



**Ministry of Business,
Innovation & Employment**

Coexistence of LTE in the 700 MHz band and Fixed Service systems in the KK band

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Radio Spectrum Policy & Planning

Resources, Energy & Communications Branch

Infrastructure and Resource Markets Group

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1. Aim

The aim of this report is to investigate and identify any potential co-existence issues that might arise as a result from the deployment of a nationwide Long Term Evolution (LTE) network in the 700 MHz band adjacent to existing fixed service systems in the KK band above 806 MHz.

2. Background

The KK fixed service band (806 to 812 MHz paired with 851 to 857 MHz) is used for backhaul communication by many electricity utilities as well as the railway network and radio broadcasting and hence is an important infrastructure communication band. This band has twelve 500 kHz bandwidth channels. Most of the equipment used in the band has been supplied by domestic manufacturers 4RF and Marine-Air Systems (MAS).

The Crown has announced its intention to auction management rights in the 700 MHz band. These management rights will very likely be used to deploy wideband LTE services. Accordingly, it is appropriate to consider whether there are any compatibility issues between the two services.

New Zealand has adopted the APT 700 MHz band plan (703 to 748 MHz paired with 758 to 803 MHz). This band has been specified as 3GPP band 28 by the 3GPP standards organization and supports channel bandwidths up to a maximum of 20 MHz.

LTE services are expected to be deployed in the 700 MHz band from December 2013 when the Digital Switchover (DSO) will be complete nationwide and the band will be available for new services. The base transmit, or downlink, part of the 700 MHz band is adjacent to the fixed service KK band with a guard band of 3 MHz between the two bands. The band arrangement is illustrated in Figure 1 below:

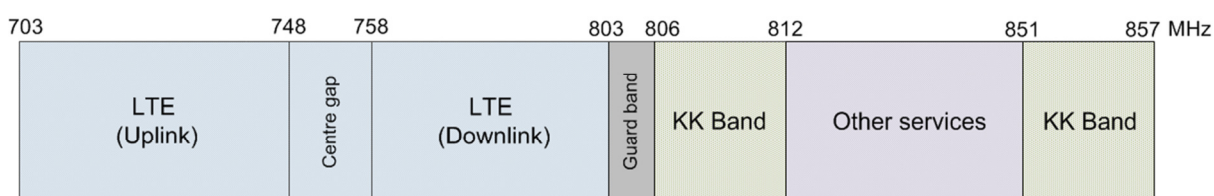


Figure 1: The configuration of the 700 MHz band and KK band

The interference scenarios in this configuration are:

1. Out of band emissions (OOB) from LTE base stations (BS) into KK band receivers; and
2. Out of band emissions from KK band transmissions into LTE user equipment (UE) receivers.

Figure 2 illustrates these two interference scenarios. Due to the widespread deployment of cellular base stations compared to the relatively remote presence of fixed link transmit sites in the KK band, the first interference scenario is much more prevalent and is the focus of this study.

