



**PROPOSED CONSTRUCTION OF THE 765KV GAMMA
SUBSTATION AND ASSOCIATED POWERLINE TURN-IN
INFRASTRUCTURE LOCATED ON PORTION 1 OF FARM UIT
VLUGT FONTEIN NO.265 AND THE REMAINDER OF FARM
SCHIETKUIL NO.3 IN THE PIXELY KA SEME AND CENTRAL
KAROO DISTRICT MUNICIPALITIES, WESTERN CAPE
PROVINCE AND NORTHERN CAPE PROVINCE**

**APRIL 2023
DRAFT MOTIVATION REPORT**

DOCUMENT DETAILS

Applicant	:	Eskom Holdings SOC Limited.
Title	:	PROPOSED CONSTRUCTION OF THE 765KV GAMMA SUBSTATION AND ASSOCIATED POWERLINE TURN-IN INFRASTRUCTURE LOCATED ON PORTION I OF THE FARM UIT VLUGT FONTEIN NO.265 AND REMAINDER OF FARM SCHIETKUIL NO.3 IN THE PIXELY KA SEME AND CENTRAL KAROO DISTRICT MUNICIPALITIES, WESTERN CAPE PROVINCE AND NORTHERN CAPE PROVINCE (OFFE REF: 12/12/20/873)
Author/EAP	:	Nala Environmental (Pty) Ltd Arlene Singh Justin Jacobs Norman Chetsanga
Purpose of Report	:	Draft Motivation Report for Public Review and comment
Date	:	April 2023

RESOLUTION OF THE MOTIVATION REPORT AND INVITATION TO COMMENT

Eskom Holdings SOC Limited received an Environmental Authorisation (EA) (Reference: I2/I2/20/873) dated 19 November 2007 for the proposed construction of the 765kV Gamma Substation on Portion I of the Farm Uit Vlucht Fontein No.265 and the Remainder of Farm Schietkuil No.3 in the Pixley Ka Seme and Central Karoo District Municipalities: Western Cape and Northern Cape Provinces. The EA authorises the construction of the Gamma Substation in phases/stages as per the Final EIA report undertaken by ACER in 2007. A further amendment was undertaken to correct the co-ordinates within the EA and subsequently granted on 22 February 2008. The first phase of the Gamma Substation commenced with construction activities within the validity period of the Environmental Authorisation and concluded construction in 2013. The first phase of the Gamma Substation as authorised has been constructed and is currently operational, however the next phase of the substation proposed is located on the Remainder of Farm Schietkuil No.3 and Portion I of the Farm Uit Vlucht Fontein 265 (as authorised) comprising of a 132kV/400kV substation yard at the existing Gamma Substation, and related turn-in of the existing 400kV Droerivier Hydra No 2 Overhead Powerline (OHL) and associated infrastructure is yet to be constructed.

The holder of the EA now proposes to commence construction of the next phase (phase 2) of the authorised development, specifically the development of a 132kV/400kV yard at the existing Gamma Substation and turn-ins of the existing 400kV Droerivier- Hydra 2 OHL, as provided for in the current EA (Reference: I2/I2/20/873). The next phase of construction activities associated with the EA is directly linked to the increased demand for grid infrastructure which is linked to upcoming renewable energy projects in the Northern Cape and Western Cape Provinces. Importantly, the 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: I4/I2/I6/3/3/2/686), which has been selected as a preferred bidder with a private off-taker and has been registered as a Strategic Integrated Project (SIP) (Refer to Appendix P for SIP Registration Letter).

The proposed 132kV/400kV yard and 400kV turn-ins of the existing Droerivier- Hydra No 2 OHL fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to reflect the updated configuration proposed to be implemented. Whilst the updated layout of the proposed 132kV/400kV substation yards falls within the scope and footprint of what was originally assessed in the original EIA process (ACER, 2007), the scope of the assessed powerline corridor for the turn-in of the existing 400kV Droerivier Hydra 2 overhead powerline to the proposed 132kV/400kV substation yard as planned had not clearly been assessed in the EIA (2007).

A Part 2 amendment application is proposed to be undertaken for the update to the layout to the existing Gamma Substation and associated powerline turn-in infrastructure. The second phase of the Gamma Substation development that will now be implemented will consist of:

- A substation yard with a step-up voltage of 132kV/400kV on the Remainder of Farm Schietkuil No.3 and Portion I of Farm Uit Vlucht Fontein 265; and
- In addition, the existing Eskom 400kV overhead powerline that currently bypasses the existing Gamma Substation (i.e., the “Droerivier- Hydra No. 2” 400kV OHL) will be reconfigured to turn-in and turn-out of the new substation yard.

In terms of Chapter 5 of the EIA Regulations of December 2014 (as amended on 07 April 2017 and 13 July 2018), it is possible for the holder of an Environmental Authorisation to apply for an amendment of the Environmental Authorisation with the Competent Authority for a change or deviation from the project description to be approved. In terms of Condition 1.4 of the Environmental Authorisation of November 2007, any changes to, or deviations from, the project description set out in this authorisation must be approved, in writing, by the Department before such changes or deviations may be affected.

The update to the Layout of the existing Gamma Substation and associated 400kV Powerline Turn-In Infrastructure is not a listed activity in itself and will not trigger any new listed activities.

Nala Environmental has prepared this Motivation Report in support of the amendment application on behalf of Eskom Holdings SOC Limited. This report aims to provide detail pertaining to the impacts and significance of the proposed update to the Layout of the existing Gamma Substation and associated 400kV Hydra-Droerivier 2 powerline turn-in infrastructure located on Portion 1 of Farm Uit Vlugt Fontein No.265 and the Remainder of Farm Schietkuil No.3 in the Pixely Ka Seme and Central Karoo District Municipalities, Western Cape Province and Northern Cape Province (DFFE Ref: 12/12/20/873) in order for interested and affected parties (I&APs) to be informed of the proposed amendment and provide comment, and for the competent authority to be able to reach a decision in this regard. This report is supported by specialist studies in order to inform the final conclusion regarding the proposed amendment (refer to **Appendix D to J** of this report). This main report must be read together with these specialist studies in order to obtain a complete understanding of the proposed amendment and the implications thereof.

This amendment motivation report has been made available to registered interested and affected parties for a 30-day period from **18 April 2023 to 22 May 2023 (both days inclusive)**. Details of where one could register as I&AP and to receive further information on the report availability was advertised in the Die Burger newspaper on **02 February 2023** (refer to Appendix C2).

The motivation report and associated appendices were made available for download at <https://nalaenvironmental.co.za/projects/part-2-amendment-application-for-the-765kv-gamma-substation-northern-and-western-cape-provinces/>

The report has been made available in electronic tablet format at the Beaufort West Public Library (Western Cape) and the Ubuntu Local Municipality (Northern Cape). USB/CD copies of the report can be made available to I&AP's and stakeholders should be requested.

All comments received during the review period will be included within the Comments & Responses Report (Appendix C7) and will be submitted to the Department of Forestry, Fisheries and Environment (DFFE) with the final amendment motivation report.

SYNOPSIS OF THE PROJECT

BACKGROUND

Eskom Holdings SOC Limited hereafter referred to as Eskom is an enterprise responsible for the generation, transmission, and distribution of virtually all bulk power supplies throughout South Africa. In 2007, Eskom planned to strengthen its transmission network into the Eastern and Western Cape provinces by constructing a 765 kV transmission line backbone through the centre of the country, linking its main generating facilities in Mpumalanga with demand centres in the Western and Eastern Cape as a result of a shortfall of electricity capacity in the Eastern and Western Cape areas. This involved constructing new 765 kV transmission lines from Standerton, in Mpumalanga, to Cape Town, in the Western Cape, with branch lines to Port Elizabeth, in the Eastern Cape.

In 2005, environmental authorisation was issued for the proposed Gamma Substation to be located on the farm Uit Vlucht near Victoria West, Northern Cape. However, after consideration and re-evaluation it was decided that it would be more ideally located about 10 km to the east of the original site. Hence the location of the substation was moved to **Portion 1 of the Farm Uit Vlucht Fontein No. 265 with a small encroachment onto the Remainder of Farm Schietkuil No.3.**

The Environmental Impact Report (EIR) done in 2007 by ACER was for the new location of the Gamma Substation i.e. Portion 1 of the farm Uit Vlucht Fontein No. 265 with a small encroachment onto the Remainder of Farm Schietkuil No.3. This placement of the substation is due to Eskom wanting the substation placed next to its three existing 400kV transmission lines as the reactive voltage correction apparatus can be housed within one structure for the 400kV and 765kV lines, as the location of the proposed Gamma Substation is indicated by an optimal distance between the Perseus (Dealesville) and Omega (Koeberg) Substations, being approximately equidistant. It also serves as an off-take for the proposed 765 kV transmission lines to the Grassridge Sub-station near Port Elizabeth. Furthermore, if the station were to be placed in this location it would be used to boost electrical power feed into the 400kV lines. The placement of all transmission lines closer together and the substation in this site would be more economical and would save Eskom a substantial capital cost in construction of transmission lines (an estimated R2.5 million/km). As per the FEIR (2007), the project timeframes indicated that in order to meet the expected electricity demand, the Gamma Substation would be developed in phases as required by growth in future electricity demand (Page 24 of the FEIR, ACER, 2007)). The FEIR (ACER, 2007), Page 4 indicates that "It should be noted that this EIA deals with the complete Gamma Sub-station, although the construction of individual components will be phased, as indicated by electricity demand over the next few years".

The Environmental Authorisation (EA) was granted for the 765kV Gamma Substation and associated infrastructure on **Portion 1 of Farm Uit Vlucht Fontein No. 265 with a small encroachment onto the Remainder of Farm Schietkuil No.3.** in November 2007 by DEAT (Ref no: 12/12/20/873) and construction of the first phase of the Gamma Substation concluded in 2013.

Presently Eskom is seeking to proceed with phase 2 of the Gamma Substation development (i.e. the construction of a 132kV/400kV substation yard within the authorised footprint of the Gamma Substation and the turn-in and turn-out infrastructure associated with the existing 400kV Droerivier – Hydra 2 OHL.), however upon consultation with the Department of Forestry, Fisheries and the Environment (DFFE), it was determined that in order to effect the changes to the authorised layout to reflect Phase 2 of the development, a Part 2 Amendment Application would need to be undertaken as the FEIR and specialist studies undertaken during 2007 (ACER), although assessed the full footprint of the Gamma Substation and specifies the phased approach of construction infrastructure did not provide sufficient information on the proposed impacts and findings associated with the addition of phase 2 (i.e. the planned 400kV turn-in's of the existing Droerivier- Hydra 2 powerline to the substation yard).

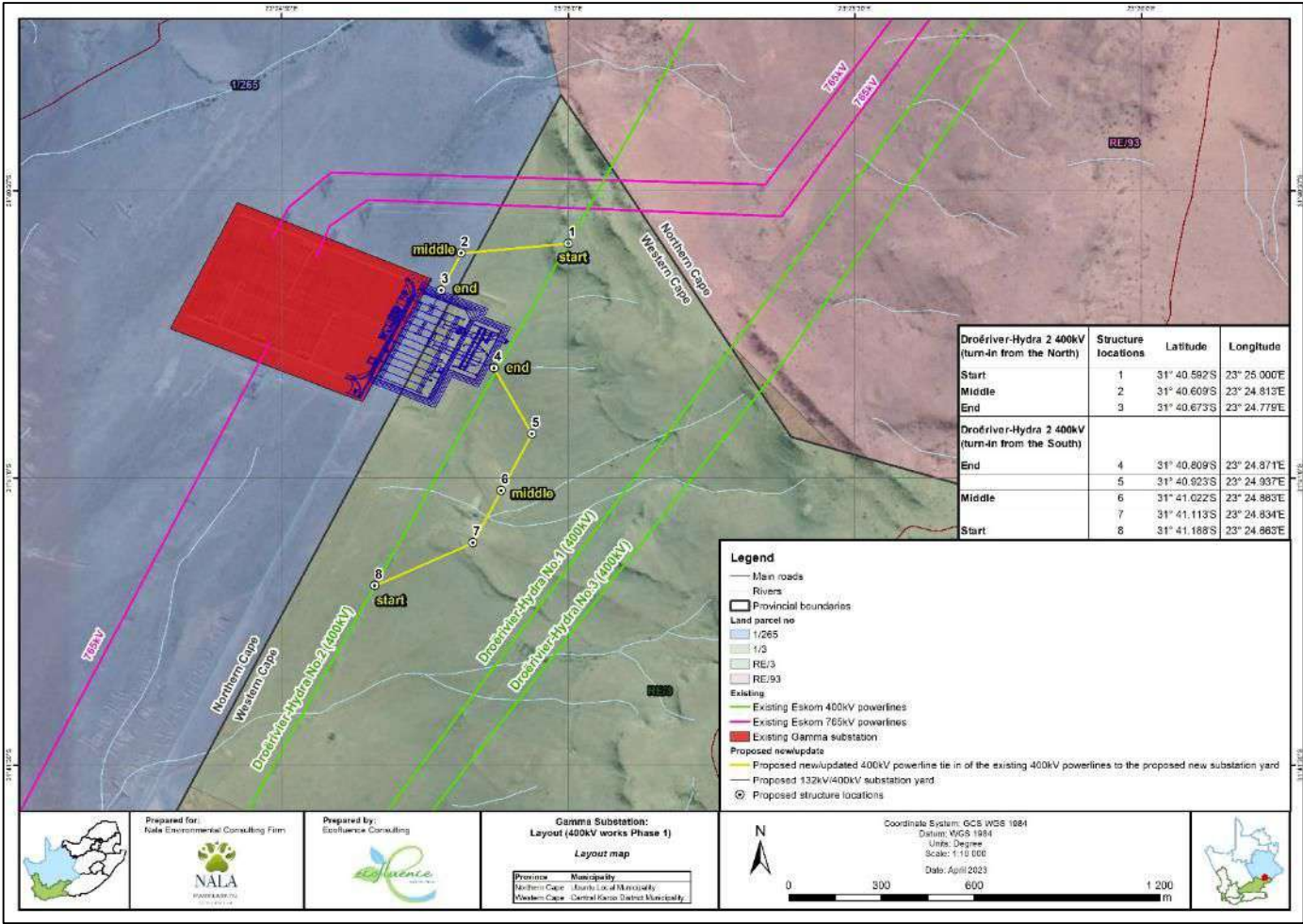


Figure 1.1. Proposed Updated Layout depicting the existing Gamma Substation with the next phase of the authorised development now proposed for implementation (new proposed 132kV/400kV Substation yard and new reconfigured turn-in and turn-out of the existing 400kV powerline).

