Dane County, Wisconsin

Telecommunications Site Review
New Support Structure

CitySCape
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February 27, 2018

Sup. Mary Kolar, Chair
Dane County Zoning & Land
Regulation Committee
210 Martin Luther King Jr., Blvd
Madison, WI 53703

RE: Radio Frequency Engineering Review of CUP #2396
by AT&T Mobility / Martinson

Dear Supervisor Kolar,

At your request, on behalf of Dane County, Wisconsin (County), CityScape Consultants, Inc. (CityScape) in its capacity as telecommunications consultant for the County, has considered the merits of the above referenced application submitted by SAC Wireless on behalf of AT&T Mobility (Applicant), to construct a new wireless telecommunications support structure and associated ground compound at 4614 County Highway A, Oregon, Wisconsin, *see Figures 1 & 2*.

The proposal is for a new, one hundred ninety-eight (198) foot monopole structure, *see Appendix, Exhibit G*. Since it is less than 200 feet, it will not require FAA approval or tower lighting.

According to the Applicant, this proposed new tower is intended to accomplish two separate objectives: to provide Wireless Local Loop broadband internet service pursuant to AT&T's acceptance of Connect American Fund II program funding from the FCC and to provide improved cellular service along the County Highway MM corridor between Oregon and Brooklyn. The proposal has been evaluated from the following perspectives:

- Whether the proposed facility, as specified, is justified due to technological reasons and is essential for the Applicant to provide its telecommunications service; and,

- Whether the proposed facility will follow the guidelines of the Telecommunications Act of 1996, the Dane County Ordinance, Wisconsin State laws and all other pertinent rules and regulations.

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Dane County Ordinance Requirements

§10.194(1): CUP required
§10.194(2) CUP requirements:

a. No existing towers exist within search area: none exist
b. Any existing towers are of sufficient height: see discussion
c. Any existing towers are of sufficient structural strength: see discussion
d. No electromagnetic interference will occur: not provided
e. Collocation fees are unreasonable: unknown
f. Other factors deem existing tower(s) unsuitable: see discussion

§10.194(3): Term reasonable defined as 25% cost of new tower – unknown
§10.194(4): Third party review – CityScape
§10.194(5): If less than 150 feet is proposed, tower must be capable of future increase to 150 feet and 2 collocations – not applicable since tower is 195 feet in height
§10.194(6): CUP required for substantial modification: not applicable
§10.194(7): CUP condition requirements can be checked at later date – *defer to County*
§10.194(8): CUP not required for collocations that are non-substantial
§10.194(9): Equipment building limits of no more than 314 square feet in floor area: complies
§10.194(10): Unused equipment shall be removed – not applicable
§10.194(11): Future buildout plans may be required – not applicable
Additional CUP requirements for communication towers

A. Legal Statement: provided in CDs
B. Tax Parcel number(s): provided on CTIF
C. Completed Zoning Application Form: provided (proposed height is incorrect on page 1)
D. Completed Communication Tower Information Form (CTIF): provided (Technology proposed is incomplete; does not include WLL, only cellular)
E. Written Statement: Limited – Short statement from RF engineer
F. Site Plan, Design Elevations, Site Photos and Photo Simulations: provided (see discussion about photo simulations)
G. CUP filing fee: *defer to County*
H. RF Engineering Analysis: statement from RF engineer and coverage maps provided

Site Justification and Coverage

For a new wireless communications facility to be justified, its need, location and height must be addressed. Explained in detail below, AT&T has submitted various, incomplete documents to the County for differing purposes and goals and has supplemented this information with changing supporting documentation which complicates this consultant's ability to conduct a technical review as well as the County's ability to fairly act on the proposal.

The Search Ring is a vital part of the submittal for any new mobile service facility. The Ring identifies boundaries for the optimum site location from an engineering standpoint. A reasonable search ring location is a key element in assuring that a site is justified. Generally, new wireless communication facilities are equally spaced with respect to existing sites. However, terrain, network capacity and other issues may necessitate a facility that it is *not* equally spaced with respect to existing sites. Typically, the wireless provider is asked to provide coverage prediction maps to indicate that a site is properly located.

One of the primary issues encountered during the review of this application has been the applicant's submittal of 3 different search rings. The initial application included a roughly ¼-mile search ring centered on the site of a previously approved, but never built, tower site located at 783 County Highway MM. A second, ½-mile search ring was later provided, which was also centered on the previously approved tower site. The selected Martinson site was located well outside of both search rings. When the applicant's agents were asked about the issue, we were informed that there were no viable sites within the search ring and therefore the Martinson site was selected as the next best option. Supplemental materials subsequently provided by AT&T in December included a ***3rd*** search ring, which included the Martinson property. Those materials suggested that there was simply some miscommunication between AT&T and its site acquisition consultant, SAC Wireless. However, as detailed later in this report, a number of other materials provided by the applicant appear to directly contradict this explanation.

The discrepancies in the search rings, inadequate technical information, and many other issues detailed in this report, have made it difficult to ascertain if the selected site is indeed justified from an engineering standpoint.

To better understand, allow some historical background. In 2013, AT&T requested and was approved for a new 150-foot tower for mobile cellular service, located at the Reindahl Stone Site, ¼-mile northwest of the intersection of County Roads MM and A and about 0.9 mile west of the site proposed in the present application. AT&T provided coverage maps from this Reindahl site to demonstrate the current level of mobile service followed by an improvement map indicating how it would meet its mobile coverage goals. According to the Applicant, a soil sample revealed that the site was not feasible for construction. Therefore, the Applicant never completed the plan and the facility was not constructed. It is not known if additional soil samples were conducted on other portions of the 20-acre site or if any other alternatives within the submitted search ring were explored at the time.

In 2017, AT&T filed the current application proposed herein. This application included a second objective, fixed wireless internet service, in addition to the original mobile cellular service. Fixed wireless was added to the current proposal after AT&T accepted federal funding in 2015 under phase II of the FCC's Connect American Fund program ("CAF II"). The program is designed to subsidize the deployment of broadband internet service to unserved rural areas and has been likened to the early 20th century efforts to extend electricity and phone service to rural America. The program sets minimum standards for broadband internet service but allows funding recipients to choose the means of deployment, which can include fiber to the home (FTTH), DSL, or fixed wireless using telecommunication towers. AT&T chose to participate in this government funded program with a type of fixed wireless internet service called "wireless local loop" (WLL).

Recipients of the CAF II funding are obligated to provide services in identified target areas of underserved homes and businesses that currently lack adequate access to broadband internet service. AT&T is required to meet its obligations under the CAF II program on a state-wide basis in Wisconsin. Although a total of 912 "living units" have been identified in the target areas within Dane County, there is no requirement or guarantee that those households will ultimately be eligible for AT&T WLL internet services.

The current 2017 application provided a search ring centered on the Reindahl site, supported with new coverage maps. However, the coverage maps are inconsistent with previous showings for mobile service and WLL service; they appear to be a combination of the two services, but due to the lack of adequate labelling and confusing signal levels, the Applicant fails to demonstrate any specific service target and/or purpose.

