

# Location Justification (Candidate C Comparison)



The map above shows the distance between the proposed Diddell Rd site and Verizon's existing New Hackensack site and compares it to the distance between the candidate C parcel and Verizon's existing New Hackensack site. It can be seen that the proposed site would be approximately 0.3 miles closer to New Hackensack if it were to be located on the candidate C parcel.

# Location Justification Summary

Locating the site at candidate C presents (1) problem when compared to the proposed location:

## **Proximity to New Hackensack Existing VZW Site**

As shown previously in the candidate C comparison slide, moving the proposed site to the candidate C parcel would push the proposed site approximately 0.3 miles closer to the existing VZW site "New Hackensack". Having the two sites so close together would create interference between the two sites and would severely compromise the performance of both sites. In addition, this would move the proposed site further away from the existing VZW site "Ehmer" and would compromise the ability of the proposed site to effectively offload traffic from Ehmer.

The combination of moving away from the Ehmer site and being too close to the New Hackensack site make the currently proposed site location a better solution than the candidate C parcel.



# **Midband coverage plots at alternate heights (Minimum Height Justification)**

Mid band coverage is critical in the effort to balance capacity (utilization) and allow for “contained” low band sites. If adequate and reliable signal strength from mid band is not present the mobile will attach to low band only. The current low band frequencies, however, due to limits in bandwidth represent only approximately seven percent (7%) of the available bandwidth licenses by Verizon Wireless, the remaining ninety three percent (93%) of bandwidth is available from the mid-band frequencies. Too many users in this RF condition will overburden low band and cause a site to become capacity exhausted requiring additional network densification. Network densification is achieved by adding mid-band frequencies at a new dominant server/site. Areas of higher utilization are of particular importance in evaluating mid band height needs. Mid band spectrum on macro sites has proven to be a very capable resource and also includes C-Band. These frequencies roughly in the 1.9-3.8GHz range are needed throughout the Diddell Rd project area to relieve existing network capacity issues.

Current wireless networks continue to rely on “line of sight” technology to provide service to existing customers, the critical component necessary to service customers is establishing the proper height of the antennas to ensure that the antennas can see the service areas. As relative antenna height is increased or decreased, area (RF) clutter is either overcome allowing a site to propagate as needed or becomes obstructed causing gaps in service. The following slides display existing on-air mid band coverage + Diddell Rd Site at identified Antenna centerline (ACL).

# Criterion for the 'focus' areas

There are always different types of areas around a site.

1. Areas with no potential traffic/customer are not considered in minimum height analysis even if Mid-band Coverage fades or is completely lost with the tower height reduction. e.g. forests, open fields, etc.
2. Potential traffic (residential/commercial areas and roads) areas, which are close to the site are also not considered as reduction in tower height does not affect these areas significantly. For example, area in green circle on the following propagations.
3. Potential traffic areas, which are not very close to the project location or are located in a challenging terrain and there will be dramatic changes in mid-band coverage when the tower height is altered, are only considered in minimum height evaluation. All such areas are shown with the help of black circles on the following propagations.

