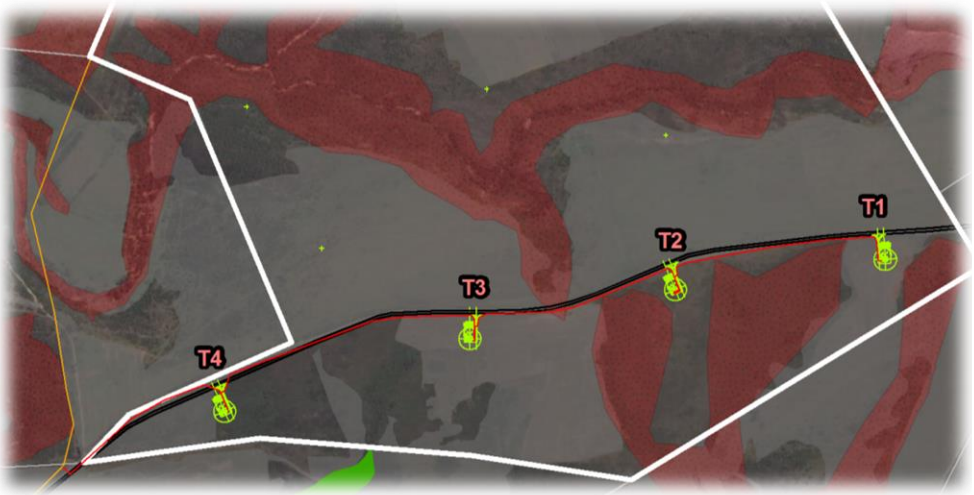
Environmental Management Programme for the Construction of Wind Turbine Generators on the Betshanger Site

Report Prepared for

AFRI-COAST ENGINEERS

Report Number 434024/1



Report Prepared by

srk consulting

June 2014

Environmental Management Programme for the Construction of Wind Turbine Generators on the Betshanger Site

Report Prepared for:

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SRK Project Number 434024
June 2014

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List of Abbreviations

DWA	Department of Water Affairs
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental control Officer
ER	Environmental Representative (the Contractor's assigned representative)
IAPs	Interested and Affected Parties
kV	Kilovolt
MW	Megawatt
RP	Responsible Person (Afri-Coast's assigned representative)
S&R	Search & Rescue
SAHRA	South African Heritage Resource Agency
SRK	SRK Consulting
SSC	Species of Special Concern
WULA	Water Use License Application

Glossary

Blades	The part of a wind turbine rotor (consisting of three blades) that catches the wind. Wind blowing over the blades causes them to lift and rotate.
Hub	The hub connects the blades.
Nacelle	The structure on top of the tower attached to the rotor and houses all of the generating components (i.e., the gearbox, low and high speed shafts, generator, controller and brake).
Rotor	The hub and the blades (i.e. the noticeably spinning part of the turbine).
Tower	The tower holds the nacelle and the rotor.

1 Background and Introduction

1.1 Introduction and scope of the EMPr

SRK Consulting has been appointed by Afri-Coast Engineers to develop an Environmental Management Programme for the construction of Wind Turbine Generators on the Betshanger site, located on Remainder of Farm Betshanger No. 473 south of the Van Stadens Road (Figure 1).

The purpose this Environmental Management Programme (EMPr) is to ensure that project construction activities are conducted such that the Duty of Care requirements, as outlined in Section 28 of the National Environmental Management Act (Act 107 of 1998), are complied with. This EMPr has also been submitted to the Eastern Cape Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) in support of an application for exemption of the requirements of the Environmental Impact Assessment regulations on the basis that no activities listed under the regulations are triggered by the project.

The EMPr specifies the mitigation and management measures that Afri-Coast have committed to for this project.

1.2 Project Description

The EMPr covers the environmental impacts associated with the construction phase of the Wind Turbine Generators at the Betshanger site as described below:

a) Erection of one wind turbine at four predetermined locations (as shown in Figure 1), each with a nominal capacity of 1 MW, a hub height of 70 m, and a rotor diameter of 60 m. This will entail the following:

- Erection of turbine units will consist of a tower, a nacelle, and three rotor blades. Foundation holes (of 2.5 m in depth) will be excavated for installation of a mounting ring to be filled with concrete which will serve as the turbine base. Concrete will be brought to site as ready-mix;
- Following backfilling of the turbine base, turbine platform areas less than 1750 m² in extent will be established. Each platform is required to be level and of sufficient compaction to accommodate the weight of the cranes. It is therefore anticipated that:
    - The construction of platforms will requires cutting into the upward slope of most of the sites and spoiling of excess material (as opposed to a traditional cut and fill operation). To minimise the footprint of each platform, the outer extent of any platform will be the 30 m x 50 m border indicated in Figures 2 to 5, i.e. the actual platform will be less that 1750 m² in extent.
    - Imported material will be required for the layer works of the platform area. This material will be obtained from commercial sources and therefore no borrow pits and associated permit requirements are needed for this project;
    - On completion of construction, topsoil will be spread over most of the compacted platform area and will be re-vegetated. The exception to this will be the surfaced area required for vehicle access for routine inspections & maintenance, anticipated to be a radius of approximately 5 m around each tower.
- Geometrical and road layer works for four new 4 m wide gravel access roads off the Van Stadens Road to the four Wind Turbine Generators. Radial curves of 35 m are required at the intersections with the existing Van Stadens Road. to accommodate abnormal vehicles;

The co-ordinates of the intersection points are as follows:

- Access road to Turbine 1 : 33º 56' 20,75" S and 25 º 18' 01,68" E
- Access road to Turbine 2 : 33 º 56' 23,94" S and 25 º 17' 36,09" E
- Access road to Turbine 3 : 33 º 56' 28,81" S and 25 º 17' 11,66" E
- Access road to Turbine 4 : 33 º 56' 35,69" S and 25 º 16' 39,32" E

- Other ancillary components of the development will include:
  - Electrical cables (22 kV) from the turbine sites to the Van Stadens Road. These electrical cables will be positioned underneath the internal access roads (i.e. the maximum width of the access roads will be 4 m, including accommodation of stormwater, power lines, and other services required for the turbine sites) and will require the excavation of trenches approximately 1.2 m in depth;
  - Power lines (22 kV) from the intersection of each access road will run along the southern side of the Van Stadens road and will terminate in a ground mounted medium voltage metering box as shown on Figure 1. From here the power lines will go overhead from the metering box to the Municipal 22 kV line between Fitches corner substation and Blue Horizon Bay. The underground section of this power line will be within the existing shoulder of the road;
  - Installation of lightning protection mats at each turbine. These lightning protection mats will be located underneath the turbine platform area, and will be smaller than 35 m x 50 m, thereby minimising the development footprint at each site;
  - Spoil site(s) will identified during construction, and in consultation with the Environmental Control Officer and landowner. The planned end use of the spoil site(s) will be to re-vegetate the area to the pre-development land use, which is anticipated to be agricultural. In order to achieve this, topsoil on the area to be used as a spoil site will first be removed and stockpiled, for use in re-vegetation / rehabilitation of the final profile;

b) Site preparation activities, including:
   - Surveying of the site;
   - Site levelling and fencing;
   - Clearance of vegetation for:
     - Construction areas;
     - New access roads;
     - Equipment and material storage areas.
   - Stripping and stockpiling of topsoil and any fill material that may be required (to be supplied from commercial sources);
   - Setting up and demarcating of construction areas;

c) Site re-vegetation / rehabilitation activities, including application of topsoil from stockpiles and re-vegetation of all temporary construction areas, including turbine laydown areas and turbine platforms. This will include control of potential invasive alien plants for a period of 12 months after construction.

