

790MHz – 862MHz Consolidated Audit Report

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1. Introduction and Background

International Mobile Telecommunications is the global standard for third generation (3G) wireless communications, defined by a set of interdependent ITU Recommendations (e.g Resolution 224 of Rev.WRC07 which is about the compatibility between mobile and broadcasting services). IMT provides a framework for worldwide wireless access by linking the diverse systems of terrestrial and/or satellite based networks and takes advantage of the synergies between digital mobile telecommunications technologies and systems for fixed and mobile wireless access systems. The 790-862 MHz bands were part of the frequency bands identified by the ITU for this purpose. This band is allocated for Mobile and Broadcasting applications. Application for Mobile is simplex operations. Resolution 224 (Rev. WRC-07) final regulations enables countries to make the 790MHz – 862MHz band available before June 2015.

Government Gazette no: 31501(e.g draft of Terrestrial Broadcasting Frequency Plan 2008) states that the following are introduction and background of digital dividends and 790-862MHz band.

- After dual illumination (e.g both analogue and digital signals are simultaneously transmitted) this spectrum will be freed (e.g the countries who wanted the band to be made available and argued that South Africa be part of the decisions of WRC-07 final regulations) for IMT. The Authority will undertake a separate process to determine the criteria to be used to access spectrum.
- If the spectrum was released by analogue services from SABC, E TV and MNET services will translate to bandwidth for new services or enhancement of existing services.
- 790MHz – 862MHz should be released for IMT after November 2011 or when analogue services have been switched off.
- The freeing of this band will allow the creation of a unified 800MHz for the purposes of providing electronic communications services such as broadband.

2. Methodology

ITU-R SM.182-5 recommendation was used which set the requirements for conducting occupancy measurements of the radio-frequency spectrum and specific relevant parameters. The spectrum database was used to verify the results obtained from spectrum management monitoring software (Argus). According to the relevant ITU recommendations, occupancy measurements normally run over a period of one week, 24 hours per day. This time ensures that all peak and off-peak traffic is covered. A frequency is regarded as being occupied when a received signal exceeds a preset threshold in the order of around 1 dB μ V/m. This is also a reasonable level for squelch adjustments of radio sets.

To determine the occupancy of a frequency, detailed measurement of various parameters is not needed, therefore fast scanning receivers can be used instead of measuring all of the various parameters. These measurements are made in the centre of a coverage area and the equipment is left alone during the scan period. All channels used in the measurement area are scanned at once. The measurement results are stored for a later evaluation and display the occupancy of each channel in separate graphics over time.

An automatic measurement mode task was configured on Argus software to run for a 24 hour period over a period of one week. The results were stored on the local hard disk of the monitoring station and later transferred to CMO and evaluated. These results display occupancy charts and diagrams for each of the measured frequencies over time, in various formats. The measurement results from all the relevant monitoring stations were then manually analysed with the help of Broadcasting unit on the Broadcasting Database. These results are reflected in the following report.

3. Results and analysis

Number and percentage of scanned, inactive, active licensed, active unlicensed and inactive frequencies.	PE	JHB	BFN	DBN	CPT	PTA	Total
Number of frequency scanned	5760	5760	5760	5760	5760	5760	34560
Number of inactive frequencies	5745	5751	5758	5678	5679	5723	34334
Percentage of inactive frequencies	99.74%	99.84%	99.97%	98.58%	98.59%	99.36%	99.35%
Number of active licensed frequencies	0	0	0	0	0	480	480
Percentage of active licensed frequencies	0%	0%	0%	0%	0%	8.33%	8.33%
Number of active unlicensed frequencies	15	8	2	82	81	37	225
Percentage of active unlicensed frequencies	0.26%	0.14%	0.03%	1.42%	1.41%	0.64%	3.91%
Number of licensed inactive frequencies	13	11	0	325	37	70	456
Percentage of licensed inactive frequencies	0.23%	0.19%	0%	5.64%	0.64%	1.22%	7.92%

Table A1: Number and percentage of frequency scanned, inactive frequencies, active licensed frequencies, active unlicensed frequencies and inactive frequencies.

4. Analysis

- Active licensed frequencies – possibility of migration depends on services (i.e. emergency / crucial) being offered by the licensee. Sharing could be considered pending utilisation of spectrum management to assist. Should migration be the preferred option, it is not envisaged that this would be a difficult process given the small number of licensed active users in this band.
- Active unlicensed frequencies – inspectors / interference team will be tasked to identify these unlicensed users.
- Licensed inactive – communication with the licensee is needed to determine the use of the spectrum and possibility of releasing the frequency.
- There are activities in the 790MHz – 862MHz band and needs to be investigated.

5. Conclusion

- IMT technology would be ideal selected should the spectrum be freed-up for the application.
- The active frequency in PTA is for MNET.
- MNET covers all the 12.5kHz channels between 839.25MHz and 845.25MHz.

6. References

[1] ITU-R SM.182-5 recommendation was used which set the requirements for conducting occupancy measurements of the radio-frequency spectrum and specific relevant parameters.

[2] The spectrum database was used to verify the results obtained from spectrum management monitoring software (Argus).

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APPENDIX B – Measurement Results

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
792.2375	N/L		100%
806.7000	N/L		100%
806.9250	N/L		100%
807.1250	N/L		100%
807.2250	N/L		100%
807.2625	N/L		100%
807.3250	N/L		100%
807.4375	N/L		100%
807.5625	N/L		100%
807.7000	N/L		100%
811.7000	N/L		100%
813.5625	N/L		100%
813.6625	N/L		100%
813.7500	N/L		100%
813.8125	N/L		100%
813.9125	N/L		100%
814.0500	N/L		100%
823.2625	N/L		100%
829.2500	N/L		100%
837.7125	N/L		100%
837.8125	N/L		100%
837.9125	N/L		100%
837.9625	N/L		100%
838.0250	N/L		100%
838.1250	N/L		100%
838.2500	N/L		100%
838.3875	N/L		100%
838.4375	N/L		100%
838.5750	N/L		100%
838.6000	N/L		100%
838.6875	N/L		100%
838.8625	N/L		100%

