law says that wireless providers or even speculative infrastructure developers, which are the tower companies, can site towers in the City's rights-of-way by right without public process, and the City must give them a right-of-way permit to do it within 20 days of them submitting a complete application. There are some public safety requirements that we can build in, because we are going to have to put a new part of our City Code together to address this, so for things like public safety and appearance, we can stipulate things around that, but the towers could be 40 ft. to 50 ft. tall with an automatic ability, once they are in place, to extend them another 10 ft. under the federal law, and just to put that into perspective, most of our city streets are about 50 ft. wide and about 24 ft. of that is the street, so about 13 ft. on either side of most city streets is the right-of-way, and anywhere within that 13 ft. on either side of the street is fair game for the wireless towers. If the Plan is now only applicable if the industry wants to defer to our desired sites, there will be some who can't do what they need to do in the right-of-way and will still need a different location or opportunity to place their infrastructure. That will still apply and the Plan will still be useful in that context, but they are going to want to first exhaust every opportunity to go in the rights-of-way, because it is quick, easy and virtually free to them.

Commissioner Klein asked if this is an Arizona bill or a federal bill, and Karen stated that it is an Arizona bill, a House Bill that was passed and signed into law by the Governor at the end of March. The Commissioner then asked what it said exactly about the right-of-way, and Karen indicated that it says that wireless providers who are installing a small cell application can go by right, which means that they just fill out an application, follow the guidelines about public safety, which could include spacing, and they are going to make it look like something that is our preference on appearance. They can submit their application, and we have to give them a permit to put it up within 20 days. There is no public process or notification to neighbors, and no Conditional Use Permit process that comes before the Commission. It is basically an over-the-counter application, and we have to provide them a permit to do it.

Commissioner Klein then asked what is meant by a small cell application, and Karen Osburn stated that the guidelines in the Arizona law says they can be a maximum of 40 ft. above the ground or 10 ft. taller than any other utility pole that already exists within 500 ft. of where they want to place theirs. Once they have met that height threshold, then the federal law kicks in, and they will be allowed to automatically increase that by another 10 ft., so most of our utility poles are around 30 ft., so they would be able to go 10 ft. above that to 40 ft., and then another 10 ft. above that. To provide some comparison, the small cell at the Church of the Red Rocks is really the only small cell tower we have in Sedona, and it is 27 ft.

The Commissioner then indicated that they can submit the application and there is no way the City can deny it, and Karen stated that is correct, unless it does not comport with the public safety. Robert Pickels agreed and explained that it is by right, but it is still subject to . . ., and this was a negotiated process, if you want to call it that. There were representatives of the cities and towns involved in the drafting of the legislation, but it was initiated largely by the Governor's office as a way of being a more welcoming economy for the State of Arizona, and it is very consistent with his philosophy of trying to ensure that people understand what they are going to get when they come to do business here. The phrase that was largely used was a 'predictable regulatory structure statewide', so that any developer coming in, whether in Sedona, Phoenix or Tucson, etc., will have that same regulatory structure in place. What was negotiated was that the initial language in the Bill did not include any ability for cities and towns to have a role in determining what these facilities look like. When the right-of-way permit is issued, as Karen addressed, we will have the public safety components and spacing issues, but the more important piece for him is the concealment authority, so we can determine what, as long as it is an objective standard, and we are still trying to determine what that will be, because we are still developing the Code language, but as long as there is an objective standard applied to every application that comes in, we can have a role in the process of determining what the concealment standards are, so it is not automatic, they still have to comply with whatever we determine that objective standard is.

Commissioner Barcus indicated that one of the things we have been evaluating over the last several months is that both private property owners and the City would potentially be eligible for rental payments from the cell tower constructors. He then asked if there is a fee associated with a right-of-way tower installation or is this a by right, no fee element. Robert Pickels stated that it depends on your perspective; there is a fee, but it is so minimal that it is almost laughable. It is $50 annually, and it was proposed at $20 and was generously increased to $50. The Commissioner then asked if that is embedded in the state law and Robert stated yes.

Commissioner Cohen asked if the issue of it being a private home zoned for residential would keep the cell phone tower from going in there, if Joe Smith wants one on his roof. Karen Osburn explained that this House Bill deals with the right-of-way, but right now our ordinance says that there cannot be any wireless infrastructure on a residential property that has a residential use, and she should say single-family residential, because multi-family is different. We are proposing in the new ordinance, and Mr. Lepore will address that in his presentation, because what we understand from CityScape is the wave of the future in technology is a smaller cell and Distributed Antenna Systems (DAS); things that are not the big towers that we are used to associating with wireless, and the providers will need to be in neighborhoods, so there are certain residential concealments for very small infrastructure that could be permissible, but she will let Mr. Lepore elaborate on what that means.

Presentation, Anthony Lepore, Director of Regulatory Affairs with CityScape: Mr. Lepore indicated that he would first elaborate a little on some of the questions posed, and he explained that Arizona is not the only state where this Bill was introduced. It was introduced in virtually the same form in Florida, Georgia, North Carolina where it is going to pass today, Virginia, Ohio, Indiana and Wisconsin, so the wireless tower industry has been very busy in doing this at the state level in as many states as they can in order to get into the rights-of-way, because for them it presents an economic model and $50 is not a lot for them to deploy service and make a lot of money and not pay for what they are getting. It is a perfect economic model if you can generate revenue from infrastructure that you don't have to pay for in terms of rent, so the stock value of the American Towers and the Crown Castles is going to go up.

Commissioner Barcus asked when this is placed in the right-of-way, where the $50 per year will go. Will it go to the City or County? Mr. Lepore indicated it would go to whoever's right-of-way they were going in. The Commissioner then asked if it wouldn't go to the property owner, and Mr. Lepore stated no.

Commissioner Cohen asked if it is on S.R. 89A or S.R. 179, would it go to the State of Arizona, and Mr. Lepore stated yes; however, Susan Rabold explained that the state has a different economic model, and Mr. Lepore added that the state is going to make money on this by using their right-of-way; they will charge a lot more than $50. Robert Pickels indicated that the state was specifically excluded from this legislation by design.

Mr. Lepore indicated that they are dealing with two components to the process. One is the Master Plan and one is revising the ordinance to harmonize with the Master Plan, so they identified the existing and anticipated gaps in the network, and they went through that process in the last hearing. They went through a discussion of your preferred type of infrastructure and preferred type of approval process and development standards that you are going to want. We designed a siting preference hierarchy following the public participation process, etc., and developed the Use Table for all of that, and they incorporated all of that into the draft ordinance and the Master Plan. That is sort of where they have been and they cataloged what you have in existing inventory. You have 22 sites that service your community, and they analyzed that existing inventory and projected forward based on what they know of the industry, where the industry's growth is going, and what the technology is going to be from a spectrum perspective and spectrum allocation perspective, and then they projected from 17 to 25 new facilities over the next 10 years and generally where they expected them to be, and they plotted all of that in a lot of different fashions. Ms. Rabold then clarified that it is not 17 to 25 new macro sites like you see at the airport and Fire District; probably

a few macro facilities, but a lot of small cells and into the future when 5G is deployed, you will see something smaller called nodes and distributed antenna networks.

Commissioner Cohen referenced the document that talked about the noise of the small units and that they are no louder than a compressor that we might have as an auxiliary. He then asked if he read that correctly, and Commissioner Barcus clarified that Commissioner Cohen was talking about base station air conditioning fan loads. Susan Rabold indicated that if they mean on the small cell, they are not nearly as loud as what you have at a macro site. Commissioner Cohen stated that he read it carefully, and it did state that they are no louder than, if he is quoting properly, a compressor that you might have when the electricity goes out at your house. Ms. Rabold indicated that is right, like a generator, but we could try and put the decibel amount to that, if that would be more helpful.

Commissioner Cohen then asked if we could limit the decibel amount, and Mr. Lepore stated only to the extent that the technology exists for that type of equipment. There are some instances where you can design some muffler and noise suppression elements, but the state of the technology isn't there yet to reduce it beyond a significant level. The Commissioner then asked Robert Pickels if the state law ties our hands on that one, and Robert stated that noise is not addressed. Commissioner Cohen then stated that it is a matter of if the technology exists to make them quieter, and Mr. Lepore stated right, and they can develop it so they at least use whatever the state of the technology is at the time they develop it. Commissioner Cohen asked if we can word the resolution to state that as technology is further developed, it would have to be followed even if it means AT&T would have to change its compressor periodically. Mr. Lepore indicated that he doesn't think you could do that from a legislative standpoint, and Robert Pickels agreed.

Commissioner Barcus noted that we have a very large crowd today and he reminded everyone that this is a public hearing and it is not unlike a City Council meeting where any conversation in the audience is not permitted. If you want to say something to your neighbor, please go outside and there will be no demonstrations, signs or applause, just like with the City Council, and he was going to mention that earlier, but he didn't see the Mayor here, and she is usually the one that gets to do that at the City Council meetings, so he missed his queue, but he wanted to remind everyone that this is a public hearing and we appreciate your indulgence. The next item we will be addressing is your concerns and that will be the time for comment, and he will be refereeing that process, but we are going through the presentation now and will have some discussion among the Commissioners, and will open it up to the public comment, close the public comment, and then we will come back and have more discussion and decide what we are going to do.

Susan Rabold stated that in response to Commissioner Cohen's question, both documents are in draft form, so it gives them plenty of opportunity to modify and any questions that we aren't quite able to answer today without more research, we will go back and respond to you. Commissioner Cohen stated that he would appreciate looking at the sound levels and how they can be reduced.