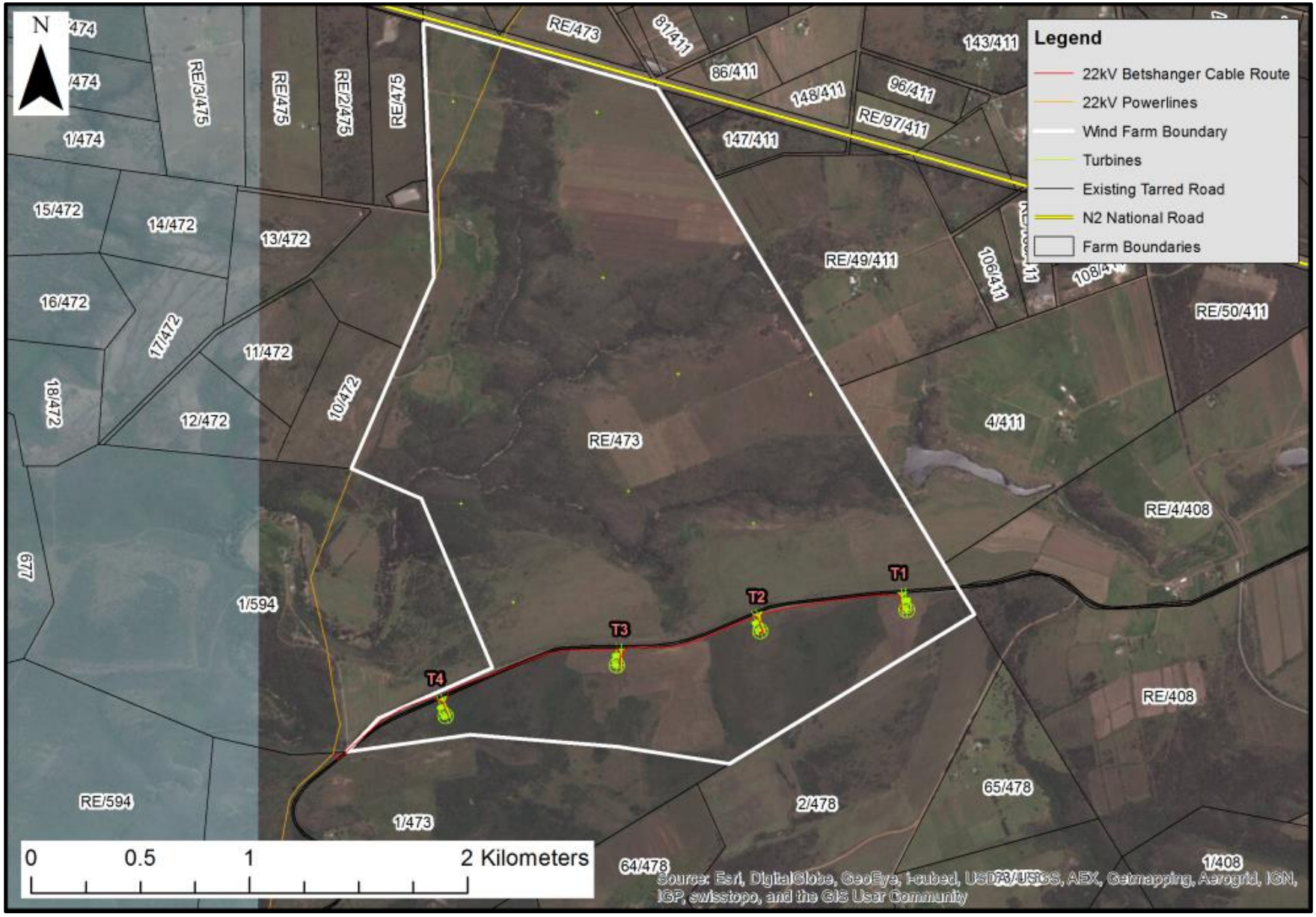


Figure 1: Site Locality Plan

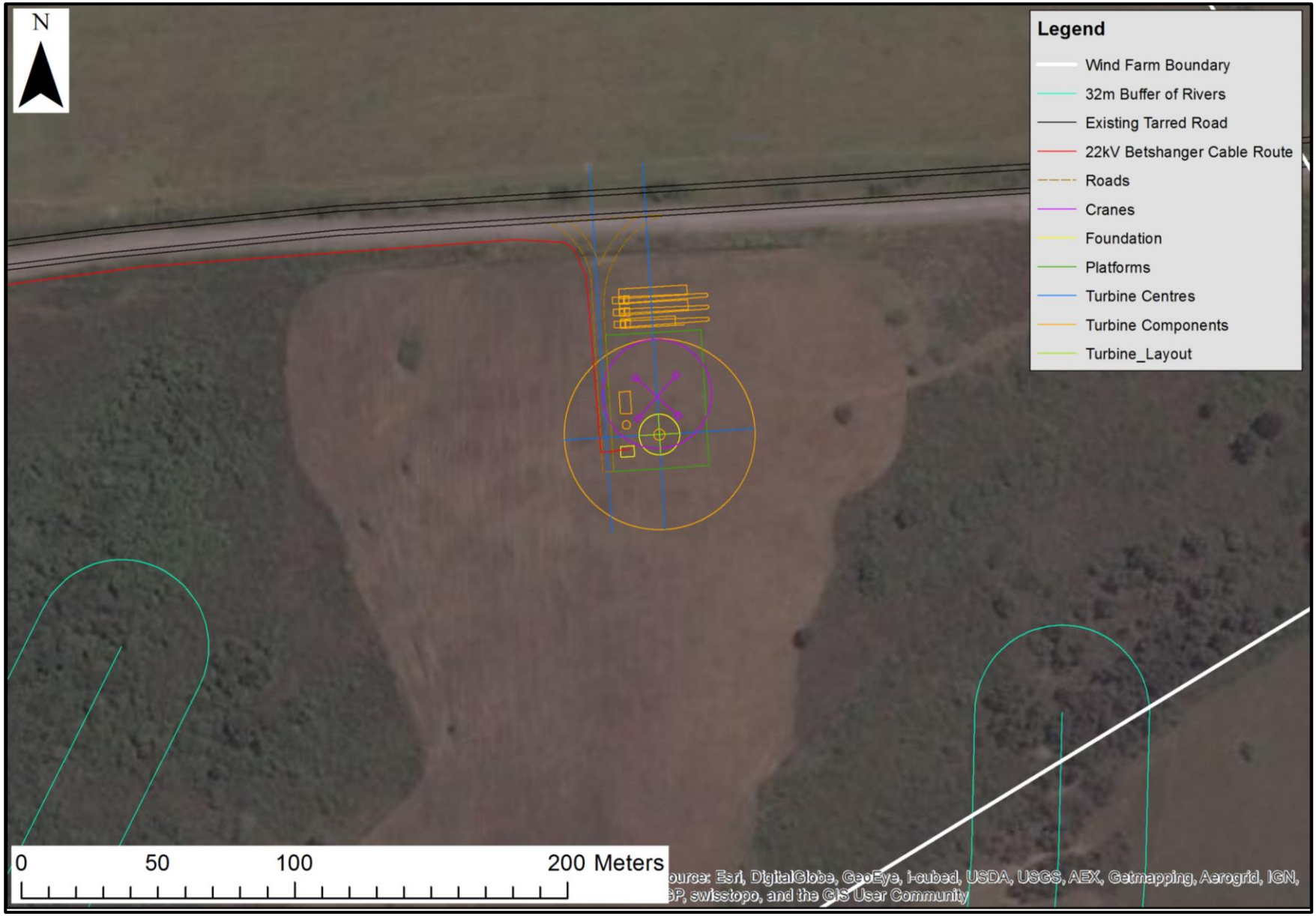


Figure 2: Layout Diagram of Turbine Site 01

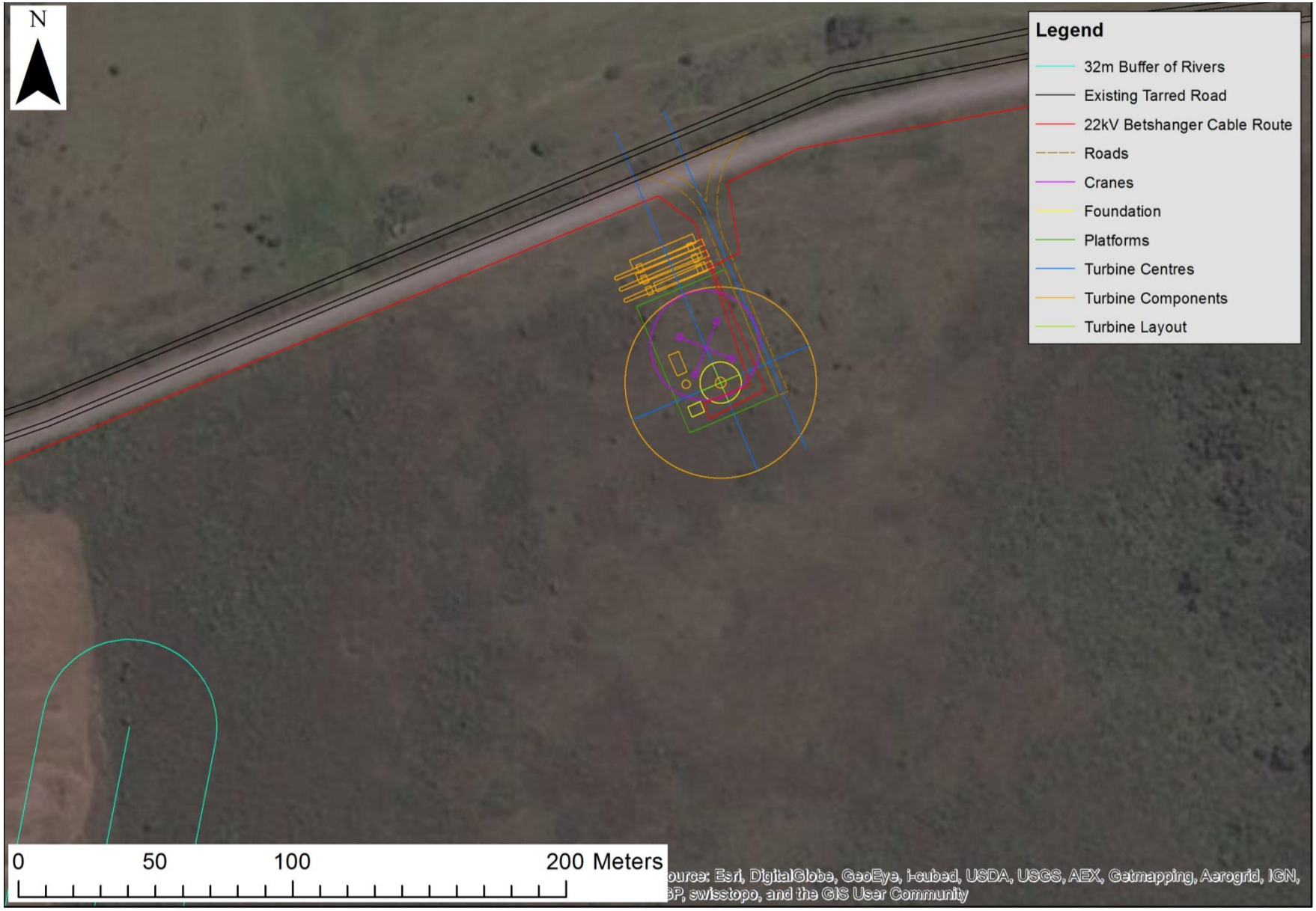


Figure 3: Layout Diagram of Turbine Site 02

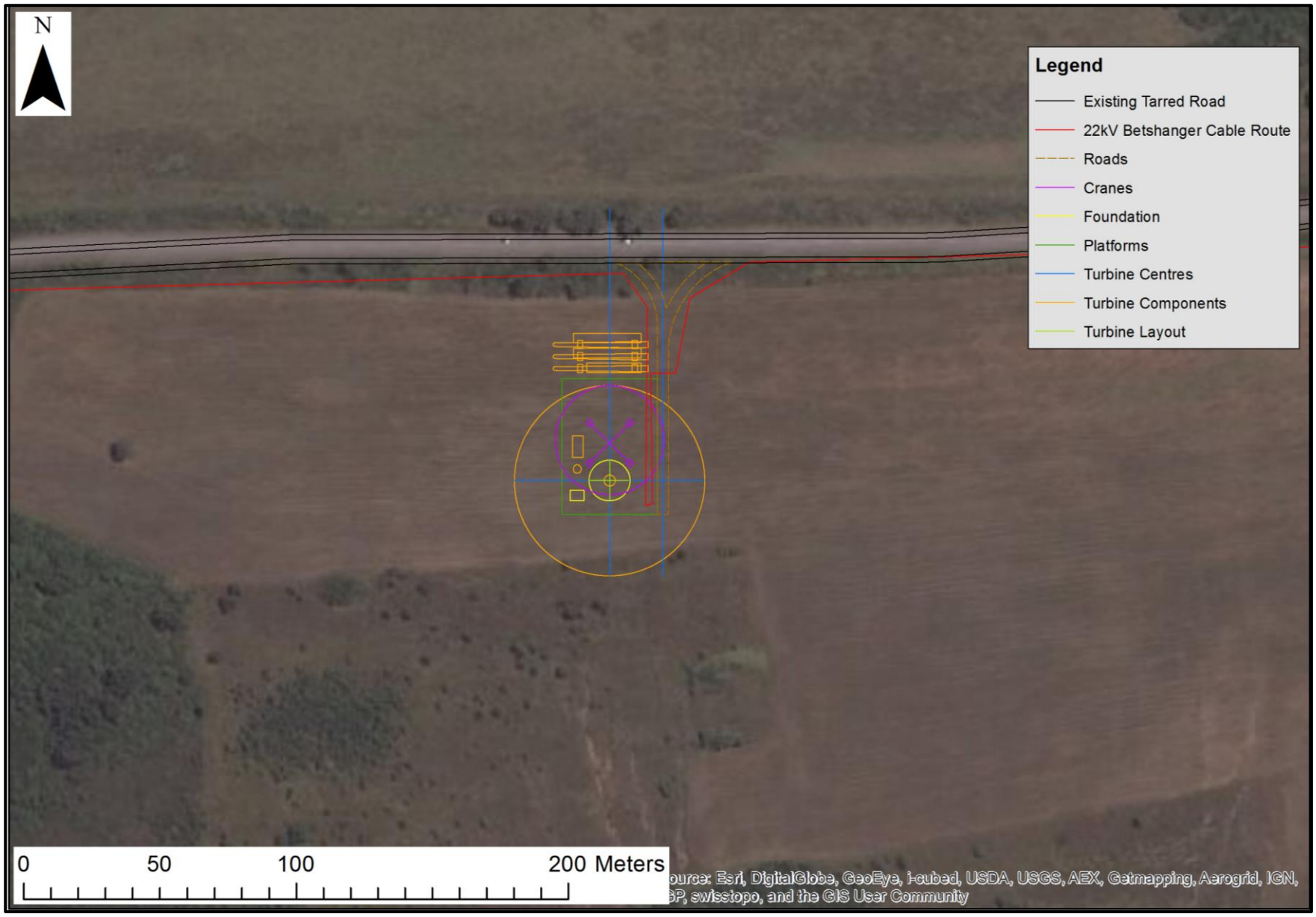


Figure 4: Layout Diagram of Turbine Site 03

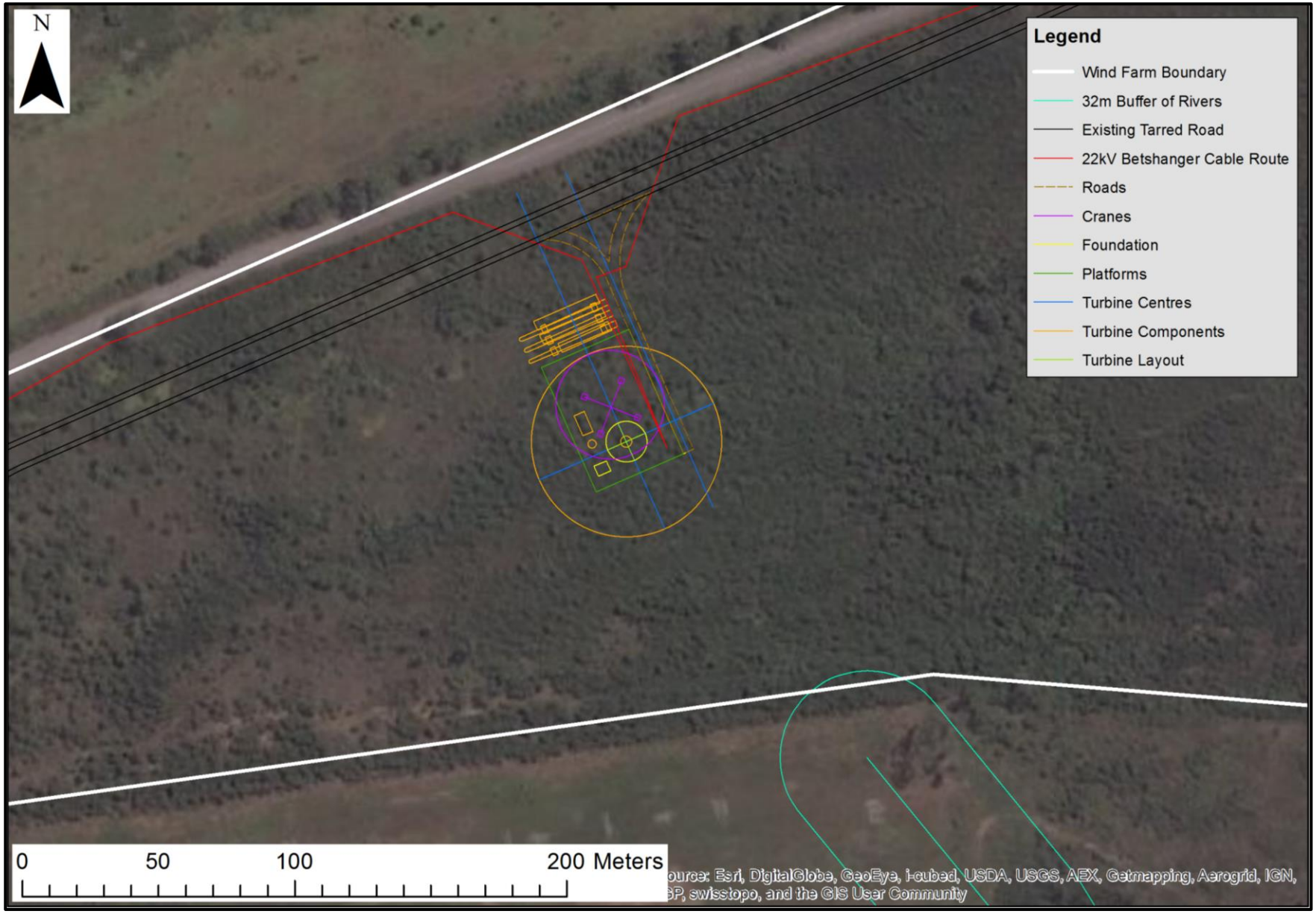


