NAMAS WIND FARM, NORTHERN CAPE PROVINCE

ENVIRONMENTAL MANAGEMENT PROGRAMME

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EMPR DETAILS

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DEFINITIONS AND TERMINOLOGY

Alien species: A species that is not indigenous to the area or out of its natural distribution range.

Alternatives: Alternatives are different means of meeting the general purpose and need of a proposed activity. Alternatives may include location or site alternatives, activity alternatives, process, or technology alternatives, temporal alternatives or the 'do nothing' alternative.

Ambient sound level: The reading on an integrating impulse sound level meter taken at a measuring point in the absence of any alleged disturbing noise at the end of a total period of at least 10 minutes after such meter was put into operation.

Assessment: The process or collecting, organising, analysing, interpreting and communicating information which is relevant.

Biological diversity: The variables among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes they belong to.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Construction: Construction means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity as per the EIA Regulations. Construction begins with any activity which requires Environmental Authorisation.

Cumulative impacts: Impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. discharges of nutrients and heated water to a river that combine to cause algal bloom and subsequent loss of dissolved oxygen that is greater than the additive impacts of each pollutant). Cumulative impacts can occur from the collective impacts of individual minor actions over a period and can include both direct and indirect impacts.

Cut-in speed: The minimum wind speed at which the wind turbine will generate usable power.

Cut-out speed: The wind speed at which shut down occurs.

Decommissioning: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned. This usually occurs at the end of the life of a facility.

Development footprint: The development footprint of the Namas Wind Farm will be located within the 5092ha project site and will be a much smaller area within which the wind turbines and associated infrastructure (excluding the 300m power line corridor within which the new 132kV power line is proposed) will be constructed and operated. The development footprint has been subject to detailed design by the

developer through the consideration of sensitive environmental features that need to be avoided by the wind farm.

Direct impacts: Impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. noise generated by blasting operations on the site of the activity). These impacts are usually associated with the construction, operation, or maintenance of an activity and are generally obvious and quantifiable.

Disturbing noise: A noise level that exceeds the ambient sound level measured continuously at the same measuring point by 7 dB or more.

'Do nothing' alternative: The 'do nothing' alternative is the option of not undertaking the proposed activity or any of its alternatives. The 'do nothing' alternative also provides the baseline against which the impacts of other alternatives should be compared.

Ecosystem: A dynamic system of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Endangered species: Taxa in danger of extinction and whose survival is unlikely if the causal factors continue operating. Included here are taxa whose numbers of individuals have been reduced to a critical level or whose habitats have been so drastically reduced that they are deemed to be in immediate danger of extinction.

Endemic: An "endemic" is a species that grows/occur in a particular area (is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment: the surroundings within which humans exist and that are made up of:
(i) The land, water and atmosphere of the earth;
(ii) Micro-organisms, plant and animal life;
(iii) Any part or combination of (i) and (ii) and the interrelationships among and between them; and
(iv) The physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental assessment practitioner (EAP): An individual responsible for the planning, management and coordinating of environmental management plan or any other appropriate environmental instruments introduced by legislation.

Environmental impact: An action or series of actions that have an effect on the environment.

Environmental impact assessment: Environmental Impact Assessment, as defined in the NEMA EIA Regulations, is a systematic process of identifying, assessing and reporting environmental impacts associated with an activity.

Environmental management: Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental management programme: A plan that organises and co-ordinates mitigation, rehabilitation and monitoring measures in order to guide the implementation of a proposal and its on-going maintenance after implementation.

Generator: The generator is what converts the turning motion of a wind turbine's blades into electricity.

Habitat: The place in which a species or ecological community occurs naturally.

Hazardous waste: Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

Incident: Section 30 of NEMA defines an 'incident' as "an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed."[1]

Indigenous: All biological organisms that occurred naturally within the study area prior to 1800.

Indirect impacts: Indirect or induced changes that may occur because of the activity (e.g. the reduction of water in a stream that supply water to a reservoir that supply water to the activity). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place because of the activity.

Interested and affected party: Individuals or groups concerned with or affected by an activity and its consequences. These include the authorities, local communities, investors, work force, consumers, environmental interest groups, and the public.

Mitigation hierarchy: The mitigation hierarchy is a framework for managing risks and potential impacts related to biodiversity and ecosystem services. The mitigation hierarchy is used when planning and implementing development projects, to provide a logical and effective approach to protecting and conserving biodiversity and maintaining important ecosystem services. It is a tool to aid in the sustainable management of living, natural resources, which provides a mechanism for making explicit decisions that balance conservation needs with development priorities

Nacelle: The nacelle contains the generator, control equipment, gearbox, and anemometer for monitoring the wind speed and direction.

Pollution: A change in the environment caused by substances (radio-active or other waves, noise, odours, dust or heat emitted from any activity, including the storage or treatment or waste or substances.

[1]http://ipwis.pgwc.gov.za/ipwisdoc/Public/Publications/ChemicalsMgt/A%20Procedure%20for%20Section%2030%20of%20NEMA.pdf

Pre-construction: The period prior to the commencement of construction, which may include activities which do not require Environmental Authorisation (e.g. geotechnical surveys).

Rare species: Taxa with small world populations that are not at present Endangered or Vulnerable, but are at risk as some unexpected threat could easily cause a critical decline. These taxa are usually localised within restricted geographical areas or habitats or are thinly scattered over a more extensive range. This category was termed Critically Rare by Hall and Veldhuis (1985) to distinguish it from the more generally used word "rare."

Red data species: Species listed in terms of the International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species, and/or in terms of the South African Red Data list. In terms of the South African Red Data list, species are classified as being extinct, endangered, vulnerable, rare, indeterminate, insufficiently known or not threatened (see other definitions within this glossary).

Rotor: The portion of the wind turbine that collects energy from the wind is called the rotor. The rotor converts the energy in the wind into rotational energy to turn the generator. The rotor has three blades that rotate at a constant speed of about 15 to 28 revolutions per minute (rpm).

Significant impact: An impact that by its magnitude, duration, intensity, or probability of occurrence may have a notable effect on one or more aspects of the environment.

Tower: The tower, which supports the nacelle to which the rotor is attached, is constructed from tubular steel or concrete. It is approximately 130m tall. The nacelle and the rotor are attached to the top of the tower. The tower on which a wind turbine is mounted is not just a support structure. It also raises the wind turbine so that its blades safely clear the ground and so it can reach the stronger winds at higher elevations. The tower must be strong enough to support the nacelle and blades, and to sustain vibration, wind loading and the overall weather elements for the lifetime of the wind turbine.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 to the Waste Amendment Act (as amended on June 2014); or any other substance, material or object that is not included in Schedule 3 that may be defined as a waste by the Minister.

Wind power: A measure of the energy available in the wind.

Wind speed: The rate at which air flows past a point above the earth's surface.

ABBREVIATIONS AND ACRONYMS

DEA	National Department of Environmental Affairs
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EPC	Engineering Procurement Contractor
EO	Environmental Office
GG	Government Gazette
GN	Government Notice
Ha	Hectare
I&AP	Interested and Affected Party
km^2	Square kilometres
kV	Kilovolt
m^2	Square meters
m/s	Meters per second
MW	Mega Watt
NEMA	National Environmental Management Act (Act No 107 of 1998)
NHRA	National Heritage Resources Act (Act No 25 of 1999)
NIRP	National Integrated Resource Planning
NWA	National Water Act (Act No 36 of 1998)
PM	Project Manager
SHE	Safety, Health and Environment
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited

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CHAPTER 1: INTRODUCTION

This Environmental Management Programme has been compiled for the Namas Wind Farm. The project site is located approximately 20km south-east of Kleinsee in the Nama Khoi Local Municipality and within the greater Namakwa District Municipality of the Northern Cape Province. The Namas Wind Farm will include a maximum of 43 wind turbines with a contracted capacity of up to 140MW and associated infrastructure to be constructed over an area of approximately 5092ha in extent, known as the project site.

This EMPr has been developed on the basis of the findings of the Basic Assessment (BA), and must be implemented to protect sensitive on-site and off-site features through controlling construction, operation and decommissioning activities that could have a detrimental effect on the environment, and through avoiding or minimising potential impacts. This EMPr is applicable to all Genesis Namas Wind (Pty) Ltd employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Namas Wind Farm. The document must be adhered to and updated as relevant throughout the project life cycle. This document fulfils the requirement of the EIA Regulations, 2014 (as amended) and forms part of the BA report of the project.

In terms of the Duty of Care provision in S28(1) the project proponent must ensure that reasonable measures are taken throughout the life cycle of this project to ensure that any pollution or degradation of the environment associated with this project is avoided, halted or minimised. In terms of NEMA, it has become the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts. While no permitting or licensing requirements arise directly by virtue of the Namas Wind Farm, this section will be applicable throughout the life cycle of the project.

CHAPTER 2: PROJECT DETAILS

Genesis Namas Wind (Pty) Ltd is proposing the establishment of the Namas Wind Farm to add new capacity to the national electricity grid.

A preferred project site, consisting of 4 affected properties[2], has been identified by Genesis Namas Wind (Pty) Ltd for the development of a wind farm. The preferred project site has an extent of ~5092ha and is considered sufficient in extent (allowing sufficient space to avoid any major environmental sensitivities which may be identified within the site) and suitable for the development of up to 43 wind turbines from a technical perspective. The project site is located ~20km south-east of Kleinsee (Northern Cape), with the entire extent of the project site located within the Springbok REDZ. The wind farm is to be constructed within the project site, and together with the associated infrastructure, will have a development footprint of less than 1% (~35.46ha) of the total project site[3]. The wind farm is proposed within the following farm portions (**Figure 2.1** and **Table 2.1**):

» Portion 3 of the Farm Zonnekwa 328;
» Portion 4 of the Farm Zonnekwa 328;
» Remaining Extent of the Farm Rooivlei 327; and
» Portion 3 of the Farm Rooivlei 327.

The development footprint of the wind farm, to be located within the larger project site, will accommodate the wind turbines as well as the associated infrastructure. The grid connection required in order to connect the facility to the national grid at the existing Gromis Substation, will primarily be located outside of the project site, and will be assessed as part of a separate Basic Assessment process. The Namas Wind Farm will consist of the following components:

» Up to 43 wind turbines with a maximum hub height of up to 130m. The tip height of the turbines will be up to 205m;
» Concrete turbine foundations and turbine hardstands;
» Temporary laydown areas which will accommodate the storage and assembly area;
» Cabling between the turbines, to be laid underground where practical;
» An on-site substation of 100m x 100m to facilitate the connection between the wind farm and the electricity grid;
» Access roads to the site (with a width of up to 10m) and between project components (with a width of approximately 8m);
» A temporary concrete batching plant; and
» Operation and maintenance buildings including a gate house, security building, control centre, offices, warehouses, a workshop and visitors centre.

[2] The 4 affected properties included as part of the Namas Wind Farm are collectively known as the project site.
3 The development footprint of the Namas Wind Farm will be located within the 5092ha project site and will be a much smaller area within which the wind turbines and associated infrastructure (excluding the 300m power line corridor within which the new 132kV power line is proposed) will be constructed and operated. The development footprint has been subject to detailed design by the developer through the consideration of sensitive environmental features that need to be avoided by the wind farm.

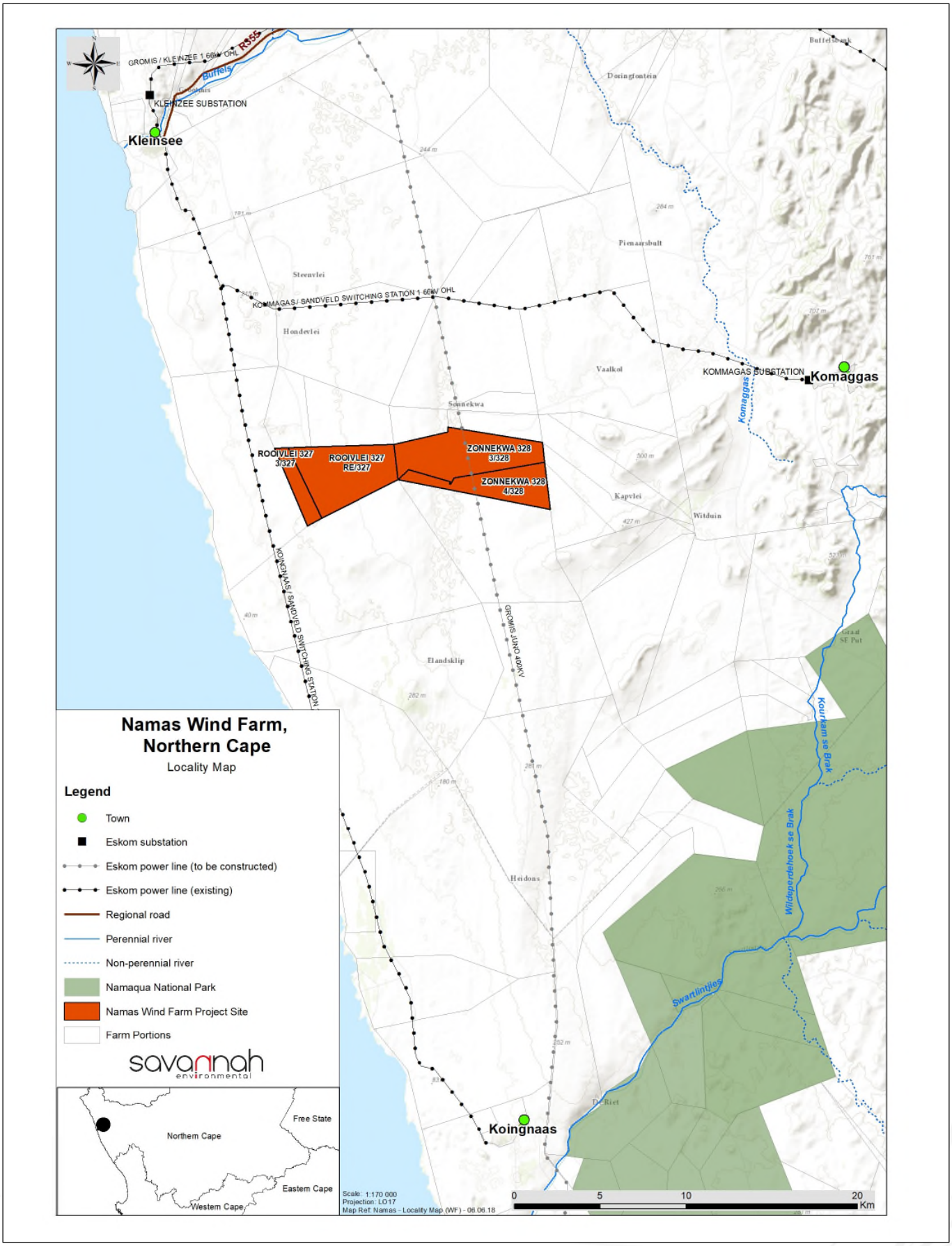


Figure 2.1: Locality map showing the location of the project site proposed for the development of the Namas Wind Farm

Table 2.1: Detailed description of the Namas Wind Farm project site

Province	Northern Cape Province
District Municipality	Namakwa District Municipality
Local Municipality	Nama Khoi Local Municipality
Ward number(s)	8
Nearest town(s)	Kleinsee (~20km north-west), Komaggas (~19km east) and Koingnaas (~37km south)
Affected Properties: Farm name(s), number(s) and portion numbers	**Namas Wind Farm:** » Portion 3 of the Farm Zonnekwa 328 » Portion 4 of the Farm Zonnekwa 328 » Remaining Extent of the Farm Rooivlei 327 » Portion 3 of the Farm Rooivlei 327
SG 21 Digit Code (s)	**Namas Wind Farm:** » Portion 3 of the Farm Zonnekwa 328 - C05300000000032800003 » Portion 4 of the Farm Zonnekwa 328 - C05300000000032800004 » Remaining Extent of the Farm Rooivlei 327 - C05300000000032700000 » Portion 3 of the Farm Rooivlei 327 - C05300000000032700003
Current zoning	Agricultural
Site co-ordinates (centre of affected properties)	**Namas Wind Farm:** » Portion 3 of the Farm Zonnekwa 328 - 29°50'21.10"S ; 17°15'35.90"E » Portion 4 of the Farm Zonnekwa 328 - 29°51'20.78"S ; 17°16'29.29"E » Remaining Extent of the Farm Rooivlei 327 - 29°50'54.07"S ; 17°11'12.96"E » Portion 3 of the Farm Rooivlei 327- 29°51'20.41"S ; 17° 9'27.75"E

2.1. Findings of the Environmental Impact Assessment

The BA report together with the specialist studies contained within **Appendices D-L** provide a detailed assessment of the potential impacts that may result from the development of the Namas Wind Farm.

No environmental fatal flaws were identified in the detailed specialist studies conducted, provided that the recommended mitigation measures are implemented. These measures include, amongst others, the avoidance of sensitive features within the development footprint and the undertaking of the construction and operational monitoring as specified by the specialists. The development footprint was designed by the proponent in order to respond to and avoid the sensitive environmental and social features located within the project site. This approach therefore applied the mitigation hierarchy (i.e. avoid, minimise and offset) to the Namas Wind Farm project, which ultimately ensures that the development is appropriate from an environmental perspective and is suitable for development within the site-specific context. The application of the mitigation hierarchy was undertaken by the developer prior to the commencement of the BA process for Environmental authorisation, as detailed in the BA report. Therefore, it is concluded that the development footprint is suitable and appropriate from an environmental perspective for the wind farm and all detrimental or adverse impacts on sensitive features were avoided, reduced and/or mitigated.

The potential environmental impacts associated with the Namas Wind Farm identified and assessed through the BA process include:

» Impacts on ecology, flora and fauna.
» Impacts on avifauna and bats.

- Impacts to soils and agricultural potential.
- Impacts on heritage resources, including archaeology, palaeontology and the cultural landscape.
- Noise impacts due to the construction and operation of the wind farm.
- Visual impacts on the area imposed by the components of the facility.
- Positive and negative socio- economic impacts.
- Traffic impacts, including increased pressure on the existing road network.

2.1.1 Impacts on Ecology

- There are no specific long-term impacts likely to be associated with the wind farm that cannot be reduced to an acceptable level through mitigation and avoidance, including a low post-mitigation impact on ESAs and CBAs.
- There are no high residual impacts or fatal flaws associated with the development and it can be supported from a terrestrial ecology perspective.
- During the construction phase, the impacts expected to occur include impacts on vegetation due to disturbance and clearing, impacts on fauna due to disturbance, loss of habitat and transformation of the area and an increased risk for soil erosion due to construction activities and the associated disturbance.
  - The significance of the construction phase impacts ranges from medium to low, following the implementation of the recommended mitigation measures by the specialist.
  - No impacts of a high significance were identified prior to the implementation of mitigation.
- During the operation phase, the anticipated impacts include faunal impacts due to the presence of the wind farm and the associated disturbance, negative impacts on ESAs, CBAs and broad-scale ecological processes due to the presence of the wind farm within the landscape and an increased soil erosion risk due to increased vulnerability of the site following the undertaking of the construction activities.
  - The significance of the impacts for the operation phase will be low following the implementation of the recommended mitigation measures by the specialist.
  - No impacts of a high significance were identified for the project prior to the implementation of the recommended mitigation measures.
- During the decommissioning phase, faunal impacts are anticipated as a result of disturbance and soil erosion due to the impact of the decommissioning activities which increase the vulnerability of the site.
  - The significance of the impacts during the decommissioning phase will be low following the implementation of the recommended mitigation measures by the specialist.
  - No ecological impacts of high significance were identified for the decommissioning phase of the project.

2.1.2 Impacts on Avifauna

- The avifauna impacts identified to be associated with the Namas Wind Farm will be negative and local in extent. The duration of the impacts will be long-term, for the lifetime of the wind farm and apply to all collision-prone species. The magnitude is expected to be low.
- The avifauna impacts identified relate specifically to three collision-prone Red Data Species likely to be impacted. These species include Secretarybird, Lanner Falcon and Ludwig's Bustard.
  - The probability of occurrence of raptors (including Secretarybirds) and bustards having interaction with the wind farm is rated medium due to their low passage rates and occurrence within the project site. This, however, does not imply zero risk, as Secretarybirds are known to fly at the rotor swept area heights.

- The avifauna impacts expected to occur include direct impact fatalities, as well as disturbance and loss of foraging habitat.
  - The significance of the impacts on the three collision-prone Red Data species will be low following the implementation of the recommended mitigation measures of the specialists.

2.1.3 Impacts on Bats

- The development of the Namas Wind Farm is acceptable from a bat impact perspective, subject to the implementation of the recommended mitigation measures.
- During the construction phase, the impacts include the destruction of foraging habitat through the clearing of vegetation.
  - This construction phase impact has been assessed as being of a low significance with the implementation of the recommended mitigation measures as identified by the specialist.
- During the operation phase the impacts to bats include bat mortalities due to direct impact or barotrauma caused by the wind turbines and an increase in bat mortalities due to increased insect numbers as a result of the light attraction caused by the wind farm.
  - The impacts expected during the operation phase will be of a low significance with the implementation of the recommended mitigation measures as specified by the specialist.

2.1.4 Impacts on Land Use, Soil and Agricultural Potential

- The development of the Namas Wind Farm is acceptable from a soils perspective considering the characteristics and the potential of the soils present within the project site.
- The impacts associated with land use, soil and agricultural potential include the loss of agricultural land and soil erosion.
  - Both of these impacts can be mitigated to a low significance with the implementation of the recommended mitigation measures.

2.1.5 Impacts on Heritage Resources

- There are no fatal flaws and the development of the Namas Wind Farm is acceptable from a heritage perspective, subject to the implementation of the recommended mitigation measures. Buffers around known archaeological sites have been respected by the development footprint and no further buffers require implementation.
- Impacts on palaeontological resources, archaeological resources and graves may occur during the construction phase should direct destruction or damage arise through the activities associated with excavations for foundations and trenches, or the clearing of land for roads, laydown areas and ancillary infrastructure.
  - The significance of these impacts ranges from medium to low with the implementation of the recommended mitigation measures. No impacts of a high significance are expected to occur.
- Impacts to the cultural landscape are expected during the operation phase through the introduction of wind turbines into an area where there are currently none.
  - The significance of this impact will be medium with the implementation of the recommended mitigation measures.

2.1.6 Noise Impacts

- The Namas Wind Farm could have a noise impact on the surrounding environment, however the impacts can be mitigated to a low significance. The increase in the noise levels is not considered to be a fatal flaw and the project is considered to be acceptable from a noise perspective.
- Five Noise Sensitive Developments (NSD) were identified, of which two are located within the Namas Wind Farm project site. It is extremely unlikely that a potential noise-sensitive receptor staying further than 2 000 m from a wind turbine would experience any noise impact.
- The construction phase of the wind farm will lead to an increase in the ambient sound level of more than 7dB during the daytime, or daytime rating levels higher than 52dBA. Should construction activities be conducted during the night-time, an increase of 7dB in the ambient sound levels is expected, which will create night-time rating levels higher than 42dBA.
  - The significance of the construction phase during both the daytime and night-time is rated as low.
- During the operation phase, activities relating to routine servicing and maintenance will be undertaken. The noise impact from maintenance activities will be insignificant, with the main noise source being the rotating wind turbine blades and the nacelle.
- The operation phase of the wind farm will lead to an increase in the ambient sound level with more than 7dB during the daytime, or daytime rating levels higher than 52dBA. With the operation of the wind farm a night-time increase of 7dB in the ambient sound levels is expected, which will result in night-time rating levels exceeding 42dBA.
  - The significance of the daytime operation of the wind farm will be low, however the significance of the night-time operation will be medium without mitigation, and low with the implementation of the mitigation measures.

2.1.7 Visual Impacts

- Anticipated visual impacts on sensitive visual receptors in close proximity to the Namas Wind Farm remains high, but the impact is not considered to be a fatal flaw.
- Subject to the recommended mitigation measures being implemented, the proposed wind farm development may be supported regardless of the impacts and the significance thereof.
- The visual impact decreases with increasing distance from the wind farm, but remains greatest within the first 5km of the wind farm.
- During the construction phase the undertaking of construction activities will impact on sensitive visual receptors in close proximity to the Namas Wind Farm. The construction phase will result in a noticeable increase in heavy vehicles which may cause a visual nuisance to other road users and landowners in the area.
  - The significance of the impacts will be low following the implementation of the recommended mitigation measures.
- Visual impacts expected to occur during the operation phase includes an impact on sensitive visual receptors within a 5km radius of the wind turbines, visual impact on sensitive visual receptors within the broader region, visual impact of shadow flicker, impact on observers of operational, safety and security lighting at night close to the wind farm, visual impact of the ancillary infrastructure and the visual impact of the wind farm on the sense of place.
  - The significance ranges from high to low with the implementation of the recommended mitigation measures.
  - The high visual impact relates to the visual impact on sensitive visual receptors within a 5km radius of the wind turbine structure. No mitigation is possible for this impact (i.e. the wind turbines will be visible

regardless), however general management measures have been recommended by the specialist as best practice.

2.1.8 Socio-economic Impacts

- The socio-economic benefits outweigh the negative socio-economic effects that the development of the Namas Wind Farm could create.
- During the construction phase the majority of the impacts will be positive, which includes an increase in production and GDP-R, the creation of temporary employment opportunities, attainment of household income, skills development and enhancement and an increase in government revenue. The negative impacts associated with the construction phase of the wind farm includes an influx of migrant labour and job seekers, a change in the sense of place and potential stock theft and security issues.
  - The significance of the positive construction phase impacts ranges from high to medium with the implementation of the recommended enhancement measures. The only impacts of high significance expected during the construction phase will be the positive impacts.
  - The significance of the negative impacts ranges from medium to low with the implementation of the recommended mitigation measures. No negative impacts of a high significance are expected.
- During the operation phase of the Namas Wind Farm, only positive impacts are expected to occur. No negative impacts were identified. The positive operation phase impacts include stimulation of the economy, the creation of long-term employment, increase in household income, skills development and an increase in government revenue.
  - The significance of the positive operational impacts ranges from high to medium with the implementation of the recommended enhancement measures.
- Positive impacts are also expected to occur during the decommissioning phase of the Namas Wind Farm. The positive impacts include the creation of temporary employment opportunities, as well as stimulation of the demand for services from transport and construction companies. In addition, the decommissioning will result in the extraction of metallic and non-metallic materials from the site that could be re-used in other projects.
  - The significance of the decommissioning phase impacts will be medium with the implementation of the recommended enhancement measures.

2.1.9 Impacts on Traffic

- The development of the Namas Wind Farm is supported from a traffic engineering perspective, subject to the implementation of the stipulated recommendations.
- During the construction phase approximately 473 trips will be required for the transportation of the project components and the required equipment. Therefore an increase in traffic on the surrounding road network is likely.
  - The significance of the traffic impacts during the construction phase will be medium with the implementation of the recommended mitigation measures.
- The operation phase of the Namas Wind Farm will generate limited vehicle trips.
  - The significance of the operation phase impacts is rated as low with the implementation of the recommended mitigation measures, and a negligible impact on the road network is anticipated.
- The decommissioning phase will result in the same impacts identified and assessed for the construction phase as similar vehicles and number of trips are expected.
  - The significance of the impacts is rated as medium with the implementation of the recommended mitigation measures.

2.2 Environmental Sensitivities

From the specialist investigations conducted for the Namas Wind Farm, the following sensitive areas/environmental features have been identified within the project site and have been considered by the development footprint:

» **Ecology** - The majority of the project site consists of Namaqualand Strandveld considered to be of a low or moderate sensitivity. Development in these areas would generate low ecological impacts as these habitats are widely available in the broader area. The areas classified as Namaqualand Salt Pans have been confirmed in the field to not be salt pans, and while the vegetation survey confirmed that they are well-differentiated from the adjacent strandveld, they are not currently acting as hydrological features and are not considered to be as sensitive as a pan feature would be. Development within these areas is considered acceptable, but should be limited to some degree as this is not a very extensive habitat type, with the result that it is considered more vulnerable to cumulative impacts. In the west, the coastal duneveld is considered to be of a moderately high ecological sensitivity. There are six turbines and their associated internal access roads located within this area, which are considered to be an acceptable impact to this area. The main risks associated with development within this moderately high sensitivity area is wind erosion of the sandy soils as well as potential impacts on plant species of conservation concern. Both of these impacts can be mitigated to low levels, with the result that this is considered to represent an acceptable risk and impact.

» **Bird Habitat and Sensitive Areas** – One avifaunal no-go area was identified within the western portion of the project site - an inactive Secretarybird nest. The specialist has identified a 1km buffer for the nest which is considered to be sufficient for the reduction of possible disturbance during the construction and operation phases, and will reduce the possibility of direct impacts. This no-go area has been incorporated into the design plans of the Namas Wind Farm, and is subsequently entirely avoided in terms of the layout of the facility.

» **Bat Habitat and Sensitive Areas** – Areas considered to be sensitive from a bats perspective have been identified within the project site. These sensitive areas support specific features which are relevant to the bat populations present on site. The high bat sensitivity areas are considered to be critical for resident bat populations, capable of elevated levels of bat activity while supporting greater bat diversity/activity than the rest of the project site. These areas were deemed no-go areas and turbines (including turbine blades) may not be placed in these areas or their associated buffers. Features considered to be of a high bat sensitivity have been allocated a 200m buffer. The features associated with the highly sensitive areas are a kraal with a cement farm dam, residences, an excavation that may accumulate water over time, and a wind pump. All areas of high bat sensitivity, including the associated buffers have been incorporated into the design layout by the developer.

» **Heritage Sites:** Archaeological sites were identified by the specialist during the field survey of the project site and a 50m buffer has been applied. The archaeological cultural landscape consists of a multitude of individual archaeological sites classifiable as a Type 3 precolonial cultural landscape. The project site houses many small archaeological sites. On the pale sand dune areas there are many small sites with marine shells, ostrich eggshell fragments and stone artefacts. One of the biggest sites was at RV2018/005 (waypoint 006). Here there were several spatially related shell scatters with artefacts and some ostrich eggshell. Although just outside the western edge of the site, BZ2018/002 is another larger site that also

has some pottery on it. The pottery indicates occupation less than 2000 years ago. Occasional isolated artefacts were also noted on the surface and these included a CCS backed bladelet that likely dates to more than 2000 years ago. The development footprint avoids all heritage sites identified by the specialist.

» **Noise Sensitive Developments (NSDs):** Noise sensitive developments, including residences located within the project site, occur in and around the project site and may be impacted by the Namas Wind Farm. It is unlikely that a potential noise-sensitive receptor staying further than 2 000m from a wind turbine would experience any noise impact.

Figure 2.2 below illustrates the identified sensitive environmental within the Namas Wind Farm project site, overlain with the preferred development footprint.

Figure 2.3 below illustrates the preferred development footprint of the Namas Wind Farm which avoids all sensitive environmental features present within the project site.

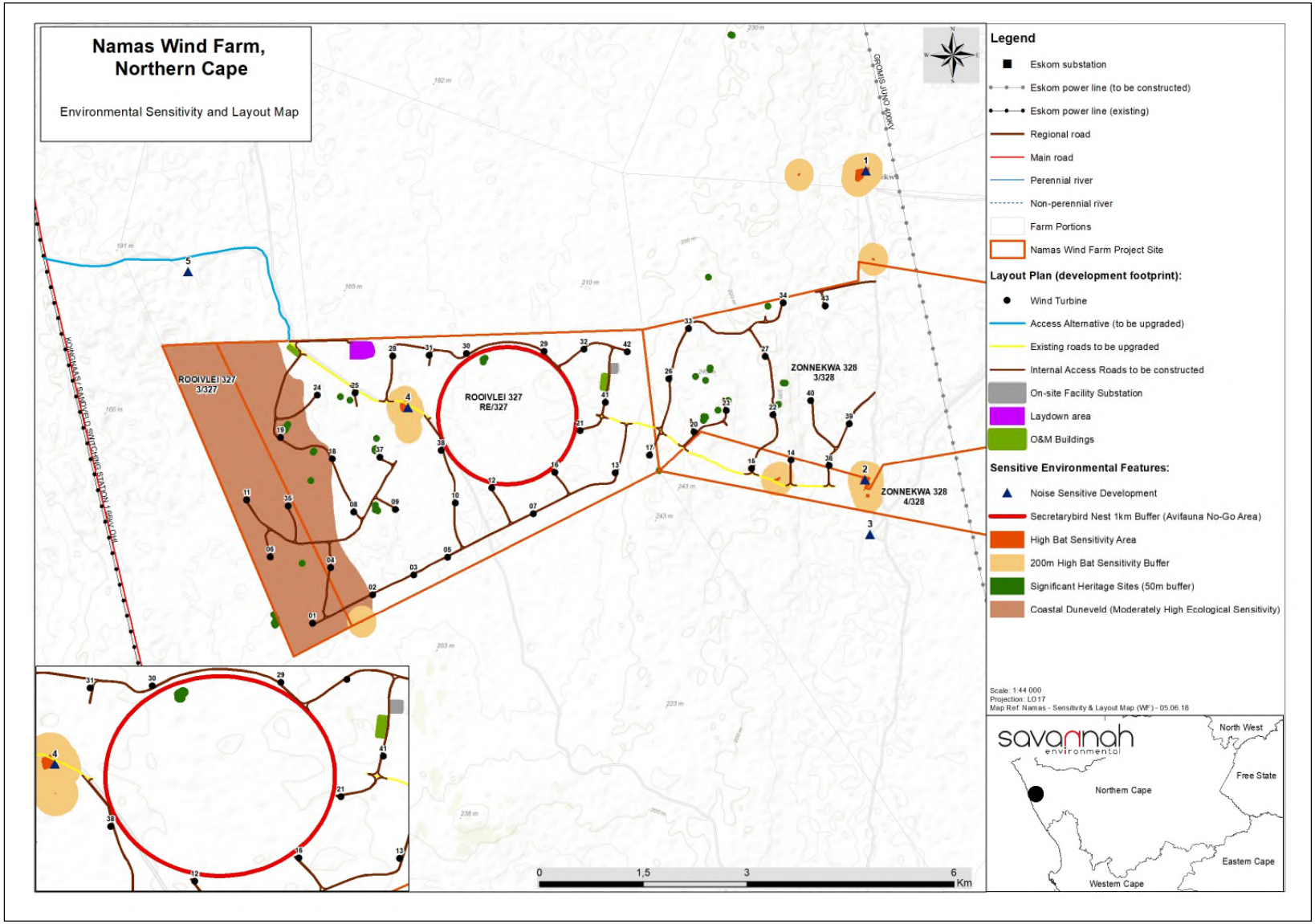


Figure 2.2: The development footprint (~35.46ha) of the Namas Wind Farm overlain on the identified environmental sensitive features (refer to **Appendix A** for A3 maps).

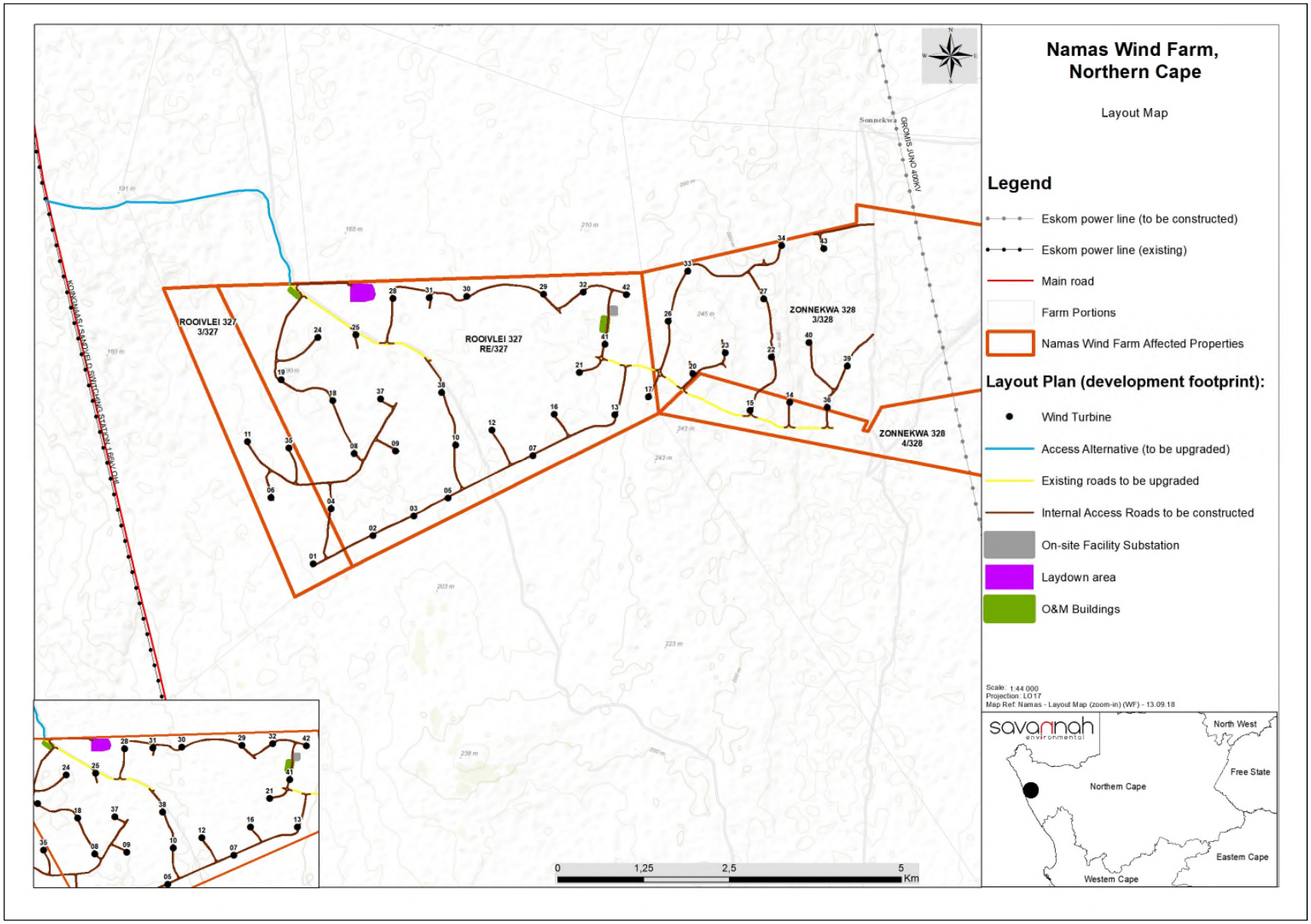


Figure 2.3: Final preferred development footprint for the Namas Wind Farm, as was assessed as part of the BA process (refer to **Appendix A** for A3 maps).

2.3. Activities and Components associated with the Namas Wind Farm

The main activities/components associated with the Namas Wind Farm are detailed in **Table 2.2**.

Table 2.2: Activities associated with Planning, Construction, Operation and Decommissioning of the Namas Wind Farm

Planning Phase	
Requirements	» Conduct technical surveys prior to initiating construction.
Activities to be undertaken	
Conduct surveys	» Including, but not limited to: a geotechnical survey, site survey and confirmation of the turbine micro-siting footprint to confirm tower locations and all other associated infrastructure, including the on-site substation.
Construction Phase	
Requirements	» Project requires Environmental Authorisation from DEA, preferred bidder allocation granted by Department of Energy, a generation license issued by NERSA, and a Power Purchase Agreement secured with Eskom. » Duration dependent on number of turbines; expected to be up to 24 months for the Namas Wind Farm. » Up to 400 construction employment positions. » No on-site labour camps. Employees to be accommodated in the nearby towns such as Kleinsee, and transported to and from site on a daily basis. » Overnight on-site worker presence would be limited to security staff. » Waste removal and sanitation will be undertaken by a sub-contractor or the municipality, where possible. Waste containers, including containers for hazardous waste, will be located at each crane pad, site camp and laydown area when construction activities are active. » Electricity required for construction activities will be generated by a generator or will be sourced from available 11kV or 22kV Eskom distribution networks in the area. » Water will be required for the construction phase, which will be approximately 100 000m^3 in total. Water will be supplied either by the Nama Khoi Local Municipality, an existing borehole on site or a new borehole, or water will be extracted from any bulk water supply pipelines near the site.
Activities to be undertaken	
Establishment of access roads to the Site	» Access/haul roads and internal access roads within the site will be established at the commencement of construction. » Existing access roads will be utilised where possible to minimise impact, and upgraded where required. » Access roads to the site will have a width of up to 10m. » Access roads to be established between the turbines for construction and/or maintenance activities within the development footprint. » Internal service road alignment will be approximately 8m wide.

Undertake site preparation	» Including the clearance of vegetation at the footprint of each turbine, establishment of the laydown areas, the establishment of internal access roads and excavations for foundations. » Stripping of topsoil to be stockpiled, backfilled, removed from site and/or spread on site. » To be undertaken in a systematic manner to reduce the risk of exposed ground being subjected to erosion. » Include search and rescue of floral species of concern (where required) and the identification and excavation of any sites of cultural/heritage value (where required).
Establishment of laydown areas and batching plant on site	» A laydown area for the storage of wind turbine components, including the cranes required for tower/turbine assembly and civil engineering construction equipment. » The laydown area will also accommodate building materials and equipment associated with the construction of buildings. » A crane hardstand at each turbine position where the main lifting crane will be erected and/or disassembled. Each hardstand to be ~60m x 30m in extent. This will also include the pre-assembly area and storage area at each turbine. » No borrow pits will be required. Infilling or depositing materials will be sourced from licenced borrow pits within the surrounding areas. » A temporary concrete batching plant of 50m x 50m in extent to facilitate the concrete requirements for turbine foundations.
Construct foundation	» Concrete foundations of approximately 400m^2 in extent to be constructed at each turbine location. » Excavations to be undertaken mechanically. » Concrete foundation will be constructed to support a mounting ring. » Depending on geological conditions, the use of alternative foundations may be considered (e.g. reinforced piles).
Transport of components and equipment to and within the site	» Turbine units to be transported includes the tower segments, hub, nacelle, and three rotor blades. » Components to be transported to the site in sections on flatbed trucks by the turbine supplier. Imported components to be transported from the Port of Saldanha to the project site via the R27, R399, N7, MR739 and the MR751. » Transportation will take place via appropriate National and Provincial roads, and the dedicated access/haul road to the site. » Components considered as abnormal loads in terms of Road Traffic Act (Act No 29 of 1989) due to dimensional limitations (abnormal length of the blades) and load limitations (i.e. the nacelle) will require a permit for the transportation of the abnormal loads on public roads. » Specialised construction and lifting equipment to be transported to site to erect the wind turbines. » Civil engineering construction equipment to be brought to the site for the civil works (e.g. excavators, trucks, graders, compaction equipment, cement trucks, site offices etc.). » Components for the establishment of the substation (including transformers) and the associated infrastructure to be transported to site.
Construction of the turbine	» A lifting crane will be utilised to lift the tower sections, nacelle and rotor into place. » Approximately 1 week is required to erect a single turbine depending on climatic conditions. » Lifting cranes are required to move between the turbine sites.
Construction of the substation	» One on-site substation to be constructed within the development footprint. » Substation will be constructed with a high-voltage yard footprint of up to 100m x 100m.