Anthony Lepore stated that HB2365 passed into law on 3/31/17 and as long as it meets certain parameters, you basically have to approve it and it doesn't go through any zoning process. Regarding the designing of other sections of your Code that are not going to be part of this, because this is your Zoning Ordinance, but other sections, particularly the concealment and design standards, because in doing that to the greatest extent possible, it will create an economic cost for an applicant to go into the right-of-way that they might want to forego and come back to the Plan and the Zoning Ordinance. If your design elements are that you want it to look like this, painted this color, designed in this fashion, etc., the legislature gave you that crack in the door to create objective design standards, so go crazy with them and do them to the nth degree, because anybody looking at that will see it will be expensive to build a lot of those, and maybe they will look at the Master Plan to see if they can solve the problem in a different fashion.

Commissioner Cohen asked if they will give us guidance and Mr. Lepore stated yes; that is where the legislature giveth and the legislature taketh away. In this one instance, since it was part of the

negotiation, you can maximize the opportunity that is there to drive things back to where you have a little more control.

Commissioner Klein read that small wireless facilities must be classified as a permitted use and are not subject to zoning review or approval if the small wireless facility is collocated in a right-of-way in any zone, and it is his understanding that collocation refers to where you are putting something on an already existing tower or something. He then asked if that means it only applies to collocation, and Mr. Lepore stated no, because the Arizona Legislature decided to define collocation differently than the federal law defines it. The Commissioner asked how they can do that, doesn't the federal law preempt state law? Anthony Lepore stated not in this particular instance, and Commissioner Cohen then asked if not even because of the federal constitution for interstate commerce, and Mr. Lepore referenced Amendment 10 and noted that there hasn't been a case yet. He has had this issue in North Carolina for a number of years, because their law substantially differs from the FCC's definition of 'substantial change' under federal law, where if you are truly collocating on an existing wireless facility and you don't make what the FCC defines as a 'substantial change' it is permitted by right. One of those categories is you don't increase the ground compound, but the minute you create an extra square foot of ground compound, it is a substantial change and goes back into CUP, zoning, etc. In North Carolina, you can increase the ground compound by 2,500 sq. ft., which is a single-family home, without it being a substantial change and no one has challenged that yet.

Commissioner Klein asked how they define collocation, and Mr. Lepore stated that under state law, it is a wireless piece of infrastructure on anything that is vertical, meaning the first wireless thing on anything vertical is defined on a state level as collocation, but not on a federal level. Commissioner Klein then stated that under the state's definition, a new tower would classify as collocation, and Mr. Lepore added, in the right-of-way. Remember it only deals with right-of-way, and in the right-of-way, the first antenna on a pole is defined as a collocation, which is not the federal definition and that is a problem in every state he has mentioned. No one has fixed that dichotomy yet.

Commissioner Barcus asked, to clarify for everyone, which of the three pictures has collocation on existing equipment, and Mr. Lepore explained that all of them are collocation under state law. Under federal law, the middle picture clearly is a collocation and a poorly designed one, and the two on either side of that could potentially, depending on the type of federal collocation, meaning a second carrier could potentially be on either one of those. Ms. Rabold added that the one on the far left meets the definition of a small cell by the state's definition in that the antenna doesn't exceed more than 6 cu. ft. by volume and the equipment housing the electronics does not exceed 24 cu. ft. by volume, and the one in the middle shows how you could potentially increase the first one by 10%, and the width and girth measurements to still be in compliance. It is very close; that equipment box protruding to the right is probably outside, but if you took that off, the way this is added to and the fact that they have two on that facility is probably showing how you would maximize that definition of how you could expand that small cell. Those are clearly non-concealed facilities for small cell. The goal would be to not have those, but to have the concealed facilities, which is the example on the right. Commissioner Barcus asked where the base station is in the one on the right, and Ms. Rabold explained it is the facility that sort of looks like a trash can. The Commissioner commented that he thought it was a trash can and Ms. Rabold stated that is the idea, it is part of the concealment solution.

Commissioner Barcus stated that to be clear, the regulations that we are discussing today are outside of what is being shown, and Ms. Rabold clarified, unless they exceed that initial design standard and they do not fall under the criteria of the state legislation, then your ordinance would address that. Mr. Lepore added that someone could still propose to go in the right-of-way, but say they want additional height beyond what the state allows or a size beyond what the state parameters set, then that would come back to you. Commissioner Barcus indicated that what he was trying to ask was if they are within those parameters, then the City is required to provide expedited service or approval to those, and Mr. Lepore stated, correct. The Commissioner then stated that what we are talking about in this hearing is everything else and has nothing to do with this. Ms. Rabold stated that is right and this would need to be addressed in your Title 12 and not in

the wireless ordinance. Robert Pickels clarified that it would be addressed in the City Code, not the Land Development Code, so it is a different process for us advancing that through for the City Council's approval.

Commissioner Cohen stated that installation of these devices is going to cost money, and he assumes that the owner of the pole is the one who is responsible for paying for it, but what if they destroy part of a sidewalk or curb or other property, are they held responsible or does the City have to take legal action to hold the contractor to it? Anthony Lepore stated that presumably you already have a process now for when infrastructure goes into your right-of-way of preserving sidewalks or re-landscaping, etc. Commissioner Cohen asked if the structure would be applicable to this over which the federal and state have exerted so much control, and Mr. Lepore indicated that for that purpose yes, you would still have your ordinary ability as you do with any other location of infrastructure.

Commissioner Barcus indicated that he wanted Robert Pickels to respond, and then he wanted to bring it back to this hearing. Robert indicated that is what he was going to respond; that is not a significant question, but it exceeds the scope of what we are here to talk about today. It is important to be aware of House Bill 2365 and what is going to occur within the right-of-way, but we will address that separately through a different process through amendments to our Sedona City Code. What you need to focus on today is what is presented in the Wireless Master Plan and Sedona Land Development Code.

Anthony Lepore stated that they developed a set of siting preferences based on all of the different polling they did of the public, elected officials, etc., and the hierarchy they developed for any other infrastructure in the community of the type you want to see and where it would go begins with the concealed base station outside of the right-of-way. Your first default option is city property in the Master Plan. The second option is city-owned property not in the Master Plan, and the third option is other public property, and then private non-residential property, and lastly, private property that is zoned Multi-Family or non-residential structures in a residential district. That is the gamut of potential for that type of infrastructure and the different pecking order of locations for that type of infrastructure. Then, it goes on to the next type of preferred infrastructure and the second option would be a concealed collocation under federal definition of collocation, meaning there is already something wireless there and you are adding to it, and again, the type of infrastructure followed by the hierarchy of location of that infrastructure. Third would be replacement of an existing non-concealed tower with a new concealed tower, and for that, it doesn't make a difference in terms of the pecking order, because you are taking down something existing, so it is wherever it is, but you are replacing it with something concealed.

Commissioner Barcus asked if pecking order is 1.a and then 1.b, and it goes all the way through, and Mr. Lepore stated yes, for the type of infrastructure. Commissioner Barcus then asked if a cell tower provider said they didn't want to do anything in #1, the next level of the pecking order is #2, and Mr. Lepore said right, and they have to show why #1 does not work for them. The Commissioner asked how they would make that showing, and Mr. Lepore explained that they generally will demonstrate from an electrical engineering perspective how that type of infrastructure has certain limitations and will not solve their coverage or capacity issue. There are limitations when you start putting concealment obligations on infrastructure; it reduces the ability of the infrastructure to service a broader geographical area, and the federal standard established by court cases is to establish a need for coverage or capacity for service, and as long as they can demonstrate that the higher-ranked alternative will not solve that need, they can demonstrate the need for the lower-ranked alternative. The Commissioner then asked if this is a physics-engineering demonstration kind of proof or a point scale that it covers 80%, etc.; how does this proof happen? Mr. Lepore stated that the applicant's engineer will testify to you that they can't solve the problem with that design, and you will weigh the evidence with the benefit of a third-party expert who will review the same engineering information and either agree or disagree with the applicant to say that they could solve it by doing something a little differently, then you have the benefit of weighing that evidence and making a quasi-judicial determination as to whether or not the

applicant proved their case for the type of infrastructure they want. Commissioner Barcus then asked Audree Juhlin if that would come to the Commission, and Karen Osburn responded that Mr. Lepore is going to be addressing the approvals, so if it requires a Conditional Use Permit, it would come to the Commission. If there are certain instances, it would be an administrative approval, and we will get into those, so some will and some won't.

Susan Rabold wanted to provide another example of why #1 possibly could not be met, and that would be because there may not be a structure for them to go on. That is more common and there may not be a facility tall enough for them to go on that is existing as a base station. It could be that there is not a property owner that is agreeable to them using a rooftop or expanding a rooftop. That is a situation they have right now; you have AT&T on a building presently, and another service provider wanted to go on that facility, but in their lease with that property owner, they have an exclusive right to that facility, so that service provider can't go on that site and they are looking at an alternative location. Those types of things are valid reasons; they may get to #2 and not be able to do a concealed collocation on an existing concealed towner, because there is not one of those in their geographic search area either. Then, they would get to #3 and ask if they could replace one of the existing non-concealed towers with a concealed tower. You have four of them, and if they are not going to the airport or Fire District, that may move them on to #4. Those are some valid reasons why they may need to move further down into the hierarchy.

Anthony Lepore explained that the hierarchy continues on with a base station for DAS and that is the small cell, which is generally the direction some of the industry is going. The more mature providers are going in that direction and the new entrants still need a lot of the traditional macro infrastructure, because they are just developing their network and subscriber base, so they are at the infancy level of their development timeline, whereas the more traditional giants, AT&T, Verizon, T-Mobile, etc. are further along in their development line, but this is sort of the way the industry elsewhere is going. He spent some time in Tokyo recently and they are 10 years ahead of us in terms of wireless technology, and lest you think well that is Tokyo with seven million people, he was in a mountain on a train between Bologna and Firenze last week and the same technology exists there, where the population density and the topography is very similar to here. It is just that they had a 10-year head start in terms of developing this infrastructure. That is the hierarchy that they designed and that takes us to the last one you want, which is a non-concealed tower, so that is the last option in your hierarchy. Susan added that they would be hard pressed to get to that point and be able to justify building another non-concealed facility for personal wireless services, but you have to allow for it.