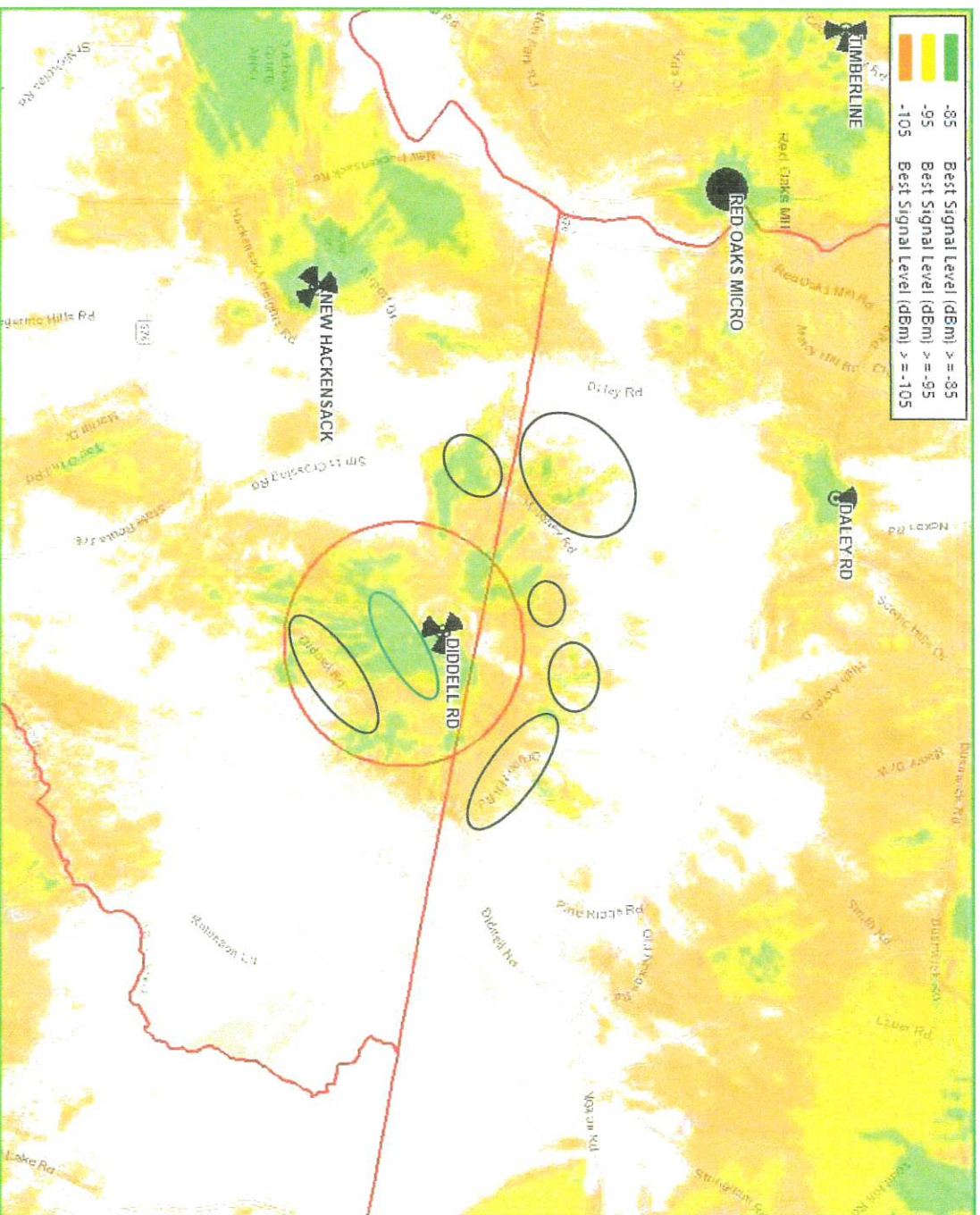
Zoomed in for clarity





# Height Justification (Mid-Band Coverage 2100MHz)

Zoomed in for clarity

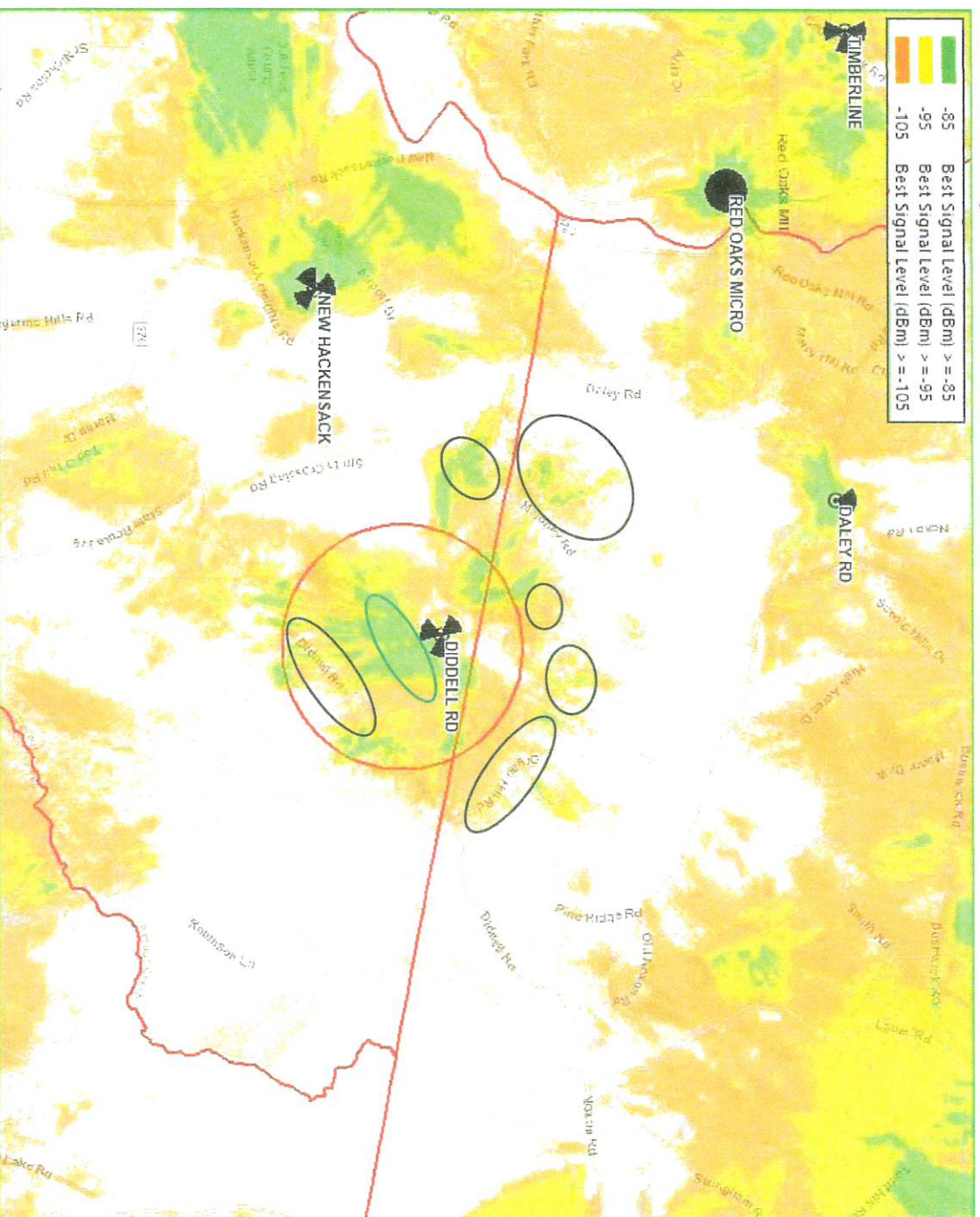


136' ACL

The map above represents mid band coverage from existing sites + Diddell Rd site at 136' Antenna Centerline (ACL) which is 20ft higher than the proposed ACL(116'). The purpose of adding mid band coverage plot at higher ACL is to show that a higher ACL will certainly result in improve mid band coverage but the improvement is not significant enough to raise the antenna by another 20ft.

