



**Engineering Statement
Prepared for the City of Madison, WI
Third Party CUP Review
RE: Proposed Sprint/ERS Telecom Wireless Tower
1314 Parkside Drive**

April 25, 2013

**Prepared by:
Ralph E. Evans
Evans Associates Consultants
13716 North Lake Shore Dr. Mequon, WI 53097
Phone (262) 242-6000
iii@evansassoc.com
evansassociates.com**

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BACKGROUND

This report has been prepared by Ralph E. Evans of Evans Associates, Communications Consultants in Mequon, Wisconsin, regarding a proposed 126 foot monopole wireless structure (including lightning rod) and associated equipment building. The monopole will be in a fenced compound as proposed by Sprint/ERS, and it is designed to support a total of four carriers.

Evans Associates has been retained to evaluate the proposal from the standpoint of necessity and minimal visual impact, as well as compliance with the Madison City Zoning Ordinance. Pursuant to our employment, this exhibit has been prepared.

The siting information provided to Evans Associates by Sprint\ERS has been used in evaluating the necessity of constructing this wireless tower. The analysis and the conclusions contained herein have been prepared by, or under the direction of, Ralph E. Evans, or have been submitted by the applicant. Information provided to Evans Associates by other parties is believed to be correct, and has been verified when feasible.

The following analysis consists of three sections:

1. Abstract (Section I)
2. Site Analysis (Section II)
3. Recommendations (Section III)

I. ABSTRACT

Sprint\ERS is continuing the process of building out their network in Dane County and Madison. Accordingly, the specified site is a "macrocell," which means it is required to improve the coverage of the primary service in all directions in a large sized area. Generally, macrocells have minimal overlap with adjacent cells utilized by the same provider; the need for the new site is therefore normally self-evident within the "search area." As wireless phone use increases, the incidence of emergency and safety of life communications also increases, making high-penetration levels mandatory in both urban and rural areas. In order to improve coverage geographically, some new construction is to be expected. Federal regulations require that local communities treat all carriers identically with respect to permit requirements.

Public safety¹, land use and other environmental considerations must be addressed at the local level, especially with respect to the visual impact of the proposed structures and conformance with planning requirements. Accordingly, the proposed site has been analyzed carefully from the standpoints of regulatory history, service necessity and availability of alternative sites. The conclusions reached herein represent the most complete engineering evaluation we are able to perform. This document and the attached exhibits are true and accurate to the best knowledge and belief of Evans Associates.

II. SITE ANALYSIS

The following paragraphs represent our analysis of the instant Sprint\ERS wireless application, which was conceived out of a need to fill a coverage gap and provide uninterrupted cell service to the community, including future 4G LTE (new generation) services such as telephone service, voice paging, Internet and wireless data transmission.

The Sprint antenna will be located at the top of the tower. There will be a 3G signal with a 4G overlay.

The tower height proposed, 126' AGL, has been requested by Sprint\ERS wireless in order to provide better coverage between the adjacent network sites (see Figure 2). The Sprint\ERS antennas will be mounted upon the proposed monopole tower at 123 feet. Additional co-locators' antenna arrays could be placed below the Sprint\ERS Wireless array. Because of the topography of the area, a significantly shorter structure would invite additional tower proliferation, which is not recommended. Relatively taller structures are required to serve areas behind hills and dense trees, especially for the co-locators that may be mounted lower on the tower.

The proposed site adds area and population to the existing propagation area shown in Figure 1, primarily in directions generally east and southeast from the antenna's location, as shown in Figure 2. This location will facilitate construction of the Sprint\ERS Wireless high-speed network in the Madison area and Dane County.

In Sprint\ERS' opinion, this new structure will represent the appropriate height and location that will achieve the required technical objectives, which is to provide and stabilize service along East Washington Avenue. As detailed herein, Evans agrees with this opinion.

2.1. Validation of RF Information

The proposed site utilizes a 12-antenna combined array, representing dual band omnidirectional coverage. The tower profile is shown in Figure 3.

¹ Except *Radio Frequency (RF) Exposure* issues, which are regulated by the FCC.