LOCATION

The existing Gamma Substation (DFFE REF: 12/12/20/873) is located on Portion 1 of Farm Uit Vlucht Fontein No.265 (Northern Cape), but as per the EA, it was also authorised to be developed with a small encroachment on Remainder of Farm Schietkuil No.3 (Western Cape). The existing Droerivier- Hydra 2 400kV powerline is located on the Remainder of Farm Schietkuil No.3 and traverses in a North Easterly and South Westerly direction past the existing Gamma Substation site. The proposed update to the layout (dated April 2023) as part of this Part 2 Amendment process consists of the proposed 132kV/400kV substation yard at the existing Gamma substation and the proposed 400kV Droerivier-Hydra 2 powerline turn-in and turn-out of the proposed substation yard (phase 2) on both Portion 1 of Farm Uit Vlucht Fontein No.265 and Remainder of Farm Schietkuil No.3 in the Western and Northern Cape Provinces. (As originally assessed during EIA undertaken by ACER in 2007 and authorised as per DFFE Ref: 12/12/20/873).

In addition, an already authorised and existing small corridor (approximately 400 m x 2,000 m, an area of 80 ha) will be used as an access road to the R63. This access road will be used during construction for the second phase of the development. The Gamma Sub-station is served by a tarred access road to the R63 and internal gravelled traffic areas for access to the Extra High Voltage (EHV) equipment. The flow of traffic to the site is relatively light and virtually no traffic.

The approved layout as per the EIA (ACER, 2007) covers about 1,290 m x 465 m (approximately 60 ha) (when measured in terms of the outer perimeter lines of the terraces and security fence). When fully operational, the sub-station will have five incoming EHV power lines and five 765 kV feeder power lines going out. In addition, power from the 765 kV incoming lines will also be used to boost the supplies in the existing 400 kV lines.

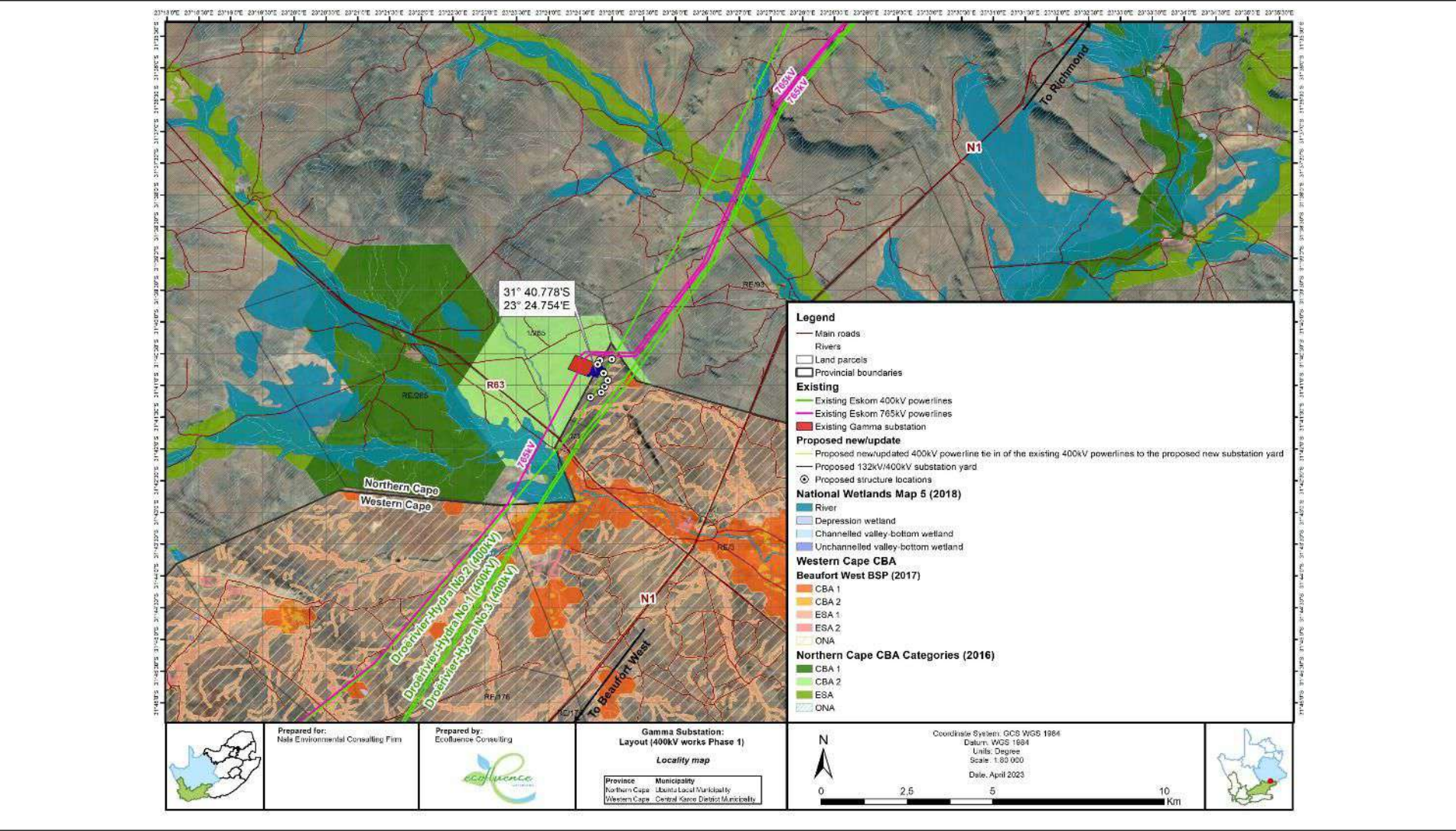


Figure 1.2. Locality Map of the Existing Gamma Substation (Phase 1) including the existing powerlines and proposed infrastructure (Phase 2).



The following tables provide a detailed description of the authorised 765kV Gamma Substation as per the EA Ref: 12/12/20/873:

Table i: Description of Gamma Substation Site (as Assessed and Authorised)

Component	Description / Dimensions
Location of the site	Pixely Ka Seme and Central Karoo District Municipalities (Northern & Western Cape)
Farm Names	Portion I of Farm Uit Vlucht Fontein No.265 and Remainder of Farm Schietkuil No.3
Original Substation Site Area Assessed (2007)	1.5 x 1,15km ² (172 ha)
Substation Structure Area	1,290 m x 465 m (60 ha)
Access to Site	Access road to R63
Transmission lines	765kV outgoing transmission lines (6 x 400 kV feeder lines that feeds into existing 400kV power grid)
Transformers	2 EHV transformers
Reactors	5 incoming transmission lines & 5 outgoing transmission lines
Busbars	3 parallel busbars
Power out	765kV outgoing transmission lines via 2 feeds going out increasing to 5 feeds as capacity is increased
Buildings	<ul style="list-style-type: none"> • Small office • workshop areas & storage space • external storage areas • control room (high voltage monitoring) • control instrumentation & equipment
Telecommunication mast	A microwave lattice mast, between 30 and 50 m high

Table ii: Description of Gamma Substation Site Phase I (as constructed)

Component	Description / Dimensions
Location of the site	Pixely Ka Seme District Municipality (Northern Cape)
Farm Names	Portion I of Farm Remainder of Uit Vlucht Fontein No.265
Original Substation Site Area Assessed (2007)	1.5 x 1,15km ² (172 ha)
Substation Structure Area – phase I (existing)	28ha
Access to Site	Access road to R63

	
Transmission lines	X3 existing 765kV powerline (Hydra, Perseus and Kappa) No 400kV turn-in lines
Transformers	No EHV transformers currently installed
Reactors	X4 reactors 
Buildings	<ul style="list-style-type: none"> • Small office • workshop areas & storage space • external storage areas • control room (high voltage monitoring) • control instrumentation & equipment
Telecommunication mast	A microwave lattice mast

POTENTIAL ENVIRONMENTAL IMPACTS AS DETERMINED THROUGH THE OF FINDINGS OF THE ORIGINAL EIR (ACER, 2007)

The following specialist assessments were undertaken within the original Environmental Impact Report (EIR, ACER 2007):

- » Faunal Assessment
- » Avifaunal Assessment
- » Wetland Assessment
- » Vegetation Assessment
- » Geotechnical Assessment
- » Land-use Assessment
- » Visual and Aesthetics Assessment
- » Social and Socio-economic Assessment
- » Transportation

» Cultural Heritage Assessment

Key summaries of the above reports (2007) pertinent to this amendment are detailed below:

» **Fauna:**

The Gamma-substation site comprises a single faunal habitat of typical Nama-Karoo shrublands, dominated by dwarf (generally <1 m tall) *microphyllous* shrubs (e.g., *Pentzia sp.*, *Eroicephalus sp.*, *Rosenia sp.* and *Lycium sp.*), succulents, geophytes, and grasses (e.g. *Aristida sp.*, *Eragrostis sp.*). Taller shrubs and small trees occur only along a non-perennial river-course and associated drainage lines that bisect the larger area. The cover of grasses in the area may vary with the occurrence of good autumn and summer rains. In total, twenty-two faunal species with conservation concern were identified. Of note is the riverine rabbit (Critically Endangered), which is potentially most vulnerable due to its particularly limited distribution range and the fact that they are extreme habitat specialists. Although potential riverine rabbit habitat does occur on the proposed site, the habitat is thought to be of a low quality. Also, there are currently no records for riverine rabbits at the proposed site. The proposed development of the Gamma-substation will undoubtedly have a negative effect on faunal habitats, and thus associated fauna, especially during the construction phase, the significance of impacts was deemed to be Low with the implementation of mitigation measures. However, the implementation of specific mitigating measures will minimise the effects/impacts of the development during both construction and operation. Potential impacts on the remaining fauna that occur in the area may be within acceptable limits as these species are mobile, are more generalist in their habitat requirements, and the area that was transformed was relatively small (172 ha).

» **Avifaunal:**

The potential impacts of the proposed sub-station on the birds of the area are: 1) destruction of habitat, 2) disturbance, 3) electrocution of birds on sub-station infrastructure, 4) collision of birds with the communications tower, and 5) the impact of birds on the operation of the sub-station. Importantly, all five impacts are adjudged to be of low significance. Mitigation of habitat destruction and disturbance will not easily make a significant difference to these impacts but can avoid unnecessary levels of the impacts. Mitigation of the impacts of electrocution, collision with the tower, and impact on quality of supply, will only need to be implemented, if necessary, once the substation is operational. Once operational, the substation should be monitored in order to detect any bird electrocutions, bird impacts on the substation, and bird collisions with the communications tower. As a general principle, all construction and maintenance activities for the substation should be undertaken according to generally accepted environmental best practice. The anticipated low significance of these impacts does not warrant implementing mitigation measures from the start.

» **Wetland:**

There are no wetland or riverine areas that will be directly impacted by the construction and operation of the sub-station. The probability that a wetland or riverine area would be impacted is low at a medium confidence level. Within the proposed sub-station areas there are a few intermittent streams that should be avoided if they fall within the transportation pathways during the construction phase of the project. Any impact would be short term but could have a medium impact on a stream if care is not taken to mitigate the possible impacts.

» **Vegetation:**

The vegetation of the proposed Gamma Sub-station site on Uit Vlug Fontein falls in the Nama-Karoo Biome, more specifically in the Upper Karoo Bioregion. The Acocks (1988) Veld Type is Central Upper Karoo (Acocks Veld Type 27). White (1983) mapped the vegetation as Highveld/Karoo Transition in the Kalahari-Highveld Phytochorion while Low and Rebelo (1996) list the Vegetation Type to be Upper Nama Karoo (Vegetation Type 50). The most recent vegetation map at the time (Mucina et al., 2005) classifies it as **Eastern Upper Karoo**. The National Spatial Biodiversity Assessment (Rouget et al., 2004) classified the area proposed for the Sub-station as being poor in threatened plant species and moderate in endemics. The site has the lowest level of irreplaceability for vegetation (0.2 = lowest level of conservation importance), and it ranks in the lowest category for vulnerability (Rouget et al., 2004). Overall, the Vegetation Type ranks low for conservation value (Rouget et al., 2004) and the use of less than 0.004% of the Eastern Upper Karoo for a Sub-station will not jeopardize any conservation plans for the Vegetation Type. Only one species of special concern was recorded on the Gamma Sub-station site (*Boophone disticha* or gifbol). All other protected species recorded on site are abundant in the areas. *Boophone disticha* is a geophyte that will transplant easily and the few individuals found on site should be translocated before construction.

Construction of the Gamma Sub-station is expected to destroy most of the vegetation of the site. The following impacts were identified: 1) Loss of 172 ha of Eastern Upper Karoo (this represents less than 0.004% of the total natural Eastern Upper Karoo) for the Sub-station, 2) Loss of additional areas of vegetation for construction of the access roads, 3) an increased risk of alien infestation due to disturbance, 4) destabilisation of soils due to removal of the vegetation with resultant erosion, 5) poaching of harvested plant species due to increased access, 6) "Flash-overs" may cause unplanned fires and 7) loss of plants of protected species. No impact tables were provided in the 2007 Vegetation Assessment in which the significance of the impact could be determined, however various mitigation measures were proposed to be implemented which would allow for the significance of impacts to be reduced and deemed acceptable for development.

» **Geotechnical:**

Findings indicated that both sites are underlain by fairly competent founding material and that the calcrete on Portion I of Farm Uit Vlugt Fontein can be used both as a founding medium and for the construction of pavement layers. In terms of drainage, ponding and surface run-off, Portion I of Farm Uit Vlugt Fontein site does not require any additional preparations/precautions whereas Kleinfontein is located down-slope from a small earth embankment dam and precautions are required to prevent flooding due to over topping of two drainage courses (with their confluence located in the near vicinity). Ample groundwater and surface water are available at Kleinfontein whilst Portion I of Farm Uit Vlugt Fontein will most probably require one or more boreholes. Good quality pavement layer construction material is available on Portion I of Farm Uit Vlugt Fontein, whereas material for Kleinfontein will have to be imported.