## Height Justification (Mid-Band Coverage 2100MHz)

Zoomed in for clarity



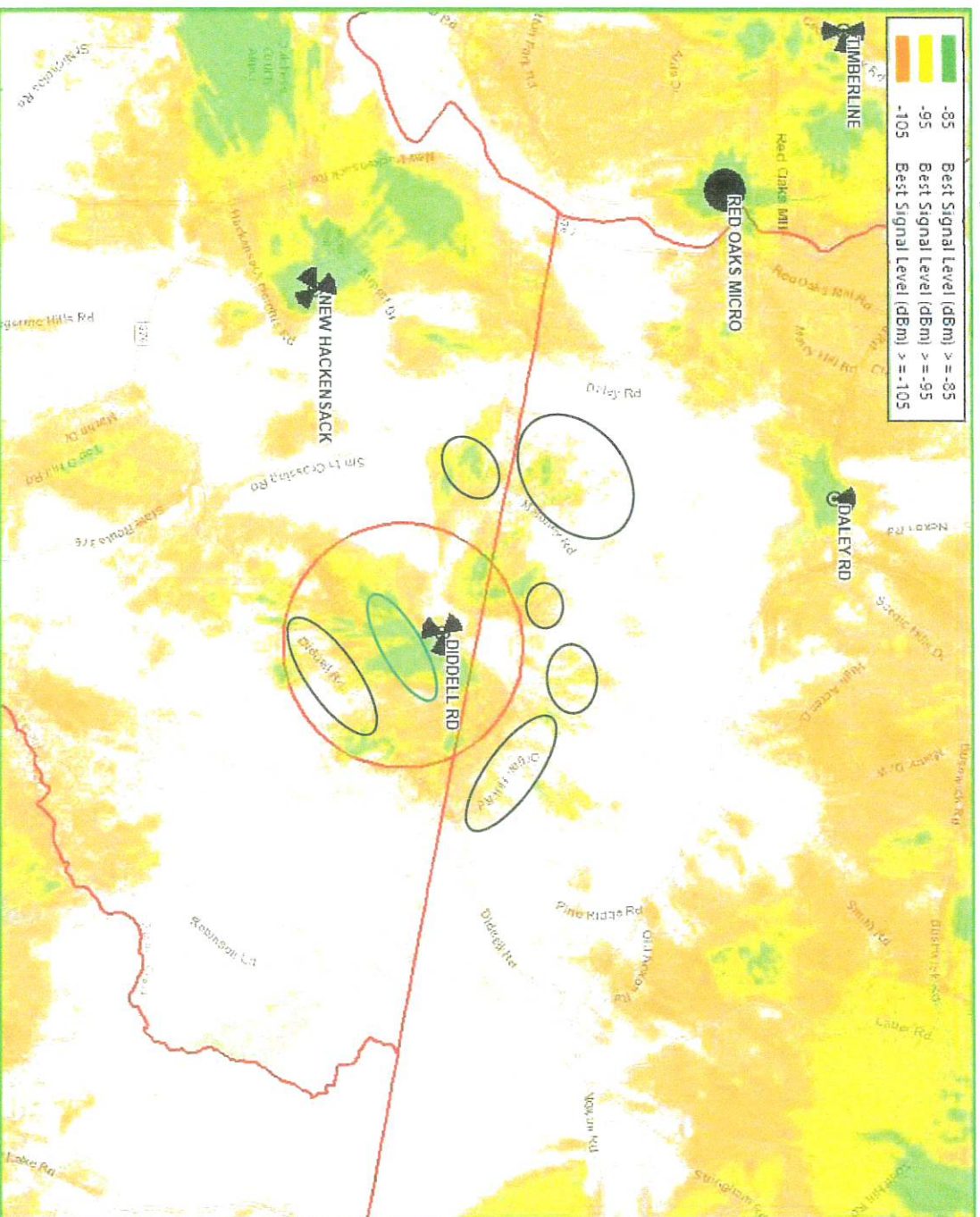
116'ACL

The map above represents mid band coverage from existing sites + Diddell Rd site at 116'ACL. Midband footprint reduced at the proposed height but it can be seen that our focus areas will still have some mid band coverage.



