

7 November 2008

Tom Forster  
Manager, Telecommunication Branch  
Commerce Commission

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cc: telco@comcom.govt.nz

Dear Tom

**RE: Mobile Co-location STD - further consultation**

We refer to your letter of 29 October 2008 inviting parties to comment on alternative methods for distinguishing between “urban” and “non-urban” areas for the purposes of setting alternative levels of “Unacceptable Performance Degradation” (UPD) in different geographic areas in the Commerce Commission’s (the “Commission”) standard terms determination (STD) for the Mobile Co-location Service.

Kordia Ltd, TeamTalk Ltd, Telecom New Zealand, Vodafone New Zealand and Woosh Wireless Ltd welcome the opportunity to comment on this issue.

While we have individually disagreed on a number of issues during the Commission’s Mobile Co-location Service STD process, we now share a common view on the issue of UPD.

***We believe a uniform level of Unacceptable Performance Degradation should be set in all geographic regions***

At the outset, it is important to note that we are all of the view that a single threshold of 0.5dB<sup>1</sup> should be set for UPD in both urban and non-urban areas.

It is a serious matter for the provision of access to network services and infrastructure to lead to reductions in existing levels of network performance. A new entrant will have little reason to be concerned about the extent to which providing access will degrade the network performance of existing network operators. The lesser the network performance of existing operators after a new entrant enters the market, the easier it will be for it to compete to provide services to consumers. Bringing down the performance of existing operators will reduce the quality of service to which the new entrant must aspire in order to remain competitive once it has entered the market.

Ultimately, end-users will not benefit if co-location leads to excessively high levels of both voice and data rate degradation. This will be the case irrespective of whether end-users are in urban or non-urban areas.

Further, a single threshold will also overcome the problems that exist with defining urban and non-urban areas in each of the three proposals suggested by the

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<sup>1</sup> The 0.5dB threshold is based on the 0.4dB ITU Guidelines, plus a margin to accommodate site solution impacts.

Commerce Commission. Geographic differentiation introduces an additional level of complexity that will never completely align with the practicalities and nuances that exist in the real world. The Commission needs to be mindful of this if it elects to determine geographic boundaries and rules for the Mobile Co-location Service.

***If a distinction is to be made between different geographic regions, we believe it should be on the basis of “clutter data” we justify this position in Appendix 3.***

Notwithstanding our common view that a uniform level of UPD should be set for all geographic areas, if the Commission is considering geographically differentiating UPD, it should consider the following points:

- The intent of a geographic UPD distinction must be to accommodate varying site solution impacts;
- Any site classification must be on the basis of coverage, rather than physical site location; and
- There needs to be an appropriate framework for assessing the proposed options.

There are two distinct elements that comprise the total UPD measure observed at a given site - co-location interference (or Noise Floor Elevation (NFE)) and site solution impacts. We consider NFE to be a fixed threshold that should not vary across sites and geography. We provide further detail on this in Appendix 2.

We are strongly of the view that the geographic classification of a site should be based on the area that the site provides coverage to, rather than on the location of site towers within that area. That is, if a particular site provides coverage to both urban and non-urban areas, then that site should be classified as a non-urban site even if the site tower is located within the urban part of the cell's coverage area.

We have objectively assessed the options proposed by the Commission against a framework comprising the following criteria:

- Cost;
- Accuracy;
- Industry practice;
- Implementation;
- On-going Maintenance; and
- Long-term solution

We provide further detail on this comparison in Appendix 1.

On the basis of this assessment, we recommend that the Commission set geographic UPD boundaries using the NZ clutter data supplied by Terralink.

A more detailed assessment of the various options discussed in your letter of 29 October 2008 is contained in the Appendices attached to this letter :

1. Appendix 1 - Comparison of the Commission's Proposed Geographic Classification Options
2. Appendix 2 - UPD, NFE and Site Solution Impacts
3. Appendix 3 - Review of the Options Proposed by the Commerce Commission

## **Conclusion**

It has not always been the case that the Kordia Ltd, TeamTalk Ltd, Telecom New Zealand, Vodafone New Zealand and Woosh Wireless Ltd have all agreed to various terms that should be contained in the STD. Indeed, in many STD processes (including this one) we have respectfully argued different positions on a number of contentious regulatory issues.

That we have reached a common view on the crucial issue of UPD, in our view, attests to the reasonableness of our position. It is a position that balances our respective perspectives as both access providers and access seekers of this service. We believe our ability to reach a common view on this matter should weigh heavily in the Commission's consideration of this matter.

Yours sincerely



Ian Goodwin  
Strategic Technology Manager  
Kordia™ Limited



Bruce Harding  
Chief Technology Officer  
TeamTalk Ltd



John Wesley-Smith  
Head of Regulatory Affairs  
Telecom New Zealand

A handwritten signature in blue ink, appearing to read "Richard York", enclosed in a light grey rectangular box.

**Richard York**  
**Regulatory Manager**  
**Vodafone New Zealand**

A handwritten signature in blue ink, appearing to read "Paul Kearney", written in a cursive style.

**Paul Kearney**  
**Chief Technology Officer**  
**Woosh Wireless Ltd**

## Appendix 1 - Comparison of the Commission's Proposed Geographic Classification Options

We have assessed the options proposed by the Commission against an objective framework. The following table details our findings and supports our recommendation - the clutter data option.

	SNZ Option	Clutter Data Option	Site Density Option
<b>Cost</b> (Generally of a similar magnitude across all options)	<ul style="list-style-type: none"> <li>SNZ boundary area classifications are already available and free to use.</li> </ul>	<ul style="list-style-type: none"> <li>A clutter database must be made available for AS and AP to use for the purpose of classifying base stations (but not for purpose of general network planning)</li> </ul>	<ul style="list-style-type: none"> <li>SNZ boundary area classifications and Ward boundaries are already available and free to use.</li> </ul>