The legend indicates "indoor service" (the highest signal level for mobile service) is provided north and east of the proposed site, but only marginal service is available to the west (within the search ring) and continuing further to the southwest away from the search ring, *see Appendix, Exhibit A*. The green and blue areas (greater than -75 dBm) are considered indoor service for mobile cellular. The next two typical mobile categories of "in-vehicle" and "outdoor" are not shown, only what is considered marginal service in red (-105 dBm and lower). For CAF II service, the signal levels should be green. However, these specific CAF II target areas are not defined on this map. The proposed site is identified as "WIL02047" and the search ring is shown as a red circle.

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Inconsistencies in Site Location Need

The proposed site is located outside of the Applicant's initial search ring by about ¾ of a mile, *see Appendix, Exhibit B.* This raised many questions as to why a site so distant was chosen when the maps clearly show a deficiency in service to the west. On October 27, the Applicant provided additional information detailing the CAF II target coverage goals, *see Appendix, Exhibit C.* However, at no point has the applicant submitted any information to demonstrate the need for a tower at the selected location in support of its wireless broadband objectives. In fact, those wireless broadband objectives have never been substantiated in any detail beyond references to the CAF II target area "in the town of Dunn".

The mobile service bands AT&T uses in Dane County are 700 MHz (LTE), 1700/2100 MHz (AWS) and 1900 MHz (PCS). The WLL service proposed will use frequencies above the mobile service band in the WCS band (2300 MHz). A commonly used formula to predict service in the upper AWS/PCS and WCS frequencies is the COST-231 formula. The service area decreases as you increase the frequency. For example, the AWS/PCS frequencies cover approximately ¼ the area as compared to the lower band (700 MHz) frequencies. Since the WLL will operate at frequencies above AWS/PCS, the resulting service area will be further reduced. Using these upper frequencies requires the site to be closer to its target service area. As discussed later, there is a better located existing tower which resides in the CAF II target area that the Applicant has not addressed.

Site Availability within Search Ring

The Applicant also provided a new, expanded search ring, claiming no sites were available within the previous one, *see Appendix, Exhibit D.* Expanding the search ring is an acceptable practice when a site cannot be found, but this did not address the issue at hand, specifically, that the proposed tower remained to the east, still outside the new larger search ring. The Applicant did not demonstrate that all properties within either of the two search rings were pursued and eliminated as viable options.

In the October supplemental information, the Applicant discounted this search ring claiming it was too far west to achieve the required CAF II coverage goals. This is in direct conflict to the original application materials that "AT&T's engineers established a 0.5-mile search ring that

encompasses the proposed tower location". Obviously, the ring did not encompass the tower, nor did the expanded ring. Thus, justification for this site location continued to be inadequate based on the materials provided. The proposed 198-foot tower exceeds the height of the approved 2013, 150-foot tower. Propagation characteristics for both services proposed (WLL and mobile cellular) does require additional height when the site is shifted further from the target area(s).

In December 2017, the Applicant provided further supplemental information in a detailed chronological report that included excerpts from original 2013 application and the current application. Significant insight provided in this report was the evolution of the search rings and explanation that the proposed tower is AT&T's only viable option to meet its coverage goals. The report included a *third* search ring that encompassed the proposed site, *see Appendix, Exhibit E.* The Applicant also stated that the proposed site would improve CAF II service in the town of Dunn. It's worth noting that the area with the highest concentrations of unserved households is located approximately 5 miles northeast of the proposed site (shown in *Figures 3, 4 & Exhibit C).* The Applicant has been unable to demonstrate how many, if any, households within the CAF II target area will be eligible for WLL broadband service as a result of the proposed new tower.

This third search ring's validity is questionable. Search rings are typically circles approximately ¼ the radius of the proposed cell. The ground elevation and topography (such as water bodies) can change the shape of the search ring. Property boundaries, such as those defining this third ring, have no bearing on where or how the signal is affected. It is also untimely that a shift in the ring's center, to encompass the proposed site was not made until well into review of this application, not at the outset. The Applicant's explanation for shifting the search ring is that AT&T engineers were still reviewing the needs for CAF II. This statement was provided eight months after the filing of the application and thirteen months after the landowner signed an agreement authorizing SAC Wireless to proceed with the CUP application, *see Appendix, Exhibit F*. This is opposite the typical procedure for locating a telecommunications site, where the search ring is chosen first by the engineer, then a potential site is found based on this ring.

Figure 3 is a map with the current AT&T service (not considering the proposal), with an approximate overlay of the CAF II target areas. Most of the target area is well served based on the maps and only areas approaching Dunn would remain underserved. The Applicant should provide substantiation as to how this proposal at the proposed site will significantly improve CAF II broadband service to these areas in and around Dunn, a significant distance from the proposed site.

The Applicant has not commented on whether collocation on the existing SBA-owned tower located on State Highway 138 (shown in *Figure 3* as WIL05625) would meet the requirements and not require constructing this proposed new tower. The Applicant challenged this notion but erred in its report by referencing a different, shorter tower just east of the proposed site (not shown on map).

Figure 4 depicts the current AT&T service (with the proposal), and an approximate overlay of the CAF II target area. There is no recognizable improvement to areas near Dunn by the proposal when compared to Figure 3, due to the proposed site being too distant from Dunn. The alternate SBA site is shown on the map, about half the distance from Dunn and directly and within the CAF II target service area. The Applicant should evaluate this site to determine the feasibility of collocation on the existing tower for the WLL broadband service.

Figure 5 is a comparison between the maps in *Figure 3 & 4*. This comparison shows the existing coverage from *Figure 3* but has been cropped at the edges of the improved service. When compared to *Figure 3*, there are no significant areas of improvement within the CAF II target area (because all areas shown already have existing service) and the proposed service shown also does not approach the town of Dunn (which *figure 5* does not extend to due to lack of coverage).

Furthermore, shifting the site east and outside of the search ring to accommodate the CAF II goals raises questions as to how the mobile service objectives can be met. This shift will result in less improvement to the mobile target areas that the earlier ring was intended to provide.

Conclusion

With shifting search rings, it appears AT&T is attempting to meet its CAF II and mobile cellular service goals from a single tower, located on a land that requires a zoning exception. This may explain the odd-shaped, dual-purpose search ring in *Exhibit E* that is located east of the original search ring and poor mobile signal areas. The County previously (in 2013) approved a less obtrusive 150-foot tower proposal for mobile service in a more appropriate and Ordinance-friendly area that does not have a deed restriction applied. The Applicant did not state if other areas on the Reindahl site were tested to determine the ability to support a new tower. It is also not believed that all properties within the initial search ring(s) were explored. The viability of an alternative location on the Martinson property could also be investigated.

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Furthermore, the Applicant should better demonstrate how they would meet the acceptable CAF II and mobile service standards. The Applicant should provide substantiation as to how their described goals would not be better served by use of separate facilities better located within proximity of the target areas for each service. The Applicant should comment if the described 195-foot SBA tower was considered as it is well within the CAF II target area and much closer proximity to the desired town of Dunn. If required, antenna beam tilting should be used to allow this site to work with the other, recently installed CAF II sites.