Connection of wind turbines to the substation	» Each wind turbine to be connected to the on-site substation via underground electrical cables. » Excavation of trenches are required for the installation of the cables. Trenches will be approximately 1.5m deep. » Underground cables are planned to follow the internal access roads, as far as possible.
Establishment of ancillary infrastructure	» A workshop, contractor's equipment camp, temporary storage areas and a construction compound will be required. » Service buildings for site offices, storage and safe refuelling areas are also required. » Establishment will require the clearing of vegetation, levelling and the excavation of foundations prior to construction.
Connect substation to the power grid	» On-site substation to connect the wind farm to the existing Gromis Substation located to the north of the site. » Connection via an overhead 132kV power line (located within a 32m servitude) in order to evacuate the generated electricity (to be authorised through a separate Application for Environmental Authorisation).
Undertake site rehabilitation	» Commence with rehabilitation efforts once construction is completed in an area, and all construction equipment is removed. » On commissioning, access points to the site that will not be required for the operation phase will be closed and prepared for rehabilitation.
Operation Phase	
Requirements	» Duration will be 20-25 years. » Requirements for security and maintenance of the facility. » Employment opportunities relating mainly to operation activities and maintenance. Up to 30 full-time employment opportunities will be available. » Current land-use activities, i.e. farming activities, being undertaken within the project site can continue during the operation of the wind farm.
Activities to be undertaken	
Operation and Maintenance	» Full time security, maintenance and control room staff. » All turbines will be operational except under circumstances of mechanical breakdown, inclement weather conditions, or maintenance activities. » Wind turbines to be subject to periodic maintenance and inspection. » Disposal of waste products (e.g. oil) in accordance with relevant waste management legislation. » Areas which were disturbed during the construction phase to be utilised should a laydown area be required during operation.
Decommissioning Phase	
Requirements	» Dismantling and decommissioning of the Namas Wind Farm infrastructure at the end of its economic life. » Potential for repowering of the facility, depending on the condition of the facility at the time. » Expected lifespan of approximately 20 - 25 years (with maintenance) before decommissioning is required. » Decommissioning and dismantling activities to comply with the legislation relevant at the time.
Activities to be undertaken	
Site preparation	» Confirming the integrity of site access to accommodate the required equipment and lifting cranes. » Preparation of the site (e.g. laydown areas and construction platform). » Mobilisation of construction equipment.

Dismantle and remove turbines	» Large crane required for the dismantling of the turbine and tower sections. » Components to be reused, recycled, or disposed of in accordance with regulatory requirements. » All parts of the turbine would be considered reusable or recyclable except for the blades. » Concrete will be removed to a depth as defined by an agricultural specialist and the area rehabilitated. » Cables will be excavated and removed, as may be required.
Components to be disposed of or recycled.	» Foundation » Tower » Electrical facilities in tower base » Rotor » Generator » Machine house » Reinforcing steel

CHAPTER 3: PURPOSE AND OBJECTIVES OF THE EMPR

An Environmental Management Programme (EMPr) is defined as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced". The objective of this EMPr is to provide consistent information and guidance for implementing the management and monitoring measures established in the permitting process and help achieve environmental policy goals. The purpose of an EMPr is to help ensure continuous improvement of environmental performance, reducing negative impacts and enhancing positive effects during the construction and operation of the facility. An effective EMPr is concerned with both the immediate outcome as well as the long-term impacts of the project.

The EMPr provides specific environmental guidance for the construction and operation phases of a project, and is intended to manage and mitigate construction and operation activities so that unnecessary or preventable environmental impacts do not result. These impacts range from those incurred during start up (site clearing and site establishment) through to those incurred during the construction activities themselves (erosion, noise, dust) to those incurred during site rehabilitation (soil stabilisation, re-vegetation) and operation. The EMPr also defines monitoring requirements in order to ensure that the specified objectives are met.

This EMPr is applicable to all employees and contractors working on the pre-construction, construction, and operation and maintenance phases of the Namas Wind Farm. The document will be adhered to and updated as relevant throughout the project life cycle.

This EMPr has been compiled in accordance with Appendix 4 of the EIA Regulations, 2014 (as amended). This is a dynamic document and will be further developed in terms of specific requirements listed in any authorisations issued for the Namas Wind Farm and/or as the project develops. The EMPr has been developed as a set of environmental specifications (i.e. principles of environmental management), which are appropriately contextualised to provide clear guidance in terms of the on-site implementation of these specifications (i.e. on-site contextualisation is provided through the inclusion of various monitoring and implementation tools).

The EMPr has the following objectives:

- Outline mitigation measures and environmental specifications which are required to be implemented for the planning, construction, rehabilitation and operation phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the Namas Wind Farm.
- Ensure that the construction and operation phases do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced.
- Identify entities who will be responsible for the implementation of the measures and outline functions and responsibilities.
- Propose mechanisms and frequency for monitoring compliance, and prevent long-term or permanent environmental degradation.
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that were not considered in the BA process.

The mitigation measures identified within the BA process are systematically addressed in the EMPr, ensuring the minimisation of adverse environmental impacts to an acceptable level.

Genesis Namas Wind (Pty) Ltd must ensure that the implementation of the project complies with the requirements of all environmental authorisations, permits, and obligations emanating from relevant environmental legislation. This obligation is partly met through the development and the implementation of this EMPr, and through its integration into the relevant contract documentation provided to parties responsible for construction and/or operation activities on the site. The adequacy and efficacy of implementation is to be monitored by an independent Environmental Control Officer (ECO). Since this EMPr is part of the BA process for the Namas Wind Farm, it is important that this document be read in conjunction with the BA report compiled for this project. This will contextualise the EMPr and enable a thorough understanding of its role and purpose in the integrated environmental management process. Should there be a conflict of interpretation between this EMPr and the Environmental Authorisation, the stipulations in the Environmental Authorisation shall prevail over that of the EMPr, unless otherwise agreed by the authorities in writing. Similarly, any provisions in legislation overrule any provisions or interpretations within this EMPr.

This EMPr shall be binding on all the parties involved in the planning, construction and operational phases of the project, and shall be enforceable at all levels of contract and operational management within the project. The document must be adhered to and updated as relevant throughout the project life cycle.

CHAPTER 4: STRUCTURE OF THIS EMPR

The first three chapters provide background to the EMPr and the Namas Wind Farm, while the chapters which follow consider the following:

» Planning and design activities;
» Construction activities;
» Operation activities; and
» Decommissioning activities.

These chapters set out the procedures necessary for Genesis Namas Wind (Pty) Ltd as the project owner, to minimise environmental impacts and achieve environmental compliance. For each of the phases of implementation, an over-arching environmental **goal** is stated. In order to meet this goal, a number of **objectives** are listed. The EMPr has been structured in table format in order to show the links between the goals for each phase and their associated objectives, activities/risk sources, mitigation actions, monitoring requirements and performance indicators. A specific EMPr table has been established for each environmental objective. The information provided within the EMPr table for each objective is illustrated below:

OBJECTIVE: Description of the objective, which is necessary to meet the overall goals; which take into account the findings of the EIA specialist studies

Project component/s	List of project components affecting the objective, i.e.: » Wind turbines; » Access roads; and » Associated infrastructure.
Potential Impact	Brief description of potential environmental impact if objective is not met.
Activity/risk source	Description of activities which could impact on achieving objective.
Mitigation: Target/Objective	Description of the target; include quantitative measures and/or dates of completion.

Mitigation: Action/control	**Responsibility**	**Timeframe**
List specific action(s) required to meet the mitigation target/objective described above.	Who is responsible for the measures	Time periods for implementation of measures

Performance Indicator	Description of key indicator(s) that track progress/indicate the effectiveness of the management plan.
Monitoring	Mechanisms for monitoring compliance; the key monitoring actions required to check whether the objectives are being achieved, taking into consideration responsibility, frequency, methods and reporting.

The objectives and EMPr tables are required to be reviewed and possibly modified throughout the life of the wind farm whenever changes, such as the following, occur:

- Planned activities change (i.e. in terms of the components of the wind farm).
- Modification to or addition to environmental objectives and targets.
- Additional or unforeseen environmental impacts are identified and additional measures are required to be included in the EMPr to prevent deterioration or further deterioration of the environment.
- Relevant legal or other requirements are changed or introduced.
- Significant progress has been made in achieving an objective or target such that it should be re-examined to determine if it is still relevant or should be modified, etc.

4.1. Project Team

This EMP was compiled by:

EMP Compilers	
Lisa Opperman	Savannah Environmental
Karen Jodas	Savannah Environmental
Input from Specialist Consultants	
Ecology	Simon Todd of Simon Todd Consulting
Avifauna	Rob Simmons and Marlei Martins of Birds and Bats Unlimited Environmental Consultants
Bats	Werner Marais of Animalia
Soils and Agricultural Potential	Garry Paterson of the Agricultural Research Council (ARC)
Heritage (including archaeology and palaeontology)	Jayson Orton of ASHA Consulting (with input from John Pether)
Noise	Morné de Jager of Enviro Acoustic Research (EAR)
Visual	Lourens du Plessis of LOGIS
Socio-economic	Elena Broughton of Urban-Econ
Traffic	Iris Wink of JG Africa

The Savannah Environmental team have extensive knowledge and experience in environmental impact assessment and environmental management, having been involved in EIA processes for more than twelve (12) years. They have managed and drafted Environmental Management Programmes for other power generation projects throughout South Africa, including numerous wind and solar energy facilities.

CHAPTER 5: MANAGEMENT PROGRAMME: PLANNING AND DESIGN

Overall Goal: undertake the pre-construction (planning and design) phase in a way that:

- Ensures that the design of the wind farm responds to the identified environmental constraints and opportunities.
- Ensures that pre-construction activities are undertaken in accordance with all relevant legislative requirements.
- Ensures that adequate regard has been taken of identified environmental sensitivities, as well as any landowner and community concerns and that these are appropriately addressed through design and planning (where applicable).
- Enables the construction activities to be undertaken without significant disruption to other land uses and activities in the area.
- Ensures that the best environmental options are selected for the wind farm.

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

5.1. Objectives

OBJECTIVE 1: To ensure that the design of the facility responds to the identified environmental constraints and opportunities

Subject to final turbine micro-siting and subsequent acceptance from DEA, the approved development footprint must be implemented.

Project component/s	» Wind turbines. » Access roads and crane hardstand areas. » Cabling between turbines. » Substation. » Service buildings. » All other associated infrastructure.
Potential Impact	» Design fails to respond optimally to the identified environmental considerations. » Employment creation for the construction, operation and decommissioning activities. » Primary visual impact of the wind farm due to the presence of the turbines and associated infrastructure as well as the visual impact of lighting at night.
Activities/risk sources	» Positioning of turbines and alignment of access roads and underground cabling. » Positioning of substation. » Positioning of buildings. » Pre-construction activities, e.g. geotechnical investigations.
Mitigation: Target/Objective	» To ensure that the design of the wind farm responds to the identified environmental constraints and opportunities, including the constraints identified through pre-construction bird and bat monitoring.

	» To ensure that pre-construction activities are undertaken in an environmentally friendly manner by e.g. avoiding identified sensitive areas. » Provide awareness of the skills desk for the local communities. » Optimal planning of visual infrastructure to minimise visual impact.

Mitigation: Action/control	Responsibility	Timeframe
The EMPr should form part of the contract with the Contractors appointed to construct and maintain the wind farm, and will be used to ensure compliance with environmental specifications and management measures. The implementation of this EMPr for all life cycle phases of the project is considered to be key in achieving the appropriate environmental management standards as detailed for this project.	Developer EPC Contractor	Tender Design and Design Review Stage
Plan and conduct pre-construction activities in an environmentally responsible manner and in a manner that does not lead to unnecessary impacts and disturbance.	Developer EPC Contractor	Pre-construction
The final layout including roads and underground cables should be subject to an ecological walk-through before construction commences and adjusted where required to reduce impacts on species of conservation concern and habitats of concern.	Specialist	Pre-Construction
Consider design level mitigation measures recommended by the specialists, especially with respect to noise, flora, fauna, avifauna, bats, and heritage sites, as detailed within the BA report and relevant appendices.	Developer EPC Contractor	Design phase
Prior to construction, the area (i.e. project site) should be searched for any signs of active Secretarybird nests.	Specialist	Pre-construction
Should an active Secretarybird nest and resident birds be confirmed this must be investigated by the relevant specialist to determine the constraints to the positioning of the turbines within 1.5km of active nests.	Developer and specialist	Pre-construction and final design phase
The EMPr for construction must be updated to include site-specific information and specifications resulting from the final walk-though surveys. This EMPr must be submitted to DEA for approval prior to the commencement of construction.	Specialists	Final design phase
Should the layout (or type of wind turbines used) change significantly during the final design, the new layout must be submitted to the Department and it is recommended the new layout consider and avoid the sensitive areas identified within the project site.	Developer	Design phase
A detailed geotechnical investigation is required for the design phase for all infrastructure components.	Developer	Design phase
Make use of existing roads where possible when planning the access road layout for the wind farm. Take cognisance of the topography and limit cut and fill requirements.	Developer	Design phase
Investigate all access and internal roads for their topographical suitability, i.e. feasibility for haulage trucks and especially abnormal loads to navigate and have sufficient height clearance for any Eskom power lines, Telkom lines or similar.	Developer EPC Contractor	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
Obtain any additional environmental permits required (e.g. water use license, protected plant permits, faunal relocation permit, etc.). Copies of permits/licenses must be submitted to the Director: Environmental Impact Evaluation at the DEA, and kept on site during the construction and operation phases of the project.	Developer	Design phase
Obtain required abnormal load permits for the transportation of project components to site.	Developer EPC Contractor (Transportation Contractor)	Design phase
The noise emission specifications of wind turbine generators should be considered when selecting the equipment in order to ensure that noise impacts are minimised as far as possible.	Developer	Design phase
A comprehensive stormwater management plan[4] must be compiled and detail how stormwater will be managed to reduce velocities and volumes of water that could lead to erosion of surfaces (refer to **Appendix G**).	EPC Contractor(s)	Design phase
Ensure that proper planning is undertaken regarding the placement of lighting structures for the substation and that light fixtures only illuminate areas inside the substation site.	Developer	Design phase
Develop a database of local BBBEE service providers and ensure that they are informed of relevant tenders and job opportunities, and create a skills requirement profile for both the construction and operation phases. Run a supplier day in Kleinsee and identify prospective companies to engage with during construction and keep record of companies and businesses supplying goods and services.	Developer	Pre-construction
Record any historical/heritage resources structures that may need to be demolished. A heritage walk-through of the development footprint must be undertaken and the relevant permit must be obtained in this regard.	Developer in consultation with archaeologist	Pre-construction
Develop a detailed method statement for the implementation of the alien invasive management plan and open space management plan for the site (refer to **Appendix C**).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the plant rescue and protection plan for the site (refer to **Appendix E**).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the re-vegetation and habitat rehabilitation plan for the site (refer to **Appendix D**).	Developer	Pre-construction
Develop a detailed method statement for the implementation of the traffic and transportation management plan for the site (refer to **Appendix F**).	Developer	Pre-construction

[4] A Stromwater Management and Erosion Control Report (September 2018) has been undertaken for the Namas Wind Farm by JG Afrika (Pty) Ltd. This report covers the requirements for the management of stormwater and erosion and is included as **Appendix I** of this EMPr.

Mitigation: Action/control	Responsibility	Timeframe
Develop an effective monitoring system to detect any leakage or spillage of all hazardous substances during their transportation, handling, use and storage. This must include precautionary measures to limit the possibility of oil and other toxic liquids from entering the soil or storm water systems.	Developer	Pre-construction
An invasive alien plants expert in consultation with a Pest Control Officer in the field of Noxious weed management must develop an invasive alien plants and weeds management plan for the site.	Specialist	Pre-construction
A suitably qualified invasive alien plants expert must map and quantify the invasive alien plants and weeds on the site. This must be undertaken with the aim of developing a suitable invasive alien plants and weeds management plan as per the NEMBA requirements.	Developer Specialist	Pre-construction and site establishment
The management of plant residues or waste handling must be discussed in the invasive alien plants and weeds management plan which will be driven by NEMBA.	Developer Specialist	Pre-construction
Appoint an independent ECO prior to the commencement of any authorised activities. Once appointed the name and contact details of the ECO must be submitted to the Director: Compliance Monitoring at the DEA.	Developer	Pre-construction
The potential noise impact must again be evaluated should the layout be changed where any wind turbines are located closer than 1,000m from a confirmed NSD, or if the layout is changed where additional wind turbines are added within 1,000m from any NSD.	Developer	Pre-construction
The developer must measure ambient sound levels over at least a two (2) night period during the winter months to allow analysis of the data prior to the development of the wind farm. The data must be used to develop ambient sound levels versus wind speed curves.	Developer	Pre-construction
Create awareness of skills through posters and media announcements and set-up a skills desk at a central and accessible location. The skills desk should serve to record local job seeker skills.	Developer	Pre-construction
Develop a local community safety forum to establish monitoring methods for the surrounding community.	Developer	Pre-construction
The respective haulage company must conduct a route test to determine the restrictions relevant to the haulage vehicles to be utilised. With some routes, road signs may need to be moved, overhead power lines will need to be raised and bellmouths may need temporary widening to accommodate abnormal loads. A route test will help to establish the relevant changes specific to the abnormal load truck used to deliver the components and materials.	Developer EPC Contractor	Pre-construction
Retain and maintain natural and / or cultivated vegetation immediately adjacent to the development footprint.	Developer Design consultant	Pre-construction
Plan all roads, ancillary buildings and ancillary infrastructure in such a way that clearing of vegetation is minimised.	Developer Design consultant	Pre-construction

Mitigation: Action/control	Responsibility	Timeframe
Consolidate infrastructure and make use of already disturbed sites rather than undisturbed areas.		
Consult a lighting engineer in the design and planning of lighting to ensure the correct specification and placement of lighting and light fixtures for the wind farm and the ancillary infrastructure. The following is recommended: » Limit aircraft warning lights for the wind farm to the turbines on the perimeter, thereby reducing the overall requirement (CAA regulations/conditions permitting). » Investigate aircraft warning lights that only activate when an aircraft is detected. » Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). » Limit mounting heights of fixtures, or use foot-lights or bollard lights. » Make use of minimum lumen or wattage in fixtures. » Make use of down-lighters or shielded fixtures. » Make use of Low Pressure Sodium lighting or other low impact lighting. » Make use of motion detectors on security lighting, so allowing the site to remain in darkness until lighting is required for security or maintenance purposes.	Developer Design consultant Lighting Engineer	Pre-construction
Provide sufficient training to all the construction personnel, in order to alert to the potential impacts of the construction phase on the bird community.	EPC Contractor EO	Pre-construction
Adequate training should be provided to all the construction personnel. Everyone working in the area should be aware of the sensitive areas.	EPC Contractor	Pre-construction
Construction managers/foremen should be informed before construction starts on the possible types of heritage sites and cultural material they may encounter and the procedures to follow if they find sites.	Specialist EO	Pre-construction
Search and rescue of species of conservation concern should be conducted prior to clearing activities.	Developer EPC Contractor	Pre-construction
Temporary laydown areas should be located within previously transformed areas or areas that have been identified as being of low sensitivity.	Developer EPC Contractor	Pre-construction

Performance Indicator	» Design meets the objectives and does not degrade the environment. » Design and layouts respond to the mitigation measures and recommendations in the BA report.
Monitoring	» Ensure that the design implemented meets the objectives and mitigation measures in the BA report through review of the facility design by the Project Manager and ECO prior to the commencement of construction.

OBJECTIVE 2: To ensure effective communication mechanisms

It is important to maintain on-going communication with the public (including affected and surrounding landowners) during the construction and operation phases of the Namas Wind Farm. Any issues and concerns raised should be addressed as far as possible in as short a timeframe as possible.

Project component/s	» Wind turbines. » Access roads and crane hardstand areas. » Cabling between turbines. » Substation. » Service buildings. » All other associated infrastructure.
Potential Impact	» Impacts on affected and surrounding landowners and land uses.
Activity/risk source	» Activities associated with pre-construction phase. » Activities associated with construction of the wind farm. » Activities associated with operation.
Mitigation: Target/Objective	» Effective communication with affected and surrounding landowners. » Addressing any issues and concerns raised as far as possible in as short a timeframe as possible.

Mitigation: Action/control	Responsibility	Timeframe
Compile and implement a grievance mechanism procedure for the public (including the affected and surrounding landowners) (using **Appendix B**) to be implemented during both the construction and operation phases of the wind farm and if applicable during decommissioning. This procedure should include the details of the contact person who will be receiving issues raised by interested and affected parties, and the process that will be followed to address issues. The mechanism must also include procedures to lodge complaints in order for the local community to express any complaints or grievances with the construction process. A Public Complaints register must be maintained by the Contractor to record all complaints and queries relating to the project and the actions taken to resolve the issue. A Project Specific Grievance Mechanism will be developed and implemented prior to construction.	Developer EPC Contractor O&M Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)
Develop and implement a grievance mechanism for the construction, operation and closure phases of the wind farm for all employees, contractors, subcontractors and site personnel. This procedure should be in line with the South African Labour Law.	Developer EPC Contractor O&M Operator	Pre-construction (construction procedure) Pre-operation (operation procedure)
Liaison with landowners is to be undertaken prior to the commencement of construction in order to agree on landowner-specific conditions during construction and maintenance.	Developer and/or EPC Contractor	Pre-construction
Develop an incident reporting system to record non-conformances to the EMPr.	EPC Contractor O&M Operator ECO	Pre-construction Duration of construction

Performance Indicator	» Effective communication procedures in place for all phases as required.
Monitoring	» An incident reporting system used to record non-conformances to the EMPr. » Grievance mechanism procedures implemented. » Public complaints register developed and maintained.

CHAPTER 6: MANAGEMENT PROGRAMME: CONSTRUCTION

Overall Goal: Undertake the construction phase in a way that:

- Ensures that construction activities are properly managed in respect of environmental aspects and impacts.
- Enables construction activities to be undertaken without significant disruption to other land uses and activities in the area, in particular concerning noise impacts, farming practices, traffic and road use, and effects on local residents.
- Minimises the impact on the indigenous natural vegetation, protected tree species, and habitats of ecological value.
- Minimises impacts on fauna using the site.
- Minimises the impact on heritage sites should they be uncovered.

An environmental baseline must be established during the undertaking of construction activities, where possible.

6.1. Institutional Arrangements: Roles and Responsibilities for the Construction Phase of the Namas Wind Farm

As the Proponent, Genesis Namas Wind (Pty) Ltd must ensure that the implementation of the project complies with the requirements of all environmental authorisations and permits, and obligations emanating from other relevant environmental legislation. This obligation is partly met through the development of the EMPr, and the implementation of the EMPr through its integration into the contract documentation. Genesis Namas Wind (Pty) Ltd will retain various key roles and responsibilities during the construction of the wind farm. These are outlined below.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to the overall implementation of the environmental management programme during construction

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Technical Director/Manager; Site Manager; Safety, Health and Environment Representative; Environmental Control Officer (ECO) and Contractor for the construction phase of this wind farm are as detailed below. **Figure 6.1** provides an organogram indicating the organisational structure for the implementation of the EMPr.

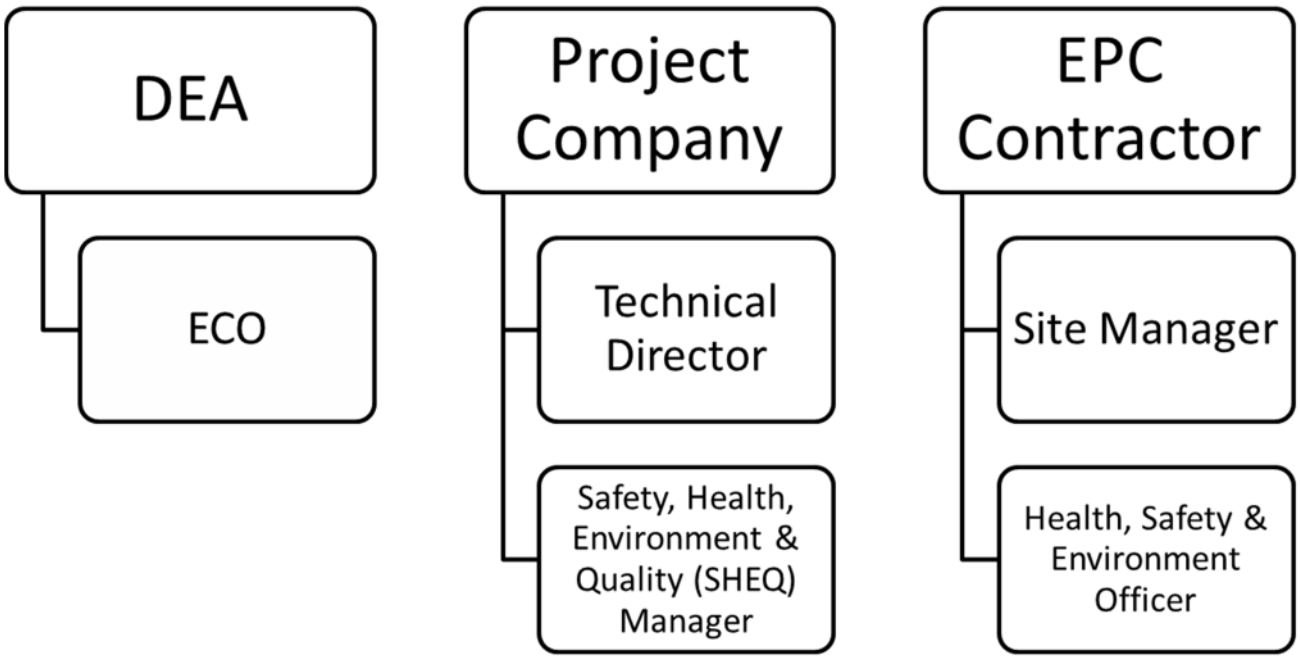


Figure 6.1: Organisational structure for the implementation of the EMPr

Technical Director will:

- Ensure all specifications and legal constraints specifically with regards to the environment are highlighted to the Contractor(s) so that they are aware of these.
- Ensure that Genesis Namas Wind (Pty) Ltd and its Contractor(s) are made aware of all stipulations within the EMPr.
- Ensure that the EMPr is correctly implemented throughout the project by means of site inspections and meetings. This must be documented as part of the site meeting minutes.
- Be fully conversant with the BA for the project, the EMPr, the conditions of the Environmental Authorisation (once issued), and all relevant environmental legislation.
- Be fully knowledgeable with the contents of all relevant licences and permits.

Site Manager (EPC Contractor's on-site Representative) will:

- Be fully knowledgeable with the contents of the BA and risk management.
- Be fully knowledgeable with the contents and conditions of the Environmental Authorisation (once issued).
- Be fully knowledgeable with the contents of the EMPr.
- Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with these.
- Have the overall responsibility of the EMPr and its implementation.
- Conduct audits to ensure compliance to the EMPr.
- Ensure there is communication with the Technical Director, the ECO, and relevant discipline engineers on matters concerning the environment.
- Be fully knowledgeable with the contents of all relevant licences and permits.

- Ensure that no actions are taken which will harm or may indirectly cause harm to the environment, and take steps to prevent pollution on the site.
- Confine activities to the demarcated construction site.

An independent **ECO** must be appointed by the project developer prior to the commencement of any authorised activities and will be responsible for monitoring, reviewing and verifying compliance by the EPC Contractor with the environmental specifications of the EMPr and the conditions of the Environmental Authorisation. Accordingly, the ECO will:

- Be fully knowledgeable with the contents with the BA.
- Be fully knowledgeable with the contents and the conditions of the Environmental Authorisation (once issued).
- Be fully knowledgeable with the contents of the EMPr.
- Be fully knowledgeable of all the licences and permits issued to the site.
- Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with them.
- Ensure that the contents of this document are communicated to the Contractor site staff and that the Site Manager and Contractor are constantly made aware of the contents through discussion.
- Ensure that the compliance of the EMPr, EA and the legislation is monitored through regular and comprehensive inspection of the site and surrounding areas.
- Ensure that if the EMPr, EA and/or the legislation conditions, regulations or specifications are not followed then appropriate measures are undertaken to address any non-compliances (for example an ECO may cease construction or an activity to prevent a non-compliance from continuing).
- Monitoring and verification must be implemented to ensure that environmental impacts are kept to a minimum, as far as possible.
- Ensure that the Site Manager has input into the review and acceptance of construction methods and method statements.
- Ensure that activities on site comply with all relevant environmental legislation.
- Ensure that a removal is ordered of any person(s) and/or equipment responsible for any contravention of the specifications of the EMPr.
- Keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.
- Ensure that the compilation of progress reports for submission to the Technical Director, with input from the Site Manager, takes place on a regular basis, including a final post-construction audit.
- Ensure that there is communication with the Site Manager regarding the monitoring of the site.
- Ensure that any non-compliance or remedial measures that need to be applied are reported.
- Submit independent reports to the DEA and other regulating authorities regarding compliance with the requirements of the EMPr, EA and other environmental permits.

The ECO must be present for the site preparation and initial clearing activities to ensure the correct demarcation of no-go areas, to facilitate environmental induction with construction staff and supervise any flora relocation and faunal rescue activities that may need to take place during the site clearing (i.e. during site establishment, and excavation of foundations). The developer should appoint a designated Environmental Officer (EO) to be present on-site to deal with any environmental issues as the arise. The ECO shall remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site handed over for operation.

Contractors and Service Providers: It is important that contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The contractor's obligations in this regard include the following:

- Employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment.
- A copy of the EMPr must be easily accessible to all on-site staff members.
- Employees must be familiar with the requirements of this EMPr and the environmental specifications as they apply to the construction of the wind farm.
- Prior to commencing any site works, all employees and sub-contractors must have attended an environmental awareness training course which must provide staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
- Staff will be informed of environmental issues as deemed necessary by the ECO.

All contractors (including sub-contractors and staff) and service providers are ultimately responsible for:

- Ensuring adherence to the environmental management specifications
- Ensuring that Method Statements are submitted to the Site Manager (and ECO) for approval before any work is undertaken
- Any lack of adherence to the above will be considered as non-compliance to the specifications of the EMPr
- Ensuring that any instructions issued by the Site Manager on the advice of the ECO are adhered to
- Ensuring that a report is tabled at each site meeting, which will document all incidents that have occurred during the period before the site meeting
- Ensuring that a register is kept in the site office, which lists all transgressions issued by the ECO
- Ensuring that a register of all public complaints is maintained
- Ensuring that all employees, including those of sub-contractors receive training before the commencement of construction in order that they can constructively contribute towards the successful implementation of the EMPr (i.e. ensure their staff are appropriately trained as to the environmental obligations)

Contractor's Safety, Health and Environment Representative: The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues and ensure that any complaints received from the public are duly recorded and forwarded to the Site Manager and Contractor. A separate Environmental Officer (EO) may be appointed to support this function.

The Contractor's Safety, Health and Environment Representative and/or Environmental Officer should:

- Be well versed in environmental matters.
- Understand the relevant environmental legislation and processes.
- Understand the hierarchy of Environmental Compliance Reporting, and the implications of non-compliance.
- Know the background of the project and understand the implementation programme.

» Be able to resolve conflicts and make recommendations on site in terms of the requirements of this Specification.
» Keep accurate and detailed records of all EMPr-related activities on site.

6.2. Objectives

In order to meet the overall goal for construction, the following objectives, actions, and monitoring requirements have been identified.

OBJECTIVE 2: Securing the site and site establishment

Project component/s	» Wind turbines. » Access roads and crane hardstand areas. » Cabling between turbines. » Substation. » Operation and maintenance buildings. » Laydown and hardstand areas, construction camp
Potential Impact	» Hazards to landowners and public. » Security of materials. » Substantially increased damage to natural vegetation. » Potential impact on fauna and avifauna habitat.
Activities/risk sources	» Open excavations (foundations and cable trenches). » Movement of construction employees, vehicles and plant equipment in the area and on-site.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/control	Responsibility	Timeframe
Secure the site, working areas and excavations in an appropriate manner. Adequate protective measures must be implemented to prevent unauthorised access to the working area and the internal access/haul routes.	EPC Contractor EO	During site establishment Maintenance: for duration of Contract
The Contractor must take all reasonable measures to ensure the safety of the public in the surrounding area. Where the public could be exposed to danger by any of the works or site activities, the Contractor must, as appropriate, provide suitable flagmen, barriers and/or warning signs in English and any other relevant indigenous languages, all to the approval of the Site Manager. All unattended open excavations shall be adequately demarcated and/or fenced.	EPC Contractor	During site establishment Maintenance: for duration of Contract
Where necessary to control access, fence and secure the area and implement access control procedures.	EPC Contractor	During site establishment Maintenance: for duration of Contract
Fence and secure Contractor's equipment camp.	EPC Contractor	During site establishment Maintenance: for duration of Contract

Mitigation: Action/control	Responsibility	Timeframe
Establish SABS 089: 1999 Part 1 approved bunded areas for the storage of hazardous materials and hazardous waste.	EPC Contractor	During site establishment and during construction
Establish the necessary ablution facilities with chemical toilets and provide adequate sanitation facilities and ablutions for construction workers (1 toilet per every 15 workers) at appropriate locations on site.	EPC Contractor	During site establishment and during construction
Water consumption requirements for the site for the construction if not obtained from an authorised water user within the area, must be authorised by the Department of Water and Sanitation.	Developer	Prior to water use
Supply adequate weather and vermin proof waste collection bins and skips (covered at minimum with secured netting or shadecloth) at sites where construction is being undertaken. Separate bins should be provided for general and hazardous waste. As far as possible, provision should be made for separation of waste for recycling.	EPC Contractor	Site establishment, and duration of construction

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured as a result of construction activities. » Fauna and flora is protected as far as practically possible. » Appropriate and adequate waste management and sanitation facilities provided at construction site.
Monitoring	» Regular visual inspection of the fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site. » ECO/ EO to monitor all construction areas on a continuous basis until all construction is completed; immediate reporting back to the site manager. » ECO/ EO to address any infringements with responsible contractors as soon as these are recorded.

OBJECTIVE 3: Maximise local employment and business opportunities associated with the construction phase

It is acknowledged that skilled personnel are required for the construction of the wind turbines and associated infrastructure. However, where semi-skilled and unskilled labour is required, opportunities for local employment should be maximised as far as possible. Employment of locals and the involvement of local Small, Micro and Medium Enterprises (SMMEs) would enhance the social benefits associated with the wind farm, even if the opportunities are only temporary. The procurement of local goods could furthermore result in positive economic spin-offs. It is acknowledged that socio-economic development forms a major part of the REIPPPP and the Namas Wind Farm therefore has various targets to meet.

Project component/s	» Construction activities associated with the establishment of the wind farm, including associated infrastructure.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised.
Activities/risk sources	» The employment of outside contractors to undertake the work and who make use of their own labour will reduce the employment and business opportunities for locals. Employment of local labour will maximise local employment opportunities.

Mitigation: Target/Objective	» The Developer, in discussions with the local municipality, should aim to employ as many workers (skilled, semi-skilled / low-skilled) from the local areas/ towns, as possible. » The Developer should also develop a database of local BBBEE service providers.

Mitigation: Action/control	Responsibility	Timeframe
Employ as many workers (skilled, semi-skilled / low-skilled) from the local area/ nearby towns.	Developer EPC Contractor	Project duration
Where required, implement appropriate training and skills development programmes prior to the initiation of the construction phase.	Developer EPC Contractor	Project duration
Develop a database of local Broad Based Black Economic Empowerment (BBBEE) service providers and ensure that they are informed of relevant tenders and job opportunities.	EPC Contractor	Project duration
Identify potential opportunities for local businesses.	Developer EPC Contractor	Construction phase

Performance Indicator	» Maximum amount of semi and unskilled labour locally sourced where possible.
Monitoring and Reporting	Contractors and appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 4: Avoid the negative social impacts on family structures and social networks due to the presence of construction workers from outside the area, including potential loss of livestock and damage to farm infrastructure

While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on the local community. In this regard the most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to the potential behaviour of construction workers, including an increase in alcohol and drug use, an increase in crime levels (including stock theft), the loss of partners and or spouses to construction workers, an increase in teenage and unwanted pregnancies, an increase in prostitution and an increase in sexually transmitted diseases.

The low and semi-skilled workers are likely to be local residents and will therefore from part of the local family and social network.

Project component/s	» Construction and establishment activities associated with the establishment of the wind farm, including associated infrastructure. » Construction work force.
Potential Impact	» The presence of construction workers who live outside the area and who are housed in local towns can impact on family structures and social networks. » Presence of construction workers on site may result in loss of livestock due to stock theft and damage to farm infrastructure, such as gates and fences. Poaching of wild animals may also occur. » Impacts on the surrounding environment due to inadequate sanitation and waste removal facilities.

	» Impact on the safety of farmers and communities (increased crime etc.) by construction workers and also damage to farm infrastructure such as gates and fences. » Increase in production and GDP-R.
Activities/risk sources	» The presence of construction workers can impact negatively on family structures and social networks, especially in small, rural communities. » The presence of construction workers on the site can result in stock thefts or illegal hunting/ trapping of fauna and or game and damage to farm infrastructure.
Mitigation: Target/Objective	» Avoid and/or minimise the potential impact of construction workers on the local community and their livelihoods. » To minimise impacts on the social and biophysical environment. » Maximise the economic benefit to the local municipality. » Prohibit theft of stock and valuables on impacted and adjacent farm portions. » Procure goods and services, as far as practically possible, from the local municipality. » Initiate site access control and monitor movement to and from the site.

Mitigation: Action/control	Responsibility	Timeframe
Establish contact with the adjacent farmers and develop a Code of Conduct for construction workers. Ensure that construction workers attend a briefing session before they commence with activities. The aim of the briefing session is to inform the construction workers of the rules and regulations governing activities on the site as set out in the Code of Conduct. Ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct.	Developer EPC Contractor	Briefing session for construction workers held before they commence work on site.
Ensure that construction workers who are found guilty of breaching the Code of Conduct are dealt with appropriately. Dismissals must be in accordance with South African labour legislation.	Developer EPC Contractor	Pre-construction/ construction
No housing of construction workers on the site is permitted, apart from security personnel.	EPC Contractor	Pre-construction/ construction
Implement a policy that no employment will be available at the gate.	EPC Contractor	Pre-construction/ construction
Compensate farmers / community members for cost for any losses, such as livestock, damage to infrastructure etc. proven to be associated with the project.	Developer EPC Contractor	Pre-construction/ construction
Appropriate fire-fighting equipment must be present on site and members of the workforce should be appropriately trained in using this equipment in the fighting of veld fires.	EPC Contractor	Construction
Ensure that open fires on the site for cooking or heating are not allowed except in designated areas.	EPC Contractor	Construction
Contact details of emergency and police services should be prominently displayed on site.	EPC Contractor	Construction
Each employed personnel ought to have an access card/ apparel for identification purposes.	Developer EPC Contractor	Construction

Mitigation: Action/control	Responsibility	Timeframe
Site access should be controlled and no unauthorised persons must be allowed on site. Security should be located at the entrance to only permit authorised personnel.	Developer EPC Contractor	Construction
A pick-up point must be established wherein employees will be transported to and from the site.	Developer EPC Contractor	Construction

Performance Indicator	» Code of Conduct developed and approved prior to commencement of construction phase. » All construction workers made aware of Code of Conduct within first week of being employed. » Labour locally sourced, where possible. » Briefing session with construction workers held at outset of construction phase. » No criminal activities and theft of livestock, illegal hunting or trapping of game and/or other fauna attributable to the construction workers are reported. » No complaints received from landowners or the general public. » No fires or on-site accidents occur.
Monitoring and Reporting	» An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site.

OBJECTIVE 5: Control of noise pollution stemming from construction activities

Various construction activities would be taking place during the development of the facility and may pose a noise risk to the closest receptors. These activities could include temporary or short-term activities where small equipment is used (such as the digging of trenches to lay underground power lines). The impact of such activities is generally very low.

Project component/s	» Construction of turbine (foundation, tower, nacelle and rotor). » Cabling between turbines. » Substation. » Access roads.
Potential Impact	» Increased noise levels at potentially sensitive receptors. » Potentially changing the acceptable land use capability.
Activity/risk source	» Any construction activities taking place within 500m from potentially noise sensitive developments (NSD). » Site preparation and earthworks. » Construction-related transport. » Foundations or plant equipment installation. » Building activities.
Mitigation: Target/Objective	» Ensure that maximum noise levels at potentially sensitive receptors are less than 65dBA. » Prevent the generation of disturbing or nuisance noises. » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors. » Ensure compliance with the National Noise Control Regulations. » Ensure night-time noise levels less than 45 dBA.

Mitigation: Action/control	Responsibility	Timeframe
Establish a line of communication and notify all stakeholders and NSDs of the means of registering any issues, complaints or comments.	Developer	Life cycle of the project
Notify potentially sensitive receptors at least 2 days before the commencement of an activity in the vicinity (within 500m) of the NSD. Following information to be presented in writing: » Description of activity to take place; » Estimated duration of activity; » Working hours; » Grievance mechanisms in place for issues, complaints and comments; and » Contact details of responsible party.	EPC Contractor	At least 2 days, but not more than 5 days before activity is to commence
Ensure that all equipment is maintained and fitted with the required noise abatement equipment.	EPC Contractor	Weekly inspection
When any noise complaints are received, noise monitoring should be conducted at the complainant, followed by feedback regarding noise levels measured.	Acoustical Consultant	Within 7 days after complaint was registered
The construction crew must abide by the local by-laws regarding noise.	EPC Contractor	Construction phase
Minimise construction activities when operating within 500m from a potential noise-sensitive receptor at night.	EPC Contractor ECO	Construction phase
Where possible, construction work should be conducted during normal working hours (06H00 – 22H00), from Monday to Saturday. If agreements can be reached (in writing) with all the surrounding (within a 1,000 distance) potentially sensitive receptors, these working hours can be extended.	EPC Contractor	Construction phase

Performance Indicator	» Construction activities do not change the existing ambient sound levels with more than 7 dB. » Ensure that maximum noise levels at potentially sensitive receptors are less than 65 dBA. » No noise complaints are registered
Monitoring and Reporting	» Ambient sound measurements are recommended to take place prior to the construction of the wind farm.

OBJECTIVE 6: Management of dust and emissions and damage to roads

During the construction phase, limited gaseous or particulate emissions (and dust) is anticipated from exhaust emissions from construction vehicles and equipment on-site, as well as vehicle entrained dust from the movement of vehicles on the internal access roads.

Project component/s	» Wind turbines. » Cabling between turbines. » Substation. » Access roads. » Buildings. » Batching Plant.

Potential Impact	» Heavy vehicles can generate noise and dust impacts. Movement of heavy vehicles can also damage roads. » Dust and particulates from vehicle movement to and on-site, foundation excavation, road construction activities, road maintenance activities, temporary stockpiles, and vegetation clearing affecting the surrounding residents (dust nuisance) and visibility. » Release of minor amounts of air pollutants (for example NO_2, CO and SO_2) from vehicles and construction equipment.
Activities/risk sources	» The movement of heavy vehicles and their activities on the site can result in noise and dust impacts and damage roads. » Clearing of vegetation and topsoil. » Excavation, grading and scraping. » Transport of materials, equipment and components on internal access roads. » Re-entrainment of deposited dust by vehicle movements. » Wind erosion from topsoil and spoil stockpiles and unsealed roads and surfaces. » Fuel burning from construction vehicles with combustion engines.
Mitigation: Target/Objective	» To avoid and or minimise the potential noise and dust impacts associated with heavy vehicles, and also minimise damage to roads. » To ensure emissions from all vehicles are minimised, where possible, for the duration of the construction phase. » To minimise nuisance to the community and adjacent landowners from dust emissions and to comply with workplace health and safety requirements for the duration of the construction phase.