Mr. Lepore noted that they identified potential city properties that are keyed on the map, and he would like the Commission's feedback as to whether or not to keep them in the inventory. He then showed the different recommendations in terms of some of the design elements – the concealed small cells, the faux tree-type of concealment and the concealed base station, and indicated that is probably what you are going to be looking at in terms of the design component of your process. Each of the proposals were developed in accordance with very site-specific data of what is appropriate for that particular location. Susan added that was based on the polling that came from public input, staff, and appointed and elected officials. They took all of that information and gave their best educated suggestion, but as they go through the table, if you disagree, it would be a good time to change, add, remove, etc., because that would be part of the recommendation going forward.

Commissioner Barcus asked the Commission if they wanted to do that one-by-one or wait and go through all of them and eliminate some afterward. Mr. Lepore explained that you could certainly consider them; you don't have to tell him right now, if you want to think about them and get back to them on which design for which location you think is appropriate or inappropriate. He is not asking you to make a spot decision. The Commissioner commented that this is the fourth time the Commission has seen these, and all Commissioners have seen them at least twice, so he is not sure that this is going to be challenging for the Commission to decide which ones to remove, if any.

Susan Rabold explained that this is important, because if the ordinance develops like this with the Master Plan, then if the industry came in, any of these site-specific properties would be administrative approvals, if they were developed according to the site-specific criteria in the Master Plan. If they deviate from that, then they would have to come through for a Conditional Use Permit, so having that recommendation is important as this moves forward.

Commissioner Barcus then indicated that the ones that stay in the Master Plan have the administrative process, and if we were to eliminate one or more of these, it would require a Conditional Use Permit, but based on the hierarchy, they could still come in and say they are meeting the hierarchy and here is why they need to put in this . . , Anthony Lepore interjected that you also would have to be willing to lease it to them, because these are city-owned parcels, so you would have to be a willing landlord as well. You first would have to establish as a threshold that you would want to lease that property to them. Commissioner Cohen asked if there are different criteria that we haven't looked at before, and Susan Rabold stated that they are the same.

Robert Pickels noted that as a matter of procedure he first would ask the Commissioner to open agenda item 5.b, because that wasn't opened and you are talking about conjunctively the ordinance and the Master Plan, so we should now open both items together, and then since this is a public hearing, it might be more orderly to go through the presentation, then hear from the public, and then have the discussion.

Commissioner Barcus then also opened the hearing for consideration agenda item 5b.

5. CONSIDERATION OF THE FOLLOWING ITEMS THROUGH PUBLIC HEARING PROCEDURES:

a. Discussion/possible action regarding a recommendation to the Sedona City Council regarding amendments to the Sedona Wireless Communications Facilities Ordinance, Sedona Land Development Code, Article 17, Wireless Communications Facilities, to be consistent with changes in federal regulations, (continued) and

b. Discussion/possible action regarding a recommendation to the Sedona City Council regarding the draft Sedona Wireless Communications Master Plan.

Anthony Lepore explained that you have either the name or the physical address of the location, and then on the right-hand side is the proposed type of infrastructure for that particular location, and you can see their suggestions for each of those locations. He then showed additional proposed types and noted that everything recommended has some element of concealment. Mr. Lepore then referenced the draft that they are currently working on for the Use Table and approval process that was previously mentioned regarding the different levels of review that different types of infrastructure in different locations would go through. From the key at the bottom, you will see that A is Administrative Permit, C is a Conditional Use Permit from the Commission, C-2 is a Conditional Use Permit from the City Council following your recommendation, and N is not permitted. The sites in the Master Plan are administratively approved, as long as they follow the design elements, etc., that they have prescribed in the Master Plan. Everything else is either conditional or not permitted, and then working through the same hierarchy and the different levels of review that will go into that. Since we want to encourage replacement of an existing non-concealed tower with a new concealed tower, that would be administratively approved to encourage that level of development, and that is all of the draft Plan right now, and the C-2s are those non-concealed infrastructures that was last on the hierarchy, because you want to make that the hardest thing to do.

Commissioner Cohen referenced item #42, Sugarloaf Trailhead, and indicated that most reporting back to the Commission from the residents is on the Sugarloaf Trail, so he asked where on the parking lot you are proposing to put it, so the Commission has a better idea as we look at this and try to deal with the concern of the Sugarloaf people.

Susan Rabold explained that the concern with this area is that they know there is going to be a gap in that area, and in trying to determine the solution for that, you have this particular piece of property and a number of utility poles in and around the park, and if the site is removed, then the

only alternative is for them to go on those right-of-way poles, so that was why they were trying to come up with a solution for use of this public space as a way to offer to the industry another option besides the use of those utility poles. She is hopeful that when the industry comes in, they won't just pull their House Bill card and just come in for permits. She is hopeful that they will want to talk with the City about their plan, so you will have the opportunity to encourage them to use a variety of deployment methodologies, but if you remove this property, which you certainly can do – she appreciates the perspective of how that property could be used by the industry and she doesn't want to discredit the concerns, she just wants to be clear that if you remove it, their only option becomes the right-of-way poles. If you leave it in, you have some leverage and as the property owner, you could negotiate any space. If you want to require them to go in a specific area, you can target that and put it in the Master Plan to alleviate any concern that it would go anywhere but that location. If they want to go somewhere other than that particular location, they would have to come back. The initial thought was . . ., but it could be wrong, because we don't live here, but there is an existing weather or water measurer as you enter the park and go to the left, and there is an existing pole that she tried to capture in the middle picture, and one idea was to do some sort of small cell in that vicinity. It doesn't have to look like the picture; you have flexibility on the type of small cell. Another idea was, in trying to prevent any additional paving or land disturbance, that as you enter the parking lot, there is a bit of disturbed area to the left, and that might be an area where you could put in some type of faux tree or small cell. That was the area they thought would have the least amount of land disturbance and it was in the vicinity of a piece of infrastructure that was already characteristic of a pole. Again, you can designate that and if you disagree that is fine, and if you want to pick another area, you could do that or take it out of the inventory.

Commissioner Cohen asked if we followed your suggestion to put it on the thing that is there . . ., Ms. Rabold interjected that it would be near it; she doesn't think you could go on it, but it could go in that vicinity. The Commissioner then asked what the noise of the compressor-like sound would be and if the noise is constant. Ms. Rabold stated that she would have to look into that, but she has been to a lot of tower sites, and the generators do not run 24-7. In an urban area, the generator will typically cut on if it gets too hot or if the power goes down, because they are intended to be back-up power units. In rural areas where they are dependent on fuel, power generators will cut on and off more frequently, and the larger the facility the larger the generator will be. For a macro site, it is going to be very similar to that of a generator that you would use for back-up power. On the small cell, they had unit running for cooling at a facility, and you could probably go by to hear the sound, because it would be very characteristic. She did not notice it being on until she got up next to it, so when she was at that site, she didn't hear it until they walked into the area where the equipment was, and then she realized it was on, but that is almost arbitrary, because it is her opinion against someone else's, and she would rather find out the industry standard and report back to you what the decibel is to give you more concrete factual information than just her observation. She doesn't like to work in grey areas, so she would prefer to come back with that information.

Commissioner Brandt stated that he was at the site this afternoon at 2:00 p.m. and 90 degrees, and it sounded little a residential air conditioning condenser, maybe a little bit louder. He then asked what the shortest faux tree available is, and Ms. Rabold stated that she has seen them at 30 ft. The Commissioner noted that he has only seen them at 60 ft. or whatever. Ms. Rabold indicated that she has seen them in Colorado at 30 ft., and she showed a picture of one that might be at 45 or 50 ft., and indicated that might be the shortest one she has actually seen, but they can make them at 30 ft.; she has seen plenty of palm trees at less than 30 ft.

Commissioner Cohen asked if it is 30 ft. can they automatically add 10 ft. to it, and Ms. Rabold explained that they would have to be able to meet the substantial change criteria and in this instance, because it is not under the House Bill, they would have to maintain the same level of concealment for it to meet that definition of substantial change. If it does not meet that definition, then they cannot do the expansion.

Commissioner Cohen then asked if the City determines the definition, and Mr. Lepore stated no, that definition is federally defined and it is pretty comprehensive as to what constitutes a substantial

change under the federal rules now, and as long as they are under that threshold, then they are allowed administratively to collocate on an existing facility, but one of the key elements of the definition is that you cannot destroy the concealment effects of the existing facility by adding onto it. If you do that, it changes it from insubstantial to substantial and once it becomes substantial, it is no longer an administrative approval and it is back to a zoning review, Conditional Use Permit process. Ms. Rabold added that the Commission makes that decision.

Anthony Lepore then indicated that, lastly, he mentioned that when things come forward for consideration and the applicant's expert is telling you A, you want to make sure you have some compelling evidence either verifying or disputing what the applicant is proposing, so part of that is included in the review process that is being built into the ordinance for you to have an expert review available to you, where the engineers have reviewed the applicant's submittals and either confirmed them or disputed them and provided you an opinion as to whether or not the applicant's position is justified, and if it isn't, offer alternatives for you to propose to the applicant, to say did you consider X or Y or Z before coming to us with this, so you are not wondering if you should accept the applicant's word. Part of the process is to give you that factual basis to be able to ask questions of the applicant and make an informed decision. Ms. Rabold added that regarding the sound from the small cells; that is the expectation that it would be in the right-of-way as well, so they would have that same sound in the right-of-way and she doesn't think you can regulate that, because that is a zoning piece, but we will look into it. Mr. Lepore commented that he wondered if sound could be part of the design standards, and Ms. Rabold noted that they are brainstorming as to how to help with your right-of-way, because it is not just specific to Arizona.