838.9375	N/L		100%
839.0125	N/L		100%
839.2250	N/L		100%
839.2375	N/L		100%
839.3375	N/L		100%
839.4750	N/L		100%
839.5500	N/L		100%
839.6250	N/L		100%
839.7375	N/L		100%
839.8125	N/L		100%
839.9000	N/L		100%
840.0000	N/L		100%
840.1375	N/L		100%
840.1875	N/L		100%
840.2875	N/L		100%
840.4250	N/L		100%
840.4625	N/L		100%
840.5500	N/L		100%
840.6875	N/L		100%
840.7800	N/L		100%
840.8250	N/L		100%
840.9750	N/L		100%
841.0125	N/L		100%
841.1875	N/L		100%
841.2250	N/L		100%
841.3750	N/L		100%
841.5000	N/L		100%
841.5875	N/L		100%
841.7250	N/L		100%
841.7625	N/L		100%
845.2000	N/L		100%
845.9875	N/L		100%
851.0125	N/L		100%
851.6125	N/L		100%

Table A2: Active frequencies which are 100% occupied in PTA and to be investigated.

Frequency (MHz)	Licence Number	Licensee	Percentage occupancy
791.2750	N/L	N/L	99.40%
791.3750	N/L	N/L	98.80%
791.4625	N/L	N/L	83.23%
791.6375	N/L	N/L	59.28%
806.0250	N/L	N/L	48.50%
806.2875	N/L	N/L	53.29%
806.3125	N/L	N/L	70.06%
806.4750	N/L	N/L	86%
806.5375	N/L	N/L	98.20%
806.5625	N/L	N/L	98.20%
806.6250	N/L	N/L	97.60%
806.8125	N/L	N/L	92.22%
806.9625	N/L	N/L	98.20%
807.6125	N/L	N/L	80.84%
807.8125	N/L	N/L	81.44%
807.9750	N/L	N/L	99.40%
808.0250	N/L	N/L	76.66%
808.1000	N/L	N/L	83.23%
808.1875	N/L	N/L	54.49%
808.2750	N/L	N/L	52.69%
808.3625	N/L	N/L	73.65%
808.4500	N/L	N/L	29.34%
811.5125	N/L	N/L	40.12%
811.6000	N/L	N/L	89.22%
811.7125	N/L	N/L	82.63%
811.8125	N/L	N/L	42.51%
813.2625	N/L	N/L	75.45%
823.1750	N/L	N/L	68.07%
823.2875	N/L	N/L	56.63%
836.6125	N/L	N/L	98.80%
841.9375	N/L	N/L	90.96%
841.9500	N/L	N/L	53.01%
842.1250	N/L	N/L	98.19%
843.4375	N/L	N/L	50.60%
843.6750	N/L	N/L	93.93%
843.7250	N/L	N/L	52.41%

845.2375	N/L	N/L	52.41%
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Table A3: Active and unlicensed frequencies in PTA and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
820.0000	N/L		100%
820.3750	N/L		100%
820.4750	N/L		100%
820.5125	N/L		100%
820.5750	N/L		100%
834.8374	N/L		100%
834.8625	N/L		100%
835.0125	N/L		100%
835.9250	N/L		100%
836.0125	N/L		100%
839.2250	N/L		100%

Table A4: Active frequencies which are 100% occupied in JHB and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
809.2750	N/L	N/L	69.89%
816.2500	N/L	N/L	71.59%
835.0500	N/L	N/L	92.05%
835.8750	N/L	N/L	97.73%
836.0875	N/L	N/L	46.59%
840.5000	N/L	N/L	82.95%
843.5000	N/L	N/L	95.45%
849.0000	N/L	N/L	47.73%

Table A5: Active and unlicensed frequencies in JHB and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
843.0000	N/L	N/L	69.89%
847.3000	N/L	N/L	71.59%

Table A6: Active and unlicensed frequencies in BFN and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
791.1375	N/L		100%
791.1625	N/L		100%
791.1875	N/L		100%
791.2500	N/L		100%
797.2375	N/L		100%
797.2500	N/L		100%
829.2625	N/L		100%
832.0250	N/L		100%
832.0375	N/L		100%
832.0500	N/L		100%
847.9375	N/L		100%
848.0000	N/L		100%
853.4875	N/L		100%

Table A7: Active frequencies which are 100% occupied in P.E and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
790.8750	N/L	N/L	45.25%
790.9000	N/L	N/L	36.84%
790.9375	N/L	N/L	43.77%
790.9500	N/L	N/L	59.28%
791.0125	N/L	N/L	65.80%
791.0250	N/L	N/L	62.13%
791.0375	N/L	N/L	60%
791.3250	N/L	N/L	80.23%
791.3375	N/L	N/L	75.24%
791.3500	N/L	N/L	78.73%

791.3625	N/L	N/L	73.38%
791.4625	N/L	N/L	56.75%
791.5625	N/L	N/L	57.22%
823.2250	N/L	N/L	99.02%
823.2625	N/L	N/L	48.86%

Table A8: Active and unlicensed frequencies in P.E and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
821.3250	N/L		100%
821.3375	N/L		100%
821.3500	N/L		100%
821.3625	N/L		100%
821.3750	N/L		100%
821.3875	N/L		100%
821.4000	N/L		100%
821.4125	N/L		100%
821.4250	N/L		100%
821.4375	N/L		100%
821.4500	N/L		100%
821.4625	N/L		100%
821.4750	N/L		100%
821.4875	N/L		100%
821.5000	N/L		100%
821.5125	N/L		100%
821.5250	N/L		100%
821.5375	N/L		100%
821.5500	N/L		100%
821.5625	N/L		100%
821.5750	N/L		100%
821.5875	N/L		100%
821.6000	N/L		100%