Wisconsin Statute §66.0404 does not apply to fixed wireless service, which CAF II is. Thus, the mobile portion of the proposal still relies on the originally provided search ring, centered on the Reindahl Stone Site. For these reasons, justification of a new dual-purpose tower has not been met at the Martinson property.

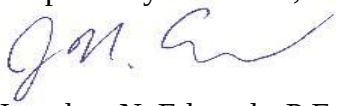
Recommendation:

The Applicant has failed to reasonably substantiate the need for a new mobile service support structure at the proposed location as detailed above. Potential alternatives for either of the two defined goals and objectives have not been adequately considered. The WLL broadband objectives have not been clearly outlined. At a minimum, this should include an estimate of the number of households within the CAF II target area would become eligible for broadband services as a result of installation of the proposed tower. That estimate should include a map showing the location of the households.

To date, the Applicant has failed to examine the possibility of collocation for the WLL service objectives and furthermore the absolute need for a new 198-foot tower. For this reason, CityScape Consultants, as wireless expert for the County, does not support this proposal in its current form.

I certify that to the best of my knowledge all the information included herein is accurate at the time of this report. CityScape only consults for public entities and has unbiased opinions. All recommendations are based on technical merits without prejudice per prevailing laws and codes.

Respectfully submitted,



Jonathan N. Edwards, P.E.
CityScape Consultants, Inc.