Commissioner Klein referenced the papers prepared by staff that refer to the 47 U.S.C. §332 that deals with mobile services, and part of that statute says under (c)(7) basically that.no state or local government can regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions. The Commissioner then asked what happens if some company wants to put up a cell tower, how do we know their tower complies with the allowable amount of emissions that the Federal Government says they can have? Code of Federal Regulations, Section 1.1310 deals with radio frequency radiation exposure limits, but it doesn't mean anything to him; he doesn't understand any of the numbers, but he thinks it is saying that these are the levels at which the Federal Government has concluded that these things aren't harmful. He found a very interesting article written by some law firm that specializes in cell tower law, and in that article that is a few years old and doesn't have all of the cases in it, it talks about how the City of San Francisco did a study and sampled 100 cell towers and 40 of them put out more radio frequency emissions than are allowed by the FCC. The attorney who wrote this paper represents a lot of municipalities, and he talks about some ideas of what you maybe can do with your zoning laws to deal with this issue. In this article, he cites that there has been at least one federal court case that has held that as part of the local zoning approval process, a municipality's Board of Health could inquire about RF emissions and require the provider to explain its RF study for the site, so as to ensure the FCC's RF emission standards are met.

Commissioner Barcus asked if that could be framed in terms of a question, and Commissioner Klein asked if we should be putting something in the Land Development Code or the Plan to ensure that these companies that are putting up additional cell towers or collocations comply with the FCC requirements on how much RF exposure they can put out. Mr. Lepore pointed out they have written that into the proposed code regulations to require the applicant to certify compliance, because that is what the Federal Government said you are allowed to do. You can request the applicant to certify that they are compliant, and in constructing the facility, they also have to use type-accepted equipment, which means the FCC labs have tested the equipment and the RF levels, which is why the equipment is deemed to be type-accepted, so as long as you spec that equipment, you have achieved compliance with the FCC regulations regarding RF emissions. You can require the applicant to certify that they are constructing in compliance with the FCC standards, but the FCC and federal courts have said that is the beginning and end of your inquiry, when it comes to RF.

Commissioner Klein asked where that is in the materials, and Mr. Lepore stated that it is in the draft LDC, where one of the submittal requirements is that the RF emissions shall comply with the FCC standards for such emissions. Commissioner Klein again referenced the article and indicated that the attorney talks about some things a municipality might be able to do, and one would be to require cell providers to provide information, especially on towers with collocation, because when you are collocating, there is a greater chance that you will have RF levels exceeding the FCC requirements, and you can require cellular providers to provide information on projected radiation and whether the standards for categorical exclusion are met, and if so why -- requiring the provider or an independent party at the provider's expense to make periodic measurements for compliance with FCC rules. The Commissioner then asked if that is in the papers prepared, and Mr. Lepore stated no, it was tried in Maryland and summarily shot down, but one thing that they could add is, in the case of both new installations and collations, that the applicant not only certify but provide the basis for their certification. In other words, they can state that they are using type-accepted equipment, or if they are not, how they achieve their calculation of RF emissions from the equipment they are proposing. He doesn't see any reason why that could be challenged.

Commissioner Klein indicated that when the public spoke at the last meeting, most of the discussion was about their concerns about health risks of these antennas and towers, and we should do everything we can to ensure that cell towers or collocations comply with the FCC requirements, because that is about all we can do to alleviate their health concerns. We can't deny a placement based on health concerns; Mr. Lepore stated that is correct. Commissioner Barcus then asked Commissioner Klein if we could ask them to put that certification language in the document, and Commissioner Klein stated yes, we would want that in the Land Development Code or the Wireless Master Plan. Commissioner Barcus then stated that wherever it is appropriate, let's insert that.

Commissioner Cohen stated that all mechanical and electrical equipment breaks down over time, and he then asked how we ensure that over time these items are still within the FCC Code, and what are our policing opportunities? Mr. Lepore explained that 'policing' you don't for RF purposes; it is field preempted by the FCC, which means you have no jurisdiction to do anything about it, and the Supreme Court has said that. Commissioner Cohen then stated that 25 years from now, we don't know if it is working properly or exceeding . . ., Mr. Lepore interjected that if it is not working properly, it typically means that it has stopped radiating. Commissioner Cohen said he is concerned about over-radiating, and Mr. Lepore stated that is extremely unlikely given how the equipment works.

Commissioner Klein again referenced the article and indicated the it says the municipalities can encourage use of cable-based microcell PCS, also known as Distributed Antenna Systems or DAS, which uses a cable system and no towers, to provide cellular service. Mr. Lepore stated that is not accurate; you do need towers and you also need . . ., he just did the math for New Canaan, Connecticut, which is roughly your size geographically, and you need almost 200 miles of fiber and it was $30 million for the fiber and another $30 million for the DAS nodes to cover their rolling hills, so it was about $60 million, because they have the same concerns and wanted to see if they could solve their problems with a DAS network. Unless you are a very small municipality like Wellington, Florida where it is flat and small, so they were able to do it, because they had the fiber backbone, but if you don't have that and you don't have the geography and terrain issues that you have here, you maybe could do it, but absent sufficient fiber, it is not a practical and economic solution. You are not going to find an industry willing to spend that kind of money, and he doesn't know of any communities that want to spend that kind of money.

Susan Rabold added that the DAS network still needs macro towers – that is your base for your DAS network, and if you only promote the DAS network, you could be viewed as a barrier to entry, because you have to allow in a nondiscriminatory manner for the industry to deploy functionally equivalent services, so you can encourage it, which they have done in the hierarchy, but you can't require it and the DAS network is still RF; it is not RF exempt. Mr. Lepore agreed and stated that it just distributes it in a different way.

Commissioner Brandt referenced page 11 of the LDC draft under Location by Zoning District that says, generally no wireless service facility shall be allowed in the National Forest or neighborhood commercial district, and he asked if neighborhood commercial district is something that will be in the new Land Development Code or just something that still needs to be looked at. Audree asked Commissioner Brandt to restate his question, and the Commissioner indicated that under 1704.04A, Location by Zoning, it says, "Generally no wireless service facility shall be allowed in the National Forest or neighborhood commercial district." Audree asked if he is referring to the proposed code and the Commissioner stated yes, on page 11. Audree indicated that staff is not sure, so we will look at it and get back with the Commission. Commissioner Brandt then indicated that the second part of that is that no wireless service facility shall be allowed in any open space districts, except as provided in subsection 1704.04C, which is the table of what can be done administratively or by special use permit, and he wasn't able to find anything in that as far as relating to that exemption. Audree stated that in the Use Table under Open Space, you will see several that are conditionally proposed as approved on city-owned property; however. Commissioner Brandt explained that the table is RS, RM, OP, GC, C-3, LRC, PD, CF and P at the top, but he doesn't see open space, which is OS, so that is something else to clarify. Audree indicated that she thinks the consultants have labeled Open Space as OP, which would be confusing for the Commission, because OP is Office Professional, so we will make a clarification.

Commissioner Brandt then asked why Japan and Italy are years in advance and if it is because of the use of small cell technology. Mr. Lepore stated no, and explained that it is because rather than build out their wireline network following WWII, they jumped into the wireless development sooner, because they didn't have the wired infrastructure that was great anymore, so they started on the path towards wireless a lot sooner than the United States. We had the AT&T monopoly until the Bells were broken up, so the wireline monopoly tried to hang on to their piece of the pie as long as possible and held back wireless until the 1996 Act, which is what jump started the wireless revolution, but that was 10 to 20 years after the rest of the world started down the wireless path. Ms. Rabold added that when we did start, we were using different operating platforms that were not universal and could not be shared between service providers, but they have since changed so there is more connectivity. In the Asian, European and developing countries, they used the same operating platforms, so they didn't have the hurdles that we had.

Commissioner Barcus asked for a show of hands from the audience; he has 19 cards and the Commission is going to take a 5-minute break, and we will decide how many minutes to allow each speaker, so he asked those who turned in a card and do not wish to speak to please raise their hand. There was one hand raised, and he indicated that he now has 20 cards.

Commissioner Barcus recessed the meeting at 5:00 p.m. and reconvened the meeting at 5:07 p.m.

Commissioner Barcus explained that the hearing today doesn't have anything to do with the example of the wireless tower at the Methodist Church in the Chapel area. We are talking about a Master Plan that has a hierarchy associated with siting towers. When an applicant comes to us, we will have a hearing and they will be applying for a Conditional Use Permit, and we will be taking testimony on specific towers at that time.

Audree Juhlin asked to clarify that based on Commissioner Brandt's questions about open space, we are going to make a number of changes to that Use Table in defining those land use categories in the next draft, and we are going to eliminate as a permitted use any facilities within the National Forest or neighborhood commercial, as well as open space, so those three will be removed from the permitted uses. We will also include, in the chart that shows if it is conditionally allowed or permitted, or Council approval required, those three land use designations as not allowed, so we will bring forward a better-defined list and clarified table.

Commissioner Barcus indicated that the Master Plan covers only inside the city limits; not any areas outside of the city limits, so we are only dealing with tower locations within the City of Sedona, and he noted that the standard for testimony at a public hearing is three minutes. If

someone else has testified on the point you were trying to make, please summarize that and you do not have to take a full three minutes.

Commissioner Barcus opened the public comment period at this time.