Table A9: Active frequencies which are 100% occupied in P.E and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
810.4625	N/L	N/L	82.20%
810.4750	N/L	N/L	85.34%
810.4875	N/L	N/L	90.05%
810.5000	N/L	N/L	94.24%
810.5125	N/L	N/L	93.72%
810.5250	N/L	N/L	95.81%
810.5375	N/L	N/L	91.62%
810.5500	N/L	N/L	89.53%
810.5625	N/L	N/L	82.2%
821.3125	N/L	N/L	91.62%
821.8250	N/L	N/L	98.95%
834.2750	N/L	N/L	99.48%
835.3625	N/L	N/L	94.76%
835.6750	N/L	N/L	99.48%
835.6875	N/L	N/L	95.81%
838.2625	N/L	N/L	93.72%
849.4750	N/L	N/L	93.68%
849.4875	N/L	N/L	99.47%
849.5000	N/L	N/L	99.47%
849.5125	N/L	N/L	98.95%
849.5250	N/L	N/L	97.89%
851.0000	N/L	N/L	93.48%
851.0125	N/L	N/L	92.39%
851.0250	N/L	N/L	95.11%
837.6625	N/L	N/L	89.53%
849.5375	N/L	N/L	87.89%
851.0375	N/L	N/L	87.50%
849.4625	N/L	N/L	85.79%
835.7000	N/L	N/L	84.82%
835.3500	N/L	N/L	81.68%

850.9875	N/L	N/L	80.98%
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Table A10: Active and unlicensed frequencies in DBN and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
810.4625	N/L	N/L	82.20%
810.4750	N/L	N/L	85.34%
810.4875	N/L	N/L	90.05%
810.5000	N/L	N/L	94.24%
810.5125	N/L	N/L	93.72%
810.5250	N/L	N/L	95.81%
810.5375	N/L	N/L	91.62%
810.5500	N/L	N/L	89.53%
810.5625	N/L	N/L	82.2%
821.3125	N/L	N/L	98.95%
821.8250	N/L	N/L	99.48%
834.2750	N/L	N/L	94.76%
835.3625	N/L	N/L	99.48%
835.6750	N/L	N/L	95.81%
835.6875	N/L	N/L	93.72%
838.2625	N/L	N/L	93.68%
849.4750	N/L	N/L	99.47%
849.4875	N/L	N/L	99.47%
849.5000	N/L	N/L	98.95%
849.5125	N/L	N/L	97.89%
849.5250	N/L	N/L	97.89%
851.0000	N/L	N/L	93.48%
851.0125	N/L	N/L	92.39%
851.0250	N/L	N/L	95.11%
837.6625	N/L	N/L	89.53%
849.5375	N/L	N/L	87.89%
851.0375	N/L	N/L	87.50%
849.4625	N/L	N/L	85.79%

835.7000	N/L	N/L	84.82%
835.3500	N/L	N/L	81.68%
850.9875	N/L	N/L	80.98%
838.7625	N/L	N/L	78.01%
837.3625	N/L	N/L	77.49%
851.0500	N/L	N/L	77.17%
849.5500	N/L	N/L	76.32%
810.5750	N/L	N/L	74.35%
810.4500	N/L	N/L	73.30%
821.7125	N/L	N/L	73.30%
822.1875	N/L	N/L	65.97%
822.2750	N/L	N/L	65.97%
836.7500	N/L	N/L	64.92%
835.3375	N/L	N/L	64.92%
850.9750	N/L	N/L	64.67%
834.2875	N/L	N/L	61.26%
849.4500	N/L	N/L	57.89%
835.7125	N/L	N/L	57.07%
836.2625	N/L	N/L	54.97%
810.4375	N/L	N/L	53.93%
849.5625	N/L	N/L	53.16%
822.7625	N/L	N/L	52.88%
851.0625	N/L	N/L	51.63%
810.5875	N/L	N/L	46.07%
821.8125	N/L	N/L	41.36%
837.6750	N/L	N/L	41.36%
810.4250	N/L	N/L	38.22%
850.9625	N/L	N/L	33.70%

835.3250	N/L	N/L	33.51%
810.6000	N/L	N/L	30.37%
837.6625	N/L	N/L	89.53%
837.6750	N/L	N/L	41.36%
838.2625	N/L	N/L	93.72%
838.7625	N/L	N/L	78.01%
849.4375	N/L	N/L	21.05%
849.4500	N/L	N/L	57.89%
849.4625	N/L	N/L	85.79%
849.4750	N/L	N/L	93.68%
849.4875	N/L	N/L	99.47%
849.5000	N/L	N/L	99.47%
849.5125	N/L	N/L	98.95%
849.5250	N/L	N/L	97.89%
849.5375	N/L	N/L	87.89%
849.5500	N/L	N/L	76.32%
849.5625	N/L	N/L	53.16%
850.9625	N/L	N/L	33.70%
850.9750	N/L	N/L	64.67%
850.9875	N/L	N/L	80.98%
851.0000	N/L	N/L	93.48%
851.0125	N/L	N/L	92.39%
851.0250	N/L	N/L	95.11%
851.0375	N/L	N/L	87.5%
851.0500	N/L	N/L	77.17%
851.0625	N/L	N/L	51.63%

Table A11: Active and unlicensed frequencies in DBN and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
815.2500	N/L	N/L	100%
825.4750	N/L	N/L	100%
825.5500	N/L	N/L	100%
826.3375	N/L	N/L	100%
826.3500	N/L	N/L	100%
828.0375	N/L	N/L	100%
828.1125	N/L	N/L	100%
828.9375	N/L	N/L	100%
829.0250	N/L	N/L	100%
829.9375	N/L	N/L	100%
830.0500	N/L	N/L	100%
830.8375	N/L	N/L	100%
831.6250	N/L	N/L	100%
833.4375	N/L	N/L	100%
833.5000	N/L	N/L	100%
835.0875	N/L	N/L	100%
835.1625	N/L	N/L	100%
835.2500	N/L	N/L	100%
836.7375	N/L	N/L	100%
836.7500	N/L	N/L	100%
838.3875	N/L	N/L	100%
838.4375	N/L	N/L	100%
838.5125	N/L	N/L	100%
839.9250	N/L	N/L	100%
840.0125	N/L	N/L	100%
840.0500	N/L	N/L	100%
840.4000	N/L	N/L	100%
843.8250	N/L	N/L	100%
844.6000	N/L	N/L	100%
844.7125	N/L	N/L	100%

844.7375	N/L	N/L	100%
844.8500	N/L	N/L	100%
844.9625	N/L	N/L	100%
845.5250	N/L	N/L	100%
845.6500	N/L	N/L	100%
858.1250	N/L	N/L	100%
858.1875	N/L	N/L	100%

Table A12: Active frequencies which are 100% occupied in CPT and to be investigated.