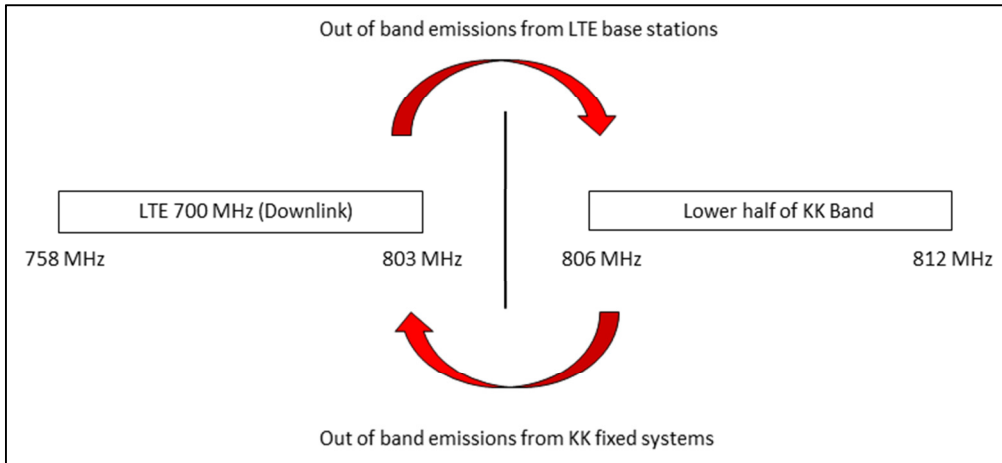


Figure 2: Out of band emissions between 700 MHz and KK band services

3. Scope

Cellular Base Station (BS) sites of the three wireless carriers (Telecom NZ, Vodafone NZ and 2Degrees Mobile) in the 850 MHz and 900 MHz bands are assumed as the BS sites for LTE in the 700 MHz band. The fixed service receive sites in the lower half of the KK band (806 to 812 MHz) have been considered. As of November 2012, there were 134 fixed service links licensed for use in the band.

There are around 1,200 BS sites each in the Telecom 850 MHz band and Vodafone 900 MHz band, and around 800 BS sites in the 2degrees 900 MHz band.

Figure 2 conceptually illustrates the interference scenario between the two services.

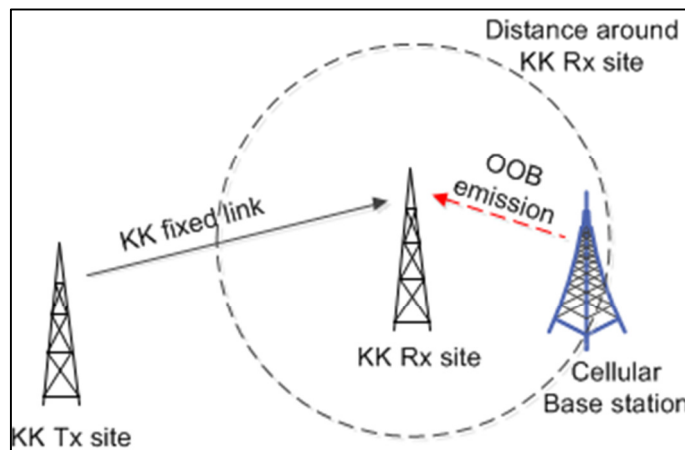


Figure 3: Conceptual illustration of the coexistence scenario between 700 MHz and KK band services

A transmission bandwidth of 5 MHz has been used for LTE BSs as this corresponds to the worst case limit for OOB emissions. The OOB specification for LTE BSs has been taken from the 3GPP Release 8 specifications. This is the first LTE release specification and is believed to be the standard that will be deployed when the 700 MHz band is made available for mobile broadband services. Most LTE equipment that is currently available has been developed to 3GPP Release 8 specifications.

The Ministry's Radio Licence Certification Rules (PIB 38) contain the engineering rules for certifying radio licences which include requirements for co-channel interference thresholds for licensed services. The co-channel interference threshold specified in PIB 38 for KK fixed service receive sites is 6 dB below the noise floor and this has been used in assessing co-existence in this report.

The information corresponding to cellular BS sites and KK fixed service links was taken from licence data in the SMART database as of November 2012.

4. Assumptions

Licence details such as location coordinates and antenna heights as recorded in the SMART database are assumed to be correct.

It is assumed that LTE services in the 700 MHz band will be deployed at all existing cellular BS sites in the 850 MHz and 900 MHz bands.

For antennas used at the sites, only the horizontal radiation pattern (HRP) has been considered. An HRP based on radiation from an isotropic antenna has been assumed for cellular BS sites.

The 3GPP specifications used in the analysis are assumed to accurately specify the operation of LTE equipment that will be deployed in the 700 MHz band. The wireless carriers may have more accurate information on LTE equipment specifications.

5. Exclusions

Cellular BS sites that are co-sited with KK sites are not analysed for interference as it is assumed that sufficient isolation would be made available as part of the site management process. BS sites that are co-sited with KK sites are listed in Annex 1 for information purposes.

Any new LTE base stations that are planned to be deployed in the 700 MHz band on sites other than existing BS sites in the 850 MHz and 900 MHz bands are unknown and not considered.

6. Process

The existing base station sites of the three cellular network operators in the 850 MHz and 900 MHz bands have been used as the site locations for LTE base stations in the 700 MHz band. This study aims to identify those sites which could contribute to a coexistence issue with existing KK band links if LTE in the 700 MHz band is deployed.

