



# Verizon Wireless Cell Site Necessity Case – South Nipomo

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**Introduction:**

There are two main drivers that prompt the creation of a cell site project, coverage and/or capacity. Most sites provide a mixture of both, but increasingly some sites are pure capacity.

**Coverage** is the need for expanded service often requested by our customers or emergency services personnel. While this initially meant providing coverage in vehicles, as usage patterns have shifted this now means improving coverage inside of buildings and in residential areas.

**Capacity** is the need for more bandwidth of service. In the simplest form this means a cell site can handle a limited number of voice calls, data mega bites, or total number of active users. When any one of these limits are met the user experience within the coverage area of that cell quickly starts to degrade during the busier hours of use.



**Coverage** is best shown in coverage maps. We use tools that take into account terrain, vegetation, building types, and cell site specifics to show predictions of the existing coverage and what we expect to see with a given cell site. The prediction models make some assumptions such as that the antennas are above the nearby ground clutter (Buildings and vegetation). Once the antennas fall below the ground clutter the models become inaccurate and cannot tell that specific trees or buildings are blocking the RF signal. Due to this, modeling of tower height requirements is frequently not accurate and misleading.



**Capacity** is best shown in graphs of usage growth and projected exhaustion. We utilize sophisticated programs to model current usage growth and project it into the future to determine when additional capacity will be required. The algorithms that predict capacity growth output numbers that are not easily explained. Since it takes 2-3 years on average to complete a cell site project, we have to be looking about 3 years into the future to meet future customer demand.

While data capacity may not seem urgent, beginning in 2014 voice traffic will begin to migrate from the older 3G voice technology to 4G VoLTE (Voice over IP). This will add additional load to the 4G data network. Since voice is delay sensitive, exhaustion of the data network can cause degradation of voice calls including 911 calls.



### **“Why do you need a site here???”**

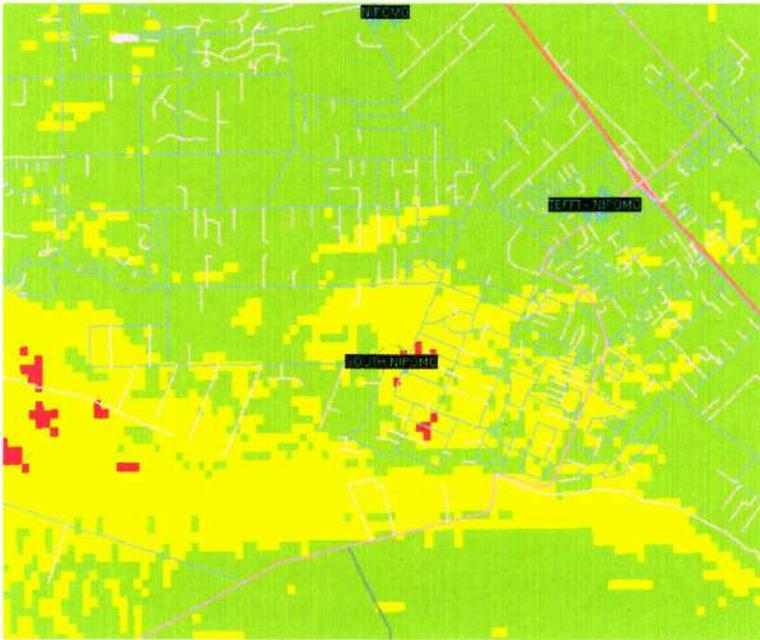
A good capacity cell will be close to the user population and have the traffic evenly spread around the site. When we cannot get a location that accomplishes being close to the customers and central to the usage, we end up having to build additional cells to meet the demands for service. Capacity sites are generally lower in height than a coverage site with a full cell needing to be above the ground clutter (buildings, trees, & etc.) and a small cell being one that is at or below the ground clutter.

Where our customers use their wireless devices continues to evolve. While we once needed to cover highways and business districts, we are seeing increasing issues with high growth in residential areas. Current statistics show that about 1 of 3 American households no longer have a landline phone. To serve this need we have to increase the cells we have in or very near residential areas.