Mitigation: Action/control	Responsibility	Timeframe
Vehicles and equipment must be maintained in a road-worthy condition at all times. Road worthy certificates must be in place for all heavy vehicles at the outset of the construction phase and updated on a monthly basis.	EPC Contractor	Duration of the contract
Implement appropriate dust suppression measures on site such as wetting roads on a regular basis including during site clearing and periods of high winds.	EPC Contractor	Construction phase
Vehicles used to transport sand and building materials must be fitted with tarpaulins or covers when travelling on roads.	EPC Contractor	Construction phase
Regular dust control of materials (sand, soil, cement) must be used at concrete batching plants on site.	EPC Contractor	Construction phase
Ensure vehicles adhere to speed limits on public roads and speed limits set within the site by the Site Manager. Vehicle speed should be monitored on site, to ensure vehicles do not habitually exceed the speed limit.	EPC Contractor Transportation contractor	Duration of contract
Ensure that damage to gravel public roads and access roads attributable to construction vehicles is repaired before completion of the construction phase.	EPC Contractor	Before completion of construction phase
Disturbed areas must be re-vegetated as soon as practicable after construction is complete in an area.	EPC Contractor	At completion of the construction phase

Performance Indicator	» Appropriate dust suppression measures implemented on site during the construction phase. » Drivers made aware of the potential safety issues and enforcement of strict speed limits when they are employed or before entering the site.

	» Road worthy certificates in place for all heavy vehicles at the outset of the construction phase and updated on a monthly basis.
Monitoring and Reporting	» The Developer and appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase. » Immediate reporting by personnel of any potential or actual issues with nuisance dust or emissions to the Site Manager. » An incident reporting system must be used to record non-conformances to the EMPr. » Public complaints register must be developed and maintained on site.

OBJECTIVE 7: Conservation of the existing soil resource within the site and in the adjacent areas

The natural soil on the site needs to be preserved as far as possible to minimise impacts on the environment. Soil degradation including erosion (by wind and water) and subsequent deposition elsewhere is of a concern. Uncontrolled run-off relating to construction activities (excessive wetting, etc.) will also lead to accelerated erosion. Degradation of the natural soil profile due to excavation, stockpiling, compaction, pollution and other construction activities will affect soil forming processes and associated ecosystems.

A set of strictly adhered to mitigation measures are required to be implemented in order to effectively limit the impact on the environment. The disturbed areas where human impact is likely are the focus of the mitigation measures laid out below.

Project component/s	» Wind turbines. » Substation. » Access roads. » Sealed surfaces (e.g. roofs, concrete surfaces, compacted road surfaces, paved roads / areas). » Construction of all infrastructure where topsoil will be disturbed
Potential Impact	» Loss of topsoil leading to wind erosion. » Erosion and soil loss. » A loss of indigenous vegetation cover. » Increased runoff.
Activities/risk sources	» Rainfall and wind erosion of disturbed areas. » Excavation, stockpiling and compaction of soil. » Concentrated discharge of water from construction activity. » Stormwater run-off from sealed surfaces. » Mobile construction equipment movement on site. » Roadside drainage ditches. » Project related infrastructure, such as buildings, turbines and fences.
Mitigation: Target/Objective	» To minimise erosion of soil from site during construction. » To minimise damage to vegetation by erosion or deposition. » To minimise damage to rock, soil and vegetation by construction activity. » No accelerated overland flow related surface erosion as a result of a loss of vegetation cover. » Minimal loss of vegetation cover due to construction related activities. » To retain all topsoil with a stable soil surface

Mitigation: Action/control	Responsibility	Timeframe
Stockpile topsoil for re-use in rehabilitation phase. Maintain stockpile shape and protect from erosion.	EPC Contractor	During site establishment and any activity related to earthworks as well as the duration of construction
Compile a comprehensive stormwater management plan as part of the final design of the project and implement during construction and operation phases (**Appendix G**).	EPC Contractor	Compile during design; implement during construction and operation
Salvaging topsoil: » Topsoil must always be salvaged and stored separately from subsoil and lower-lying parent rock or other spoil material. ∗ Topsoil stripping removes up to 30 cm or less of the upper soils. ∗ In cultivated areas, depth of topsoil may increase and needs to be confirmed with the land owner. » Prior to salvaging topsoil the depth, quality and characteristics of topsoil should be known for every management area. o This will give an indication of total volumes of topsoil that need to be stored to enable the proper planning and placement of topsoil storage. o Different types of topsoil – rocky soils and sands or loams must be stored separately. » Topsoil should be removed (and stored) under dry conditions to avoid excessive compaction whenever topsoil will have to be stored for longer than one year.	EPC Contractor	Pre-construction/ Construction phase
New access roads to be carefully planned and constructed to minimise the impacted area and prevent unnecessary excavation, placement and compaction of soil.	EPC Contractor	Before and during construction
Storing topsoil: » Viability of stored topsoil depends on moisture, temperature, oxygen, nutrients and time stored. » Rapid decomposition of organic material in warm, moist topsoil rapidly decreases microbial activity necessary for nutrient cycling, and reduces the amount of beneficial micro-organisms in the soil. » Stockpile location should ideally be in a disturbed but weed-free area. » Storage of all topsoil that is disturbed should be of a maximum height of 2m and the maximum length of time before re-use is 18 months. » Topsoil handling should be reduced to stripping, piling (once), and re-application. Between the stockpiling and reapplication, stored topsoil should not undergo any further handling except control of erosion and (alien) invasive vegetation. » Where topsoil can be reapplied within six months to one year after excavation, it will be useful to store the topsoil as close	EPC Contractor	Pre-construction/ Construction phase

Mitigation: Action/control	Responsibility	Timeframe
as possible to the area of excavation and re-application, e.g. next to cabling trenches. » Do not mix overburden with topsoil stockpiles, as this will dilute the proportion of fertile soil (with less fertile subsoil or rock material). » Employ wind nets made from Hessian or similarly fibrous and biodegradable material, where required, to stabilise newly placed topsoil stockpiles and to reduce wind erosion. » In cases where topsoil has to be stored longer than 6 months or during the rainy season, soils should be kept as dry as possible and protected from erosion and degradation by: * Preventing ponding on or between heaps of topsoil * Covering topsoil berms * Preventing all forms of contamination or pollution * Preventing any form of compaction * Monitoring the establishment of all invasive vegetation and removing such if it appears * Keeping slopes of topsoil at a maximal 2:1 ratio * Monitoring and mitigating erosion where it appears » Where topsoil needs to be stored in excess of one year, it is recommended to either cover the topsoil or allow an indigenous grass cover to grow on it – if this does not happen spontaneously, seeding should be considered.		
Identify and demarcate construction areas for general construction work and restrict construction activity to these areas.	EPC Contractor	Construction phase
Spillages of cement to be cleaned up immediately and disposed or re-used in the construction process.	EPC Contractor	Construction phase
Spill kits to be kept on active parts of the construction site and at site offices.	EPC Contractor	Construction phase
Cement batching to take place in designated areas only, as approved on site layout (if applicable).	EPC Contractor	Construction phase
When preparing the hard setting area, cuts should be used for fill with little or no wastages.	EPC Contractor EO	Construction phase
Implement erosion control measures denuded areas as required and monitor erosion and manage all occurrences according to the erosion management plan (refer to **Appendix G**). Erosion control measures should be implemented in areas where slopes have been disturbed.	EPC Contractor	Construction phase
Control depth of all excavations and stability of cut faces/sidewalls.	EPC Contractor	Maintenance over duration of contract
Reapplying topsoil: » Spoil materials and subsoil must be back-filled first, then covered with topsoil. » Immediate replacement of topsoil after the undertaking of construction activities within an area. » Generally, topsoil should be re-applied to a depth slightly greater than the topsoil horizon of a pre-selected undisturbed reference site.	EPC Contractor	Construction and rehabilitation

Mitigation: Action/control	Responsibility	Timeframe
» The minimum depth of topsoil needed for re-vegetation to be successful is approximately 20 cm. » If the amount of topsoil available is limited, a strategy must be devised to optimise re-vegetation efforts with the topsoil available. » Reapplied topsoil should be landscaped in a way that creates a variable microtopography of small ridges and valleys that run parallel to existing contours of the landscape. The valleys become catch-basins for seeds and act as run-on zones for rainfall, increasing moisture levels where the seeds are likely to be more concentrated. This greatly improves the success rate of re-vegetation efforts. » To stabilise reapplied topsoil and minimise raindrop impact and erosion: * Use organic material from cleared and shredded woody vegetation where possible * Alternatively, suitable geotextiles or organic erosion mats can be used as necessary » Continued monitoring will be necessary to detect any sign of erosion early enough to allow timeous mitigation.		
Re-applied topsoil needs to be re-vegetated as soon as possible.	EPC Contractor	Construction monitored during operation phase
Implement general erosion control measures/practises: » Runoff control and attenuation can be achieved by using any or a combination of sand bags, logs, silt fences, storm water channels and catch-pits, shade nets, geofabrics, seeding or mulching as needed on and around cleared and disturbed areas. * Ensure that all soil surfaces are protected by vegetation or a covering to avoid the surface being eroded by wind or water. » Ensure that heavy machinery does not compact areas that are not meant to be compacted as this will result in compacted hydrophobic, water repellent soils which increase the erosion potential of the area. » Prevent the concentration or flow of surface water or storm water down cut or fill slopes or along pipeline routes or roads and ensure measures to prevent erosion are in place prior to construction. » Minimise and restrict site clearing to areas required for construction purposes only and restrict disturbance to adjacent undisturbed natural vegetation. » Vegetation clearing should occur in parallel with the construction progress to minimise erosion and/or run-off. Large tracts of bare soil will either cause dust pollution or quickly erode and then result in sedimentation. » When implementing dust control measures, prevent over-wetting, saturation, and run-off that may cause erosion and sedimentation.	EPC Contractor	Construction monitored during operation phase

Mitigation: Action/control	Responsibility	Timeframe
Conservation measures should be applied to ensure that soil does not get unusable or unproductive and to ensue soil stabilisation.	EPC Contractor	Project lifetime

Performance Indicator	» Minimal level of soil erosion around site. » Minimal level of soil degradation. » No activity outside demarcated areas. » Acceptable state of excavations. » No activity in restricted areas. » Acceptable state of excavations, as determined by EO and ECO. » Progressive return of disturbed and rehabilitated areas to the desired end state (refer also to the Plant Rescue and Protection Plan in **Appendix E**). » No indications of visible topsoil loss.
Monitoring and Reporting	» Continual inspections of the site by the ECO. » Fortnightly inspections of sediment control devices by the ECO. » On-going inspections of surroundings by the ECO. » Reporting of ineffective sediment control systems and rectification as soon as possible. » Visual inspection every six (6) months (minimum) of all areas where disturbance has taken place (for the duration of the project. » If soil loss is suspected, acceleration of soil conservation and rehabilitation measures must be implemented.

OBJECTIVE 8: Minimise the impacts on and loss of indigenous vegetation and control of alien invasive plants

The national vegetation types present within the project site of the Namas Wind Farm includes the Namaqualand Coastal Duneveld, Namaqualand Strandveld and the Namaqualand Salt Pans. All three national vegetation types are classified as Least Threatened.

Five habitats and communities have been identified by the ecological specialist within the project site. The habitats include Coastal Duneveld, Low Coastal Strandveld, Strandveld on Namaqualand Salt Pans, Namaqualand Dune Stranveld and typical Namaqualand Strandveld.

» The *Coastal Duneveld* community is considered to be somewhat more sensitive than the adjacent Namaqualand Strandveld due to the greater vulnerability to wind erosion, as well as the potential greater importance of this area for fauna associated with the coastal plain, many of which do not penetrate far inland and would not occur further east within the site.

» The *Low Coastal Strandveld* is not considered to be a highly sensitive habitat type, but as it is of limited extent it is considered more vulnerable to cumulative habitat loss. No specific avoidance of this habitat is recommended as it does not have a high abundance of species of concern.

» *Strandveld on Namaqualand Salt Pans* is a habitat of limited extent and offers features that are not found elsewhere in the area, it is considered more sensitive than the surrounding Strandveld and the overall development footprint in this habitat should be kept low, but some development in these areas is considered acceptable.

» Areas considered as *Namaqualand Dune Strandveld* are considered somewhat more sensitive than the typical surrounding Strandveld due to the large dunes which are vulnerable to disturbance. No specific avoidance of this habitat is recommended, but some additional mitigation is likely to be required to reduce wind erosion risk during the construction phase.

» *Typical Namaqualand Strandveld* is the dominant habitat at the projects site and comprises the majority of the area. This is not considered to be a sensitive habitat and while some species of conservation concern are present, a significant impact on the local populations of these species is not likely as this is a widespread vegetation type.

Within the project site 4 species of conservation concern (SCC) were confirmed including *Aloe arenicola* (Near Threatened), *Leucoptera nodosa* (Near Threatened), *Wahlenbergia asparagoides* (Vulnerable) and *Babiana hirsuta* (Near Threatened). However, the abundance of these species is low across most of the project site.

Invasive alien plants displace indigenous vegetation leading to a loss of biodiversity and landscape transformation. Potential consequences of the introduction and expansion of invasive alien plants is biodiversity loss, soil erosion, loss of grazing, increased site management costs, increased fire hazards, loss of wetland function, decreased drainage, increased water use, etc.

Weeds are pioneer plants that thrive in disturbed areas such as road verges and construction site. The process of constructing the facility causes disturbance that may introduce new weeds or break the dormancy of those already in the area. The potential impact of weeds includes the increased cost of rehabilitation, introduction of poisonous and harmful plants, reduced grazing and increased management costs.

Project component/s	» Wind turbines. » Access roads. » Cabling between turbines. » Workshop area/ laydown areas. » Substation.
Potential Impact	» Loss of plant cover leading to erosion as well as loss of faunal habitat and loss of specimens of protected plants. » Biodiversity loss. » Soil erosion. » Loss of grazing potential. » Increased site management costs. » Increased fire hazards. » Increased water use.
Activity/risk source	» Site preparation and clearing. » Soil disturbance » Introduction of contaminated soil. » Introduction of plant propagules with people and vehicles. » Movement of plant propagules across the site. » Activities outside of designated construction areas. » Driving off designated routes.

Mitigation: Target/Objective	» To limit construction activities to designated areas. » Implement invasive clearing prior to construction, but after site demarcation. » The management of invasive alien plants and weeds continues into the operation phase for at least 5 years, or until any problem plants are under suitable management/control.

Mitigation: Action/control	Responsibility	Timeframe
Communicate clearly to all contractors that no disturbance outside these demarcated areas will be tolerated.	EPC Contractor	Duration of construction
Permits from the Northern Cape Department of Environment and Nature Conservation to relocate and/or disturb any affected listed plant species will be required if this is undertaken.	EPC Contractor	Duration of construction
Avoid creating conditions in which alien plants may become established: » Keep disturbance of indigenous vegetation to a minimum » Rehabilitate disturbed areas as quickly as possible once construction is complete in an area » Do not import soil from areas with alien plants.	EPC Contractor	Construction phase
Unnecessary impacts on surrounding natural vegetation must be avoided, e.g. driving around in the veld where there are no existing roads or where there aren't new roads planned. The construction impacts must be contained to the footprint of the wind farm.	EPC Contractor	Construction phase
Establish an on-going monitoring programme to detect, quantify and remove any alien species that may become established and identify the problem species (as per Conservation of Agricultural Resources Act and Act 43 of 1983 and NEM: Biodiversity Act).	EPC Contractor	Construction and operation
Immediately control any alien plants that become established using registered control methods appropriate for the particular species in question. Where necessary, obtain an opinion from a registered Pest Control Officer.	EPC Contractor	Construction phase
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides (a registered Pest Control Officer). It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.	EPC Contractor	Construction and rehabilitation
A registered Pest Control Officer must be appointed to implement the invasive alien plants and weeds management plan. The Pest Control Officer must supervise the clearing team to ensure compliance with the invasive alien plants and weeds management plan.	Pest Control Officer	Construction phase
The invasive alien plants and weeds management plan must include best practises for managing invasive alien plants and weeds. This must be used by the ECO to monitor the progress and the methods used.	Specialist ECO	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
No plant propagules (seeds or otherwise) are to be introduced into the site. Any soil to be introduced to the site must be from sites assessed by the invasive alien plants specialist.	EPC Contractor Specialist	Prior to any soil collection for bedding (or any other use) is brought to the site.
All construction vehicles should adhere to clearly defined and demarcated roads. No off-road driving is to be allowed once the site has been pegged for construction.	EPC Contractor	Construction phase
All cleared areas should be revegetated with indigenous perennial species from the local area.	EPC Contractor	Construction phase

Performance Indicator	» Limited disturbance outside of designated work areas. » Limited alien infestation within project control area. » Construction activities restricted to the development footprint.
Monitoring and Reporting	» Observation of vegetation clearing activities by ECO/ EO throughout the construction phase. » Monitoring of alien plant establishment within the site on an on-going basis.

OBJECTIVE 9: Protection of fauna, bats and avifauna

Mammals captured by the camera traps include, in order of decreasing abundance, Steenbok, Cape Hare, Cape Fox, Bat-eared fox, Striped Polecat, Suricate, Cape Porcupine, Common Duiker, Honey Badger, Small Spotted Genet, Grey Mongoose, Caracal, Yellow Mongoose, African Wild Cat and Slender Mongoose. More than half the observations are from Steenbok and Cape Hare, with Cape Fox, Bat-eared fox, Striped Polecat, Suricate and Cape Porcupine being moderately abundant and the remaining species uncommon. This represents a fairly typical mammalian community and is similar to that obtained at other sites along the West Coast. The major impacts on mammals would occur during the construction phase when there would be significant noise and disturbance generated at the project site. However, in the long-term, impacts on mammals would be low as additional habitat loss would be minimal and the resident species would be those that are tolerant of human activity and a modified landscape therefore it is unlikely that any species would be significantly affected by the Namas Wind Farm.

Reptile species observed at the project site include Angulate Tortoise, Giant Desert Lizard, Common Giant Ground Gecko, Knox's Desert Lizard, Common Sand Lizard, Cape Skink, Coastal Dwarf Legless Skink, Namaqua Sand Lizard, Pink Blind Legless Skink, Dwarf Beaked Snake and Many-horned Adder. For most species the major impact of the Namas Wind Farm would be loss of habitat equivalent to the footprint of the development. For most species this is not considered highly significant as there are large intact tracts of similar habitat available in the surrounding area. Subterranean species associated with sandy substrates may be vulnerable to habitat disruption due to the construction of roads which may fragment the continuity of the sandy substrate. However, overall, the impacts of the wind farm on reptiles are likely to be of local significance only as there are no species with a very narrow distribution range or of high conservation concern present at the project site that may be compromised by the development.

There is no natural permanent or even seasonal standing water present at the Namas Wind Farm project site, which is due to the sandy substrate and consequent lack of drainage features where water can gather. As a result, the amphibian community at the project site is restricted to species that are relatively

independent of water and is consequently of low diversity. The only species confirmed present in the immediate area is the Namaqua Rain Frog which appears to be relatively widespread within the coastal strandveld vegetation types on sandy soils. Given the absence of important amphibian habitats at the project site and the low diversity of amphibians, a significant impact on amphibians is not likely.

Over the course of 12-months of the pre-construction monitoring campaign, only 46 avian species in the Namas Wind Farm project site were recorded. This is a very low total compared with other arid areas in the Northern and Western Capes that have been sampled. Species richness varied over the seasons, with higher totals recorded in summer (38 species) and the lowest in spring and autumn (21 and 22 species respectively). All species were typical residents of the arid Karoo landscape including Chats, Prinias, Titbabbler, Flycatchers, Karoo Larks and Grey Tit *Parus afer*. The average number of species per kilometre was slightly lower in the project site (9.7 species per km) than in the Control site (10.5 species per km). Similarly, the average number of individual birds per kilometre found in the project site (29.6 birds per km) was higher than in the Control (26.3 birds per km). Bird abundance indices were higher in the spring (September) than any other month. Bird species richness on site stayed relatively constant throughout the year, with summer showing the highest numbers.

One high risk area was identified within the project site and is considered to be an avifaunal no-go area. The sensitivity associated with the area is based on an inactive Secretarybird nest (S29°50'41.8"; E17°11'41.69"). A 1km no-go buffer has been allocated to the nest. The 1km buffer around the known but inactive Secretarybird nest is designed to reduce the possibility of disturbance by construction or operation of the Namas Wind Farm for this vulnerable Red Data species, if it is ever used.

The bat community located within the project site has been confirmed through a bat pre-construction monitoring campaign undertaken within the full-extent of the project site from May 2017 to June 2018. Five bat species were detected by the passive systems and during the driven transects, namely *Miniopterus natalensis, Neoromicia capensis*, *Eptesicus hottentotus, Sauromys petrophilus and Tadarida aegyptiaca*. The *T. aegyptiaca* (Egyptian Free-tailed bat) were the most dominant at all passive recording systems. Although this species has a conservation status of least concern, such abundant species are of a large value to the local ecosystems as they provide a greater contribution to most ecological services than the rarer species, due to their higher numbers. Moderate and high sensitivity areas were identified; areas considered to be of a moderate sensitivity received a 100m buffer and areas considered to be of a high sensitivity received a 200m buffer.

Project component/s	» Wind turbines and associated laydown areas. » Access roads and cabling. » Substation. » Workshop area. » Batching plants. » Temporary laydown areas.
Potential Impact	» Vegetation clearance and associated impacts on faunal habitats. » Disturbance of birds (e.g. destruction of habitat). » Displacement of birds. » Collision with project components. » Traffic to and from site.
Activity/risk source	» Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on site.

	» Access road construction activities. » Substation construction facilities.
Mitigation: Target/Objective	» To minimise footprints of habitat destruction. » To minimise disturbance to resident and visitor faunal and avifaunal species.

Mitigation: Action/control	Responsibility	Timeframe
The extent of clearing and disturbance to the vegetation must be kept to a minimum so that impact on fauna and their habitats is restricted.	EPC Contractor	Site establishment and duration of contract.
Should any animals be found within the project construction area these should be relocated in accordance with a relevant permit. This must be undertaken by a qualified person.	EPC Contractor	Site establishment and duration of contract.
The collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the demarcated construction site.	EPC Contractor	Site establishment and duration of contract.
No animals are to be harmed or killed by the Developer or Contractor(s). Employees should be trained (e.g. during toolbox talks) that poisonous animals should not be killed and if encountered the ECO/ EO should be informed.	Developer EPC Contractor	Duration of contract
Any fauna directly threatened by the construction activities must be removed to a safe location by the ECO or other suitably qualified person.	ECO	Construction phase
All construction vehicles should adhere to a low speed limit (30km/h max) to avoid collisions with susceptible species such as snakes and tortoises.	EPC Contractor	Duration of contract
If any parts of the facility are to be fenced, then no electrified strands should be placed within 30cm of the ground as some species such as tortoises are susceptible to electrocution from electric fences as they do not move away when electrocuted but rather adopt defensive behaviour and are killed by repeated shocks.	EPC Contractor	Duration of contract
Employees must be prohibited from harvesting wild plants or animals for any purpose.	EPC Contractor	Duration of contract
Unnecessary disturbance to habitats should be strictly controlled and the footprint of the impact should be kept to a minimum.	EPC Contractor	Construction phase
Install structures which reduce the availability of perching sites in the area close to the turbines.	EPC Contractor	Construction phase
Increase the visibility of the guy wires, should these be needed, through the use of markers, especially visible at night.	EPC Contractor	Construction phase
Position turbines away from risk areas of high aerial traffic or nests of collision-prone species. This applies to the Secretarybird nest located on site and its associated 1km buffer area.	Developer	Construction phase
Rehabilitate cleared vegetation where possible at areas such as laydown areas.	EPC Contractor	Construction phase

Performance Indicator	» No disturbance outside of designated work areas. » Minimised clearing of existing/natural vegetation and habitats for fauna and avifauna. » Limited impacts on faunal species (including avifauna) (i.e. noted/recorded fatalities), especially those of conservation concern.

Monitoring and Reporting	» Observation of vegetation clearing activities by ECO/ EO throughout construction phase. » Supervision of all clearing and earthworks by ECO/ EO.

OBJECTIVE 10: The identification and rescue of fossil material that may be exposed in the excavations made during the construction of the wind farm.

Palaeontological materials were not observed on the wind farm site but isolated fossil bones could occur within the various sand formations of the area. Impacts to palaeontological resources would occur only during the construction phase when foundations and cable trenches are excavated. The impacts would be direct since the excavations might damage or destroy fossils as they are uncovered. The probability of impacts occurring was rated as 'probable', with the resultant significance of the impacts being medium. With mitigation, the status becomes positive because of the potential gain in knowledge from access to deposits and fossils that would otherwise have remained buried and undiscovered. The significance would be medium following the implementation of mitigation measures. There are no fatal flaws expected from a palaeontological perspective.

Project component/s	» Excavations of turbine foundations. » Excavations of trenches for the installation of cabling and infrastructure.
Potential Impact	» Loss of fossil resources. » Loss of resources going unnoticed. » Destruction of resources
Activity/risk source	» All bulk earthworks.
Mitigation: Target/Objective	» To facilitate the likelihood of noticing fossils and ensure appropriate actions in terms of the relevant legislation

Mitigation: Action/control	Responsibility	Timeframe
Inform staff of the need to watch for potential fossil occurrences.	Proponent Eco	Pre-construction
Inform staff of the Fossil Finds Procedures (**Appendix H** of the BA report) to be followed in the event of fossil occurrences.	ECO Specialist	Pre-construction
Response by personnel in the event of fossil finds: In the process of digging the excavations fossils may be spotted in the hole sides or bottom, or as they appear in the excavated material on the spoil heap. The following process must be followed in the event of such a find: » Stop work at the fossil find. The ECO must be informed. » Protect the find site from further disturbance and safeguard all fossil material in danger of being lost such as in the excavator bucket and scattered in the spoil heap. » The ECO must immediately inform the South African Heritage Resources Agency (SAHRA) and/or the contracted standby palaeontologist of the find and provide via email the following information about the find: * Date * Position of the excavation (GPS coordinate) and depth	Developer ECO Specialist	Construction

Mitigation: Action/control	Responsibility	Timeframe
* A description of the nature of the find * Digital images of the excavation showing vertical sections (sides) and the position of the find showing its depth/location in the excavation * A reference scale must be included in the images (tape measure, ranging road or object of recorded dimensions) * Close-up, detailed images of the find (with a scale included) SAHRA and/or the contracted standby palaeontologist will assess the information and a suitable response will be established which will be reported to the developer and the ECO regarding whether rescue excavation or rescue collection by a palaeontologist is necessary or not. A permit from SAHRA is required to excavate fossils.		
Monitor for the presence of fossils.	ECP Contractor ECO	Construction
Liaise with a palaeontologist on the nature of potential finds and appropriate actions.	ECO Specialist SAHRA	Construction
Obtain a permit from SAHRA for the fossil finds collection should resources be discovered.	Proponent Specialist	Construction
Excavate main finds, inspect pits and record and sample excavations.	Specialist	Construction

Performance Indicator	» Reporting of and liaison about possible fossil finds. » Fossils noticed and rescued. » Scientific record of fossil contexts and temporary exposures in earthworks. » All heritage items located are dealt with as per the legislative guidelines.
Monitoring and Reporting	» Ensure staff are aware of fossils and the procedure to follow when found. » ECO to conduct inspections of open excavations whenever on site.

OBJECTIVE 11: Ensure that impacts to archaeological sites and materials are minimised during the construction of the wind farm

Archaeological sites were found scattered throughout the sand dune areas with almost nothing present on the intervening plain. Because it is closer to the coast, the western dune cordon had far more sites on it than the eastern one. The sites are all small shell and/or artefact scatters with the amount of shell reducing significantly further from the coast. The various farm buildings present are all 20th century and none are of any significance. A farm graveyard occurs close to the farm buildings. Impacts to archaeological resources would occur only during the construction phase when foundations and cable trenches are excavated and land is cleared and levelled for access roads, laydown areas and ancillary infrastructure. The impacts would be direct since the excavations might damage or destroy archaeological materials. The probability of impacts occurring was rated as 'probable' with the resultant significance of the impacts being medium. With mitigation, the magnitude and probability of the impact would be reduced and the significance will be reduced to low.

Project component/s	» Construction of all wind farm related infrastructure.
Potential Impact	» Archaeological sites and materials may be damaged and/or destroyed during earthworks.
Activity/risk source	» All earthworks and surface clearing.
Mitigation: Target/Objective	» Successful location, evaluation and sampling of archaeological materials as required

Mitigation: Action/control	Responsibility	Timeframe
Ensure that a pre-construction walk-through survey is conducted surveying the development footprint.	Developer Specialist	Pre-construction - about 6 months before construction.
Obtain permits from SAHRA for any required mitigation, including excavation.	Specialist	Pre-construction - about 4-5 months before construction
Conduct mitigation excavations.	Specialist	Pre-construction - about 3-4 months before construction.
If a heritage object/resource is found, work in that area must be stopped immediately and appropriate specialists brought in to assess the site, notify the administering authority of the item/site, and undertake due/required processes.	EPC Contractor in consultation with Specialist	Duration of contract
The duty of protection of structures greater than 60 years of age will lie with the provincial heritage authority. Any changes to the farm structures (by anyone) must be done in terms of the necessary permits.	EPC Contractor Specialist	Pre-construction/ Construction
If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) must be alerted. If unmarked human burials are uncovered, the SAHRA Burial Grounds and Graves (BGG) Unit (Thingahangwi Tshivhase/Mimi Seetelo 012 320 8490), must be alerted immediately. A professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the findings. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.	ECO in consultation with the specialist	Construction Phase

Performance Indicator	» Successful completion of mitigation work. » Negligible loss of known significant archaeological resources. » All heritage items located are dealt with as per the legislative guidelines.
Monitoring and Reporting	» None.

OBJECTIVE 12: Ensure that graves are rescued during the construction of the wind farm

Impacts on graves would occur only during the construction phase when foundations and cable trenches are excavated and land is cleared and levelled for access roads, laydown areas and ancillary infrastructure. The impacts would be direct since the excavations might damage or destroy graves. The probability of impacts occurring is very improbable with the resultant significance of impacts being low. With mitigation, the magnitude of the impact would be reduced but the significance remains low.

Project component/s	» Construction of all wind farm related infrastructure.
Potential Impact	» Graves may be damaged and/destroyed during earthworks.
Activity/risk source	» All earthworks and surface clearing.
Mitigation: Target/Objective	» Successful location, evaluation and rescue as required.

Mitigation: Action/control	Responsibility	Timeframe
Ensure that any graves found are immediately protected *in situ* and reported to an archaeologist or SAHRA.	EPC Contractor ECO	Immediately on discovery of the grave
Obtain permit from SAHRA for exhumation of remains.	Specialist	Immediately on discovery of the grave
Carry out exhumation and recording of the grave.	Specialist	As soon as the permit is approved
If any human remains are exposed during construction, all work must cease and it must be reported immediately to the nearest museum/archaeologist or to the South African Heritage Resources Agency, so that a systematic and professional investigation can be undertaken. Sufficient time should be allowed to investigate and to remove/collect such material. If any unmarked or informal graves and subsurface finds are found, these sites should be preserved *in situ*.	EPC Contractor in consultation with Specialist	Construction phase

Performance Indicator	» Successful rescue of burials » All heritage items located are dealt with as per the legislative guidelines.
Monitoring and Reporting	» Should further resources be discovered the applicable monitoring and reporting procedures must be applied.

OBJECTIVE 13: Minimisation of visual impacts associated with construction

During construction heavy vehicles, components, cranes, equipment and construction crews will frequent the area and may cause, at the very least, a visual nuisance to landowners and residents in the area as well as road users.

Project component/s	» Construction site. » Transportation of staff and equipment. » Wind turbines.

Potential Impact	» Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing and the resulting erosion. » Construction traffic.
Activity/risk source	» The viewing of visual scarring by observers in the vicinity of the wind farm or from the roads in the surrounding area.
Mitigation: Target/Objective	» Minimal disturbance to vegetation cover in close vicinity of the wind farm and its related infrastructure. » Minimised construction traffic, where possible. » Minimal visual intrusion by construction activities and intact vegetation cover outside of the immediate construction work areas.

Mitigation: Action/control	Responsibility	Timeframe
The turbines must be painted in a manner that reduces visual impact e.g. a pale, matt, non-reflective colour (i.e. off white, as specified by CAA) before erection of the turbines.	EPC Contractor	Construction phase
Remove all temporary works when construction in an area is completed.	EPC Contractor	Construction phase
The general appearance of construction activities, construction equipment camps and laydown areas must be maintained and kept neat and tidy by means of the timely removal of rubble and disused construction materials.	EPC Contractor	Construction phase
Treat finished surfaces with non-reflective coating.	EPC Contractor	Construction phase
Reduce visual disturbances by minimising areas of surface disturbance, controlling erosion, using dust suppression techniques and restoring exposed soil as close as possible to their original contour and vegetation.	EPC Contractor	Construction phase
Limit access to the construction site (during both construction and operation phases) along existing access roads as far as possible.	EPC Contractor	Duration of contract
Vehicle movements on local roads must be limited to standard construction operating hours wherever possible to limit dust nuisance.	EPC Contractor	Duration of contract
The movement of all vehicles within the site must be on designated roadways.	EPC Contractor	Duration of contract
Signage must be established at appropriate points warning of turning traffic and at the construction site (all signage to be in accordance with prescribed standards and must be managed on an ongoing basis).	EPC Contractor	Duration of contract
Ensure that vegetation is not unnecessarily cleared or removed during the construction phase.	EPC Contractor	Early in the construction phase
Reduce the construction phase through careful logistical planning and productive implementation of resources.	EPC Contractor	Early in the construction phase
Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.	EPC Contractor	Early in the construction phase
Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.	EPC Contractor	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	EPC Contractor	Construction phase
Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	EPC Contractor	Construction phase
Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	EPC Contractor	Construction phase
Rehabilitate all disturbed areas, construction areas, servitudes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.	EPC Contractor	Throughout and at the end of the construction

Performance Indicator	» Construction site maintained in a neat and tidy condition. » Vegetation cover on and in the vicinity of the site is intact (i.e. full cover as per natural vegetation within the environment) with no evidence of degradation or erosion. » Site appropriately rehabilitated after construction is complete.
Monitoring	» Ensure that mitigation measures are implemented during construction to minimise visual impacts on surrounding communities. » Ensure that aviation warning lights or other measures are installed before construction is completed according to CAA requirements. » Ensure that aviation warning lights or other measures are functional at all times. » Monitoring of vegetation clearing during construction (by contractor as part of construction contract). » Monitoring of rehabilitated areas quarterly for at least a year following the end of construction (by contractor as part of construction contract).

OBJECTIVE 14: Appropriate handling and storage of chemicals, hazardous substances and waste

The construction phase of the wind farm will involve the storage and handling of a variety of chemicals including adhesives, abrasives, oils and lubricants, paints and solvents. The main wastes expected to be generated by the construction of the wind farm will include general solid waste, hazardous waste and liquid waste.

Project component/s	» Wind turbines. » Substation. » Concrete batching plant.
Potential Impact	» Release of contaminated water from contact with spilled chemicals. » Generation of contaminated wastes from used chemical containers. » Inefficient use of resources resulting in excessive waste generation. » Contamination of soils. » Litter or contamination of the site or water through poor waste management practices.
Activity/risk source	» Vehicles associated with site preparation and earthworks. » Substation construction activities. » Packaging and other construction wastes. » Hydrocarbon use and storage.

	» Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	» To ensure that the storage and handling of chemicals and hydrocarbons on-site does not cause pollution to the environment or harm to persons. » To ensure that the storage and maintenance of machinery on-site does not cause pollution of the environment or harm to persons. » To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste storage and disposal. » To avoid environmental harm from waste disposal. » A waste manifest should be developed for the ablutions showing proof of disposal of sewage at appropriate water treatment works.

Mitigation: Action/control	Responsibility	Timeframe
The storage of flammable and combustible liquids such as oils must be in designated areas which are appropriately bunded, and stored in compliance with Material Safety Data Sheets (MSDS) files.	EPC Contractor	Duration of contract
Any spills must receive the necessary clean-up action. Spill kits are to be kept on-site and used to remediate any spills that may occur. Appropriate arrangements are to be made for appropriate collection and disposal of all cleaning materials, absorbents and contaminated soils.	EPC Contractor	Duration of contract
Any storage and disposal permits/approvals which may be required must be obtained, and the conditions attached to such permits and approvals must be complied with.	EPC Contractor	Duration of contract
Routine servicing and maintenance of vehicles is not to be undertaken on-site (except for emergency situations or large cranes which cannot be moved off-site). If repairs of vehicles must take place on site, an appropriate drip tray must be used to contain any fuel or oils.	EPC Contractor	Duration of contract
Transport of all hazardous substances must be in accordance with the relevant legislation and regulations.	EPC Contractor	Duration of contract
Waste disposal records must be available for review at any time.	EPC Contractor	Duration of contract
Construction contractors must provide specific detailed waste management plans to deal with all waste streams.	EPC Contractor	Duration of contract
Specific areas must be designated on-site for the temporary management of various waste streams, i.e. general refuse, construction waste (wood and metal scrap) and contaminated waste. The location of such areas must seek to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage and vermin control.	EPC Contractor	Duration of contract
Liquid dispensing receptacles (e.g. lubricants, diesel, shutter oil etc.) must have drip trays beneath them/beneath the nozzle fixtures. Material safety data sheets (MSDS) must be available on site (if required) where products are stored, so that in the event of an incident, the correct action can be taken. Depending on the types of materials stored on site during the maintenance activities, suitable product recovery materials (such as Spillsorb	Proponent EPC Contractor	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
or Drizit products) must be readily available. Vehicles should ideally be washed at their storage yard as opposed to on site.		
Where possible, construction and general wastes on-site must be reused or recycled.	EPC Contractor	Duration of contract
Disposal of waste must be in accordance with the relevant legislative requirements, including the use of licensed contractors and licensed waste disposal sites.	EPC Contractor	Duration of contract
Hydrocarbon waste must be contained and stored in sealed containers within an appropriately bunded area and clearly labelled.	EPC Contractor	Duration of contract
Waste and surplus dangerous goods must be kept to a minimum and must be transported by approved waste transporters to sites designated for their disposal.	EPC Contractor	Duration of contract
Documentation (waste manifest) must be maintained detailing the quantity, nature and fate of any hazardous waste Proof of disposal (receipts) must be kept on file should a third party waste management contracted be utilised.	EPC Contractor	Duration of contract
An incident/complaints register must be established and maintained on-site.	EPC Contractor	Duration of contract
Discharge of sewage into the environment must be prevented and if leaks occur from sewage systems, then this must be fixed and the contaminated vegetation / soil must be removed immediately and treated as hazardous waste.	EPC Contractor	Duration of construction
Hazardous and non-hazardous waste must be separated at the source. Separate waste collection bins must be provided for this purpose. These bins must be clearly marked and appropriately covered.	EPC Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
All solid waste collected must be disposed of at a registered waste disposal site. A certificate of disposal must be obtained and kept on file. Under no circumstances may solid waste be burnt or buried on site.	EPC Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Supply waste collection bins at construction equipment and construction crew camps.	EPC Contractor	Erection: during site establishment Maintenance: for duration of Contract within a particular area
Construction equipment must be refuelled within designated refuelling locations, or where remote refuelling is required, appropriate drip trays must be utilised.	EPC Contractor	Duration of contract
All stored fuels to be maintained within a bund and on a sealed surface. Bunds must be sufficiently large to contain at least 120% of the largest tank within the bund (i.e. must exceed the capacity of the largest tank).	EPC Contractor	Duration of contract
Fuel storage areas must be inspected regularly to ensure bund stability, integrity and function.	EPC Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Construction machinery must be stored in an appropriately sealed area.	EPC Contractor	Duration of contract
Spilled cement and concrete must be cleaned up as soon as possible and disposed of at a suitably licensed waste disposal site.	EPC Contractor	Duration of contract
Corrective action must be undertaken immediately if a complaint is made, or potential/actual leak or spill of polluting substance identified. This includes stopping the contaminant from further escaping, cleaning up the affected environment as much as practically possible and implementing preventive measures.	EPC Contractor	Duration of contract
The Contractor shall be in possession of emergency spill kits that must be complete and available at all times on site.	EPC Contractor	Duration of contract
In the event of a major incident (including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed), the responsible person must, as soon as reasonably practicable after knowledge of the incident: (a) take all reasonable measures to contain and minimise the effects of the incident, including its effects on the environment and any risks posed by the incident to the health, safety and property of persons; (b) undertake clean-up procedures; (c) remedy the effects of the incident; (d) assess the immediate and long-term effects of the incident on the environment and public health.	EPC Contractor	Duration of contract
All the maintenance of vehicles must be carried out in specially designated areas to prevent any type of pollution on the residual site.	EPC Contractor	Duration of contract
Upon the completion of construction, the area will be cleared of potentially polluting materials.	EPC Contractor	Completion of construction
All work sites must be kept free of waste. Solid waste (general waste) to be disposed of at the nearest municipal landfill site. Slips of disposal to be retained as proof of responsible disposal	EPC Contractor	Site establishment, and duration of construction
Keep a record of all hazardous substances stored on site for submission to the ECO. Clearly label all the containers storing hazardous waste.	EPC Contractor	Construction phase
An effective monitoring system must be put in place to detect any leakage or spillage of all hazardous substances during their transportation, handling, installation and storage.	EPC Contractor	Duration of contract

Performance Indicator	» No chemical spills outside of designated storage areas. » No water or soil contamination by chemical spills. » No complaints received regarding waste on site or indiscriminate dumping. » Internal site audits ensuring that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests for all waste streams. » Spills are sufficiently cleaned and dealt with.

Monitoring and Reporting	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout the construction phase. » A complaints register must be maintained, in which any complaints from the community will be logged. Complaints must be investigated and, if appropriate, acted upon. » Observation and supervision of waste management practices throughout the construction phase. » Waste collection to be monitored on a regular basis. » Waste documentation completed. » An incident reporting system must be used to record non-conformances to the EMPr. » The appointed ECO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 15: Effective management of concrete batching plant

Concrete is required during the construction of the wind farm. In this regard there could be a need to establish a temporary batching plant within the site. Batching plants are facilities/installations that combine various ingredients to form concrete. Some of these inputs include sand, water, aggregate (rocks, gravel, etc.), fly ash, potash, and cement.

Turbid and highly alkaline wastewater, dust emissions and noise are the key potential impacts associated with concrete batching plants. Concrete batching plants, cement, sand and aggregates can produce dust. Potential pollutants in batching plant wastewater and stormwater include cement, sand, aggregates, chemical additive mixtures, fuels and lubricants.

Project component/s	» Concrete batching plant.
Potential Impact	» Dust emissions. » Release of contaminated water. » Generation of contaminated wastes from used chemical containers » Inefficient use of resources resulting in excessive waste generation.
Activity/risk source	» Operation of the batching plant. » Packaging and other construction wastes. » Hydrocarbon use and storage. » Spoil material from excavation, earthworks and site preparation.
Mitigation: Target/Objective	» To ensure that the operation of the batching plant does not cause pollution to the environment or harm to persons.