Typically, out of band emissions requirements apply from the channel edge and extend a further two channels. Unwanted emissions beyond this point are usually considered to be spurious emissions. For the different channel bandwidths, the following boundaries apply for emissions from LTE base stations operating on the highest channel in the 700 MHz band:

Channel Bandwidth (MHz)	Out of Band Emissions (MHz)	Spurious Emissions (MHz)
5	803 – 813	>813
10	803 – 823	>823
15	803 – 833	>833
20	803 – 843	>843

There are no specific out of band emissions requirements outlined in the specification, however these are often assumed to be addressed by the Adjacent Channel Leakage Ratio (ACLR) requirements. The ACLR criterion is the less stringent of: -13 dBm/MHz or 45 dBc/BW_{Channel}. For a 5 MHz channel bandwidth, the requirement of 45 dBc/BW_{Channel} is less stringent of the two.

The out-of-band emission limit of -6 dBm/MHz corresponding to a 5 MHz channel was used as the worst case emission level for an LTE base station. An interference threshold of 6 dB below the receiver noise floor was used for the KK fixed link receiver as specified in the Radio Licence Certification Rules (PIB 38). The minimum coupling loss (MCL) corresponding to the different LTE channel bandwidths are:

LTE Channel Bandwidth (MHz)	Required Minimum Coupling Loss (dB)
5	109
10	106
15	104
20	103

Using this information we can calculate a minimum separation distance that will be necessary between a base station and a KK fixed service receiver under free space conditions.

From the table above we can assume the worst case Minimum Coupling Loss is 109 dB. On the assumption that current base station filters typically provide attenuation of approximately 45 dB, then the total losses required between the LTE base station and KK fixed receiver is 64 dB. These total losses are a function of the free space path loss, transmit and receive antenna gains and feeder losses. The following calculations apply:

$$\text{Required Total Loss (TL)} = 32.44 + 20 \log d_{\text{km}} + 20 \log f_{\text{MHz}} - G_{\text{tx}} - G_{\text{rx}}$$

Where:

$$G_{\text{tx}} = \text{Base station Antenna Gain} - \text{Feeder Loss} \\ = 15 - 2 = 13 \text{ dBi}$$

$$G_{\text{rx}} = \text{KK Receiver Antenna Gain} - \text{Feeder Loss} \\ = 17 - 2 = 15 \text{ dBi}$$

$$f_{\text{MHz}} = 800 \text{ MHz}$$

$$\text{TL} = \text{MCL} = 64 \text{ dB}$$

Solving for d_{km} :

$$20 \log d_{\text{km}} = \text{TL} - 32.44 - 20 \log f_{\text{MHz}} + G_{\text{tx}} + G_{\text{rx}} \\ = 64 - 32.44 - 58.06 + 13 + 15 \\ = 1.50 \\ d_{\text{km}} = 1.2 \text{ km}$$

On the basis of the calculation completed above there is a potential incompatibility issue on occasions where a BS transmitter is within 1.2 km of a KK band receiver. This is, however, a coarse approximation used as a “first cut”. Further analysis has been completed as outlined below.

The base station sites of the three wireless carriers in the 850 and 900 MHz band and the KK band sites were extracted from the SMART database and plotted in ICS Telecom¹. Base station sites in the vicinity of KK band sites were identified as potential interference concerns. A number of the base station sites identified are sites which are co-sited with KK fixed link sites and hence would have to be appropriately isolated from the KK link receiver at the site. These base station sites are listed in Annex 1. As noted in the Exclusions section, an analysis of these co-sited services has not been included in the report because of special requirements for co-siting that would have to be satisfied by the two service providers which we are not in a position to undertake.

For each of the base station sites within 5 km of a KK fixed service site, the path loss between the two sites was assessed using ICS Telecom, based on the ITU-R Recommendation P.525 model and Deygout diffraction. A larger distance compared to the separation distance from the free space path loss calculation was chosen to ensure a conservative approach to the analysis. The angular discrimination from antenna directivity based on the horizontal radiation pattern has also been included in the path analysis. Any additional attenuation required to meet the minimum coupling loss requirement has been calculated for each base station site.

7. Results

The tables below list the cellular base station sites that have been identified to be in the vicinity of KK fixed service receive sites. The associated KK fixed service receive sites have also been included in the table along with the distance between the two sites and any additional attenuation required to meet the minimum coupling loss (MCL) requirement. The cellular sites have been grouped based on the cellular operator and are ordered based on cellular site licence IDs.