2.2. RF Exposure

The proposed site will meet FCC RF exposure requirements with respect to the general population as long as no high-power antennas are installed below 60 feet above ground level (more than approximately 6 kilowatts ERP).

Accordingly, with the RF energy exposure standards utilized in previous evaluations by this consultant, and as per previous concurring opinions from the Medical College of Wisconsin, it is concluded that there is no credible concern related to RF health risks with respect to the described site as long as the industry standard construction practices are followed.

2.3. Alternative Ways of Addressing a Particular Service Area Void

The applicant has stated that there are no suitable existing alternative sites upon which the proposed antenna may be co-located. The closest existing tower site is 80' high and is outside of the search area defined by Sprint/ERS (within an approximate one-mile radius from the center of the original search ring. Evans has confirmed the lack of a suitable structure by researching the ASR FAA database.

It is the intent of the Madison Zoning Ordinance to populate the city with the minimum number of structures through means of co-locating carriers. The instant proposal is in conformance with this requirement by means of supporting a total of four carriers.

2.4. Conformance with Industry Standards

A six (6) foot high chain link fence will surround the tower and equipment building for security reasons. The fence will include barbed wire at the top for a total of seven (7) feet in height.

Assuming no serious malfunction of Sprint/ERS wireless transmitters or public safety radio receivers, interference to public safety or other RF services is not expected. In any case, all transmitters and receivers located at common sites should observe good engineering practice with respect to tower bonding and grounding.

2.5. Proposed Height Verification

As per the above discussion, the tower height is dictated by the antenna height necessary for reliable coverage, which is influenced by topography and "look angle." This proposal, at 126 feet, is below the normal macrocell height of 150 feet above ground level, but the height is sufficient to service the required area of Madison.

2.6. Response to Nearby Residents' Questions

None received by Evans.

2.7. Validation of Adequate Support Structure

Sprint\ERS Wireless has provided drawings of the proposed tower. A set of detailed design drawings has been reviewed and stamped by a structural engineer, licensed by the State of Wisconsin, to verify that the latest EIA/TIA standards are being observed, and that the tower will support the antennas of three additional possible future co-locators.

2.8. Visual Impact Assessment

The proposed tower would be configured as a tapered monopole using "low-profile" antennas. This structure is less visually intrusive than a lattice-type tower.

2.9. Alternative Sites

No alternative sites have been identified that would pose a reduced environmental impact.

2.10. Co-location Capabilities

According to Sprint\ERS Wireless, the proposed tower has been designed to accommodate up to three future additional carriers, for a total of four carriers. It is the intent of Sprint\ERS Wireless to allow future PCS or cellular antenna arrays to be added.

2.11. Network Propagation Analysis

A propagation study conducted by Sprint\ERS Wireless, and verified by this engineer, shows that there is an unmistakable underserved area surrounding the proposed site, as seen in the attached Figure 1. This significant coverage gap would result in reduced quality and dropped calls in these areas, especially for high-speed data. A wireless network must be put together like pieces of a puzzle; each site is located strategically so that when the network is completed, a cell telephone subscriber can use his or her phone anywhere in the county without dropped calls when transitioning between cells.

Figure 2 shows a coverage area map with the proposed site activated. The colored areas show the newly acceptable coverage that the new site would provide.

The color scheme used for the propagation maps is as follows, and reflects Operational Path Loss:



Green.....BEST (assume In Building Coverage (dBm) > -113)
Yellow/Red...GOOD (assume In Vehicle Coverage (dBm) > -123)
Blue.... FAIR (assume Street Level Coverage (dBm) > -133)

III. RECOMMENDATIONS

The following recommendations are made with respect to the proposed Sprint\ERS tower site:

1. It is the opinion of Evans Associates that the Sprint\ERS proposal is in conformance with industry standards and the technical requirements of the Madison Zoning Ordinance.
2. If the tower is approved, all tower components, appurtenances and transmission lines should be bonded securely and grounded to prevent RF interference caused by stray signals.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Ralph E. Evans III".