Frequency (MHz)	Licence number	Licensee	Percentage occupancy
799.2500	N/L	N/L	56.50%
821.2375	N/L	N/L	99.31%
821.2500	N/L	N/L	99.65%
826.4625	N/L	N/L	99.31%
827.9875	N/L	N/L	90.97%
829.8875	N/L	N/L	68.40%
831.7625	N/L	N/L	90.29%
832.5625	N/L	N/L	64.93%
832.5875	N/L	N/L	43.18%
833.3625	N/L	N/L	52.08%
833.5500	N/L	N/L	78.47%
834.8125	N/L	N/L	96.18%
834.8875	N/L	N/L	92.36%
834.9750	N/L	N/L	37.50%
835.7875	N/L	N/L	81.25%
835.8500	N/L	N/L	85.42%
835.9625	N/L	N/L	73.26%
836.8375	N/L	N/L	98.96%
837.5125	N/L	N/L	92.01%
837.6375	N/L	N/L	90.97%
837.7375	N/L	N/L	68.40%
838.5750	N/L	N/L	78.82%

839.3250	N/L	N/L	70.14%
839.3875	N/L	N/L	77.43%
839.8625	N/L	N/L	99.65%
840.1500	N/L	N/L	95.49%
840.3500	N/L	N/L	98.61%
840.8625	N/L	N/L	46.18%
840.9500	N/L	N/L	66.67%
841.0250	N/L	N/L	60.07%
840.9500	N/L	N/L	53.13%
841.0250	N/L	N/L	68.75%
841.8500	N/L	N/L	56.53%
841.9375	N/L	N/L	73.26%
841.9875	N/L	N/L	60.07%
842.0375	N/L	N/L	53.13%
842.7125	N/L	N/L	53.82%
842.7625	N/L	N/L	43.06%
842.8625	N/L	N/L	40.64%
843.4500	N/L	N/L	95.49%
843.5750	N/L	N/L	98.96%
843.6000	N/L	N/L	31.25%
843.7500	N/L	N/L	99.65%
843.8625	N/L	N/L	99.65%
843.9625	N/L	N/L	64.24%
844.5375	N/L	N/L	81.60%
845.0000	N/L	N/L	70.14%
845.4750	N/L	N/L	60.07%
845.9875	N/L	N/L	78.13%
846.3125	N/L	N/L	38.19%
847.1250	N/L	N/L	95.83%
847.2625	N/L	N/L	46.88%
847.9000	N/L	N/L	81.94%
848.0750	N/L	N/L	51.74%
848.4750	N/L	N/L	39.93%
848.8625	N/L	N/L	98.26%
848.4750	N/L	N/L	39.93%
848.8625	N/L	N/L	98.26%
848.9750	N/L	N/L	50.69%

849.3750	N/L	N/L	99.65%
849.4000	N/L	N/L	80.90%
849.7750	N/L	N/L	58.68%
850.3375	N/L	N/L	87.15%
850.4000	N/L	N/L	80.21%
850.9500	N/L	N/L	32.29%
851.0250	N/L	N/L	99.31%
851.1250	N/L	N/L	99.65%
851.3625	N/L	N/L	37.14%
851.5500	N/L	N/L	47.92%
851.5625	N/L	N/L	51.74%
852.2500	N/L	N/L	53.82%
852.9375	N/L	N/L	61.46%
852.9750	N/L	N/L	98.96%
853.1000	N/L	N/L	59.03%
853.8625	N/L	N/L	50.69%
854.5875	N/L	N/L	53.82%
854.6125	N/L	N/L	61.81%
855.1875	N/L	N/L	97.22%
855.2125	N/L	N/L	77.43%
856.4375	N/L	N/L	90.63%
858.3125	N/L	N/L	31.25%
859.3375	N/L	N/L	40.28%
859.7750	N/L	N/L	99.65%
859.8125	N/L	N/L	67.36%
861.4125	N/L	N/L	68.75%
861.4375	N/L	N/L	37.14%

Table A13: Active and unlicensed frequencies in CPT and to be investigated.

APPENDIX C – Measurement parameters and sites used

ESVN 20	SETTINGS
IF bandwidth	15 kHz
Demodulation	FM
Step width	12.5 kHz
Detector	Average
Priority	Low
Antenna type	HK 014 Omni Directional

Table A14: Measurement parameters.

MONITORING SITE	DATE
JHBCONT (Block D Pinmill) 790MHz – 862MHz	28/08/2009
PTACONT(Pretoria) 790MHz – 862MHz	28/08/2009
BFN(Bloemfontein) 790MHz – 862MHz	10/11/2009
PE (Port Elizabeth) 790MHz – 862MHz	10/11/2009
DBNCONT(Durban) 790MHz – 862MHz	03/09/2009
CPT (Cape Town) 790MHz – 862MHz	03/09/2009

Table A18: Sites used.

APPENDIX D – Broadcasting Database

Station	SABC 1	SABC 2	SABC 3	TNBC	etv
Aliwal North		61			
King Williams Town			68		
Patensie			68		
PE City			61		
Port St. Johns	61			65	
Suurberg	63		67		
Umtata	63			67	

Eastern Cape

Station	SABC 1	SABC 2	SABC 3	M-NET	etv
Bez. Valley(JHB)		68		64	
Helderberg	64			68	
Menlo Park			65	61	
Mulbarton		61		65	
Sunnyside	63			67	

Gauteng

Station	SABC 1	SABC 2	SABC 3	M-NET	etv
Bethlehem	63				
Bethlehem (Town)				61	
Kroonstad	61		65		
Ladybrand					68

Freestate

Station	SABC 1	SABC 2	SABC 3	M-NET	etv
Greytown	61		65		
Newcastle			68	64	
Nongoma		62	66		

Kwazulu Natal

Station	SABC 1	SABC 2	SABC 3	M-NET	etv
Amanda Glen					61
Constantiaberg (CPT)			62		
Fish Hoek				67	
Franschhoek			65	61	
Hout BAY			68	64	
Stellenbosch			68	64	
Table Mountain					64

Western Cape

APPENDIX E – Pie charts showing percentages of active unlicensed frequency, under utilised licensed spectrum, unoccupied spectrum and active licensed frequencies.