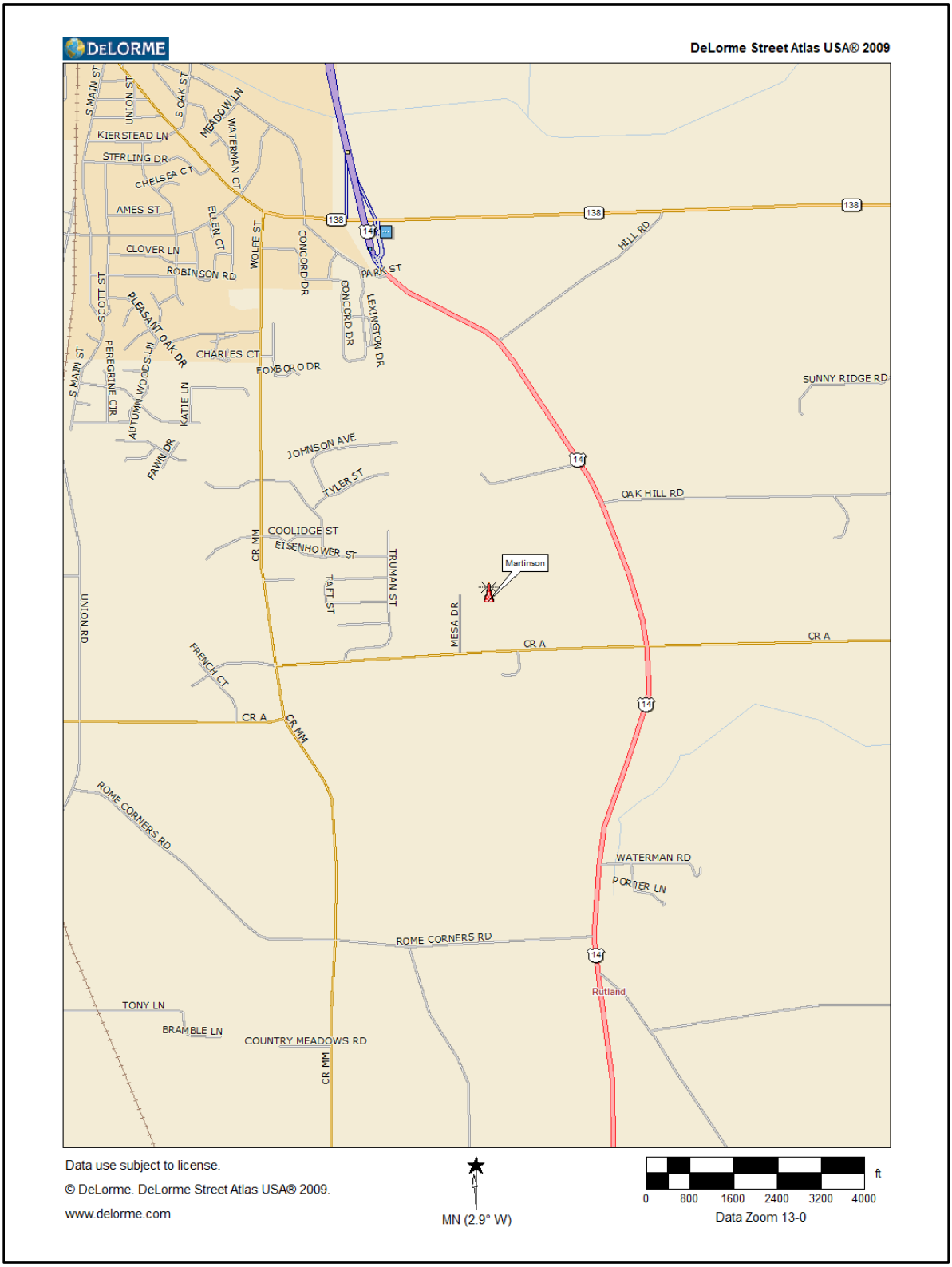


Figure 1 – Site Location

Figure 2 – Aerial Site View

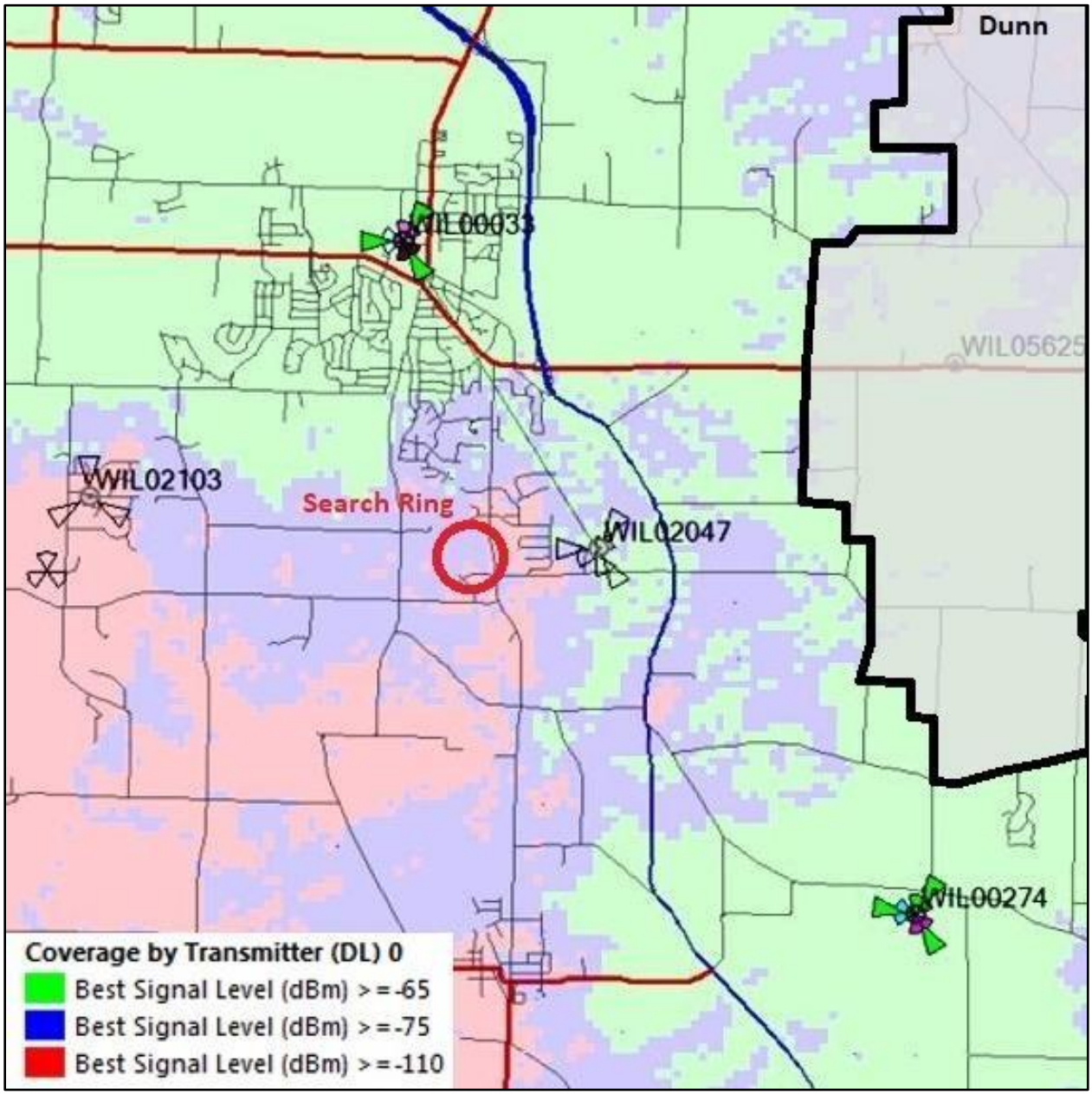


Figure 3 – AT&T Current Coverage Map with CAF II Target Area