» **Land-use:**

The determining elements affecting land-use in the area are rainfall, soils and vegetation, which give rise to a very low level of primary productivity in the study area, which limits primary land-use to extensive livestock production (the dominant form of agriculture throughout the region). The direct impact of the development on land-use will, therefore, not be significant. The development will be limited to civil engineering works, within the boundary fence of the site. The development itself will therefore have no impact on the land use of the surrounding unaffected area and no mitigation actions are necessary there. Within the site boundary, the construction work will consist of bush-clearing over the whole site and land-levelling where construction items are to be installed. The only hazard arising from this is the possibility of severe erosion from rain and some wind erosion, for as

long as the raw soil surface is left uncovered. It is recognised that this is not valuable land and, therefore, the damage done either to the surface of the site or collateral damage off site will not result in costly losses. Nevertheless, it remains necessary to respect the fragility of the environment and, in particular, to ensure that excess sediment is not delivered to the adjacent drainage lines. The current land use is agriculture and existing transmission servitudes.

» **Visual & Aesthetics:**

The sub-station will be dominant in the landscape due to the low visual absorption capacity of the landscape, and the uniformity of the visual landscape and lack of diversity will result in a visual contrast. However, as the study area has a relatively undefined sense of place, the visual impact will not have a high significance on the modification of the Genius Loci as the sense of place has already been affected by existing infrastructure and the close proximity of the R63. The visual intrusion will not have a significant impact or influence on existing land-uses. The visual impact is regarded as significantly low, notwithstanding the large extent and height of the sub-station, the low visual absorption capacity and the close proximity to the R63 and the NI. The significance is tempered by the low surrounding hills, the already altered landscape due to existing transmission lines, a capacitor station and major roads, and the lack of economic activities that rely on the visual environment, such as game reserves, conservation areas and lodges.

Due to the scale, height and bulk of the development components, the visual impact of the project on the local environment will be highly intense but the significance of the impact is considered **low**. The visual impact can be reduced to some extent by implementing the recommended mitigation and management measures.

» **Social & Socio-economic:**

The assessment of social and socio-economic impacts (for example, employment opportunities, effects of construction camps, pressure on existing infrastructure, effects on safety and security, effects on farming, operation-specific effects, cumulative impacts, etc.) shows that there are no negative impacts which can be classified as fatal flaws, or which are of high significance thereby blocking the project, provided that mitigation measures are undertaken. Monitoring indicators include employment opportunities and use of local contractors, and health and safety.

» **Transportation:**

At the original sub-station site, access would be off the NI, which could cause hazard on the NI (an upgrade of the existing intersection would be required). At the new sub-station site, access would be off the R63, which has very light traffic and a fairly low standard intersection should suffice. Common to both sites are the Kleinfontein NI/R63 Intersection, and it may be necessary to consider safety measures at this intersection due to the very high volume of traffic (and high percentage of heavy vehicles) on the NI. This will be limited to the construction period and will probably consist of speed reductions on the NI as well as rumble strips in combination with signage. However, depending on from where construction materials come (Johannesburg or Port Elizabeth), this could be relevant to the new proposed site or both sub-station sites. From a transportation perspective, the new proposed sub-station site is preferred to the original site.

» **Cultural Heritage:**

At the sub-station site there is a presence of miscellaneous Middle Stone Age stone knapping debris, and the artefacts are water washed and weathered, on patinated shale, and are part of colluvial down slope wash. Another concentration of archaeological material is present immediately to the west of the existing entrance gate to the property, at S31 41.950; E23 24.325. Here very weathered Early Stone Age flakes and cores are mixed with Middle Stone Age knapping detritus. It appears that episodes of soil deflation and pedogenesis have caused the two temporally disparate traditions to mix. Artefacts are eroding open, exposed by down slope wash, and are mixed with other colluvial debris. These sites have low heritage significance for their scientific value and, as is the case for all heritage resources, a permit from SAHRA is required for any alteration to them. These sites have **low heritage significance** for their scientific value.

OVERALL SUMMARY OF THE EIA (2007) AND 2023 SPECIALIST STUDIES

» Summary of the original EIA (ACER, 2007) report for the Gamma Substation

The key issues, which required attention and consideration, included the potential impact on the riverine rabbit and the visual and aesthetic impact on the landscape, and the translocation of *Boophae disticha* or gifbol plants. Also of importance was the minor disruption to the social and socio-economic environment, and the employment opportunities created.

The Gamma Sub-station was built with transformers to step down the voltage from 765 kV to 400 kV, and this additional power can then be fed into the 400 kV lines for onward transmission. Also, by placing both the existing 400 kV and the 765 kV transmission lines close together and bringing them down the same basic route, the voltage correction function that is necessary for all the lines and feeding extra power to the 400 kV line from the 765 kV line can be housed within the confines of the same dedicated facility.

» Summary of 2023 comparative assessments associated with the updating of the proposed layout of the existing Gamma Substation and associated Infrastructure.

Therefore based on the findings of the comparative assessments between the original findings of the specialist assessments undertaken during the EIR (ACER, 2007) and the 2022 site sensitivity verifications and 2023 comparative assessment of the Gamma Substation yard and the 400kV turn-in footprint it can be concluded that no impacts associated with the proposed amendment have been deemed unacceptable by the relevant specialist provided that the additional mitigation measures as specified in this report are included within the Generic EMPs. As many of the 2007 reports do not contain specific impact ratings, the comparative assessment has made provision for a detailed impact assessment using a specified methodology.

AMENDMENT REASONING

The applicant is proposing an update to the authorised layout of the existing 765kV Gamma Substation i.e. the addition of the 132kV/400kV substation yard and associated 400kV powerline turn-in infrastructure located on the Farms Portion I of Farm Uit Vlucht Fontein No.265 and Remainder of Farm Schietkuil No.3 in the Pixely Ka Seme and Central Karoo District Municipalities; Western Cape and Northern Cape Provinces as it has been identified that the Authorized layout as per Ref: 12/12/20/873 did not include provision for the proposed routing of the 400kV turn-ins now proposed for phase 2 of the development.

The Environmental Authorisation (EA) for the existing Gamma Substation took into consideration the construction of the Gamma Substation as a phased approach as per the EIA undertaken in 2007. Whilst the updated layout of the proposed 132kV/400kV substation yards falls within the scope and footprint of what was originally assessed in the original EIA process, the scope of the assessed powerline corridor for the turn-in of the existing 400kV Droerivier Hydra 2 overhead powerline to the proposed 132kV/400kV substation yard as planned had not clearly been assessed in the EIA (2007).

A Part 2 amendment application is proposed to be undertaken for the update of the layout of the existing Gamma Substation to include the 132kV/400kV substation yard and the existing 400kV Droerivier Hydra 2 powerline turn-in to the substation yard. As such the proposed corridor for the 400kV powerline turn-in will be assessed clearly by the relevant specialists.

The amendments related to the updating of the contact details for the holder of the EA and the title of the EA are considered administrative in nature and no additional impacts are anticipated as a result of the proposed administrative amendments.

DEFINITIONS

Activity (Development) – an action either planned or existing that may result in environmental impacts through pollution or resource use.

Alien vegetation – Alien vegetation is defined as undesirable plant growth (usually of foreign origin) which includes but is not limited to all declared category 1 and 2 listed invader species as set out in the 1983 Conservation of Agricultural Resources Act (CARA) regulations. Other vegetation deemed to be alien are those plant species that show the potential to occupy in number any area within the defined construction area and which are declared undesirable.

Alternatives: – a possible course of action, in place of another, of achieving the same desired goal of the proposed project. Alternatives can refer to any of the following but are not limited to site alternatives, site layout alternatives, design or technology alternatives, process alternatives or a no-go alternative. All reasonable alternatives must be rigorously explored and objectively evaluated.

Applicant – the project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.

Biodiversity – the diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.

Commencement – 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 – means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

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 to produce a greater impact or different impacts.

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.

Direct impacts – impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

‘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.

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.

Emergency – An undesired/ unplanned event that results in a significant environmental impact and requires the notification of the relevant statutory body, such as a local authority.

Emissions – The release or discharge of a substance into the environment which generally refers to the release of gases or particulates into the air.

Environment – In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), “Environment” means the surroundings within which humans exist and that are made up of:

- a) the land, water and atmosphere of the earth.
- b) micro-organisms, plants and animal life.
- c) any part or combination of (i) of (ii) and the interrelationships among and between them; and
- d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Assessment – the generic term for all forms of environmental assessment for projects, plans, programmes or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.

Environmental Authorisation – an authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

Environmental Assessment Practitioner (EAP) – the individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

Environmental impact – a change to the environment (biophysical, social and/ or economic), whether adverse or beneficial, wholly or partially, resulting from an organisation’s activities, products or services.

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 detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. The EMP focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

Fatal Flaw – issue or conflict (real or perceived) that could result in developments being rejected or stopped.

General Waste – household water, construction rubble, garden waste and certain dry industrial and commercial waste which does not pose an immediate threat to man or the environment.

Hazardous Waste – waste that may cause ill health or increase mortality in humans, flora and fauna.

Heritage – That which is inherited and forms part of the National Estate (Historical places, objects, fossils as defined by the National Heritage Resources Act of 2000).

Incident – An undesired event which may result in a significant environmental impact but can be managed through internal response.

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

Indirect impacts – indirect or induced changes that may occur as a result of the activity. These types of impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity.

Method statement – A written submission to the ECO and the site manager (or engineer) by the EPC Contractor in collaboration with his/her EO.

Mitigate – the implementation of practical measures designed to avoid, reduce or remedy adverse impacts or enhance beneficial impacts of an action.

No-Go Option – in this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.

Open Space – environmentally sensitive areas which are not suitable for development and consist of watercourses, buffers, floodplains, steep slopes, sensitive biodiversity and/or areas of cultural or heritage significance.

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).

Pre-construction – The period prior to the commencement of construction, this 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).

Registered Interested and Affected Party – an interested and affected party whose name is recorded in the register opened for that application.

Rehabilitation – a measure aimed at reinstating an ecosystem to its original function and state (or as close as possible to its original function and state) following activities that have disrupted those functions.

Significance – significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e., magnitude, intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e., level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e., biophysical, social and economic).

Stakeholder engagement – the process of engagement between stakeholders (the proponent, authorities and I&As) during the planning, assessment, implementation and/or management of proposals or activities.

Watercourse – means:

- a) a river or spring.
 - b) a natural channel or depression in which water flows regularly or intermittently.
 - c) a wetland, lake or dam into which, or from which, water flows; and
 - d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse
- as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

Wetland – means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

ACRONYMS

ABE	Affirmative Business Enterprise
DFFE	Department of Fisheries, Forestry and the Environment
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act
ECO	Environmental Control Officer
EGI	Electrical Grid Infrastructure corridors
EHV	Extra High Voltage
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
ELF	Extremely Low Frequency
EMF	Electro-Magnetic Field
EMP	Environmental Management Plan
FSR	Final Scoping Report
GIS	Geographic Information System
ISAP	Interested and Affected Party
HIA	Heritage Impact Assessment
MTS	Main Transmission Substation
NEMA	National Environmental Management Act
NER	National Electricity Regulator
OHL	Overhead Lines
PCB	Polychlorinated Biphenyl
ROD	Record of Decision
SA RDB	South African Red Data Book
SAHRA	South African Heritage Resources Agency
SME	Small and Medium Enterprise

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SECTION 1- DETAILS OF THE AMENDMENTS APPLIED FOR

1.1. Background of the original EIA (ACER, 2007)

Eskom Holdings SOC Limited received an Environmental Authorisation (EA) (Reference: 12/12/20/873) dated 19 November 2007 for the proposed construction of the 765kV Gamma Substation on Portion I of the Farm Uit Vlugt Fontein No.265 and the Remainder of Farm Schietkuil No.3 in the Pixley Ka Seme and Central Karoo District Municipalities: Western Cape Province and Northern Cape Provinces. The EA authorises the construction of the 765kV Gamma Substation in phases/stages as per the Final EIA report undertaken by ACER in 2007. A further amendment was undertaken to correct the co-ordinates within the EA and subsequently granted on 22 February 2008. The first phase of the Gamma Substation commenced with construction activities within the validity period of the Environmental Authorisation and concluded construction in 2013. The first phase of the Gamma Substation as authorised has been constructed and is currently operational, however the next phase of the substation proposed is located on Remainder of Farm Schietkuil No.3 and Portion I of the Farm Uit Vlugt Fontein 265 (as authorised) comprising of a 132kV/400kV substation yard at the existing Gamma Substation, and related 400kV OHL turn-in of the existing 400kV Droerivier Hydra No 2 Overhead Powerline (OHL) and associated infrastructure is yet to be constructed.

The Environmental Impact Report (EIR) done in 2007 by ACER was for the new location of the Gamma Substation i.e., Portion I of Farm Uit Vlugt Fontein No. 265 with a small encroachment onto the Remainder of Farm Schietkuil No.3. This placement of the substation is due to Eskom wanting the substation placed next to its three existing 400kV transmission lines as the reactive voltage correction apparatus can be housed within one structure for the 400kV and 765kV lines, as the location of the proposed Gamma Substation is indicated by an optimal distance between the Perseus (Dealesville) and Omega (Koeberg) Substations, being approximately equidistant. It also serves as an off take for the proposed 765 kV transmission lines to the Grassridge Sub-station near Port Elizabeth. Furthermore, if the station were to be placed in this location it would be used to boost electrical power feed into the 400kV lines. The placement of all transmission lines closer together and the substation in this site would be more economical and would save Eskom a substantial capital cost in construction of transmission lines, an estimated R2.5 million/km). As per the FEIR (2007), the project timeframes indicated that in order to meet the expected electricity demand, the Gamma Substation would be developed in phases as required by growth in future electricity demand (Page 24 of the FEIR, ACER, 2007)). The FEIR (ACER, 2007), Page 4 indicates that “It should be noted that this EIA deals with the complete Gamma Sub-station, although the construction of individual components will be phased, as indicated by electricity demand over the next few years”.