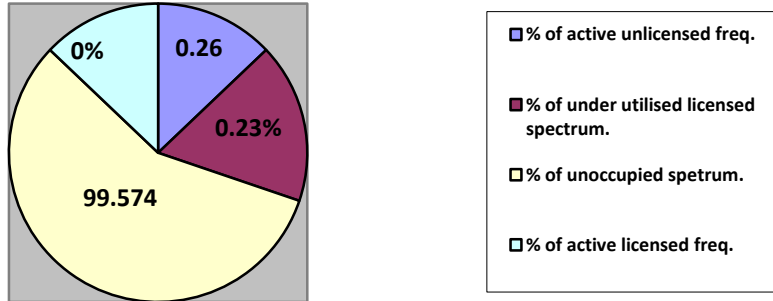


Chart 1: Results for Port Elizabeth.

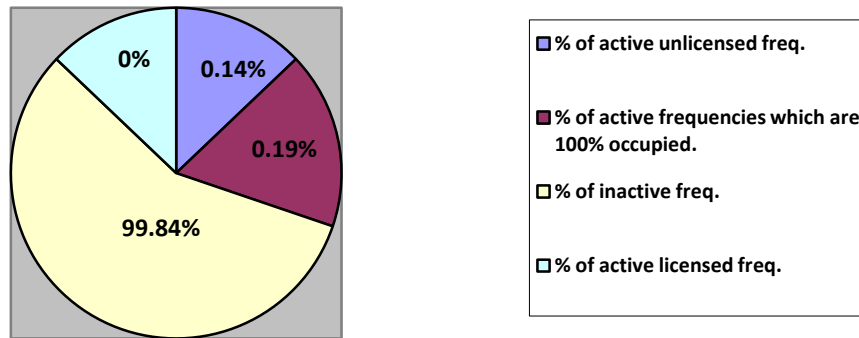


Chart 2: Results for Johannesburg

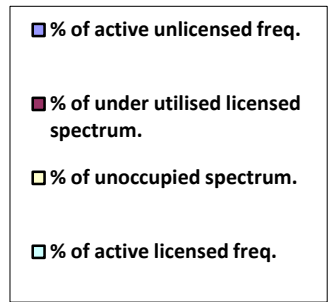
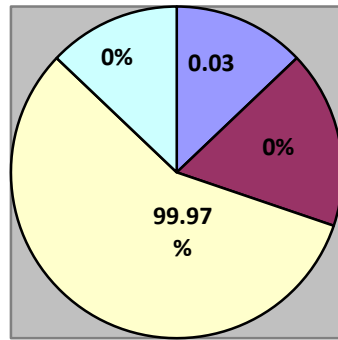


Chart 3: Results for Bloemfontein

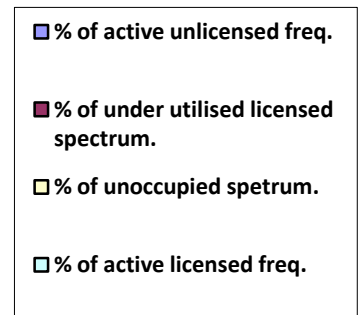
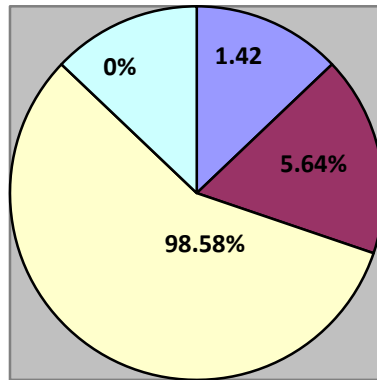


Chart 4: Results for Durban

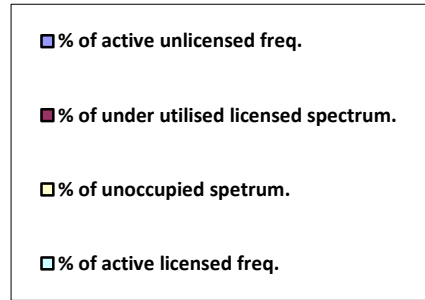
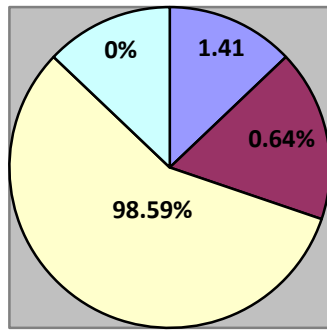


Chart 5: Results for Cape Town

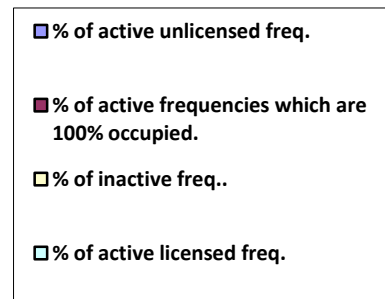
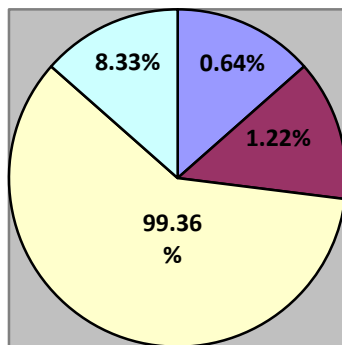