Out of a total number of base station sites nationwide of around 3200, only 35 base stations require any additional attenuation and only 15 base stations require additional attenuation of 20 dB or more. It is understood that current base station filter technology is able to readily provide attenuation of up to 45 dB. Only one base station site has been identified to require additional attenuation of more than 45 dB to ensure compatibility between the services.

¹ ICS Telecom is a software platform developed by ATDI and is used for radiocommunications planning by the Ministry. It incorporates topographic information and propagation models that enable it to provide more accurate estimates of RF coverage.

Telecom Sites

Licence ID	Cell Site Name	KK Receive Site	Distance (m)	Additional attenuation required (dB)
44802	BOMBAY	BOMBAY SUBSTATION	697	20
44844	KUMEU	HUAPAI	2384	8
44869	MT VERNON	RIVERLANDS SUBSTATION	3124	22
44882	PAPAKURA	20 WALTERS ROAD	1490	16
44906	SEWELL PEAK	PAPAROA	586	20
44908	SIGNAL HILL	ROSEBANK	4282	22
44939	WAIOURU	WAIOURU	2498	0
44941	WELD CONE	WELD CONE TURBINE	826	26
45770	TE AHUA	PIHA HUB	4733	3
47850	KAITAIA	KAITAIA	279	0
47904	TUTUKAKA	NGUNGURU	87	55
48052	TE KAUWHATA	HAMPTON DOWNS	1757	0
73186	BLLENHEIM	MURPHYS ROAD	2578	9
73906	NZ DAIRY FOODS	20 WALTERS ROAD	642	19
73932	KAITERITERI	KAITERITERI	850	15
74111	MAKARETU	WHAREKOPAE	384	32
74111	MAKARETU	WHAREKOPAE (TEAMTALK)	598	31
74142	ONETANGI (WAIHEKE)	PHILCODALE FARM	3714	0
111344	BOMBAY BEND	BOMBAY SUBSTATION	2493	5
111348	KAIKOURA ISLAND	GREAT BARRIER IS	556	0

2degrees Sites

Licence ID	Cell Site Name	KK Receive Site	Distance (m)	Additional attenuation required (dB)
128486	237 AIRFIELD ROAD (AKL-009-003-C)	20 WALTERS ROAD	2500	21
128495	TUNNEL CONTROL (CHC-060-057-A)	MT CAVENDISH	955	13
129155	29C TE AHUAHU ROAD PIHA (AKL-006-033-C)	PIHA HUB	4056	6
131107	1-17 MARKET STREET BLENHEIM (MBN-053-004-A)	MURPHYS ROAD	2413	34
153445	BLLENHEIM CARPARK	MURPHYS ROAD	2315	35

	SEVENTH LANE BLENHEIM (COW-000-009-C)			
153447	WITHER HILLS COW DRY HILLS RISE BLENHEIM (COW-000-010-A)	RIVERLANDS SUBSTATION	2994	13

Vodafone Sites

Licence ID	Cell Site Name	KK Receive Site	Distance (m)	Additional attenuation required (dB)
47996	KAITAIA	KAITAIA	234	30
72280	HEATHCOTE VALLEY	MT CAVENDISH	671	29
75688	SUGARLOAF BCL	MARLEYS HILL (TAIT)	1455	4
109254	BOMBAY NORTH	BOMBAY SUBSTATION	1803	3
109255	BOMBAY SH1	BOMBAY SUBSTATION	1432	37
110074	MEREMERE STRAIGHTS 2	HAMPTON DOWNS	1799	0
110103	PAPAKURA	20 WALTERS ROAD	224	33
110104	PAPAKURA SOUTH	20 WALTERS ROAD	1476	3
113211	MOSSBURN	MOSSBURN SUBSTATION	2159	14
113509	WAIOURU	WAIOURU	2385	3
113934	BLENHEIM	RIVERLANDS SUBSTATION	2953	20
113938	BLENHEIM CAPACITY	MURPHYS ROAD	2357	35
117019	KUMEU	HUAPAI	421	27
117434	TUTUKAKA	NGUNGURU	100	44
119566	WELLINGTON SOUTHERN LANDFILL (VFNZ)	HAWKINS HILL PSR	1660	0
119901	GREYMOUTH OUTER	PAPAROA	707	8

8. Conclusions

The coexistence study was carried out assuming the existing 850 MHz and 900 MHz cellular base station sites are used for LTE deployment in the 700 MHz band and hence the report identifies those sites that could potentially hinder the operation of existing fixed service links in the bottom half of the KK band (806 to 812 MHz).