Michael Sepe, Sedona, AZ: Mr. Sepe wanted to draw attention to a study conducted by the National Toxicology Program under the auspices of NIH, which operates under the Department of Health and Human Studies. It was a two-year study that cost $25 million and was completed the beginning of last year. The preliminary findings have been issued and the study was done primarily to assuage concerns about health effects of RF. Unfortunately, it did the opposite and produced a very good correlation between dosage and the development of tumors of the brain and heart. These findings are online, they can be found very easily. It is an 87-page study that was released early, because the researchers felt a need to alert the public of the concerns. It flies directly in the face of the legislation of 1996 that basically says you can't talk about this. Effectively, it put a gag order on talking about this issue. One would wonder what would have happened if the tobacco industry had the foresight to write legislation that said you can't discuss lung cancer. What would the effect have been? The industry knows about this problem; they are ignoring it and hiding it, and it goes well beyond the FCC limitations, which are 100 times higher than in some countries, so we need to really consider how we are going to deploy 5G, which involves increasing the tower count by over an order of magnitude, without jeopardizing public safety. This is a public safety issue.

Commissioner Barcus reminded the audience that if you applaud, you will have to leave; there will be no demonstrations, no applause and no talking other than the speaker.

Dayle Dodge, Sedona, AZ: Ms. Dodge indicated that she is here because of the Sugarloaf Trailhead proposal, and she understands that this proposal is for cell towers and to try to make it so it at least somewhat looks decent for the City, and in that light, she encourages the use of those that look like trees, but also, if it is at all possible to have a height limit on the ones that are in public areas and forested. Like many of the people here, she is really concerned about the RF radiation and its effects on health, but not even just the health of people; we are talking about the health of the plan life, animal life and insect life. There have been studies where these electrical radiations are also affecting other parts of our community. If you start putting a bunch of cell towers in our natural areas, then you are also affecting those natural areas, not just the people who go into those areas. Sedona is known for its vortexes, which are electrical and magnetic – the same kind of power source that these cell towers have, and they will also be influencing the vortex and the energy areas of the City that we are so well known for, and those energies can be perceived by many people who live here, are called here and healed here, and even some of the healers who live in the City are so sensitive they actually feel them already, and she wonders what contribution all of these extra cell towers is going to do to the healing effects of this community. Lastly, the state taking over the cities' prerogatives on what it can have in the City is ridiculous and completely against the democracy of our country, but also who is benefitting? This sounds like the whole concept of having these cell towers already approved and you can't do anything, except try to minimize the damage of what they are going to do to how the place looks or to people being affected by it. Why is there such an allowance and no protests made about all of this corruption that is causing this to even be an issue to be addressed?

Richard Sacks, Sedona, AZ: Mr. Sacks stated that he has been an independent health scientist, research and experimental scientist for 50 years, and the concerns in the first two comments were right on target. These energies are a health concern and a public safety issue, and it was bought up that public safety is one area that is not preempted by law. He talked to one of the Harvard-recommended consultant's in this field that deals with wireless all the time, and she has a comment on the law, "Proponents misrepresent the Telecommunications Act of 1996. TCA is preempting all state and local regulation of wireless facilities", in other words there is nothing you can do, your hands are tied. "State and local governments are preempted only from regulating the placement, construction, modification of wireless facilities based on their environmental effects. Preemption includes neither health effects nor health sciences, nor is regulation of operations preempted in any

way". So, these things can be shut down; there is more about that. He has extensive documentation of the reality of the health effects; not the risks, but the damage, and anybody that wants it, he will try to give it to them for free. They can send a request to Ricard@lostartsradio.com. He will send it out as time allows, and he also wants to say in closing that this is a really surreal experience for him, having to say any of this stuff, because he knows he will be seen as completely crazy, and it seems similar to coming from 2017 back to the 1950s, when they were talking about cigarettes and saying oh, they are great for you and the heart attacks having nothing to do with all of the cigarette smoking that is on the movies and everything, and the doctors are going on national television and they belong to all of the great associations that everybody respects, and they are saying do it for your nerves, Camels are great, etc., so we are here talking about what the packages should look like and the colors should not clash, and he finds that a bizarre experience. It is like Mommy all of my friends are running over the cliff; I have to go faster, and he sees that is what is happening, so he hopes you will think about it.

Cheryl Fowler, Sedona, AZ: Ms. Fowler stated that she wanted to speak on the proposed tower on Jordan Rd. She lives across from the Heritage Museum, and most of her concerns have been addressed with the heath concerns. There have been many studies done, and she has one from the Journal of Chemical Neuroanatomy, and it discusses widespread neuropsychiatric effects including depression, and that was a journal study done from 2016. There is also a PubMed article about radio frequency radiation injuring trees around mobile phone base stations, which someone else also mentioned, and that study was in Germany and conducted in 2016. Aside from the environmental concerns her other concern is the impact it could have on the value of her home. Being so close to a tower, she is concerned that the value of her home will go down. Other things to consider about the value of people's homes and properties and the long-term damage and effects that could happen with the radio frequency emissions, and her other concern also was Commissioner Klein was talking about some regulation or an annual inspection for the radio frequency transmission, so we could at least monitor them.

Thomas Brennan, Sedona, AZ: Mr. Brennan stated that there is a certain amount of irony, he has his cell phone with him. First just a brief anecdote, in 1958, he was a little kid and watched their family doctor at their house trying to pump the dogs stomach, and then afterward, his dad and their family doctor were on the back porch having a cigarette together. They didn't die right away, the doctor died from lung cancer about 30 years later and his died from heart disease about 30 years later, so his point is exposure to RF radiation is on the same level as exposure to smoking cigarettes – it is pretty much the same level of risk. We could call it risk, but it is actually more like certainty that the social impact of the disease effect is a certainty. A lot of people here are speaking and offering ways to mitigate the effect and presence of the RF in our community and in our homes. One of the things we can do as a community is we certainly don't need to lie down and just accept it. There are ways that the community can mitigate the concern, and a primary concern is very few people have been notified about these hearings and about the proposal for the Wireless Master Plan, and there needs to be a very concentrated effort to notify directly as many people in the community as possible and get more community involvement. It is really important and needs to be done. He doesn't know exactly how the City would do that, but more can be done.

Barbara Litrell, Sedona, AZ: Ms. Litrell indicated that her first question is who cares about public safety, because we seem to put that on a back burner. You have not necessarily done that, but certainly the Federal Government is making cities do that and that really has to be challenged. Five years ago when she was on the City Council, community members came before them and challenged the coming of smart meters to Sedona. The City of Sedona did intervene and there was a lot of information brought to their attention, and they ended up with a good percentage of Sedonans who opted out of it, because they became aware of the health effects. She has heard a couple of analogies to the tobacco situation, and she was thinking the same thing that if your 18-year-old said he or she decided to start smoking, and the Center for Disease Control said you absolutely cannot say anything to them about the dangers of smoking, all you can do is decide on the priorities of whether it is filtered, unfiltered, long, short, menthol or maybe even an e-cigarette, that is a little bit of what we were doing here. She just challenges you to have your eyes wide open

as you go into this and take the yoke off of the Federal Government telling us what we can and can't do for the safety of our community. First, RF is cumulative, so putting in these cell towers is going to be added to all of the RF already coming from smart meters and their grid network all over town. The overwhelming evidence of the dangers of RF radiation are documented everywhere, and she can provide that to you at any time. Be skeptical of the FCC, the FCC Commissioner is a gentleman named Ajit Pai, and he is a former counsel at Verizon, so you have the fox taking care of the hen house. The FCC is run by the industry and this is all about money, and that is why they are putting a gag order on it. Tying the City's hands with a gag order is just not acceptable. It is overreach by the Federal Government; we hear about that in so many different situations, so why are we not hearing about that here. You don't have to follow a law that is wrong; she cannot believe that we would follow something that goes against the health of our community, and the burden of proof for the safety of these cell towers has to be on the providers, so when they come before you for a permit of any sort, they need to be able to provide independent scientists' information – not industry scientists, but independent scientists' information on the safety. She has to question why cities are not challenging this; they have to prove the safety to us or we have to ask who cares about the safety of the public.

Janine Jennings, Sedona, AZ: Ms. Jennings indicated that she just purchased a home on Farmer Brothers Road, and she agrees with everybody up here. It is extremely unusual that everybody up here is talking about health issues when the Federal Government says there are no health issues. It is a huge fight; she doesn't think Sedona by themselves can stand up and fight this with the Federal Government. It is a fight that somebody is going to have to do one of these day, and maybe Sedona can take a lead in it and other communities can get involved. It really is something that is eventually going to have to be addressed. Her main point today is that the purpose of the Master Wireless Plan is to incentivize some of these Telcos to put in towers that we like, agree with and are comfortable with in areas that we want. She doesn't think that we want to incentivize them to put it at Sugarloaf or the location next to it – A1 and A2, so when she says Sugarloaf, she means both of them. One, it is a big tourist area, two it is nature, and three, it is a small neighborhood right in that area that has smaller to medium-size homes that were built before zoning laws insisted on bigger properties. They are real close together, and there are a lot of families there, so since everybody is concerned about health and we are not allowed to say no, we don't have to say yes, put it there. We need to really take a look at where the options are, where the companies can put them, and where we are willing to do it. This is Sophie's Choice, we'll give up our son in order to keep our daughter; we'll give up one location in order to put something somewhere else, but it is not a good choice either way. She knows this is not a forum for her to ask a question, so she will make it a rhetorical question, she wonders why we need new towers in that area near Sugarloaf. It is the highest location on the map; it backs up against the mountain and the National Forest, and the neighborhood there is not growing in leaps and bounds. There are a few empty lots there, but it is not growing in leaps and bounds. They have cell phone coverage and there is cell phone coverage on Thunder Mountain, so if you are a hiker, you can get rescued. Another question, Mr. Klein brought up the actual compliance with some of the regulations about safety, so would there be some way for us to monitor those 20 or 25 years later, to make sure they are still in compliance, and if they are not in compliance, fine them and make them pay for the cost that it took to determine that they were out of compliance? Just a thought to keep them in compliance.