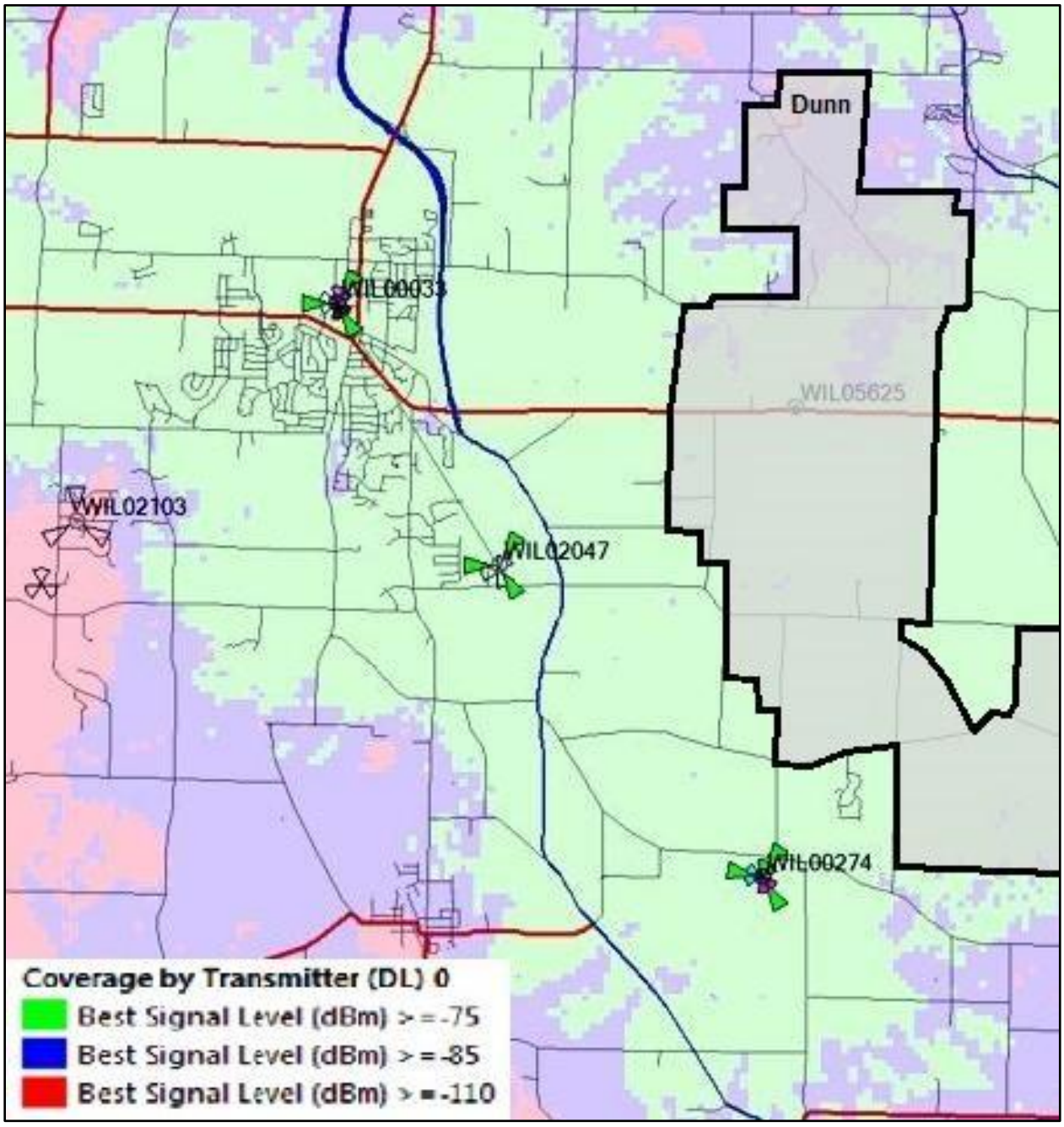


Figure 4 – AT&T Proposed Map with CAF II Target Area

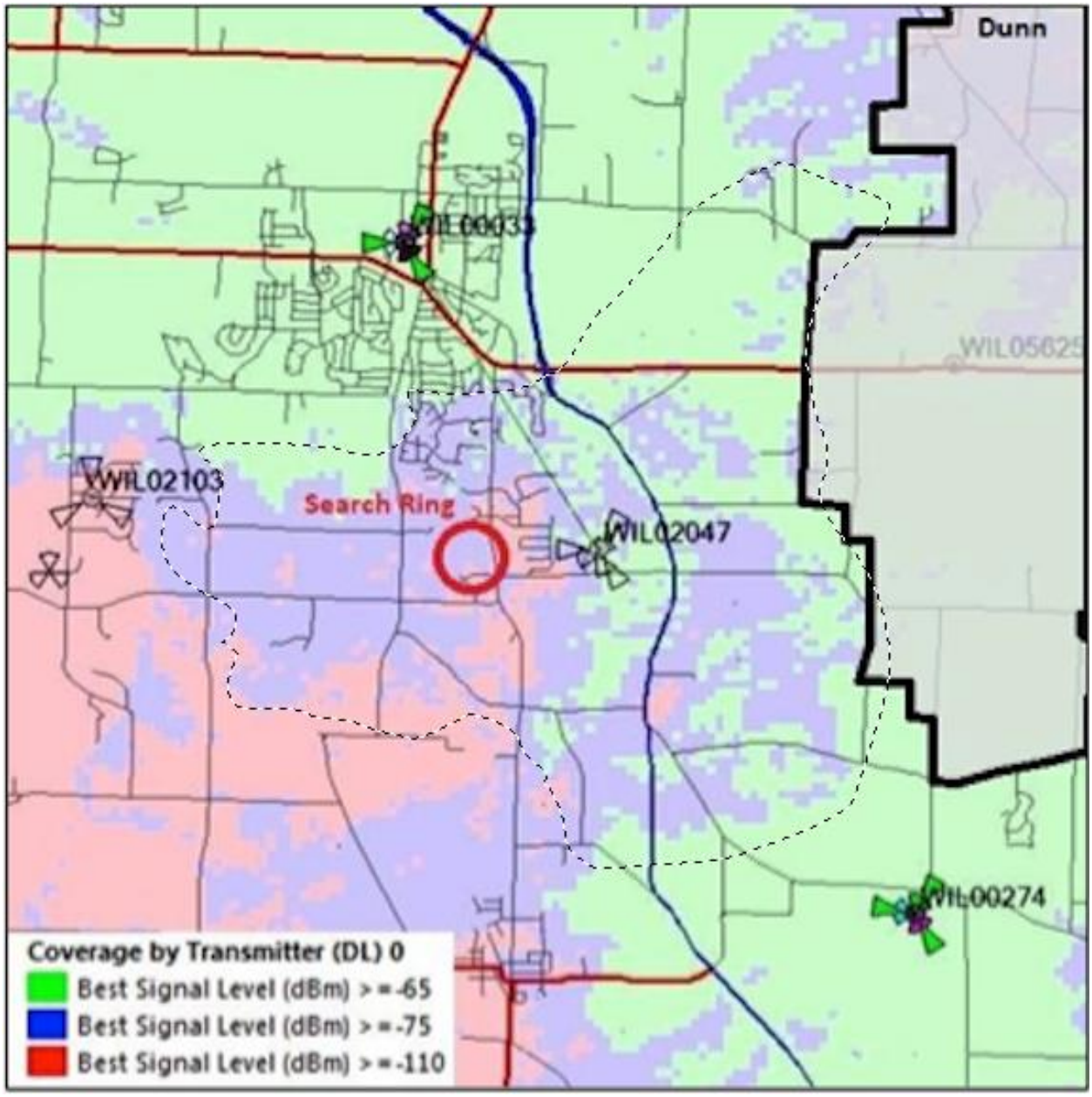


Figure 5 – AT&T Current Map