Chart 6: Results for Pretoria

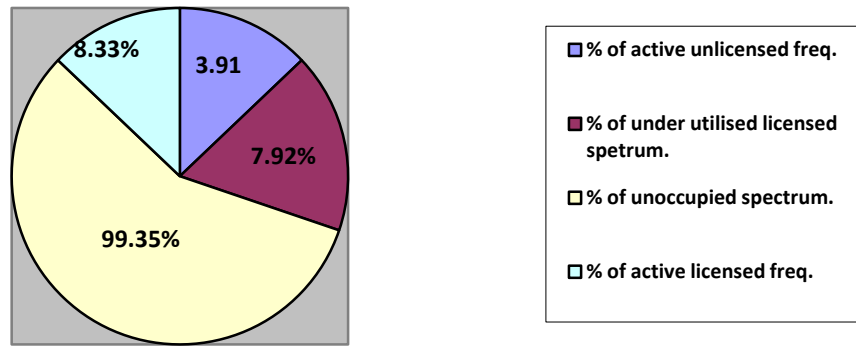
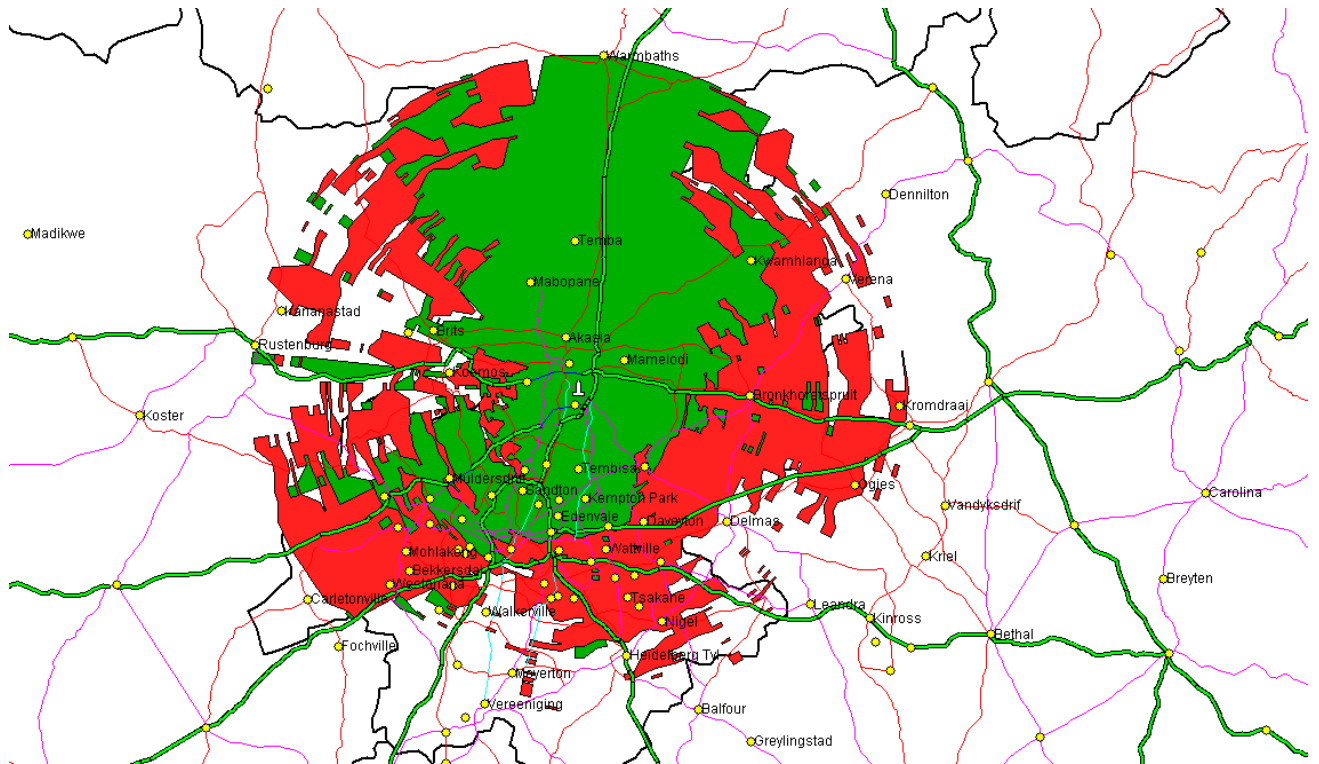