The coexistence study has showed that there are no substantial coexistence issues between the two services and there are not expected to be any significant impediments to existing services.

Out of a total number of base stations nationwide (around 3200), 35 require additional attenuation and only 19 base station sites require additional attenuation of 20 dB or more. Only one base station site would require additional attenuation of more than 45 dB. If this level of additional attenuation is not practically achievable, LTE coverage for that area could be provided from a different site.

Annex 1

List of cellular base stations in the 850 MHz and 900 MHz bands that are co-sited with KK fixed service sites:

Telecom Sites

Cellular Site Licence ID	Cellular Site Name	NZMG Easting	NZMG Northing
44827	HILL END	2202454	5601351
44867	MT PLEASANT	2487952	5735391
44876	NORTH RANGE ROAD	2747111	6093364
44898	PUTAUAKI	2837795	6337403
44933	UTIKU	2757062	6161141
45737	MINDEN	2779333	6383829
45765	MT PROSPECT	2114846	5520693
47539	MT MARY	2292260	5670705
47902	TOKATEA	2735495	6494132
73035	PUKEPOTO	2702851	6269568
73166	CLINTON	2230006	5434907

2degrees Sites

Cellular Site Licence ID	Cellular Site Name	NZMG Easting	NZMG Northing
147380	CAN-054-002-E	2566983	5865212
153356	COW-000-004	2566997	5865188
156213	CAN-062-002-A	2427142	5755369
157665	BOP-024-020-A	2794748	6308488
126389	AKL-009-002-B	2682200	6459500

Vodafone Sites

Cellular Site Licence ID	Cellular Site Name	NZMG Easting	NZMG Northing
65214	MARLEYS HILL	2480400	5732900
73364	EAST CAPE	2956800	6332200
102307	TAUMARUNUI NORTH	2702800	6269500
113215	TE ANAU	2100300	5516300
113216	WANAKA	2202400	5601300
113219	CLYDE	2219300	5551100
113225	HEDGEHOPE BCL	2178200	5448500
113231	MT MARY	2292200	5670700
113281	SPRINGFIELD	2427200	5755400

	WEST/DARFIELD		
113508	WHARITE	2753100	6101800
113897	KAIKOURA	2567200	5865000
113899	KAITERITERI	2511700	6017900
113916	QUEEN CHARLOTTE SOUND	2603600	5992800
114143	MINDEN A	2778800	6383400
114153	PAEROA RANGE BCL	2794700	6308400
114154	PUTAUAKI	2837700	6337400
116319	COROMANDEL TOWNSHIP	2735500	6494200
117009	GREAT BARRIER ISLAND	2719800	6554900
117081	NORTH HARBOUR STADIUM	2662200	6495800
117438	WAIHEKE	2700100	6486900
119878	WAIATARUA HUB BCL	2650100	6473900
119887	CLINTON VODAFONE	2230000	5435000

Annex 2

Note: The minimum coupling loss requirement, as shown in these tables, is 137 dB. This takes antenna gains into account in the calculations.