Mitigation: Action/control	Responsibility	Timeframe
Where possible concrete batching plants should be sited such that impacts on the environment or the amenity of the local community from noise, odour or polluting emissions are minimised.	EPC Contractor	Construction phase
The provision of natural or artificial wind barriers such as trees, fences and landforms may help control the emission of dust from the plant.	EPC Contractor	Construction phase

Mitigation: Action/control	Responsibility	Timeframe
Where there is a regular movement of vehicles. Access and exit routes for heavy transport vehicles should be planned to minimise noise and dust impacts on the environment.	EPC Contractor	Construction phase
The concrete batching plant site should demonstrate good maintenance practices, including regular sweeping to prevent dust build-up.	EPC Contractor	Construction phase
The prevailing wind direction should be considered to ensure that bunkers and conveyors are sited in a sheltered position to minimise the effects of the wind.	EPC Contractor	Construction phase
Aggregate material should be delivered in a damp condition, and water sprays or a dust suppression agent should be correctly applied to reduce dust emissions and reduce water usage.	EPC Contractor	Construction phase
Conveyors must be designed and constructed to prevent fugitive dust emissions. This may include covering the conveyor with a roof, installing side protection barriers and equipping the conveyor with spill trays, which directs material to a collection point. Belt cleaning devices at the conveyor head may also assist to reduce spillage.	EPC Contractor	Construction phase
The site should be designed and constructed such that clean stormwater, including roof runoff, is diverted away from contaminated areas and directed to the stormwater discharge system.	EPC Contractor	Construction phase
Contaminated stormwater and process wastewater should be captured and recycled where possible. A wastewater collection and recycling system should be designed to collect contaminated water.	EPC Contractor	Construction phase
Areas where spills of oils and chemicals may occur should be equipped with easily accessible spill control kits to assist in prompt and effective spill control.	EPC Contractor	Construction phase
Ensure that all practicable steps are taken to minimise the adverse effect of noise emissions. This responsibility includes not only the noise emitted from the plant and equipment but also associated noise sources, such as radios, loudspeakers and alarms.	EPC Contractor	Construction phase
Where possible, waste concrete should be used for construction purposes at the batching plant or project site.	EPC Contractor	Construction phase

Performance Indicator	» No complaints regarding dust. » No water or soil contamination by chemical spills. » No complaints received regarding waste on site or indiscriminate dumping.
Monitoring and Reporting	» Observation and supervision of chemical storage and handling practices and vehicle maintenance throughout the construction phase. » A complaints register must be maintained, in which any complaints from the community must be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr. » The Developer or appointed ECO/EO must monitor indicators listed above to ensure that they have been met for the construction phase.

OBJECTIVE 16: Appropriate management of the construction site and construction workers

In order to minimise impacts on the surrounding environment, contractors must be required to adopt a certain Code of Conduct and commit to restricting construction activities to areas within the development footprint. Contractors and their sub-contractors must be familiar with the conditions of the Environmental Authorisation, the BA report, and this EMPr, as well as the requirements of all relevant environmental legislation.

Project component/s	» Wind farm. » Associated infrastructure.
Potential Impact	» Pollution/contamination of the environment. » Damage to and/or loss of topsoil (i.e. pollution, compaction etc.). » Disturbance to the environment and surrounding communities. » Fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences.
Activity/risk source	» Vegetation clearing and levelling of equipment storage area/s. » Contractors are not aware of the requirements of the EMPr, leading to unnecessary impacts on the surrounding environment.
Mitigation: Target/Objective	» To ensure appropriate management of actions by on-site personnel in order to minimise impacts to the surrounding environment.

Mitigation: Action/control	Responsibility	Timeframe
Road borders must be regularly maintained to ensure that vegetation remains short to serve as an effective firebreak. A fire management plan to be developed with emergency procedures in the event of a fire (refer to **Appendix I**).	EPC Contractor	Erection: during site establishment Maintenance: duration of contract
Contractors must use chemical toilets/ablution facilities situated at designated areas of the site; no abluting must be permitted outside of the designated area. These facilities must be regularly serviced by appropriate contractors.	EPC Contractor	Duration of contract
Cooking must take place in a designated area. No firewood or kindling may be gathered from the site or surrounds.	EPC Contractor	Duration of contract
A Method Statement should be compiled for the management of pests and vermin within the site, specifically relating to any canteen area.	EPC Contractor	Construction phase
Provide fire-fighting training to selected construction staff.	EPC Contractor	Construction phase
Provide adequate fire-fighting equipment on-site.	EPC Contractor	Construction phase
Ensure compliance with all national, regional and local legislation with regards to the storage, handling and disposal of hydrocarbons, chemicals, solvents and any other dangerous good, harmful and hazardous substances and materials.	EPC Contractor	Construction phase
All litter must be deposited in a clearly marked, closed, animal-proof disposal bin in the construction area; particular attention needs to be paid to food waste.	EPC Contractor	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
No one may disturb flora or fauna outside of the demarcated construction area/s.	EPC Contractor	Duration of contract

Performance Indicator	» Designated areas for fires identified on site at the outset of the construction phase. » Fire-fighting equipment and training provided before the construction phase commences. » Compliance with specified conditions of Environmental Authorisation, BA report and EMPr. » No complaints regarding contractor behaviour or habits recorded in complaints register. » Code of Conduct drafted before commencement of the construction phase and briefing session with construction workers held at the outset of construction phase.
Monitoring and Reporting	» Observation and supervision of Contractor practices throughout construction phase. » A complaints register must be maintained, in which any complaints from the community are to be logged. Complaints must be investigated and, if appropriate, acted upon. » An incident reporting system must be used to record non-conformances to the EMPr.

OBJECTIVE 17: Traffic management and transportation of equipment and materials to site (Traffic Management Plan)

The construction and decommissioning phases of the project will be the most significant in terms of traffic impacts resulting from the transport of equipment (including turbine components) and materials and construction crews to the site and the return of the vehicles after delivery of materials. Potential impacts associated with transportation and access relate mostly to works within the site boundary (i.e. the wind farm and ancillary infrastructure) and the external road network. This section should be read in conjunction with the Traffic and Transportation Plan attached as **Appendix F**.

It should be noted that the road network within the Kleinsee area was established to cater for the requirements of the mining operations within the area. These existing routes can therefore accommodate moderate to high traffic volumes. With the down-scaling of the mining in the area the routes are envisaged to adequately accommodate the trips expected to be generated with the development of the wind farm.

Project component/s	» Wind turbines. » Substation. » Access roads. » All other associated infrastructure. » Construction vehicles.
Potential Impact	» Traffic congestion, particularly on narrow roads or on road passes where overtaking is not permitted. » Risk of accidents. » Deterioration of road pavement conditions (i.e. both surfaced and gravel road) due to abnormal loads.
Activity/risk source	» Construction vehicle movement. » Speeding on local roads. » Degradation of local road conditions. » Site preparation and earthworks. » Foundations or plant equipment installation. » Mobile construction equipment movement on-site.

	» Substation construction activities.
Mitigation: Target/Objective	» Minimise impact of traffic associated with the construction of the wind farm on the local traffic volume, existing infrastructure, property owners, animals, and road users. » To minimise the potential for negative interaction between pedestrians or sensitive users and traffic associated with the wind farm construction. » To ensure all vehicles are roadworthy and all materials/equipment are transported appropriately and within any imposed permit/licence conditions.

Mitigation: Action/control	Responsibility	Timeframe
Develop and implement a detailed method statement for the implementation of the traffic and transportation management plan (refer to **Appendix F**).	Contractor(s), (Transportation sub-contractor)	Duration of contract
Existing road infrastructure must be used as far as possible for providing access to the proposed turbine positions. Where no road infrastructure exists, new roads should be placed within existing disturbed areas or environmental conditions must be taken into account to ensure the minimum amount of damage is caused to natural habitats.	Contractor(s), (Transportation sub-contractor)	Duration of contract
A designated access (or accesses) to the proposed site must be created to ensure safe entry and exit.	EPC Contractor	Duration of contract
Appropriate road management strategies must be implemented on external and internal roads with all employees and contractors required to abide by standard road and safety procedures.	Contractor(s), (Transportation sub-contractor)	Duration of contract
Signage must be established at appropriate points warning of turning traffic and the construction site (all signage to be in accordance with prescribed standards). Signage must be maintained on an on-going basis.	Contractor(s)	Duration of contract
Appropriate maintenance of all vehicles must be ensured. Proof of maintenance (maintenance rosters) must be kept on site as evidence for ongoing maintenance.	Contractor(s)	Duration of contract
Signs must be placed along construction roads to identify speed limits, travel restrictions, and other standard traffic control information. All vehicles travelling on public roads must adhere to the specified speed limits and all drivers must be in possession of an appropriate valid driver's license.	Contractor(s)	Duration of contract
All vehicles to adhere to low speed limits (40km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.	Contractor(s)	Duration of contract
Keep hard road surfaces as narrow as possible.	Contractor(s)	Duration of contract
Construction vehicles carrying material to the site should avoid using roads through densely populated built-up areas.	Contractor(s), (Transportation sub-contractor)	Duration of contract
The movement of all vehicles (barring clearing machinery) within the site must be on designated roadways.	Contractor(s)	Duration of contract
All hazardous substances must be transported in accordance with the relevant legislation and regulations.	Contractor(s)	Duration of contract
Road borders should be regularly maintained to ensure that vegetation remains short and that they therefore serve as an effective firebreak (where required).	Contractor(s) in consultation with the ECO	Duration of contract

Mitigation: Action/control	Responsibility	Timeframe
Roads must be designed so that changes to surface water runoff are avoided and erosion is not initiated.	Contractor(s)	Duration of contract
The 228m sight triangle area must be kept clear of obstructions at the access point	EPC Contractor	Duration of contract
All bellmouths present along the site access to the wind turbine locations need to be in line with the required geometric standards to accommodate abnormal haulage vehicles. The exact location and upgrades of the internal access roads will need to be established at the detailed design stage.	EPC Contractor	Construction phase
The chosen access and circulation roads are to be upgraded to suit the abnormal load vehicle requirements. If the access and circulation roads to the site are to remain as gravel roads, the routes need to be maintained during the additional loading experienced during the construction phase and be reinstated once construction is complete.	Developer EPC Contractor	Construction phase
The delivery of wind turbine components to the site must be staggered and trips must be scheduled to occur outside of peak traffic hours.	Developer EPC Contractor	Construction phase
Stagger the construction of the turbines.	EPC Contractor	Construction phase
Staff and general trips should occur outside of peak traffic periods.	EPC Contractor	Construction phase
Staff can be shuttled on scheduled busses to minimise the number of trips.	EPC Contractor	Construction phase

Performance Indicator	» No traffic incidents involving project personnel or appointed contractors. » Appropriate signage in place. » No complaints resulting from traffic congestion, delays or driver negligence associated with construction of the wind farm.
Monitoring	» Visual monitoring of dust produced by traffic movement. » Visual monitoring of traffic control measures to ensure they are effective. » A complaints register will be maintained, in which any complaints from the community will be logged. Complaints will be investigated and, if appropriate, acted upon. » An incident reporting system will be used to record non-conformances to the EMPr.

6.3. Detailing Method Statements

OBJECTIVE 18: Ensure all construction activities are undertaken with the appropriate level of environmental awareness to minimise environmental risk

The environmental specifications are required to be underpinned by a series of Method Statements, within which the Contractors and Service Providers are required to outline how any identified environmental risks will practically be mitigated and managed for the duration of the contract, and how specifications within this EMPr will be met. That is, the Contractor will be required to describe how specified requirements will be achieved through the submission of written Method Statements to the Site Manager and ECO.

A Method Statement is defined as "a written submission by the Contractor in response to the environmental specification or a request by the Site Manager, setting out the plant, materials, labour and method the Contractor proposes using to conduct an activity, in such detail that the Site Manager is able to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications". The Method Statement must cover applicable details with regard to:

- Details of the responsible person/s
- Construction procedures
- Materials and equipment to be used
- Getting the equipment to and from site
- How the equipment/material will be moved while on-site
- How and where material will be stored
- The containment (or action to be taken if containment is not possible) of leaks or spills of any liquid or material that may occur
- Timing and location of activities
- Compliance/non-compliance with the Specifications
- Any other information deemed necessary by the Site Manager

Method Statements must be compiled for all activities which affect any aspect of the environment and should be applied consistently to all activities. Specific areas to be addressed in the method statement: pre, during and post construction include:

- Site establishment (which explains all activities from induction training to offloading, construction sequence for site establishment and the different amenities and to be established etc., including a site camp plan indicating all of these).
- Preparation of the site (i.e. clearing vegetation, compacting soils and removing existing infrastructure and waste).
- Soil management/stockpiling and erosion control.
- Excavations and backfilling procedure.
- Stipulate norms and standards for water supply and usage (i.e. comply strictly to licence and legislation requirements and restrictions).
- Stipulate the stormwater management procedures recommended in the stormwater management method statement.
- Ablution facilities (placement, maintenance, management and servicing).
- Solid Waste Management:
  - Description of the waste storage facilities (on site and accumulative).
  - Placement of waste stored (on site and accumulative).
  - Management and collection of the waste process.
  - Recycle, re-use and removal process and procedure.
- Liquid waste management:
  - Design, establish, maintain and operate suitable pollution control facilities necessary to prevent discharge of water containing polluting matter or visible suspended materials into rivers, streams or existing drainage systems.
  - Should grey water (i.e. water from basins, showers, baths, kitchen sinks etc.) need to be disposed of, link into existing facilities or sewerage systems where possible. Where no facilities are available, grey water runoff must be controlled to ensure there is no unacceptable seepage occurs.
- Dust and noise pollution:

- Describe the necessary measures to ensure that noise from construction activities is maintained within lawfully acceptable levels.
- Procedure to control dust at all times on the site, access roads, borrow pits and spoil sites (dust control shall be sufficient so as not to have significant impacts in terms of the biophysical and social environments). These impacts include visual pollution, decreased safety due to reduced visibility, negative effects on human health and the ecology due to dust particle accumulation.

» Hazardous substance storage (ensure compliance with all national, regional and local legislation with regard to the storage of oils, fuels, lubricants, solvents, wood treatments, bitumen, cement, pesticides and any other harmful and hazardous substances and materials. South African National Standards apply):
  - Lists of all potentially hazardous substances to be used.
  - Appropriate handling, storage and disposal procedures.
  - Prevention protocol of accidental contamination of soil at the storage and handling areas.
  - All storage areas, (i.e. for harmful substances appropriately bunded with a suitable collection point for accidental spills must be implemented and drip trays underneath dispensing mechanisms including leaking engines/machinery).
» Fire prevention and management measures on site.
» Fauna and flora protection process on and off site (i.e. removal to reintroduction or replanting, if necessary):
  - Rehabilitation, re-vegetation process and bush clearing.
» Incident and accident reporting protocol.
» General administration.
» Designate access road and the protocol for when roads are in use.
» Requirements on gate control protocols.

The Contractor may not commence with the activity covered by the Method Statement until it has been reviewed by the Site Manager, except in the case of emergency activities and then only with the consent of the Site Manager. Approval of the Method Statement will not absolve the Contractor from their obligations or responsibilities in terms of their contract.

Failure to submit a method statement may result in suspension of the activity concerned until such time as a method statement has been submitted and approved.

6.4. Awareness and Competence: Construction Phase of the Namas Wind Farm

OBJECTIVE 19: To ensure all construction personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm

To achieve effective environmental management, it is important that Contractors are aware of the responsibilities in terms of the relevant environmental legislation and the contents of this EMPr. The Contractor is responsible for informing employees and sub-contractors of their environmental obligations in terms of the environmental specifications, and for ensuring that employees are adequately experienced and properly trained in order to execute the works in a manner that will minimise environmental impacts. The Contractors obligations in this regard include the following:

- All employees must have a basic understanding of the key environmental features of the construction site and the surrounding environment. This includes the discussion/explanation of site environmental matters during toolbox talks.
- The content and requirements of Method Statements are to be clearly explained to all plant operators and general workers. All staff acting in a supervisory capacity is to have copies of the relevant Method Statements and be aware of the content thereof.
- Ensuring that a copy of the EMPr is readily available on-site, and that all senior site staff is aware of the location and have access to the document. Senior site staff will be familiar with the requirements of the EMPr and the environmental specifications as they apply to the construction of the wind farm.
- Ensuring that, prior to commencing any site works, all employees and sub-contractors have attended an Environmental Awareness Training session. The training session must provide the site staff with an appreciation of the project's environmental requirements, and how they are to be implemented.
  - Records must be kept of those that have completed the relevant training.
  - Training should be done either in a written or verbal format but must be appropriate for the receiving audience.
  - Refresher sessions must be held to ensure the contractor staff are aware of their environmental obligations as practically possible.
- All sub-contractors must have a copy of the EMPr and sign a declaration/ acknowledgement that they are aware and familiar with the contents and requirements of the EMPr and that they will conduct work in such a manner as to ensure compliance with the requirements of the EMPr.
- Contractors and main sub-contractors should have basic training in the identification of archaeological sites/objects, and protected flora and fauna that may be encountered on the site.
- Awareness of any other environmental matters, which are deemed to be necessary by the ECO.
- Ensuring that employee information posters, outlining the environmental "do's" and "don'ts" (as per the environmental awareness training course) are erected at prominent locations throughout the site.

Therefore, prior to the commencement of construction activities on site and before any person commences with work on site thereafter, adequate environmental awareness and responsibility are to be appropriately presented to all staff present on-site, clearly describing their obligations towards environmental controls and methodologies in terms of this EMPr. This training and awareness will be achieved in the following ways:

6.4.1 Environmental Awareness Training

Environmental Awareness Training must be undertaken by the EPC Contractor and must take the form of an on-site talk and demonstration by the SHE Officer and/or ECO before the commencement of site establishment and construction on site. The education/awareness programme should be aimed at all levels of management and construction workers within the contractor team. A record of attendance of this training must be maintained by the SHE Officer on site.

6.4.2 Induction Training

Environmental induction training must be presented to all persons who are to work on the site – be it for short or long durations; Contractor's or Engineer's staff; administrative or site staff; sub-contractors or visitors to site.

This induction training should be undertaken by the Contractor's SHE Officer and should include discussing the developer's environmental policy and values, the function of the EMPr and Contract Specifications and

the importance and reasons for compliance to these. The induction training must highlight the overall "do's" and "don'ts" on site and clarify the repercussions of not complying with these. The non-conformance reporting system must be explained during the induction as well. Opportunity for questions and clarifications must form part of this training. A record of attendance of this training must be maintained by the SHE Officer on site.

6.4.3 Toolbox Talks

Toolbox talks should be held on a scheduled and regular basis (at least once a week) where foremen, environmental and safety representatives of different components of the works and sub-consultants hold talks relating to environmental practices and safety awareness on site. These talks should also include discussions on possible common incidents occurring on site and the prevention of the reoccurrence thereof. Records of attendance and the awareness talk subject must be kept on file.

6.5. Monitoring Programme: Construction Phase of the Namas Wind Farm

OBJECTIVE 20: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. The period and frequency of monitoring will be stipulated by the Environmental Authorisation (once issued). Where this is not clearly dictated, Namas Wind Farm will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The Technical Director/Manager will ensure that the monitoring is conducted and reported.

Bird and/or bat monitoring should take place in line with guidelines or endorsed standards in South Africa, at the time of implementing the wind farm. Where this is not clearly dictated, Genesis Namas Wind (Pty) Ltd will determine and stipulate the period and frequency of monitoring required in consultation with relevant stakeholders and authorities. The ECO will ensure that the monitoring is conducted and reported.

The aim of the monitoring and auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- Ensure adequate and appropriate interventions to address non-compliance.
- Ensure adequate and appropriate interventions to address environmental degradation.
- Provide a mechanism for the lodging and resolution of public complaints.
- Ensure appropriate and adequate record keeping related to environmental compliance.
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
- Aid communication and feedback to authorities and stakeholders.

6.5.1. Non-Conformance Reports

All supervisory staff including Foremen, Resident Engineers, and the ECO must be provided with the means to be able to submit non-conformance reports to the Site Manager. Non-conformance reports will describe, in detail, the cause, nature and effects of any environmental non-conformance by the Contractor. Records of penalties imposed may be required by the relevant authority within 48 (forty eight) hours.

The non-conformance report will be updated on completion of the corrective measures indicated on the finding sheet. The report must indicate that the remediation measures have been implemented timeously and that the non-conformance can be closed-out to the satisfaction of the Site Manager and ECO.

6.5.2. Incident Reports

According to Section 30 of National Environmental Management Act (NEMA), an "Incident" is defined as an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed.

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality such information as is available to enable an initial evaluation of the incident, including:

(a) the nature of the incident;
(b) the substances involved and an estimation of the quantity released and their possible acute effect on persons and the environment and data needed to assess these effects;
(c) initial measures taken to minimise impacts;
(d) causes of the incident, whether direct or indirect, including equipment, technology, system, or management failure; and
(e) measures taken and to be taken to avoid a recurrence of such incident.

6.5.3. Monitoring Reports

A monitoring report will be compiled by the ECO on a monthly basis (or as dictated by the conditions of the EA) and must be submitted to the Director: Compliance Monitoring at DEA for their records. This report should include details of the activities undertaken in the reporting period, any non-conformances or incidents recorded, corrective action required, and details of those non-conformances or incidents which have been closed out, or any other aspect as per the Appendix 7 of the EIA Regulations (2014, as amended 2017). The EPC contractor must ensure that all waste manifests are provided to the ECO on a monthly basis in order to inform and update the DEA regarding waste related activities.

6.5.4. Audit Report

The Developer must ensure that project compliance with the conditions of the Environmental Authorisation is audited by an independent auditor, and that the audit reports are submitted to the Director: Compliance Monitoring at the DEA at intervals as dictated by the conditions of the EA. Such audits must be undertaken during both the construction and operation phases of the wind farm. The effectiveness of the mitigation

measures and recommendations for amongst others the following: grievance incidents; waste management, alien and open space management, re-vegetation and rehabilitation, plant rescue and protection and traffic and transportation should be audited. The results must form part of the project monitoring and audit reports.

6.5.5. Final Audit Report

A final environmental audit report must be compiled by an independent external auditor and be submitted to DEA upon completion of the construction and rehabilitation activities (within 30 days of completion of the construction phase. This 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 and the requirements of the EMPr.

CHAPTER 7: MANAGEMENT PROGRAMME: REHABILITATION

Overall Goal: Undertake the rehabilitation measures in a way that:

» Ensures rehabilitation of disturbed areas following the execution of the works, such that residual environmental impacts are remediated or curtailed.

7.1. Objectives

In order to meet this goal, the following objective, actions and monitoring requirements are relevant:

OBJECTIVE 1: Ensure appropriate rehabilitation of disturbed areas such that residual environmental impacts are remediated or curtailed

Areas requiring rehabilitation will include all areas disturbed during the construction phase and that are not required for regular operation and maintenance operations. Rehabilitation should be undertaken in an area as soon as possible after the completion of construction activities within that area.

Project component/s	» Wind farm (including temporary access roads and laydown areas). » Substation. » Temporary laydown areas.
Potential Impact	» Environmental integrity of the site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/risk source	» Site preparation and earthworks. » Excavation of foundations and trenches. » Temporary laydown areas. » Temporary access roads/tracks. » Other disturbed areas/footprints.
Mitigation: Target/Objective	» To ensure and encourage site rehabilitation of disturbed areas. » To ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts (including erosion) are remediated or curtailed.

Mitigation: Action/control	Responsibility	Timeframe
A site rehabilitation programme should be compiled and implemented (refer to **Appendix D**).	EPC Contractor in consultation with Specialist	Duration of contract
All temporary facilities, equipment and waste materials must be removed from site and appropriately disposed of.	EPC Contractor	Following execution of the works
Necessary drainage works and anti-erosion measures must be installed, where required, to minimise loss of topsoil and control erosion.	EPC Contractor	Following the completion of construction activities in an area

Mitigation: Action/control	Responsibility	Timeframe
Re-vegetated areas may have to be protected from wind erosion and maintained until an acceptable plant cover has been achieved.	EPC Contractor in consultation with rehabilitation specialist	Post-rehabilitation
On-going alien plant monitoring and removal should be undertaken on all areas of natural vegetation on an annual basis.	EPC Contractor in consultation with rehabilitation specialist	Post-rehabilitation

Performance Indicator	» All portions of site, including construction camp and working areas, cleared of equipment and temporary facilities. » Topsoil replaced on all areas and stabilised. » Disturbed areas rehabilitated and acceptable plant cover achieved on rehabilitated sites. » Closed site free of erosion and alien invasive plants.
Monitoring and Reporting	» On-going inspection of rehabilitated areas in order to determine the effectiveness of the rehabilitation measures implemented during the operational lifespan of the wind farm. » On-going alien plant monitoring and removal should be undertaken on an annual basis. » An incident reporting system must be used to record non-conformances to the EMPr.

CHAPTER 8: MANAGEMENT PROGRAMME: OPERATION

Overall Goal: To ensure that the operation of the wind farm does not have unforeseen impacts on the environment and to ensure that all impacts are monitored and the necessary corrective action taken in all cases. In order to address this goal, it is necessary to operate the Namas wind Farm in a way that:

» Ensures that operation activities are properly managed in respect of environmental aspects and impacts.
» Enables the wind farm operation activities to be undertaken without significant disruption to other land uses in the area, in particular with regard to farming practices, traffic and road use, and effects on local residents.
» Minimises impacts on fauna using the site.

An environmental manager must be appointed during operation whose duty will be to ensure the implementation of the operational EMPr.

8.1. Objectives

In order to meet this goal, the following objectives have been identified, together with necessary actions and monitoring requirements.

OBJECTIVE 1: Establish clear reporting, communication, and responsibilities in relation to the overall implementation of the environmental management programme during operation

Formal responsibilities are necessary to ensure that key procedures are executed. Specific responsibilities of the Operations Manager, and Environmental Manager for the operation phase of this project are detailed below.

The **Operations Manager** will:
» Ensure that adequate resources (human, financial, technology) are made available and appropriately managed for the successful implementation of the operational EMPr.
» Conduct annual basis reviews of the EMPr to evaluate its effectiveness.
» Take appropriate action as a result of findings and recommendations in management reviews and audits.
» Provide forums to communicate matters regarding environmental management.

The **Technical/SHEQ Manager** will:

» Develop and Implement an Environmental Management System (EMS) for the wind farm and associated infrastructure.
» Manage and report on the wind farm's environmental performance.
» Maintain a register of all known environmental impacts and manage the monitoring thereof.
» Conduct internal environmental audits and co-ordinate external environmental audits.

- Liaise with statutory bodies such as the National and Provincial departments of Environmental Affairs (DEA and DENC) on environmental performance and other issues.
- Conduct environmental training and awareness for the employees who operate and maintain the wind farm.
- Compile environmental policies and procedures.
- Liaise with interested and affected parties on environmental issues of common concern.
- Track and control the lodging of any complaints regarding environmental matters.

The Technical/SHEQ Manager must provide fourteen (14) days written notification to the DEA that the Namas Wind Farm operation phase will commence.

OBJECTIVE 2: Securing the site and general maintenance during operation

Safety issues may arise with public access to wind turbines (e.g. unauthorised entry to the site) or to the wind farm substation. Prevention and control measures to manage public access are therefore important.

General maintenance at the Namas Wind Farm will be required during the operation of wind farm. The maintenance required may also include the replacement of wind turbines, if required during the operation lifetime of the facility.

Project component/s	» Wind turbines. » Access roads. » Substation. » Operations and service building.
Potential Impact	» Hazards to landowners and public.
Activities/risk sources	» Uncontrolled access to the wind farm and associated infrastructure.
Mitigation: Target/Objective	» To secure the site against unauthorised entry. » To protect members of the public/landowners/residents.

Mitigation: Action/control	Responsibility	Timeframe
General onsite maintenance of the wind turbines during the operation phase must in no way impact or negatively affect the environment, and contractors or other service providers providing onsite maintenance must be made aware of this EMPr and the content thereof.	O&M Operator	Operation phase: weekly
Where necessary to control access, fence and secure access to the site and entrances.	O&M Operator	Operation phase
Post information boards about public safety hazards and emergency contact information.	O&M Operator	Operation phase
A grievance and consultation plan must be developed and kept on the site at all times during operation of the wind farm. All grievances between landowners and Genesis Namas Wind (Pty) Ltd and between Genesis Namas Wind (Pty) Ltd or any service provider or other entity should be recorded and dealt with in the appropriate grievance channels are outlined in the grievance plan which must be established.	O&M Operator	Operation phase: weekly

Mitigation: Action/control	Responsibility	Timeframe
Community consultation with surrounding landowners and community members must continue through the life cycle of the project, and must be reported on as such in the grievance and consultation plan. This will allow the receipt of - and facilitate resolution of concerns and grievances about the project's social and environmental issues raised by individuals or groups during the project operational period.		
Should wind turbines be required to be replaced, the following will apply: » Site access must be confirmed for the transportation of the required turbine components and equipment to the site and turbine location of the infrastructure to be replaced. » Materials and turbine structures are to be stored within the previously disturbed construction laydown area. No disturbance of areas outside of these areas should occur. » Full clean-up of all materials must be undertaken after the removal and replacement of the wind turbine and associated infrastructure is complete, and disturbed areas appropriately rehabilitated. » Most of the materials used for wind turbines can be recycled. The majority of the turbine (excluding the blades) can be recovered and re-used or recycled. Recyclable materials must be transported off-site by truck and managed at appropriate facilities in accordance with relevant waste management regulations. No waste materials may be left on-site following the replacement. » Waste material which cannot be recycled shall be disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.	O&M Operator	Operation phase: when required

Performance Indicator	» Site is secure and there is no unauthorised entry. » No members of the public/ landowners injured. » No complaints from landowners/ public.
Monitoring and Reporting	» Regular visual inspection of fence for signs of deterioration/forced access. » An incident reporting system must be used to record non-conformances to the EMPr. » A public complaints register must be developed and maintained on site. » Landowners should be consulted regularly.

OBJECTIVE 3: Protection of indigenous natural vegetation, fauna and maintenance of rehabilitation

Indirect impacts on vegetation and terrestrial fauna during operation could result from maintenance activities and the movement of people and vehicles on site. In order to ensure the long-term environmental integrity of the site following the construction, maintenance of the areas rehabilitated post-construction must be undertaken until these areas have successfully re-established.

Project component/s	» Areas requiring regular maintenance. » Route of the security team. » Wind farm including access roads and laydown areas. » Areas disturbed during the construction phase and subsequently rehabilitated at its completion.
Potential Impact	» Disturbance to or loss of vegetation and/or habitat. » Alien plant invasion. » Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention.
Activity/Risk Source	» Movement of employee vehicles within and around site.
Mitigation: Target/Objective	» Maintain minimised footprints of disturbance of vegetation/ habitats on-site. » Ensure and encourage plant regrowth in non-operational areas of post-construction rehabilitation.

Mitigation: Action/Control	Responsibility	Timeframe
Vehicle movements must be restricted to designated roadways as far as practically possible.	O&M Operator	Operation phase
There should be no vegetation clearing within any areas of indigenous vegetation.	O&M Operator	Operation phase
Any potentially dangerous fauna such snakes or fauna threatened by the maintenance and operational activities should be removed to a safe location.	O&M Operator	Operation phase
In order to increase general faunal protection, the use of any pesticide in the wind farms area should be prohibited.	O&M Operator	Operation phase
Existing roads must be maintained to ensure limited erosion and impact on areas adjacent to roadways.	O&M Operator	Operation phase
Vegetation control within the wind farm should be by manual clearing and herbicides should not be used except to control alien plants in the prescribed manner if necessary.	O&M Operator Specialist	Operation phase
An annual alien plant monitoring and eradication programme must be implemented, where necessary.	O&M Operator	Operation phase
The use of herbicides and pesticides and other related horticultural chemicals should be carefully controlled and only applied by personnel adequately certified to apply pesticides and herbicides. It must be ensured that WHO Recommended Classification of Pesticides by Hazard Class 1a (extremely hazardous) or 1b (highly hazardous) are not purchased, stored or used on site along with any other nationally or internationally similarly restricted/banned products.	O&M Operator	Operation phase
Implement an animal removal plan to ensure safety of workers and fauna.	O&M Operator	Operation phase
Fire breaks should be established, where appropriate and as discussed with the landowners. Access roads could also act as fire breaks.	O&M Operator Specialist	Duration of contract
There should be follow-up rehabilitation and revegetation of any remaining bare areas with indigenous perennial shrubs and succulents from the local area.	O&M Operator	Operation phase

Mitigation: Action/Control	Responsibility	Timeframe
Annual site inspection for erosion with follow up remedial action where problems are identified.	Specialist	Annual monitoring until successful re-establishment of vegetation in an area
Management of invasive alien plants and weeds to continue for 5 years into the operation phase or until any problem plants are under suitable management/control.	Specialist	Operation phase

Performance Indicator	» No further disturbance to vegetation or terrestrial faunal habitats. » No erosion problems resulting from operational activities within the wind farm. » Low abundance of alien plants within affected areas. » Maintenance of a ground cover that resist erosion. » Continued improvement of rehabilitation efforts.
Monitoring	» Observation of vegetation on-site by environmental manager. » Regular inspections to monitor plant regrowth/performance of rehabilitation efforts and weed infestation compared to natural/undisturbed areas. » Annual monitoring with records of alien species presence and clearing actions. » Annual monitoring with records of erosion problems and mitigation actions taken with photographs.

OBJECTIVE 4: Protection of avifauna

Only 46 avian species in the project site were recorded. The avifauna impacts expected with the development of the Namas Wind Farm relate to the three collision-prone Red Data species likely to be impacted. The impacts include direct fatalities, disturbance and loss of foraging habitat. The three Red Data species include Secretarybird, Lanner Falcon and Ludwig's Bustard. An inactive Secretarybird nest (S29°50'41.8"; E17°11'41.69") was identified and a 1km no-go buffer has been allocated to the nest.

Given the possible impact of the Namas Wind farm development, the overall impact on avifaunal species requires systematic monitoring during both the construction and post-construction phases; this is a recommendation of the BARESG guidelines (Jenkins et al. 2015). The guidelines suggest adaptive and systematic monitoring of bird displacement (comparing avian densities before and after construction, particularly for priority collision-prone and red data species) and particularly the monitoring of all turbine-related fatalities. The latter must take account biases introduced by scavengers removing carcasses and observers failing to detect bird remains below the turbines.

An assessment guided by the activities is required not only to enact and experiment with different mitigation measures where significant mortality occurs, but also to allow data to be collected that will benefit the welfare of avifauna at other renewable energy farms.

Where avian fatalities are found to occur (i) to red-data species, or (ii) at unacceptably high levels, to priority species, then the mitigation measures included below, should be incorporated, as a management intervention. Experiments, for example with bird deterrent techniques such as black-painted (or UV-painted) blade mitigation, should be conducted without delay to reduce fatality rates.

Project component/s	» Wind turbines. » Substation.
Potential Impact	» Disturbance to or loss of birds as a result of collision with the turbine blades and project components. » Destruction of habitat. » Displacement of birds. » Collision with project components. » Traffic to and from site.
Activity/risk source	» Spinning turbine blades. » Substation.
Mitigation: Target/Objective	» More accurately determine the impact of the operating wind farm on collision-prone Red Data species. » Minimise impacts associated with the turbines and the substation.

Mitigation: Action/control	Responsibility	Timeframe
Post-construction monitoring of bird abundance and movements and fatality surveys should span 2-3 years to take inter-annual variation into account.	Specialist	Operation phase
Post-construction monitoring to start as the wind farm becomes operational, bearing in mind that the effects of the wind farm may change over time.	Specialist	Once facility is operational
Post-construction monitoring should be divided into two categories: a) quantifying bird numbers and movements (replicating baseline data collection), and b) estimating bird mortalities.	Specialist	Once facility is operational
Carcass monitoring should be undertaken by trained observers, willing to cover 4-5 turbines per day in all weather conditions and overseen by an ornithologist competent to identify species and a manager to collate and analyse each year's data.	Specialist	Once facility is operational
Estimating bird fatality rates must include: a) an estimation of searcher efficiency and scavenger removal rates, b) carcass searches, and c) data analysis incorporating systematically collected data from (a) and (b). These biases should then allow for estimating fatality rates.	Specialist	Once facility is operational
A minimum of 30-40% of the wind farm development footprint should be methodically searched for fatalities, throughout the year, with a search interval informed by scavenger removal trials and objective monitoring. Any evidence of mortalities or injuries within the remaining area should be recorded and included and reported as incidental finds within the reports.	O&M Operator	Operation phase
The search area should be defined and consistently applied throughout monitoring.	Specialist	Once facility is operational
The duration and scope of ongoing post-construction monitoring should be informed by the outcomes of the previous year's monitoring, and reviewed annually.	Specialist	Operation phase
If significant problems are found or suspected, the post-construction monitoring should continue in conjunction with	Specialist	Operation phase

Mitigation: Action/control	Responsibility	Timeframe
adaptive management and mitigations, taking into account the risks related to the particular site and species involved.		
Selective feathering or stopping of turbines can be implemented during high-use seasons or times in the day for turbines that continue to kill unsustainable numbers of birds, specifically raptors.	O&M Operator	Operation phase
If raptors continue to be attracted into the site then habitat can be manipulated to reduce the attractiveness (from a prey point of view) for the raptors. Reducing the attractiveness from a food resources point of view will reduce raptor use of the area. This can be achieved by increasing the stocking density of sheep or goats on the affected properties.	O&M Operator	Operation phase

Performance Indicator	» Minimal additional disturbance to bird populations on the wind farm site. » Continued improvement of bird protection devices, as informed by the operational monitoring. » Regular provision of clearly worded, logical and objective information on the interface between the local avifauna and operating wind farm. » Clear and logical recommendations on why, how and when to institute mitigation measures to reduce avian impacts of the development, from the pre-construction to operation phase.
Monitoring and Reporting	» Observation of avifaunal populations and incidence of injuries/death from collisions from turbine blades. » Monitoring of facility and reporting where fatalities do occur. » Review of bird monitoring report on a full year of post-construction monitoring.

OBJECTIVE 5: Protection of bat species

The correct placement of wind farms and of individual turbines can significantly lessen the impacts on bat fauna in an area. Turbines within moderate sensitivity and moderate sensitivity buffers have a higher likelihood of possibly requiring mitigation, if found to be required by the operational monitoring study. Additional to mitigation by location of turbines to avoid known highly sensitive areas, other options that may be utilised when necessary including curtailment, blade feathering, blade lock, acoustic deterrents or light lures.

Project component/s	» Wind turbines. » Substation.
Potential Impact	» Disturbance to or loss of bats as a result of collision with turbines and/or barotrauma. » Bat mortality and destruction of habitat / roosts.
Activity/risk source	» Spinning turbine blades.
Mitigation: Target/Objective	» More accurately determine the impact of the operating wind farm on bat species. » Minimise impacts associated with the turbines and substation.

Mitigation: Action/control	Responsibility	Timeframe
A minimum of 2 years of operational bat mortality monitoring must be conducted, initiating from the start of the facility's operation	O&M Operator in consultation with Specialist	Operation phase
Start post-construction bat monitoring as soon as possible.	Specialist	Once facility is operational
Turbine layout adjustments to avoid high sensitivities and their buffers must be implemented where applicable. Where needed reduce turbine blade movement at selected turbines during high-risk bat activity times/weather conditions, if the operational bat mortality monitoring find bat mortalities to be above sustainable levels. If reducing blade movements is not technically feasible, alternative and equally effective mitigations should be recommended during the operational bat mortality monitoring programme. Acoustic deterrents are technologically advanced enough to be trialled, if needed.	Specialist	Operation phase
Only use lights with low sensitivity motion sensors that switch off automatically when no persons are nearby. This will prevent the creation of regular insect gathering pools.	O&M Operator	Operation phase
Level 3 mitigation must be applied to all turbines on site from the start of operation, from sunset until sunrise every night for the months of March, April, May, August and September. This implies 90-degree feathering below the manufacturer's cut in speed to minimise free-wheeling, which does not result in high production loss but can lessen the likelihood of bat impacts significantly. If this mitigation is not technically feasible, based on the model of turbine to be used, the bat specialist conducting the operational bat mortality study must recommend a technically feasible alternative. The specialist conducting the operational bat mortality monitoring may also, after the first year of operational monitoring, recommend Level 3, or other required mitigations, to be applied to selected turbines only, based on the bat mortality results. This is an adaptive management approach and the effectiveness of the adaptive management will have to be determined during the second year of the operational monitoring study.	Specialist	Operation phase

Performance Indicator	» Minimal additional disturbance to bat populations on the wind farm site. » Continued improvement of bat protection devices, as informed by the operational monitoring. » Regular provision of clearly worded, logical and objective information on the interface between the local bats and the proposed/ operating wind farm. » Clear and logical recommendations on why, how and when to institute mitigation measures to reduce bat impacts of the development, from the pre-construction to operation phase.
Monitoring and Reporting	» Monitoring of facility and reporting where fatalities do occur. » Review of bat monitoring report on a full year of post-construction monitoring.

OBJECTIVE 6: Minimisation of visual impact

The mitigation of secondary visual impacts, such as security and functional lighting, construction activities, etc. may be possible and should be implemented and maintained on an on-going basis.

The aircraft warning lights mounted on top of the hub of the wind turbines are prescribed by the Civil Aviation Authority (CAA), and the potential to mitigate their visual impacts is low. The regulations for the CAA's *Marking of Obstacles* should be strictly adhered to, as the failure of complying with these guidelines may result in the developer being required to fit additional light fixtures at closer intervals thereby aggravating the visual impact.

Project component/s	» Wind farm (including access roads). » Substation. » Ancillary infrastructure.
Potential Impact	» Risk to aircraft in terms of the potential for collision. » Enhanced visual intrusion. » Visual impact of the wind farm degradation (including operational wind turbines) and vegetation rehabilitation failure.
Activity/risk source	» Size/scale of turbines. » Associated lighting. » Wind turbines and other infrastructure. » Access roads. » Other associated infrastructure. » Viewing of the degradation and vegetation rehabilitation failure by observers on or near the site.
Mitigation: Target/Objective	» To minimise the potential for visual impact. » To ensure that the wind farm complies with Civil Aviation Authority requirements for turbine visibility to aircraft. » Minimise the contrast with the surrounding environment and visibility of the turbines to humans. » The containment of light emitted from the substation in order to eliminate the risk of additional night-time visual impacts. » Well maintained and neat facility.

Mitigation: Action/control	Responsibility	Timeframe
Maintain the general appearance of the facility as a whole, including the turbines, servitudes and the ancillary buildings.	O&M Operator	Operation and maintenance
Lighting of the wind farm (for example security lights) should be kept to a minimum. Lights should be directed downwards.	O&M Operator	Operation phase
Aviation warning lights must be mounted on the turbine hub or such measures specified by the Civil Aviation Authority consent.	O&M Operator	Operation and maintenance
Minimise night lighting with motion sensors and make use of an infra-red security system. Maintain lighting focused on the development and angled low.	O&M Operator	Operation phase

Mitigation: Action/control	Responsibility	Timeframe
If turbines are to be lit at night, lighting should be kept to a minimum and should preferably not be white light. Flashing strobe-like lights should be used where possible.	O&M Operator	Operation phase
Maintain communications with adjacent residents with regard to shadow flicker. Undertake necessary mitigation including fitting of blinds and or screens.	O&M Operator	Operation phase
Undertake regular maintenance of light fixtures.	O&M Operator	Operation and maintenance
Maintain roads and servitudes to forego erosion and to suppress dust.	O&M Operator	Operation and maintenance
Monitor rehabilitated areas and implement remedial action as and when required.	O&M Operator	Operation and maintenance

Performance Indicator	» Appropriate visibility of infrastructure to aircraft. » Minimised visual intrusion on surrounding areas. » Minimal exposure (limited or no complaints from I&APs) of ancillary infrastructure and lighting at night to observers on or near the site (i.e. within 5km) and within the region. » Well maintained and neat facility with intact vegetation on and in the vicinity of the wind farm.
Monitoring and Reporting	» Ensure that aviation warning lights or other measures are installed before construction is completed and are fully functional at all times. » The monitoring of the condition and functioning of the light fixtures during the operation phase of the project. » Monitoring of the entire site on an ongoing basis by the operator.