The Environmental Authorisation (EA) was granted for the 765kV Gamma Substation and associated infrastructure on the Portion I of the Farm Uit Vlugt Fontein No. 265 with a small encroachment onto the Remainder of Farm Schietkuil No.3. in November 2007 by DEAT (Ref no: 12/12/20/873) and construction of the first phase of the Gamma Substation concluded in 2013.

The Gamma Sub-station is located on the Portion I of Farm Uit Vlugt Fontein No. 233 and the Remainder of Farm Schietkuil No 3 in the Pixley Ka Seme and Central Karoo District Municipalities and will cover an area of at least 1.5 x 1.15 km² (172 ha). In addition, an already authorised existing small corridor (approximately 400 m x 2,000 m, an area of 80 ha) is used as an access road to the R63.

The existing Gamma Substation itself covers about 1,290 m x 465 m (approximately 60 ha) (when measured in terms of the outer perimeter lines of the terraces and security fence). When fully operational, the sub-station will have five incoming EHV power lines and five 765 kV feeder power lines going out. In addition, power from the 765 kV incoming lines will also be used to boost the supplies in the existing 400 kV lines.

The following table provides a detailed description of the proposed activity of the Eskom Gamma Substation:

Table I.1. Description of Gamma Substation Site (as Assessed and Authorised- ACER, 2007)

Component	Description / Dimensions
Location of the site	Pixely Ka Seme and Central Karoo District Municipalities (Northern & Western Cape)
Farm Names	Portion I of Farm Uit Vlucht Fontein No.265 and Remainder of Farm Schietkuil No.3
Original Substation Site Area Assessed (2007)	1.5 x 1,15km ² (172 ha)
Substation Structure Area	1,290 m x 465 m (60 ha)
Access to Site	Access road to R63
Transmission lines	765kV outgoing transmission lines (6 x 400 kV feeder lines that feeds into existing 400kV power grid)
Transformers	2 EHV transformers
Reactors	5 incoming transmission lines & 5 outgoing transmission lines
Busbars	3 parallel busbars
Power out	765kV outgoing transmission lines via 2 feeds going out increasing to 5 feeds as capacity is increased
Buildings	<ul style="list-style-type: none"> • Small office • workshop areas & storage space • external storage areas • control room (high voltage monitoring) • control instrumentation & equipment
Telecommunication mast	A microwave lattice mast, between 30 and 50 m high

Presently Eskom is seeking to proceed with phase 2 of the Gamma Substation development (i.e. the construction of a 132kV/400kV substation yard within the authorised footprint of the Gamma Substation and the turn-in and turn-out infrastructure associated with the existing 400kV Droerivier – Hydra 2 OHL.), however upon consultation with the Department of Forestry, Fisheries and the Environment (DFFE), it was determined that in order to effect the changes to the authorised layout to reflect Phase 2 of the development, a Part 2 Amendment Application would need to be undertaken as the FEIR and specialist studies undertaken during 2007 (ACER), although assessed the full footprint of the Gamma Substation and specifies the phased approach of construction infrastructure did not provide sufficient information on the proposed impacts and findings associated with the addition of phase 2 (i.e. the addition of the 400kV turn-ins of the existing Droerivier- Hydra 2 powerline to the substation yard).

Table I.2. Description of Gamma Substation Site Phase I as Constructed (Authorised Ref no: I2/I2/20/873)

Component	Description / Dimensions
Location of the site	Pixely Ka Seme District Municipality (Northern Cape)
Farm Names	Portion I of Farm Uit Vlucht Fontein No.265
Original Substation Site Area Assessed (2007)	1.5 x 1,15km ² (172 ha)
Substation Structure Area	28ha
Access to Site	Access road to R63
Transmission lines	X3 existing 765kV powerline (Hydra, Perseus and Kappa) No 400kV turn-in lines
Transformers	No EHV transformers currently installed
Reactors	X4 reactors
Buildings	<ul style="list-style-type: none"> • Small office • workshop areas & storage space • external storage areas

	<ul style="list-style-type: none"> control room (high voltage monitoring) control instrumentation & equipment
Telecommunication mast	A microwave lattice mast

1.2. Purpose of the Part 2 Amendment Report & Details of the Application for Amendment

Nala Environmental has prepared this Part 2 Amendment Motivation Report in support of the amendment, application on behalf of Eskom Holdings SOC Limited (Eskom) for the existing 765kV Gamma Substation and associated powerline turn-in infrastructure located on the Farms Portion I of Farm Uit Vlucht Fontein No.265 and Remainder of Farm Schietkuil No.3 in the Pixely Ka Seme and Central Karoo District Municipalities; Western Cape and Northern Cape Provinces (Ref – 12/12/20/873).

Since the Environmental Authorisation was issued, the first phase (as per Table 1.2) of the authorised Gamma Substation commenced with construction within the validity period of the Environmental Authorisation and concluded construction on the first phase in 2013.

The holder of the EA now proposes to commence construction of the next phase (Phase 2) of the authorised substation development, specifically the development of a 132/400kV yard at the existing 765kV Gamma Substation and 400kV OHL turn-in and turn-out infrastructure, as provided for in the current EA (Ref – 12/12/20/873). The phase of the Gamma Main Transmission Substation (MTS) development that will now be implemented will consist of:

- A substation yard with a step-up voltage of 132kV/400kV on Remainder of Farm Schietkuil No. 3 and Portion I of Farm Uit Vlucht Fontein 265 as assessed and authorised within the EA; and
- In addition, the existing Eskom 400kV overhead powerline that currently bypasses the existing Gamma Substation (i.e. the "Droerivier- Hydra No. 2" 400kV OHL) will be reconfigured to turn-in and turn-out of the new substation yard-i.e. the subject of this Part 2 Amendment Application (refer to layout in Figure 1.2)

The 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686), which has been selected as a preferred bidder with a private off-taker and has been registered as a Strategic Integrated Project (SIP).

The proposed 132kV/400kV yard and 400kV OHL turn-ins fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to accommodate the updated configuration/layout now proposed to be implemented. The phase 2 substation layout falls within the scope and footprint of what was originally assessed in the original EIA process. The scope of the assessed powerline corridor for the turn-in of the existing 400kV Droerivier Hydra 2 overhead powerline to the proposed 132kV/400kV substation yard as planned had not clearly been assessed in the EIA (2007).

Following further Eskom planning related to future demand and upcoming renewable energy facilities set to come online in the near future, Eskom has considered an updated layout of the Gamma Substation to accommodate for the additional capacity.

Currently there are no 400kV turn-in lines that have been constructed for the existing phase of the Gamma Substation, with only 765kV constructed. The updated layout (Figure 1.3) will consist of the existing 400kV Hydra- Droerivier 2 overhead powerlines being reconfigured to turn-in to the new 400kV/132kV Gamma Substation yard. This is in compliance with the specifications of the FEIR (ACER,2007), and is schematically represented by the "400kV Feeder lines". As per Figure 1.3. the proposed turn-in's of the existing 400kV powerline are reflected as points as numbered 1-3 and 4-8. Once the turn-in's of the 400kV powerline has been constructed the length of the existing 400kV powerline (currently bypassing the Gamma Substation) falling within points 1-8 will be removed.

This section of the report details the amendments detailed within the Part 2 Application report and by the specialist investigations (refer to **Appendix D – J**). The amendment request is detailed below as per the numbering in the Environmental Authorisation:

1) Addition of Conditions to the EA relating to the Updated Layout (April 2023):

The Environmental Authorisation was issued for the construction of the complete Eskom Gamma Substation on Remainder of Farm Schietkuil No.3 and Portion I of the Farm Uit Vlucht Fontein No 265. The FEIR (August 2007), Page 4 indicates that “It should be noted that this EIA deals with the complete Gamma Sub-station, although the construction of individual components will be phased, as indicated by electricity demand over the next few years”. In this regard the first phase of the Gamma Substation commenced construction within the validity period of the EA and concluded in 2013. The holder of the EA now proposes to commence construction of the next phase of the authorised development, specifically the development of a 132/400kV yard at the MTS and 400kV OHL turn-ins, as provided for in the current EA. The next phase of construction activities associated with the EA is directly linked to the increased demand for grid infrastructure which is linked to upcoming Renewable Energy projects in the Northern and Western Cape Provinces. Importantly, the 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686), which has been selected as a preferred bidder with a private off-taker and has been registered as a Strategic Integrated Project (SIP).

The proposed 132kV/400kV yard and 400kV OHL turn-ins fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to reflect the updated configuration proposed to be implemented. The phase 2 substation layout falls within the scope and footprint of what was originally assessed in the original EIA process, however the scope of the assessed powerline corridor for the turn-in of the existing 400Kv Droerivier Hydra 2 overhead powerline to the proposed 132Kv/400Kv substation yard as planned had not clearly been assessed in the EIA (ACER, 2007) and is therefore being assessed as part of this Part 2 Amendment Application. In this regard, the following condition is requested to be included within the Environmental Authorisation:

“The layout titled “Gamma Substation – April 2023 Layout Map” submitted with the Part 2 Amendment Application dated April 2023 is hereby approved.”

2) Amendment to the project description on Page 3 of the Environmental Authorisation related to updated layout and coordinates of the 765kV Gamma Substation

From:

“For the construction of proposed 765kV Gamma Substation and associated infrastructure as described in the Scoping Report (SR), dated April 2007 and the Environmental Impact Report (EIR), dated August 2007.

At 31° 40' 38.802"S and 28° 24' 24.234" E and, portion I of Farm Uit Vlucht Fontein 265 and bordering the Remainder of Farm Schietkuil 3, which fall within the jurisdiction of Pixley Ka Seme Municipality of the Northern Cape Province and Central Karoo District Municipality in the Western Cape Province, hereafter referred to as “the property”.

To:

“For the construction of proposed 765kV Gamma Substation and associated infrastructure as described in the Scoping Report (SR), dated April 2007, the Environmental Impact Report (EIR), dated August 2007 and layout titled “**Gamma Substation – April 2023 Layout Map**” submitted with the Part 2 Amendment Application dated April 2023”.

At **31°40'47.37"S and 23°24'44.67"E**, Portion I of Farm Uit Vlucht Fontein 265 and bordering **the Remainder of Farm Schietkuil No. 3**, which fall within the jurisdiction of Pixley Ka Seme Municipality of the Northern Cape Province and Central Karoo District Municipality in the Western Cape Province, hereafter referred to as “the property”.

3) Amendment to the Environmental Authorisation Title:

The properties on the title page (Page 1) of the Environmental Authorisation are different to those described on Page 3 of the EA and all other references to these properties. The properties on Page 3 of the EA are correct and have been authorised as per those indicated in the FEIR 2007. It is therefore requested that title of the Environmental Authorised be corrected as follows:

From:
"Proposed construction of the 765KV Gamma Substation on the Farms Portion I of Farm Uit Vlucht Fontein No.233 and the Remainder of Farm Schietkuil No.3 in the Pixley Ka Seme and Central Karoo District Municipalities: Western Province and Northern Cape Province".

To:
"Proposed construction of the 765KV Gamma Substation on the Farms Portion I of Farm Uit Vlucht Fontein No.265 and the Remainder of Farm Schietkuil No.3 in the Pixley Ka Seme and Central Karoo District Municipalities: Western Province and Northern Cape Province".

4) Change to the name of contact person and contact details for the Holder of the Environmental Authorisation

From:

"Ms C Streaton
Eskom Holdings Limited
P O Box 1091
Johannesburg
2000
Tel: (011) 800- 5411
Fax: (011) 800-3917"

To:

"Ms Martina Phiri
Eskom Holdings SOC Limited
P O Box 1091
Johannesburg
2000
Tel: 011 800 3550
Email: PhiriM@eskom.co.za"

1.3. Expertise of Environmental Assessment Practitioner

Nala Environmental Pty (Ltd) has considerable experience in the undertaking of EIAs, including part 1 and part 2 EA amendment processes. Staff and specialists who have worked on this project and contributed to the compilation of this report are detailed in Table 1.3 below:

Table 1.3: Project Team

Name and Surname	Organisation	Specialist Study
Environmental Assessment Practitioners		
Arlene Singh	Nala Environmental	Environmental Assessment Practitioner (SACNASP) (EAPASA)

Norman Chetsanga	Nala Environmental	Environmental Assessment Practitioner (SACNASP)
Justin Jacobs	Nala Environmental	Junior Environmental Consultant
Nadeemah Docrat	Nala Environmental	Intern Environmental Consultant
Vanessa Zwane	Nala Environmental	Intern Environmental Consultant
Specialists (2023)		
Andrew Husted/ Leigh-Ann Wet	The Biodiversity Company	Avifauna Comparative Assessment (2023)
Andrew Husted/ Leigh-Ann Wet	The Biodiversity Company	Ecological & Biodiversity Comparative Assessment (2023)
Andrew Husted/ Leigh-Ann Wet	The Biodiversity Company	Soil and Agric Potential Comparative Assessment (2023)
Andrew Husted	The Biodiversity Company	Aquatic Comparative Assessment (2023)
Nikki Mann	PGS Heritage (Pty) Ltd	Heritage and Palaeontology Comparative Assessments (2023)
Elize Butler	Banzai Environmental (Pty) Ltd	Palaeontology Assessments (2023)
Tosca de Villiers/ Bryony van Niekerk	Nuleaf Planning and Environmental (Pty) Ltd	Visual Comparative Assessment (2023)
Specialists (2007)		
Mr M Klawijk	Cave Klapwijk and Associates	Visual Impact Assessment
Dr D Schael	Centre for African Conservation Ecology (Nelson Mandela Bay Metropolitan University)	Wetland Specialist Study
Mr F Serton	Masise Consulting Engineers cc	Transport Assessment
Mr Johan van der Walt	Ntshebe Consulting	Social and socio-economic Impact Assessment
Mr J Smallie	Endangered Wildlife Trust	Avifauna Assessment
Ms M. Landman, Prof G Kerley and Dr A Boshoff	Centre for African Conservation Ecology (Nelson Mandela Bay Metropolitan University)	Ecological & Biodiversity Assessment
Mr P Hansmeyer	Engeolab	Geotechnical Assessment
Ms B Wahl and Mr L van Schalkwyk	eThembeni Cultural Heritage	Heritage Impact Assessments
Dr D Tapson	David Tapson Consultants	Land Use Assessment
Prof E Campbell	Centre for African Conservation Ecology (Nelson Mandela Bay Metropolitan University)	Vegetation Assessment

The change in the update to the layout is not expected to have any effect on the findings of the Geotechnical Assessment, Traffic Assessment, Socio-Economic Assessment and Land use Assessment undertaken as part of the original EIA process undertaken in 2007 as this proposed infrastructure had already been planned for. Therefore, no geotechnical, traffic, socio-economic and land use specialist input and reports have been included as part of this motivation report.