Figure 5: Layout Diagram of Turbine Site 04

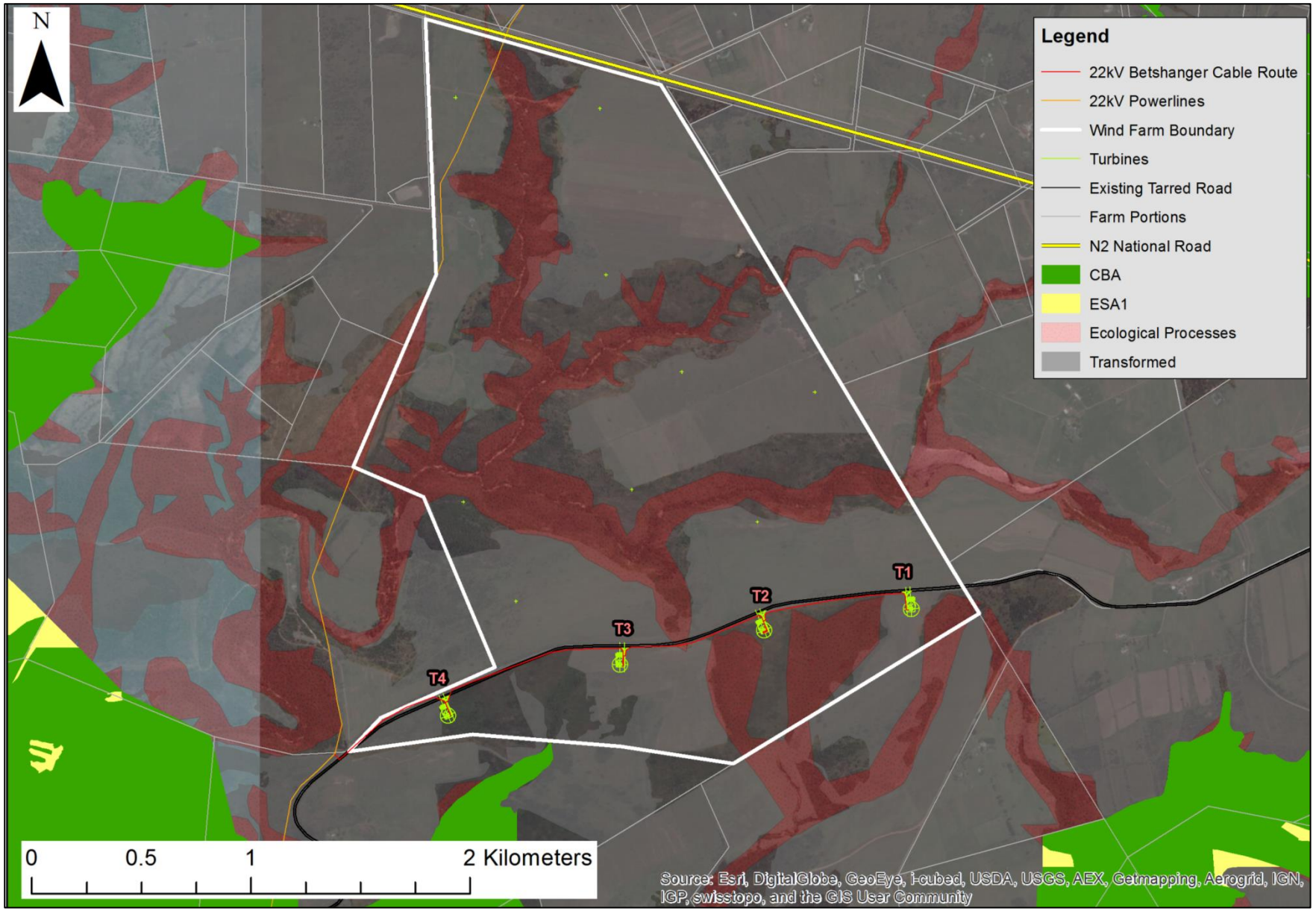


Figure 6: Ecological Sensitivity Map

The duration of construction is anticipated to be approximately 6 months, from site establishment to commissioning. Re-vegetation / rehabilitation activities are expected to continue for a 12 month period after commissioning.