OBJECTIVE 7: Minimisation of noise impacts from turbines

From the results of the BA studies undertaken, noise impacts associated with the wind farm are expected to be of medium significance during the night-time operation of the wind turbines, without the implementation of mitigation measures. However, mitigation measures are proposed in order to reduce the noise impact to a low significance. The total noise levels may be higher than 42 dBA at NSD04. Mitigation measures are recommended that will reduce the noise levels experienced.

Project component/s	» Wind farm (including access roads).
Potential Impact	» Increased noise levels at potentially sensitive receptors. » Changing ambient sound levels could change the acceptable land use capability. » Disturbing character of noise from the wind turbines..
Activity/risk source	» Simultaneous operation of a number of wind turbines.
Mitigation: Target/Objective	» Define ambient sound levels at NSD04 prior to the development of the wind farm. » Ensure that the change in ambient sound levels as experienced by potentially sensitive receptors is less than 7 dBA. » Prevent the generation of nuisance noises. » Ensure acceptable noise levels at surrounding stakeholders and potentially sensitive receptors. » Ensure that noises from wind turbines do not exceed 45 dBA at all NSDs.

Mitigation: Action/control	Responsibility	Timeframe
Define ambient sound levels before the development of the wind farm (before construction and operation phase) at NSD04 (if any people stay at this location).	Specialist	Prior to the operation phase
Operational noise measurements should be collected over a minimum of 48 hours during the operation phase (winter period) to ensure that noise levels are less than 42 dBA at NSD04 with people staying at this farm dwelling. The acoustician measuring noise levels can advise whether further measurements are required.	Specialist	Commencement of the operation phase
The developer must ensure that no receptor is subjected to total noise levels exceeding 45 dBA at night resulting from the development, or that the change in ambient sound levels is less than 7dB.	Developer	Operation phase
The developer must investigate any reasonable and valid noise complaint if registered by a receptor staying within 2,000 m from the location where construction activities are taking place or from an operational wind turbine.	O&M Operator	Operation phase
Add noise monitoring points at any complainants that register a valid noise complaint relating to the operation of the wind farm.	O&M Operator	Operation phase monitoring programme

Performance Indicator	» Ensure that the change in ambient sound levels as experienced by potentially sensitive receptors is less than 7 dBA
Monitoring and Reporting	» Defining of ambient sound levels prior to the operation phase (at NSD04) as well as defining noise levels during the operation phase. These measurements should be taken in 10-minute bins for a period not less than 2 night-time periods. This data should be co-ordinated with the meteorological mast wind speed (as calculated for the 10 meter height wind speed). The measurements should aim to gather at least 12 data points each for the wind speeds 4, 5, 6, 7, 8, 9 and 10 m/s. » If a valid and reasonable complaint is registered relating to the operation of the wind farm, additional noise monitoring should be undertaken as recommended by an acoustic consultant. » If these measurement locations are not used as residential dwellings these measurement locations can be removed.

OBJECTIVE 8: Appropriate handling and management of hazardous substances and waste

The operation of the wind farm will involve the generation of limited waste products. The main wastes expected to be generated by the operation activities includes general solid waste and hazardous waste.

Project component/s	» Wind turbines. » Substation. » Associated infrastructure.
Potential Impact	» Inefficient use of resources resulting in excessive waste generation. » Litter or contamination of the site or water through poor waste management practices.
Activity/risk source	» Generators and gearbox – turbines.

	» Transformers and switchgear – substation. » Fuel and oil storage.
Mitigation: Target/Objective	» To comply with waste management legislation. » To minimise production of waste. » To ensure appropriate waste disposal. » To avoid environmental harm from waste disposal.

Mitigation: Action/control	Responsibility	Timeframe
Hazardous substances must be stored in sealed containers within a clearly demarcated designated area.	O&M Operator	Operation phase
Storage areas for hazardous substances must be conducted within a secured and clearly demarcated area.	O&M Operator	Operation phase
All structures and/or components replaced during maintenance activities must be appropriately disposed of at an appropriately licensed waste disposal site or sold to a recycling merchant for recycling.	O&M Operator	Operation phase
Care must be taken to ensure that spillage of oils and other hazardous substances are limited during maintenance. Handling of these materials should take place within an appropriately sealed and bunded area. Should any accidental spillage take place, it must be cleaned up according to specified standards regarding bioremediation.	O&M Operator	Operation and maintenance
Waste handling, collection and disposal operations must be managed and controlled by a waste management contractor.	O&M Operator / waste management contractor	Operation phase
Used oils and chemicals: » Where these cannot be recycled, appropriate disposal must be arranged with a licensed facility in consultation with the administering authority. » Waste must be stored and handled according to the relevant legislation and regulations.	O&M Operator	Operation phase
General waste must be recycled where possible or disposed of at an appropriately licensed landfill.	O&M Operator	Operation phase
Spill kits must be made available on-site for the clean-up of spills and leaks of contaminants.	O&M Operator	Operation and maintenance
Hazardous waste (including hydrocarbons) and general waste must be stored and disposed of separately.	O&M Operator	Operation phase
Disposal of waste must be in accordance with relevant legislative requirements, including the use of licensed contractors.	O&M Operator/ waste management contractor	Operation phase
No waste may be burned or buried on site.	O&M Operator	Operation phase

Performance Indicator	» No complaints received regarding waste on site or dumping. » Internal site audits identifying that waste segregation, recycling and reuse is occurring appropriately. » Provision of all appropriate waste manifests. » No contamination of soil.
Monitoring and Reporting	» Waste collection must be monitored internally on a regular basis. » Waste documentation must be completed and made available for inspection on request.

	» An incidents/complaints register must be maintained, in which any complaints from the community must be logged. Complaints must be investigated and, if appropriate, acted upon. » Regular reports on exact quantities of all waste streams exiting the site must be compiled by the waste management contractor and monitored by the environmental manager. All appropriate waste disposal certificates must accompany the monthly reports.

OBJECTIVE 9: Maximise benefits and opportunities for local communities associated with local employment, skills opportunities, socio-economic development plans and a community trust

The Namas Wind Farm would create ~30 employment opportunities over a 20-25 year period. The employment opportunities will include low skilled, semi-skilled and high skilled positions. The majority of employment opportunities associated with the operational phase is likely to benefit historically disadvantaged (HD) members of the community (if available). However, given that the wind energy sector in South Africa is relatively new, the skilled positions may need to be filled by people from other parts of South Africa or even overseas.

Project component/s	» Wind farm. » Day to day operational activities associated with the wind farm including maintenance.
Potential Impact	» The opportunities and benefits associated with the creation of local employment and business should be maximised as far as possible.
Activity/risk source	» The operation phase of the wind farm will create permanent employment opportunities. » The establishment of a wind farm has the potential to create an attraction for visitors to the area. The development also has the potential to promote the benefits of renewable energy projects.
Mitigation: Target/Objective	» Create medium- to long-term full time employment opportunities for locals.

Mitigation: Action/control	Responsibility	Timeframe
Identify local members of the community who are suitably qualified or who have the potential to be employed full time.	O&M Operator	Prior to commencement of operation
As far as possible, ensure community needs are addressed (in line with the local government initiatives) and the correct representatives of the community are appointed to run the community trust.	Developer	Pre-operation
Develop a training and skills transfer programme for local personnel.	Developer O&M Operator	Prior to commencement of operation

Performance Indicator	» Public exposure to the project. » Meeting with the Local Municipality. » A training and skills development programme developed and designed before the construction phase is completed.
Monitoring and Reporting	» Indicators listed above must be met for the operation phase.

OBJECTIVE 10: Implement an appropriate fire management plan during the operation phase

The vegetation on the site may be at risk of fire, especially considering the current drought conditions experienced in the area. The increased presence of people on the site could increase the risk of veld fires, particularly in the dry season.

Project Component/s	» Operation and maintenance of the wind farm and associated infrastructure.
Potential Impact	» Veld fires can pose a personal safety risk to local farmers and communities, and their homes, crops, livestock and farm infrastructure, such as gates and fences. In addition, fire can pose a risk to the wind farm infrastructure.
Activities/Risk Sources	» The presence of operation and maintenance personnel and their activities on the site can increase the risk of veld fires.
Mitigation: Target/Objective	» To avoid and or minimise the potential risk of veld fires on local communities and their livelihoods.

Mitigation: Action/Control	Responsibility	Timeframe
Provide adequate firefighting equipment on site. Apply for membership to the local Fire Protection Association, should there be one.	O&M Operator	Operation phase
Provide fire-fighting training to selected operation and maintenance staff.	O&M Operator	Operation phase
Ensure that appropriate communication channels are established to be implemented in the event of a fire.	O&M Operator	Operation phase
Fire breaks should be established where and when required. Cognisance must be taken of the relevant legislation when planning and burning firebreaks (in terms of timing, etc.). Access roads may also act as fire breaks.	O&M Operator	Operation phase
Upon completion of the construction phase, an emergency evacuation plan must be drawn up to ensure the safety of the staff and surrounding land users in the case of an emergency.	O&M Operator	Operation phase
Contact details of emergency services should be prominently displayed on site.	O&M Operator	Operation phase

Performance Indicator	» Firefighting equipment and training provided before the construction phase commences. » Appropriate fire breaks in place.
Monitoring and Reporting	» The Developer must monitor indicators listed above to ensure that they have been met.

OBJECTIVE 11: Minimise the potential negative impact on farming activities and on the surrounding landowners

Once operational, the negative impact on the daily living and movement patterns of neighbouring residents is expected to be minimal and intermittent (i.e. the increase in traffic to and from site, possible dust creation of vehicle movement on gravel roads on site and possible increase in criminal activities). The number of workers on site on a daily basis is anticipated to have minimal negative social impacts in this regard.

Some positive impacts will be experienced with farmers gaining more access to land through the high quality site roads. Farmers involved with the project will also receive additional income, which can be invested into farming activities.

Once construction is completed, negative impacts on farming activities on the site must be limited as far as possible.

Project Component/s	» Operation and maintenance of the wind farm. » Associated infrastructure.
Potential Impact	» Limited intrusion impact on surrounding landowners. » Interference with farming activities on site.
Activities/Risk Sources	» Increase in traffic to and from the site could affect daily living and movement patterns of surrounding residents. » Operational activities on site could interfere with farming activities of the landowners.
Mitigation: Target/Objective	» Effective management of the wind farm. » Mitigation of intrusion impacts on property owners. » Mitigation of impacts on farming activities.

Mitigation: Action/Control	Responsibility	Timeframe
Effective management of the wind farm to avoid any environmental pollution focusing on water, waste and sanitation infrastructure and services.	O&M Operator	Operation phase
Vehicle movement to and from the site should be minimised as far as possible.	O&M Operator	Operation phase
Local roads should be maintained to keep the road surface up to a reasonable standard.	O&M Operator	Operation phase
Limit the development of new access roads on site.	O&M Operator	Operation phase
Ensure on-going communication with the landowners of the site in order to ensure minimal impact on farming activities	O&M Operator	Operation phase

Performance Indicator	» No environmental pollution occurs (i.e. waste, water and sanitation). » No intrusion on private properties and on the activities undertaken on the surrounding properties. » Continuation of farming activities on site.
Monitoring and reporting	» The Developer should be able to demonstrate that the wind farm is well managed without environmental pollution and that the above requirements have been met.

8.2. Monitoring Programme: Operation Phase of the Namas Wind Farm

OBJECTIVE 12: To monitor the performance of the control strategies employed against environmental objectives and standards

A monitoring programme must be in place not only to ensure conformance with the EMPr, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could

result in significant environmental impacts for which corrective action is required. An internal environmental audit must be conducted every 6 months and an external audit must be conducted once a year in order to confirm compliance with the requirements of all environmental permits (including the Environmental Authorisation, once issued) for the project, this EMPr, and all relevant legislation. The results of the audit reports must be made available to the DEA and the relevant authorities on request, and must be part of monitoring and audit reports. An annual audit report must be compiled and submitted to DEA. The aim of the auditing process would be to routinely monitor the implementation of the specified environmental specifications, in order to:

- Monitor and audit compliance with the prescriptive and procedural terms of the environmental specifications.
- Ensure adequate and appropriate interventions to address non-compliance.
- Ensure adequate and appropriate interventions to address environmental degradation.
- Provide a mechanism for the lodging and resolution of public complaints.
- Ensure appropriate and adequate record keeping related to environmental compliance.
- Determine the effectiveness of the environmental specifications and recommend the requisite changes and updates based on audit outcomes, in order to enhance the efficacy of environmental management on site.
- Aid in the communication and feedback to authorities and stakeholders.

CHAPTER 9: MANAGEMENT PROGRAMME: DECOMMISSIONING

The turbine infrastructure which will be utilised for the Namas Wind Farm is expected to have a lifespan of 25 to 30 years (with maintenance). Equipment associated with this wind farm would only be decommissioned once it has reached the end of its economic life. It is most likely that decommissioning activities of the infrastructure of the wind farm would comprise the dismantling and replacement of the turbines with more appropriate technology/infrastructure available at that time. It must be noted that decommissioning activities will need to be undertaken in accordance with the legislation applicable at that time, which may require this section of the EMPr to be revisited and amended.

The relevant mitigation measures contained under the construction section should be applied during decommissioning and therefore are not repeated in this section.

» ***Site Preparation***
Site preparation activities will include confirming the integrity of the access to the site to accommodate the required equipment, preparation of the site (e.g. laydown areas, construction platform) and the mobilisation of construction equipment.

» ***Dismantle and Remove Infrastructure***
The wind infrastructure (turbine and tower sections) of the wind farm will be dismantled once it reaches the end of its economic lifespan. A large crane would be required for dismantling the turbine and tower sections. Once dismantled, the components will be reused, recycled, or disposed of in accordance with regulatory requirements (NEMA / NEM:WA). All parts of the turbine would be considered reusable or recyclable except for the blades.

9.1. Objectives

In decommissioning the Namas Wind Farm, Genesis Namas Wind (Pty) Ltd must ensure that:

» All structures not required for the post-decommissioning use of the site (may include the turbines, substation, ancillary buildings, monitoring masts) are dismantled and/or demolished, removed and waste material disposed of at an appropriately licensed waste disposal site or as required by the relevant legislation.
» Rehabilitate access/service roads and servitudes not required for the post-decommissioning use of the site. If necessary, an ecologist should be consulted to give input into rehabilitation specifications.
» All disturbed areas are compacted, sloped and contoured to ensure drainage and runoff and to minimise the risk of erosion.
» Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.
» Any fauna encountered during decommissioning activities should be removed to safety by a suitably qualified person.
» All vehicles to adhere to low speed limits (i.e. 30km/h max) on the site, to reduce risk of faunal collisions as well as reduce dust.
» Retrenchments should comply with South African Labour legislation of the day.

The general specifications of Chapter 6 (Construction) and Chapter 7 (Rehabilitation) are also relevant to the decommissioning of the Namas Wind Farm and must be adhered to.

APPENDIX A:

FACILITY LAYOUT AND SENSITIVITY MAPS

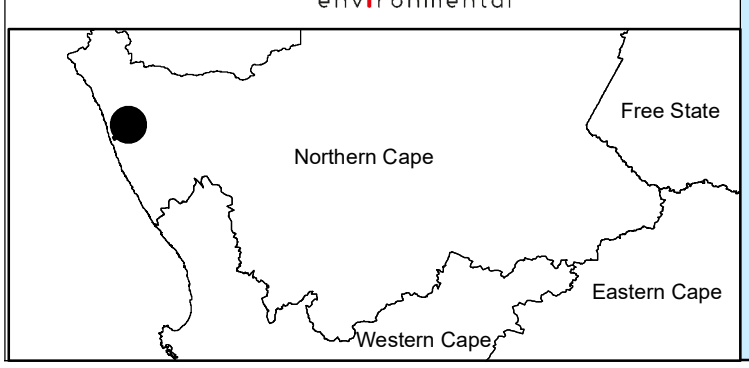
Namas Wind Farm, Northern Cape

Locality Map

Legend

- Town
- Eskom substation
- Eskom power line (to be constructed)
- Eskom power line (existing)
- Regional road
- Perennial river
- Non-perennial river
- Namaqua National Park
- Namas Wind Farm Project Site
- Farm Portions

savannah environmental



GROMIS / KLEINZEE 1 66kV OHL

R355

Buffels

KLEINZEE SUBSTATION

Kleinsee

KOMMAGAS / SANDVELD SWITCHING STATION 1 66kV OHL

KOMMAGAS SUBSTATION

Komaggas

ROOIVLEI 327 3/327

ROOIVLEI 327 RE/327

ZONNEKWA 328 3/328

ZONNEKWA 328 4/328

KOINGNAAS / SANDVELD SWITCHING STATION

GROMIS JUNO 400KV

Koingnaas

Komaggas

Kourkam se Brak

Wildeperdehoek se Brak

Swartlintjies

Graaf SE Put

Buffelsbank

Doringfontein

Pienaarsbult

Steenvlei

Hondevlei

Vaalkol

Sonnekwa

Kapvlei

Witduin

Elandsklip

Heidons

De Riet

Grootmis

244 m

181 m

284 m

761 m

707 m

500 m

427 m

523 m

40 m

282 m

281 m

180 m

266 m

252 m

Scale: 1:170 000
Projection: LO17
Map Ref: Namas - Locality Map (WF) - 06.06.18

0 5 10 20 Km

Namas Wind Farm, Northern Cape

Layout Map

Legend

- Eskom power line (to be constructed)
- Eskom power line (existing)
- Main road
- Farm Portions
- Namas Wind Farm Affected Properties

Layout Plan (development footprint):

- Wind Turbine
- Access Alternative (to be upgraded)
- Existing roads to be upgraded
- Internal Access Roads to be constructed
- On-site Facility Substation
- Laydown area
- O&M Buildings

ROOIVLEI 327 3/327

ROOIVLEI 327 RE/327

ZONNEKWA 328 3/328

ZONNEKWA 328 4/328

KOINGNAAS / SANDVELD SWITCHING STATION 1 66kV OHL

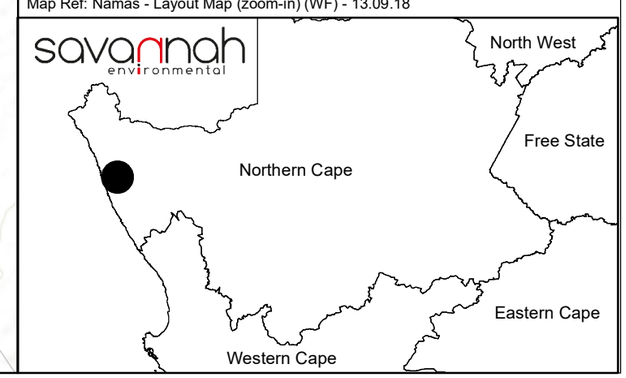
GROMIS JUNO 400KV

Sonnekwa

0 1,25 2,5 5 Km

Scale: 1:44 000
Projection: LO17
Map Ref: Namas - Layout Map (zoom-in) (WF) - 13.09.18

savannah environmental



Namas Wind Farm, Northern Cape

Environmental Sensitivity and Layout Map

ROOIVLEI 327 3/327

ROOIVLEI 327 RE/327

ZONNEKWA 328 3/328

ZONNEKWA 328 4/328

GROMIS-JUNO 400KV

KOINGNAAS / SANDVELD SWITCHING STATION 1 66kV OHL

Legend

- Eskom substation
- Eskom power line (to be constructed)
- Eskom power line (existing)
- Regional road
- Main road
- Perennial river
- Non-perennial river
- Farm Portions
- Namas Wind Farm Project Site

Layout Plan (development footprint):

- Wind Turbine
- Access Alternative (to be upgraded)
- Existing roads to be upgraded
- Internal Access Roads to be constructed
- On-site Facility Substation
- Laydown area
- O&M Buildings

Sensitive Environmental Features:

- Noise Sensitive Development
- Secretarybird Nest 1km Buffer (Avifauna No-Go Area)
- High Bat Sensitivity Area
- 200m High Bat Sensitivity Buffer
- Significant Heritage Sites (50m buffer)
- Coastal Duneveld (Moderately High Ecological Sensitivity)

0 1,5 3 6 Km

Scale: 1:44 000
Projection: LO17
Map Ref: Namas - Sensitivity & Layout Map (WF) - 05.06.18

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North West
Free State
Northern Cape
Eastern Cape
Western Cape

APPENDIX B:

GRIEVANCE MECHANISM FOR COMPLAINTS AND ISSUES

GRIEVANCE MECHANISM / PROCESS

PURPOSE

This Grievance Mechanism has been developed to receive and facilitate the resolution of concerns and grievances regarding the project's environmental and social performance. The aim of the grievance mechanism is to ensure that grievances or concerns are raised by stakeholders and to ensure such grievances are addressed in a manner that:

- Provides a predictable, accessible, transparent, and credible process to all parties, resulting in outcomes that are fair and equitable, accountable and efficient.
- Promotes trust as an integral component of broader community relations activities.
- Enables more systematic identification of emerging issues and trends, facilitating corrective action and pre-emptive engagement.

The aim of this Grievance Mechanism is to address grievances in a manner that does not require a potentially costly and time-consuming legal process.

PROCEDURE FOR RECEIVING AND RESOLVING GRIEVANCES

The following proposed grievance procedures are to be complied with throughout the construction, operation and decommissioning phases of the project:

- Local landowners, communities and authorities must be informed in writing by the Developer of the grievance mechanism and the process by which grievances can be brought to the attention of the Developer through its designated representative. This must be undertaken with the commencement of the construction phase.
- A company representative must be appointed as the contact person in order for grievances to be addressed. The name and contact details of the contact person must be provided to local landowners, communities and authorities when requested.
- Project related grievances relating to the construction, operation and or decommissioning phases must be addressed in writing to the contact person. The contact person should assist local landowners and or communities who may lack resources to submit/prepare written grievances, by recording grievances and completing written grievance notices where applicable, translating requests or concerns or by facilitating contact with the nominated contact person. The following information should be obtained, as far as possible, regarding each written grievance, which may act as both acknowledgement of receipt as well as record of grievance received:
    a. The name and contact details of the complainant;
    b. The nature of the grievance;
    c. Date raised, received, and for which the meeting was arranged;
    d. Persons elected to attend the meeting (which will depend on the grievance); and
    e. A clear statement that the grievance procedure is, in itself, not a legal process. Should such avenues be desired, they must be conducted in a separate process and do not form part of this grievance mechanism.
- The grievance must be registered with the contact person who, within 2 working days of receipt of the grievance, must contact the Complainant to discuss the grievance and, if required, agree on suitable

date and venue for a meeting in order to discuss the grievances raised. Unless otherwise agreed, the meeting should be held within 2 weeks of receipt of the grievance.

- The contact person must draft a letter to be sent to the Complainant acknowledging receipt of the grievance, the name and contact details of Complainant, the nature of the grievance, the date that the grievance was raised, and the date and venue for the meeting (once agreed and only if required).
- A grievance register must be kept on site (in electronic format, so as to facilitate editing and updating), and shall be made available to all parties wishing to gain access thereto.
- Prior to the meeting being held the contact person must contact the Complainant to discuss and agree on the parties who should attend the meeting, as well as a suitable venue. The people who will be required to attend the meeting will depend on the nature of the grievance. While the Complainant and or Developer are entitled to invite their legal representatives to attend the meeting/s, it should be made clear to all the parties involved in the process that the grievance mechanism process is not a legal process, and that if the Complainant invites legal representatives, the cost will be their responsibility. It is therefore recommended that the involvement of legal representatives be limited as far as possible, as a matter of last resort, and that this process be primarily aimed at stakeholder relationship management as opposed to an arbitration or litigation mechanism
- The meeting should be chaired by the Developer's representative appointed to address grievances. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.
- Draft copies of the minutes must be made available to the Complainant and the Developer within 5 working days of the meeting being held. Unless otherwise agreed, comments on the Draft Minutes must be forwarded to the company representative appointed to manage the grievance mechanism within 5 working days of receipt of the draft minutes.
- The meeting agenda must be primarily the discussion of the grievance, avoidance and mitigation measures available and proposed by all parties, as well as a clear indication of the future actions and responsibilities, in order to put into effect the proposed measures and interventions to successfully resolve the grievance.
- In the event of the grievance being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties. The record should provide details of the date of the meeting/s, the names of the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.
- In the event of a dispute between the Complainant and the Developer regarding the grievance, the option of appointing an independent mediator to assist with resolving the issue should be discussed. The record of the meeting/s must note that a dispute has arisen and that the grievance has not been resolved to the satisfaction of all the parties concerned.
- In the event that the parties agree to appoint a mediator, the Developer will be required to identify three (3) mediators and forward the names and CVs to the Complainant within 2 weeks of the dispute being declared. The Complainant, in consultation with the Developer, must identify the preferred mediator and agree on a date for the next meeting. The cost of the mediator must be borne by the Developer. The Developer must supply and nominate a representative to capture minutes and record the meeting/s.
- In the event of the grievance, with the assistance of the mediator, being resolved to the satisfaction of all the parties concerned, the outcome must be recorded and signed off by the relevant parties, including the mediator. The record should provide details on the date of the meeting/s, the names of

the people that attended the meeting/s, the outcome of the meeting/s, and where relevant, the measures identified to address the grievance, the party responsible for implementing the required measures, and the agreed upon timeframes for the measures to be implemented.

- In the event of the dispute not being resolved, the mediator must prepare a draft report that summaries the nature of the grievance and the dispute. The report should include a recommendation by the mediator on the proposed way forward with regard to the addressing the grievance.
- The draft report must be made available to the Complainant and the Developer for comment before being finalised and signed by all parties, which signature may not be unreasonably withheld by either party. Unless otherwise agreed, comments on the draft report must be forwarded to the company representative appointed to manage the grievance mechanism within 5 working days. The way forward will be informed by the recommendations of the mediator and the nature of the grievance.

A Complaint is closed out when no further action is required, or indeed possible. Closure status must be classified and captured following mediation or successful resolution in the Complaints Register as follows:

- Resolved. Complaints where a resolution has been agreed and implemented and the Complainant has signed the Confirmation Form.
- Unresolved. Complaints where it has not been possible to reach an agreed resolution despite mediation.
- Abandoned. Complaints where the Complainant is not contactable after one month following receipt of a Complaint and efforts to trace his or her whereabouts have been unsuccessful.

The grievance mechanism does not replace the right of an individual, community, group or organization to take legal action should they so wish. In the event of the grievance not being resolved to the satisfaction of Complainant and or the Developer, either party may be entitled to legal action if an appropriate option, however, this grievance mechanisms aims to avoid such interactions by addressing the grievances within a short timeframe, and to mutual satisfaction, where possible.

APPENDIX C:

OPEN SPACE MANAGEMENT PLAN

NAMAS WIND FARM NEAR KLEINSEE, NORTHERN CAPE:

OPEN SPACE MANAGEMENT PLAN

PRODUCED FOR SAVANNAH ENVIRONMENTAL

ON BEHALF OF GENESIS NAMAS WIND (PTY) LTD

BY

3Foxes Biodiversity Solutions

Simon.Todd@3foxes.co.za

October 2018

OPEN SPACE MANAGEMENT PLAN – PURPOSE

The purpose of the Namas Wind Farm Open Space Management Plan is to provide a framework for the integrated management of the natural and semi-natural areas within and adjacent to the Namas Wind Farm during the daily operational activities of the wind farm. The footprint of the facility will occupy a small proportion of the site, but impacts resulting from the construction and operational activities of the facility may extend beyond the required footprint and impact biodiversity within the site more generally. The goal of the Open Space Management Plan is to reduce the ecological footprint of the Namas Wind Farm through ensuring that the facility operates in a biodiversity-compatible manner and does not have a long-term negative impact on the local environment.

PROBLEM OUTLINE

The Namas Wind Farm is located within a matrix of natural vegetation with a variety of free-roaming wildlife as well as livestock. In addition, alien plant invasion, soil erosion, motor vehicle impacts, noise and disturbance generated by operational activities and human disturbance are potential impacts that may occur on an on-going basis at the site and extend beyond the actual footprint of the development. The purpose of the plan is therefore to ensure that the facility operates in a biodiversity compatible manner and does not have a long-term negative impact on the local environment.

RELATION TO OTHER SUBPLANS

During construction, there are a variety of subplans developed as part of the EMPr for the development that are aimed at ensuring that construction occurs in a responsible and biodiversity-compatible manner, this includes the Plant Rescue and Protection Plan, Revegetation and Rehabilitation Plan and Alien Management Plan. The purpose of the Open Space Management Plan is to ensure that all the different plans are aligned, and that additional measures are implemented during the operation of the wind farm to ensure that the negative environmental impacts of the development are minimised.

OPEN SPACE MANAGEMENT SUBPLAN

The following elements are considered part of the Open Space Management Subplan

Access Control:

- Access to the facility should be strictly controlled.

- All visitors and contractors should be required to sign-in.
- Signage at the entrance should indicate that disturbance to fauna and flora is strictly prohibited.
- If there are fenced-off parts of the wind farm such as substations, O&M buildings etc., these should be fenced with a single fence with electrified strands only on the inside of the fence and not the outside, if required at all.

Prohibited Activities:

The following activities should not be permitted within the wind farm by anyone except as part of the other management programmes of the EMPr for the development.

- No fires within the site.
- No hunting, collecting or disturbance of fauna and flora, except where required for the safe operation of the wind farm and only by the Environmental Officer on duty and with the appropriate permits and landowner permission.
- No driving off of demarcated roads.
- No interfering with wildlife or livestock.

Fire Risk Management:

Fires are not a natural occurrence in the vicinity of the site. Where the vegetation becomes dominated by grasses, it is possible that these areas could build up sufficient biomass for a fire, specifically following exceptional rainfall. However this is likely to be a rare occurrence and would not be a general concern for the wind farm.

The National Veld and Forest Fires Act places responsibility on the landowner to ensure that the appropriate equipment as well as trained personnel are available to combat fires. Therefore, the management of the wind farm should ensure that they have suitable equipment as well as trained personnel available to assist in the event of fire.

Firebreaks

Due to the nature and aridity of the site, firebreaks are not recommended at the site and should not be used. The access roads around the site are sufficient to act as effective firebreaks and no additional steps should be required to limit the spread of fires.

Alien Plant Control

- Alien invasive plants should be controlled according to the Alien Invasive Management Plan.
- No non-locally occurring or alien plants should be established or brought onto the site.

Erosion Management

- The wind farm should be inspected every 6 months for erosion problems or more frequently in the event of exceptional rainfall events. All erosion problems should be rectified according to the Erosion Management Subplan.

Faunal Management

The site will remain a largely natural environment with a full complement of resident natural fauna, including a variety of mammals, reptiles and frogs that may be impacted by day to day activities at the site. The management of the wind farm should be aimed at trying to minimise interactions between wildlife and the facility in terms of its staff, infrastructure and activities.

- Bird monitoring and mitigation should occur according to the most current best practise guidelines
- Snakes and Reptiles
    - There are likely to be a variety of snakes present at the site including venomous species such as Puff Adder and Cape Cobra. They may be attracted to certain features such as buildings if these provide shelter or contain an abundance of prey species such as rodents.
    - Snakes encountered within the wind farm may pose a danger to staff and should be allowed to move off on their own in the case of snakes encountered on roads or other areas within the 'veld' or be removed unharmed to safety by a suitably qualified person in the case where these pose a danger to humans.
    - All vehicles should give way to snakes and tortoises crossing roads. There are a lot of access roads at the site and reptiles will be crossing these on a regular basis and the potential for mortality resulting from being 'run over' is high. All vehicles should adhere to a low speed limit (30km/h) and give way to all reptiles crossing the roads.
- Mammals
    - Resident fauna should not be habituated by feeding them scraps or other foodstuffs and it is not necessary to provide such species with water either as most arid fauna are independent of water. As such, it is also important that all waste at the site is handled appropriately and kept in closed bins not accessible to fauna.
    - Some species are vulnerable to being hit by motor vehicles including Steenbok, Bat-eared Fox and Hares. All vehicles on the site should adhere to a low speed limit (30km/h) and give way to any mammals on the roads, especially if there is any driving on the site at night.
    - All incidents should be recorded on a log maintained by the Environmental Officer, so that additional mitigation measures can be implemented if there are any specific areas where regular incidents occur.

- If there is any post-construction trenching or similar activity at the site, any trenches and holes excavated should not be left open for extended periods as fauna can fall in and become trapped. Trenches should have ramps of soil present where fauna can escape or should be excavated incrementally so that they are used only as required and do not stand open for extended periods.

- General Faunal Mitigation
  - Night-lighting at the site should be kept to a minimum. Artificial lights affect invertebrates and migrating birds and also attract bats and birds. If any parts of the site need to be lit at night for security or other reasons, then all lighting should be downward-directed low-UV type lights (such as most LEDs), which do not attract insects.
  - Any chemical, fuel, oil or other spills should be cleaned in the appropriate manner as related to the nature and extent of the spill. Contaminated soil should be removed from the site.

Integrated & Adaptive Management

The management of the wind farm should meet with the landowner and other relevant local managers to review the management of the facility on a regular basis. Records of such meetings should be maintained including decisions and management outcomes resulting from such meetings. The Open Space Management plan should be reviewed annually for the first three years post-construction to evaluate the effectiveness of management actions so that these can be adapted as appropriate.

Monitoring & Evaluation

- As the integrating framework for the environmental management of the site, the Open Space Management Plan should ensure that all monitoring and associated record keeping is conducted according to the schedules of the respective subplans.
- As the issues at the site are likely to change over time, the Open Space Management Plan should be evaluated on an annual basis for the first three years of operation and then every 3 years or more regularly if required. Where specific problems arise, persons with relevant expertise should be brought in to advise the management of the site and update the Open Space Management Plan.

APPENDIX D:

RE-VEGETATION AND HABITAT REHABILITATION PLAN

NAMAS WIND FARM - REHABILITATION AND REVEGETATION PLAN

PRODUCED FOR SAVANNAH ENVIRONMENTAL

ON BEHALF OF GENESIS NAMAS WIND (PTY) LTD

BY

3Foxes Biodiversity Solutions

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October 2018

Background & Purpose

The purpose of the Namas Wind Farm revegetation and rehabilitation plan is to ensure that areas cleared or impacted during construction activities of the wind farm are rehabilitated with a plant cover that reduces the risk of erosion of these areas, as well as restore some ecosystem function. The West Coast has specific requirements in terms of rehabilitation and revegetation due to the sandy soils which characterise the area as well as the high winds that the area experiences. Together these characteristics of the area, make effective rehabilitation of disturbed areas more important than it is typically the case, but also more difficult and challenging. The intention is not to provide a fully operational plan, but rather the principles that should underpin a detailed rehabilitation action and implementation plan for transformed and disturbed areas that occur as a result of the construction activities at the site. Due largely to the mining activity that occurs along the West Coast, there is already a substantial body of research and work that has been done on rehabilitation in this area and the lessons learnt and salient aspects are extracted and summarised here as relevant to the current situation.

Rehabilitation Goals

It is important to define a rehabilitation benchmark and end-goal against which relative rehabilitation success can be measured. The Society for Ecological Restoration (2002) provides eight objectives for a restored ecosystem:

- It should contain characteristic species that occur in the reference system;
- It should comprise largely indigenous species;
- The functional groups necessary for continued stability must be present or have the potential to colonise;
- The physical environment must be conducive for the establishment of species that will lead to stability;
- It functions normally for its stage of development;
- It is integrated into a larger ecological matrix;
- Potential threats to the system's stability are eliminated; and
- It is self-sustaining to the same degree as the reference system.

The above goals are fairly broad and the discussion that follows will provide details on how these goals can be achieved and what indicators can be used to measure progress towards these goals.

Rehabilitation Targets

Although the overall goal of rehabilitation is provided above, it is common practice to set measureable targets against which progress can be measured and evaluated. Parameters that are usually measured include indicators of plant community structure and composition such as similarity to a reference area, species richness, species diversity, vegetation cover, species dominance, vertical structure and functional diversity of the vegetation. Important considerations with regards to setting such targets include ensuring that they are achievable, and secondly, that they change appropriately over time. In other words, there should be different targets for a parameter based on

the time since rehabilitation. Targets for vegetation cover should be set as follows in reference to the baseline cover of the undisturbed vegetation:

- Year 1: 20%
- Year 2: 40%
- Year 3: 60%

Assuming that the background vegetation cover is 40%, as typically occurs in the area, the actual plant cover that would represent the above targets is as follows:

- Year 1: 8% Cover
- Year 2: 16% Cover
- Year 3: 24% Cover

These targets must be closely tied into the monitoring schedule to provide references against which the effectiveness of monitoring can be measured. The ultimate goal should be to achieve approximately 80% of the background perennial plant cover.

Much has been made of species richness targets for rehabilitation. However, in most situations, these are not directly relevant as the emphasis should be on restoring ecological function. It is not practical or cost effective to attempt to restore high levels of plant biodiversity within a short time frame. Once some ecological function is restored, species richness will slowly increase and ultimately the effectiveness of rehabilitation in restoring species richness can only be evaluated after 10 or more years following rehabilitation. However, it is important to note that rehabilitation with a variety of species provides increased resilience to drought and other pressures. As a result, rehabilitation with single-species stands is not recommended and at least 3-4 species should be used in any area.

Plant Species Suitable for Rehabilitation at the Namas Wind Farm

No alien species should be used for rehabilitation. Although some of these are easy to establish, in the long-run, they retard the return of the indigenous species and do not contribute to meeting rehabilitation goals. Although the species selected for use in rehabilitation should come from the local indigenous species pool, not all species are equally suitable for use in rehabilitation. The primary criteria for selection are practical and economic which usually dictate the ease with which species can be established. This includes survival rates, such that establishment success is measured in the field at least a year after planting once plants can be considered established and self-sustaining. Although there are not large numbers of species which are suitable for rehabilitation, it is important to select a mix of functional types or growth forms (i.e. a mix of grasses, low shrubs and tall shrubs) as this adds structural diversity to the rehabilitated areas and also increases resilience.

Species suitable for Transplant

Succulent shrubs and sprawling succulents are usually the best candidates for translocation, while most woody species are not suitable due to low survival rates. There have been a number of studies on the West Coast which have examined which species are most useful for rehabilitation. Blood (2006) found that at Brand-se-Baai, *Othonna cylindrica*, *Ruschia versicolor* and *Lampranthus suavissimus* were the best suited species present for translocation. Similar species are also present

at the Namas Wind Farm and should be used for translocation where possible. *Zygophyllum morgsana* is also potentially suitable for translocation but survival is more variable and some experimentation may be required to establish the best approach for this species. As this species is common across most of the Namas Wind Farm site, it should be used where possible as taller species suitable for transplant are uncommon. Apart from these species, other succulent shrubs such as the various *Othonna* species or "vygies" present on site should also be trialled.

An important aspect regarding transplants is that they provide immediate cover and structure and encourage the establishment of other species through creating seed traps and suitable microsites for plant establishment, even if they do not survive. There is some debate as to whether transplants should be provided with supplementary water post-transplant or not, however some studies have shown that this does not significantly improve survival, and given the logistical problems with irrigating, it is not seen as a viable option for most situations along the West Coast. However, transplanting should preferably occur just prior or during the wet season when there is some moisture in the soil as this improves survival and it is also easier to work the soil when it is not too loose. As the death of transplants is often caused by a failure to meet the water demands of the plant, transplants should preferably occur before the shrubs have leaves in the case of deciduous species or during the cool season for evergreen species.

Species Suitable for Seeding

In terms of species suitable for seeding, the grasses *Ehrharta calycina* and *Cladoraphis spp.* are recommended as well as shrubs such as *Tetragonia* spp. and *Zygophyllum* spp., *Lebeckia sericea*, *Ehrharta calycina*, *Salvia* spp. and *Eriocephalus brevifolius*. When seeding, there are a number of additional considerations that need to be adhered to. Seeding should only occur once the site has been prepared with topsoil and wind erosion nets have been put in place. In addition, seeds cannot be spread on the surface and need to be planted, which is usually done using an agricultural methods (i.e. tractor and planter or spreader and roller). Although there are numerous species whose seeds are commercially available, such as *Cenchrus ciliaris* and *Digitaria eriantha*, these species do not naturally occur on the West Coast and will not survive. Details on how to collect, prepare and store seeds is not provided here, but an experienced specialist should be appointed to provide on-site advice or services in this regard.

Constraints and Limiting Factors for Rehabilitation

There are various environmental constraints that retard or otherwise limit rehabilitation success on the West Coast. These are briefly described and discussed below.

Wind and Sand Movement

The strong winds of the West Coast are problematic for rehabilitation because of the effect they have on vegetation and sand movement. Areas being rehabilitated are especially vulnerable to wind erosion, firstly because there is no vegetation cover to protect the soils, and secondly, because the soils are loose from being disturbed.

Sand movement results in sand accumulation leading to the burial of established plants and especially seedlings which cannot grow fast enough to outpace the rate of burial. Alternatively, there may be sand erosion, leaving plant roots exposed. In both cases, sand movement leads to

death and loss of the plants. This is usually remedied by placing shade cloth wind barriers perpendicular to the dominant wind direction. Depending on the local conditions, these need to be 5-10m apart. The wind barriers need to be maintained in place until such time as the vegetation cover has recovered sufficiently to stabilise the sand (approximately 30-40% vegetation cover). As these areas remain vulnerable to disturbance for decades, rehabilitated areas should be demarcated as no-go areas and protected from disturbance as much as possible.

Wind breaks are standard practice for rehabilitation on the West Coast. These should be placed about 5m apart. Here the area in the foreground has been seeded with *Cladoraphis cyperoides*.

Soil Factors

As already mentioned, topsoil management is a key element of rehabilitation. This is because the topsoil contains seeds, mycorrhiza (symbiotic root fungi), organic matter and nutrients that may be lacking in the deeper soil layers. In addition, the deeper soils frequently contain high levels of salts and other minerals that may make the soil unfavourable for plant establishment. In general, the soils on the West Coast are sandy soils of marine and aeolian origin. These are usually very nutrient poor and not well differentiated in the upper layers, although there may be various types of cemented layers and hard pan deeper down.

The subsoils on the West Coast are usually highly saline with high clay and sodium content and have poor soil microbial communities. These function to limit or prevent plant establishment and dumps of these soils may remain unvegetated for decades. Previous studies along the coast have shown that the electrical conductivity (Ec) of the subsoils may be 10 times the Ec levels of the topsoil (Desmet & Cowling 1999). These soil properties act as very strong limits and constraints on plant establishment and active rehabilitation of these soils is usually met with very poor success. As a result, it is important that these soils are not exposed, but rather are covered with a layer of topsoil before rehabilitation is attempted.

Although topsoil depth varies, it is recommended that no more than 30cm of material is stripped and used for topsoil. As the seeds and microbes in the topsoil decline over time, it is recommended that the topsoil is used as quickly as possible and preferably transferred directly from where it is being stripped to where it is being applied. If topsoil needs to be stored, it should be stored in dumps no more than 1m deep and for no longer than 6 months as it quickly loses viability. In addition, the vegetation should not be cleared from the topsoil before it is stripped, but should be mixed in with the topsoil.