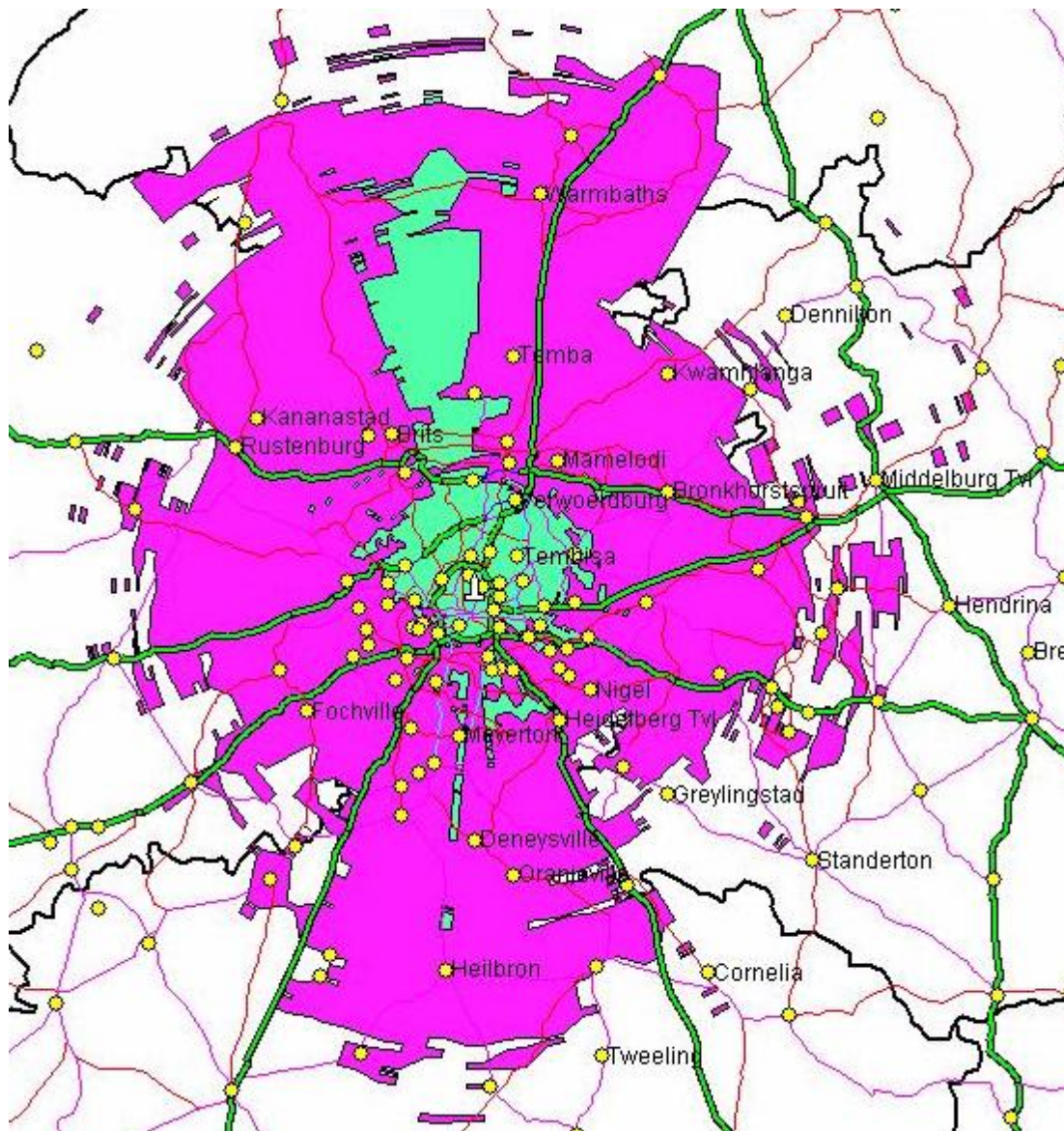
Chart 7: Consolidated Results

APPENDIX F – Coverage areas



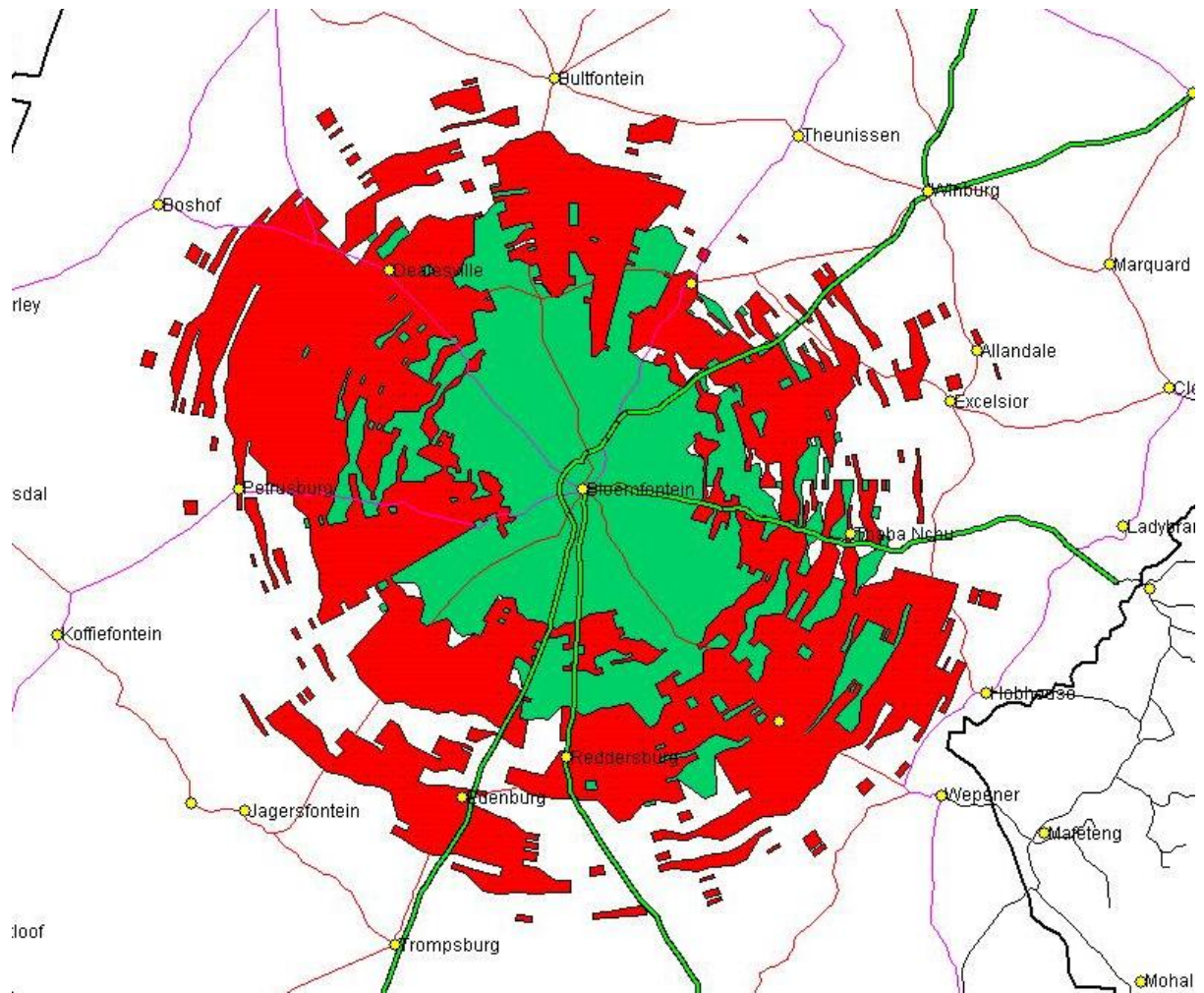
- Green is the coverage area.
- Purple is the protection area(20dB).