<p>Accuracy</p>	<ul style="list-style-type: none"> <li>• This approach extends the definition of urban areas well into less densely populated areas that would be better classified as non-urban areas.</li> <li>• The lack of granularity in the SNZ classification also results in large areas being incorrectly classified. We are concerned that using the SNZ classification could result in a number of sites located inside urban areas which provide coverage to non-urban areas being subjected to higher levels of degradation than the Commission would intend if it adopted an approach of setting a lower threshold in non-urban areas.</li> </ul>	<ul style="list-style-type: none"> <li>• The greater granularity of Clutter data compared to the other two methods enables more accurate classification of urban and non-urban boundary areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Regardless of at what level the urban and non-urban threshold is set, there are likely to be anomalies in this approach, with areas that would properly be considered to be urban being classified as non-urban, and vice-versa, due to the low level of granularity.</li> <li>• Telecom and Vodafone use a number of frequency bands to provide service from the same site. It is for this reason that the licences recorded in the Spectrum Search Lite Database will vary between one, two and three for each site. Using the licence numbers as a proxy for cell site numbers will result in double or triple counting a number of sites. This is likely to lead to a number of non-urban areas being classified as urban areas because of the increased site density due to double or triple counting.</li> <li>• An increased site density is required at 2100MHz compared to 850MHz and is required for both urban areas and in non-urban areas (for example Woosh's network in Southland) so site density does not provide an adequate metric to distinguish urban areas from non-urban areas.</li> </ul>
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<p><b>Industry Practice</b></p>	<ul style="list-style-type: none"> <li>Based on SNZ classifications.</li> </ul>	<ul style="list-style-type: none"> <li>All cellular operators already use Clutter data in their general network planning and design activities.</li> </ul>	<ul style="list-style-type: none"> <li>A key point of concern is that there are no established rules for deciding what site density would constitute urban and non-urban areas such that there is no clear boundary between what are normally considered to be urban and non-urban areas. Thus, the choice of threshold is likely to be very subjective, and would likely require another round of consultation and debate between interested parties.</li> </ul>
<p><b>Implementation</b></p>	<ul style="list-style-type: none"> <li>Currently used for urban/rural split in UCLL STD.</li> <li>Need to determine which classifications are urban vs non-urban.</li> </ul>	<ul style="list-style-type: none"> <li>Using Clutter data is not significantly more complicated than using the SNZ classification as both methods require a level of processing</li> <li>The application of Clutter data to classify urban and non-urban is practical and generally not complicated.</li> <li>It is easy to implement this classification in existing planning tools.</li> <li>Also need to determine which classifications are urban vs non-urban</li> </ul>	<ul style="list-style-type: none"> <li>Sorting out the number of actual sites based on licence details will require some level of processing. This level of processing is similar to using Clutter data to classify urban and non-urban areas.</li> <li>No agreed industry standards for urban site density vs non-urban site density thresholds (per frequency band) leads to an uncertain outcome for this approach.</li> </ul>

<p><b>On-going Maintenance</b></p>	<ul style="list-style-type: none"> <li>• SNZ maintain their classifications. Urban/Rural is updated from 5-yearly Census data, with annual updates in the intervening period.</li> </ul>	<ul style="list-style-type: none"> <li>• Clutter databases are also updated occasionally as new urban/suburban areas develop - similar to SNZ updates.</li> </ul>	<ul style="list-style-type: none"> <li>• The SNZ boundaries are used in this process and will need to be kept up to date.</li> <li>• Site densities will also change through time and for each AP, so each AP will need to regularly review all classifications and boundaries as new sites are introduced.</li> <li>• This approach will lead to a general lack of consistency of classification across areas of similar types which may lead to confusion or points of dispute.</li> </ul>
<p><b>Long-term Solution</b></p>	<ul style="list-style-type: none"> <li>• SNZ classification also tends to vary with time e.g by the expansion of towns. This could lead a particular site having different classifications over time.</li> <li>• This could be undesirable as it may lead to uncertainty as to the classification of a site over time if access providers and access seekers are concerned they may be required to alter their network design if an area changes from one classification to another.</li> </ul>	<ul style="list-style-type: none"> <li>• Similar to SNZ, however site classifications will initially be more accurately defined</li> <li>• We note that the Terralink clutter data is revised from time to time, currently approximately every six years. Consequently, if clutter data is used for geographic classification, the matter of how to accommodate changes to clutter data as a result of Terralink's revisions, needs to be addressed in a pragmatic way.</li> </ul>	<ul style="list-style-type: none"> <li>• Site densities will change regularly as networks mature.</li> <li>• Site density will also be different for each Assess Provider so keeping track of urban vs non-urban classifications will be an ongoing and unnecessarily complex issue to manage</li> </ul>

	<ul style="list-style-type: none"><li>• A change from non-urban to urban site classification will mean maximum UPD level for a co-lo application may increase, so get greater reduction in coverage or data services than previously anticipated</li></ul>		
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## Appendix 2 - UPD, NFE and Site Solution Impacts

Unacceptable Performance Degradation results from the combined total of co-location interference (termed Noise Floor Elevation (NFE)) and the impacts of the co-location site solutions.

We believe it is important that New Zealand regulations are consistent with accepted international standards. In support of this principle it was generally agreed at the recent Mobile Co-location conference that it was appropriate to adopt the maximum external co-location interference levels specified in ITU-R reports that limit the maximum NFE to 0.4dB at all sites.

This can be summarised by the following formulae:

$$\text{UPD}_{\text{max}} = \text{NFE} + \text{L}_{\text{solution}}$$

Where  $\text{L}_{\text{solution}}$  = losses associated with co-location site solution impacts

Put another way:  $\text{L}_{\text{solution}} = \text{UPD}_{\text{max}} - \text{NFE}$

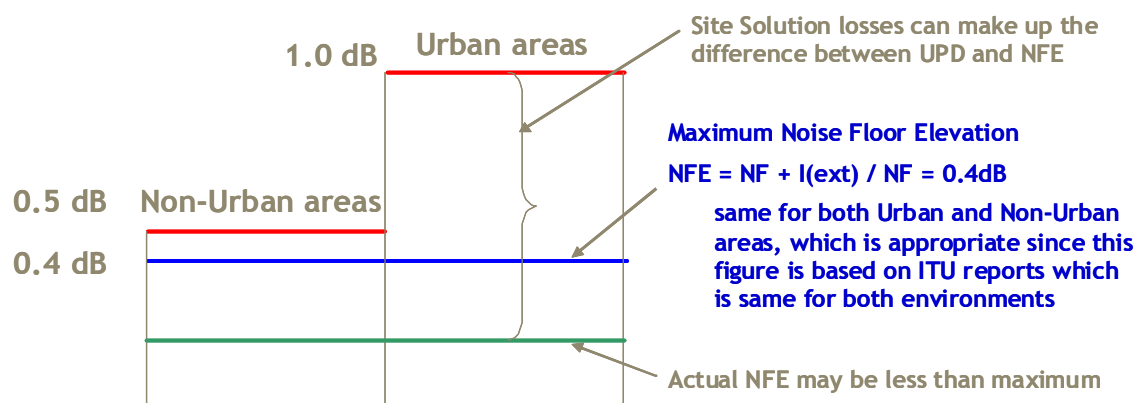
Where:  $\text{UPD}_{\text{max}} = 0.5 \text{ dB}$ ; and  
 $\text{NFE} \leq 0.4 \text{ dB}$

If the external co-location interference and NFE at a site is low and near 0 dB, then  $\text{L}_{\text{solution}}$  can be almost 0.5 dB.

If the maximum NFE is maintained at 0.4dB, then any increase in total UPD in urban areas will therefore increase the maximum allowed losses from the site solution impacts that may be necessary to further facilitate co-location at those urban sites.