1.3 Environmental Assessment Practitioner Details

Details of the authors of this Environmental Management Programme report (EMPr) are as follows:

Rob Gardiner, MSc, Pr Sci Nat: Rob Gardiner is the Principal Environmental Scientist and head of SRK's Environmental Department in Port Elizabeth. He has more than 19 years environmental consulting experience covering a broad range of projects, including Environmental Impact Assessments (EIA), Environmental Management Systems, Environmental Management Programmes (EMPr), and environmental auditing.

Tammy Arthur, BSc Hons: Tammy Arthur is an Environmental Scientist with over four years experience. Her expertise includes Environmental Basic Assessments, Environmental Management Plans, Environmental Auditing, Waste License and Water Use License Applications, report writing and public participation facilitation. Her training is in Botany and Geography and she has a sound knowledge in Conservation Biology.

1.4 Structure of the EMPr

The EMPr stipulates the environmental standards to be adhered to by the parties involved in the construction of Wind Turbine Generators at the Betshanger site and is based on the relevant South African Legislation, such as the National Environmental Management Act No. 107 of 1998, the Conservation of Agricultural Resources Act 43 of 1983 and the National Water Act No. 36 of 1998.

This EMPr identifies the project Roles and Responsibilities with regard to managing and reporting, Environmental Procedures and the Environmental Specifications associated with the project.

2 Summary of Potential Environmental Impacts

This section summarises the potential environmental impacts associated with establishment of turbines at the Betshanger site. The impacts identified are as follows:

2.1 Terrestrial Ecological Impacts

The clearing of vegetation will be required, and in some cases this will be permanent (specifically for the turbine sites, 4 m wide access roads, and a portion of the platform areas).

The portion of the property (Remainder of Farm Betshanger No. 473) on which the Wind Turbine Generators are to be erected has previously been cleared for pastures and consists of predominantly Grassland mixed with Fynbos species (particularly where Turbine Sites 01 and 01 are located). Sections of the farm (particularly side slopes of valleys) consist of indigenous Thicket. Large portions of the farm have been invaded by Black Wattle, Port Jackson and Eucalyptus species (particularly where Turbine Sites 03 and 04 are located). The surrounding properties are farmland, with the closest residential area being Blue Horizon Bay (approximately 4 to 7 km south-west of the site).

Figure 6 above shows various ecological features in relation to the development. No elements of the development cross drainage lines, nor are they within 100 m of drainage lines.

The site selection process has taken care to avoid Critical Biodiversity Areas and construction areas have mostly been placed in areas transformed by previous farming practises. The topography of the

landscape allows for the turbine blades to rest on the ground thereby limiting the temporary disturbance that would have resulted from the establishment of blade laydown platforms. In order to minimise laydown footprints, turbine tower sections will be transported to site first and erected, before turbine blades are transported to site.

The footprint of the four proposed sites is furthermore very small (i.e. less than 2500 m² each) in order to limit disturbance to ecological habitats. Any temporary disturbance of vegetation outside of this footprint (e.g. spoil sites and laydown areas) will be rehabilitated using topsoil removed and saved from the disturbed area prior to it being disturbed, thereby promoting reestablishment of natural vegetation.

A few protected plant species (e.g. species of the *mesembryanthemaceae* family at turbine site 02) have been observed and could be impacted by the construction activities. Permits will be obtained from DEDEAT for destruction and/ or translocation of these protected plants.

Mitigation measures listed under sections 5.1 and 5.2 will help reduce the significance of terrestrial ecological impacts.

2.2 Impacts on Avifauna and Bats

There is the potential, during the operational phase of the development, for Wind Turbine Generators to impact on avifauna and bats. No impacts are anticipated during the construction phase.

An Important Bird Area is located along the coast, approximately 4 km to the south of the closest turbine, associated with the black oyster catcher, and a bat colony has been identified in previous studies at Maitland Mine.

Due to the limited number of turbines, it is anticipated that these impacts will be relatively minor in comparison to a major wind farm. However, in order to manage the potential cumulative impacts during the operational phase (no impacts are anticipated during the operational phase) this EMPr recommends that monitoring of birds and bats be conducted prior to commissioning of the site (to establish a baseline), and during the operational life of the development, and that the results of this monitoring are reported to the Endangered Wildlife Trust as per the guidelines published by this organisation.

2.3 Wetlands and Watercourse Impacts

No wetlands have been identified within 500 m of the development footprint. The turbines are surrounded by seasonal drainage lines, however they are located a few hundred meters away, with the closest being within 200 m from Turbine Sites 01 and 04.

No impacts on wetlands or watercourse are anticipated.

2.4 Impacts on Existing Services

A tower with two microwave satellite dishes was observed at Turbine Site 01. The developer would need to contact the owner of the tower and notify them of the development. Should any concerns arise, an agreement between said owner and the contractor must be reached. No other visible existing services were identified at any of the Turbine Sites.

2.5 Aviation Safety

Turbines have potential to impact on aviation safety (e.g. interference with radar, navigation systems and flight paths). The sites are located roughly 28 – 31 km away from the Port Elizabeth Airport. Care has been taken in the site selection process to meet the requirements of the Civil Aviation

Authority (CAA) regarding the obstructions within the flight envelop. A CAA application for the turbine site has been made by Afri-Coast and authorisation is still pending.

2.6 Noise Impacts

The prevention of noise impacts associated with Wind Turbine Generators is determined largely by site location. To this end Afri-Coast have considered the location of existing dwellings during site selection, and ensure that there is a minimum distance of 500 m between turbine sites and any existing dwelling.

Mitigation measures listed under section 5.10 will help reduce the significance of such impacts during the construction phase.

This EMPr also recommends that baseline noise monitoring be conducted prior to commissioning, and that periodic (with a frequency no longer than once a year) monitoring at selected monitoring locations on the perimeter of the property be conducted during the operational life of the development.

2.7 Dust Impacts

There is the potential for dust generation during the construction phase as a consequence of clearing of vegetation and establishment of gravel access roads and associated road layer works. This could negatively affect motorists on the Van Stadens Road in terms of nuisance, traffic safety and visual impact.

Mitigation measures listed under section 5.10 will help reduce the significance of such impacts.

2.8 Traffic Safety

Turbine components and equipment will need to be transported to site by means of road transport during construction. Increases in vehicular traffic and abnormal loads during construction as well as turning points at dangerous points (e.g. before blind rises) on route to the site will increase the risk of traffic related accidents.

Preliminary concept drawings of proposed intersections of the gravel access roads with the Van Stadens Road have been approved by the District Roads and Public Works Department.

Mitigation measures listed under section 5.11 will further help reduce the significance of such impacts.

2.9 Visual Impacts

Wind Turbine Generators are by their very nature highly visible structures, usually clearly visible for many kilometres reducing the quality of natural views and reducing the values of properties in the area. There are very few farm houses in the direct line of sight of the Wind Turbine Generators and thus the visual impact on these receptors is expected to be minimal. The Van Stadens Road is however located approximately 90 m away from the turbine sites which will be seen by motorists on the road. Very little mitigation is available to limit the visual impacts on the surrounding areas.

In terms of the associated infrastructure, lighting of ancillary buildings and structures will be designed to minimise light pollution at night (e.g. use of motion detectors for security lighting). Electrical cables will be installed underground and substations will be styled to blend in with the environment and other buildings in the vicinity.

2.10 Heritage Impacts

According to Section 38 (1) of the National Heritage Resources Act (Act No. 25 of 1999), the responsible Heritage Resources Authority must be notified of all new developments which will change the character of a site exceeding 5,000 m² in extent and including linear developments exceeding 300 m in length.

Since each of the Turbine Sites are disturbed (through agricultural practices) and since the footprint of each turbine site is less than the 5,000 m² threshold, the potential for heritage impacts is deemed to be low and there is no need to notify the Heritage Resources Authority.

Similarly, the access roads, and the alignment of the (underground) power lines along the Van Stadens road either are below the 300 m threshold (each road is less than 100 m long), and the power line adjacent to the Van Stadens Rad is within the shoulder of the road, the potential for heritage impacts is deemed to be low and there is no need to notify the Heritage Resources Authority.

Notwithstanding the low probability of heritage resources within the development footprint, management measures are specified in the Section 5.8 of the EMPr in the event that concentrations of artefacts are discovered during construction.

3 Roles and Responsibilities

The general roles and responsibilities of the various parties are outlined below.

3.1 Developer: Afri-Coast

Afri-Coast must assign a representative, who in this document will be referred to as the Responsible Person (RP), who irrespective of other responsibilities must be responsible for:

a) Ensuring that the employees of the company are aware of environmental risks and how these can be reduced to avoid pollution and degradation of the environment;

b) Ensuring that the Contractor is duly informed of the EMPr and associated responsibilities and implications of this EMPr;

c) Appoint an independent Environmental Control Officer (ECO), to monitor the implementation of this EMPr during the construction phase of the project. The appointed ECO must be a qualified environmental professional with the relevant environmental expertise;

d) Ensuring that the construction contract makes provision for rehabilitation, to the satisfaction of the relevant authorities, of any environmental damage resulting from the proposed development, as well as from non-compliance with the EMPr, environmental regulations and relevant legislation, carried out by the Contractor; and

e) Notify the relevant authorities and the Environmental Control Officer should problems arise that are not remedied effectively, or of any change in the development or changes in project specification that could significantly impact negatively on the environment.

3.2 The Contractor

The Contractor must ensure that all aspects of the contract comply with both this EMPr and other relevant environmental legislation. The Contractor must be responsible for the following:

a) Appointing an Environmental Representative (on site), who irrespective of other duties, will also be responsible to oversee all activities associated with the contract;

b) Ensuring that the Environmental Representative has the means with which to carry out his / her tasks; and

c) Be responsible for the rehabilitation of, or the cost of rehabilitation, of any environmental damage that may arise out of non-compliance with this EMPr and / or environmental legislation. Such rehabilitation must be to the satisfaction of the Developer.

3.3 The Contractor's Environmental Representative (ER)

The Contractor's Environmental Representative (ER) must be responsible for implementation of this EMPr and any other environmental requirements that may be identified by the ECO, and agreed to by Afri-Coast, during the course of the contract. The ER must be familiar, either through training or prior experience, with the environmental aspects and impacts associated with construction projects. In addition to any other responsibilities, the general duties of the ER are as follows:

a) Ensuring that all personnel (including sub-contractors) are duly informed of the requirements, and the associated responsibilities and implications, of this EMPr;

b) Ensuring that all records needed to demonstrate compliance with the EMPr requirements are obtained, safely stored, and are readily available for inspection by the ECO and / Afri-Coast;

c) Consulting with the Environmental Control Officer (ECO) regarding interpretation of the EMPr and any other aspects of the contract that may impact significantly on the environment;

d) Ensuring that all personnel (including sub-contracted personnel) demonstrate respect and care for the environment in which they are operating; and

e) Acting as a point of contact for local residents and community members.