Karen von Merveldt-Guevara, Sedona, AZ: Ms. von Merveldt-Guevara indicated that she spoke last time and spoke in another meeting on smart meters, and she works in alternative medicine. She is a trained MD; her training is from Germany, and she is an International Member of the American Academy of Environmental Medicine. She left papers with the Commission last time, and the AAEM has for years issued statements and recommendations to the FCC with not much recourse about the non-existing safety of non-ionizing radiation. There is study after study out like everybody quoted, and she can only agree with Barbara Litrell and others who spoke before her. We are here to make choices that are no choice. She would like to know who determines what we need here, and she would encourage the citizens and the City to look at their own use of their cell phones and their own data flow, because it is our demand that drives the industry. There is a lot to do and a lot that we can do privately. The person that spoke here last time and said they had bad

reception, if you have wi-fi on your home, you are in charge of that router and can jump with your cell phone on your wi-fi, so many some people just lack the knowledge to work modern technology. The other point is that she knows the areas of high density are the target areas by the industry, but those tourist areas, the hotels and resorts, could do a lot more to facilitate the plugged-in wi-fi possibilities to help their customers, and the City of Sedona could set an example of promoting public health and safety, because she cannot believe that there are not laws that could overrule whatever the federal or state law issued, because it is limited in its consequences to just look at the wireless or the telecommunications industry versus public health and safety. There is a civil right to public integrity and that is at stake.

Dewey Akers, Sedona, AZ: Mr. Akers presented another 129 signatures out of the Sugarloaf area and indicated that the majority of them are from tourists who don't want to see a tower in that area. We have now put up a board on the street for tourists to sign-in with, so he would like to present you with those. Secondly, he invited each of you to come and meet with Tom O'Halloran this week, and he realizes it was the holiday and short notice, but it was a very informational meeting and a number of them went to his office in Flagstaff and spoke to him about this issue. He knows that you have been presented by Keep Sedona Beautiful information about taking Sugarloaf off of that list, which wasn't done in the initial 40 or 60 or whatever it was, but more importantly, we talked a great deal about 2365 and the legalities and challenges that have yet to be addressed. You are throwing your eggs in a basket that has yet to be proven. Also there is Mesh network, which you haven't addressed with your consultants, and that is why Japan and Europe are so far ahead of the United States, and that requires very little RF exposure, and most of the technology that AT&T, Sprint and all of the majors have currently -- all of the cell phones allow for that technology presently, so your resorts, hotels, density areas, should be providing their own access to that technology versus asking the rest of us citizens to pay for their conveniences. He would also like to ask that this Commission consider that this community has not been reached out to successfully or adequately, and the 42 people that you referenced in your Master Plan overview is certainly not an overview of the community, and he would ask that you consider tabling moving this forward to the City Council for further community involvement. He was going to ask about lease payments, but you addressed that currently.

Rich Helt, Sedona, AZ: Mr. Helt passed, and declined his opportunity to speak.

Reisha Akres, Sedona, AZ: Ms. Akres stated that she lives in the Sugarloaf area of Sedona, and it is with dismay that she sees that Keep Sedona Beautiful did a rather extensive study over a year ago with over 40 sites, and Sugarloaf was the number one site they suggested to be taken off the Master Plan, and now it is with dismay, she sees it is the number one site we are looking at. They looked at the needs of the community, residents and beauty of the area, and it has been kicked right off. Again, she recommends that we table this for further review, further decibel level, further looking to see if we can monitor to see the radio decibel outlook and how you can look at this and monitor it to look at the health concerns. Can we do that, can we look at the decibel level of those larger structures? We were looking at those trees at the Sugarloaf site; that is a huge structure and it didn't show the supporting structure. If you go to Flagstaff and see one of those trees, it has a monstrous building that goes with it, and if you stand beside it, the decibel level is huge when it goes off, so don't let them say that it sounds like a compressor; it doesn't, it is loud. She wants to look at that ongoing compliance with the radio frequency; how do we do that? Does the City have any way of doing that? To me, a fine is not enough; a fine is just a way for the City to make money; it doesn't protect us, and to answer that rhetorical question about why do we need it right there – we don't. What we need it for is the tourists who come there and want to take their selfies, and the buses that are coming from the resorts; they are the ones pushing it, and if the resorts are pushing it, why aren't we looking at the resorts to site these structures? We do need to extend the communications to the neighborhoods; we live in the Sugarloaf area and we were never notified. We really need to do a better job of community involvement, and we do have current problems with those poles that we're talking about adding onto. The wires on those poles are currently 3 ft. lower than federal standards and are currently in the trees, so if you're looking at putting high electronic frequency structures on them, you are going to have real problems.

Kevin Okie, Sedona, AZ: Mr. Okie thanked them for bringing up the studies, and wanting to look at limiting the RF frequency or at least having some oversight. He was going to say strike A1 and A2; obviously no one wants them in our neighborhood, but due to the House Bill passed by the State Legislature and the Governor that means they can put them on the power lines there, and one of those is in my yard, so saying strike A1 and A2 doesn't help anybody else in town either. If so much of the citizenry is opposed to this and if local government isn't a forum for beginning to discuss bucking or trying to look at laws that are a public safety hazard or that permit these kinds of large corporations to overrun smaller communities, this should be a forum where we can start to reach out to other communities, and form some kind of larger discussion here. He doesn't want to say strike A1 and A2, because that leaves everybody else hanging out to dry, and it sounds like the Master Plan – he gets the intentions, but it sounds like it is almost a moot point at this point. He is curious about whether there is incentive to even lease city-owned lands when they can build the tower for $50 a year somewhere else. Basically, he just wants to say that it sounds like the citizenry is saying this disturbs us to a great degree. He knows that it is federal law and state law and that our hands are tied, but we shouldn't be just rolling over and accepting that, and he would like to suggest that maybe we do start having a discussion about how we form some kind of resistance to this. Form some kind of effort to on a wider scale, because Sedona alone is not going to overturn a law, but start to have discussions about how we resist this, and it sounds like some communities have, but he just wants to leave it with that.

Randy Smith, Sedona, AZ: Mr. Smith indicated that he lives across from the trailhead, so he is just like this gentleman. For him to say that he doesn't want it in his front yard is something he is not going to say, but having it in that park; man, we are really missing the boat there. It is not that kind of park; he could see it in some parks, but Sugarloaf is a wilderness access. There are a great number of people that come there that can only walk a couple hundred yards; that is as far as they are going into the wilderness, a good share of the people. He doesn't think it would work to put a noisy box out there with a fake tree there, and he realizes that what we are trying to do here is not get things shoved down our throat, but he would think Sugarloaf would be the last place that we would want one, so to put it as A1 and A2 just doesn't make any sense. He agrees with all of the RF issues; he is on board with that, and then as far as the infrastructure is concerned, the power lines are too low and like who is going to do anything about that? He guesses the city people are supposed to be in charge of that, he doesn't know; they have been too low forever, so we will just leave them the way it is. The road, since 1977 or whenever it went in, is way in the wrong place. It is on my property; there is 6½ ft. of the current road that is his property, and he wasn't want to screw up his neighborhood by sticking a wall in the middle of the road, leaving you 11 ft. for your road. The telephone poles sit about in the middle of where the road belongs, so what happens if the cell companies come in and put a tower up there and the City decides that you need a road at Buena Vista? There are all sorts of issues up there.

Paul Kelson, Sedona, AZ: Mr. Kelson was not present when called to speak.

Commissioner Barcus explained that it is practice to not comment on statements made during the public comment, but he wanted to make sure everyone knows that the numbering isn't a hierarchy in terms of preferences; it was just for convenience, so these things could be found on the map, so there is no hierarchy in terms of preference.

Kirk Landauer, Sedona, AZ: Mr. Landauer stated right there at the hotbed of this discussion, primarily the Sugarloaf Trailhead. He forgot who made the quotation, but it is rather appropriate at the moment. You should be the most scared when the Federal Government says we are here to help you. If this is any indication of a stalking horse, a Trojan horse or whatever you want to call them coming here to sell you and us a bill of goods that we need this. How many people are coming to Sedona in the next five to ten years? Are we going to double the inventory of residents? If they are here, maybe it is the high rises that they are going to put up. There is no place for anybody to go; this town is pretty close to buildout – what a couple hundred undeveloped lots? That's it unless you start compromising the BLM land to developers and all that nonsense, and he has lived through that in other neighborhoods. Please wake up, we don't need it. When is enough,

enough, and somebody, and this is just the right jurisdiction, draw the line in the sand. Enough is enough; tell the feds to go . . ., and he has five bars in his front yard; he doesn't need any better service than that. It is a canard; pay attention.