For example, if  $\text{UPD}_{\text{max}}$  is increased to 1.0dB and NFE is below 0.1 dB, then

$$\text{L}_{\text{solution}} = \text{UPD}_{\text{max}} - \text{NFE} = 1.0 \text{ dB} - 0.1\text{dB} = 0.9\text{dB}$$



### **Appendix 3 - Review of the Options Proposed by the Commerce Commission**

In its letter of 29 October 2008, the Commission outlines three various options for distinguishing between urban and non-urban areas. The relative benefits and costs of each of these options are discussed, in turn, below.

#### **Option 1 - SNZ classification of urban/non-urban areas**

We are of the view that the Statistics New Zealand (SNZ) classification of urban and non-urban areas will not provide a reasonable representation of these areas. This is because more accurate data is available in the form of clutter data, and these data should be used instead of the less accurate SNZ classification.

The following figures highlight the potential for mis-estimation of urban areas in Auckland, Hamilton, Wellington and Christchurch under the SNZ approach.<sup>2</sup> The areas shaded in pink show the full extent of urban areas that would be measured using the SNZ approach. Clearly, this approach extends the definition of urban areas well into less densely populated areas that would be better classified as non-urban areas. The alternative, and our view more appropriate, areas that would be measured under the Clutter data approach are shaded in the darker purple colour.

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<sup>2</sup> Nb. The extent of mis-estimation would not be limited only to these areas.

Figure 1.A: Classification of Auckland into urban and non-urban based on SNZ and clutter data.

- Urban area – clutter data
- Urban area – SNZ

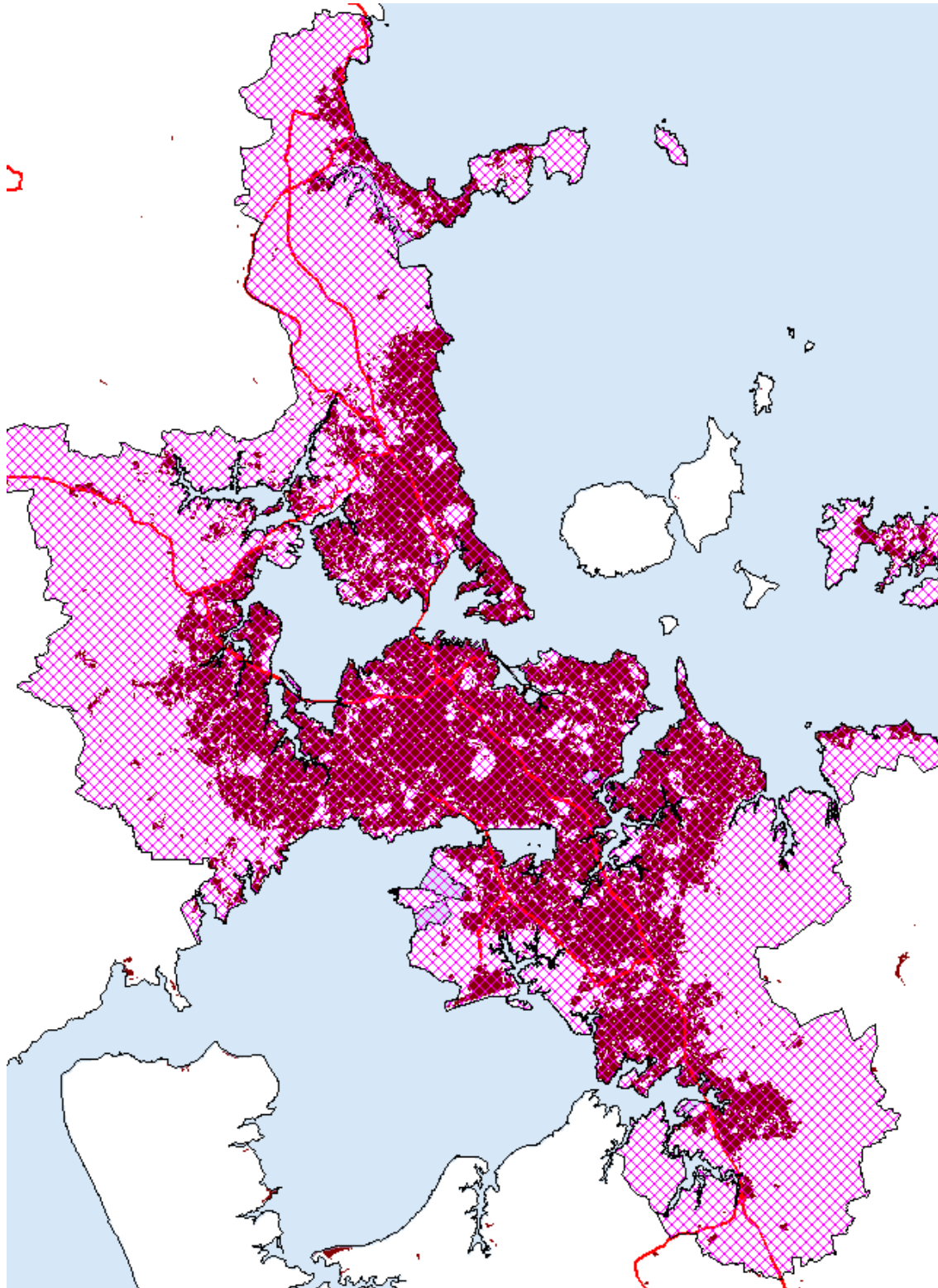


Figure 1.B: Classification of Hamilton into urban and non-urban based on SNZ and clutter data.