* It must be noted that the original specialists who undertook the EIA studies (ACER, 2007) have been used for these assessments as far as possible. However, where the original specialists were not available for whatever reason, suitably qualified and experienced specialists have been used to provide an assessment of the proposed amendments.

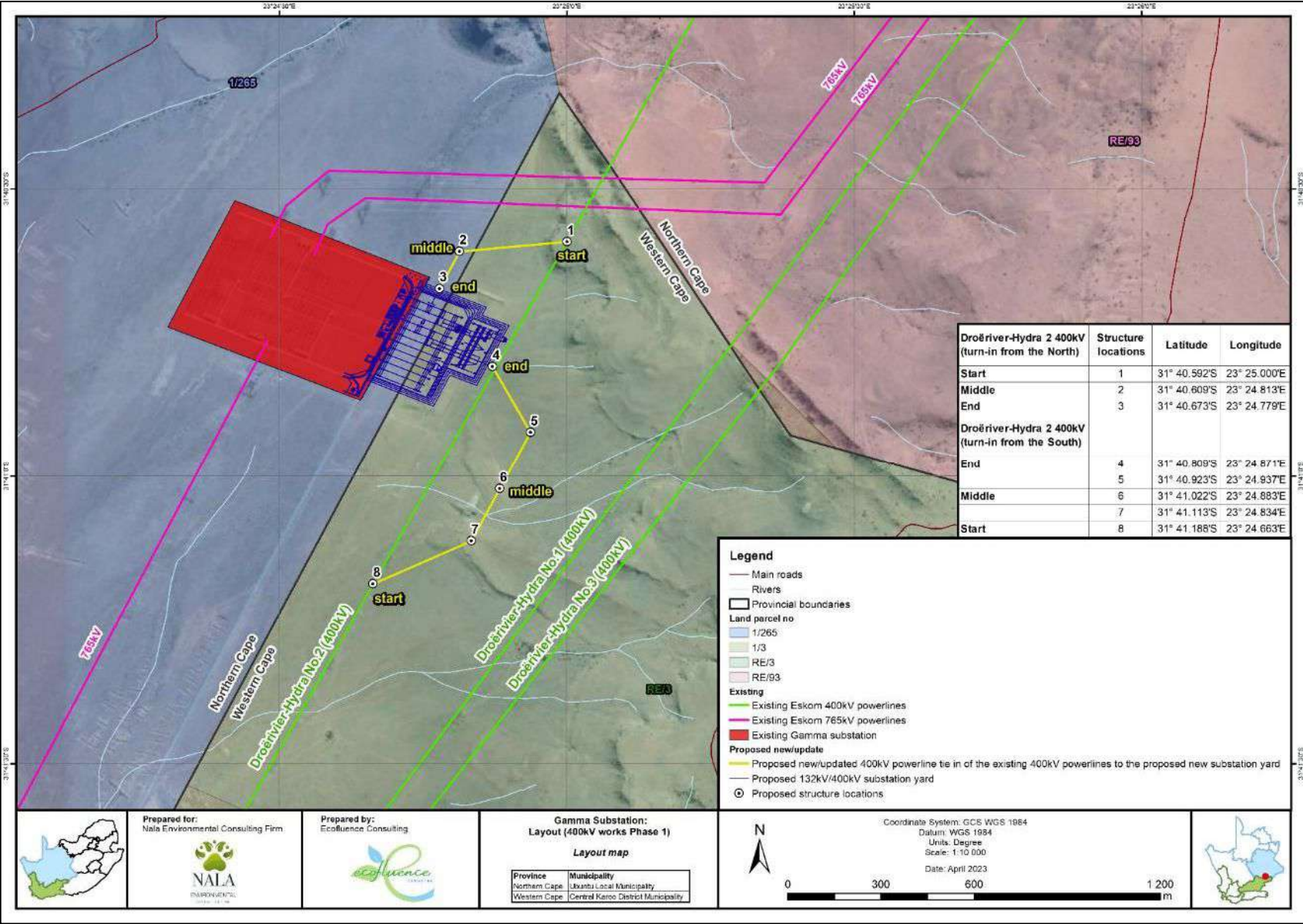


Figure 1.3: Updated layout of the 765kV Gamma Substation and associated Infrastructure (April 2023)

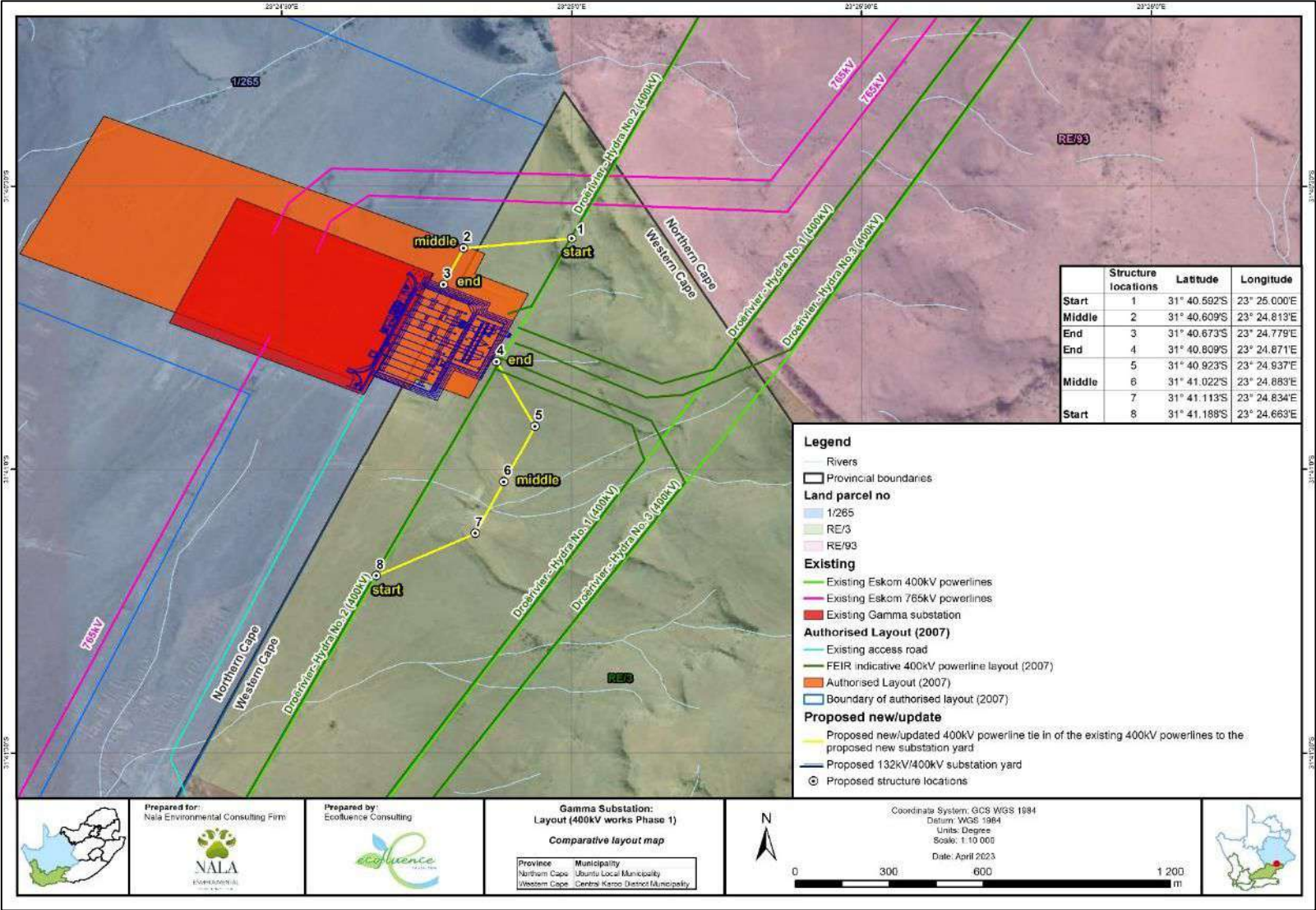


Figure 1.4. Comparative Map of the Authorised Gamma Substation Layout, including the existing Gamma Substation and the proposed addition of the substation yard and turn-in infrastructure (April 2023)

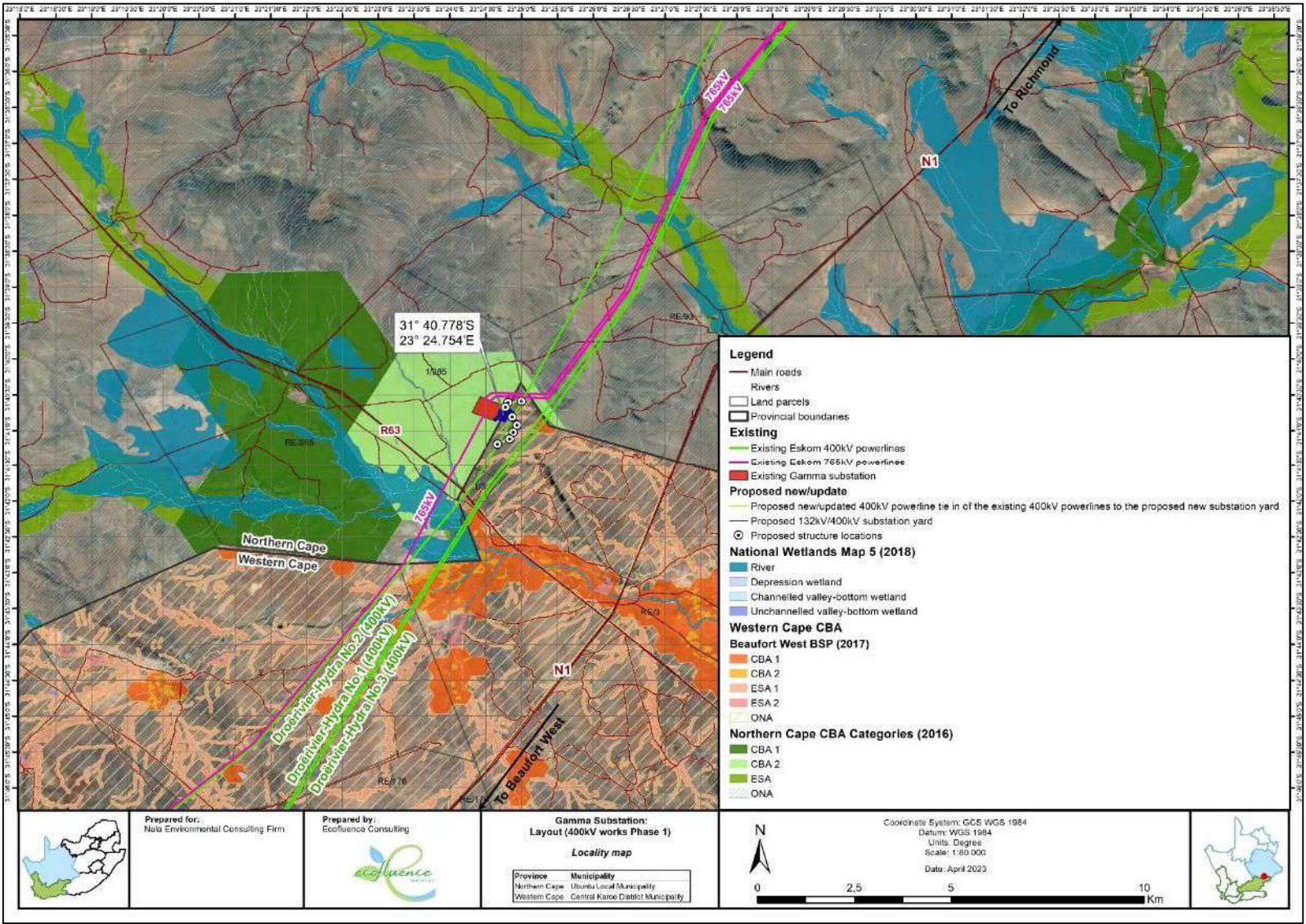


Figure 1.5: Locality map of the 765kV Gamma Substation and associated Infrastructure (April, 2023)

SECTION 2 - MOTIVATION FOR THE PROPOSED AMENDMENTS

Motivation for Amendment for the updating of the layout of the existing 765kV Gamma Substation and associated powerline turn-In Infrastructure.

The motivation for the update to the layout of the Gamma Substation will facilitate the connection of the authorized Umsinde Emoyeni Wind Energy Facility (DFFE REF: 14/12/16/3/3/2/686) which has been registered as a SIP including facilitate construction of Phase 2 of the development that had originally been planned as described in the EIA report (ACER, 2007).

1) Addition of Conditions to the EA regarding the Updated Layout (April 2023)

In 2007, an Environmental Authorisation was issued for the Gamma Substation located on Portion 1 of Farm Uit Vlucht Fontein No. 265 and the Remainder of Farm Schietkuil No.3, Northern Cape & Western Cape Province. As per the FEIR (2007), the project timeframes indicate that in order to meet the expected electricity demand, the Gamma Substation would be developed in phases as required by growth in electricity demand (Page 24 of the FEIR). The Environmental Authorisation for the Gamma Substation and associated infrastructure was issued by the Department of Environment and Tourism (now the Department of Forestry, Fisheries and the Environment) on the 19 November 2007 (Ref: 12/12/20/873) and layout as submitted with the FEIR (2007) approved.