Depicting Improvement Service Area (Dashed)

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Appendix

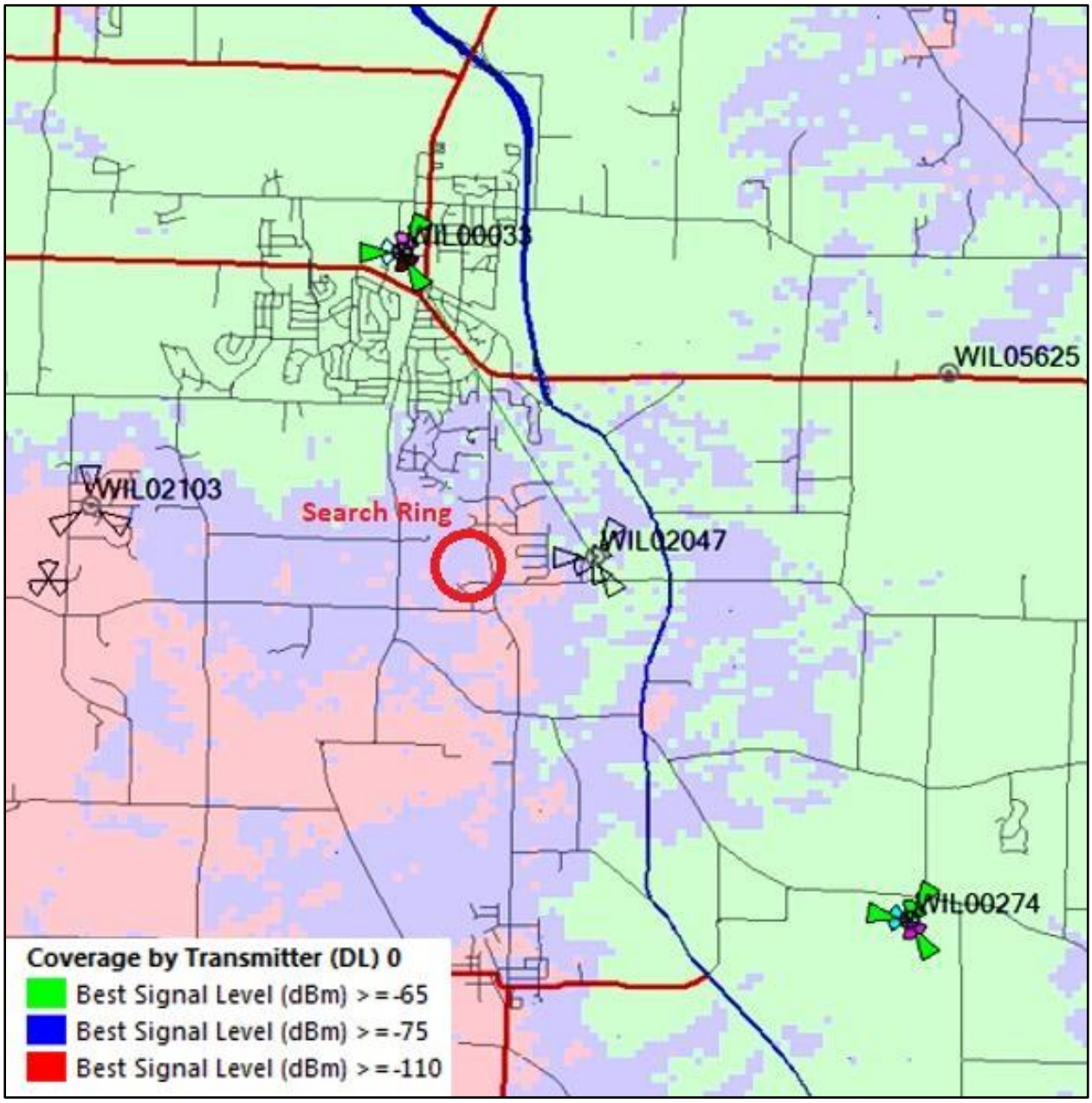

Exhibit A – AT&T Coverage Map (Current)