It is anticipated that these ER duties would be assigned to a member of the on-site personnel that would ordinarily be appointed for the duration of construction related activities by the Contractor, and that these ER duties would be in addition to the other (possibly primary) responsibilities of the that person.

3.4 The Environmental Control Officer (ECO)

The ECO must be a qualified environmental professional. The ECO must be responsible for checking compliance of the Contractor with the requirements of this EMPr and any other relevant environmental legislation for all activities associated with the contract.

The general duties of the ECO are as follows:

a) Being familiar with the environmental management requirements contained in this EMPr;

b) Undertaking the pre-construction and post-construction inspection, which may result in recommendations for additional clean-up and rehabilitation measures;

c) Monitor the Contractor's activities with regard to the requirements outlined in the EMPr;

d) Undertake regular (fortnightly) audits on the implementation of the EMPr during the course of construction, and submit these to Afri-Coast and Contractor; and

e) Conduct audits at suitable intervals after the construction period is completed, to monitor rehabilitation of the site, and report the findings in a final, Post-Construction Audit Report.

4 Environmental Procedures

This section outlines the overall processes / procedures associated with the implementation and monitoring of this EMPr.

4.1 Compliance Auditing

a) The appointed ECO and Contractor's ER must conduct a pre-construction site inspection to identify sensitive environments (and protected vegetation, which should be avoided, or if this is not possible, permits obtained from the relevant authorities for its disturbance or removal, no-go areas, locations of site camps);

b) The ECO must prepare a pre-construction audit report, which will include photographs of the general condition of the key features of the site. These photographs must be used for comparison purposes on completion of the contract, i.e. after rehabilitation of construction areas;

c) The ECO must conduct fortnightly audits of all construction related activities;

d) On completion of construction and rehabilitation activities, the ECO must conduct a site inspection, together with the Contractor's ER. Any items requiring attention must be included in a Post-Construction audit report;

e) The environmental audit report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions as well as the requirements of the EMPr; and

f) On completion of the defects liability period, the ECO must accompany Afri-Coast and the Contractor with a view to determining whether outstanding matters from the Post-Construction audit report have been adequately addressed.

4.2 Community Liaison

a) The ER must act as community liaison officer and his / her contact details must be displayed on the Contractor's board;

b) A complaints register (including the action taken in response to the complaint) must be kept on site by the ER; and

c) All complaints received must be forwarded to the ECO and Afri-Coast. All issues raised should be appropriately addressed and recorded.

4.3 Environmental Incidents

a) The ER must maintain a register of all environmental incidents occurring as a result of the activities associated with the contract. Environmental incidents that must be recorded include (but are not limited to):

- Fires;
- Accidents (e.g. traffic);
- Spills of hazardous materials, contaminating soil or water resources;
- Non-compliances with applicable legislation; and
- Non-compliances with this EMPr.

b) Each environmental incident must be investigated by the ECO and an environmental incident report must be forwarded to the Contractor and Afri-Coast. Such incident must be reported to the ECO within five working days of the incident occurring;

c) Environmental incident reports must include (as a minimum):

- A description of the incident;
- The actions taken to contain any damage to the environment, personnel, or the public,
- The actions taken to repair / remediate any such damage;
- Prescribe additional measures that may be required to remediate damage resulting from the incident and / or to prevent similar incidents occurring in the future.

4.4 Training

The Contractor is responsible for ensuring that the specifications within this EMPr are conveyed to all personnel (including sub-contracted personnel). It is recommended that regular training sessions (including basic environmental awareness training at induction) be conducted to fulfil this purpose. Training registers must be kept as proof for auditing purposes. The environmental training should, as a minimum, include (but not be limited to) the following:

a) The importance of conformance with the EMPr, including the legal consequences on non-conformance;

b) The environmental impacts, actual or potential, of the development activities;

c) The environmental benefits of improved personal performance;

d) Their roles and responsibilities in achieving conformance with the procedures and specifications contained in this EMPr, including emergency response procedures;

e) The potential consequences of departure from specified operating procedures; and

f) The mitigation measures required to be implemented when carrying out their work activities.

5 Environmental Specifications

Unless otherwise stated, it is the responsibility of the Contractor to ensure that all environmental specifications indicated in this section are adhered to at all times.

The following sections detail management and mitigation measures that will be undertaken to address the environmental impacts, in addition to general environmental good practice.

5.1 Site Demarcation & Vegetation Clearing

Vegetation clearing is required for the establishment of the, construction area, new access roads, power lines and substation and for equipment and material storage areas. The following mitigation measures are listed:

a) A botanical survey must be conducted by a suitable botanist to identify any red listed plant species in all areas to be disturbed (including the overhead power line). Should any species be identified, the relevant destruction and/ or translocation permits must be obtained and a search and rescue operation of such red listed plants must be undertaken under the supervision of the ECO;

b) All construction areas shall be clearly demarcated and no access shall be allowed outside these areas. No clearing of vegetation, storage of materials, or other construction related activities, shall be permitted outside of the demarcated construction areas;

c) Clearing of vegetation must be kept to the minimum required (and restricted to the construction areas only), and where possible must be avoided;

d) Areas for construction-related activities (e.g. stockpiling) must be located where the natural habitat has been previously transformed; and

e) Any remaining undisturbed patches of indigenous vegetation must be identified as no-go areas for development and must be marked as such (e.g. with danger tape) during the construction phase.

5.2 Other Ecological Specifications

The following ecological mitigation measures must be adhered to:

a) Under no circumstance may any animal, including snakes or other reptiles, be harmed or killed. Every effort should be taken to safely relocate any animal found (to a safe area outside the construction site). This might include, for example, the presence of a specialist with expertise in handling reptiles on site during the removal of vegetation;

b) No wildlife may be removed from the site or surrounding areas unless approved by the ECO in conjunction with the appropriate permits obtainable from DEDEAT or other relevant authorities;

c) No hunting, killing, capturing or snaring of wildlife or domestic animals shall occur on the site or the surroundings. The Contractor shall assume responsibility in this regard for all his employees and sub-contractors; and

f) All disturbed or cleared areas (including the edges of servitudes) must be kept clear of alien invasive plants for the duration of the construction up until the defects notification period;

5.3 Control of Environmentally Hazardous Materials

The following measures, aimed at preventing contamination of soil, surface water or groundwater by environmentally hazardous materials (such as fuel, oils or cement), are specified:

a) No storage or handling of any environmentally hazardous materials, including fuels, may take place outside the designated and demarcated laydown areas;

b) No chemicals may be stored, nor any vehicle maintenance may occur, within 350 m of the temporal zone of wetlands, whether a drainage line with or without an extensive floodplain or hillside wetlands;

c) Storage of hazardous liquids must include secondary containment and drip trays must be in place under all fuel bowsers;

d) Hazardous and flammable substances must be stored and used in compliance with the applicable regulations and safety instructions;

e) Appropriate spill kits must be available where hazardous liquids are stored and/or handled;

f) Should any spills of hazardous materials occur, all contaminated soil must be removed (at the Contractor’s expense) and disposed of at a registered hazardous waste disposal facility. Proof of safe disposal must be retained for auditing purposes;

g) Any material that is used to soak up spills (and is therefore contaminated) must be disposed of at a registered waste disposal facility. Proof of safe disposal must be retained for auditing purposes;

h) Spilled hazardous material within a bunded area must either be recovered (if possible), or disposed of at a suitable hazardous waste disposal facility. Proof of safe disposal must be retained for auditing purposes;

i) On-site mixing of cement must be conducted on an impervious surface;

j) All wastewater that is contaminated with cement must be contained, allowed to evaporate, and the remaining solids disposed of at a registered landfill site. Proof of safe disposal must be retained for auditing purposes;

k) All personnel must be trained and educated during induction on the handling of hazardous substances on site, including measures for dealing with spills or leaks; and

l) An effective monitoring system must be put in place to detect any leakage or spillage of hazardous substances.

5.4 Waste Management

Domestic as well as construction waste will be generated by construction activities. The following waste management mitigation measures must be followed:

a) No waste may be buried, burned, or dumped on the site or the surrounding area;

b) Sufficient weather and scavenger- proof bins (with lids, to prevent the escape of litter) must be provided, and be easily accessible at all points were wastes are generated;

c) The site must be kept clean and free of litter, and no litter from the site must be allowed to disperse to surrounding areas;

d) All personnel must be instructed to dispose of all waste in the proper manner (i.e. in bins or waste receptacles fitted with lids);

e) The Contractor must identify and separate materials that can be reused or recycled to minimise waste e.g. metals, packaging and plastics, and provide separate marked bins for these items;

f) All construction materials (e.g. bags of cement) must be suitably stored and protected, so that they do not become damaged and unusable;

g) The Contractor is responsible for the regular disposal (at suitable and licensed municipal waste disposal facilities) of all waste generated as a result of the construction activities. Proof of safe disposal must be kept for auditing purposes;

h) Any excess subsoil (i.e. spoil material) shall be spoiled in a pre-identified location in collaboration with the ECO;

i) Transport and disposal of all wastes must be compliant with the relevant legislation, including (but not limited to) the use of NMBM registered waste transporter; and

j) The frequency of collections will be such that waste receptacles do not unduly accumulate or overflow.

5.5 Sewage and Sanitation

No on-site camp for construction workers is proposed. Sewage and sanitation is therefore limited to the provision of portable chemical toilets. The following must be adhered to with regards to sewage and sanitation:

a) No wastewater (e.g. from the washing of equipment / vehicles) may be discharged to a water resource;

b) An adequate number of portable toilets must be positioned at all construction areas. These toilets must be regularly serviced by a registered sub-contractor, who must provide the appropriate safe disposal certificates.