# Height Justification (Mid-Band Coverage 2100MHz)

Zoomed in for clarity

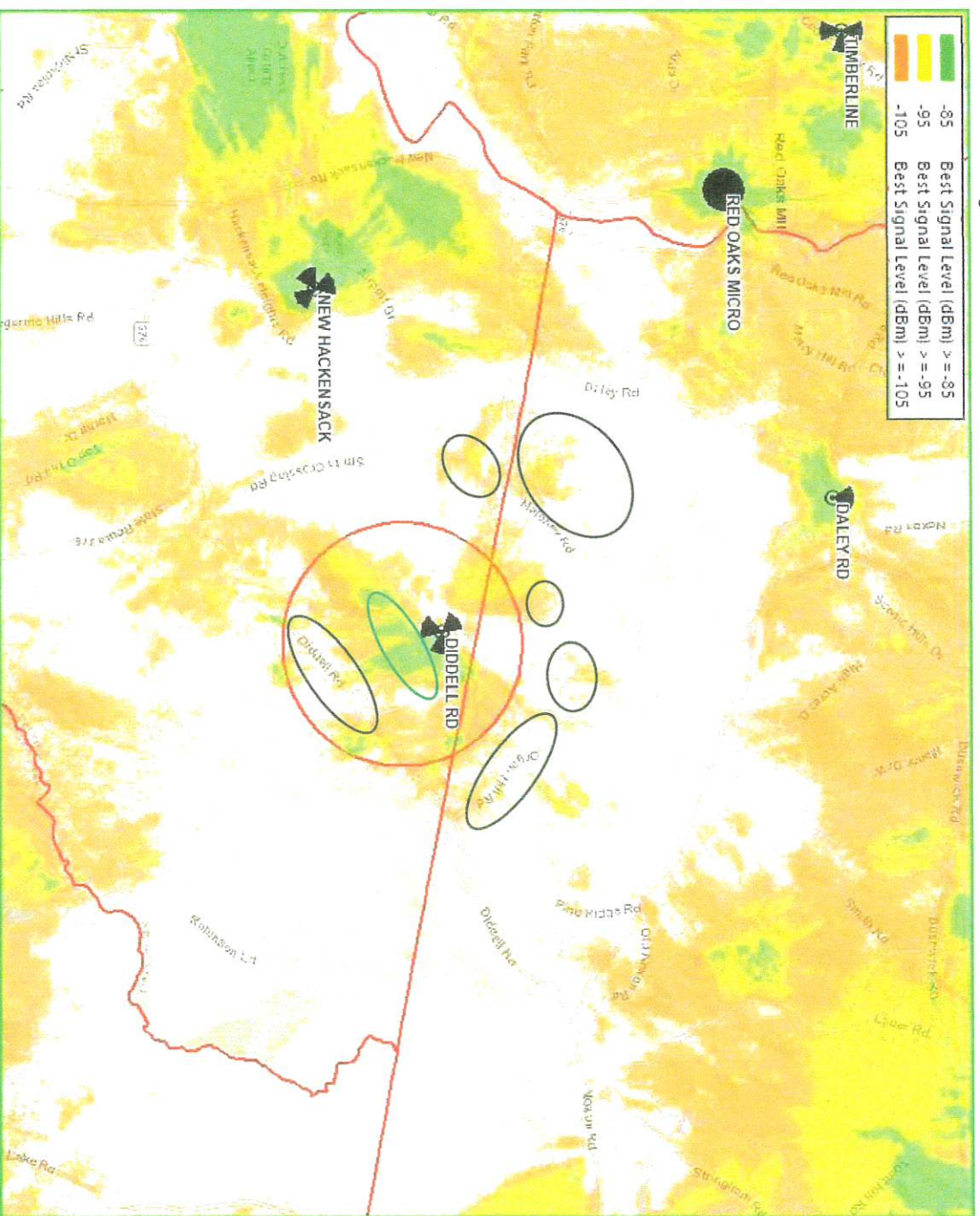


96' ACL

The map above represents mid band coverage from existing sites + Diddell Rd site at 96'ACL. Midband footprint significantly reduced at 96'ACL and spots within our focus areas will have significantly reduced midband coverage, often resulting in either tier 4 outdoor coverage (-95dBm to -105dBm, which means no indoor midband coverage) or no midband coverage at all.

## Height Justification (Mid-Band Coverage 2100MHz)

Zoomed in for clarity



76'ACL

The map above represents mid band coverage from existing sites + Diddell Rd site at 76'ACL. Midband footprint significantly reduced at 76'ACL and our focus areas will have either tier 4 outdoor coverage (-95dBm to -105dBm, which means no indoor midband coverage) or no midband coverage at all.