Low Rainfall and Unfavourable Climate

A limiting factor for seedling establishment in arid and semi-arid environments is moisture availability, which is related to rainfall timing and amount. The timing of rehabilitation efforts is therefore very important as rehabilitation in the incorrect season may be futile. The optimal time for transplants or seeding is usually in the winter months, from May through to August. As the wind farm construction timing will not be seasonal, areas that require rehabilitation will be generated throughout the construction period and should be prepared for rehabilitation all year round, with the application of topsoil and preparation of wind breaks. Translocation of adult plants and planting of seedlings or seeds can then take place in the optimal cool-season window.

Monitoring and Evaluation

The primary purpose of monitoring should be to inform and enable adaptive management interventions and improve rehabilitation outcomes. As such, monitoring must be linked to targets, their associated measurement intervals, as well as what actions are triggered when a target has not been met. There should therefore be a clearly defined feedback between monitoring outcomes and consequent rehabilitation actions. A critical component of monitoring is detailed record keeping and associated data management.

There are various approaches to monitoring and parameters that can be measured. It is however important that these are relevant and practical to measure. Simple indicators such as plant cover and species richness are usually the most simple and reliable to measure, with a variety of published and well-known sampling methods.

As rehabilitation success is unpredictable in this environment, monitoring and follow-up actions are important to achieve the desired cover and soil protection. The following basic monitoring schedule with associated remedial actions is recommended:

- Re-vegetated areas should be monitored every 4 months for the first 12 months following construction. Thereafter, monitoring should be conducted every six months until such time that the target areas have attained the desired benchmark vegetation cover.
- Re-vegetated areas showing inadequate surface coverage (less than 20% within 12 months after re-vegetation) should be prepared and re-vegetated;
- Any areas showing erosion, should be re-contoured and seeded with indigenous shrubs or succulents present in the local area.

Conclusions and Recommendations

In terms of achieving good rehabilitation outcomes for the Namas Wind Farm, the most important aspect of the construction process is ensuring the efficient management of topsoil. During construction, topsoil should preferably be transferred directly from one area to another and not stored for extended periods, as the seeds present and microbiota of the soil quickly lose their viability when stored.

In terms of the species most suitable for rehabilitation, these should be drawn from the local species pool. Succulent shrubs and sprawling succulents are usually the best candidates for translocation, while most woody species are not suitable due to low survival rates. Transplants are useful in that they provide instant cover and structure and do not require several years to establish. It can however be costly to transplant large numbers of plants and survival rates can also be low if this is not done correctly. Seeding can also be used, but this requires planning and adequate seed collection which can be difficult as this must be done manually.

The West Coast is a generally unfavourable climate for plant establishment, with high winds, poor soils and low rainfall all inhibiting plant growth and establishment. These constraints need to be considered in rehabilitation programmes and the timing of rehabilitation needs to coincide with the most favourable period for plant establishment. The ultimate goal of the rehabilitation is twofold, firstly and primarily, it is to prevent erosion of the vulnerable sandy soils of the area and secondly it is to promote and maintain the ecological functioning of the landscape within the wind farm. In terms of restoring ecological function, the main metrics of success are vegetation cover and structure; the affected areas will be relatively small and distributed across the site with the result that large contiguous areas requiring rehabilitation will not be present. While diversity is important in the long-term, in the short to medium term, diversity is of secondary importance and the immediate focus should be on restoring a self-sustaining cover of perennial vegetation to protect the soil and facilitate the natural recolonization of the affected areas by the local fauna and flora.

Monitoring and evaluation is a key component of rehabilitation, but needs to be clearly linked with outcomes and interventions that are triggered when targets are not met. In terms of indicators, simple parameters such as plant cover and species richness are usually the most simple and reliable to measure, with a variety of published and well-known sampling methods available.

Literature and Further Reading:

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APPENDIX E:

PLANT RESCUE AND PROTECTION PLAN

NAMAS WIND FARM:

PLANT RESCUE & PROTECTION PLAN

PRODUCED FOR SAVANNAH ENVIRONMENTAL

ON BEHALF OF GENESIS NAMAS WIND (PTY) LTD

BY

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October 2018

MANAGEMENT PLAN OBJECTIVES

The purpose of the Namas Wind Farm plant rescue and protection plan is to implement avoidance and mitigation measures to reduce the impact of the development of the wind farm on listed and protected plant species and their habitats during construction and operation. This subplan is required in order to ensure compliance with national and provincial legislation for vegetation clearing and any required destruction or translocation of provincially and nationally protected species within the footprint of the wind farm.

The Plan first provides some legislative background on the regulations relevant to listed and protected species, followed by a summary of the protected species and genera as listed by the Northern Cape Conservation Act (2009) and then an identification of species present at the Namas Wind Farm project site and actions that should be implemented to minimise impact on these species and comply with legislative requirements.

IDENTIFICATION OF SPECIES OF CONSERVATION CONCERN

Plant species are protected at a national level as well as a provincial level and different permits may be required for different species depending on their protection level. At a national level, protected trees are listed by the Department of Agriculture, Forestry and Fisheries (DAFF) under the National List of Protected Trees, which is updated on a regular basis. Any clearing of nationally protected trees requires a permit from DAFF. At the provincial level, all species red-listed under the Red List of South African plants (http://redlist.sanbi.org/) as well as species listed under the Northern Cape Nature Conservation Act (No. 9 of 2009) are protected and require provincial permits. The Northern Cape Conservation Act lists a variety of species as protected but also lists several whole families and genera as protected. Of particular relevance to the current study are the following, which are extracted from the legislation and are not intended to provide a comprehensive list of all protected species, only those which are likely to be encountered in the area. The reader is referred to the schedules of the Act for a full list of species listed under the act.

Under the Northern Cape Nature Conservation Act (No. 9 of 2009), the following are highlighted as potentially being present at the site:

Schedule 1: Specially Protected Flora

- Family GERANIACEAE - *Pelargonium* spp. all species

Schedule 2 Protected Flora

- *Amaryllidaceae* – All species
- *Apiaceae* – All Species
- *Apocynaceae* – All Species
- *Asphodelaceae* – All species except Aloe ferox
- *Iridaceae* – All species
- *Mesembryanthemaceae* – All species
- *Androcymbium* spp. - All species
- *Crassulaceae* - All species except those listed in Schedule 1
- *Euphorbiaceae* - Euphorbia spp. All species
- *Oxalidaceae* - Oxalis spp - All species
- *Portulacaceae* - Anacampseros spp. - All species

A full list of plant species known from the broader area around Namas Wind Farm project site including those recorded at the site are provided in Annex 1. This includes their protection status according to the Northern Cape Conservation Act and whether they are listed under the national list of protected trees. It is important to note that authorisation of the project by DEA does not free the developer from complying with the provincial legislation and permitting requirements with regards to protected species.

MITIGATION AND AVOIDANCE OPTIONS

The primary mitigation and avoidance measure that must be implemented at the preconstruction phase is the Preconstruction Walk-Through of the development footprint. This defines which and how many individuals of listed and protected species are found within the development footprint. This information is required for the DAFF (if required) and Northern Cape Nature Conservation (definitely required) permits which must be obtained before construction can commence.

Where listed plant species fall within the development footprint and avoidance is not possible, then it may be possible to translocate the affected individuals outside of the development footprint. However, not all species are suitable for translocation as only certain types of plants are able to survive the disturbance. Suitable candidates for translocation include most geophytes and succulents. Although there are exceptions, the majority of woody species do not survive translocation well and it is generally not recommended to try and attempt to translocate such species. Recommendations in this regard would be made following the walk-through of the development footprint before construction, where all listed and protected species within the development footprint will be identified and located.

Preconstruction

- Identification of all listed species which may occur within the site, based on the SANBI SIBIS database as well as the specialist studies for the site and any other relevant literature.

Before construction commences at the site, the following actions should be taken:

- A walk-through of the final development footprint by a suitably qualified botanist/ecologist to locate and identify all listed and protected species which fall within the development footprint. This should happen during the flowering season at the site which depending on rainfall is likely to be during winter.
- A walk-through report following the walk-through which identifies areas where minor deviations to roads and other infrastructure can be made to avoid sensitive areas and important populations of listed species. The report should also contain a full list of localities where listed species occur within the development footprint and the number of affected individuals in each instance, so that this information can be used to comply with the permit conditions required by the authorization as well as provincial requirements.
- A permit to clear the site and relocated species of concern is required from Northern Cape DENC before construction commences. There are no listed tree species present at the site and a permit from DAFF to clear protected trees is not likely to be required.
- Once a permit has been issued, there should be a search and rescue operation of all listed species which have been identified in the walk-through report as being suitable for search and rescue within the development footprint that cannot be avoided. Affected individuals should be translocated to a similar habitat outside of the development footprint and marked for monitoring purposes. Those species suitable for search as rescue should be identified in the walk-through report. It is important to note that a permit is required to translocate or destroy any listed and protected species even if they do not leave the property.

Construction

- Vegetation clearing should take place in a phased manner, so that large cleared areas are not left standing with no activity for long periods of time and pose a wind and water

erosion risk. This will require coordination between the contractor and ECO, to ensure that the ECO is able to monitor activities appropriately.

- All cleared material should be handled according to the Revegetation and Rehabilitation Plan and used to encourage the recovery of disturbed areas.
- ECO to monitor vegetation clearing at the site. Any deviations from the plans that may be required should first be checked for listed species by the ECO and any listed species present which are able to survive translocation should be translocated to a safe site.
- All areas to be cleared should be demarcated with construction tape, survey markers or similar. All construction vehicles should work only within the designated area.
- Plants suitable for translocation or for use in rehabilitation of already cleared areas should be identified and relocated before general clearing takes place.
- Any listed species observed within the development footprint that were missed during the preconstruction plant sweeps should be translocated to a safe site before clearing commences.
- Many listed species are also sought after for traditional medicine or by collectors and so the ECO should ensure that all staff attend environmental induction training in which the legal and conservation aspects of harvesting plants from the wild are discussed.
- The ECO should monitor construction activities in sensitive habitats such as in dune areas carefully to ensure that impacts to these areas are minimised.

Operation

- Access to the site should be strictly controlled and all personnel entering or leaving the site should be required to sign in and out with the security officers.
- The collecting of plants or their parts should be strictly forbidden and signs stating so should be placed at the entrance gates of the site.

IDENTIFICATION OF LISTED SPECIES

In this section, the listed species known to occur in the area are identified based on species observed during site visits as well as surveys captured within SANBI SIBIS database. According to the SIBIS database, more than 500 indigenous species are known from the area. Of these at least 5 can be confirmed present at the site, but there are likely to be others as well as the site has not been well investigated in the past. Those present within the development footprint would be clarified following the preconstruction walk-through.

It is important to note that the list below is only those species which are of conservation concern and which are known to occur in the area. In addition to such species there are provincially protected species which may include entire genera and even families that are protected under the provincial legislation. While some families such as *Mesembryanthemaceae* contain many abundant species which are not of conservation concern, these should still be listed on any clearing permit applications to DENC.

Table 1. Species of conservation concern known from the broad area around the site.

Family	Genus	Species	Status
Aizoaceae	*Antimima*	*koekenaapensis*	VU
Aizoaceae	*Jacobsenia*	*vaginata*	VU
Aizoaceae	*Jordaaniella*	*clavifolia*	VU
Aizoaceae	*Jordaaniella*	*uniflora*	NT
Aizoaceae	*Leipoldtia*	*klaverensis*	EN
Aizoaceae	*Tetragonia*	*pillansii*	VU
Aizoaceae	*Wooleya*	*farinosa*	VU
Apiaceae	*Capnophyllum*	*africanum*	NT
Apocynaceae	*Ceropegia*	*occidentalis*	NT
Asphodelaceae	*Aloe*	*arenicola*	NT
Asphodelaceae	***Aloe***	***framesii***	**NT**
Asteraceae	*Gazania*	*splendidissima*	NT
Asteraceae	*Helichrysum*	*marmarolepis*	NT
Asteraceae	***Leucoptera***	***nodosa***	**VU**
Asteraceae	*Metalasia*	*adunca*	NT
Asteraceae	*Osteospermum*	*nordenstamii*	VU
Campanulaceae	***Wahlenbergia***	***asparagoides***	**VU**
Ericaceae	*Erica*	*floccifera*	VU
Fabaceae	*Argyrolobium*	*velutinum*	VU
Fabaceae	*Aspalathus*	*obtusata*	VU
Fabaceae	*Calobota*	*acanthoclada*	EN
Fabaceae	*Calobota*	*lotononoides*	NT
Fabaceae	*Lotononis*	*rigida*	VU
Fabaceae	*Rhynchosia*	*emarginata*	EN
Fabaceae	*Wiborgiella*	*humilis*	VU
Geraniaceae	*Pelargonium*	*adriaanii*	VU
Hyacinthaceae	*Lachenalia*	*angelica*	VU
Iridaceae	***Babiana***	***hirsuta***	**NT**
Iridaceae	*Babiana*	*lanata*	VU
Iridaceae	*Babiana*	*namaquensis*	VU
Iridaceae	*Babiana*	*tritonioides*	VU
Iridaceae	*Lapeirousia*	*barklyi*	NT
Iridaceae	*Lapeirousia*	*simulans*	VU

Molluginaceae	*Adenogramma*	*teretifolia*	VU
Poaceae	*Stipagrostis*	*geminifolia*	NT
Proteaceae	*Leucospermum*	*praemorsum*	VU
Scrophulariaceae	*Dischisma*	*leptostachyum*	NT
Scrophulariaceae	*Nemesia*	*saccata*	VU

MONITORING & REPORTING REQUIREMENTS

The following reporting and monitoring requirements are recommended as part of the plant rescue and protection plan:

- Preconstruction walk-through report detailing the location and distribution of all listed and protected species. This should include a walk-through of all infrastructure including all new access roads, turbine locations, turbine service areas, underground cables, buildings and substations. The report should include recommendations of route adjustments where necessary, as well as provide a full accounting of how many individuals of each listed species will be impacted by the development.
- Permit application to NC-DENC. This requires the walk-through report as well as the identification and quantification of all listed and protected species within the development footprint. The permit is required before search and rescue can take place. Where large numbers of listed species are affected a site inspection and additional requirements may be imposed by NC-DENC as part of the permit conditions. All documentation associated with this process needs to be retained and the final clearing permit should be kept at the site.
- Active daily monitoring of clearing during construction by the ECO to ensure that listed species and sensitive habitats are avoided. All incidents should be recorded along with the remedial measures implemented.
- Post construction monitoring of plants translocated during search and rescue to evaluate the success of the intervention. Monitoring for a year post-transplant should be sufficient to gauge success.

APPENDIX F:

TRAFFIC AND TRANSPORTATION MANAGEMENT PLAN

PRINCIPLES FOR TRAFFIC MANAGEMENT

1. PURPOSE

The purpose of this Traffic Management Plan (TMP) is to address regulatory compliance, traffic management practices, and protection measures to help reduce impacts related to transportation and the construction of temporary and long-term access within the vicinity of the Namas Wind Farm project site. The objectives of this plan include the following:

- To ensure compliance with all legislation regulating traffic and transportation within South Africa (National, Provincial, Local & associated guidelines).
- To avoid incidents and accidents while vehicles are being driven and while transporting personnel, materials, and equipment to and from the project site.
- To raise greater safety awareness in each driver and to ensure the compliance of all safe driving provisions for all the vehicles.
- To raise awareness to ensure drivers respect and follow traffic regulations.
- To avoid the deterioration of access roads and the pollution that can be created due to noise and emissions produced by equipment, machinery, and vehicles.

2. RELEVANT ASPECTS OF THE PROJECT

The public roads located within the surrounding area of the project site includes:

- The DR2964 gravel road, which is well maintained and shows signs of frequent blading;
- The MR751 surface road, which used to be a private road with checkpoint access and maintained by the De Beers Mining Company, however, when the mine was closed the route was converted into a public road; and
- A minor gravel road.

The Namas Wind Farm project site can be accessed from the:

- West via the MR751 (surfaced) and a minor road; and
- North via the DR2964 and an internal farm road.

The current traffic volumes on the routes within the area surrounding the project site are very low. This low volume is due to the following:

- Low development density;
- The closure of the De Beers mining operations, which led to a drastic drop in the population in the area; and
- A lack of schools in the area.

Most of the traffic expected to occur with the development of the Namas Wind Farm will be generated during the construction phase. The transportation of each wind turbine will require a total of eleven

abnormal load trips, therefore the total for a maximum of 43 turbines will be around 473 trips. These trips are expected to be staggered.

The preferred route for the transportation of the project components and infrastructure was identified by the traffic specialist. The route is considered to be the shortest route to the site which maximises the use of higher order routes, and minimises travelling through towns. It is expected that the project components and equipment will need to be transported from the Port of Saldanha to the Namas Wind Farm project site. The route comprises the following:

- Head north on the Saldanha Bay Road;
- Turn right and then left onto the R27;
- Head north-east towards Velddrif;
- Turn left onto the R399;
- Turn left onto the N7 heading northwards towards Piketberg;
- Continue north on the N7 towards Garies;
- Turn left onto the MR739 connecting Garies to Hondeklip;
- Turn right onto the MR751 and continue on the MR751;
- Turn left towards Koingnaas; and
- Continue travelling in a north-west direction on the MR751 to the project site.

During the operation phase the vehicle trips will be low and will have a negligible impact on the external road network.

3. TRAFFIC AND TRANSPORTATION MANAGEMENT PRINCIPLES

- Prior to the commencement of construction the contractor must develop their own detailed Transport Management Plan (TMP) based on traffic volumes and road carry capacity outlines.
- The transport contractor must ensure that all required permits for the transportation of abnormal loads are in place prior to the transportation of equipment and project components to the project site. Specific abnormal load routes must be developed with environmental factors taken into consideration.
- Before construction commences, authorised access routes must be clearly marked in the field with signs or flagging.
  - Traffic signs used must conform to the National Road Traffic Act and South African National Standards.
  - Appropriate signs must be installed at locations as deemed necessary.
  - Signage must be placed at intersections, speed limit alterations, severe changes in road grading, where road hazards are located and where usual traffic flow changes abruptly.
  - All traffic signs must be obeyed by all staff and visitors on site, without exception.
- The EPC Contractor must review the location of the designated access and will be responsible for ensuring construction travel is limited to designated routes. The entrance of the main access road must not be constructed before a blind rise or on a bend of the public road.
- All employees must attend an environmental training program (e.g. toolbox talks) by the Environmental Officer (EO). Through this program, employees will be instructed to use only approved access roads, drive within the delineated road limits, and obey jurisdictional and posted speed limits to minimise potential impacts to the environment and other road users.
- The contractor will be responsible for making sure that their suppliers, vendors, and subcontractors strictly comply with the principles of this TMP and the contractor's TMP.

- Adjacent landowners must be notified of the construction schedule.
- Access roads and entrances to the site should be carefully planned to limit any intrusion on the neighbouring property owners and road users.
- Signs must be posted in the project area to notify landowners and others of the construction activity.
- Flagging must be provided at access points to the project site and must be maintained until construction is completed on the site.
- Speed limits must be established prior to commencement of construction and enforced for all construction traffic. The following limits are suggested for internal roads:
  - 60 km/hour where sign posted.
  - 40 km/hour where sign posted.
  - 20km/hour around workshop areas, in all car parks and yards.
  - A warning system, penalties or fines must be put in place where speed limits are not adhered to.
- Speed controls and implementation of appropriate dust suppression measures must be enforced to minimise dust pollution.
- Throughout construction the contractor will be responsible for monitoring the condition of roads used by project traffic and for ensuring that roads are maintained in a condition that is comparable to the condition they were in before the construction began.
- Inspect traffic/road signs regularly for cleanliness, condition and appropriateness. Take immediate action to rectify any problems with signage.
- Drivers must have an appropriate valid driver's license and other operation licences required by applicable legislation.
- All vehicles must be maintained in good mechanical, electrical, and electronic condition, including but not limited to the brake systems, steering, tires, windshield wipers, side mirrors and rear view mirror, safety belts, signal indicators, and lenses.
- Any traffic delays attributable to construction traffic must be co-ordinated with the appropriate authorities.
- No deviation from approved transportation routes must be allowed, unless roads are closed for reasons outside the control of the contractor.
- Impacts on local communities must be minimised. Consideration should be given to limiting construction vehicles travelling on public roadways during the morning and late afternoon commute time.
- A driver must not use the vehicle's horn except on the grounds of safety.
- Drivers of vehicles must always keep to the left and must be observant of other road users.
- Drivers must follow communication procedures and shall where applicable be trained in the correct use of two-way radios.
- Ensure all staff are trained upon entering the site regarding the meaning and correct response to each traffic sign utilised on site.
- All light vehicles must be fitted with a flashing amber strobe or revolving light.
- Persons authorized to operate on site must have a legal valid appropriate code provincial driver's license and competency certificate where applicable.
- No passengers allowed in any construction vehicles. If an assistant is required, they must obtain permission
- Vehicles must be maintained at approved intervals and must be inspected daily before use to ensure safe operation.
- All vehicles must only be used within the design specifications and limits set by the manufacturer.
- All construction vehicles will be used according to the Health & Safety Plan and related Method Statements and/or Risk Assessments.

- Weather and road conditions must be sufficient to allow safe operation to proceed. Head lights must be turned on at all times.
- No vehicle will be driven with any defect that may impact on the safe operation of that vehicle.
- Two-way radios shall only be used for official/work related matters.
- The use of mobile phones while driving a vehicle is prohibited.
- All vehicles shall carry a fire extinguisher (Dry Powder); 2.5kg for light vehicles, 4.5kg for haul trucks and 9kg for machinery.

4. MONITORING

- The principal contractor must ensure that all vehicles adhere to the speed limits.
- A speeding register must be kept with details of the offending driver.
- Repeat offenders must be penalised.

APPENDIX G:

STORMWATER AND EROSION MANAGEMENT PLAN

JG AFRIKA
EXPERIENCE QUALITY INTEGRITY

Namas Wind Farm

Storm Water Management and Erosion Control Report

Report No. : 4842-SW/R-01

September 2018
REVISION 1

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SYNOPSIS

Conduct a Storm Water Management and Erosion Control Report for the proposed Namas Wind Farm near Kleinsee in the Northern Cape, pertaining to all relevant storm water run-off calculations, new storm water infrastructure of proposed access roads as well as recommendations to mitigate erosion and flooding.

KEY WORDS:

Storm Water Management, Erosion Control, Environmental Protection and Rehabilitation

QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO9001: 2015 which has been independently certified by DEKRA Certification under certificate number 90906882/5-1

Verification	Capacity	Name	Signature	Date
By Author	Civil Engineer	Viahn Parazee		19 Sept 2018
Checked by:	Senior Civil Engineer	Stephan Schutte		19 Sept 2018
Authorised by:				

Filename:	4842 Namas WF-SW Mag & Erosion Control (rev1).doc

Namas Wind Farm

Storm Water Management and Erosion Control Report

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1 INTRODUCTION

1.1 Background Information

Genesis Namas Wind (Pty) Ltd (the Developer) propose to develop a 140MW wind energy facility, located on Farm Portions 3/327, RE/327, 3/328 and 4/328, approximately twenty kilometres (20 km) south-east of Kleinsee in the Northern Cape Province (refer to Figure 1-1 below for the locality of this Wind Farm). The Developer is in the process of obtaining an Environmental Approval from National DEA, for the proposed wind energy facility.

1.2 Terms of Reference

JG Afrika (Pty) Ltd was appointed by Genesis Namas Wind (Pty) Ltd to carry out professional engineering services related to the approvals and development of the proposed wind farm renewable energy facility. This Storm Water Management Plan forms an integral part of the supportive documentation, which will be required by National DEA.

1.3 Purpose of the Report

The purpose of this report is to investigate and to comment on the current site conditions and expected impacts or changes, due to changes in the natural (current) storm water run-off characteristics, due to the proposed development / impacted footprints. The wind farm development, especially the internal access roads and proposed turbine footprints areas, will impact the immediate local topography and natural storm water run-off characteristics of the surrounding landscape.

Steep gradients and sandy soil conditions are a concern when managing storm water run-off and ensuring sufficient erosion protection at exposed cut and fill slopes of embankment. Recommendations are therefore required to guide the detail design and construction stages, ensuring the landscape and vegetation are protected against excessive storm water run-off which will cause erosion. It is also critical that the detail design ensure that no unnecessarily increase in storm water run-off and concentration occur during and after construction.

Good Storm Water Management principles must therefore be in place to implement during the construction stage, for both permanent and temporary construction areas.

1.4 Limitations of the Report

This Storm water Management Report :

1. Does not intent to serve as a Storm Water Master Plan for the regional area;
2. Does not address the storm water run-off and management of the un-affected open areas, in between the wind turbine footprints;
3. Only conceptual designs of storm water infrastructure were performed. Detail designs of all final storm water infrastructure, will be done during the Detail Design stage.

During the Detail Design Stage, road gradients (longitudinal and cross-fall) and storm water open channel gradients and capacities, and related storm water run-off velocities, will be calculated. Principles forthcoming from this SWMP report will guide the design considerations.

The following applicable information should be noted for this SWMP:

- This SWMP was compiled for only the Namas WF catchment area;
- Storm water run-off and peak flow values were calculated based on a MAP of 131mm obtained from for the Kommagas Rainfall Station, No.: 0021 3888W.
- There are areas in the Namas WF region where storm water run-off or storm water ponding will occur due to the undulating topography.

1.5 Wind Farm Locality and Access

It is proposed to develop the Namas Wind Farm near Kleinsee, approximately 100km west of Springbok in the Northern Cape (see Figure 1.1 below).

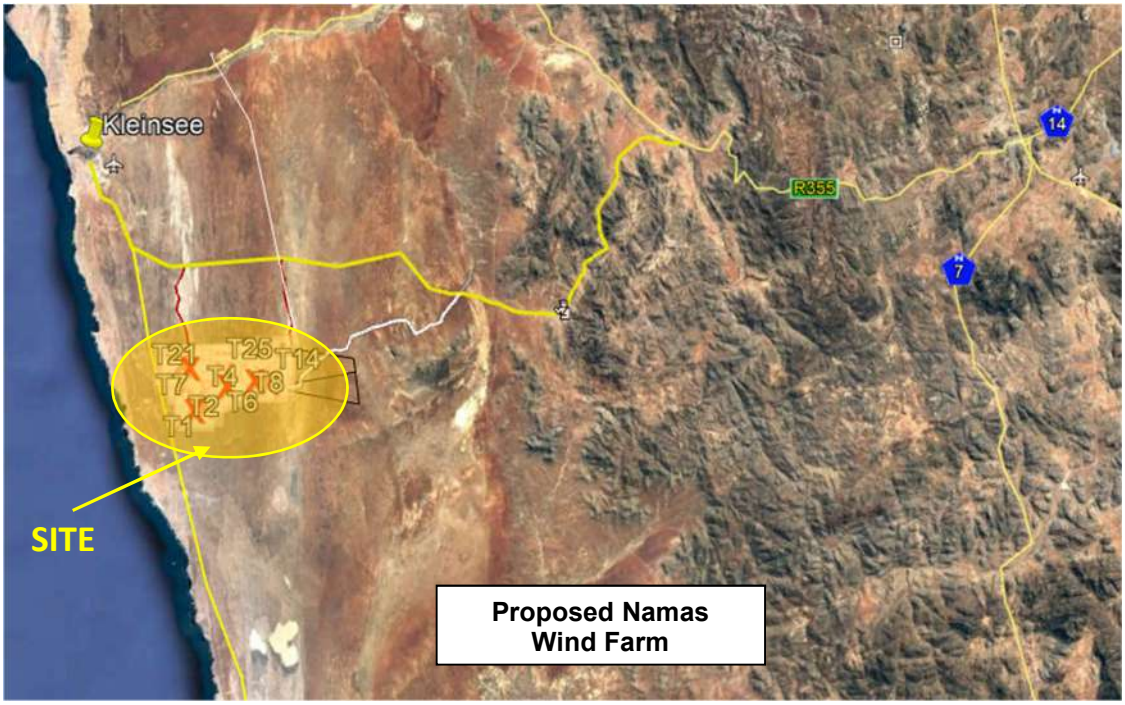

Figure 1-1: *Locality map of the proposed Namas Wind Farm*

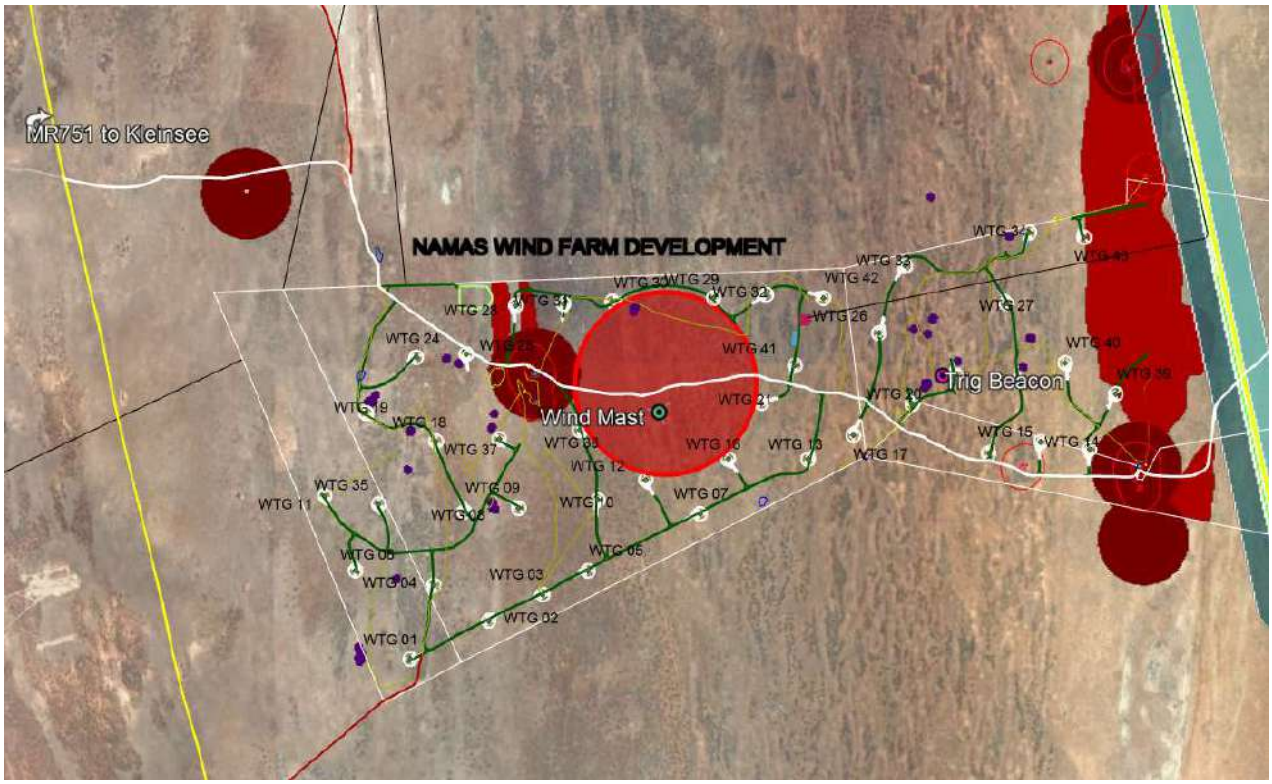

Figure 1-2: *Layout of the proposed Namas Wind Farm*

Figure 1-2 above shows the layout of this Wind Farm, situated just east of the MR751, a surfaced Provincial Main Road, running towards Kleinsee. The co-ordinates (Latitudes and Longitudes) of these 43 Wind Turbine positions are listed in the table bound in ***Annexure A***.

1.6 Climate

The Kleinsee region is very arid and classified as semi-desert. This area falls in the Namakwaland region and receives on long term average only 131mm of precipitation per year. It receives most of its rainfall during winter months. Rainfall varies and some years the recorded precipitation is less than 50mm per annum. A high percentage of precipitation is received from dense fog and sea mist, which frequently occurs in the mornings. This wets the upper soils and vegetation, but does not contribute to any overland run-off.

The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Kleinsee range from 23°C in July to 33°C in February. The region is the coldest during July when the mercury drops to 7°C on average during the night. Mid-summer days can become scorching hot.

1.7 Topography and Vegetation

The region has predominantly flat gradients (less than 3%) and large open stretched landscapes, with rolling hills of red sand dunes with sparse hardened vegetation and white calcrete outcrops on the flatter topography.

No natural water courses or streams exist in the development area. The topography forms minor valleys which open into large flat plains. A few minor localised depressions exist where storm water ponding may occur during high rainfall events.

The vegetation present across the proposed development area comprises sparse low hardened shrubland and fynbos with varying amounts of grass, succulents, forbs and geophytes, as shown in Figure 1-3 and Figure 1-4 below. The surrounding area is not cultivated and consists of sparse vegetation.

The region is mainly used for sheep and ostrich farming, and it accommodates a few farm houses, scattered long distances apart.

Figure 1-3: Typical vegetation across the majority of the Development Area : rolling reddish sand dunes with hard and sparse vegetation. Note deep sandy soils with high rate of permeability.

Figure 1-4: Typical vegetation at flat calcrete zones :
white calcrete plains with low and slightly more densely spaced vegetation growth.
These areas are known for plains of desert flowers after the rainfall season.

The elevation of the affected farms forming part of the proposed Namas Wind Farm, ranges from 155 masl to 244 masl (meters above sea level) and stretches over a 9km area from west to east, approximately 4km wide (north to south).

1.8 Geology

According to the 1:250 000 Geological Map Series, 3316 Springbok, the site is underlain by unconsolidated, redistributed sediments of Quaternary origin. These comprise unconsolidated sediments in the form of coastal sand dunes, alluvium, interior aeolian sand dunes, lacustrine limestones, marine reef and bioclastic sediments, as well as sand sheets with local gravel. During the field investigation, localised white calcrete deposits were encountered across the site, and were predominantly observed to underlie the unconsolidated Quaternary reddish sandy sediments.

***Figure 1-5**: White calcrete outcrops with open hardpan plains.*

***Figure 1-6**: Typical farm road across the white calcrete plains.*

***Figure 1-7**: Main road across the reddish rolling sand dune topography.*

1.9 Storm water infrastructure and Erosion observed

No storm water infrastructure such as culverts or drainage pipes exist on any of the Provincial Road sections or local farm roads, crossing the development area. The few main farm access roads are generally lower than the surrounding natural topography, to form a water path and convey storm water in the event of rainfall – refer to Figure 1-6 above. Most farm roads are however not constructed roads, and are merely two-track paths with no storm water control, such as side drains, in place. Small storm water side drains are only cut along the Provincial Main Roads (which receives regular blading maintenance), to accommodate storm water flow – see Figure 1-7 above.

Very little flood damage was observed across the development area, which indicates that (part from the very low rainfall, the current natural topography, with its mild gradients and sparse vegetation cover, generally assists with the restriction of erosion of normal over-land storm water run-off flows and velocities. Some localised open arid patches exist, with little or no vegetation growth, where erosion trenches occur. Erosion is evident mainly along the prominent drainage corridors such as access roads, as well as man-made borrow pits, which also serves as storm water detention ponds during flood events – see Figures 1-9 and 1-10.

***Figure 1-8**: Note the erosion damage along the main farm access roads with sandy soil condition, running on relative steep gradients.*

***Figure 1-9 and Figure 1-10**: Note the erosion damage at the man-made borrow pit areas. Note the reddish sand soils above and the whitish calcrete sand below. These depressions also serve as storm water detention ponds, to retain a storm water flood, in the event of abnormal high rainfall.*

1.10 Ground Water

No groundwater seepage was encountered in any trial pits excavated across the site. The region however currently experienced a very dry season.

It is however recommended that appropriate drainage measures be implemented at the impacted development areas during construction, to ensure potential groundwater and surface water caused by heavy or prolonged rainfall is diverted away from the vicinity of the roads and wind turbine structures and their respective foundation excavations.

2 STORM WATER MANAGEMENT

Storm water planning is essential to prevent erosion of natural and agricultural land and flooding of disturbed areas with new infrastructure. Impacted footprints of new infrastructure must be designed, constructed and maintained using best Storm water Management practices to prevent flooding and to protect natural water quality. Focus must also be to reduce soil erosion and to maintain and improve the natural flora as wildlife habitat, thereby contributing to the aesthetic values of the development.

The concept and principles to protect any identified sensitive hydrological features should be contained in the Environmental Management Plan (EMP) and Environmental Method Statement (EMS), which will both form part of the conditions of the Environmental Approval. This should be made available to the Contractors at tender stage as compulsory requirements. This report will highlight environmental requirements required in the planning and costing exercises, prior to commencement of construction.

The primary design criterias for the hard surface infrastructure for the Wind Farm (access roads and turbine crane platforms etc.) must be :

- to minimise unnecessary vegetation disturbance during excavation;
- to control the storm water run-off velocities; and
- to minimise storm water run-off concentrations.

Measures recommended to mitigate storm water erosion and flooding should be incorporated in the final detail designs, and may include some or all of the following:

a) limitation of land disturbance (minimise clearing and grubbing of natural vegetated areas and topsoil removal) to suit the requirements of the Development;

b) limitation of fire break paths;

c) all vegetation clearing should occur in a phased manner in accordance with the construction programme, to minimise large bare open areas for long periods before construction activities will commence, to minimise the possibility of soil erosion. Large tracts of bare soil will either cause dust pollution or quickly erode and then cause sedimentation wash-aways into the lower portions of the local catchments;

d) minimization of impervious surfaces – eg. avoid excessive open areas for road turning radii or service roads along the overhead cables routes. It is preferable to leave natural vegetation undisturbed - where possible only perform trimming of trees and bushes;

e) maintain well established vegetated buffers and natural vegetation strips;

f) the use of terraces, berms and / or contoured landscapes;

g) the use of cut-off drains or berms at the top of cut embankments above roads and platforms;

h) limit the length of road side drains and discharge storm water run-off as quickly as possible via mitre drains to natural water courses or valleys;

i) the use of vegetated open channels next to roads to convey and treat storm water runoff (acting as a bio-filter : allowing suspended sediment particles to settle, and to remove pollutants) and resulting in slower discharged velocities;

j) introduce storm water runoff energy breakers in road side drains, eg. grass or rock-lined swales;

k) the use of infiltration systems, eg. cut-off sub-soil drains to minimise the impact of sub-surface ground water, especially at the foot of high cut embankments next to roads and other excavations;

l) washing and cleaning of construction equipment should only be done at dedicated demarcated areas at the plant storage area. Berms or lined ponds should be constructed, to trap any cement, oils and fuel spillages and to prevent excessive soil erosion at the washing areas.

m) where steep slopes exist, especially at fill embankments, suitable storm water protection features and vegetation rehabilitation must be exercised, to prevent soil erosion and prevent any sediment from entering the downstream water courses;

n) Erosion and sedimentation into water courses must be minimised through effective stabilisation (eg. using Gabions and/or Reno mattresses) and the re-vegetation of any natural valleys, especially at fresh embankment cuts near the stream crossings.

The Developer will be required to ensure sufficient and suitable on-site storm water management features as proposed above, and will also be responsible for maintaining the storm water and open hard surface infrastructure during the entire operation period of the Wind Farm facility.

3 EROSION CONTROL

The lack of storm water planning during Detail Design stage will lead to excessive erosion over time. The lack of effective erosion control will result in the wash-away of fine material like sand and silt. This will create unnatural storm water run-off paths, which will develop into erosion channels and may over time develop into land slip scars.

If erosion occurs on gravel road surfaces, due to excessive storm water run-off with high velocities, regular grading maintenance will be required to repair minor surface erosion problems. If regular maintenance is neglected, road surface erosion will develop in rutting, corrugations and transverse channels which may negatively impact on the accessibility of transport roads.

Storm water run-off on exposed cut or fill gravel embankments eg. for large new turbine platform areas, will soon lead to erosion channels - refer to Figures 1-9 and 1-10 above. Storm water will always flow down the path of least resistance. Storm water will discharge via erosion channels, at higher velocities and causing wash-aways over time. This snow-ball effect

may soon lead to embankment damage and road slippages, which may have major cost implications if access roads become inaccessible during the construction or turbine transportation stages.

It is therefore recommended that cut and fill slopes be covered with topsoil recovered from the same area**,** to minimise the development of erosion. Geo-synthetic material such as Soil Saver, Bio-degradable matts or similar Geo-synthetic membranes may be used to protect and stabilize cut and fill embankments.

It may be necessary to protect the toe of cut embankments from local slip, at localised sections along the gravel roads, by anchoring rock-filled gabion cages at road level.

4 ROAD AND PLATFORM CONSTRUCTION

4.1 Access Roads to the Wind Farm

The Storm Water Drainage Plan, drawing 4842-0-C003-R is bound in ***Annexure B***. This drawing shows the layout of the existing gravel access roads to the site, as well as all new proposed internal gravel roads relative to the property boundaries and the proposed Wind Turbine positions.

The existing internal gravel roads are in un-acceptable condition for abnormal vehicle loads, and are mainly sandy two-track paths with no storm water infrastructure or run-off control. Rehabilitation or re-construction of these gravel road will be required, together with new storm water infrastructure along the main gravel roads. See Section 5 below for discussion on the new storm water crossings.

The MR751 is a surfaced road near the proposed development and provides access to the proposed Namas Wind Farm. This road is in good condition and does not need any upgrades to the road surface or storm water infrastructure.

4.2 New Road Constructions on the Wind Farm

All internal access roads linking the turbines will be new roads, to be constructed in the current natural greenfield environment, with the aim to follow the alignments of existing inferior

gravel roads and two-track field paths as far as practical possible, but to straighten and widen the roads to accommodate abnormal transport vehicles.

Access to the new internal roads will be from the existing Provincial Minor gravel road running across the Namas Wind Farm. All access roads will have to be constructed to a minimum 6m width, together with moderate horizontal and vertical re-alignments, to suit the minimum turbine transportation requirements of the specific turbine supplier.

The road alignments and final road levels (FRL) will therefore have to be carefully planned and designed to suit the "undulating plains" topography of the area, although not excessive. Detail designs need to be carefully executed to limit the extent of the environmental impacts and final footprint width of the new road, inclusive of cut and fill embankment profiles.

Road designs must further be optimised to balance the depths of cuts and fills of road volumes. This will limit the exposed faces of side slopes. All exposed slopes are prone to erosion and flooding, which may cause severe damage to road infrastructure and wash-aways of sandy material.

It is recommended to construct storm water side drains along all new gravel road sections in cut, with a possible cut-off berm on top of the cut slope, depending on the cut height and size of the upper catchment area. Road fill embankments will as far as possible be used to install the electrical cables to minimize the impact on denuding vegetated areas.

It is recommended that all initial grass and topsoil be removed prior to commencement of construction, be stockpiled and maintained on or near the road construction sites. The stockpile heaps should not exceed 2,5m in height. The same natural top-soil and grass material must be used to cover all exposed slopes as the construction work progresses. Fill slopes will be more prone to scouring and erosion due to higher storm water run-off velocities generated along the hard road surfaces.

4.3 Turbine Foundation Platforms

Large levelled hard surfaces are required where the turbine concrete foundations will be constructed and the turbine towers will be erected. Sufficient temporary working space is further required for the establishment, assembly and maneuverability of the cranes while

erecting the wind turbines. Additional space is also required on or next to the platforms for access by abnormal transport vehicles and temporary placement of turbine components. The proposed construction working space of these turbine platforms will be approximately 60m x 90m. It is recommended to allow for a 5m "Environmental Buffer" around these areas for plant movement, where no topsoil will be removed, but only vegetation trimming will be done.