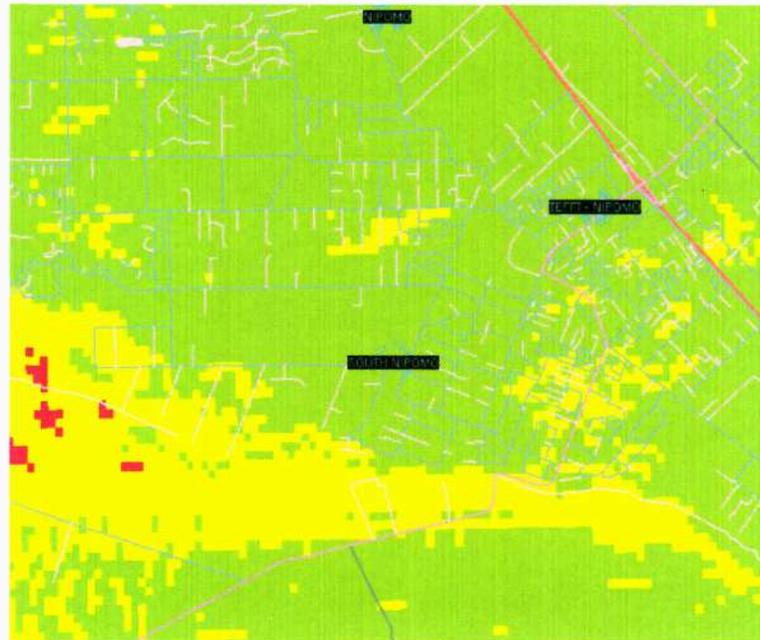


## Need Case for: **South Nipomo**

Existing Coverage



Proposed Coverage



The proposed South Nipomo site is a coverage/capacity site which will significantly improve coverage as shown above where we have a large area of marginal in-building service

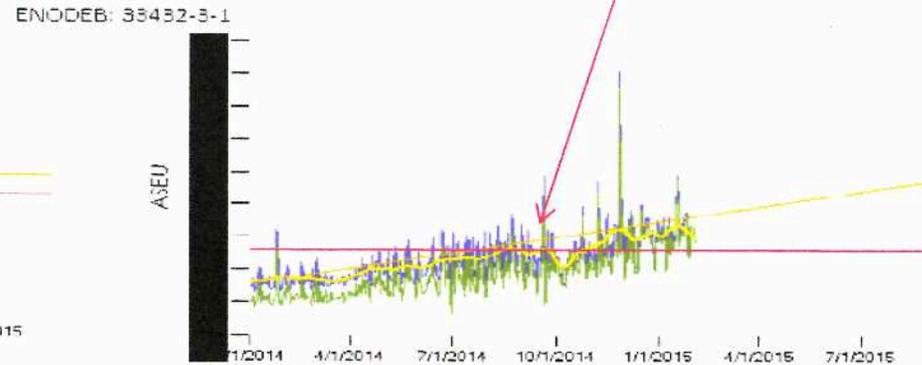
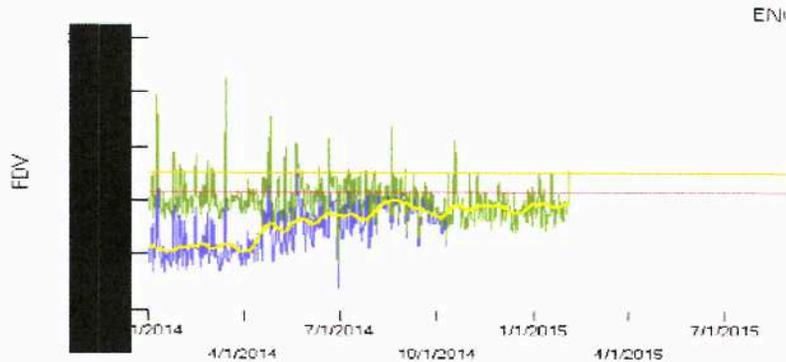
**Green**=Good In-Building, **Yellow**= Good In-Vehicle, **Red**=Good on-Street.



## Need Case for: South Nipomo

Blue and Green lines show FDV.  
Red line is the threshold where significant service degradation is seen.  
The yellow line is the trend.

Blue and Green lines show ASEU.  
Red line is the threshold where significant service degradation is seen.  
The yellow line is the trend.