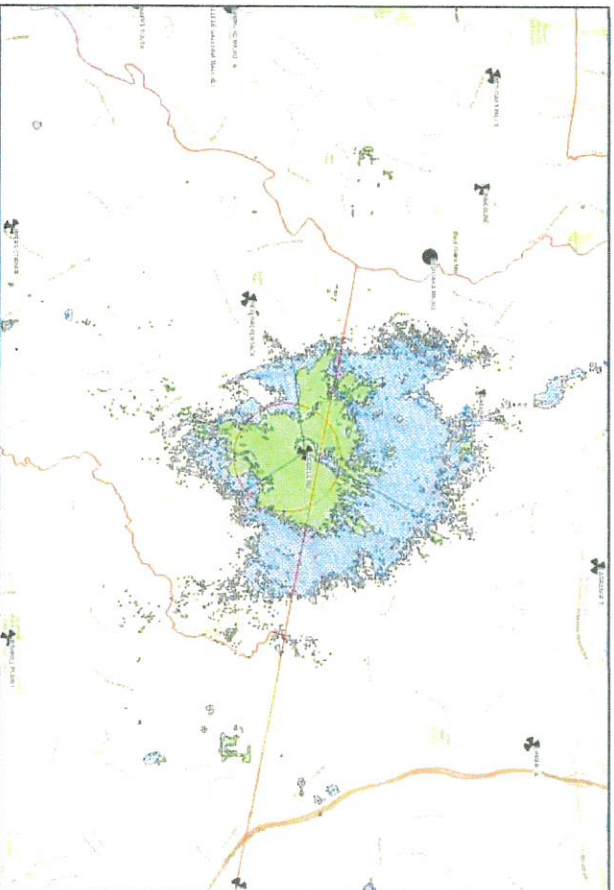


# Height Justification Narrative/Summary

As mentioned before, Diddell Rd project area is already experiencing high network utilization, primarily on low band due to lack of adequate and reliable mid band coverage in the area. Due to the high number of users in the project area, it is important for the mid band coverage from the proposed Diddell Rd site to serve the residential areas along Diddell Rd, Smith Crossing Rd, Maloney Rd, Organ Hill Rd, and the smaller roadways in these areas to prevent the low band frequencies on the proposed Diddell Rd site from becoming congested themselves.

Verizon RF evaluated the minimum height requirement and it is our expert opinion that any height lower than 120' (116' ACL) will fail the capacity objective of the project. As shown previously, 116' ACL is not as ideal for the project as 136' would be, however it does provide acceptable coverage for the majority of the project area.

# RF Justification Summary



The proposed site at 116' ACL resolves the substantial and significant gaps in coverage and capacity impacting the Diddell Rd project area. The gaps are shown in the above graphic. The shaded areas as detailed in the legend represent gaps in coverage and capacity that Diddell Rd (site) will resolve.

The network was analyzed to determine whether there is sufficient **RF coverage and capacity** in the **Town of Wappinger**. It was determined that there are significant gaps in adequate LTE service for Verizon Wireless in the 700 and 2100MHz frequency bands. In addition to the coverage deficiencies, Verizon Wireless' network does not have sufficient capacity (low band or mid band) to handle the existing and projected LTE voice and data traffic in the area near and neighboring the proposed **Diddell Rd** facility ("targeted service improvement area"). Based on the need for additional coverage and capacity while considering the topography and specific area requiring service, any further addition of capacity to distant existing sites does not remedy Verizon's significant gap in reliable service. Therefore, the proposed facility is also needed to provide "**capacity relief**" to the existing nearby Verizon Wireless sites, allowing the proposed facility and those neighboring sites to adequately serve the existing and projected capacity demand in this area.

With the existing network configuration there are significant gaps in service which restricts Verizon Wireless customers from originating, maintaining or receiving reliable calls and network access. It is our expert opinion that the proposed height will satisfy the coverage and capacity needs of Verizon Wireless and its subscribers in this portion of the **Town of Wappinger** and the **Diddell Rd** project area. The proposed location depicted herein satisfies the identified service gaps and is proposed at the minimum height necessary for adequate service.

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