- Urban area – clutter data
- Urban area – SNZ

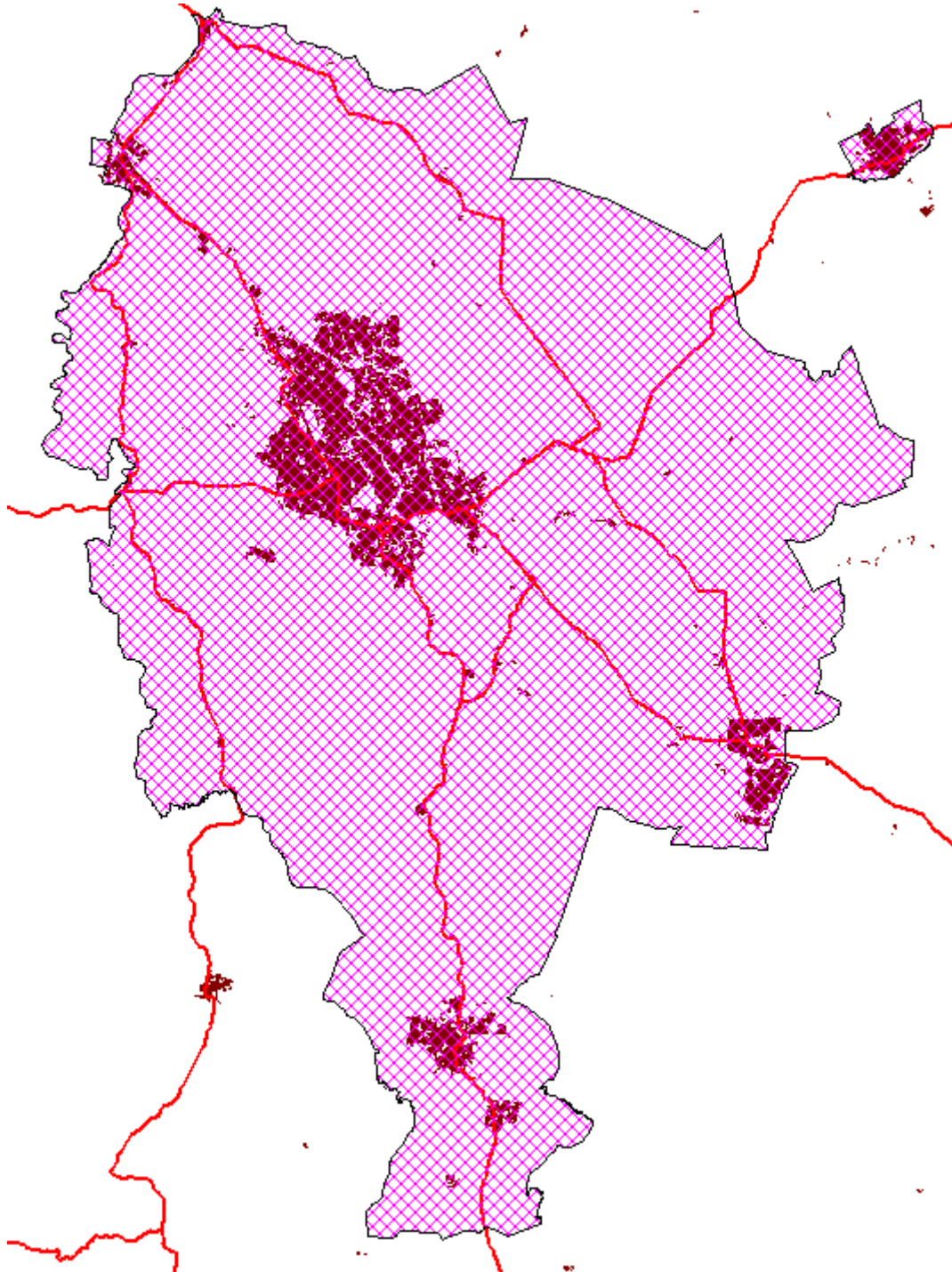


Figure 1.C: Classification of Wellington into urban and non-urban based on SNZ and clutter data.

- Urban area – clutter data
- Urban area – SNZ

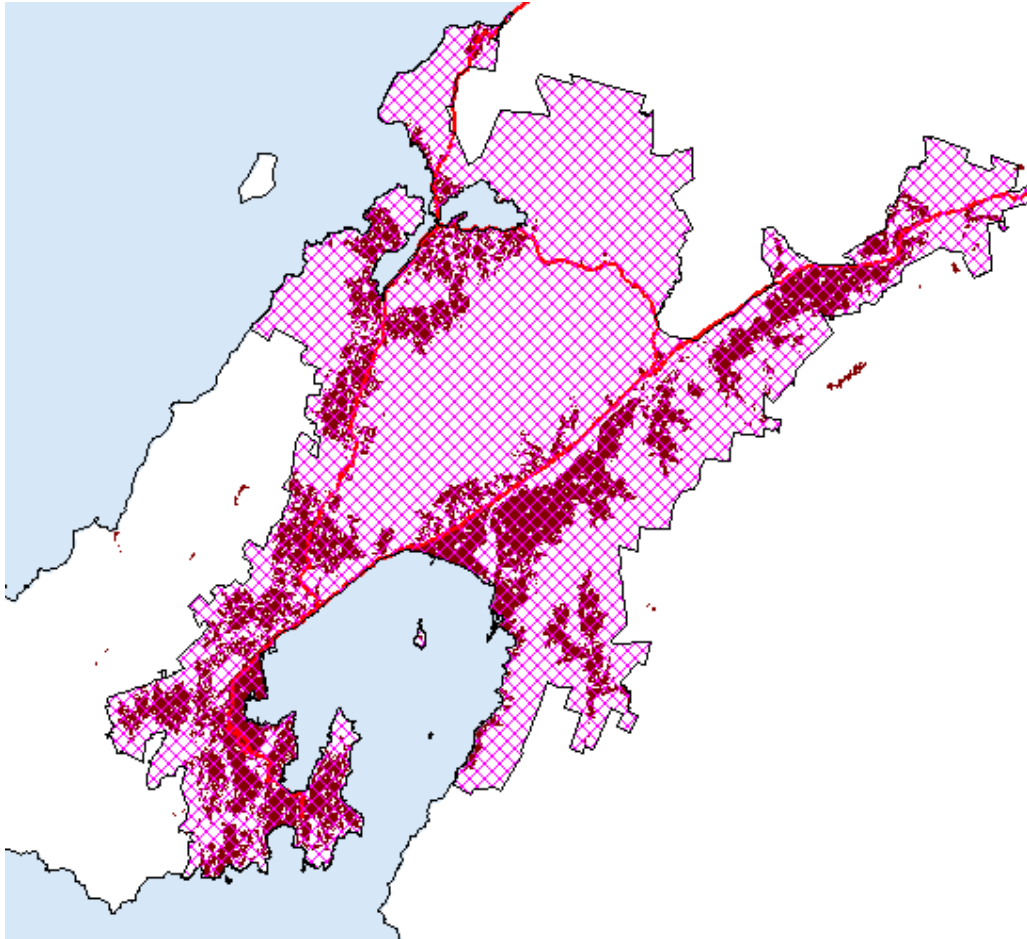
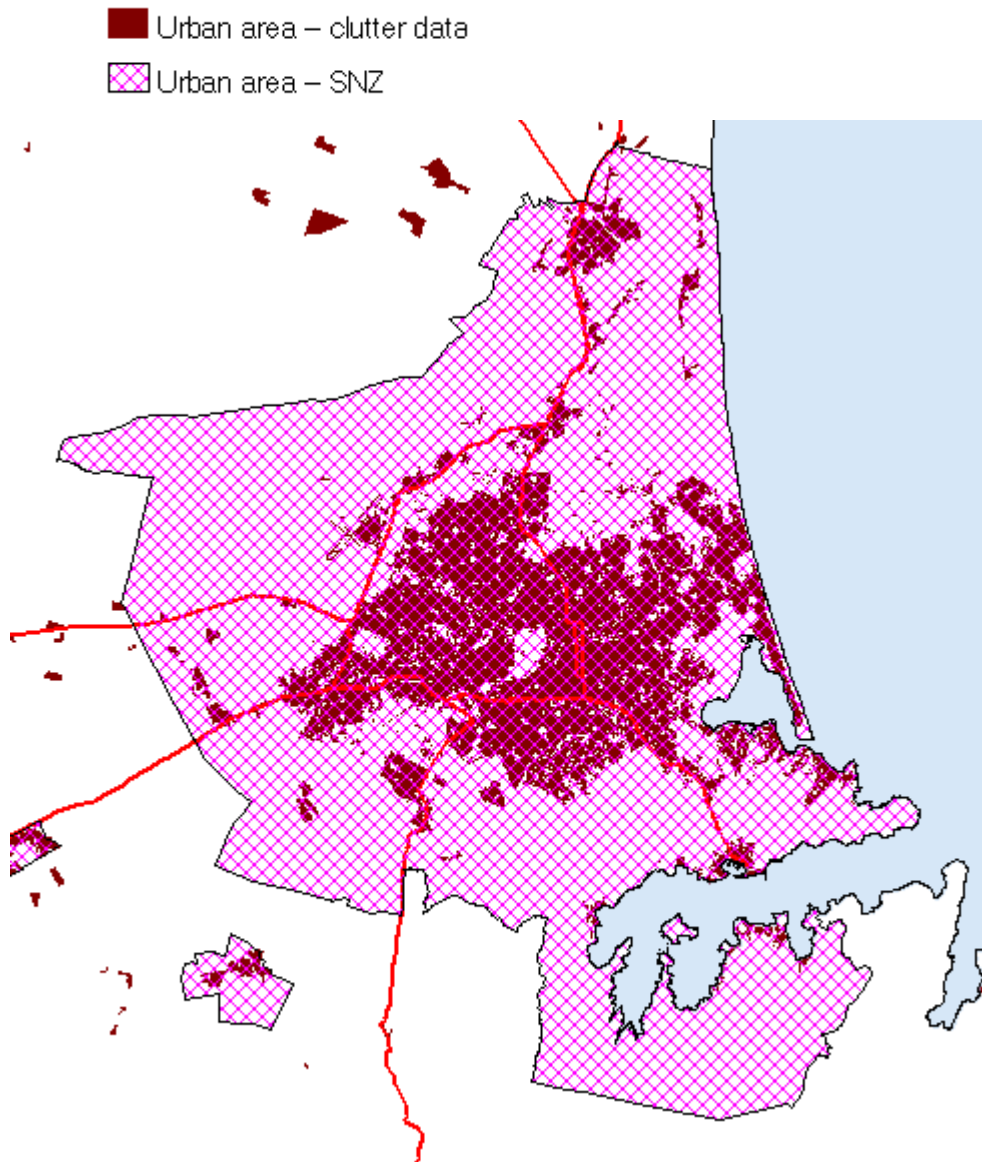