**Summary:** The existing Nipomo PG&E site cannot support the data traffic in the large area of the Nipomo Mesa it covers.  
**Detail below.**

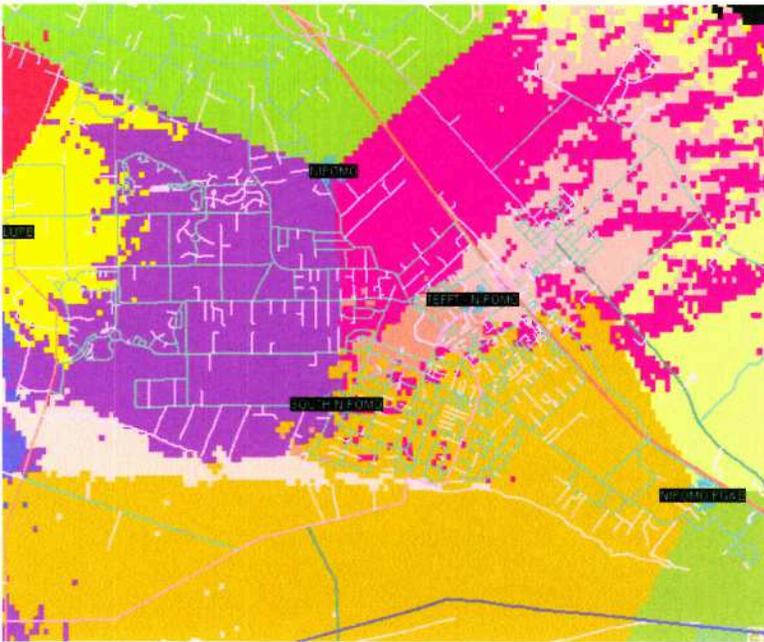
The graphs above show FDV (Forward Data Volume) and ASEU (Average Schedule Eligible Usage). While these are very technical capacity measurements below is a brief explanation. FDV is the total MB of data flowing through the cell it can rise just above the red line then reaches a hard limit and data delivery is delayed. The ASEU measure is of the resource manager in the cell site and shows its ability to schedule the data packets over the Radio channel. At closer distances to the cell higher efficiency modulation schemes can be utilized. Closer traffic means fewer error correction techniques are used and few retransmissions of data. When the cell is serving users at a great distance they require more resources to carry far less data than a closer user would use. This causes the cell to exhaust well before the other limiting factors of the cell are reached. A simple analogy, you can communicate more info talking to someone across a table than you could yelling across a canyon.

To aid in resolving this, we propose to remove the residential traffic in this area onto the proposed local cell site providing better network coverage and capacity.

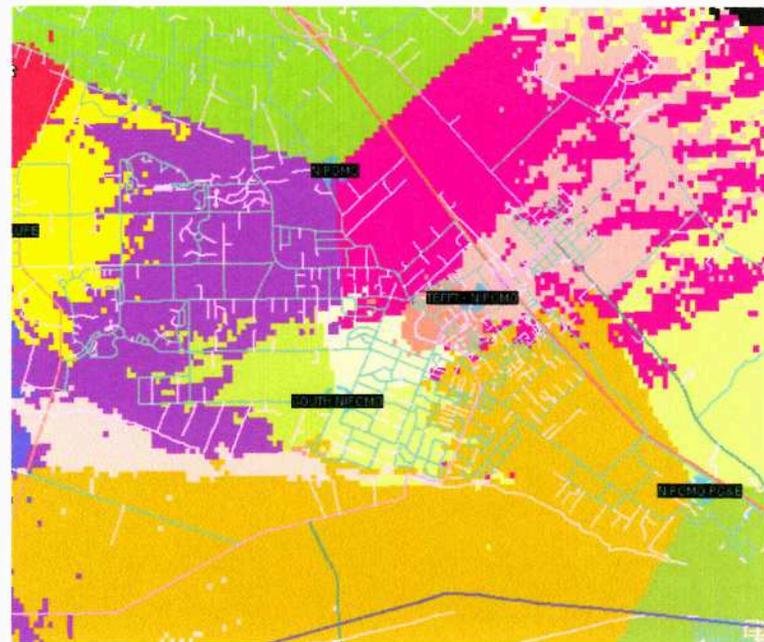


## Need Case for: South Nipomo

Best Server without South Nipomo



Best Server with South Nipomo



The plots above show the best server or sectors that cover this area. The new South Nipomo site will both improve an area where coverage is sub standard and offload residential traffic from the overloaded Nipomo PG&E site to the East. The area around this site should notice much improved 4G coverage and have ample capacity to support continues growth with this site.