Barbara Kiefel, Sedona, AZ: Ms. Kiefel indicated that she also resides in California, and in regard to all of the good things that were said today, she appreciates the community in particular that has come out to talk about this. She will bring up some key points. In relation to the Council here in regards to Federal law, there are lots of laws that are on the federal books that mean nothing and they are not imposed, so don't think that is a reason why we have to move forward. Please, to her community, take the time to call your legislators and advise them that this is not something for Sedona, Arizona, and that we need to fight it. Number two, the beauty of Sedona; keep in mind that this Council and many people in the community spent millions of dollars to improve the view that goes on in just one area, just that major bridge. There was a height requirement for lights, but yet, you want to affect major neighborhoods with appalling looks, and keep in mind, just because it looks like a tree, doesn't mean that it belongs there – it is not nature. There is a site, check it on Google, called '15 Horrifying Looks of Trees' that are cell phones disguised as trees. You look at them yourself and tell me what you think; that is not something that will fool anybody. Number three, one approval opens up a flood gate. She also lives in a community in California and a local park agreed upon letting in Verizon to build what you called a 30-ft. tower, and it ended up being over 100 ft. and from the course of one year's time, we had five within that park. She has a photo of it, if you would like to see it after we leave here, of how huge these are and how they took away the natural beauty of the Santa Monica mountains. They do affect home values, in fact, that side of where she lives in Santa Monica has experienced over a 25% reduction in home value, because people do not want to stare at them. Health concerns, keep in mind that Europe definitely, as said tonight, they are definitely ahead of us in relationship to concerns of health. These particular emissions have not been tested, and it is in the future. We do not need them for involvement of having community or tourists coming to Sedona. People come to Sedona for nature; we want them to unplug. They can stay in their hotels and use wi-fi. There is still opportunity; she lives right on Orchard Lane and gets fine reception. She doesn't need a tower on Jordan Road staring out and taking down her home value as well as her neighbor's. Businesses are affected by what you consider to be free wi-fi. What takes a person . . ., keep in mind, McDonald's used to have free coffee all the time, but what they found in free wi-fi in different places like Starbuck's, was that people would sit for three hours and milk a cup of coffee for three hours. Our businesses don't want that, do you want that? If you are a tourist waiting for . . .

Commissioner Barcus advised Ms. Kiefel that her time was up.

Karen Shuman, Cornville, AZ: Ms. Shuman stated that she has worked in Sedona as a realtor since 1989, and what Sedona is known for throughout the world is its beauty. What she is asking you today is to take the Jordan Road cell tower off of the list, because Uptown, Jordan Road is at the base of the most exquisite mountain, Steamboat/Submarine Rock, and if you stick a cell tower there, she doesn't care how creative the cell tower people are in making them attractive, they are weird, odd and eyesores, and they hurt property values. They devastate what the City of Sedona needs to protect, and that is our beauty, that is what we are known for, so please take it off of your list.

Kimberly Lillyblad, **Sedona, AZ**: Ms. Lillyblad indicated that she appreciates what you are attempting to do, and she realizes that this is a challenging matter, so she does want to say thank you to everyone who is hearing her. A little side note, it would be greatly appreciated for 11 Newcastle Lane to be removed from the wireless plan list. She will go into more detail shortly, but first would like to express very clearly that the City is the entity that is proposing to put a tower in our private neighborhood, meaning without the City very more than likely, almost certainly, they wouldn't come to her neighborhood. We have very private rough roads; they are private and not city-owned, and all of her resident neighbors, not the City neighbor, but the resident neighbors are not interested in selling out, so she just wanted to make that really clear, and she wrote a letter, so she is going to read the letter; hopefully, within the time. Ms. Lillyblad then read the following:

"In regards to the proposed wireless tower site at 11 Newcastle Lane, the neighboring property at 70 Newcastle Lane is a historic property in this historical area. It was home to the salvage of the Call of the Canyon, a creek-side cabin, and Oak Creek Bait and Tackle. The historically designated Owenby Irrigation Ditch runs through the property and was incorporated by the previous residents, Kay and Clyde Tillotson. There is a tranquility here that is offered by the sensitivity of the area; the established wildlife reside in this area because of this sensitivity.

The lift station property the City is proposing for a 20-ft. wireless tower is in a valley on a mountainside in this historical area of Oak Creek. The property is near the creek, surrounded by established natural wildlife such as rookeries. It is next to the historically-designated irrigation ditch and is less than 100 ft. from my creek-side home and property. A historical creek-side home with irrigation is a rare and special place in the desert. This must be considered in accordance with Article 17, Wireless Communications Facilities, Section C, which states, 'Consideration of historical and environmentally-sensitive areas, as well as consideration of potential impacts on adjacent properties'. This article indicates that the City of Sedona is being negligent and has not in any way taken into consideration the impact of the proposed wireless tower on this historical creek-side area.

The geographical maps that were presented by the City do not represent what the coverage would potentially look like from the proposed sites. The mapping does not accurately show the actual amount of coverage that would be gained from these specific proposed sites. This came to my attention and was confirmed. It seems impossible for a 20 ft. . . ."

Commissioner Barcus advised Ms. Lillyblad that her time was up and she responded that she really needed to finish this. The Commissioner stated that she could give the letter to the clerk and Ms. Lillyblad stated no, she really needed to finish. The Commissioner stated, excuse me, but your time is up, please give the letter to the clerk, and she will enter it into the record. Ms. Lillyblad stated wow, wow, wow, and the Commissioner stated sorry, the rules are the rules.

Michael Sanders, Sedona, AZ: Mr. Sanders thanked the four Commissioners and those who had invested their time in creating this Plan; it is irresponsible not to plan, so thank you for what you have done; however, the difference between having the wireless community come in and impose a tower in our neighborhoods is very separate from feeling that the City of Sedona has invited them into a neighborhood, and that is what you are hearing from several residents today. You are hearing it strongly at the Sugarloaf Trailhead, and he is here to represent the Jordan Park as well as the others that have spoken, and as you heard before him with Newcastle, if they come in, we all understand federal and state laws prohibit you from stepping in their way, that is clear; however, what we are feeling is you are inviting them right next door to our home. What hasn't been mentioned about the health effects is that they are amplified with young children, whose skeletal structure is not yet developed. Their bodies are more absorbent to these RF emissions. He represents 200 people in his community, and he will be leaving a petition of 200 signatures. There are nine families with children under 5-years-old; that is a highly susceptible population. Those with young families are within 100 to 300 ft. of the proposed tower in the Jordan Park area. The Jordan Park site is a field trip site for our public school system. Growing up here for the past 30 years, he attended a field trip there as a young child. His mother has been a public school teacher in the community for 36 years, so your actions will have serious consequences on the trust of the community with feeling that you are inviting the cell companies into our neighborhood versus letting them intrude, then they are the villain, not our elected representatives. He also thinks there is a flaw in your site selection criteria. Primacy should be given to sites, which aren't in the immediate vicinity of residential homes, especially like the Joran Park area where there are families with young children right next door to the tower site. He knows for a fact that in the excluded sites in the Jordan area; there were several not in the immediate vicinity to houses. Those were eliminated, because of proposed view concerns or land obstruction, land disturbance concerns. He believes that is absolutely flipped given the health effects, which are still coming out and you are seeing, which have been submitted into evidence at the last meeting. Primacy should be given to sites away from homes. Again, thank you very much for your time. It is responsible to plan, but it is

more responsible to have criteria which models the community's interest, keeps these towers, which we understand will come, away from our homes, our children, and not inviting them right next to our homes.

Rebecca Torok, Sedona, AZ: Ms. Torok stated that she is near the El Camino proposed location. She became aware of this very recently, and she received a letter, because she is within 300 ft. of the proposed site, but for neighbors that are 350 ft. to 1,000 ft., there are no letters that have gone out to those neighbors, and we are talking about Sedona Meadows, Thunderbird Hills; neighborhoods off of El Camino. It is like a wraparound of neighborhoods around the pump station. Our neighborhoods are kind of behind. We don't have awareness over there of what is happening. These people live so close by this and they are not being informed by any kind of letter; she herself has just become recently informed of this and that she needs to take in up herself to go out and make those people aware, but she spoke with Karen Osburn, who sent the letter out that she got, and she declined to send those neighbors any kind of notification to people that are 350 ft. or 500 ft. away, and she feels her neighbors that heard about that, the people she knows and spoke to are very shocked by that, because it is not like a bread & breakfast 300 ft. away. You are talking about something that clearly will affect those people and, from their point of view, their health. The other thing is that she would like to know what timeframe we are talking about that these could potentially go in, because she would like to have the time – it is a down market, so she would like to have time to sell her house. She doesn't want to sleep within 300 ft. of a cell tower at all, so she would like to have time in a down market – homes taking two or three years to sell; she would like to know if it is going to go in before that -- could potentially go in before two or three years. Is there someone here that can address that?

Commissioner Barcus explained that the Commission is not allowed to respond to questions from public comment.

Ms. Torok then continued to say that the other things she would like to know is what the amount of microwatts per meter squared is for us and what their exposure would be. On El Camino, they are talking about a micro site and what does that translate to in terms of how many microwatts per meter squared? That is important for the neighbors to know. She would like to make them aware of that herself, even though she intends to sell her home. How can she find out some answers to those questions?

Commissioner Barcus advised Ms. Torok that her time was up, but she could contact staff and they can respond to her.

Kristina Paley, Sedona, AZ: Ms. Paley stated that she just had a brief request. Just like the previous resident who spoke, she found out by complete chance about this hearing from her friend who lives on Sugarloaf, so she does request that the Council disseminate this information to many residents around those 20 sites that you are proposing would be open to those cell phone towers, because it is a little bit unfair for us to have this room full of so few people, when a lot more people would be concerned; they just don't know, so please she requests that.

Having no additional requests to speak, Commissioner Barcus closed the public comment period.

Summary Discussion:
Robert Pickels suggested, regarding the process and given the hour, that these two items are posted for possible action on the public hearing agenda, but that doesn't necessitate that action be taken today if the Commission is not in a position to take action. You can simply take no action on those items, if you feel more time is necessary, but what he would caution is that we do have the consultants here today, and if you have specific questions regarding specific sites or anything that requires the technical expertise of the consultants, you should definitely take advantage of their presence today and ask those questions, but if you feel that another work session would be appropriate to more fully explore some of the discussion you want to have, that would also be appropriate, if you decide you want to do that.