Figure 1.D: Classification of Christchurch into urban and non-urban based on SNZ and clutter data.



The lack of granularity in the SNZ classification also results in large areas being incorrectly classified. We are concerned that using the SNZ classification could result in a number of sites which provide coverage to non-urban areas being subjected to higher levels of degradation than the Commission would intend if it adopted an approach of setting a lower threshold in non-urban areas.

SNZ classification also tends to vary with time e.g by the expansion of towns. This could lead a particular site having different classifications over time. This could be undesirable as it may lead to uncertainty as to the classification of a site over time if access providers and access seekers are concerned they may be required to alter their network design if an area changes from one classification to another.

## Option 2 - Clutter data

We believe that out of the three options proposed by the Commerce Commission, Clutter data is the best option for classifying urban and non-urban. This is not to say that this is a perfect option. We acknowledge Clutter data has its own set of issues as well. For example, Clutter data too can suffer from variation over time. However, the greater granularity of Clutter data compared to the other two methods enables more accurate classification of urban and non-urban areas.

Using Clutter data is not significantly more complicated than using the SNZ classification as both methods require a level of processing. Further, all cellular operators use Clutter data already for network planning. Thus the application of Clutter data to classify urban and non-urban is practical and generally not complicated.

The classification based on clutter data has to be standardised. We propose that the Terralink LCDB2 clutter database be adopted and that the following clutter classes should be defined as urban:

	<b>LCDB2 Class</b>	<b>Terralink descriptor</b>	<b>Urban / Non-urban</b>
1	1	Built-up Area	Urban
2	2	Urban Parkland / Open Space	Urban
3	3	Surface Mine	Non-urban
4	4	Dump	Non-urban
5	5	Transport Infrastructure	Urban
6	10	Coastal Sand and Gravel	Non-urban
7	11	River and Lakeshore Gravel and Rock	Non-urban
8	12	Landslide	Non-urban
9	13	Alpine Gravel and Rock	Non-urban
10	14	Permanent Snow and Ice	Non-urban
11	15	Alpine Grass-/ Herbfield	Non-urban
12	20	Lake and Pond	Non-urban
13	21	River	Non-urban
14	22	Estuarine Open Water	Non-urban
15	30	Short-rotation Cropland	Non-urban
16	31	Vineyard	Non-urban
17	32	Orchard and Other Perennial Crops	Non-urban
18	40	High Producing Exotic Grassland	Non-urban
19	41	Low Producing Grassland	Non-urban
20	43	Tall Tussock Grassland	Non-urban
21	44	Depleted Grassland	Non-urban
22	45	Herbaceous Freshwater Vegetation	Non-urban
23	46	Herbaceous Saline Vegetation	Non-urban
24	47	Flaxland	Non-urban
25	50	Fernland	Non-urban
26	51	Gorse and or Broom	Non-urban
27	52	Manuka and or Kanuka	Non-urban
28	53	Matagouri	Non-urban
29	54	Broadleaved Indigenous Hardwoods	Non-urban
30	55	Sub Alpine Shrubland	Non-urban

31	56	Mixed Exotic Shrubland	Non-urban
32	57	Grey Scrub	Non-urban
33	60	Minor Shelterbelts	Non-urban
34	61	Major Shelterbelts	Non-urban
35	62	Afforestation (not imaged)	Non-urban
36	63	Afforestation (imaged, post LCDB 1)	Non-urban
37	64	Forest - Harvested	Non-urban
38	65	Pine Forest - Open Canopy	Non-urban
39	66	Pine Forest - Closed Canopy	Non-urban
40	67	Other Exotic Forest	Non-urban
41	68	Deciduous Hardwoods	Non-urban
42	69	Indigenous Forest	Non-urban
43	70	Mangrove	Non-urban

While the above classification may seem complicated, it is easy to implement this classification in planning tools used for cell site design.

### Option 3 - Determination based on the density of cell sites

We are of the view that this method is very subjective and is the least preferred method of the three options suggested by the Commission. This method has a greater number of draw backs compared to the other two methods. These drawbacks will lead to ambiguity and disputes in the future. In particular, we note that:

1. There are no established rules for deciding what site density would constitute urban and non-urban areas such that there is no clear boundary between what are normally considered to be as urban or non-urban areas. Thus, the choice of threshold is likely to be very subjective, and would likely require another round of consultation and debate between interested parties.
2. Regardless of at what level the urban and non-urban threshold is set, there are likely to be anomalies in this approach, with areas that would properly be considered to be urban being classified as non-urban, and vice-versa. This is illustrated in the figures below.