Due to the "undulating plains" topography at some of the of the wind turbine positions, it is expected that some of the top-cut or bottom-fill levels of the embankments of the crane platforms may vary considerably from the platform final levels. Deep cut-face embankments may not be stable due to the expected sandy-soil conditions.

The storm water run-off onto these large open platforms and water ponding on the platforms, can be problematic during the construction and turbine erection stages. It is therefore recommended that storm water run-off volumes from higher lying areas should be controlled by constructing a cut-off berm at the top of the cut-face embankments, or by a side cut-off channel at the toe to the cut-face, directing surface water away from the open hard surfaces. This will prevent potential ponding and storm water damage or disruption at the crane platform areas, during construction stage.

It is recommended that all initial grass and topsoil will be removed from these areas, be stockpiled and maintained on or near the turbine platforms. These stockpiles should not exceed 2,5m in height. The same natural top-soil and grass material must be used to cover all exposed gravel slopes, especially fill slopes which will be more prone to scouring and erosion.

5 STORM WATER CROSSINGS

5.1 Existing Natural Stream Crossings

No existing natural water courses (natural drainage paths) exist on the development area or will be intersected or disturbed due to the proposed new road infrastructure. Therefore, no stream crossing upgrading work will have to take place, or will be required within 32m of a natural water course (thus regulation *GNR 544, Activities 11, 18 and 39* - will be not triggered in this instance). Further, no excavations (moving material into or removal of material from a

water course) which will exceed the minimum volume of 5m³, will occur at any water course. Hence regulation *GNR 544, Activity 18,* will also not be triggered.

It is therefore not required to apply for a Water Use License (WUL) at any of the storm water crossings. No sign of major flooding or erosion damage has been observed at existing storm water flow paths.

5.2 Proposed New Storm Water Infrastructure

Following site investigations and examination of the contours of the development area, the watershed boundaries and local catchments were determined for the natural overland storm water run-off flowing towards the new turbine positions and the low points along the new proposed access roads. None of these catchments form part of any natural water courses.

Eighteen (18) local catchment areas were determined where storm water overland run-off will cross new proposed internal roads or the main gravel access road, where new storm water crossings will be required. Refer to ***Annexure C*** for a Summary of the storm water run-off analysis and a table listing the proposed new storm water crossings.

The new storm water crossings will all be non-perennial with no permanent water flows anticipated. Storm water events generally have low rainfall intensity and duration, resulting in low discharge volumes generally seep quickly into the upper soil layers with thick sandy characteristics and fractured calcrete layers. Higher floods, which may overtop roads, will abate after a few hours once the run-off peak has passed, with no flows which will remain for long durations.

Cutting off road access for extended periods during the wind farm construction and transportation period cannot be permitted and will result in huge financial impact, especially if cranes or abnormal delivery trucks should be delayed for a few hours or even days to repair storm water damage to roads. It is therefore recommended that the flow capacity at each storm water crossing be designed to accommodate a 1:10 year recurrence flood peak, and not be based on generally acceptable design criteria of only a 1:2 year peak flow, as for minor gravel roads.

Storm water run-off calculations have been made for each new storm water crossing based on the Rational Method. Run-off coefficients were based on the understanding of the site characteristics (slope, vegetation cover, soil conditions and rate of permeability), to calculate the expected 1:10 year storm water run-off capacities at each of these eighteen (18) storm water crossings. The Storm water run-off "Calculations Summary" is bound into Annexure C of this report, listing all storm water crossings.

Due to the flat road gradients and the loose sandy soils at the Namas Wind Farm, it is recommended not to install any storm water pipes or culverts at any storm water crossing, irrespective of the calculated storm water run-off volume. Culvert constructions will either require :

- deeper than road level excavation to create inlet flow condition, which will become silted with loose sand deposits, which will either block the pipe or culvert inlets, or will require ongoing maintenance, or
- will require huge volumes of road fill, with fill embankments exposed to erosion, should storm water pipes or culverts be constructed higher than the natural ground level (NGL) to avoid the problem of siltation.

It is therefore recommended to only construct low-level reinforced concrete drifts at each storm water crossing, to assist with the control of natural over-land storm water run-off and to protect the road pavement and layerworks from scouring and erosion.
A typical detail of a local storm water low-level crossing is bound in ***Annexure D.***

5.3 Storm Detention Ponds

The topography surrounding the footprints of the proposed Wind Turbine positions are fairly uniform and forms only small natural low points – refer to the Storm Water Drainage Plan bound into ***Annexure B*** (which shows the contours and storm water flow paths). Areas where visible local ponding occurred, to such an extent that natural detention ponds exist, were demarcated with a GPS on site and are shown on the Storm Water Drainage Plan. Due to the sandy soil conditions, rain water run-off dissipates quickly to prevent perennial storm water ponding.

The local areas which will be impacted due to the new platform constructions at each wind turbine site, will not have any noteworthy influence on existing natural local low points or areas which may act as detention ponds. The excavation work during construction will not create any deep open low points where storm water ponding will occur.

Overland storm water run-off will be directed past the new hard stand platform construction areas as far as possible, to conform with the natural over-land run-off downstream of the Wind Turbine sites. The hardstand areas measured only 0,53% of the Namas Wind Farm development areas, and have been assessed for increase in flow volumes and velocities. Due to the small percentage of undisturbed land to be impacted (due to the hardstand platform construction work, compared with local catchment areas), the increase in storm water run-off volumes and velocities are deemed negligible.

There will thus be no need to construct new, or to increase areas at any of the storm water detention ponds at local low points. Good storm water management principles at the new hardstand platforms will however be necessary - refer to Paragraph 2 above.

6 CONSTRUCTION CONSIDERATIONS

Construction work at these proposed storm water infrastructures must comply with:

a. new 6m wide road widths, plus side widths for the road embankment slopes, if necessary;

b. flat vertical gradients (less than 300mm difference over 100m length), hence the road fill at local recesses are required;

c. the capacity of low level concrete drifts must be sufficient to accommodate a 1:10 year flood;

d. the excavated foundation levels will be compacted to allow for a stable and level surface;

e. side fill material will be required to smooth out steep gradients;

f. all electrical cables on site, linking the various turbines to the new on-site Electrical Sub-Station, must be installed underground and in the fill embankments of the new internal roads. Provision must be made inside the road layerworks and underneath the storm water concrete drifts to accommodate the underground electrical cables;

g. no underground electrical cables will be allowed to be installed outside of the internal road reserves, or to cross the storm water flow path downstream or upstream of the storm water low level drifts.

7 RECOMMENDATIONS

Responsible environmental practices must be adopted and implemented during the construction stages. Reference should be made amongst others, to this "***Storm Water and Erosion Control Report***".

Measures recommended to mitigate storm water erosion and flood damage should be incorporated in the final detail designs, and may include some or all of the following:

a) limitation of land disturbance - minimise clearing and grubbing of natural vegetated areas and topsoil removal;

b) all vegetation clearing should occur in a phased manner in accordance with the approved construction programme to minimise large barren open areas for long periods, before construction activities will commence, to minimise the possibility of soil erosion. Large tracks of barren soil will cause dust pollution and will quickly erode and will cause sedimentation wash-aways into the lower portions of the catchment;

c) limit the length of road side drains, and discharge storm water run-off as quickly as possible, via mitre drains to natural water courses or valleys, and

d) it is recommended that steep and high fill slopes be covered with topsoil and grass as minimum protection against the development of erosion. Geo-synthetic material such as Soil Saver or similar Geo-synthetic membranes may be used to protect and stabilize fill embankments.

The Developer will be required to provide sufficient and suitable on-site storm water management infrastructure as proposed herein and will also be responsible to maintain the storm water infrastructure during the entire operation period of the Wind Farm facility.

8 CONCLUSION

This Storm Water Management and Erosion Control Report forms an integral part of the supportive documentation required for adherence to the conditions of the Environmental Authorisation during the pre-construction, construction and operational phases.

An Environmental Management Plan (EMP) must be compiled, which should incorporate the recommendations of this report, and serve as a guideline for the Developer and Contractor, to comply with the requirements of the National DEA.

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Annexure A :

NAMAS WF - 43 Wind Turbine Co-ordinates

180MW NAMAS WIND FARM

43x WTG DEVELOPMENT

Co-ordinate Data Table for Proposed Wind Turbine Centre Positions (WGS 84 - Lo17°)

Assumed:	
Hub-Height:	128.9m
Blade Radius:	69.3m

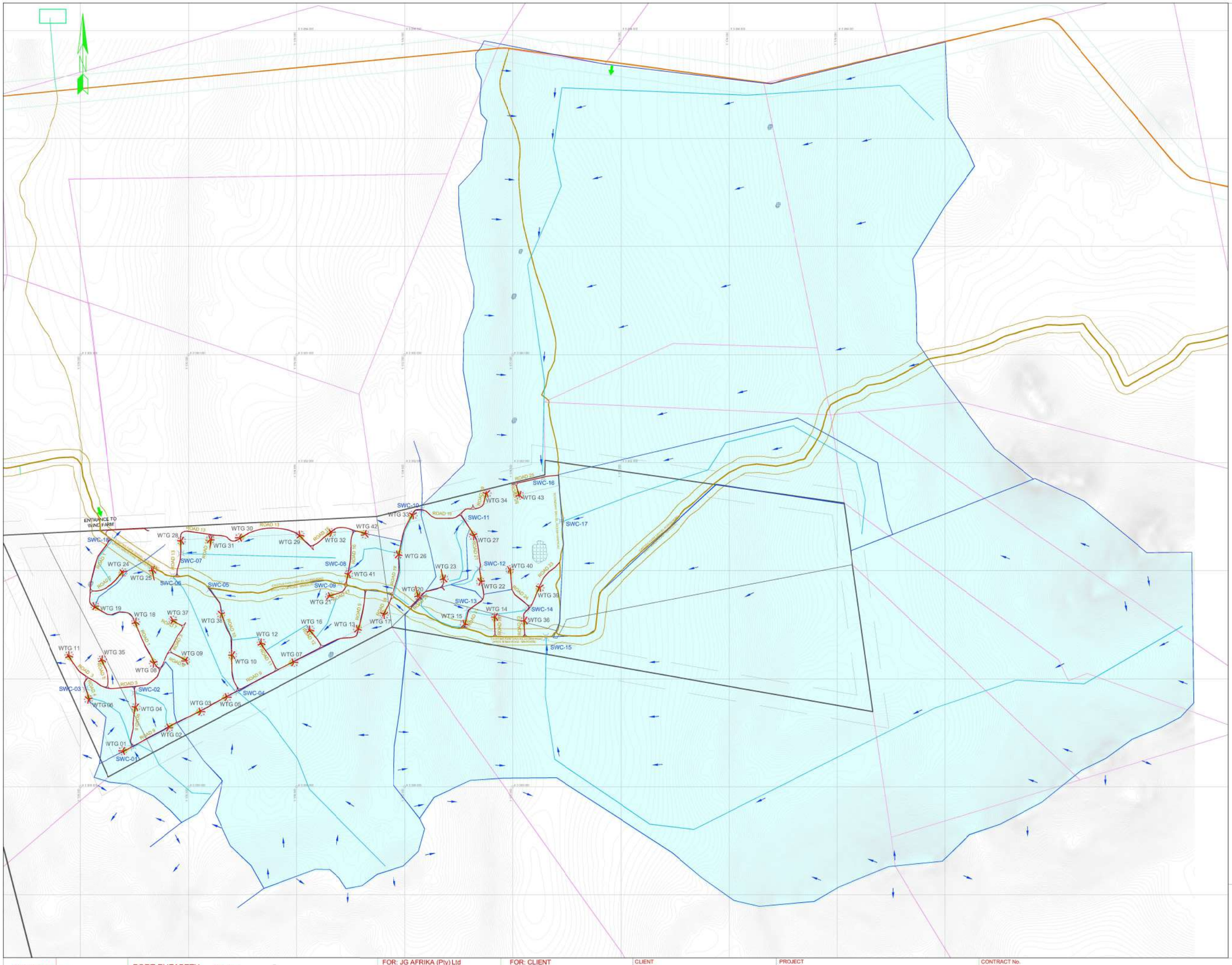
01 August 2018 Rev 03

No.	WTG No.	X_Latitude	Y_Longitude	NGL	Hub-Height	Blade Tip Height
		deg / min / sec	deg / min / sec	(masl)	(masl)	(masl)
FARM ROOIVLEI - 3/327 (4x WIND TURBINES)						
1	WTG01	29°52'19.11"S	17° 9'56.68"E	172	300.9	370.2
2	WTG06	29°51'47.83"S	29°51'47.83"S	155	283.9	353.2
3	WTG11	29°51'21.24"S	17° 9'20.97"E	153	281.9	351.2
4	WTG35	29°51'24.12"S	17° 9'43.39"E	161	289.9	359.2
FARM ROOIVLEI - RE8/327 (26x WIND TURBINES)						
5	WTG02	29°52'5.59"S	17°10'29.00"	179	307.9	377.2
6	WTG03	29°51'56.29"S	17°10'51.15"E	177	305.9	375.2
7	WTG04	29°51'52.97"S	17°10'6.37"E	172	300.9	370.2
8	WTG05	29°51'47.87"S	17°11'9.60"E	172	300.9	370.2
9	WTG07	29°51'27.62"S	17°11'55.73"E	183	311.9	381.2
10	WTG08	29°51'26.79"S	17°10'18.84"E	171	299.9	369.2
11	WTG09	29°51'25.61"S	17°10'41.17"E	169	297.9	367.2
12	WTG10	29°51'22.63"S	17°11'13.71"E	171	299.9	369.2
13	WTG12	29°51'15.52"S	17°11'33.41"E	179	307.9	377.2
14	WTG13	29°51'8.20"S	17°12'40.01"E	196	324.9	394.2
15	WTG16	29°51'8.11"S	17°12'7.26"E	188	316.9	386.2
16	WTG17	29°50'59.77"S	17°12'58.46"E	226	354.9	424.2
17	WTG18	29°51'1.81"S	17°10'7.12"E	162	290.9	360.2
18	WTG19	29°50'51.90"S	17° 9'39.14"E	188	316.9	386.2
19	WTG21	29°50'48.32"S	17°12'20.83"E	191	319.9	389.2
20	WTG24	29°50'31.90"S	17° 9'59.02"E	173	301.9	371.2
21	WTG25	29°50'30.75"S	17°10'19.49"E	163	291.9	361.2
22	WTG28	29°50'13.40"S	17°10'39.66"E	158	286.9	356.2
23	WTG29	29°50'11.12"S	17°12'1.34"E	192	320.9	390.2
24	WTG30	29°50'12.15"S	17°11'19.58"E	178	306.9	376.2
25	WTG31	29°50'12.89"S	17°10'59.40"E	164	292.9	362.2
26	WTG32	29°50'10.03"S	17°12'22.90"E	200	328.9	398.2
27	WTG37	29°51'0.98"S	17°10'32.93"E	160	288.9	358.2
28	WTG38	29°50'57.83"S	17°11'6.04"E	167	295.9	365.2
29	WTG41	29°50'35.00"S	17°12'34.63"E	193	321.9	391.2
30	WTG42	29°50'11.26"S	17°12'46.21"E	197	325.9	395.2
FARM ZONNEKWA - 3/328 (11x WIND TURBINES)						
31	WTG20	29°50'48.82"S	17°13'22.43"E	234	362.9	432.2
32	WTG22	29°50'40.79"S	17°14'5.09"E	212	340.9	410.2
33	WTG23	29°50'38.78"S	17°13'39.90"E	240	368.9	438.2
34	WTG26	29°50'23.88"S	17°13'8.84"E	225	353.9	423.2
35	WTG27	29°50'13.26"S	17°14'0.75"E	210	338.9	408.2
36	WTG33	29°50'0.15"S	17°13'19.49"E	227	355.9	425.2
37	WTG34	29°49'47.92"S	17°14'10.43"E	191	319.9	389.2
38	WTG36	29°51'4.63"S	17°14'35.43"E	166	294.9	364.2
39	WTG39	29°50'44.96"S	17°14'46.17"E	163	291.9	361.2
40	WTG40	29°50'33.95"S	17°14'25.43"E	166	294.9	364.2
41	WTG43	29°49'49.23"S	17°14'33.25"E	164	292.9	362.2
FARM ZONNEKWA - 4/328 (2x WIND TURBINES)						
42	WTG14	29°51'2.14"S	17°14'14.89"E	197	326	395
43	WTG15	29°51'6.15"S	17°13'53.55"E	209	338	407

Annexure B :

PROPOSED PRELIMINARY STORM WATER DRAINAGE PLAN:

Drw : 4842-0-C003-R



LEGEND:

- EXTERNAL WIND FARM BOUNDARY
- INTERNAL FARM BOUNDARIES
- 250m WIND FARM BOUNDARY OFF-SET
- CADASTRAL FARM BOUNDARIES
- DISTRICT SURFACED ROADS
- PROVINCIAL GRAVEL ROADS
- EXISTING FARM ACCESS GRAVEL ROADS
- NEW INTERNAL WIND FARM ROADS
- PROPOSED DEVELOPMENT FOOTPRINT : WIND TURBINE WITH CRANE PLATFORM

STORM WATER CARACTERISTICS :

- STORM WATER LOW POINTS (indicative / Not actual size)
- STORM WATER SUB-CATCHMENT BOUNDARY
- STORM WATER LONGEST WATER RUN-OFF PATH
  NOTE : All Stormwater Run-off is Overland Flow, directed to local low points at roads. No Natural Water Courses / Stream Crossings exist. No WULA Applications are required for new Stormwater Infrastructure on Roads).
- STORM WATER FLOW DIRECTION ARROW
- STORM WATER CROSSING : (CULVERT OR LOW LEVEL CONCRETE DRIFT) (See Stormwater Infrastructure Table)

ON ORIGINAL
0 5 10 15 20 25 30 40 50MM

FOR APPROVAL PURPOSES

DESIGNED	VP	PORT ELIZABETH 1st FLOOR, BLOCK 5 GREENACRES OFFICE PARK SECOND AVENUE NEWTON PARK, 6045 P.O. BOX 27308 GREENACRES, 6057	Telephone +27 41 390-8700 Facsimile +27 41 363-1922 E-MAIL portelizabeth@jgafrika.com	JG AFRIKA	FOR: JG AFRIKA (Pty) Ltd NAME SIGNATURE DATE	FOR: CLIENT NAME SIGNATURE DATE	CLIENT GENESIS NAMAS WIND (PTY) LTD	PROJECT NAMAS WIND FARM DEVELOPMENT
CHECKED	SS							
DRAWN	JS							
CHECKED	SS							

CONTRACT No. 4842/01

TITLE: STORMWATER DRAINAGE PLAN (SHOWING CATCHMENTS AND NEW STORMWATER INFRASTRUCTURE)

DATE	AUGUST 2018
SCALE	1:35 000
JG AFRIKA DWG No.	4842-0-C003-R
REVISION	00
CLIENT DWG No.	
CAD FILENAME	C:\JG\Work\4842 Namas & Zonnequa WF\4842-Namas Zonnequa WF - SDP Layout-rev5.dwg

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Annexure C :

SITE SPECIFIC STORM WATER RUN-OFF CALCULATIONS AND STORM WATER INFRASTRUCTURE REQUIRED

Project 4842/01 - Namas Wind Farm

Preliminary Designs (Storm water Run-off Calculations)

DATE : 22 August 2018
Revision 2

Primary DWA Drainage Region :	14. Lower Orange River	
Quartarnary Sub-Catchment :	F40A	MAP (mm/year)
Rainfall Station 1 (Komaggas) :	0021 3888 W	131

selected

Stream Crossing No.	Latitude (South)	Longitude (East)	Road Location	Catchment Area	Longest water path	Flood $Q_{10\ years}$	New Storm Water Infrastructure for Flood Q_{10}
				(km^2)	(m)	(m^3/s)	DESCRIPTION
STORMWATER CROSSINGS AT PROPOSED NEW INTERNAL GRAVEL ROADS							
SWC-01	29°52'15.22"S	17°10'6.59"E	Along Road 9 - north-east of WTG-01	2.132	1726	0.415	Low Level Concrete Drift (to accommodate overland flow)
SWC-02	29°51'44.74"S	17°10'7.37"E	Along Road 8 - north of WTG-04	0.771	914	0.150	Low Level Concrete Drift (to accommodate overland flow)
SWC-03	29°51'41.28"S	17°9'32.07"E	Along Road 4 - north of WTG-06	3.783	4231	0.736	Low Level Concrete Drift (to accommodate overland flow)
SWC-04	29°51'44.64"S	17°11'15.98"E	Along Road 9 - north-east of WTG-05	14.808	4271	2.882	Low Level Concrete Drift (to accommodate overland flow)
SWC-05	29°50'43.04"S	17°10'58.65"E	Along Road 10 - north of WTG-38	3.441	3790	0.804	Low Level Concrete Drift (to accommodate overland flow)
SWC-06	29°50'34.67"S	17°10'33.05"E	Along Prov Minor Road - south-east of WTG-25	22.177	6927	3.644	Low Level Concrete Drift (to accommodate overland flow)
SWC-07	29°50'21.20"S	17°10'39.19"E	Along Road 13 - south of WTG-28	3.196	2819	0.622	Low Level Concrete Drift (to accommodate overland flow)
SWC-08	29°50'32.15"S	17°12'34.50"E	Along Road 16 - north of WTG-41	0.925	1144	0.144	Low Level Concrete Drift (to accommodate overland flow)
SWC-09	29°50'40.75"S	17°12'28.66"E	Along Prov Minor Road - south of WTG-41	0.925	1144	0.144	Low Level Concrete Drift (to accommodate overland flow)
SWC-10	29°50'3.36"S	17°13'16.79"E	Along Road 19 - north-east of WTG-33	0.860	1935	0.167	Low Level Concrete Drift (to accommodate overland flow)
SWC-11	29°50'4.25"S	17°13'54.91"E	Along Road 21 - north of WTG-27	0.881	1346	0.171	Low Level Concrete Drift (to accommodate overland flow)
SWC-12	29°50'32.84"S	17°14'4.75"E	Along Road 21 - north of WTG-22	0.280	633	0.014	Low Level Concrete Drift (to accommodate overland flow)
SWC-13	29°50'57.69"S	17°13'56.56"E	Along Road 21 - north of WTG-15	0.648	1465	0.126	Low Level Concrete Drift (to accommodate overland flow)
SWC-14	29°50'58.18"S	17°14'37.1"E	Along Road 23 - north of WTG-36	1.412	2539	0.245	Low Level Concrete Drift (to accommodate overland flow)
SWC-15	29°51'14.58"S	17°14'49.88"E	Along Prov Minor Road - south-east of WTG-36	75.167	15164	24.867	Low Level Concrete Drift (to accommodate overland flow)
SWC-16	29°49'38.70"S	17°14'49.36"E	Along Road 25 - north-east of WTG-43	70.164	14439	34.135	Low Level Concrete Drift (to accommodate overland flow)
SWC-17	29°50'5.05"S	17°15'1.75"E	Along Secondary Gravel Farm Road from Zonnequa Farms, between Road 23 and Road 25	9.726	7420	2.553	Low Level Concrete Drift (to accommodate overland flow)
SWC-18	29°50'13.21"S	17°9'53.22"E	Along Prov Minor Road - just south of Wind Farm Main Entrance	0.551	901	0.086	Low Level Concrete Drift (to accommodate overland flow)

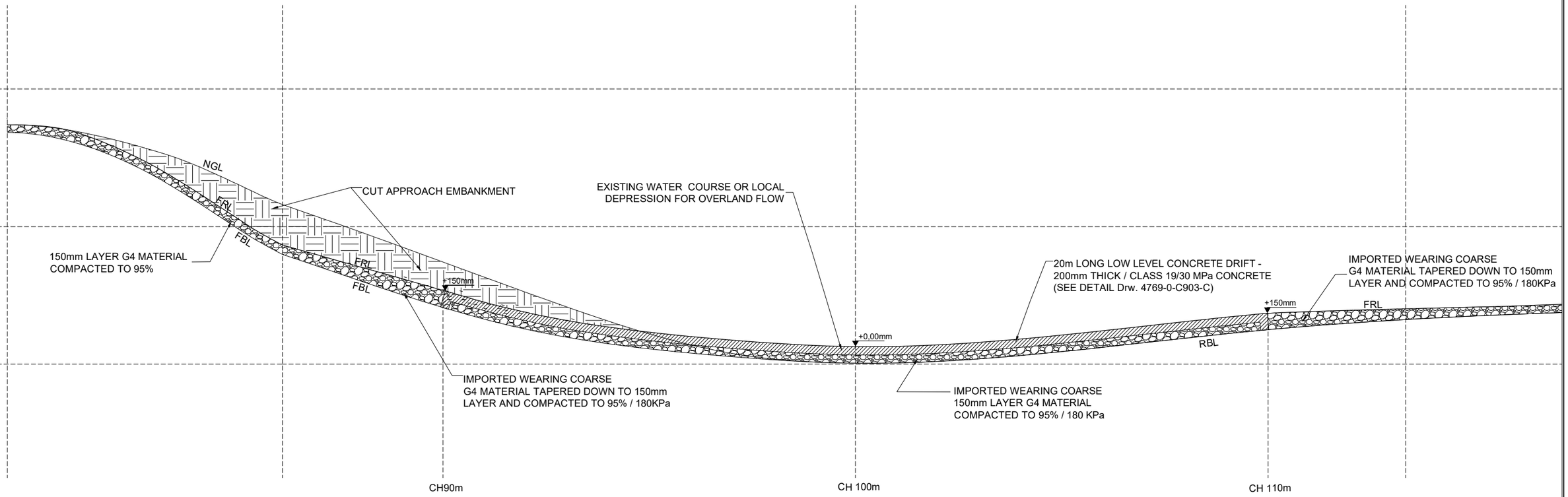
NOTE : All Stormwater Run-off is "Overland Flow". Stormwater will be directed to local low points at roads.
No natural water courses / stream crossings exist. No WULA applications will be required for new SW infrastructure.

Annexure D :

TYPICAL STORM WATER CROSSING WITH NEW CONCRETE LININED LOW LEVEL DRIFT CONSTRUCTION

NOTES:

- EXCAVATION UP TO ROCK BED LEVEL
- TRANSITION FROM GRAVEL ROAD SURFACE TO CONCRETE SURFACE TO BE DETERMINED



LEGEND:

NGL - NATURAL GROUND LEVEL
FRL - FINAL ROAD LEVEL
FBL - FINAL BED LEVEL

TYPICAL DETAIL OF NEW STORM WATER CONCRETE DRIFT LINING INSTALLATIONS AT ROAD LOCAL LOW POINTS (N.T.S)

FOR REPORT PURPOSES ONLY

REF. DRAWINGS

DWG. No.'s	DESCRIPTION

No.	AMENDMENTS	DATE	SIGNED
0	ISSUED FOR CONSTRUCTION PURPOSES	16/08/2018	

DESIGNED	VP
CHECKED	SS
DRAWN	VP
CHECKED	SS

PORT ELIZABETH
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JG AFRIKA

FOR: JG AFRIKA (Pty) Ltd	FOR: CLIENT
NAME	NAME
SIGNATURE	SIGNATURE
DATE	DATE

CLIENT: GENESIS NAMAS WIND (PTY) LTD

PROJECT: NAMAS WIND FARM DEVELOPMENT

CONTRACT No.: CONTRACT No. : 4842/01

TITLE: TYPICAL NEW STORM WATER CONCRETE DRIFT LINING INSTALLATION

DATE	August 2018
SCALE	N.T.S
JG AFRIKA DWG No.	4842-0-C902-C
REVISION	00
CLIENT DWG No.	
CAD FILENAME	P:\00 JG AFRIKA\4842 - Namas & Zonnequa WF\v05 DRAWINGS\Details\842-0-C902 (Typical Stream Crossing).dwg

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APPENDIX H:

WASTE MANAGEMENT PLAN

WASTE MANAGEMENT PLAN

1. PURPOSE

A Waste Management Plan (WMP) plays a key role in achieving sustainable waste management throughout all phases of the project. The plan prescribes measures for the collection, temporary storage and safe disposal of the various waste streams associated with the project and includes provisions for the recovery, re-use and recycling of waste. The purpose of this plan is therefore to ensure that effective procedures are implemented for the handling, storage, transportation and disposal of waste generated from the project activities on site.

This WMP has been compiled as part of the project EMPr and is based on waste stream information available at the time of compilation. Construction and operation activities must be assessed on an ongoing basis in order to determine the efficacy of the plan and whether further revision of the plan is required. This plan should be updated should further detail regarding waste quantities and categorisation become available, during the construction and/or operation stages.

2. RELEVANT ASPECTS OF THE SITE

It is expected that the development of the Namas Wind Farm will generate construction solid waste, general waste and hazardous waste during the lifetime of the wind farm.

Waste generated on site, originates from various sources, including but not limited to:

- Concrete waste generated from spoil and excess concrete.
- Contaminated water, soil, rocks and vegetation due to hydrocarbon spills.
- Hazardous waste from vehicle, equipment and machinery parts and servicing, fluorescent tubes, used hydrocarbon containers, and waste ink cartridges.
- Recyclable waste in the form of paper, glass, steel, aluminium, wood/ wood pallets, plastic (PET bottles, PVC, LDPE) and cardboard.
- Organic waste from food waste as well as alien and endemic vegetation removal.
- Sewage from portable toilets and septic tanks.
- Inert waste from spoil material from site clearance and trenching works.

3. LEGISLATIVE REQUIREMENTS

Waste in South Africa is currently governed by several regulations, including:

- National Environmental Management: Waste Act (NEM:WA), 2008 (Act 59 of 2008);
- National Environmental Management: Waste Amendment Act, 2014 (Act 26 of 2014);
- The South African Constitution (Act 108 of 1996);
- Hazardous Substances Act (Act 5 of 1973);
- Health Act (Act 63 of 1977);
- Environment Conservation Act (Act 73 of 1989);
- Occupational Health and Safety Act (Act 85 of 1993);
- National Water Act (Act 36 of 1998);
- The National Environmental Management Act (Act 107 of 1998) (as amended);

- Municipal Structures Act (Act 117 of 1998);
- Municipal Systems Act (Act 32 of 2000);
- Mineral and Petroleum Resources Development Act (Act 28 of 2002); and
- Air Quality Act (Act 39 of 2004).

Storage of waste must be conducted in accordance with the National Norms and Standards for the Storage of Waste, published in GNR 926.

4. WASTE MANAGEMENT PRINCIPLES

An integrated approach to waste management is needed on site. Such an approach is illustrated in **Figure 1**.

It is important to ensure that waste is managed with the following objectives in mind during all phases of the project:

- Reducing volumes of waste is the greatest priority;
- If reduction is not feasible, the maximum amount of waste is to be recycled; and
- Waste that cannot be recycled is to be disposed of in the most environmentally responsible manner.

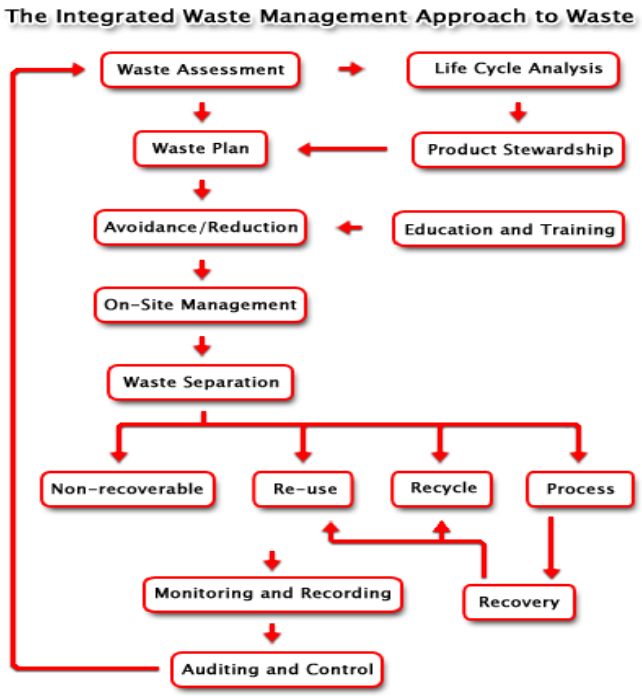

Figure 1: Integrated Waste Management Flow Diagram
(Source: http://www.enviroserv.co.za/pages/content.asp?SectionId=496)

4.1. Construction phase

A plan for the management of waste during the construction phase is detailed below. A Method Statement detailing specific waste management practices during construction should be prepared by the Contractor prior to the commencement of construction, for approval by the Resident Engineer and/or ECO.

4.1.1. Waste Assessment / Inventory

- The Environmental Officer (EO), or designated staff member, must develop, implement and maintain a waste inventory reflecting all waste generated during construction for both general and hazardous waste streams.
- Construction methods and materials should be carefully considered in view of waste reduction, re-use, and recycling opportunities, to be pro-actively implemented.
- Once a waste inventory has been established, targets for the recovery of waste (minimisation, re-use, recycling) should be set.
- The EO must conduct waste classification and rating in terms of SANS 10288 and Government Notice 634 published under the NEM: WA.

4.1.2. Waste collection, handling and storage

- It is the responsibility of the EO to ensure that each subcontractor implements their own waste recycling system, i.e. separate bins for food waste, plastics, paper, wood, glass cardboard, metals, etc. Such practises must be made contractually binding upon appointment of the subcontractors.
- Waste manifests and waste acceptance approvals (i.e. receipts) from designated waste facilities must be kept on file at the site office, in order to record and prove continual compliance for future auditing.
- Septic tanks and portable toilets must be monitored by the EO or responsible subcontractor and maintained regularly. Below ground storage of septic tanks must withstand the external forces of the surrounding environment. The area above the tank must be demarcated to prevent any vehicles or heavy machinery from moving around in the surrounding area.
- Waste collection bins and hazardous waste containers must be provided by the principal contractor and subcontractors and placed at strategic locations around the site for the storage of organic, recyclable and hazardous waste.
- A dedicated waste area must be established on site for the storage of all waste streams before removal from site. The storage period must not trigger listed waste activities as per the NEMWA, GN 921 of November 2013.
- Signage/ colour coding must be used to differentiate disposal areas for the various waste streams (i.e. paper, cardboard, metals, food waste, glass etc.).
- Hazardous waste must be stored within a bunded area constructed according to SABS requirements, and must ensure complete containment of the spilled material in the event of a breach. As such, appropriate bunding material, design, capacity and type must be utilised to ensure that no contamination of the surrounding environment will occur despite a containment breach. The net capacity of a bunded compound in a storage facility should be at least 120% of the net capacity of the largest tank.
- Take into consideration the capacity displaced by other tanks within the same bunded area and any foundations.

- Treat interconnected tanks as a single tank of equivalent total volume for the purposes of the bund design criteria
- The location of all temporary waste storage areas must aim to minimise the potential for impact on the surrounding environment, including prevention of contaminated runoff, seepage, and vermin control, while being reasonably placed in terms of centrality and accessibility on site. Where required, an additional temporary waste storage area may be designated, provided identical controls are exercised for these locations.
- Waste storage shall be in accordance with all Regulations and best-practice guidelines and under no circumstances may waste be burnt on site.
- A dedicated waste management team must be appointed by the principal contractors' SHE Officer, who will be responsible for ensuring the continuous sorting of waste and maintenance of the area. The waste management team must be trained in all areas of waste management and monitored by the SHE Officer.
- All waste removed from site must be done by a registered/ licensed subcontractor, who must supply information regarding how waste recycling/ disposal will be achieved. The registered subcontractor must provide waste manifests for all removals at least once a month or for every disposal made, records of which must be kept on file at the site camp for the duration of the construction period.

4.1.3. Management of waste storage areas

- The position of all waste storage areas must be located so as to ensure minimal degradation to the environment. The main waste storage area must have a suitable stormwater system separating clean and contaminated stormwater.
- Collection bins placed around the site and at subcontractors' camps (if at a different location than the main site camp) must be maintained and emptied on a regular basis by the principal contractor to avoid overflowing receptacles.
- Inspections and maintenance of the main waste storage area must be undertaken daily. Skips and storage containers must be clearly marked or colour coded and well-maintained. Monitor for rodents and take corrective action if they become a problem.
- Waste must be stored in designated containers and not on the ground.
- Inspections and maintenance of bunds must be undertaken regularly. Bunds must be inspected for leaks or cracks in the foundation and walls.
- It is assumed that any rainwater collected inside the bund is contaminated and must be treated by oil/water separation (or similar method) prior to dewatering, or removed and stored as hazardous waste, and not released into the environment.
- If any leaks occur in the bund, these must be removed immediately.
- Bund systems must be designed to avoid dewatering of contaminated water, but to rather separate oil and hydrocarbons from water prior to dewatering.
- Following rainfall event bunds must always be dewatered in order to maintain a sufficient storage capacity in the event of a breach.
- No mixing of hazardous and general waste is allowed.

4.1.4. Disposal

- Waste generated on site must be removed on a regular basis. This frequency may change during construction depending on waste volumes generated at different stages of the construction process,

however removal must occur prior to the storage capacity being reached to avoid overflow of containers and poor waste storage.
» Waste must be removed by a suitably qualified contractor and disposed of at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor to the EO and ECO.

4.1.5. Record keeping

The success of the Waste Management Plan is determined by measuring criteria such as waste volumes, cost recovery from recycling and cost of disposal. Recorded data can indicate the effect of training and education, or the need for education. It will provide trends and benchmarks for setting goals and standards. It will provide clear evidence of the success or otherwise of the plan.

» Documentation (waste manifest, certificate of issue or safe disposal) must be kept detailing the quantity, nature, and fate of any regulated waste for audit purposes.
» Waste management must form part of the monthly reporting requirements in terms of volumes generated, types, storage and final disposal.

4.1.6. Training

Training and awareness regarding waste management shall be provided to all employees and contractors as part of the toolbox talks or on-site awareness sessions with the EO and at the frequency as set out by the ECO.

4.2. Operation phase

It is expected that the operation phase will result in the production of limited amounts of general waste consisting mostly of cardboard, paper, plastic, tins, metals and a variety of synthetic compounds. Hazardous wastes (including grease, oils) will also be generated. All waste generated will be required to be temporarily stored at the facility in appropriate sealed containers prior to disposal at a permitted landfill site or other facilities.

The following waste management principles apply during the operation phase:

» The SHE Manager must develop, implement and maintain a waste inventory reflecting all waste generated during operation for both general and hazardous waste streams.
» Adequate waste collection bins at site must be supplied. Separate bins should be provided for general and hazardous waste.
» Recyclable waste must be removed from the waste stream and stored separately.
» All waste must be stored in appropriate temporary storage containers (separated between different operation wastes, and contaminated or wet waste).
» Waste storage shall be in accordance with all best-practice guidelines and under no circumstances may waste be burnt on site.
» Waste generated on site must be removed on a regular basis throughout the operation phase.
» Waste must be removed by a suitably qualified contractor and disposed at an appropriately licensed landfill site. Proof of appropriate disposal must be provided by the contractor and kept on site.

5. Monitoring of Waste Management Activities

Records must be kept of the volumes/ mass of the different waste streams that are collected from the site throughout the life of the project. The appointed waste contractor is to provide monthly reports to the operator containing the following information:

- Monthly volumes/ mass of the different waste streams collected;
- Monthly volumes/ mass of the waste that is disposed of at a landfill site;
- Monthly volumes/ mass of the waste that is recycled;
- Data illustrating progress compared to previous months.

This report will aid in monitoring the progress and relevance of the waste management procedures that are in place. If it is found that the implemented procedures are not as effective as required, this WMP is to be reviewed and amended accordingly. This report must from part of the EO's reports to the ECO on a monthly basis.

APPENDIX I:

EMERGENCY PREPARDENESS, RESPONSE AND FIRE MANAGEMENT PLAN

EMERGENCY PREPAREDNESS, RESPONSE AND FIRE MANAGEMENT PLAN

1. PURPOSE

The purpose of the Emergency Preparedness and Response Plan is:

- To assist contractor personnel to prepare for and respond quickly and safely to emergency incidents, and to establish a state of readiness which will enable prompt and effective responses to possible events.
- To control or limit any effect that an emergency or potential emergency may have on site or on neighbouring areas.
- To facilitate emergency responses and to provide such assistance on the site as is appropriate to the occasion.
- To ensure communication of all vital information as soon as possible.
- To facilitate the reorganisation and reconstruction activities so that normal operations can be resumed.
- To provide for training so that a high level of preparedness can be continually maintained.

This plan outlines response actions for potential incidents of any size. It details response procedures that will minimise potential health and safety hazards, environmental damage, and clean-up efforts. The plan has been prepared to ensure quick access to all the information required in responding to an emergency event. The plan will enable an effective, comprehensive response to prevent injury or damage to the construction personnel, public, and environment during the project. Contractors are expected to comply with all procedures described in this document. A Method Statement should be prepared at the commencement of construction detailing how this plan is to be implemented as well as details of relevant responsible parties for the implementation. The method statement must also reflect conditions of the IFC Performance Standard 1 and include the following:

- Identification of areas where accidents and emergency situations may occur;
- Communities and individuals that may be impacted;
- Response procedure;
- Provisions of equipment and resources;
- Designation of responsibilities;
- Communication; and
- Periodic training to ensure effective response to potentially affected communities.

2. PROJECT-SPECIFIC DETAILS

Genesis Namas Wind (Pty) Ltd is proposing the development of a 140MW wind farm and associated infrastructure on a site located approximately 20km south-east of Kleinsee. The wind farm is known as the Namas Wind Farm and is located within the Nama Khoi Local Municipality and the Namakwa District Municipality in the Northern Cape Province. The wind farm will include up to 43 wind turbines with a contracted capacity of up to140MW (described as a wind farm) and associated infrastructure to be constructed over an area of approximately 5092ha in extent (known as the project site).

Due to the scale and nature of this development, it is anticipated that the following risks could potentially arises during the construction and operation phases:

» Fires;
» Leakage of hazardous substances;
» Storage of flammable materials and substances;
» Flood events;
» Accidents; and
» Natural disasters.

3. EMERGENCY RESPONSE PLAN

There are three levels of emergency as follows:

» Local Emergency: An alert confined to a specific locality.
» Site Emergency: An alert that cannot be localised and which presents danger to other areas within the site boundary or outside the site boundary.
» Evacuation: An alert when all personnel are required to leave the affected area and assemble in a safe location.

If there is any doubt as to whether any hazardous situation constitutes an emergency, then it must be treated as an Evacuation.

Every effort must be made to control, reduce or stop the cause of any emergency provided it is safe to do so. For example, in the event of a fire, isolate the fuel supply and limit the propagation of the fire by cooling the adjacent areas. Then confine and extinguish the fire (where appropriate) making sure that re-ignition cannot occur.

3.1. Emergency Scenario Contingency Planning

3.1.1. Scenario: Spill which would result in the contamination of land, surface or groundwater

i. Spill Prevention Measures

Preventing spills must be the top priority at all operations which have the potential of endangering the environment. The responsibility to effectively prevent and mitigate any scenario lies with the Contractor and the ECO. In order to reduce the risk of spills and associated contamination, the following principles should be considered during construction and operation activities:

» All equipment refuelling, servicing and maintenance activities should only be undertaken within appropriately sealed/contained or bunded designated areas.
» All maintenance materials, oils, grease, lubricants, etc. should be stored in a designated area in an appropriate storage container.
» No refuelling, storage, servicing, or maintenance of equipment should take place within sensitive environmental resources in order to reduce the risk of contamination by spills.
» No refuelling or servicing should be undertaken without absorbent material or drip pans properly placed to contain spilled fuel.