Commissioner Klein indicated that he had a couple of more questions for the consultants, and going back to the issue of what we can do to determine that new collocations or cell towers are complying with the amount of RF exposure they are allowed to put out, he said one of the things we could do is require the provider or an independent party, at the provider's expense, to make periodic measurements for compliance with FCC rules. If he heard you correctly, you said there was a Maryland case that decided . . . Mr. Lepore interjected, County of Anne Arundel vs. FCC. The Commissioner then asked if that is what that case held, and Mr. Lepore stated yes, and for further support of the FCC rules on the issue, you can look at the cities of San Antonio and Austin vs. FCC, which is a Supreme Court decision from June of 2014. He thinks it is captioned San Antonio vs. FCC and Austin was the secondary city in it. They fought the battle that was advocated from members of the public already, and the Supreme Court ruled in the FCC's favor. Commissioner Klein then asked why the court ruled that once these were up you can't monitor them to determine if they are exceeding their amount of radiation. Mr. Lepore explained that the Court ruled was that the FCC had what is called 'field preemption' in this area and that local jurisdictions had no ability to overrule what the FCC has determined to be appropriate and cannot second guess the FCC's position on this matter. Commissioner Klein then stated that once these are put up something could happen and they could be exceeding the amount of exposure allowed by the FCC and there is nothing we can do about it. Mr. Lepore indicated that what the FCC has said is that you can file a complaint with the FCC.

Commissioner Klein again referenced the article and indicated that the author said that – well, he guesses that it is irrelevant if you can't determine that they are exceeding limits. This was answered but he didn't get to write it down, so where exactly in either the proposed Land Development Code or the Wireless Plan do we talk about what the providers have to provide us with, so we can determine that their towers aren't going to exceed the FCC requirements, and Mr. Lepore stated that there are a number of places where the part of the applicant's submittal package includes a certification from their RF Engineer that the equipment is type-accepted and does meet the FCC standards. The Commissioner asked if that is in the material, and Mr. Lepore stated in the draft LDC in a couple of places. The Commissioner then asked exactly where, and Mr. Lepore referenced 1705.01 subsection G and there is another location in 1705.02A, and he is going to propose as strong a language as the Supreme Court said we can impose there.

Commissioner Klein then stated that we shouldn't vote on this today, and if we have another meeting, could you put together a slide that will show what you are proposing in that regard. Mr. Lepore stated for the language, sure. It also is in 1705.04 in the draft.

Commissioner Klein asked what a Mesh network is, and Mr. Lepore explained that is another name for DAS network that he discussed earlier. The Commissioner then referenced a comment by the public that primacy should be given to sites not near families, and asked of these sites on the list, is there any way you can provide the number of houses within 300 ft. of each site. Mr. Lepore indicated that he doesn't know that they have that data; however, staff indicated that could be provided, and the Commissioner then asked that it be provided before their next meeting. Commissioner Klein asked why notices were only sent out to people within 300 ft., and Karen Osburn explained that is what the current ordinance requires for private providers. If they are siting a tower, they must notify within 300 ft., so we used the same criteria for our notifications. The Commissioner again asked if, for the Commission's next meeting, staff could tell for each of the 20 sites how many houses are within 300 ft., and Karen stated yes.

Commissioner Cohen stated that there had been a lot of questions raised today, and he is not prepared to make a recommendation to the City Council yet. There is some date that some of us have requested that he would like to hear before we go forward, so he would request that we put this into another meeting. He then asked if the Chair wanted a motion, and Commissioner Barcus explained that the consultants will not be back for us to ask questions . . . Commissioner Cohen interjected that is understood, but they have already told us they will provide information. Commissioner Barcus then stated that he would like to hear from Commissioner Brandt before entertaining a motion.

Commissioner Brandt stated that it appears that it is two to something in a four-member board, so it doesn't sound like we are going to make any recommendations tonight. When folks are talking about the City being more proactive in protecting the health, he thinks that is an absolutely fantastic notion, but as other people have said, our hands are somewhat tied, because of the FCC ruling and because of the way that the boards and commissions of the City of Sedona are set up within the rules of the state; we are set to these really narrow little paths of what we can and can't do. At the last work session, he also suggested that the folks that have the energy of bringing this together and of really challenging it, continue with that energy, but it is not necessarily the Planning & Zoning Commission that might be the best place to do that. He went to the American Cancer Society and they were kind of downplaying the concerns saying that it is more just actual distance from towers and it drops off real quick, and Dr. Andrew Weil from Tucson had similar statements that really they didn't find it to be that broad of a health concern. Two places that he respects with their official statements, but there is always something new coming out. It would be interesting to know from seeing the big towers that are on our professional safety places, the firefighters and EMTs have been dealing with wireless communications and have huge towers right over their heads; they live in those places all across the country and across the world, so that would be a good place to start to find out, and ironically, they are in the health business. For those in attendance and for everyone here, his thought is that the Master Plan and the proposed Land Development Code prohibit towers in the National Forest and in open space, so it seems that those places that appear to be National Forest recreation sites should fall into that same category.

Commissioner Brandt added that commercial use in a residential zone, he is having questions about, and a few people mentioned that we can't, as a city, say we can't have these things, and we have to provide for them within our ordinances, but we shouldn't encourage their use in certain places through endorsing them within planning, even though the City of Sedona is not setting up these towners and that is something some people seem to think that the City is going to be putting up these towers, but yet, having the Master Plan say these are the preferred locations is saying the City is endorsing these places, and that might not be the best thing. Someone mentioned in passing that in the canyon, there was a cell tower proposed in a certain neighborhood and the folks there protested and another place in the canyon said they would rather have it there in a commercial space, so that is where it moved to. Had there been a Master Plan that said that was a preferred location, then those people might not have had the sway within the cell phone companies to move that, so those are his thoughts and while he was ready to make a recommendation with an amendment to the recommendation to the City Council, it doesn't seem like it would be going anywhere, so he will just hold his thoughts and get more information as well as you folks will.

Commissioner Klein asked if the consultants are not going to be at next meeting, how they are going to get the Commission whatever you plan to put into the Land Development Code to toughen the language to ensure that the cell phone companies comply with the FCC requirements on the amount of exposure allowed, and Susa Rabold said that they will make the amendments as they understand them and provide it to staff, and then staff can get it to you.

Commissioner Barcus stated that he would entertain a motion; however, Audree Juhlin recommended that they date specific the motion, and the next available date would be Thursday June 29th, so we would continue the discussion to June 29th. Commissioner Barcus indicated that he would not be available on June 29th.

MOTION: Commissioner Cohen moved to table this discussion and perhaps the final decision to the June 29th meeting, so that we may get all of the data that we have requested brought to us, so we can study it more carefully.

Commissioner Klein asked if there is some date we could move it to when Commissioner Barcus would be present. It might be best if everybody could be present to make this decision. Commissioner Barcus stated that he would be available after the 4th of July, and there is no meeting scheduled the week of the 4th, because that would be our meeting date.

Robert Pickels explained that the motion could be amended to simply continue items 5a and b to a future date as coordinated by the Chair and the Director. Commissioner Cohen stated that as the maker of the motion, he accepts our attorney's suggestion.

AMENDED MOTION: Commissioner Cohen moved to continue items 5a and b to a future date as coordinated by the Chair and the Director. Commissioner Klein seconded the amended motion. Motion carried, four (4) for and zero (0) opposed. Chair Losoff and Vice Chair Levin were excused and Commissioner Mayer was unexcused.

Robert Pickels explained for the benefit of the public here today that when this item is heard again, it will be a continuation of today's hearing, so it won't be a new public hearing with new public comment; it will be simply a continuation of where we left off today. Commissioner Barcus then added that will be discussion among the Commissioners on the issues and we will have the minutes of this meeting at our disposal, and the Commissioners who were unable to attend today will have those minutes, and included in the minutes will be a transcript of all of the public comment, I think. Commissioner Cohen stated yes, they were in the minutes of the last meeting.

6. FUTURE MEETING DATES AND AGENDA ITEMS

a. Tuesday, June 6, 2017; 5:30 pm (Public Hearing)
b. Thursday, June 15, 2017; 3:30 pm (Work Session)
c. Tuesday, June 20, 2017; 5:30 pm (Public Hearing)
d. Thursday, June 29, 2017; 3:30 pm (Work Session)

Commissioner Barcus indicated that he received an email that the meeting on June 6th has been canceled and that has been noticed. Audree Juhlin agreed that June 6th is canceled, and the next meeting date is June 15th and we do not have any items for that meeting, and the same with June 20th. June 29th, if we are not having wireless is also available, so the next meeting we do have a scheduled item for is July 18th, which will be the Land Development Code discussion. Commissioner Cohen asked what would happen to the three she mentioned, and Audree stated that most likely those meeting dates will be canceled. Commissioner Klein and Commissioner Brandt indicated that they will be out of town on June 15th and Commissioner Cohen indicated that he had already notified staff. Commissioner Barcus reminded the Commissioners to send an email to Audree, who then indicated that for future meeting agendas, she will be sending out dates for the continuation of the wireless, so she asked that they get back to her as soon as possible with their available dates.

7. EXECUTIVE SESSION

If an Executive Session is necessary, it will be held in the Vultee Conference Room at 106 Roadrunner Drive. Upon a public majority vote of the members constituting a quorum, the Planning and Zoning Commission may hold an Executive Session that is not open to the public for the following purposes:

a. To consult with legal counsel for advice on matters listed on this agenda per A.R.S. § 38-431.03(A)(3).
b. Return to open session. Discussion/possible action on executive session items.

No Executive Session was held.

8. ADJOURNMENT

Commissioner Barcus called for adjournment at 6:23 p.m., without objection.

I certify that the above is a true and correct summary of the meeting of the Planning & Zoning Commission held on June 1, 2017.

_____ _____

Donna A. S. Puckett, *Administrative Assistant* Date