Figure 1: Pretoria site coverage area



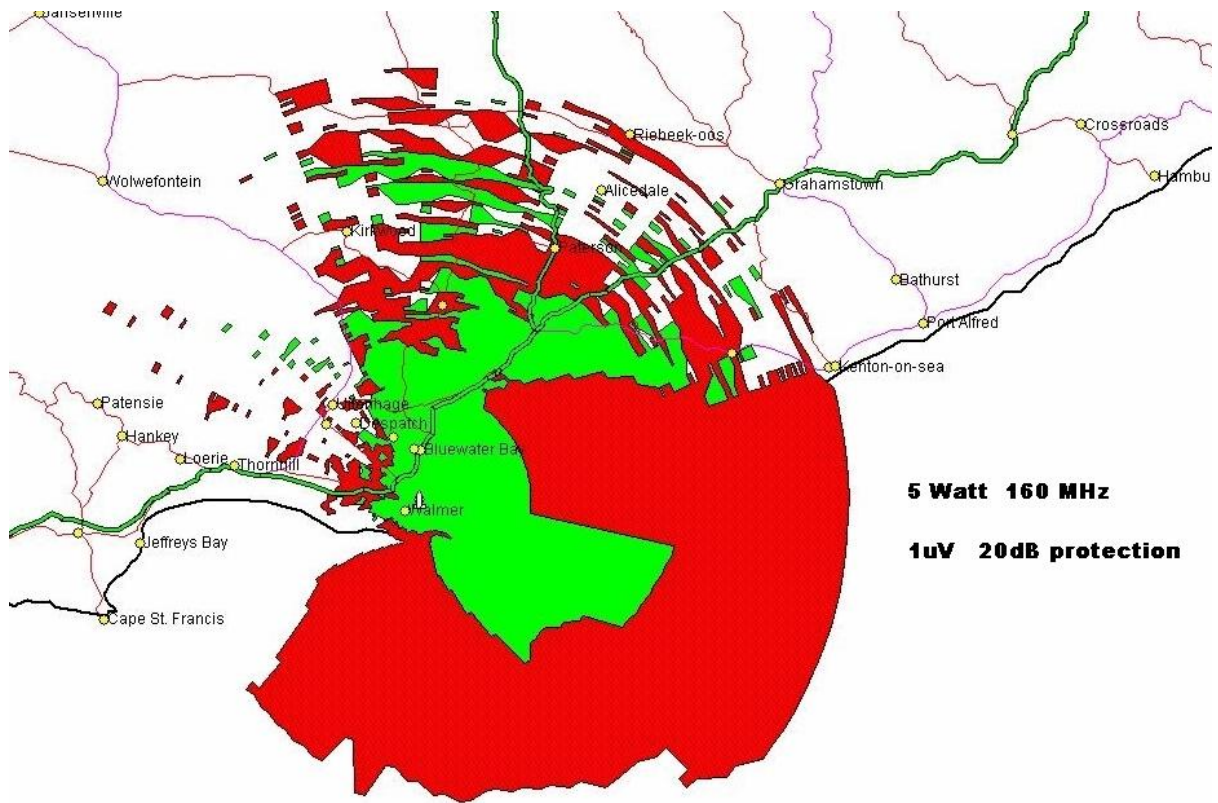
- Green is the coverage area.
- Purple is the protection area(20dB).

Figure 2: Pin Mill Farm site coverage area



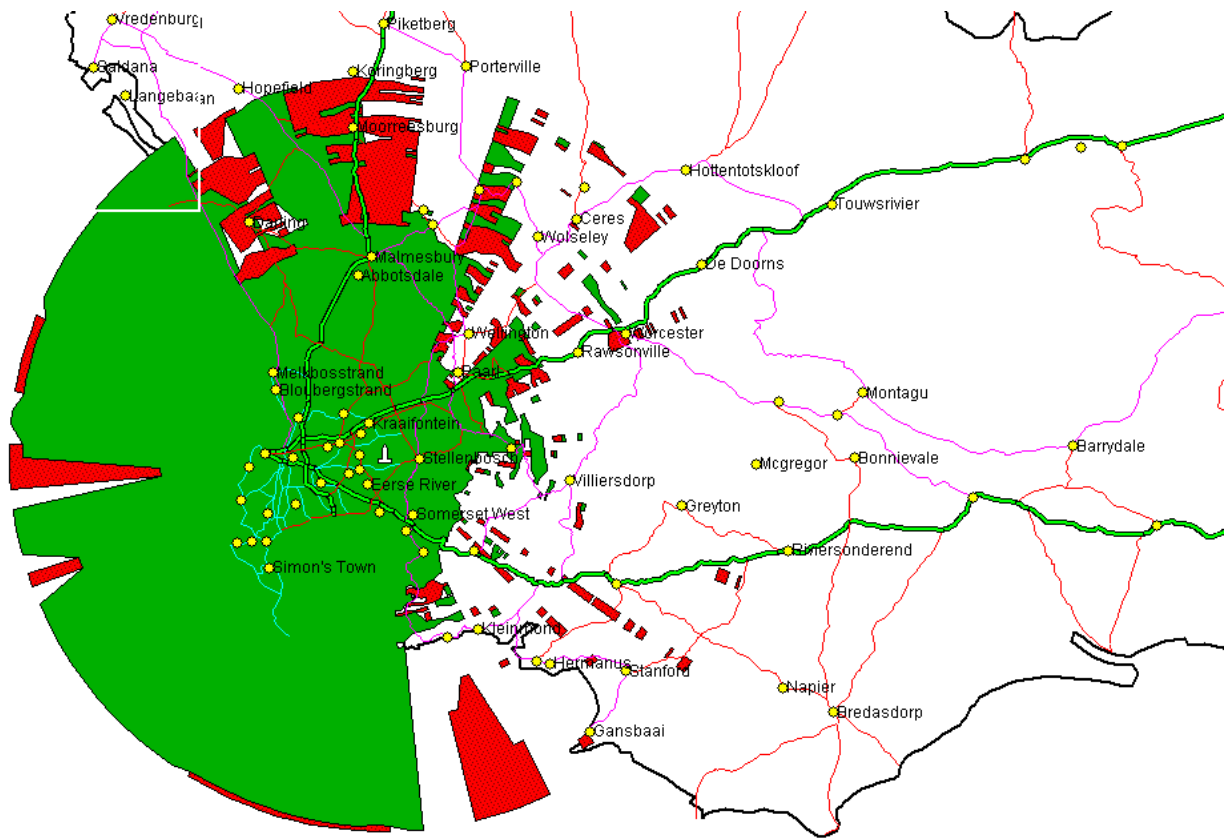
- Green is the coverage area.
- Red is the protection area(20dB).

Figure 3: Bloemfontein site coverage area



- Green is the coverage area.
- Red is the protection area(20dB).

Figure 4: Port Elizabeth site coverage area



- Green is the coverage area.
- Red is the protection area(20dB)

Figure 6: Cape Town site coverage area