Figure 2.A: Devonport and Takapuna which are urban areas shown as non-urban based on cell site density.

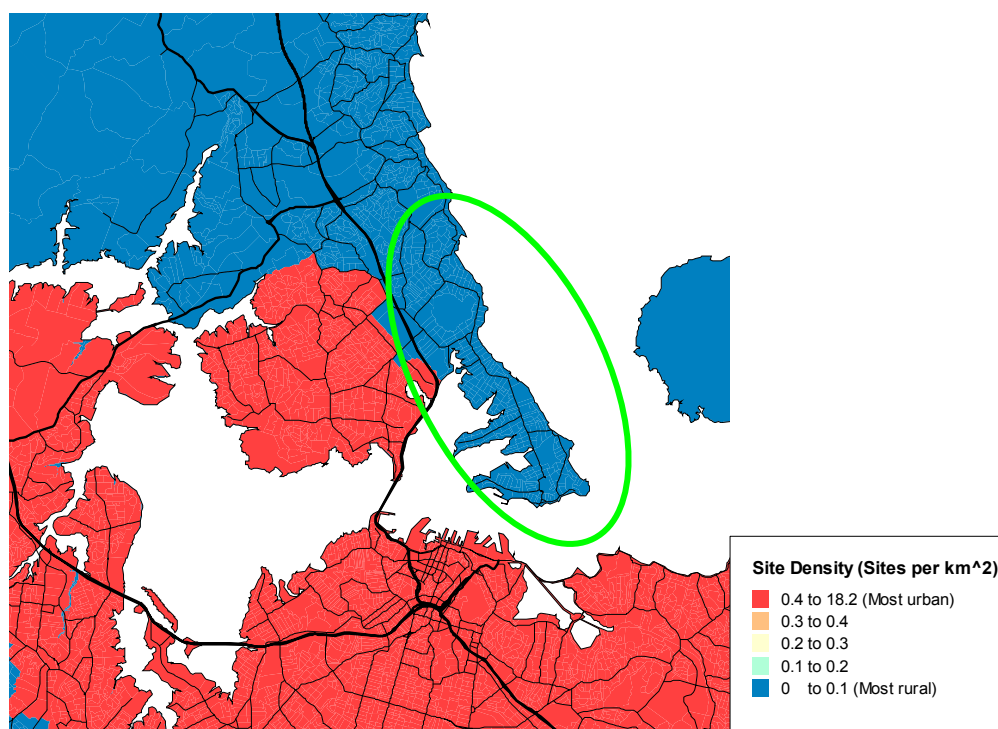


Figure 2.B: Lower Hutt and Upper Hutt which are urban areas shown as non-urban based on cell site density.

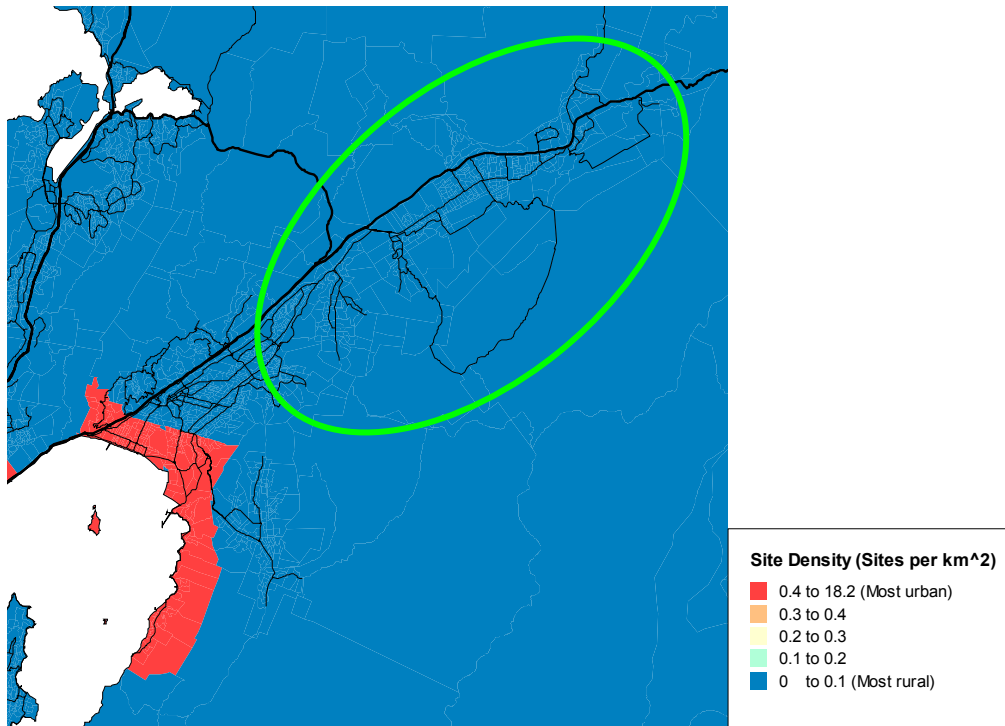
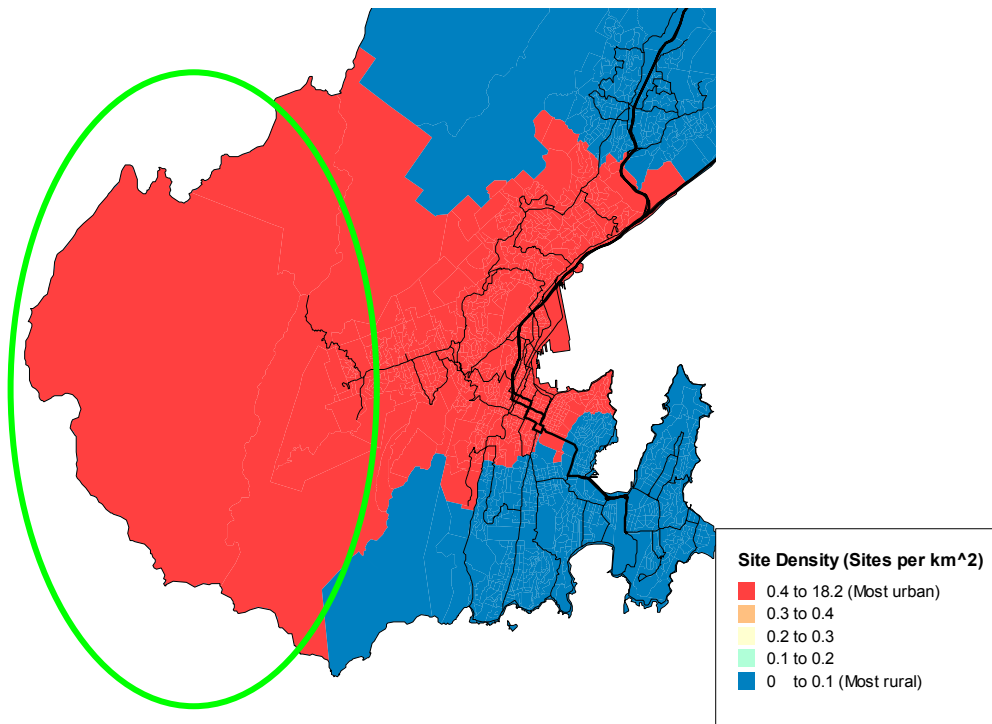


Figure 2.C: Rural outskirts of Wellington shown as urban based on cell site density.