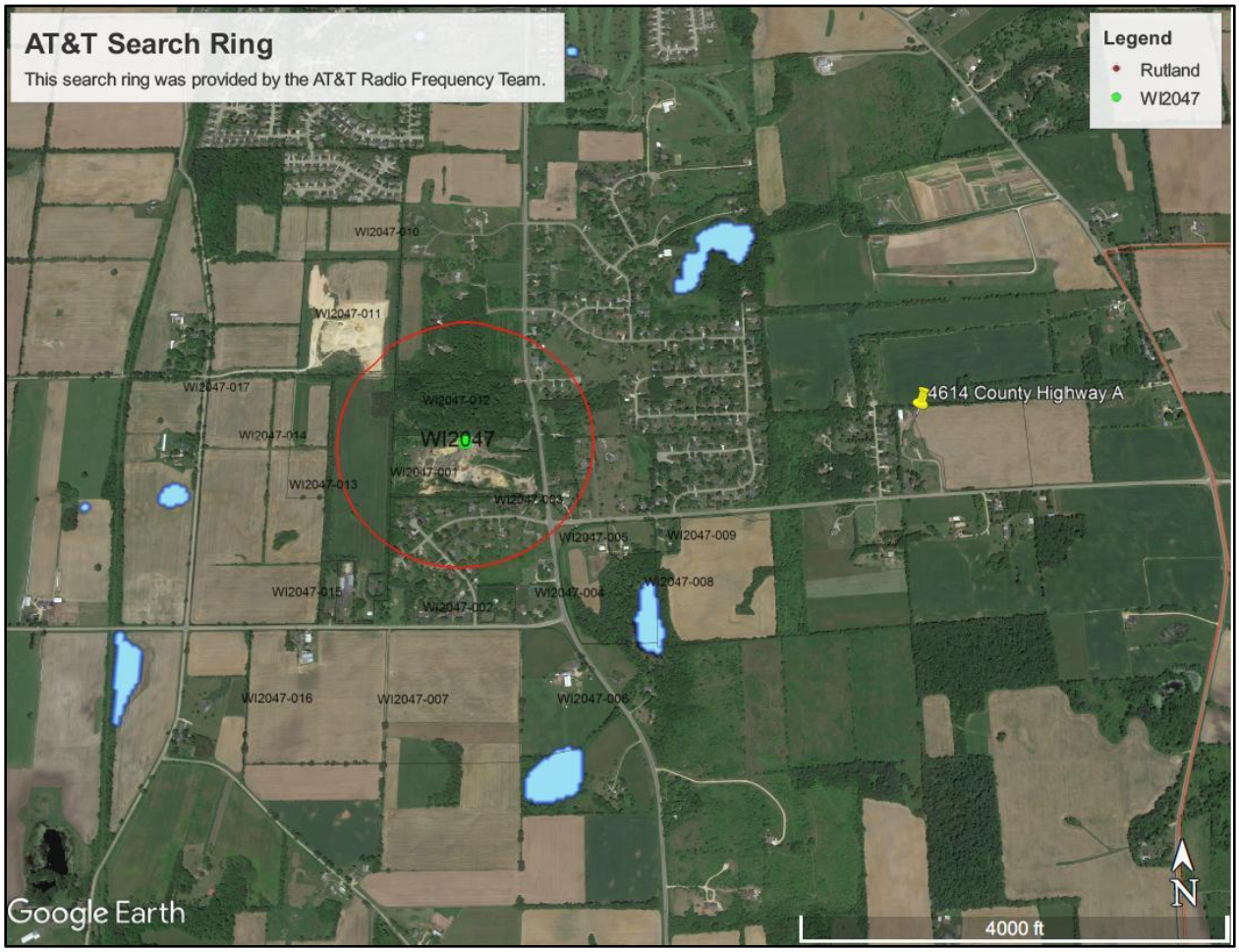

Exhibit B – Search Ring and Proposed Site Provided with Application

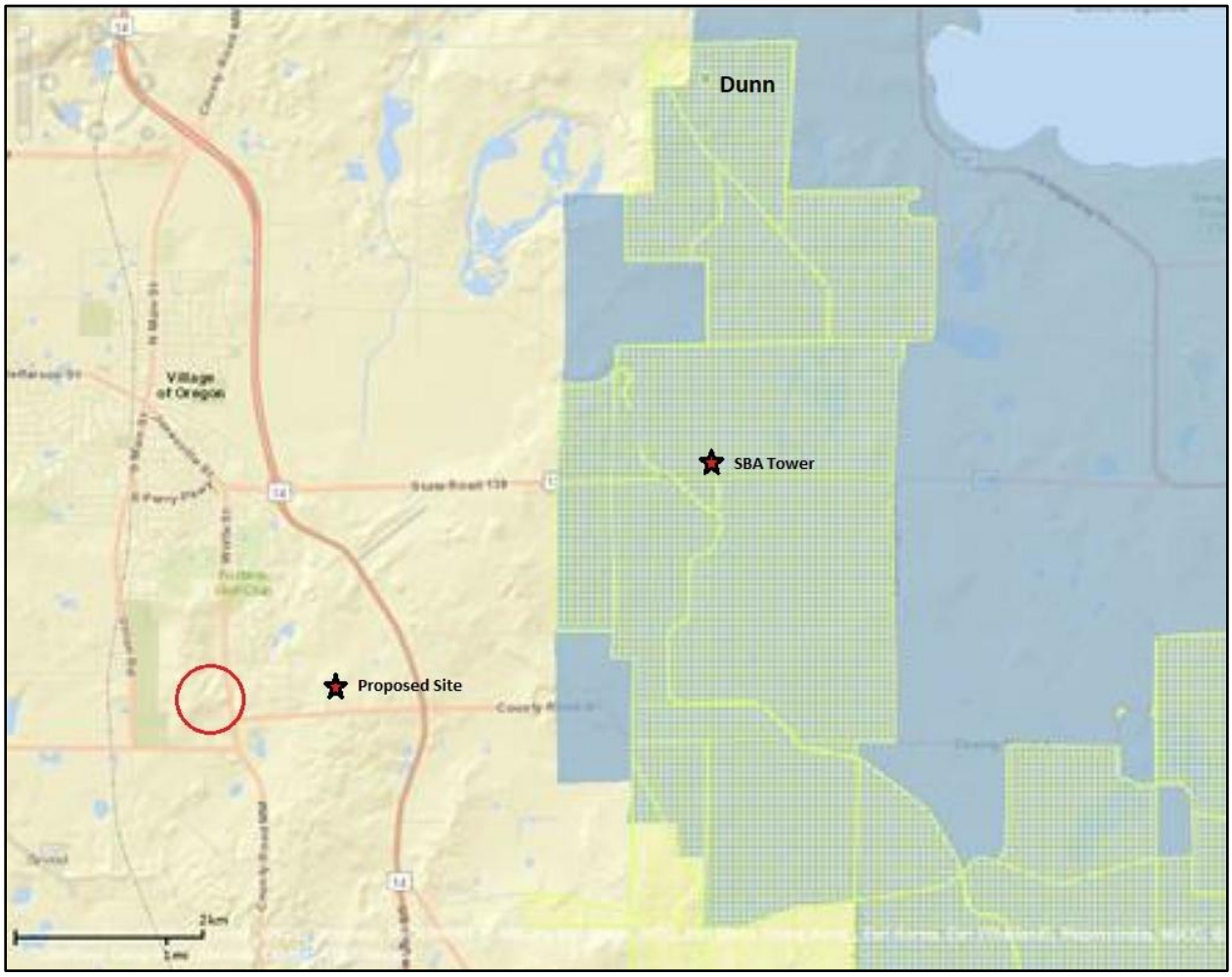

Exhibit C – AT&T's CAF II Coverage Target Area (green hashed)

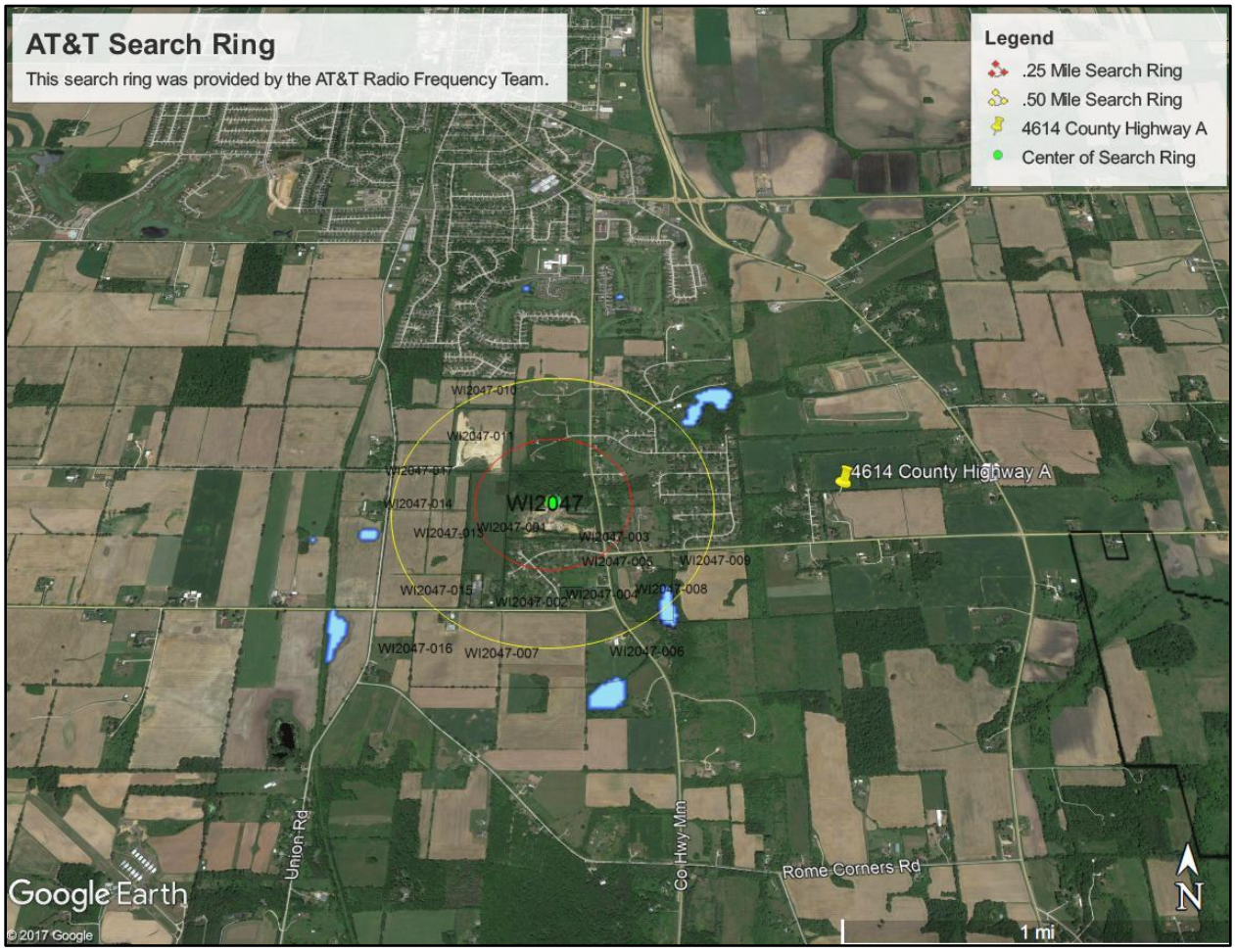

Exhibit D – Second Search Ring Provided as Supplement

Exhibit E – Updated 2017 Search Ring

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SAC WIRELESS

November 18, 2016

RE: Letter of Authorization between Thomas A. Martinson ("Landlord") and SAC Wireless ("SAC") for AT&T Mobility site located at 4614 County Road A, Oregon, WI 53575

Dear Sir of Madam,

This letter is to inform you that the Landlord intends on leasing land to AT&T Mobility to construct a new wireless telecommunication facility on his property, located at 4614 County Road A, Oregon, WI 53575.

The Landlord hereby authorizes SAC Wireless to represent the Landlord throughout the site development process in preparation for constructing the wireless facility at this location. SAC Wireless has the authority to act as the Landlord's agent to obtain all necessary approvals throughout the zoning, permitting, regulatory, and compliance processes required for the construction of the wireless facility.

If you have any questions or concerns, please feel free to contact Thomas A. Martinson at 608-279-9512. Thank you in advance for your cooperation.