Telecom Site Details

Cellular Site				KK Receive Site				Distance (m)	Path Loss (dB)	Angular Discrimination (dB)	Total Loss (dB)	Additional attenuation (dB)
Licence ID	Name	NZMG Easting	NZMG Northing	KK Tx Licence ID	Name	NZMG Easting	NZMG Northing					
44802	BOMBAY	2687173	6444205	32123	BOMBAY SUBSTATION	2687800	6443900	697	103	14	117	20
44802	BOMBAY	2687173	6444205	100029	BOMBAY SUBSTATION	2687800	6443900	697	103	14	117	20
44844	KUMEU	2649562	6490517	53420	HUAPAI	2648100	6492400	2384	115	14	129	8
44869	MT VERNON	2592198	5961627	131857	RIVERLANDS SUBSTATION	2594574	5963656	3124	101	14	115	22
44882	PAPAKURA	2683078	6458229	36734	20 WALTERS ROAD	2682300	6459500	1490	107	14	121	16
44906	SEWELL PEAK	2373550	5865216	127877	PAPAROA	2373600	5865800	586	103	23	126	11
44906	SEWELL PEAK	2373550	5865216	127536	PAPAROA	2373600	5865800	586	103	14	117	20
44906	SEWELL PEAK	2373550	5865216	119213	PAPAROA	2373600	5865800	586	103	14	117	20
44908	SIGNAL HILL	2320152	5481675	130423	ROSEBANK	2320400	5477400	4282	115	0	115	22
44908	SIGNAL HILL	2320152	5481675	130425	ROSEBANK	2320400	5477400	4282	115	14	129	8
44939	WAIOURU	2738000	6186131	113677	WAIOURU	2739400	6188200	2498	130	14	144	0
44939	WAIOURU	2738000	6186131	126779	WAIOURU	2739400	6188200	2498	130	14	144	0
44941	WELD CONE	2607238	5928070	135129	WELD CONE TURBINE	2606510	5928460	826	88	23	111	26
45770	TE AHUA	2641114	6469198	16540	PIHA HUB	2645000	6471900	4733	128	6	134	3
45770	TE AHUA	2641114	6469198	11570	PIHA HUB	2645000	6471900	4733	128	23	151	0
47850	KAITAIA	2535682	6677022	52639	KAITAIA	2535700	6677300	279	116	23	139	0
47904	TUTUKAKA	2647813	6619091	21244	NGUNGURU	2647900	6619100	87	68	14	82	55
48052	TE KAUPHATA	2695725	6423894	126577	HAMPTON DOWNS	2694478	6425132	1757	114	23	137	0
73186	BLLENHEIM	2589879	5965429	131890	MURPHYS ROAD	2587827	5966989	2578	126	2	128	9
73186	BLLENHEIM	2589879	5965429	111225	MURPHYS ROAD	2587827	5966989	2578	126	23	149	0
73906	NZ DAIRY FOODS	2681741	6459816	36734	20 WALTERS ROAD	2682300	6459500	642	98	20	118	19
73932	KAITERITERI	2510951	6018030	76545	KAITERITERI	2511800	6018000	850	108	14	122	15
74111	MAKARETU	2910420	6292757	120614	WHAREKOPAE	2910800	6292700	384	82	23	105	32
74111	MAKARETU	2910420	6292757	120617	WHAREKOPAE	2910800	6292700	384	82	23	105	32
74111	MAKARETU	2910420	6292757	31814	WHAREKOPAE(Teamt Alk)	2910900	6292400	598	86	20	106	31
74142	ONETANGI (WAIHEKE)	2698584	6490244	6262	PHILCODALE FARM	2700200	6486900	3714	132	14	146	0

111344	BOMBAY BEND	2686620	6446096	32123	BOMBAY SUBSTATION	2687800	6443900	2493	125	14	139	0
111344	BOMBAY BEND	2686620	6446096	100029	BOMBAY SUBSTATION	2687800	6443900	2493	125	7	132	5
111348	KAIKOURA ISLAND	2720250	6554573	53883	GREAT BARRIER ISLAND	2719800	6554900	556	122	23	145	0

2degrees Site Details

Cellular Site				KK Receive Site				Distance (m)	Path Loss (dB)	Angular Discrimination (dB)	Total Loss (dB)	Additional attenuation (dB)
Licence ID	Name	NZMG Easting	NZMG Northing	KK Tx Licence ID	Name	NZMG Easting	NZMG Northing					
128486	AKL-009-003-C	2684115	6461219	36734	20 WALTERS ROAD	2682300	6459500	2500	111	5	116	21
128495	CHC-060-057-A	2486287	5735801	130890	MT CAVENDISH	2487100	5735300	955	120	8	128	9
128495	CHC-060-057-A	2486287	5735801	104575	MT CAVENDISH	2487100	5735300	955	120	4	124	13
129155	AKL-006-033-C	2641421	6469991	16540	PIHA HUB	2645000	6471900	4056	130	1	131	6
129155	AKL-006-033-C	2641421	6469991	11570	PIHA HUB	2645000	6471900	4056	130	23	153	0
131107	MBN-053-004-A	2589893	5965743	131890	MURPHYS ROAD	2587827	5966989	2413	103	0	103	34
131107	MBN-053-004-A	2589893	5965743	111225	MURPHYS ROAD	2587827	5966989	2413	103	23	126	11
153445	COW-000-009-C	2589785	5965753	131890	MURPHYS ROAD	2587827	5966989	2315	102	0	102	35
153445	COW-000-009-C	2589785	5965753	111225	MURPHYS ROAD	2587827	5966989	2315	102	23	125	12
153447	COW-000-010-A	2592169	5961872	131857	RIVERLANDS SUBSTATION	2594574	5963656	2994	110	14	124	13