We are of the view that regardless of what the threshold is, there will be incorrect classification of areas. The best this method can do is to minimise this misclassification.

3. Telecom and Vodafone use a number of frequency bands to provide service from the same site. It is for this reason that the licences recorded in the Spectrum Search Lite Database will vary between one, two and three for each site. Using the licence numbers as a proxy for cell site numbers will result in double or triple counting a number of sites. This is likely to lead to a number of non-urban areas being classified as urban areas because of the increased site density due to double or triple counting.
4. An increased site density does not necessarily produce an increased coverage overlap since mobile networks using higher frequency bands (eg 2100MHz compared to 800MHz or 900MHz) require a greater density of sites to provide adequate coverage due to reduced propagation range achieved at higher frequencies.
5. The increased site density required at 2100MHz compared to 850MHz is required for both urban areas and in non-urban areas (for example Woosh's network in Southland) so site density does not provide an adequate metric to distinguish urban areas from non-urban areas.
6. Mobile systems must also minimise inter-cell interference by down-tilting antennas, so coverage overlap between sites in urban areas and also in non-urban areas is generally kept to a minimum and is designed to only provide adequate handoff of mobile users moving between sites, rather than providing large overlapping areas of coverage which significantly reduces overall site capacity.
7. We do not agree with the Commission's view that this method is relatively simple. Sorting out the number of actual sites based on licence details will require some level of processing.
8. Site density will vary between Access Providers operating in an area and will also vary through time as Access Providers introduce additional sites. It is therefore likely that a site density approach will require more regular review and updating of the classification of each area by each Access Provider.

Based on the information presented, we are of the view that using cell site density should not be used for classifying urban and non-urban areas.

### **Site Classification based on Geographical Coverage**

Regardless of the method used for classing urban and non-urban areas, we are of the view that the area covered by a site should be used to classify it rather than the location of the site tower within a site. That is, any site that covers non-urban areas should be classified as non-urban (even if the site tower is located in an urban area).

In this regard, there are a large numbers of sites that serve both non-urban and urban areas. For instance, a cell may serve both a small town and a neighbouring non-urban area. In these cases, a site tower may be located within the town itself - even though the cell may primarily provide coverage to the neighbouring non-

urban area. Given that many of the effects of performance degradation would be experienced at the cell edge (and thus in the non-urban areas), it is important that these sites not be subjected to higher levels of performance degradation.

The following figures show a number of examples where sites located in urban areas provide coverage to non-urban areas.

Figure 3.A: Cell site based in Wanganui (Bastia Hill) providing coverage to large part of non-urban areas.

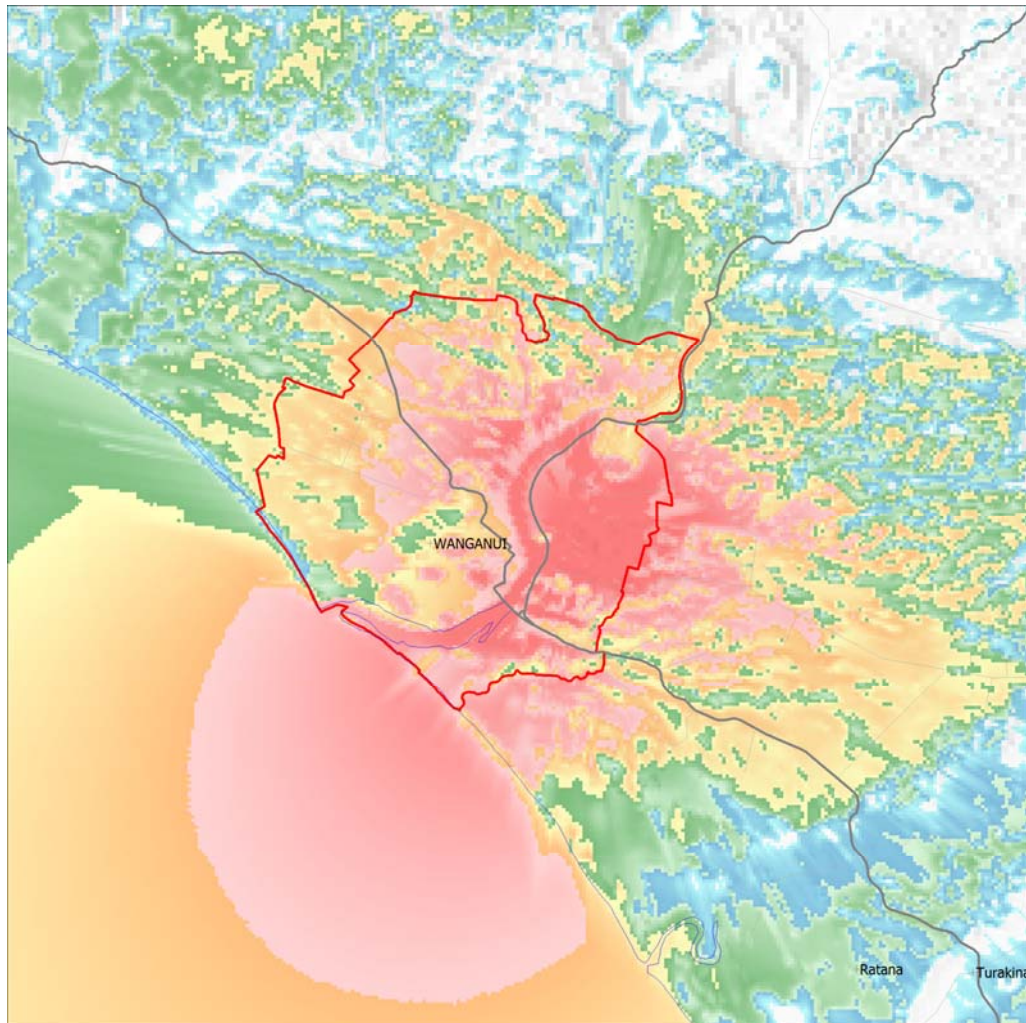


Figure 3.B: Cell site based in Gisborne (Kaiti Hill) providing coverage to large part of non-urban areas.

