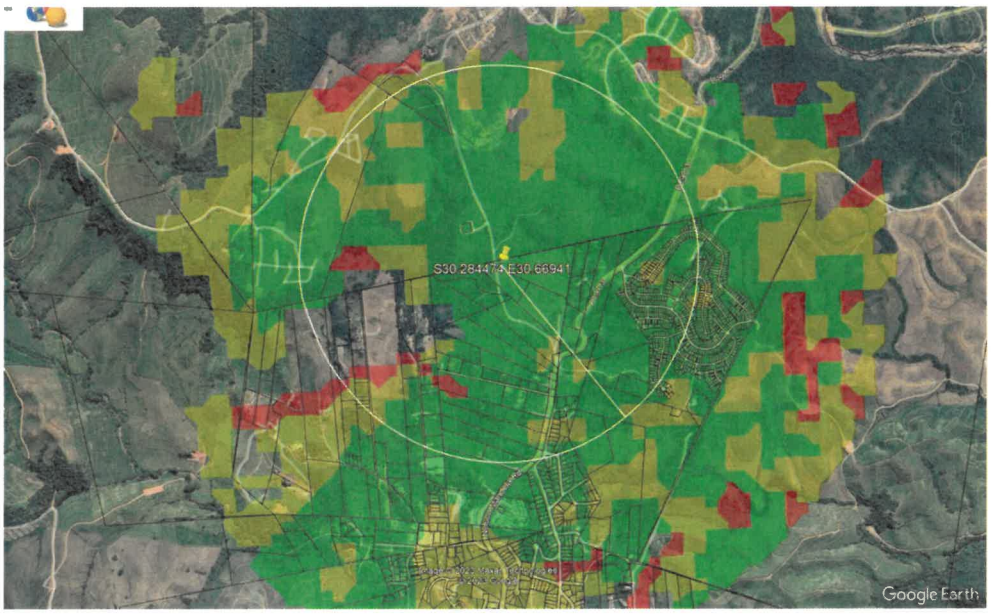
Appendix A3

Radio Frequency Map

BEFORE ATKZN1381 Umzinto North COVERAGE

AFTER ATKZN1381 Umzinto North COVERAGE



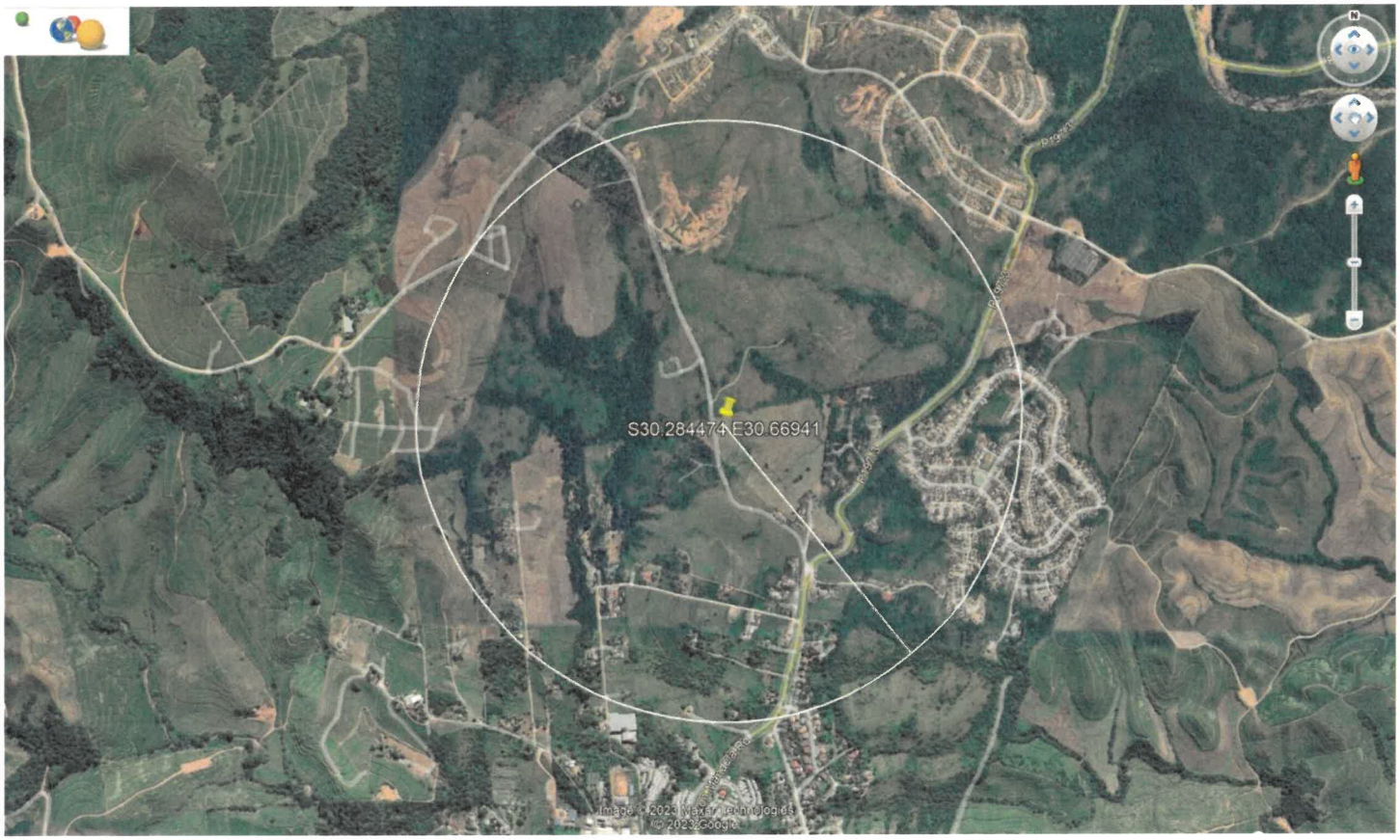
51 dBµV/m -93 dBm
55 dBµV/m -89 dBm
59 dBµV/m -85 dBm
63 dBµV/m -81 dBm
67 dBµV/m -77 dBm
71 dBµV/m -73 dBm
75 dBµV/m -69 dBm
79 dBµV/m -65 dBm
83 dBµV/m -61 dBm
87 dBµV/m -57 dBm
91 dBµV/m -53 dBm