Vodafone Site Details

Cellular Site				KK Receive site				Distance (m)	Path Loss (dB)	Angular Discrimination (dB)	Total Loss (dB)	Additional attenuation (dB)
Licence ID	Name	NZMG Easting	NZMG Northing	KK Tx Licence ID	Name	NZMG Easting	NZMG Northing					
47996	KAITAIA	2535690	6677066	52639	KAITAIA	2535700	6677300	234	84	23	107	30
72280	HEATHCOTE VALLEY	2486500	5735600	130890	MT CAVENDISH	2487100	5735300	671	100	14	114	23
72280	HEATHCOTE VALLEY	2486500	5735600	104575	MT CAVENDISH	2487100	5735300	671	100	8	108	29
75688	SUGARLOAF BCL	2481700	5733700	117163	MARLEYS HILL (TAIT)	2480430	5732990	1455	110	23	133	4
109254	BOMBAY NORTH	2686300	6444900	32123	BOMBAY SUBSTATION	2687800	6443900	1803	120	14	134	3
109254	BOMBAY NORTH	2686300	6444900	100029	BOMBAY SUBSTATION	2687800	6443900	1803	120	14	134	3
109255	BOMBAY SH1	2686400	6443600	32123	BOMBAY SUBSTATION	2687800	6443900	1432	100	0	100	37

109255	BOMBAY SH1	2686400	6443600	100029	BOMBAY SUBSTATION	2687800	6443900	1432	100	14	114	23
110074	MEREMERE STRAIGHTS 2	2695750	6423860	126577	HAMPTON DOWNS	2694478	6425132	1799	116	23	139	0
110103	PAPAKURA	2682100	6459600	36734	20 WALTERS ROAD	2682300	6459500	224	84	20	104	33
110104	PAPAKURA SOUTH	2683000	6458200	36734	20 WALTERS ROAD	2682300	6459500	1476	120	14	134	3
113211	MOSSBURN	2138100	5493800	131086	MOSSBURN SUBSTATION	2137600	5491700	2159	100	23	123	14
113509	WAIOURU	2738100	6186200	113677	WAIOURU	2739400	6188200	2385	120	14	134	3
113509	WAIOURU	2738100	6186200	126779	WAIOURU	2739400	6188200	2385	120	14	134	3
113934	BLENHEIM	2592200	5961900	131857	RIVERLANDS SUBSTATION	2594574	5963656	2953	103	14	117	20
113938	BLENHEIM CAPACITY	2589800	5965700	131890	MURPHYS ROAD	2587827	5966989	2357	102	0	102	35
113938	BLENHEIM CAPACITY	2589800	5965700	111225	MURPHYS ROAD	2587827	5966989	2357	102	23	125	12
117019	KUMEU	2648437	6492653	53420	HUAPAI	2648100	6492400	421	90	20	110	27
117434	TUTUKAKA	2647800	6619100	21244	NGUNGURU	2647900	6619100	100	79	14	93	44
119566	WELLINGTON SOUTHERN LANDFILL (VFNZ)	2656110	5984907	26928	HAWKINS HILL PSR	2654450	5984920	1660	150	3	153	0
119901	GREYMOUTH OUTER	2373500	5865100	127877	PAPAROA	2373600	5865800	707	120	23	143	0
119901	GREYMOUTH OUTER	2373500	5865100	127536	PAPAROA	2373600	5865800	707	120	14	134	3
119901	GREYMOUTH OUTER	2373500	5865100	119213	PAPAROA	2373600	5865800	707	120	9	129	8