5.6 Soil Aspects

Soil will need to be stripped and stockpiled following in conjunction with or following vegetation clearing. The following conditions are specified:

a) In cases where topsoil is disturbed / excavated, such topsoil must be stored in stockpiles on the site where it originated from, for later use during rehabilitation;

a) Topsoil (usually first 150 mm) shall be removed from all areas where physical disturbance of the surface will occur. Topsoil means that layer of soil covering the earth and which provides a suitable environment for the germination of seeds, allows the penetration of water, and is a source of microorganisms, plant nutrients and in some cases seed;

b) The topsoil that is removed shall be stockpiled on the high ground side of the operations and in such a way that it will not cause damming up of water or washaways, or wash / blow away itself;

c) Topsoil stockpiles shall not exceed a height of two meters;

d) Stockpiles shall be managed so as to maintain the regrowth potential of the topsoil;

e) The topsoil shall be stored so that it can be placed on the exposed subsoil as soon as the construction activities have been completed and slopes have been finished off to the acceptable gradient as part of the rehabilitation process;

f) No chemical pollution shall be allowed to contaminate the soils. Any plant equipment found to be contributing to this shall be removed from the site and repaired; and

g) In the event of a petrochemical (diesel, oil, fuels, etc.) spill, the Contractor must take suitable measures to contain the pollution and prevent it from spreading or seepage. Once the spill has been contained, contaminated material (soil, etc.) shall be removed and disposed of at a registered hazardous waste disposal site.

5.7 Stormwater and Erosion

Measures for stormwater and erosion control are as follows:

a) Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated; and
b) Stormwater should be managed using suitable structures such as swales, gabions and rock rip-wrap so that any run-off does not cause erosion.

5.8 Control of Possible Heritage Impacts

Mitigation measures for control of possible heritage impacts are as follows:

a) Construction managers / foremen must be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow when they find such sites; and

b) If any concentrations of archaeological material are exposed during construction, all work in that area must stop and it must be reported immediately to the nearest museum / archaeologist or to SAHRA so that a systematic and professional investigation can be undertaken.

5.9 Fire Prevention and Control

The following fire prevention and control measures are specified:

a) A fire officer must be appointed and must be responsible for co-ordinating rapid, appropriate responses in the event of a fire;

b) No burning of vegetation, whether to clear or already cleared, is permitted;

c) Cooking or heating fires are not permitted, except where these are in designated areas within the construction camp. No fires, or designated fire areas, are permitted outside of the construction camp;

d) Sufficient firefighting equipment must be maintained and be accessible on sites at all times. In particular, such firefighting equipment must be readily on hand in areas where hot work may be required; and

e) In the event that the fire is too large for the on-site personnel to control, the Fire Brigade must be called to extinguish it.

5.10 Air Quality and Noise Control

Construction activities, particularly the clearing of vegetation and increased occurrence of vehicular traffic on site will result in dust and noise impacts. The following mitigation measures to control such impacts are listed:

a) To minimise dust impacts, areas to be cleared of vegetation or topsoil must be cleared only when required, and must be rehabilitated immediately on completion of the construction activity in that area;

b) Access roads should be kept to a minimum, and must be limited to designated construction areas;

c) Dust abatement techniques must be used on unpaved, unvegetated surfaces to minimise airborne dust;

d) To minimise disturbance to neighbouring landowners or residents, activities that are likely to result in noise levels in excess of 7 dB above ambient noise, at a distance of 100 m from the source, should be restricted to normal working hours (i.e. 06h00 to 18h00, Monday to Saturday) according to the Noise Control Regulations in terms of the Environment Conservation Act (Act 73 of 1989) and the By-Laws of the Local Municipality to reduce the noise impact to an acceptable level;

e) Construction materials and stockpiled soils must be covered if they are a source of dust;

f) Dust abatement techniques must be used before and during surface clearing and excavation;

g) No burning of any waste material may take place on site during the construction phase; and

h) Equipment and machinery must be well maintained and equipped with silencers.

5.11 Roads and Transportation

The following roads and transportation mitigation measures are specified:

a) A Transportation and traffic management plan must be developed, particularly for the transport of turbine components, main assembly cranes and other large pieces of equipment. A permit must be obtained from the relevant transport department for the transportation of all components (abnormal loads) to the sites; and
b) To minimise impacts on a local commuters, consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.

5.12 Rehabilitation Plan

All disturbed areas, including turbine platforms and laydown areas will be rehabilitated. The following measures must be adhered to:

a) All disturbed and / or cleared areas must be rehabilitated as soon as construction in that area has been completed, as part of the construction contract;
b) All eroded areas shall be rehabilitated (using gabions and establishing indigenous vegetation where appropriate) to prevent further and more widespread erosion prior to the commencement of construction;
c) Stockpiled topsoil from the cleared areas shall be spread over the disturbed areas (minimum of 100 mm thick) after construction in each area has been completed, and watered to enhance growth of the internal seed bank;
d) If sufficient plant growth has not established after a two month period, the still exposed areas (particularly on slopes) should be revegetated with an indigenous grass seed mix to prevent erosion of those areas. This should be monitored by the ECO;
e) Anti-erosion measures such as silt fences must be installed in disturbed areas susceptible to wind and water erosion (e.g. slopes);
f) Compacted areas, e.g. due to movement of vehicles, shall be scarified to loosen soil and enable regrowth of vegetation; and
g) All disturbed areas shall be monitored and cleared of alien invasive vegetation, during the course of the construction and defects liability periods, before they become seed-bearing.

6 Safety

It is noted that this EMPr is not a Health & Safety Plan. It is Afri-Coast's responsibility to ensure that a Health & Safety Plan, as per the requirements of the Occupational Health & Safety Act, is prepared prior to any physical work occurring on the site.

Prepared by

Tammy Arthur (BSc Hons.)

Environmental Scientist

Reviewed by

Rob Gardiner Pr Sci Nat

Partner, Principal Environmental Scientist

All data used as source material plus the text, tables, figures, and attachments of this document have been reviewed and prepared in accordance with generally accepted professional engineering and environmental practices.

Appendices

Appendix A: Site Development Plans

06

05

01

RE/473

22kV UNDERGROUND LINE-
3xCORE 50mm² Al XLPE
CABLE-840m

MV RING MAIN UNIT

02

RE/473

22kV UNDERGROUND LINE-
3xCORE 50mm² Al XLPE
CABLE-811m

03

RE/473

22kV UNDERGROUND LINE-
3xCORE 50mm² Al XLPE
CABLE-1.23km

MV RING MAIN UNIT

04

22kV OVERHEAD LINE CONNECTED WITH
3xCORE 50mm² Al XLPE CABLE

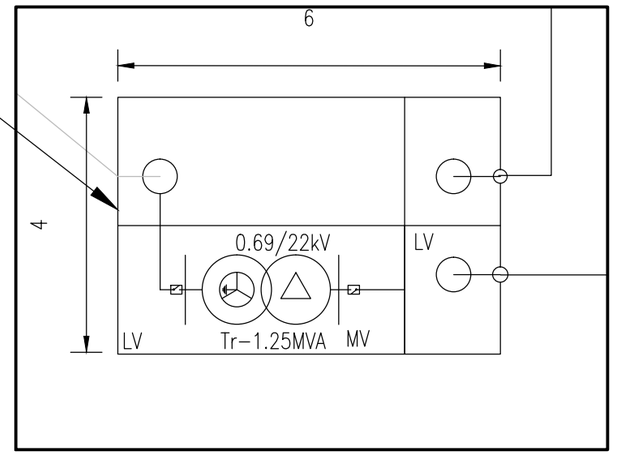
22kV UNDERGROUND LINE
3xCORE 50mm² Al XLPE
CABLE-640

1/473

64/478

2/478

MV RING MAIN UNIT



GENERAL NOTES

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SW	=	STORM WATER	DET	=	DETAILS	CON	=	CONSTRUCTION
ELE	=	ELECTRICAL	GA	=	GENERAL ARRANGEMENT	ASB	=	AS BUILT
STR	=	STRUCTURAL						

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DESIGNED	DESIGNED	--/--/----
CHECKED	CHECKED	--/--/----

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PROJECT MANAGER: DATE

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CLIENT:
NOPRLOG (PTY) LTD

PROJECT:
**BETSHANGER WIND FARM
NELSON MANDELA BAY**

TITLE:
**BETSHANGER WIND FARM
GENERAL LAYOUT**

DRAWING NUMBER : SCALE: AS SHOWN

PROJECT No.	DISCIPLINE	SUB No.	DWG No.		STATUS	REVISION
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STUDENT 8 09/04/2014

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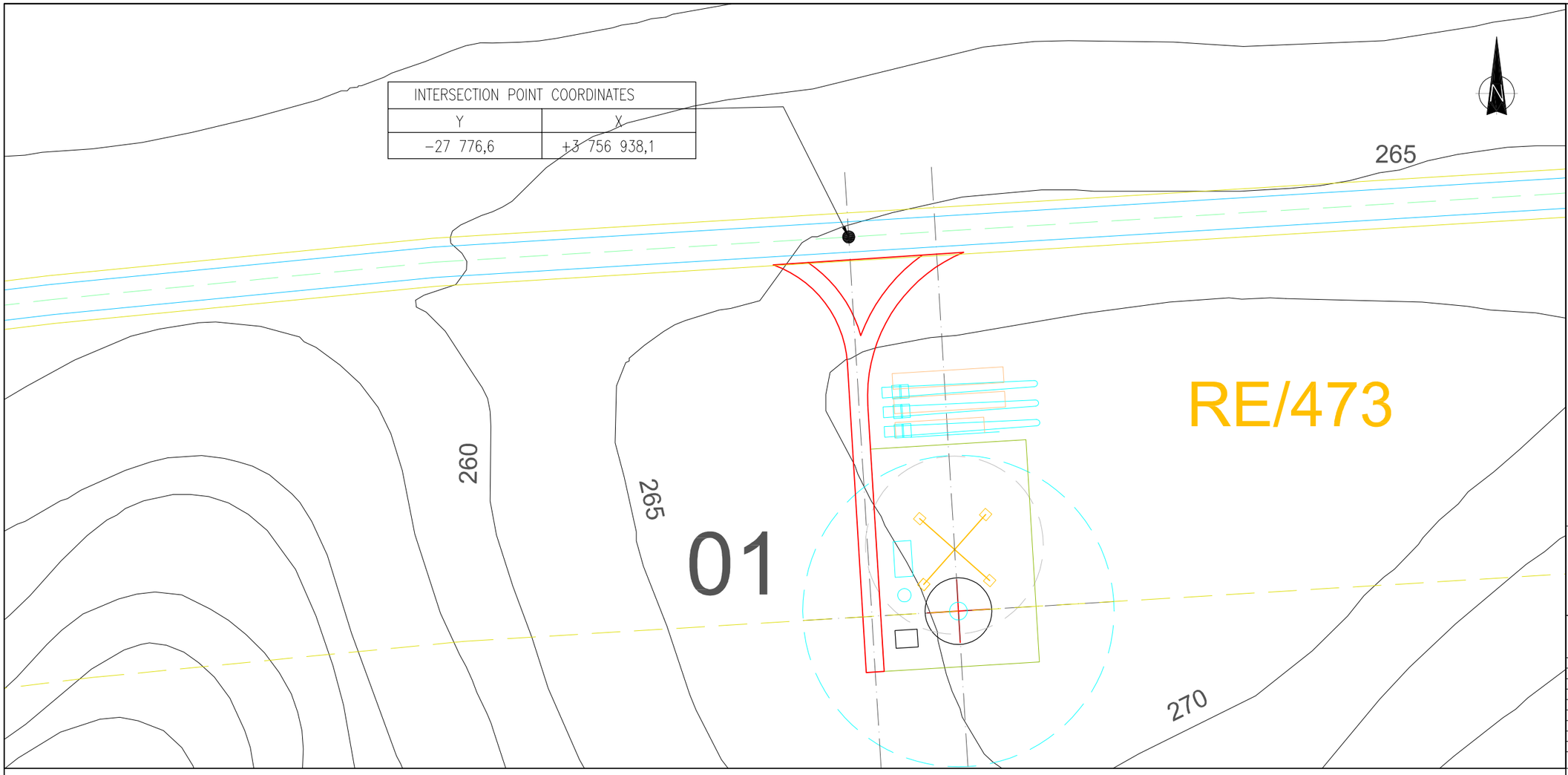