Poor Coverage

Good Coverage

Excellent Coverage

ATKZN1381 Umzinto North COVERAGE
EXISTING MASTS



SITE DETAILS ATKZN1381 Umzinto North COVERAGE

ATKZN1381 Umzinto North						

The proposed site at ATKZN1381 Umzinto North is required for the following reason,

1. To provide new improved coverage for both voice and data requirements for the northern outskirts of the town of Umzinto in and around the proposed site.
2. To provide inbuilding coverage withing the proposed site area.

GENERAL INFORMATION

- The propagation of cell phone signals is very much dependent on the environment. Foliage, metal sheeting roofs, concrete, bricks, etc. all have a cause and effect on the intensity of the radio signal.
- Cell phone frequencies are transmitted in three main frequency bands, namely:
  - 900MHz band
  - 1800MHz band
  - 2100MHz band
- A correlation exists between the frequency of transmission versus the propagation distance. Lower frequencies travel further when compared to higher frequencies.
- Frequencies in the 900MHz band can travel further and diffract around the corners of buildings. Frequencies in the 900MHz band are used rural areas to reach subscribers that are located far away from the tower. Typically, the distance covered by frequencies in the 900MHz band can be more than of 15KM.
- The frequencies in the 1800MHz and 2100MHz band have a shorter range of coverage. These frequencies tend to travel in more of a direct line of site and have a limited ability to diffract around corners.
- In order to provide good quality calls and data download rates in a built-up sub urban environment, we use these three frequency bands in tandem to achieve optimal radio coverage.
- The working range of a cell site is not a fixed figure. It depends on several factors, including, but not limited to:
  - Height of antenna on the mast
  - The frequency of signal in use.
  - The transmitter's rated power.
  - The required uplink/downlink data rate of the subscriber's device
  - The directional characteristics of the site antenna array.
  - Reflection and absorption of radio energy by buildings or vegetation.
  - It may also be limited by local geographical or regulatory factors and weather conditions.
  - In addition, there are timing limitations in some technologies

Generally, in areas where there are enough cell sites to cover a wide area, the range of each one will be set to:

- Ensure there is enough overlap for handover to/from other sites (moving the signal for a mobile device from one cell site to another, for those technologies that can handle it - e.g. making a GSM phone call while in a car or train).
- Ensure that the overlap area is not too large, to minimize interference problems with other sites.

- In practice, cell sites are grouped in areas of high population density, with the most potential users. Cell phone traffic through a single site is limited by the base station's capacity; there is a finite number of calls or data traffic that a base station can handle at once. This capacity limitation is commonly the factor that determines the spacing of cell mast sites. In less dense suburban areas, masts are commonly spaced 1–3 km) apart and in denser suburban and urban areas, masts may be as close as 250–800 m apart.
- The concept of "maximum" range is misleading, however, in a cellular network. Cellular networks are designed to support many conversations with a limited number of radio channels (slices of radio frequency spectrum necessary to make one conversation) that are licensed to an operator of a cellular service. To overcome this limitation, it is necessary to repeat and reuse the same channels at different locations. Just as a car radio changes from one local station to a completely different local station with the same frequency when you travel to another city, the same radio channel gets reused on a cell mast only a few miles away. To do this, the signal of a cell mast is intentionally kept at low power and in many cases tilted downward to limit its reach. This allows covering an area small enough not to have to support more conversations than the available channels can carry. Due to the sectorized arrangement of antennas on a tower, it is possible to vary the strength and angle for each sector depending on the coverage from other towers in the area.

This document was prepared by PD Koen, experienced Radio Network Technical Planning Specialist. With over 23 years experience in the telecommunications technical RF planning field.

- Project Management and Technical Radio Network Planning for Wireless Telecommunications 3GHz and 26GHz License Bids for **Formus Communications Inc**. (within Finland, Poland, Greece, Denmark, Czech Republic, Italy, Belgium and Sweden) and **Callino, GmbH** (within Austria and Germany).
- Project Management and Technical Radio Network Planning of Wireless Telecommunications Projects in Africa for Plessey South Africa Ltd **(Plessey South Africa)**, **Transtel** a division of Transnet, Telkom SA Ltd **(Telkom)** (within Nigeria, Mauritius, Tanzania and South Africa).
- Project Management and Technical Radio Network Planning of Wireless Telecommunications Projects in South Africa for Atlas Towers.
- Project Management and Technical Radio Network Planning of Wireless Telecommunications Rural Services within Lesotho for new Towerco Operator License.

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