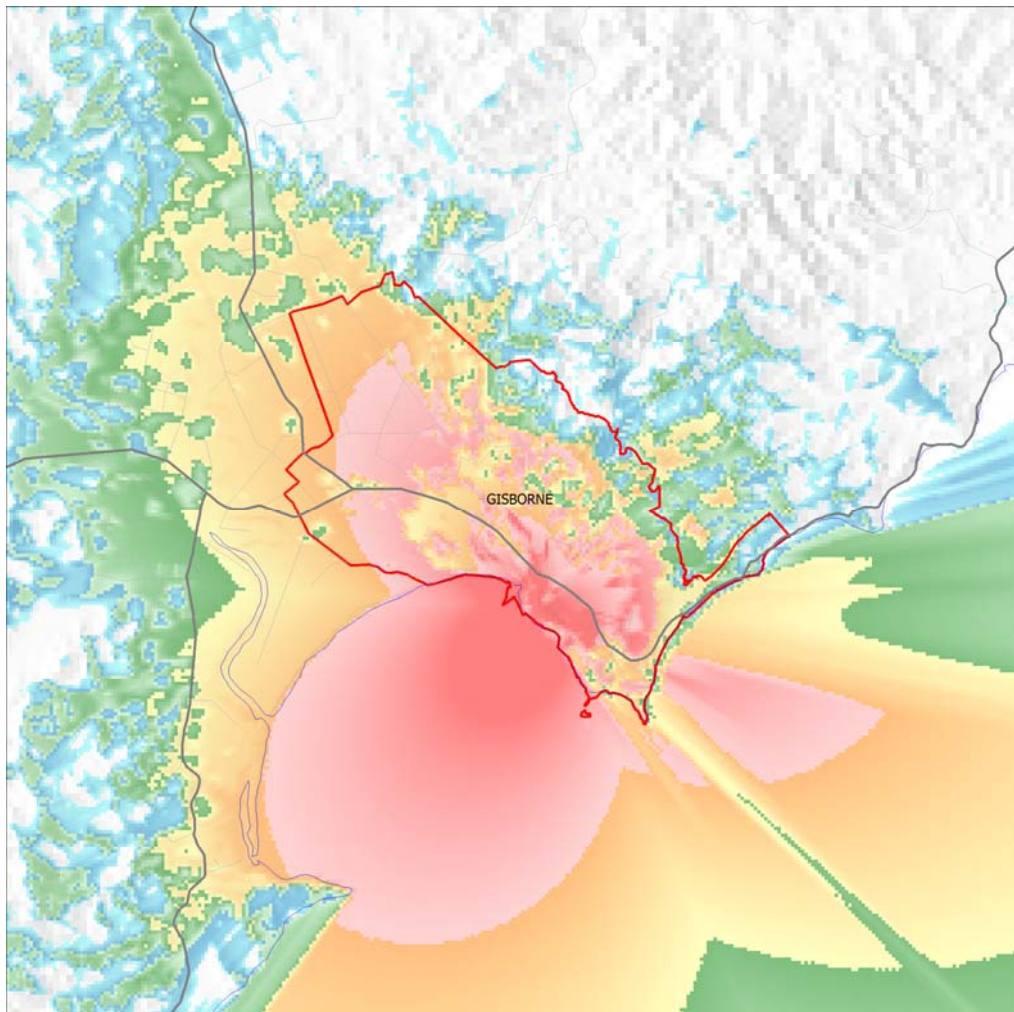
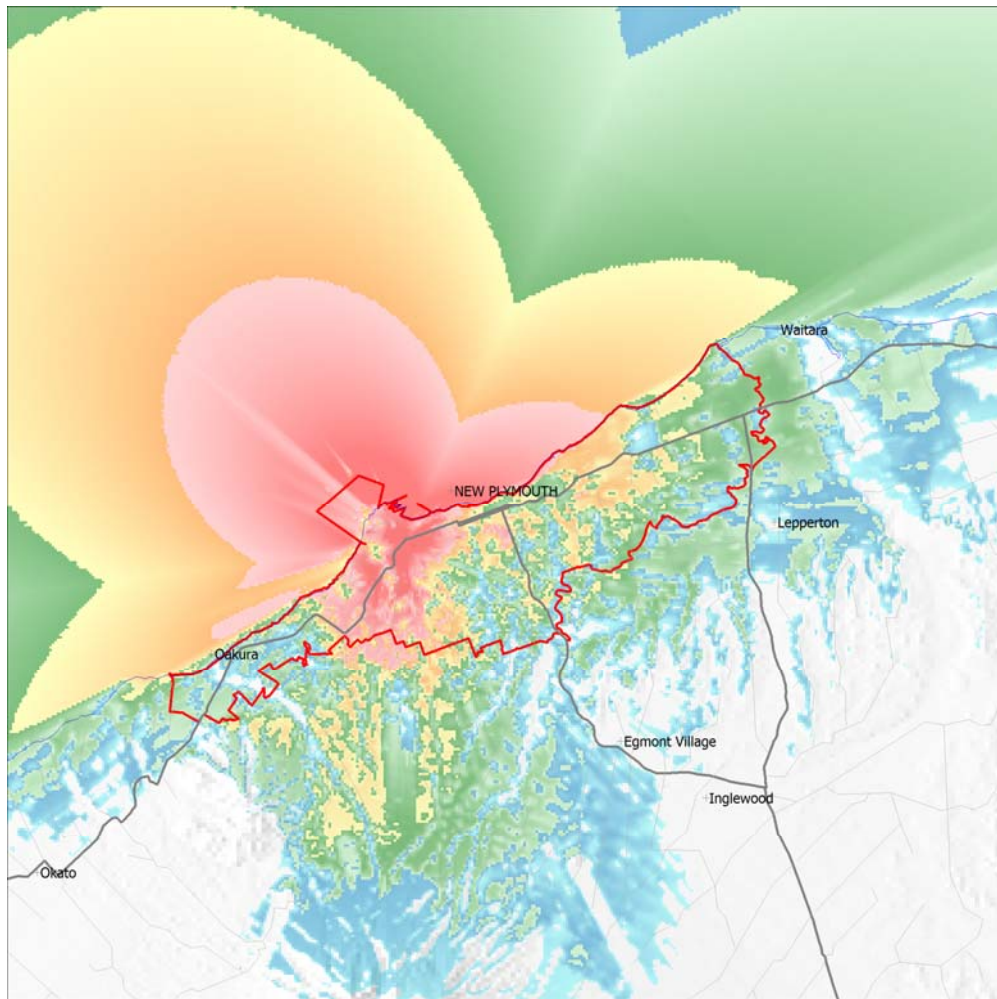


Figure 3.C: Cell site based in New Plymouth (Blagdon Hill) providing coverage to large part of non-urban areas.



The above situations are common in provincial New Zealand and we are of the view that these sites should not be classified as urban sites. Thus we propose that any site that provides coverage to non-urban areas should be classified as a non-urban site.