Sincerely,

Thomas A. Martinson

Thomas A. Martinson
Landlord
2411 White Oak Trail
Oregon, WI 53575

Site #: WI2047
FA #: 12716346
PACE #: MRCHI005569

Exhibit F – Good Faith Lease Agreement

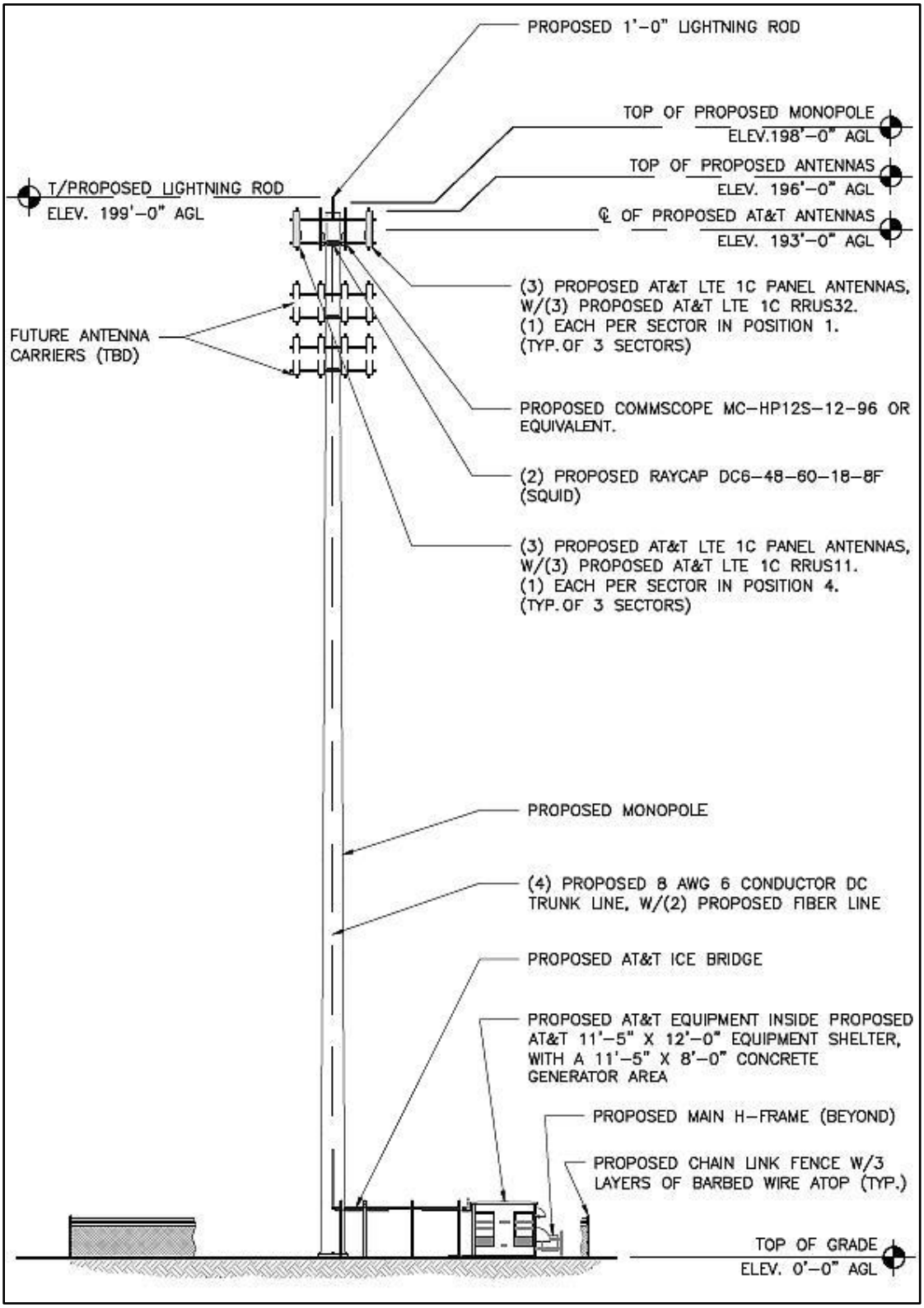

Exhibit G – Proposed Tower

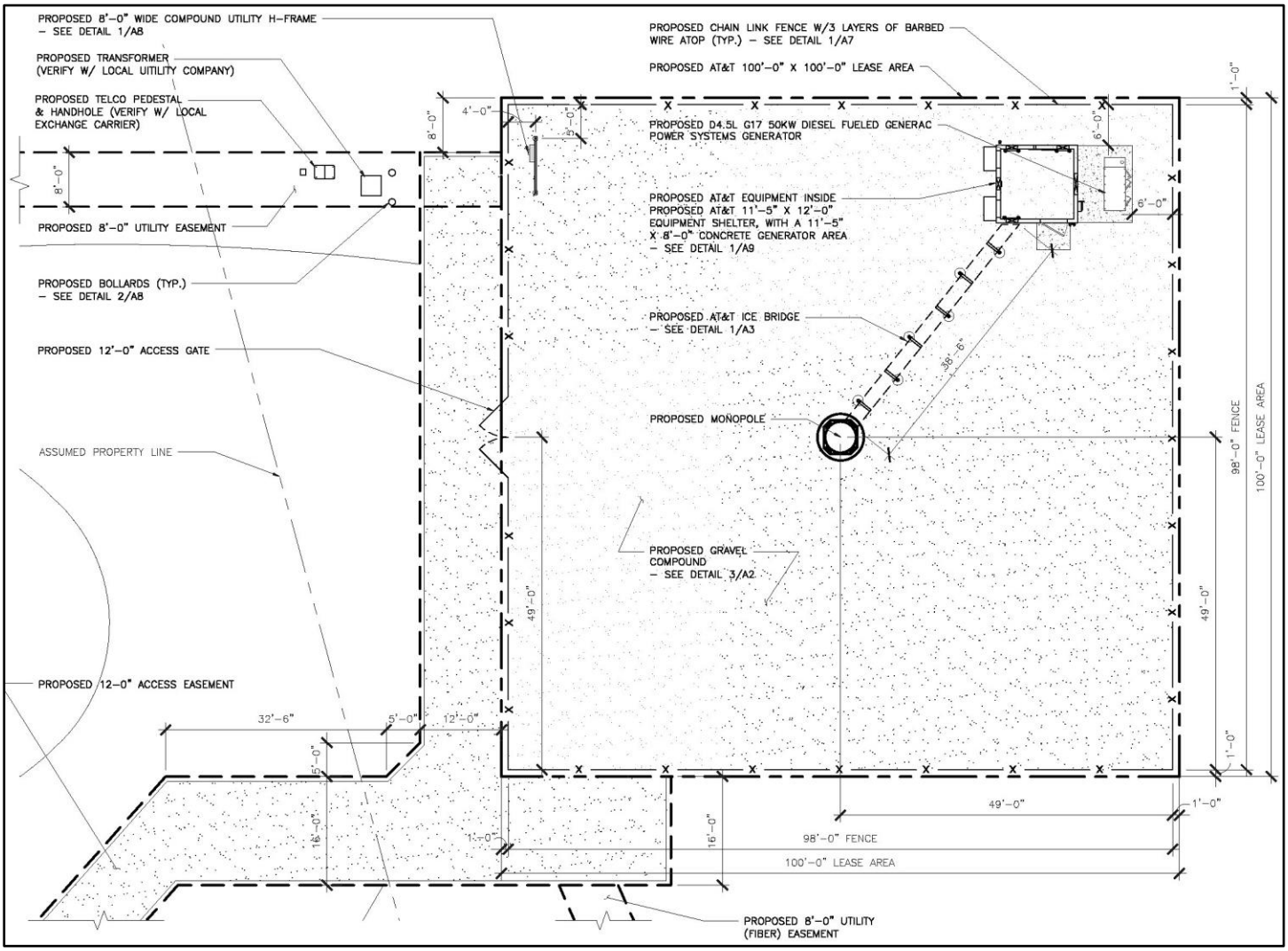

Exhibit H – Proposed Ground Compound