AFFECTED AREAS :

1, TOTAL ROAD SECTIONS = 680m²

2, PLATFORM AREA (50 x 35m) = 1 750m²

3 TOTAL AFFECTED AREA = 2 430m²

GENERAL NOTES

1. THE REQUIRED SHOULDER SIGHT DISTANCE IS 155m FROM FIGURE 2.5.5 (a) TRH 17 WITH HEIGHT OF EYE AT 1.05m AND OBJECT HEIGHT 1.3m (SEE DETAIL A)
2. THE REQUIRED STOPPING SIGHT DISTANCE IS 115m FROM TRH 17 USING A K VALUE OF 33 FOR A DESIGN SPEED OF 80KM/H. THE HEIGHT OF EYE IS TAKEN AT 1.05m AND OBJECT HEIGHT 0.15m (SEE DETAIL B)
3. THE SHOULDER SIGHT DISTANCE LINE OF SIGHT IS TAKEN 5m FROM THE PROVINCIAL ROAD (MR 451) EDGE FOR A STOP CONDITION

DRAWING NUMBER CODES

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SW	=	STORM WATER	DET	=	DETAILS	CON	=	CONSTRUCTION
ELE	=	ELECTRICAL	GA	=	GENERAL ARRANGEMENT	ASB	=	AS BUILT
STR	=	STRUCTURAL						

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DESIGNED	DESIGNED	--/--/----
CHECKED	CHECKED	--/--/----

PROJECT DIRECTOR: _____ DATE

PROJECT MANAGER: _____ DATE

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CLIENT:

NOPRLOG (PTY) LTD

PROJECT:

BETSHANGER WIND FARM
NELSON MANDELA BAY

TITLE:

GENERAL LAYOUT OF TURBINE WTG 1 – ACCESS ROAD AND PLATFORM –

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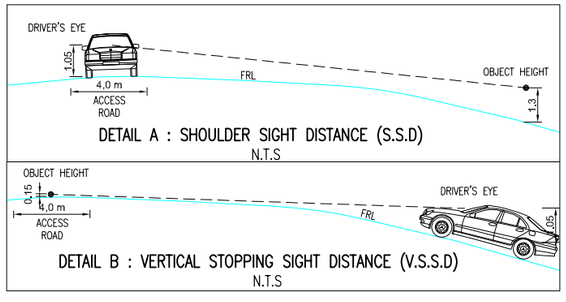

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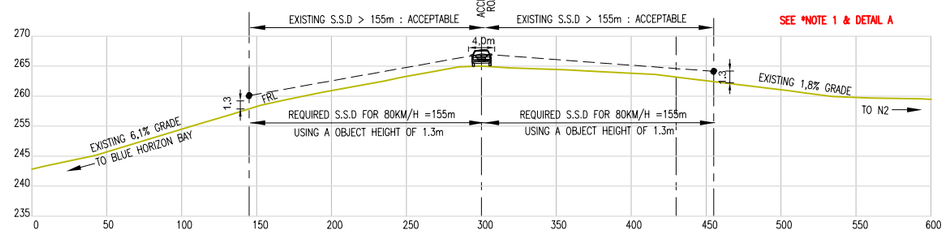
VER 1:500



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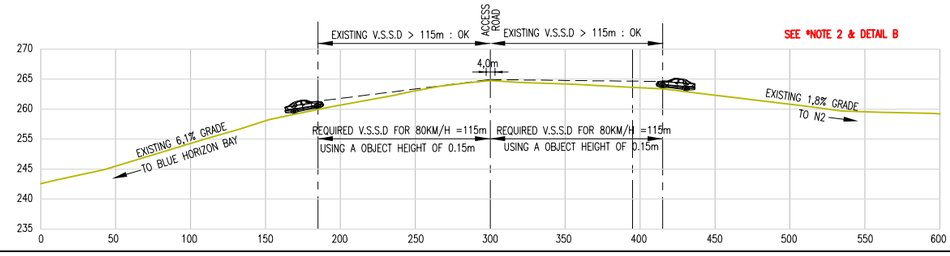

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STEPHAN & 06/03/2014

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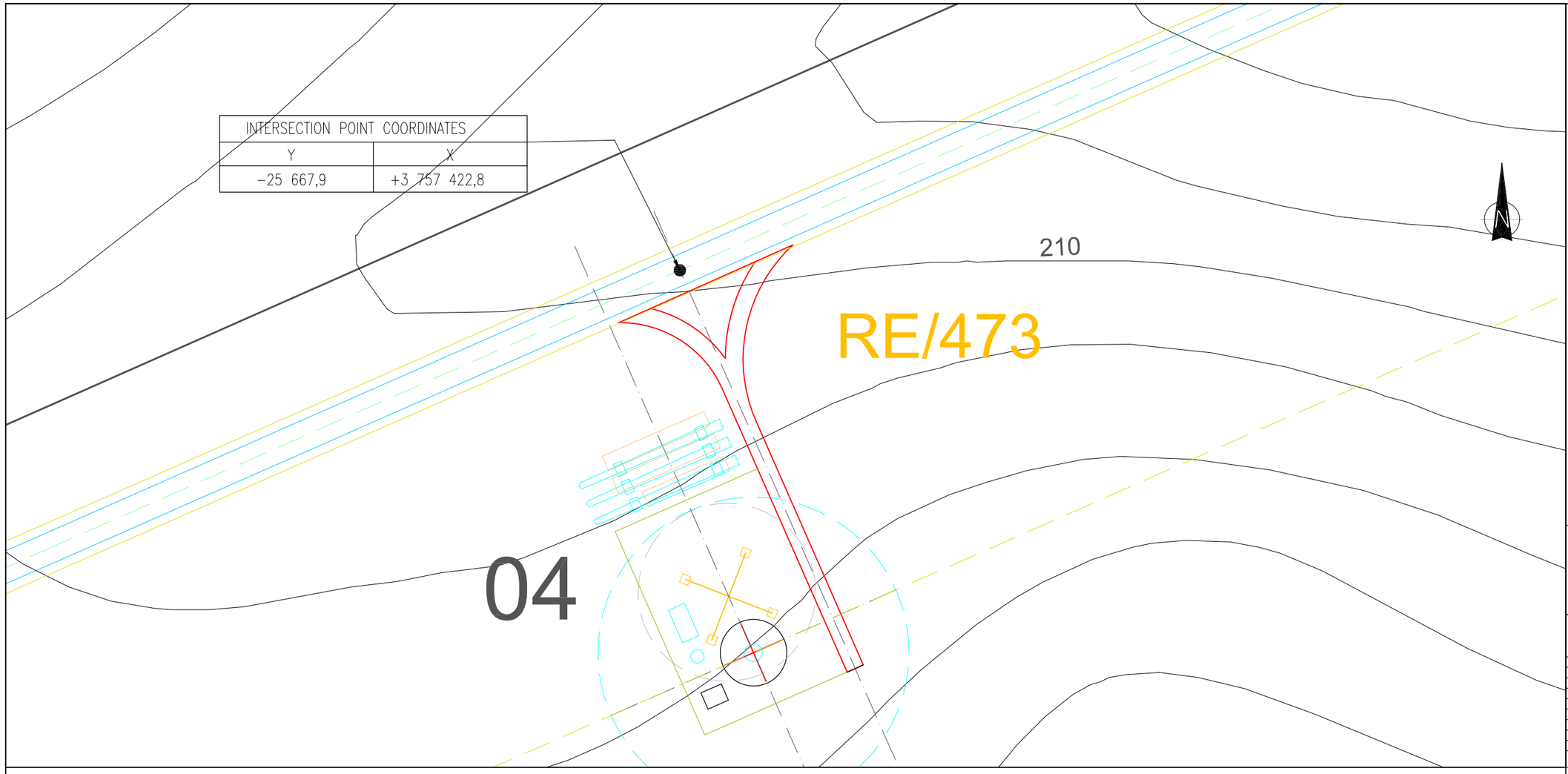

AFFECTED AREAS :

1, TOTAL ROAD SECTIONS = 680m²

2. PLATFORM AREA (50 x 35m) = 1 750m²

3 TOTAL AFFECTED AREA = 2 430m²

GENERAL NOTES

1. THE REQUIRED SHOULDER SIGHT DISTANCE IS 155m FROM FIGURE 2.5.5 (a) TRH 17 WITH HEIGHT OF EYE AT 1.05m AND OBJECT HEIGHT 1.3m (SEE DETAIL A)

2. THE REQUIRED STOPPING SIGHT DISTANCE IS 115m FROM TRH 17 USING A K VALUE OF 33 FOR A DESIGN SPEED OF 80KM/H. THE HEIGHT OF EYE IS TAKEN AT 1.05m AND OBJECT HEIGHT 0.15m (SEE DETAIL B)