Ralph E. Evans III
Senior Consultant
Evans Associates

Attached Figures

- Figure 1 --- Existing Propagation Map
- Figure 2 --- Proposed Propagation Map
- Figure 3 --- Tower Elevations

Figure 1 – Existing Propagation Map
East Towne – Parkside Drive

Current Prediction Coverage Without Site ML85XC644

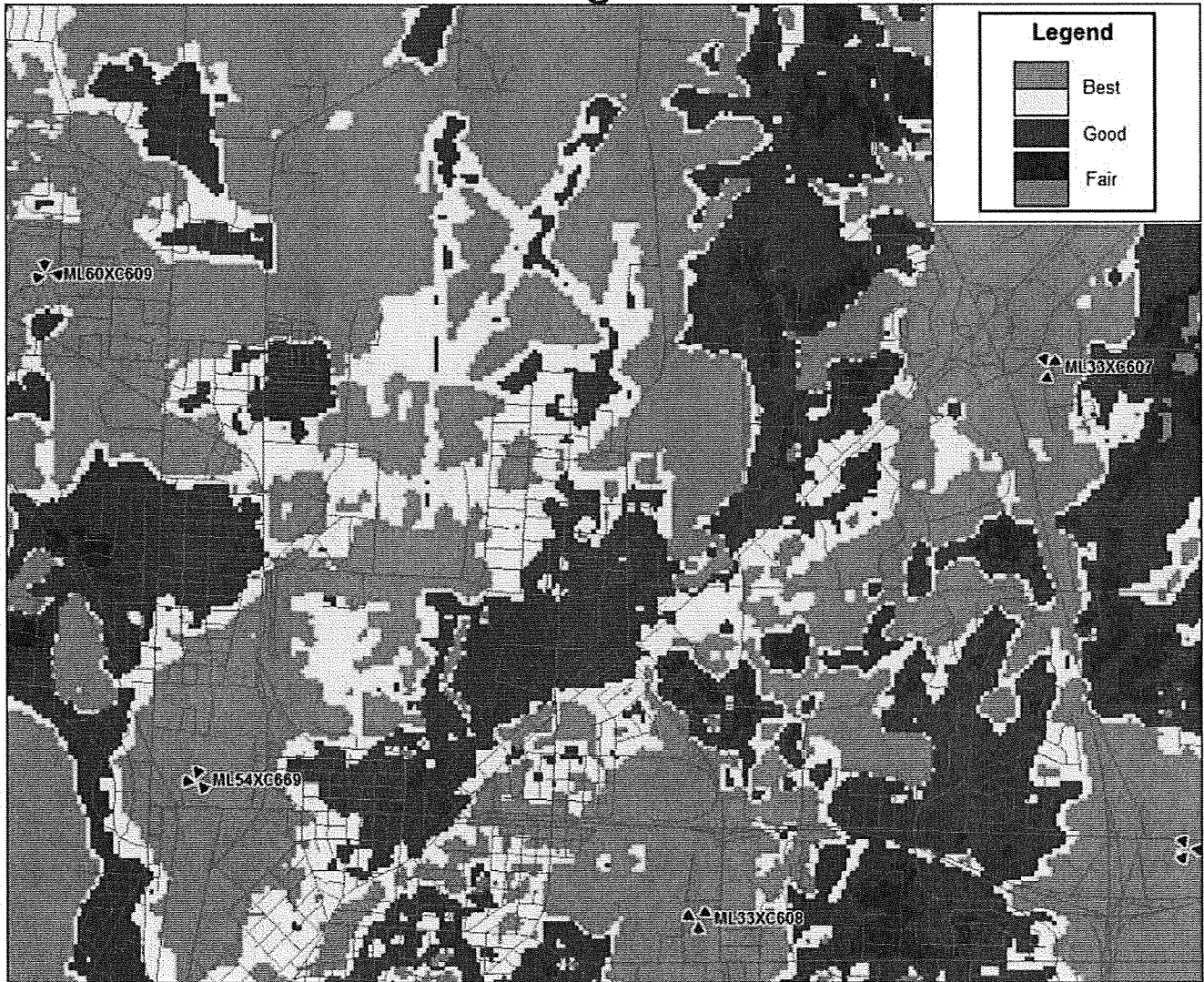
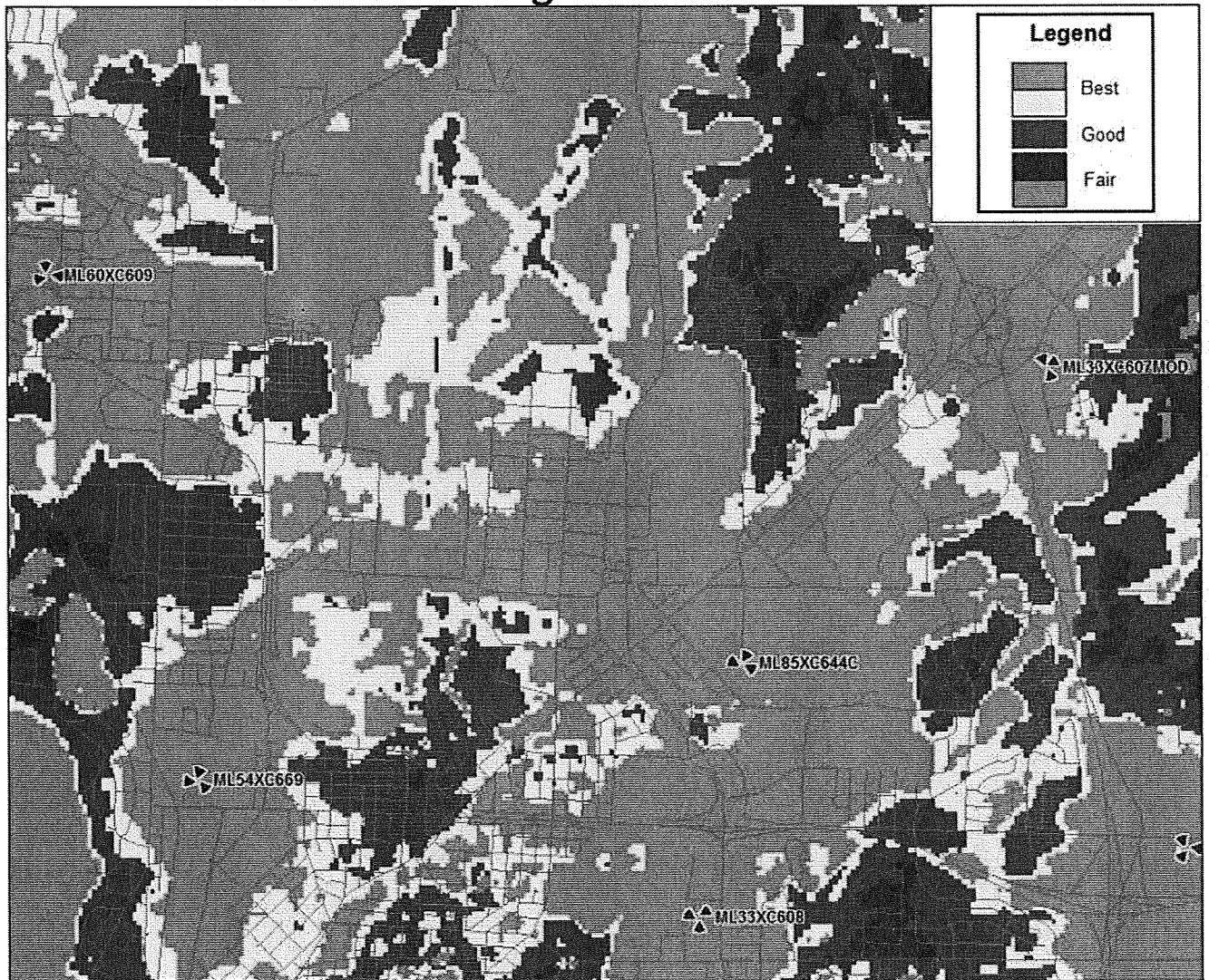


Figure 2 – Proposed Propagation Map
East Towne – Parkside Drive

Predicted Coverage With Site ML85XC644



**Figure 3 – Tower Elevations
East Towne – Parkside Drive**