Since the Environmental Authorisation was issued, the first phase of the authorised Gamma Substation commenced with construction within the validity period of the Environmental Authorisation and concluded construction on the first phase in 2013.

The holder of the EA now proposes to commence construction of the next phase of the authorised substation development, specifically the development of a 132/400kV yard at the MTS and 400kV OHL turn-ins, as provided for in the current EA. The phase of the Gamma MTS development that will now be implemented will consist of:

- A substation yard with a step-up voltage of 132kV/400kV on the Remainder of Farm Schietkuil No.3 and Portion 1 of Farm Uit Vlucht Fontein 265; and
- In addition, the existing Eskom 400kV overhead powerline that currently bypasses the existing Gamma Substation (i.e. the "Droerivier- Hydra No. 2" 400kV OHL) will be reconfigured to turn-in and turn-out of the new substation yard (refer to layout on Figure 1.1).

The above components are represented by the "400 Yard Phase I" and "400kV Feeder Lines" (turn-ins) shown in the schematic diagram below (Figure 2.1), extracted from the original FEIR (2007). The next phase of construction activities associated with the EA is directly linked to the increased demand for grid connection capacity which is linked to upcoming Renewable Energy projects in the Northern Cape and Western Cape Provinces. Importantly, the 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686), which has been selected as a preferred bidder with a private off-taker and has been registered as a Strategic Integrated Project (SIP).

The proposed 132kV/400kV yard and 400kV OHL turn-ins fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to accommodate the updated configuration/layout now proposed to be implemented. The updated layout falls within the scope and footprint of what was originally assessed in the original EIA process.

Following further Eskom planning related to future demand and upcoming renewable energy facilities set to come online in the near future, Eskom has considered an updated layout of the Gamma Substation to accommodate for the additional capacity.

The updated layout (April 2023 as per Figure 2.3) falls within the assessed properties in the FEIR (2007) and related specialist studies and as authorised within the Environmental Authorisation (Ref:12/12/20/873). however, the scope of the assessed powerline corridor for the turn-in of the existing 400kV Droerivier Hydra 2 overhead powerline to the proposed 132kV/400kV substation yard as planned had not clearly been assessed in the EIA (ACER, 2007). Therefore, a Part 2 Amendment Application has been undertaken to assess the proposed update to the authorised layout to ensure that all environmental impacts have now been adequately assessed.

The updated April 2023 layout consists of the following infrastructure to accommodate for the next phase of the development:

- The layout is located on Portion I of the Farm Uit Vlugt Fontein 265 and bordering the Remainder of Farm Schietkuil No.3 and consists of a substation yard with a step-up voltage of 132kV/400kV, that borders the Remainder of Farm Schietkuil No.3 and 400kV turn-in infrastructure.
- In addition, the existing Eskom 400kV overhead powerline that currently bypasses the existing Gamma Substation will be reconfigured to turn-in and turn-out of the new substation yard. (Refer to Figure 2.3).

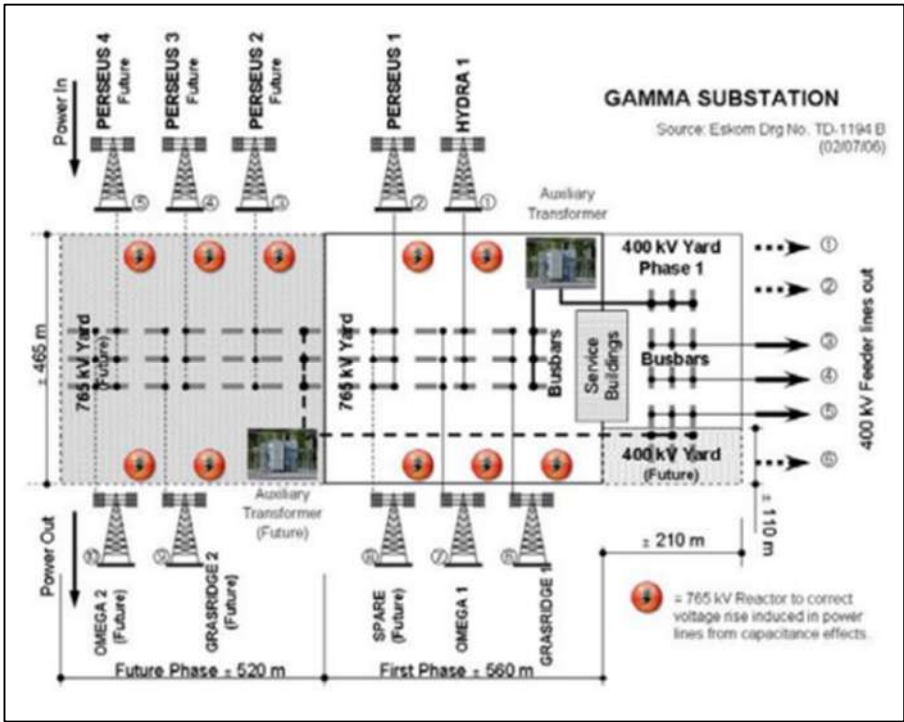


Figure 2.1: Schematic diagram of the proposed Gamma Substation layout, indicating 6 x 400kV incoming/out-going lines (turn-in lines as per the EIA, 2007).

The FEIR (2007), Page 16, indicates that “there will also be turn in lines from the existing 400kV lines to the substation”.

Currently there are no 400kV turn-in lines that have been constructed for the existing phase of the Gamma Substation, with only 765kV constructed. The updated layout (Figure 2.3) will consist of the existing 400kV Hydra- Droerivier 2 overhead powerlines being reconfigured to turn-in to the new 400kV/132kV Gamma Substation yard. This is in compliance with the specifications of the FEIR (2007) and is schematically represented by the “400kV Feeder lines” shown in the above image.

Footprint of the Authorised Gamma Substation:

According to the FEIR (2007), Page 16, “When finally completed, the substation itself will cover about 1 290m x 465m (approximately 60ha) (when measured in terms of the outer perimeter lines of the terraces and security fence).”

The footprint of the already constructed first phase of the existing Gamma Substation is approximately 28 ha. The 132kV/400kV yard that will now be implemented is approximately 14ha, within the already authorised Gamma substation footprint.

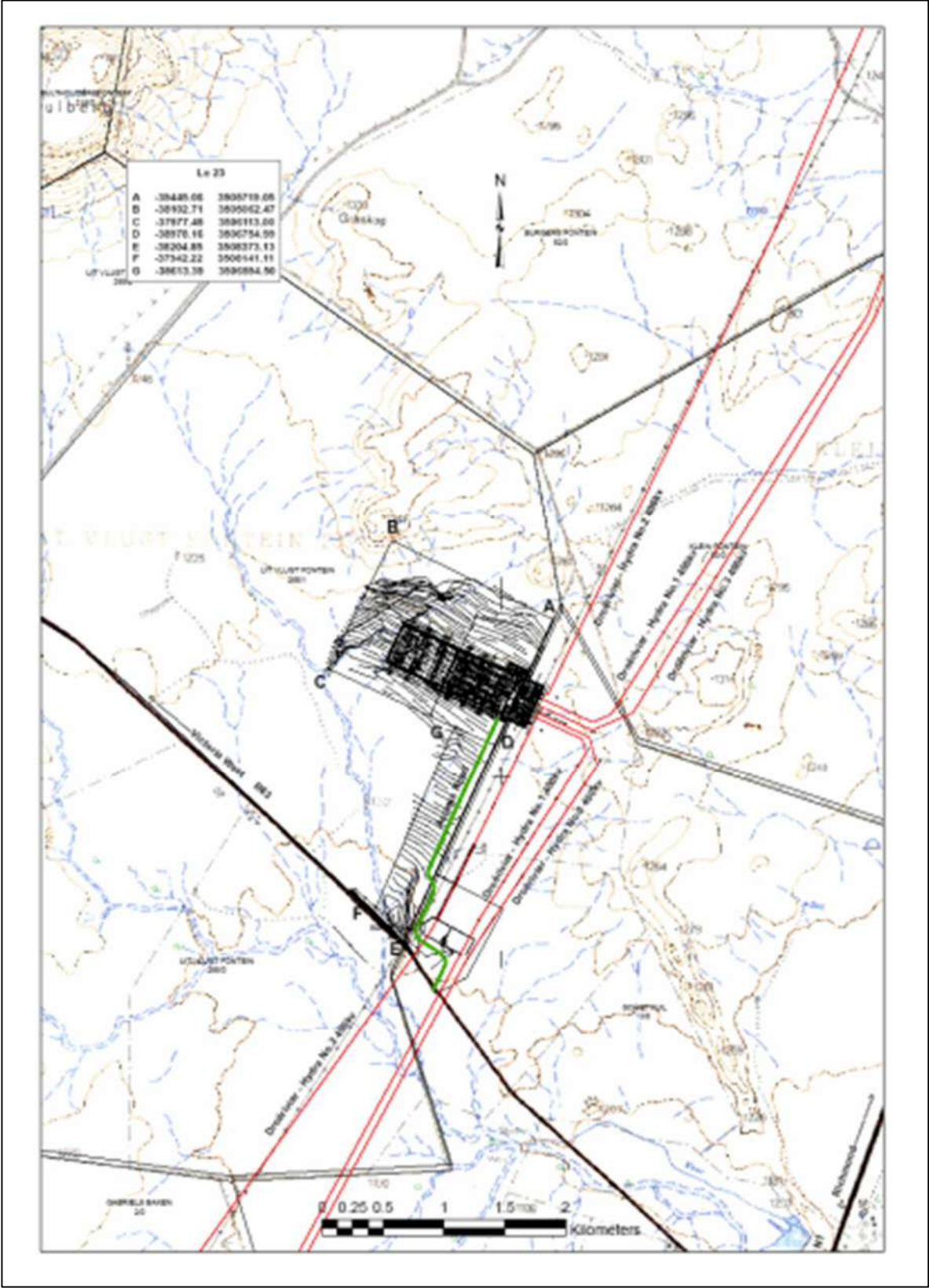


Figure 2.2. The layout of the 765kV Gamma Substation as authorised as per the FEIR (2007)

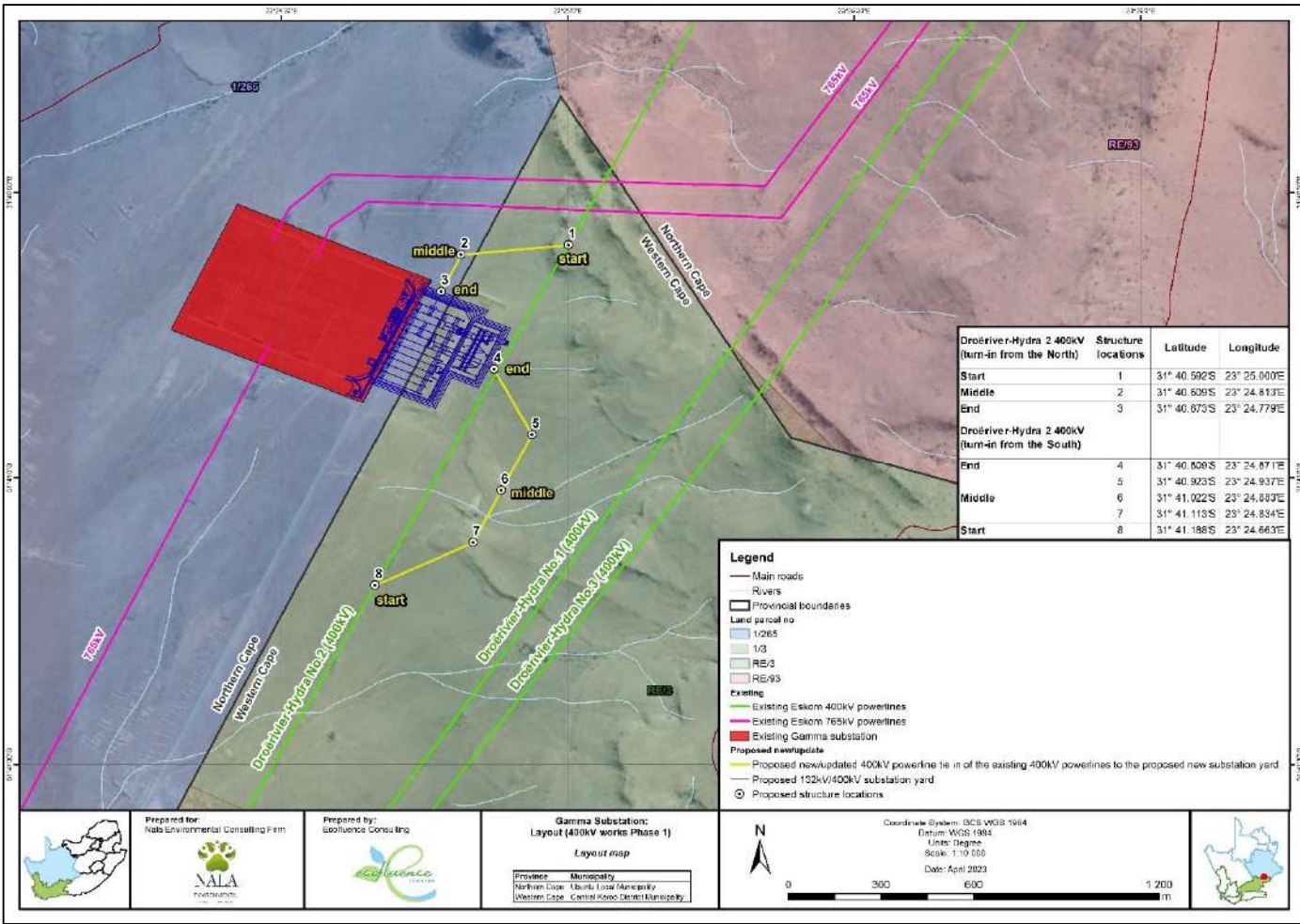


Figure 2.3. Proposed Updated Layout depicting the existing Gamma Substation with the next phase of the authorised development now proposed for implementation (new proposed 132kV/400kV Substation yard and new reconfigured turn-in and turn-out of the existing 400kV powerline).