3. THE SHOULDER SIGHT DISTANCE LINE OF SIGHT IS TAKEN 5m FROM THE PROVINCIAL ROAD (MR 451) EDGE FOR A STOP CONDITION

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DESIGNED	DESIGNED			--/--/----
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PROJECT DIRECTOR: DATE

PROJECT MANAGER: DATE

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info@africoast.com

CLIENT:

NOPRLOG (PTY) LTD

PROJECT:

BETSHANGER WIND FARM
NELSON MANDELA BAY

TITLE:

GENERAL LAYOUT OF TURBINE WTG 4 – ACCESS ROAD AND PLATFORM –

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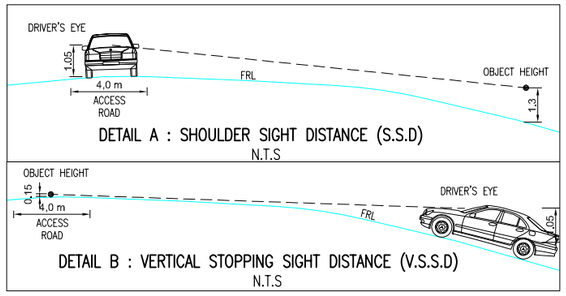

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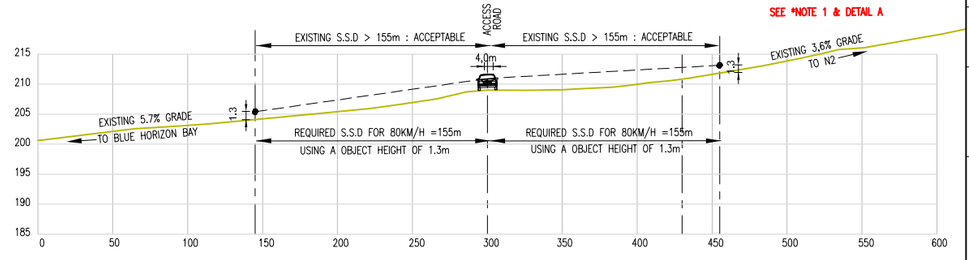
VER 1:500



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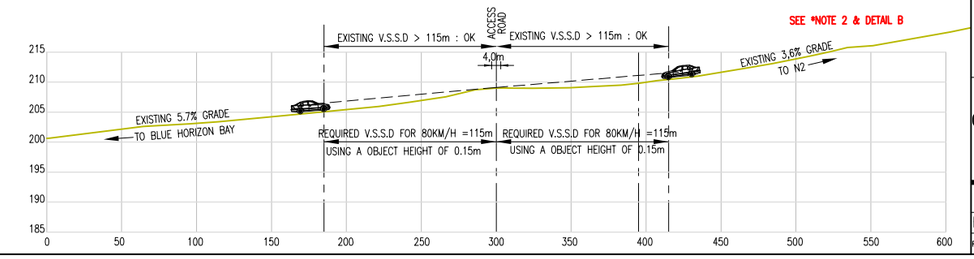

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STEPHAN & 06/03/2014

INTERSECTION POINT COORDINATES	
Y	X
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250

245

RE/473

03

OLD CULTIVATED LAND

AFFECTED AREAS :

1, TOTAL ROAD SECTIONS = 680m²

2. PLATFORM AREA (50 x 35m) = 1 750m²

3 TOTAL AFFECTED AREA = 2 430m²

GENERAL NOTES

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3. THE SHOULDER SIGHT DISTANCE LINE OF SIGHT IS TAKEN 5m FROM THE PROVINCIAL ROAD (MR 451) EDGE FOR A STOP CONDITION

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ELE =	ELECTRICAL	GA =	GENERAL ARRANGEMENT	ASB =	AS BUILT
STR =	STRUCTURAL				

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CLIENT:

NOPRLOG (PTY) LTD

PROJECT:

BETSHANGER WIND FARM
NELSON MANDELA BAY

TITLE:

GENERAL LAYOUT OF TURBINE WTG 3
– ACCESS ROAD AND PLATFORM –

DRAWING NUMBER : R1009– RD – GA – 03

SCALE: 1:500

PROJECT No. | DISCIPLINE | SUB No. | DWG No. | STATUS | REVISION

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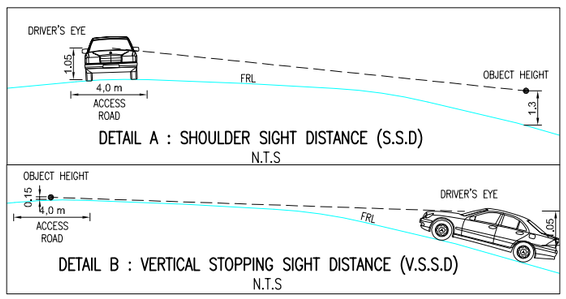

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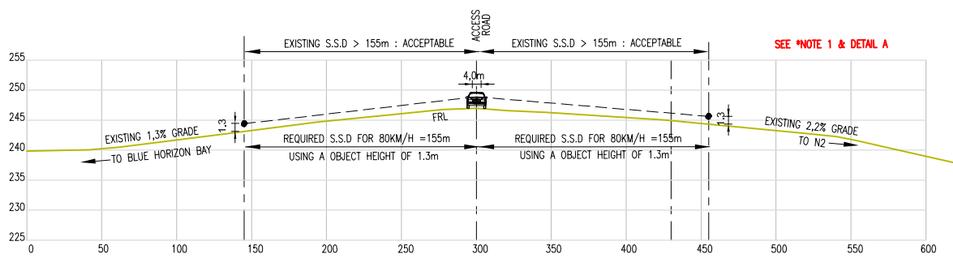

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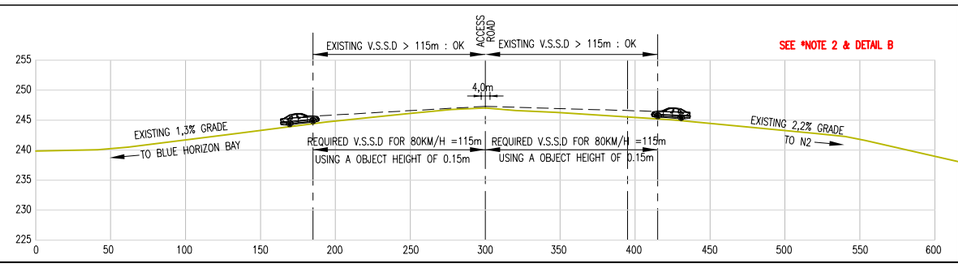

INTERSECTION POINT COORDINATES	
Y	X
−27 113,7	+3 757 034,1

WOODLANDS

RE/473

02

AFFECTED AREAS :

1, TOTAL ROAD SECTIONS = 680m²

2. PLATFORM AREA (50 x 35m) = 1 750m²

3 TOTAL AFFECTED AREA = 2 430m²

GENERAL NOTES

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3. THE SHOULDER SIGHT DISTANCE LINE OF SIGHT IS TAKEN 5m FROM THE PROVINCIAL ROAD (MR 451) EDGE FOR A STOP CONDITION

DRAWING NUMBER CODES

DISCIPLINE			SUBDIVISION No.			STATUS		
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PROJECT MANAGER: DATE

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CLIENT:

NOPRLOG (PTY) LTD

PROJECT:

BETSHANGER WIND FARM
NELSON MANDELA BAY

TITLE:

GENERAL LAYOUT OF TURBINE WTG 2
– ACCESS ROAD AND PLATFORM –

DRAWING NUMBER : R1009– RD – GA – 02

SCALE: 1:500

PROJECT No. | DISCIPLINE | SUB No. | DWG No. | STATUS: PRE | REVISION: 00

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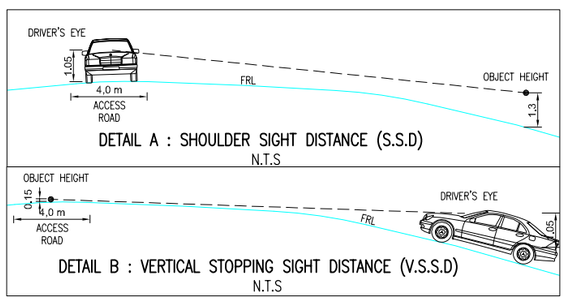
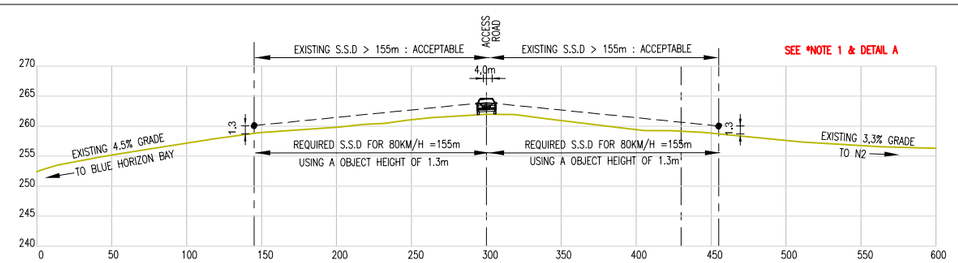
STEPHAN & 06/03/2014



VERTICAL PROFILE OF LINE OF SIGHT FOR SHOULDER SIGHT DISTANCE (S.S.D)
SCALE HOR 1:2000
VER 1:500



EXISITNG AND REQUIRED VERTICAL STOPPING SIGHT DISTANCE (V.S.S.D)
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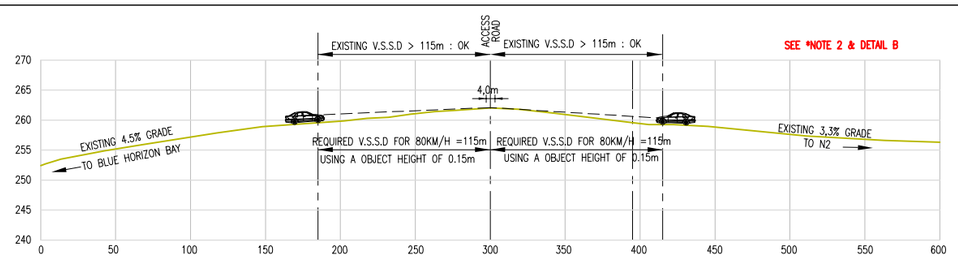

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