- Any fluids drained from the machinery during servicing should be collected in leak-proof containers and taken to an appropriate disposal or recycling facility.
- If these activities result in damage or accumulation of product on the soil, the contaminated soil must be disposed of as hazardous waste. Under no circumstances shall contaminated soil be added to a spoils pile and transported to a regular disposal site.
- Chemical toilets used during construction must be regularly cleaned. Chemicals used in toilets are also hazardous to the environment and must be controlled. Portable chemical toilets could overflow if not pumped regularly or they could spill if dropped or overturned during moving. Care and due diligence should be taken at all times.
- Contact details of emergency services and HazMat Response Contractors are to be clearly displayed on the site. All staff are to be made aware of these details and must be familiar with the procedures for notification in the event of an emergency.

ii. Procedures

The following action plan is proposed in the event of a spill:

1. Spill or release identified.
2. Assess person safety, safety of others and environment.
3. Stop the spill if safely possible.
4. Contain the spill to limit entering surrounding areas.
5. Identify the substance spilled.
6. Quantify the spill (under or over guideline/threshold levels).
7. Notify the Site Manager and emergency response crew and authorities (in the event of major spill).
8. Inform users (and downstream users) of the potential risk.
9. Clean up of the spill using spill kit or by HazMat team.
10. Record of the spill incident on company database.

a) Procedures for containing and controlling the spill (i.e. on land or in water)

Measures can be taken to prepare for quick and effective containment of any potential spills. Each contractor must keep sufficient supplies of spill containment equipment at the construction sites, at all times during and after the construction phase. These should include specialised spill kits or spill containment equipment. Other spill containment measures include using drip pans underneath vehicles and equipment every time refuelling, servicing, or maintenance activities are undertaken.

Specific spill containment methods for land and water contamination are outlined below.

Containment of Spills on Land

Spills on land include spills on rock, gravel, soil and/or vegetation. It is important to note that soil is a natural sorbent, and therefore spills on soil are generally less serious than spills on water as contaminated soil can be more easily recovered. It is important that all measures be undertaken to avoid spills reaching open water bodies. The following methods could be used:

- *Dykes* - Dykes can be created using soil surrounding a spill on land. These dykes are constructed around the perimeter or down slope of the spilled substance. A dyke needs to be built up to a size that

will ensure containment of the maximum quantity of contaminant that may reach it. A plastic tarp can be placed on and at the base of the dyke such that the contaminant can pool up and subsequently be removed with sorbent materials or by pump into barrels or bags. If the spill is migrating very slowly, a dyke may not be necessary and sorbents can be used to soak up contaminants before they migrate away from the source of the spill.

» *Trenches* - Trenches can be dug out to contain spills. Spades, pick axes or a front-end loader can be used depending on the size of the trench required. Spilled substances can then be recovered using a pump or sorbent materials.

b) Procedures for transferring, storing, and managing spill related wastes

Used sorbent materials are to be placed in plastic bags for future disposal. All materials mentioned in this section are to be available in the spill kits. Following clean up, any tools or equipment used must be properly washed and decontaminated, or replaced if this is not possible.

Spilled substances and materials used for containment must be placed into empty waste oil containers and sealed for proper disposal at an approved disposal facility.

c) Procedures for restoring affected areas

Criteria that may be considered include natural biodegradation of oil, replacement of soil and revegetation. Once a spill of reportable size has been contained, the ECO and the relevant Authority must be consulted to confirm that the appropriate clean up levels are met.

3.1.2. Scenario: Fire (and fire water handling)

i. Action Plan

The following action plan is proposed in the event of a fire:

1. Quantify risk.
2. Assess person safety, safety of others and environment.
3. If safe – attempt to extinguish the fire using appropriate equipment.
4. If not safe to extinguish, contain fire.
5. Notify Site Manager and emergency response crew and authorities.
6. Inform users of the potential risk of fire.
7. Record the incident on the company database or filing register.

ii. Procedures

Because large scale fires may spread very fast in the environment it is most advisable that the employee/contractor not put his/her life in danger in the case of an uncontrolled fire.

Portable firefighting equipment must be provided at strategic locations throughout the site, in line with the Building Code of South Africa and the relevant provincial building code. All emergency equipment including

portable fire extinguisher, hose reels and hydrants must be maintained and inspected by a qualified contractor in accordance with the relevant legislation and national standards.

Current evacuation signs and diagrams for the building or site that are compliant to relevant state legislation must be provided in a conspicuous position, on each evacuation route. Contact details for the relevant emergency services should be clearly displayed on site and all employees should be aware of procedures to follow in the case of an emergency.

a) Procedures for initial actions

Persons should not fight the fire if any of the following conditions exist:

- They have not been trained or instructed in the use of a fire extinguisher.
- They do not know what is burning.
- The fire is spreading rapidly.
- They do not have the proper equipment.
- They cannot do so without a means of escape.
- They may inhale toxic smoke.

b) Reporting procedures

In terms of the requirements of NEMA, the responsible person must, within 14 days of the incident, report to the Director General, provincial head of department and municipality.

- Report fire immediately to the site manager, who will determine if it is to be reported to the relevant emergency services and authorities.
- The site manager must have copies of the Report form to be completed.

SUMMARY: RESPONSE PROCEDURE

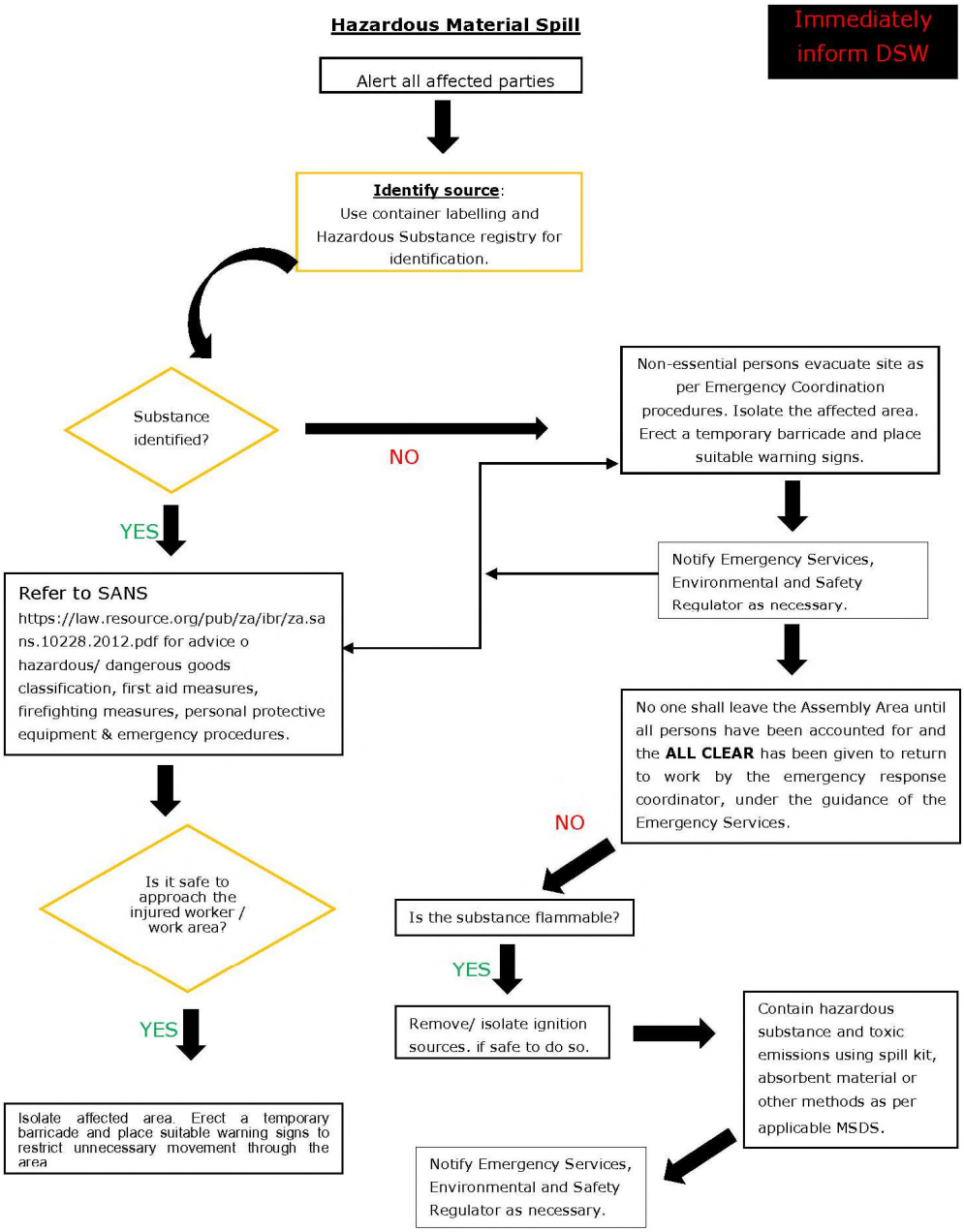

Figure 1: Hazardous Material Spill

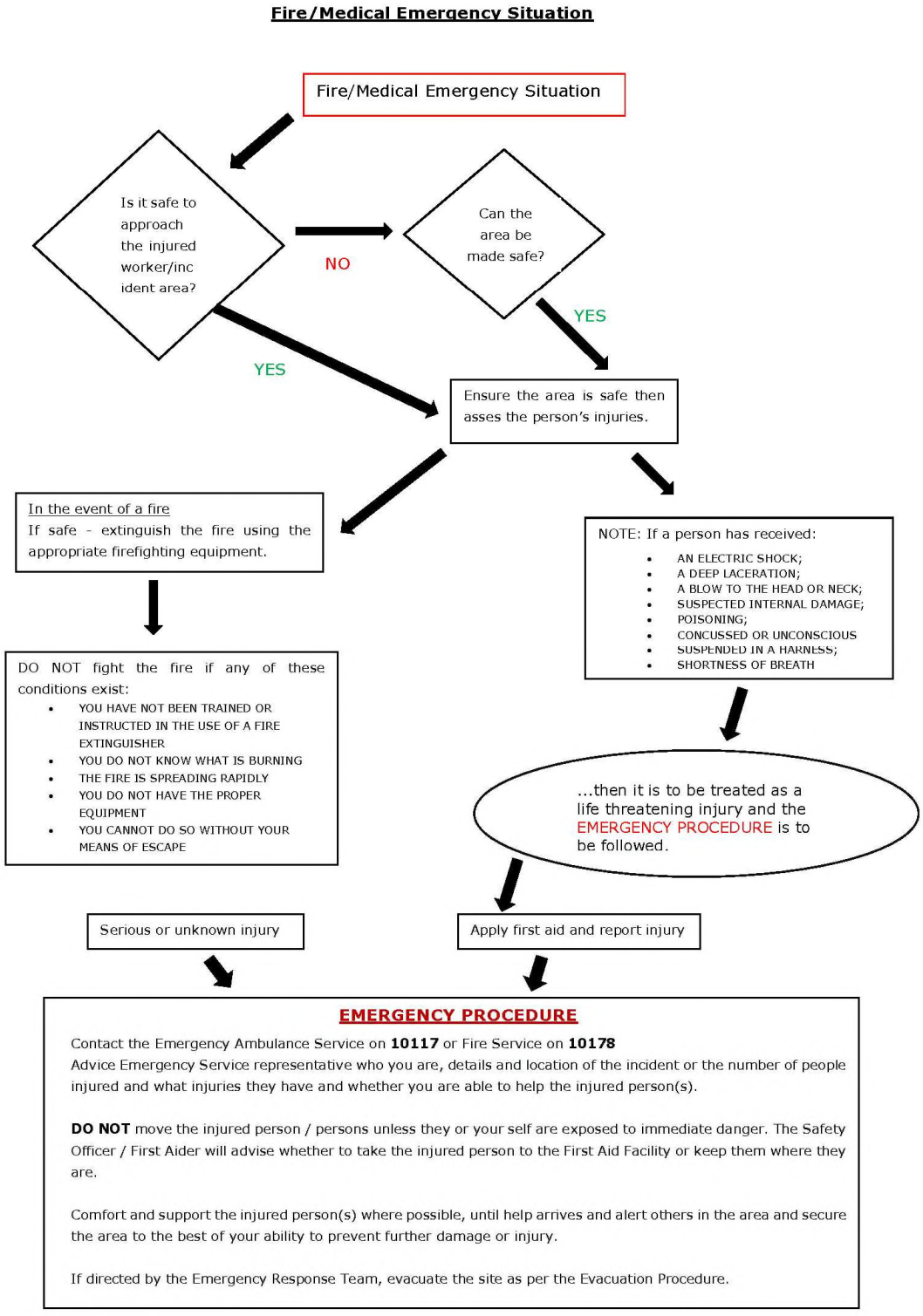

Figure 2: Emergency Fire/Medical

4. PROCEDURE RESPONSIBILITY

The Contractor's Safety, Health and Environment (SHE) Representative, employed by the Contractor, is responsible for managing the day-to-day on-site implementation of this EMPr, and for the compilation of regular (usually weekly) Monitoring Reports. In addition, the SHE must act as liaison and advisor on all environmental and related issues.

The local authorities will provide their assistance when deemed necessary, or when it has been requested and/or indicated in Section 30 (8) of NEMA. The provincial authority will provide assistance and guidance where required and conduct awareness programmes.

APPENDIX J:

CURRICULCUM VITAE OF THE PROJECT TEAM

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Woodlands Drive, Woodmead
Johannesburg, South Africa

Email: lisa.o@savannahsa.com
Tel: +27 (11) 656 3237

CURRICULUM VITAE OF LISA OPPERMAN

Profession : Environmental Assessment Practitioner and GIS Consultant

Specialisation: Environmental Impact Assessments, Basic Assessments, Site Screening and Site Selection reporting, compilation of maps through the use of ArcGIS

Work Experience: 3 years of experience in the environmental management and GIS field

VOCATIONAL EXPERIENCE

Lisa Opperman has three years of experience in the environmental field. She has worked on a variety of EIA processes including renewable energy projects, as well as industrial developments. She has also been involved in the undertaking of public participation for projects located in South Africa which has included the undertaking of public meetings, focus group meetings and key stakeholder meetings in both Afrikaans and English. She also has experience in working with ArcGIS 10 for the compilation of maps, the manipulation of data and screening for environmental sensitivities within areas with the potential for development.

SKILLS BASE AND CORE COMPETENCIES

- GIS Mapping
- EIA Report Writing
- Conducting of public involvement processes
- Administrative tasks
- Analysis and manipulation of geographical information and technical experience with the use of ArcGIS

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc. (Hons) Environmental Management (2014), North-West University, Potchefstroom
- B.A Psychology, Geography and Environmental Studies (2013), North-West University, Potchefstroom

Courses:

- Environmental Legal Compliance and Auditing (2017), Janice Tooley at the Protea Hotel OR Thambo, Johannesburg

EMPLOYMENT

Date	Company	Roles and Responsibilities
February 2015 – current	Savannah Environmental (Pty) Ltd	Environmental Assessment Practitioner and GIS Consultant *Tasks include: Compilation of Environmental Scoping Reports, Plan of Study, Environmental Impact Assessment Reports, Basic Assessments and Environmental management programmes; Environmental Screening Reports; Specialist management; project proposals and tenders; Client liaison and Marketing; Process EIA Applications, GIS Mapping and data analysis and manipulation*

PROJECT EXPERIENCE

Renewable Power Generation Projects: Solar Energy Facilities

Screening Studies

Project Name & Location	*Client Name*	*Role*
Pre-feasibility Desktop Screening and Fatal Flaw Scan for a Solar PV Project near Lichtenburg, North West Province	*ABO Wind AG*	*EAP and GIS Consultant*

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	*Client Name*	*Role*
Buffels PV 1 & Buffels PV 2 Solar Energy Facilities near Orkney, North West	*Kabi Solar*	*EAP and GIS Consultant*
Woodhouse Solar 1 & Woodhouse Solar 2 PV Facilities near Vryburg, North West	*Genesis Eco-Energy Developments*	*EAP and GIS Consultant*
Orkney Solar Farm, North West	*Genesis Eco-Energy Developments*	*EAP and GIS Consultant*
Tewa Isitha Solar 1 & Tewa Isitha Solar 2 PV facilities near Upington, Northern Cape	*AfriCoast Energy*	*EAP and GIS Consultant*

Basic Assessments

Project Name & Location	*Client Name*	*Role*
Harmony Gold 3x PV Facilities, Welkom, Free State	*BBEntropie*	*EAP and GIS Consultant*

Renewable power generation projects: Wind Energy Facilities

Screening Studies

Project Name & Location	*Client Name*	*Role*
Juno Wind Farm Screening Assessment Report near Lamberts Bay, Western Cape Province	*AMDA Developments*	*EAP and GIS Consultant*

Lamberts Bay Wind Farm Screening Assessment Report near Lamberts Bay, Western Cape Province	*Windy World*	*EAP and GIS Consultant*
Pre-feasibility Desktop Screening and Fatal Flaw Scan for the Kudusberg and Rondekop Wind Energy Facilities, Northern Cape and Western Cape Provinces	*ABO Wind AG*	*EAP and GIS Consultant*

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Boulders Wind Farm, Western Cape Province	*Vredenburg Windfarm*	*EAP and GIS Consultant*
Namas Wind Farm, Northern Cape Province	*Genesis Namas Wind (Pty) Ltd*	*EAP and GIS Consultant*
Zonnequa Wind Farm, Northern Cape Province	*Genesis Zonnequa Wind (Pty) Ltd*	*EAP and GIS Consultant*

Grid Infrastructure Projects

Basic Assessments

Project Name & Location	***Client Name***	***Role***
132/11kV Olifantshoek Substation and Power Line, Northern Cape	*Eskom*	*EAP and GIS Consultant*

Gas Projects

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Richards Bay Combined Cycle Power Plant (CCPP) power plant, KwaZulu-Natal	*Eskom*	*EAP and GIS Consultant*

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Neopak Combined Heat and Power (CHP) Plant, Rosslyn, Gauteng	*Neopak*	*EAP, Public Participation and GIS Consultant*

Screening Studies

Project Name & Location	***Client Name***	***Role***
Richards Bay Combined Cycle Power Plant (CCPP) power plant, near Richards Bay, KwaZulu-Natal	*Eskom*	*EAP and GIS Consultant*

Infrastructure Development Projects (bridges, pipelines, roads, etc)

Basic Assessments

Project Name & Location	***Client Name***	***Role***
Water Treatment Plant at the Neopak Facility, Rosslyn, Gauteng	*Neopak*	*EAP, Public Participation and GIS Consultant*

Housing and Urban Projects

Environmental Impact Assessments and Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***

Metals Industrial Cluster near Kuruman, Northern Cape	*Northern Cape Department of Economic Development and Tourism*	*EAP and GIS Consultant*

Environmental Management Tools

Environmental Management Programmes

Project Name & Location	***Client Name***	***Role***
Environmental Management Programme (EMPr) for the Nxuba Wind Farm, Eastern Cape	*ACED*	*EAP*
Operation Environmental Management Programme (EMPr) for Phase 1 of the Amakhala Emoyeni Wind Energy Facility, Eastern Cape	*Cennergi*	*EAP*
Operation Environmental Management Programme (EMPr) for the Tsitsikamma Community Wind Energy Facility, Eastern Cape Province	*Cennergi*	*EAP*
Environmental Management Programme (EMPr) for the Skuitdrift 1 Solar PV Energy Facility near Augrabies, Northern Cape Province	*Building Energy South Africa*	*EAP and GIS Consultant*
Environmental Management Programme (EMPr) for the Skuitdrift 2 Solar PV Energy Facility near Augrabies, Northern Cape Province	*Building Energy South Africa*	*EAP and GIS Consultant*

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CURRICULUM VITAE OF KAREN JODAS

Profession : Environmental Management and Compliance Consultant ; Environmental Assessment Practitioner. Professional Natural Scientist: Environmental Science since 1999.

Specialisation: Strategic environmental assessment and advice; development of plans and guidelines; environmental compliance advise and monitoring; Environmental Impact Assessment; environmental management; project management and co-ordination of environmental projects; peer review; policy, strategy and guideline formulation; renewable energy projects; water resources management.

VOCATIONAL EXPERIENCE

Provide technical input for projects in the environmental management field, specialising in strategic evaluation, Environmental Impact Assessment studies, environmental management plans, programmes and guidelines, integrated environmental management, environmental compliance monitoring; peer review of EIA reports and processes, strategy and guideline development, and public participation. Key focus on overall Project Management, integration of environmental studies and environmental processes into larger engineering-based projects, strategic assessment, and the identification of environmental management solutions and mitigation/risk minimising measures.

Excellent working knowledge of environmental legislation, strategies, guidelines and policies. Compilation of the reports for environmental studies are in accordance with the all relevant environmental legislation under the National Environmental Management Act. Due consideration of Equator Principles and compliance with IFC performance standards is now a part of all projects.

SKILLS BASE AND CORE COMPETENCIES

- Twenty years (20) of experience in the environmental management, impact assessment and compliance fields
- Eighteen (18) years of experience in Project Management - Project management of large environmental assessment and management projects
- Strategic and compliance advise for all aspects of environmental assessment and management
- External and peer review of environmental assessment and compliance reporting as well as EIA processes
- Working knowledge of environmental planning policies, regulatory frameworks and legislation
- Input and review of Environmental Management Plans and Programmes, including Invasive Species Monitoring, Control and Eradication Plans
- Identification and assessment of potential environmental impacts and benefits
- Development of practical and achievable mitigation measures and management plans and evaluation of risk to project execution
- Experienced in environmental compliance advise, monitoring and reporting for construction projects
- Compilation and review of the reports in accordance with all relevant environmental legislation
- Public participation/involvement and stakeholder consultation
- Environmental strategy, policy and guidelines development
- Experienced in assessments for both linear developments and nodal developments
- Key experience in the assessment of impacts associated with renewable energy projects
- Wide range of experience for public and private sector projects
- Experienced consultant in projects in Sub-Saharan Africa.

EDUCATION AND PROFESSIONAL STATUS

Degrees:

- B.Sc Earth Sciences, majoring in Geography and Zoology, Rhodes University, Grahamstown, 1993
- B.Sc Honours in Geography (in Environmental Water Management), Rhodes University, Grahamstown, 1994. Major subjects included Water Resources Management, Streams Ecology, Fluvial Geomorphology and Geographic Information Systems.
- M.Sc in Geography (Geomorphology), Rhodes University, Grahamstown, 1996

Short Courses:

- Water Quality Management, Potchefstroom University, 1998
- Environmental Law Course, Aldo Leopold Institute, 2002
- WindFarmer Wind Farm Design course, Garrad Hassan, 2009

Professional Society Affiliations:

- Registered with the South African Council for Natural Scientific Professions as a Professional Natural Scientist: Environmental Science (400106/99)

Other Relevant Skills:

- Xtrack Extreme – Advanced Off-Road Driving Course (2003)

EMPLOYMENT

Date	Company	Roles and Responsibilities
2006 - Current	Savannah Environmental (Pty) Ltd	Director *Independent specialist environmental consultant, Environmental Assessment Practitioner (EAP) and advisor*
1997 – December 2005	Bohlweki Environmental (Pty) Ltd	Associate *Environmental Management Unit: Manager; Principle Environmental Scientist focussing on Environmental Management and Project Management*

APPENDIX K:
APPLICABLE LEGISLATION

APPLICABLE LEGISLATION

Table 1: Applicable Legislation, Policies and/or Guidelines associated with the development of the Namas Wind Farm

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	National Legislation		
Constitution of the Republic of South Africa (No. 108 of 1996)	In terms of Section 24, the State has an obligation to give effect to the environmental right. The environmental right states that: "*Everyone has the right –* » *To an environment that is not harmful to their health or well-being; and* » *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:* * *Prevent pollution and ecological degradation;* * *Promote conservation; and* * *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*."	» Applicable to all authorities	There are no permitting requirements associated with this Act. The application of the Environmental Right however implies that environmental impacts associated with proposed developments are considered separately and cumulatively. It is also important to note that the "right to an environment clause" includes the notion that justifiable economic and social development should be promoted, through the use of natural resources and ecologically sustainable development.
National Environmental Management Act (Act No. 107 of 1998)	The EIA Regulations, 2014, have been promulgated in terms of Chapter 5 of the Act. Listed activities which may not commence without EA are identified within the Listing Notices (GNR 327, GNR 325 and GNR 324) which form part of these Regulations (GNR 326). In terms of S24(1) of NEMA, the potential impact on the environment associated with these listed activities must be assessed and reported on to the competent authority charged by NEMA with granting of the relevant environmental authorisation.	» National Department of Environmental Affairs (DEA) - competent authority. » Northern Cape Department of Environment and Nature Conservation (DENC) - commenting authority.	The listed activities triggered by the Namas Wind Farm have been identified and assessed in the BA process being undertaken. This BA process will culminate in the submission of a final BA report to the competent authority in support of the application for authorisation.

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	A BA process is required to be undertaken for the Namas Wind Farm in accordance with GN114, as formally gazetted on 16 February 2018, due to the location of the project site within the REDZ.		
National Environmental Management Act (Act No. 107 of 1998)	In terms of the "Duty of Care and Remediation of Environmental Damage" provision in Section 28(1) of NEMA every person who causes, has caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environment is authorised by law or cannot reasonably be avoided or stopped, to minimise and rectify such pollution or degradation of the environment. In terms of NEMA, it is the legal duty of a project proponent to consider a project holistically, and to consider the cumulative effect of a variety of impacts.	» National Department of Environmental Affairs (DEA). » Northern Cape Department of Environment and Nature Conservation (DENC)	While no permitting or licensing requirements arise directly by virtue of the proposed project, this section is applicable during the BA process through the consideration of potential cumulative, direct, and indirect impacts. It will continue to apply throughout the life cycle of the project.
National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEM:BA)	Section 53 of NEM:BA provides for the MEC / Minister to identify any process or activity in such a listed ecosystem as a threatening process. Three government notices have been published in terms of Section 56(1) of NEM:BA as follows: » Commencement of TOPS Regulations, 2007 (GNR 150). » Lists of critically endangered, vulnerable and protected species (GNR 151). » TOPS Regulations (GNR 152). It provides for listing threatened or protected ecosystems, in	» Northern Cape Department of Environment and Nature Conservation (DENC).	Under this Act, a permit would be required for any activity which is of a nature that may negatively impact on the survival of a listed protected species. An Ecological Impact assessment has been undertaken as part of the BA Report (refer to **Appendix D** of the Basic Assessment Report). As such the potential occurrence of critically endangered, endangered, vulnerable, and protected plant species and the potential for them to be affected has been considered. Species of conservation concern of which four can be confirmed present at the site includes *Aloe arenicola*

Legislation / Policy / Guideline	Applicable Requirements	Relevant Authority	Compliance requirements
	one of four categories: critically endangered (CR), endangered (EN), and vulnerable (VU) or protected. The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process including the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (NEM:BA: National list of ecosystems that are threatened and in need of protection, (Government Gazette 37596, GNR 324), 29 April 2014).		(NT), *Leucoptera nodosa* (NT), *Wahlenbergia asparagoides* (VU) and *Babiana hirsuta* (NT). However, the abundance of these species is low across most of the site and the local populations would not be compromised by the development. A permit may be required should any listed plant species be disturbed or destroyed as a result of the development of the Namas Wind Farm.
National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEM:BA)	Chapter 5 of NEM:BA pertains to alien and invasive species; and states that a person may not carry out a restricted activity involving a specimen of an alien species without a permit issued in terms of Chapter 7 of NEM:BA; and that a permit may only be issued after a prescribed assessment of risks and potential impacts on biodiversity is carried out. Applicable, and exempted alien and invasive species are contained within the Alien and Invasive Species List (GNR 864).	» Northern Cape Department of Environment and Nature Conservation (DENC).	Restricted Activities and the respective requirements applicable to persons in control of different categories of listed invasive species are contained within the Alien and Invasive Species Regulations (GNR 598) published under NEM:BA; together with the requirements of the Risk Assessment to be undertaken. The Ecological Impact Assessment (**Appendix D** of the Basic Assessment Report) requires the development of an Alien Management Plan for the site. The EMPr makes provision for managing and mitigating alien invasion on the site (refer to **Appendix M** of the Basic Assessment Report).
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA)	The Minister may by notice in the Gazette publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. The Minister may amend the list by –	» National Department of Environmental Affairs (DEA) – hazardous waste. » North Cape Department of	As no waste disposal site is to be associated with the Namas Wind Farm, no permit is required in this regard. Waste handling, storage and disposal during construction and operation is required to be

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	» Adding other waste management activities to the list. » Removing waste management activities from the list. » Making other changes to the particulars on the list. In terms of the Regulations published in terms of NEM:WA (GNR 912), a BA or EIA is required to be undertaken for identified listed activities. Any person who stores waste must at least take steps, unless otherwise provided by this Act, to ensure that: » The containers in which any waste is stored, are intact and not corroded or in » Any other way rendered unlit for the safe storage of waste. » Adequate measures are taken to prevent accidental spillage or leaking. » The waste cannot be blown away. » Nuisances such as odour, visual impacts and breeding of vectors do not arise; and » Pollution of the environment and harm to health are prevented.	Environment and Nature conservation (DENC) - general waste.	undertaken in accordance with the requirements of the Act, as detailed in the EMPr (refer to **Appendix M** of the Basic Assessment Report).
National Environmental Management: Air Quality Act (Act No. 39 of 2004) (NEM:AQA)	The National Dust Control Regulations (GNR 827) published under Section 32 of NEM:AQA prescribe the general measures for the control of dust in all areas; and provide a standard for acceptable dustfall rates for residential and non-residential areas. In accordance with the Regulations (GNR 827) any person who conducts any activity in such a way as to give rise to dust in quantities and concentrations that may exceed the	» Nama Khoi Local Municipality. » Namakwa District Municipality	In the event that the project results in the generation of excessive levels of dust, the possibility could exist that a dustfall monitoring programme would be required for the project; in which case dustfall monitoring results from the dustfall monitoring programme would need to be included in a dust monitoring report and a dust management plan would need to be developed. However, granted that appropriate mitigation measures are

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	dustfall standard set out in Regulation 03 must, upon receipt of a notice from the air quality officer, implement a dustfall monitoring programme. Any person who has exceeded the dustfall standard set out in Regulation 03 must, within three months after submission of the dustfall monitoring report, develop and submit a dust management plan to the air quality officer for approval.		implemented, the wind farm is not anticipated to result in significant dust generation. The EMPr however makes provision for managing and mitigating potential dust impacts (refer to **Appendix M** of the Basic Assessment Report).
National Water Act (Act No. 36 of 1998)	A water use listed under Section 21 of the NWA must be licensed with the Regional DWS, unless it is listed in Schedule 1 of the NWA (i.e. is an existing lawful use), is permissible under a GA, or if a responsible authority waives the need for a licence. Water use is defined broadly, and includes consumptive and non-consumptive water uses. taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering a watercourse, removing water found underground for certain purposes, and recreation. Consumptive water uses may include taking water from a water resource (Section 21(a)), and storing water (Section 21(b)). Non-consumptive water uses may include impeding or diverting of flow in a water course (Section 21(c)); and altering of bed, banks or characteristics of a watercourse (Section 21(i)).	» Department of Water and Sanitation (DWS). » Lower Orange Catchment Management Agency	The development footprint of the Namas Wind Farm does not impact on any watercourses within the preferred project site. In the event that development activities impede or divert the flow of water in a watercourse, or alter the bed, banks, course or characteristics of watercourse, Section 21(c) and 21 (i) of the NWA would be triggered, and the project proponent would need to apply for a WUL or register a GA with the DWS. Should water be extracted from groundwater/a borehole on site for use within the wind farm, a water use license will be required in terms of sections 21(a) and 21 (b) of the National Water Act.
Environment	The Noise Control Regulations in terms of Section 25 of the	» National Department of	There is no requirement for a noise permit in terms of

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Conservation Act (Act No. 73 of 1989) (ECA)	ECA contain regulations applicable for the control of noise in the Provinces of Limpopo, North West, Mpumalanga, Northern Cape, Eastern Cape, and KwaZulu-Natal Provinces. The Noise Control Regulations cover the powers of a local authority, general prohibitions, prohibitions of disturbing noise, prohibitions of noise nuisance, use of measuring instruments, exemptions, attachments, and penalties. In terms of the Noise Control Regulations, no person shall make, produce or cause a disturbing noise, or allow it to be made, produced or caused by any person, machine, device or apparatus or any combination thereof (Regulation 04).	» Environmental Affairs (DEA). » Northern Cape Department of Environment and Nature Conservation (DENC). » Nama Khoi Local Municipality.	the legislation. A Noise Impact Assessment has been undertaken in accordance with SANS 10328. This was completed as part of the BA process for the project, and is included in **Appendix I** of the Basic Assessment Report.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002) (MPRDA)	In accordance with the provisions of the MPRDA a mining permit is required in accordance with Section 27(6) of the Act where a mineral in question is to be mined, including the mining of materials from a borrow pit. Section 53 of the MPRDA states that any person who intends to use the surface of any land in any way which may be contrary to any object of the Act, or which is likely to impede any such object must apply to the Minister for approval in the prescribed manner.	» Department of Mineral Resources (DMR).	Any person who wishes to apply for a mining permit in accordance with Section 27(6) must simultaneously apply for an Environmental Authorisation in terms of NEMA. No borrow pits are expected to be required for the construction of the wind farm, and as a result a mining permit or EA is not required to be obtained. In terms of Section 53 of the MPRDA approval is required from the Minister of Mineral Resources to ensure that the proposed development does not sterilise a mineral resource that might occur on site.
National Heritage Resources Act (Act No. 25 of 1999)	Section 07 of the NHRA stipulates assessment criteria and categories of heritage resources according to their significance.	» South African Heritage Resources Agency » Ngwao Boswa Kapa Bokone (NBKB)	A Heritage Impact Assessment (including archaeology and palaeontology) was undertaken as part of the BA process to identify heritage sites (refer to **Appendix H** of the Basic Assessment Report)

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	Section 35 of the NHRA provides for the protection of all archaeological and palaeontological sites, and meteorites. Section 36 of the NHRA provides for the conservation and care of cemeteries and graves by SAHRA where this is not the responsibility of any other authority. Section 38 of the NHRA lists activities which require developers or any person who intends to undertake a listed activity to notify the responsible heritage resources authority and furnish it with details regarding the location, nature, and extent of the proposed development. Section 44 of the NHRA requires the compilation of a Conservation Management Plan as well as a permit from SAHRA for the presentation of archaeological sites as part of tourism attraction.		as per the requirements of the National Heritage Resources Act. The results of the Heritage Impact Assessment indicated that palaeontological materials were not observed on the Namas Wind Farm site but isolated fossil bones could occur within the various sand formations of the area. Archaeological sites were found scattered throughout the sand dune areas with almost nothing present on the intervening plain. Because it is closer to the coast, the western dune cordon had far more sites on it than the eastern one. The sites are all small shell and/or artefact scatters with the amount of shell reducing significantly further from the coast. The landscape does carry cultural significance but this area has been incorporated into a REDZ.
National Forests Act (Act No. 84 of 1998)	According to this Act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. Notice of the List of Protected Tree Species under the National Forests Act (No. 84 of 1998) was published in GNR 536 of 2018 (September 2018). The prohibitions provide that "no person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister".	» Department of Agriculture, Forestry and Fisheries (DAFF).	A permit or license is required for the destruction of protected tree species and/or indigenous tree species within a natural forest. No protected tree species have been identified within the development footprint, as per the Ecological Impact Assessment (**Appendix D** of the Basic Assessment Report).
National Veld and Forest Fire Act (Act 101 of 1998) (NVFFA)	Chapter 4 of the NVFFA places a duty on owners to prepare and maintain firebreaks, the procedure in this regard, and the role of adjoining owners and the fire protection	» Department of Agriculture, Forestry and Fisheries (DAFF).	While no permitting or licensing requirements arise from this legislation, this Act will find application during the construction and operation phases of the

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	association. Provision is also made for the making of firebreaks on the international boundary of the Republic of South Africa. The applicant must ensure that firebreaks are wide and long enough to have a reasonable chance of preventing a veldfire from spreading to or from neighbouring land, it does not cause soil erosion, and it is reasonably free of inflammable material capable of carrying a veldfire across it. Chapter 5 of the Act places a duty on all owners to acquire equipment and have available personnel to fight fires. Every owner on whose land a veldfire may start or burn or from whose land it may spread must have such equipment, protective clothing and trained personnel for extinguishing fires; and ensure that in his or her absence responsible persons are present on or near his or her land who, in the event of fire, will extinguish the fire or assist in doing so, and take all reasonable steps to alert the owners of adjoining land and the relevant fire protection association, if any.		wind farm in terms of the preparation and maintenance of firebreaks, and the need to provide appropriate equipment and personnel for firefighting purposes. The relevant management and mitigation measures have been included in the EMPr (**Appendix M** of the Basic Assessment Report).
Conservation of Agricultural Resources Act (Act No 43 of 1983) (CARA) and Subdivision of Agricultural Land Act (Act 70 of 1970)	Regulation 15 of GN R1048 provides for the declaration of weeds and invader plants, and these are set out in Table 3 of GN R1048. Declared Weeds and Invaders in South Africa are categorised ac-cording to one of the following categories: » Category 1 plants: are prohibited and must be controlled. » Category 2 plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread. » Category 3 plants: (ornamentally used plants) may no	» Department of Agriculture, Forestry and Fisheries (DAFF).	CARA will find application throughout the life cycle of the project. In this regard, soil erosion prevention and soil conservation strategies need to be developed and implemented. In addition, a weed control and management plan must be implemented. The EMPr provides mitigation for soil erosion and weed control and management (refer to **Appendix M** of the Basic Assessment Report). The development of the Namas Wind Farm does not

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	longer be planted; existing plants may re-main, as long as all reasonable steps are taken to prevent the spreading thereof, except within the floodline of watercourses and wetlands. These regulations provide that Category 1, 2 and 3 plants must not occur on land and that such plants must be controlled by the methods set out in Regulation 15E.		require the draining of vleis, marshes or water sponges on land outside urban areas. Permission from DAFF will therefore not be required in this regard. In terms of Regulation 15E (GNR 1048) where Category 1, 2 or 3 plants occur, a land user is required to control such plants by means of one or more of the following methods: » Uprooting, felling, cutting or burning. » Treatment with a weed killer that is registered for use in connection with such plants in accordance with the directions for the use of such a weed killer. » Biological control carried out in accordance with the stipulations of the Agricultural Pests Act (No. 36 of 1983), the ECA and any other applicable legislation. » Any other method of treatment recognised by the executive officer that has, as its object, the control of plants concerned, subject to the provisions of sub-regulation (4). » A combination of one or more of the methods prescribed, save that biological control reserves and areas where biological control agents are effective shall not be disturbed by other control methods to the extent that the agents are destroyed or become ineffective.
Hazardous Substances Act (Act No. 15 of 1973)	This Act regulates the control of substances that may cause injury, or ill health, or death due to their toxic, corrosive,	» Department of Health (DOH).	It is necessary to identify and list all the Group I, II, III, and IV hazardous substances that may be on the

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(HAS)	irritant, strongly sensitising or inflammable nature or the generation of pressure thereby in certain instances and for the control of certain electronic products. To provide for the rating of such substances or products in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, modification, disposal or dumping of such substances and products. » Group I and II: Any substance or mixture of a substance that might by reason of its toxic, corrosive etc., nature or because it generates pressure through decomposition, heat or other means, cause extreme risk of injury etc., can be declared as Group I or Group II substance » Group IV: any electronic product; and » Group V: any radioactive material. The use, conveyance, or storage of any hazardous substance (such as distillate fuel) is prohibited without an appropriate license being in force.		site and in what operational context they are used, stored or handled. If applicable, a license could be required to be obtained from the Department of Health.
National Road Traffic Act (Act No 93 of 1996) (NRTA)	The technical recommendations for highways (TRH 11): "Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads" outline the rules and conditions which apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the	» South African National Roads Agency Limited - national roads. » Northern Cape Department of Transport, Safety and Liaison – provincial roads	An abnormal load/vehicle permit may be required to transport the various components to site for construction. These include: » Route clearances and permits will be required for vehicles carrying abnormally heavy or abnormally dimensioned loads. » Transport vehicles exceeding the dimensional limitations (length) of 22m. » Depending on the trailer configuration and height when loaded, some of the project

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	damaging effect on road pavements, bridges, and culverts. The general conditions, limitations, and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution, and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the National Road Traffic Act and the relevant Regulations.		components may not meet specified dimensional limitations (height and width).
Astronomy Geographic Advantage Act (Act No. 21 of 2007)	The Astronomy Geographic Advantage (AGA) Act (No. 21 of 2007) provides for the preservation and protection of areas within South Africa that are uniquely suited for optical and radio astronomy; for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas and for matters connected thereto. Chapter 2 of the Act allows for the declaration of astronomy advantage areas whilst Chapter 3 pertains to the management and control of astronomy advantage areas. Management and control of astronomy advantage areas include, amongst others, the following: * Restrictions on use of radio frequency spectrum in astronomy advantage areas * Declared activities in core or central astronomy advantage area * Identified activities in coordinated astronomy advantage area; and * Authorisation to undertake identified activities.	» Department of Science and Technology.	The site proposed for the development of the Namas Wind Farm is located within the Northern Cape Province, however the site falls outside of the areas considered to be uniquely suited in terms of nationally significant astronomy advantage areas.

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Aviation Act (Act No 74 of 1962) 13th amendment of the Civil Aviation Regulations (CARS) 1997	Any structure exceeding 45m above ground level or structures where the top of the structure exceeds 150m above the mean ground level, the mean ground level considered to be the lowest point in a 3km radius around such structure. Structures lower than 45m, which are considered as a danger to aviation shall be marked as such when specified. Overhead wires, cables etc., crossing a river, valley or major roads shall be marked and in addition their supporting towers marked and lighted if an aeronautical study indicates it could constitute a hazard to aircraft. Section 14 of Obstacle limitations and marking outside aerodrome or heliport – CAR Part 139.01.33 relates specifically to appropriate marking of wind energy facilities.	» Civil Aviation Authority (CAA)	This Act will find application during the operation phase of the Namas Wind Farm. Appropriate marking on the project infrastructure is required to meet the specifications as detailed in the CAR Part 139.01.33. An obstacle approval for the Namas Wind Farm is required to be obtained from the CAA.
Provincial Policies / Legislation			
Northern Cape Nature Conservation Act (Act No. 9 of 2009)	This Act provides for the sustainable utilisation of wild animals, aquatic biota and plants; provides for the implementation of the Convention on International Trade in Endangered Species of Wild Fauna and Flora; provides for offences and penalties for contravention of the Act; provides for the appointment of nature conservators to implement the provisions of the Act; and provides for the issuing of permits and other authorisations. Amongst other regulations, the following may apply to the current project: » Boundary fences may not be altered in such a way as to prevent wild animals from freely moving onto or off of	» Northern Cape Department of Environment and Nature Conservation (DENC).	A collection/destruction permit must be obtained from Northern Cape Nature Conservation for the removal of any protected plant or animal species found on site. The Ecological Impact Assessment (**Appendix D** of the Basic Assessment Report) did not identify any species protected under this Act within the development footprint.

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	a property; » Aquatic habitats may not be destroyed or damaged; » The owner of land upon which an invasive species is found (plant or animal) must take the necessary steps to eradicate or destroy such species; » The Act provides lists of protected species for the Province.		