The footprint of the original layout is still aligned with the updated February 2023 layout submitted with this amendment application and makes provision for the substation yard that encroaches onto the Remainder of Farm Schietkuil No.3:



The figure 2.5 above depicts the layout of the 132kV/400kV yard that will be developed within the authorised footprint of the Gamma Substation, as well as the 400kV tie-ins (turn-in / turn-out) infrastructure. The Orange outline indicates the encroachment of the proposed substation yard and 400kV turn-in and turn-out infrastructure on the Remainder of Farm Schietkuil No.3 as assessed and authorised within the FEIR (2007).

In order demonstrate that the updated layout (April 2023) and the originally approved layout (FEIR 2007) are aligned and have been fully assessed and that the Updated Layout (April 2023) falls within the scope of Environmental Authorisation, the following table has been established:

Table 2.1: Summary of project description

	Approved Layout (FEIR, 2007)	Existing/Constructed Gamma Substation (Phase 1)	Updated Layout (February 2023) (Phase 1 & 2)
Substation Footprint	60ha	~28 ha	~42 ha
Properties Assessed	<ul style="list-style-type: none"> Portion I of the Farm Uit Vlugt fontein No.265 The Remainder of Farm Schietkuil No.3 	<ul style="list-style-type: none"> Portion I of the Farm Uit Vlugt Fontein No.265 The Remainder of Farm Schietkuil No.3 	<ul style="list-style-type: none"> Portion I of the Farm Uit Vlugt Fontein No.265 The Remainder of Farm Schietkuil No.3
Incoming and outgoing powerlines (765kV):	X5 765kV Power lines	X3 existing lines (Hydra, Perseus and Kappa)	X3 existing lines (Hydra, Perseus and Kappa), no new 765kV power lines
Transformers	X2 EHV transformers	No transformers currently installed	X1 transformer to be installed
Reactors	10 reactor units (five on the incoming and five on the outgoing transmission lines)	X3 reactors	X4 reactors (existing) X1 busbar reactor X3 132kV fault limiting reactors
400kV Turn-in lines	X6 400kV incoming/outgoing lines (turn-in and turn -out lines)	No 400kV turn-in lines	Existing 400kV Hydra-Droerivier 2 OHL to be reconfigured to turn-in to the new 400kV/132kV yard.

The updated layout (April 2023) complies with the authorised project specifications of the EA and FEIR (2007), and complies with the original assessed and authorised layout in terms of the following:

- The updated layout falls within the authorised footprint of the originally assessed layout in the FEIR (2007) and still falls within the authorised properties i.e. Portion I of the Farm Uit Vlugt Fontein No.265 and The Remainder of Farm Schietkuil No.3; however the scope of the assessed powerline corridor for the turn-in of the existing 400Kv Droerivier Hydra 2 overhead powerline to the proposed 132kV/400kV substation yard as planned had not clearly been assessed in the EIA (ACER, 2007) and has been assessed as per this Part 2 Amendment Application; No new additional infrastructure has been included within the Updated Layout that will trigger the requirement for new listed activities, or a change in the scope of the EA. All approved infrastructure as indicated in the table above indicates that the updated layout is in compliance with the EA and FEIR (2007);
- The updated layout is aligned with FEIR (2007) in that it had been envisioned that development would be undertaken in phases based on the demand in the future:

- Specialist studies undertaken as part of the FEIR (2007), i.e. Avifauna Impact Assessment, Faunal Impact Assessment, Heritage Impact Assessment and Wetland Impact Assessment have all considered the footprint of the original layout (i.e. 60ha) indicating that the updated layout (April 2023), with a smaller footprint of ~42 ha has been fully assessed and all impacts associated with the Gamma Substation and future development within this footprint have been determined and mitigated for within this Motivation report and Generic EMPs. The change in the update to the layout is not expected to have any effect on the findings of the Geotechnical Assessment, Traffic Assessment, Socio-Economic Assessment and Land use Assessment undertaken as part of the original EIA process undertaken in 2007 as this proposed infrastructure had already been planned for. Therefore, no geotechnical, traffic, socio-economic and land use specialist input and reports have been included as part of this motivation report; and
- The 400kV OHL turn-in of the existing 400kV Droerivier-Hydra No. 2 OHL remains within Eskom's existing servitude rights on the property.

2) Amendment to the project description on Page 3 of the Environmental authorisation related to the updated layout and co-ordinates of the 765kV Gamma Substation

The update to the project description is aligned with the changes to the layout (As the activities have already been authorised in the EA and the planned phased construction of the substation yard and associated turn-in infrastructure is located within the assessed properties a Part 2 amendment application is proposed to be undertaken for the update of the layout of the existing Gamma Substation to include the 132kV/400kV substation yard and allow for the existing 400kV Droerivier Hydra 2 powerline turn-in to the substation yard and subsequently the description on page 3 of the EA)

In addition, the co-ordinates included in the EA appears to be incorrect, as it relates to a location >100km away from the assessed and approved Gamma MTS location.

3) Amendment to the Title of the Environmental Authorisation

The properties on the title page (Page 1) of the Environmental Authorisation are different to those described on Page 3 of the EA and all other references to these properties. The properties on Page 3 of the EA are correct and have been authorised as per those indicated in the FEIR 2007). The title page is required to be updated to reflect the authorised and assessed properties related to the Gamma Substation.

4) Change to the name of contact person and contact details for the Holder of the Environmental Authorisation

Ms C Streaton is no longer an employee of the applicant, Eskom Holdings SOC Limited. Ms Martina Phiri is now the contact person for the applicant (attached also is the Delegation of Authority of Martina Phiri).

In overview, the applicant is applying to amend and update the layout of the existing Gamma Substation as it was identified that the layout of the authorised infrastructure was not updated to accommodate the updated configuration/layout now proposed to be implemented. This is needed in order to commence construction of the next phase of the authorised substation development, specifically the development of a 132/400kV yard at the MTS and 400kV OHL turn-ins, as provided for in the current EA as it is directly linked to the increased demand for grid connection capacity which is linked to upcoming Renewable Energy projects in the Northern and Western Cape Provinces. Importantly, the 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686), which has been selected as a preferred bidder with a private off-taker and has been registered as a Strategic Integrated Project (SIP).

SECTION 3- CONSIDERATIONS IN TERMS OF THE REQUIREMENTS OF THE EIA REGULATIONS

In terms of Regulation 31 of the EIA Regulations 2014 (as amended on 07 April 2017 and 13 July 2018), an environmental authorisation may be amended by following the process in this Part (i.e., a Part 2 amendment) if it is expected that the amendment may result in an increased level or change in the nature of impact where such level or change in nature of impact was not:

- a) Assessed and included in the initial application for environmental authorisation; or
- b) Taken into consideration in the initial authorisation.

In this instance, the proposed 132kV/400kV yard and 400kV Overhead Lines (OHL) turn-ins fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to accommodate the updated configuration/layout now proposed to be implemented. As per the EIR (ACER, 2007), it was indicated that Eskom would purchase an area of approximately 172ha (consisting of properties Portion 1 of the Farm Uit Vlucht Fontein No.265 and Remainder of the Farm Schietkuil No.3) on which the Gamma Substation would be constructed with a footprint of 60ha of the 172ha. The EIR (ACER, 2007) further indicates that there will also be turn-in lines from the existing 400kV lines to the substation that will have their own servitudes (Page 16, EIR), i.e., 55m in width (27,5m on either side of the centre line). The FEIR, 2007 indicates that the Gamma Sub-station makes provision for six 400 kV feeder lines going out that can feed into the existing 400 kV power grid. Three of these feeds will be commissioned during the initial construction phase of the work. Three will be added later as the demand for power increases and the feed to the 400 kV grid has to be increased proportionately (Page 20 of the EIR, 2007), however the three feeds were not commissioned during the initial construction works which concluded in 2013.

Subsequently, the aim of this amendment is to undertake the inclusion of the substation yard (which falls within the existing authorised footprint of the Gamma Substation) and to realign the existing 400kV Hydra- Droer Rivier -Hydra 2 power line to now turn into the proposed substation yard, as was originally planned (Figure 2.4) during the initial phase of construction. A Part 1 amendment was undertaken In 2022 to update the wording in the EA to refer to the updated layout, however, DFFE has indicated that the EIA (ACER, 2007) and the related specialist studies undertaken were not detailed enough for them to determine if the corridor to accommodate the turn-in of the existing 400kV powerlines to the proposed substation yard was assessed in the original assessments undertaken in 2007.

The Part 2 Amendment report, inclusive of this motivation report integrates comparative specialist assessments (between the findings of the specialist studies undertaken in 2007 and the specialist site verification undertaken in 2022 and assessments undertaken in 2023) to indicate the current site sensitivity and assesses the impacts associated with the proposed 400kV powerline turn-in to the substation yard. No additional properties will be affected by the amendments as the proposed amendment is within the originally assessed and authorised development footprint and all other associated infrastructure will remain the same as originally assessed.

3.1. SITE VERIFICATION AND NEW GUIDELINES/PROTOCOLS

The proposed development falls within the Renewable Energy Development Zone II (REDZ) (Government Notice No. 44191 Government Gazette No. 142 dated 26 February 2021) i.e., the Beaufort West REDZII, and within the Electrical Grid Infrastructure corridors (EGI) (namely the Central Corridor as per in Government Gazette 41445, Government Notice 113). Where required, specialists have taken into consideration the Protocol for the specialist assessment and minimum report content requirements for environmental impacts (Government Gazette No 43855, 30 October 2020).

Although the Protocols for Specialist Assessment and Minimum Report Content Requirements, as per Government Gazette No.43855, are not applicable to Amendment Applications, these have been considered for the project based on the fact that the EA was received in 2007 (i.e., a considerable amount of time has passed since the original EIA process was undertaken) and because the latest data from the DFFE Screening Tool should be used to verify the findings of the specialist assessments undertaken where the layout incorporating the layout with the grid turn in and turn out is requested to be

approved. At the time of the EIA, which was undertaken in 2007 (ACER, Africa), the 2010 EIA Regulations promulgated in terms of Chapter 5 (NEMA) and which came into effect on 2nd August 2010 were not considered, and the Protocols for Specialist Assessment and Minimum Report Content Requirements (as per Government Gazette No. 43855 of 30 October 2020) were also not in effect and were thus not considered for the development. The various specialist have taken the specialists protocols into account to ensure that all the relevant legislation has been accounted for and considered in these assessments. Had a new Scoping and EIA process been considered for the project under the 2014 EIA Regulations (as amended), the relevant specialist protocols would need to be considered by the EAP and the various specialists.

Due to the considerable amount of time that has passed since the original EIA process was undertaken, it would be preferable to verify the findings of the specialist assessments undertaken, taking the findings of the DFFE Screening Tool as well as all potentially applicable legislation and/or guidelines into consideration. This involved the undertaking of site sensitivity verifications (where it was advised this was required) and adherence to the Protocols for Specialist Assessments and Minimum Report Content Requirements (where applicable). Therefore, even though the specialist protocols are technically not applicable, the EAP and specialists deemed this the best way to verify the findings of the specialist assessments undertaken for the proposed layout to be adequately assessed and approved.

In light of the above, a summary of the findings of the DFFE Screening Tool has been considered below and within the relevant specialist comparative assessments undertaken as part of the amendment process, for consideration.

Biodiversity (Fauna & Flora): Following current legislation, an assessment of the site would have required compliance with the gazetted Species Protocols.

(https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Terrestrial_Biodiversity_Assessment_Protocols.pdf) as per Government Gazette No 43110, 20 March 2020. A Screening Tool report for the site shows that Terrestrial Biodiversity, have Very high sensitivity. This would need to be confirmed by an on-site field verification, followed by a Site Sensitivity Verification. The terrestrial biodiversity screening theme sensitivity for the area is 'Very High', due to the presence of CBA 2. The assessment (2023) determined the sensitivity of the degraded shrubland habitat to be 'Medium', whereas the Limestone habitat was rated with a High SEI. Thus, the following is concluded: Presently there are natural habitats within the assessment area that possess a High and Very High SEI. This is due to the combination of their functional integrity and conservation importance. The classification of the screening tool was considered to be accurate as far as the impact of the proposed powerline, substation and associated infrastructure is concerned based on actual conditions recorded on the ground during the site visit of March 2022, April 2022 and August 2022.

Avifauna: The assessment area was identified with the screening tool as possessing a High and Medium sensitivity within a Faunal context. The Gamma Substation occurs in an area with a High sensitivity. Presently there are natural habitats within the assessment area that possess a High and Very High SEI. This is due to the numbers and density of avifaunal SCC i.e. the presence of a Verreaux Eagle nest within a pylon structure of an existing 400kV OHL to the east of the gamma Substation. The classification of the screening tool was considered to be largely accurate for most of the grid route however, much of the grid route (assigned Medium sensitivity) should be assigned a higher sensitivity (High) due to the number and density of SCC. The sensitivity of the Gamma substation was considered to be accurate at a High sensitivity with the surrounds a Very High sensitivity.

Aquatic: The outcome of the screening tool indicated a Low sensitivity rating for the aquatic biodiversity theme. A baseline assessment (2022) determined the sensitivity of the local watercourses to be 'Medium'.

Soil & Agricultural Potential: The desktop agricultural theme sensitivity according to the screening tool for the site area is 'medium'. A compliance statement assessment confirmed the 'Low' classification of the Gamma substation area (April 2022), which was then confirmed by the Sensitivity Verification (October 2022).

Visual: No specific mention to visual impact sensitivity was made in the DFFE screening tools generated for the proposed amendments to the Gamma Substation (i.e., Substation extension and 400kV powerline turn-in).

Palaeontology: According to the screening tool the proposed development has a Very High (dark red) Palaeontological Sensitivity. A few weathered loose vertebrate fossils were uncovered during the 2022 winter walkdown of the development footprints. These fossil finds were expected as the surrounding area of the developments are known to be highly fossiliferous as almost 2000 fossils have been collected by research teams in the past. This classification is thus confirmed to be accurate (National Environmental Web-bases Screening Tool and SAHRIS) as far as the impact of the proposed powerline, substation and associated infrastructure is concerned, based on actual conditions recorded on the ground during the site visit in the winter months of 2022.

Heritage: According to the DFFE Screening Tool the proposed development has a Low sensitivity rating as confirmed by the specialist site sensitivity verification undertaken in 2022.

The change does not however, on its own, constitute a listed or specified activity. Therefore, the application is made in terms of Regulation 31(b).

Table 3.1 Summary of information provided for the Part 2 Amendment Process:

Information Provided	Applicable Section
A detailed motivation as to why the Department should authorise the updated layout and amendments relayed to the updated layout, including the advantages and disadvantages associated with the approval or refusal to the request for the update to the authorised layout.	Section 2
Provision of the updated layout of the authorised infrastructure to accommodate the updated configuration/layout now proposed to be implemented	Section 1, Figure 2.3
You are also required to provide a Map which depict the proposed powerline reconfigurations in relation to the existing 400kV powerlines, the length of the sections of powerline to be reconfigured, and their respective geographic coordinates (the start, middle and end points of both the east and west reconfiguration).	Section 1, Figure 2.3
The current status of the assessed environment (social and biophysical) (by the relative specialist, if applicable);	Section 4
A review of all specialist studies undertaken, and a detailed assessment, including a site verification report providing an indication of the status of the receiving environment (by the relative specialist, if applicable);	Section 4, Appendices D-J
The terms of reference for the specialist reports and declaration of interest of each specialist must be provided;	Section 9 and Appendix K
Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.	Section 4
The report mentioned above, must indicate if the impact rating as provided in the initial assessment remains valid; if the mitigation measures provided in the initial assessment are still applicable; or if there are any new mitigation measures which need to be included into	Section 4

the EA, should the request to extend the commencement period be granted by the Department	
An indication if there are any new assessments/guidelines which are now relevant to the authorised development which were not undertaken as part of the initial assessment, must be taken into consideration and addressed in the report	Section 3
Cumulative impacts significance rating to inform the need and desirability of the proposed development.	Section 4
A cumulative impact environmental statement on whether the proposed development must proceed.	Section 4
A description and an assessment of the surrounding environment, in relation to new developments or changes in land use which might impact on the authorised project, the assessment must consider the following: similar developments within a 30km radius;	Section 4
A description and an assessment of any changes to the environment (social and biophysical) that has occurred since the initial EA was issued;	Section 4
The Public Participation Process must be conducted in terms of Chapter 6 of the EIA Regulations, 2014 as amended.	Section 8
A comments and response report.	Appendix C7

SECTION 4- POTENTIAL FOR CHANGE IN THE SIGNIFICANCE OF IMPACTS AS ASSESSED IN THE EIA (ACER, 2007) AS A RESULT OF THE PROPOSED AMENDMENT (2023)

Following communication, with the DFFE it was advised that this application is considered to be a Part 2 amendment as contemplated in terms of Regulation 32 of the EIA Regulations (2014, as amended on 07 April 2017 and 13 July 2018), as amended. In terms of Regulation 32(1)(a)(i), the following section provides an assessment of the impacts related to the proposed change. Understanding the nature of the proposed amendments and the impacts associated with the project, the following has been considered:

- » Avifauna Comparative Assessment
- » Ecological & Biodiversity Comparative Assessment
- » Soil and Agricultural Potential Comparative Assessment
- » Aquatic Comparative Assessment
- » Heritage Comparative Assessment
- » Palaeontology Comparative Assessment
- » Visual Comparative Assessment

The activities associated with the update to the layout for the Gamma substation i.e., the proposed 132kV/400kV yard and 400kV DHL turn-ins is expected to have **no effect** on the findings of the geotechnical, social and socio-economic, land-use and transportation specialist assessments undertaken as part of the FEIR (ACER, 2007) or subsequent amendments. Therefore, no geotechnical, social and socio-economic, land-use and transportation assessments have been included as part of this motivation report.

The potential for change in the significance and/or nature of impacts based on the proposed amendments as described within this motivation report is discussed below and detailed in the specialists' assessments (as applicable) contained in **Appendix D-J**¹. Additional mitigation measures were recommended as a result of the proposed amendment and have been included within the Generic EMPRs (**Appendices L & M**) and in this motivation report (section 6) as well. This section of the main report must be read together with the specialist reports contained in **Appendix D-J** for the reader to obtain a complete understanding of the proposed amendments and the implications thereof. **It must be noted that the appointed specialists to undertake the comparative assessment associated with this Part 2 Amendment process have been involved in the impact assessment for the Emoyeni Grid Infrastructure, for a Basic Assessment process that was undertaken (DFFE Ref: 14/12/16/3/3/1/2626), the final Basic Assessment report was submitted to the DFFE for decision making on the 26 January 2023 and authorised on 15 March 2023. The Emoyeni Grid Basic Assessment consisted of grid corridor that has been assessed by these same specialists which included the proposed Gamma Substation Yard and proposed 400kV turn-in footprint as proposed in this amendment. Therefore, the appointed specialists have based their comparative assessments on the site sensitivity verification's undertaken in 2022 as these have been undertaken recently and include the footprints associated with the proposed Part 2 Amendment. Note: The Emoyeni Grid Basic Assessment, has assessed a 400m grid corridor spanning from the authorised Umsinde Emoyeni and Khangela Emoyeni Wind Energy Facilities to the existing Gamma Substation and assessed a 1,92km² extended corridor at the Gamma Substation site to assess turn-in of the existing powerline to the Gamma Substation site. Therefore, the entire footprint of the Gamma Substation yard including the proposed turn-in of the existing 400kV Droerivier- Hydra 2 Powerline has been assessed and site sensitivity verifications undertaken as per the results of the DFFE Screening Tool. The site sensitivity verification reports have been appended to the comparative assessments. All specialist assessment undertaken comply with the protocols and the certified copies of specialist declarations are attached as Appendix K of this report.**

¹ It must be noted that the original specialists who undertook the EIA (2007) studies have been used for these assessments as far as possible. However, where the original specialists were not available for any reason, suitably qualified and experienced specialists have been used to provide an assessment of the proposed amendments.

4.1. Aquatic Assessment Site Description and Findings

The aquatic ecology study as part of the Environmental Authorisation (EA) process (DEA REF. NO. 12/12/20/873) could not be reviewed by The Biodiversity Company (TBC) because it could not be made available for use in comparison. Dr DM Schael of African Conservation Ecology only provided a letter for the wetland study in 2007. TBC however conducted a site assessment in April 2022, followed by a Sensitivity Verification in October 2022 and thus the TBC, 2022 assessment report was subsequently used for comparative purposes.

Associated site visits were conducted in March 2022, April 2022 and August 2022. The site assessments and site verifications undertaken in 2022 by TBC were therefore used as the most recent source of information for the purposes of this amendment. The aquatic assessment (Appendix D) undertaken for the proposed amendments included the review and assessment of the original report and data, as well as the update of any previously assessed impacts and updated mitigation measures, where required.

The aquatic ecology assessment completed in 2007 as part of the Environmental Impact Assessment (EIA) undertaken by ACER for the proposed Construction of the 765 KV Gamma Substation on the farms Portion I of Farm Uit Vlugt Fontein and the Remainder of Farm Schietkuil No.3 in the Western Cape and Northern Cape (DEA REF. No. 12/12/20/873), was not available for review and consideration for this amendment as it could not be located.

The intended update to the authorised Gamma substation layout, although within the scope of the current EA, must be reviewed by respective specialists in order to ascertain whether conditions on site have changed since the original EIA (ACER, 2007).

The letter submitted to Acer in 2007 by aquatic ecologist Dr DM Schael states the following:

Upon review (based on an aerial survey on 14 February 2007 and a ground survey on 17 May 2007) of the proposed areas for the Gamma Sub-station (Portion I of Uit Vlugt Fontein No. 233 and the Remainder of Farm Schietkuil No. 3) it appears that there are **no wetland or riverine areas that will be directly impacted by the construction and operation of the planned sub-station**. The probability that a wetland or riverine area would be impacted is **low** at a medium confidence level.

Findings from the Site Ecological Importance description from the 2022 Aquatic Ecology Assessment Report (M Ryan and A Husted, 2022) which included the assessment of the proposed Gamma substation yard and the 400kV powerline turn -in footprint (see figure 4.1 below) presented the following:

- Two habitat units were identified and delineated for the project, including both perennial and ephemeral watercourses.
- The aquatic theme sensitivity was determined to be '**medium**' for both units.

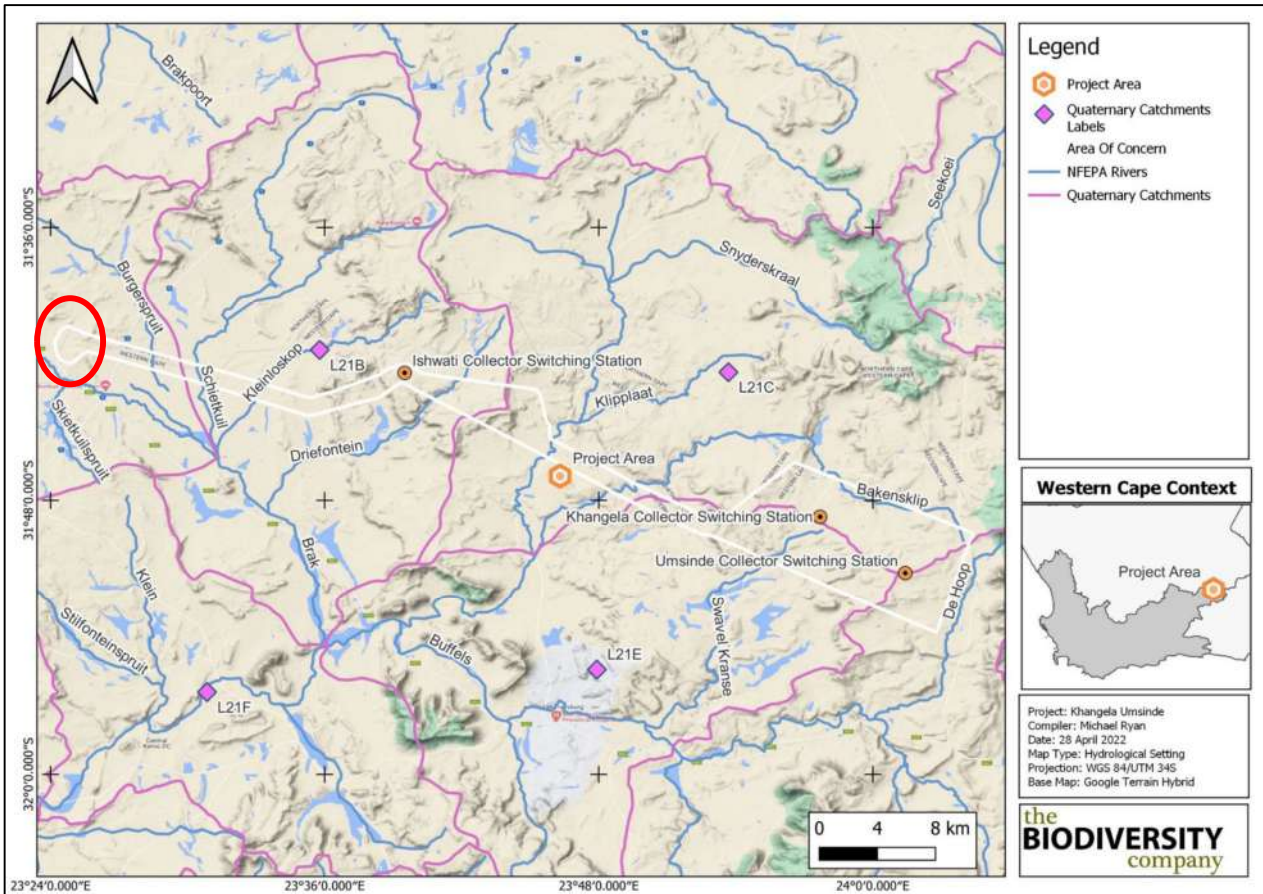


Figure 4.1: Hydrological context of the project area (M Ryan and A Husted, 2022), the red circle depicting the Gamma Substation Yard and 400kV turn-in.

4.1.1 Impact Assessment

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project’s impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development.

Impact Assessment from the 2022 Aquatic Ecology Assessment Report (M Ryan and A Husted, 2022) included impact assessment tables for the full grid line, associated access roads, switching stations and the Gamma Substation and turn-in footprint as can be seen below. **It must be noted that no impact tables were included for Aquatic Impacts as per the 2007 assessment undertaken for the EIA.**

A variety of risks have been identified for the proposed gamma substation and associated infrastructure and turn-in points. All the identified risks associated with this project were determined to be **low** for the construction phase of the project. This is due to the distance of all construction aspects outside of the delineated buffers combined with the low spatial scale of.

The operation of substations poses a low risk to the identified water resources with adequate installation of stormwater management measures due to an increase in sheet runoff due to hardened surfaces. The resultant elevated risks result from the duration which they will occur for, being the lifetime of the activity.

Table 4.1: Summary of Impact tables (TBC, 2022)

Impact	Rating after mitigation
Construction Phase	
Small scale drainage patterns change	Low
Isolated removal of embankment vegetation areas for select roads	Low
Operation of equipment and machinery outside riparian areas	Low
Soil and building material stockpile management	Low
Domestic and industrial waste	Low
Storage of chemicals, mixes, and fuel	Low
Final landscaping and post-construction rehabilitation	Low
Operational Phase	
Alteration of surface drainage and runoff	Low
Storm water management	Low
Operation of transmission line and substation	Low
Establishment of alien plants on disturbed areas	Low
Conducting maintenance	Low

Table 4.2: Potential impacts associated with the Substations (TBC, 2022)

Activity	Aspect	Impacts
Construction of substations	<ul style="list-style-type: none"> Drainage patterns change Soil and building material stockpile management Domestic and industrial waste Storage of chemicals, mixes and fuel Final landscaping and post-construction rehabilitation Temporary staff ablutions 	<ul style="list-style-type: none"> Loss of embankments. Siltation of watercourse. Increase in sediment inputs Vegetation removal Loss of seepage areas Alteration to future flow volumes
Operation of substations	<ul style="list-style-type: none"> Alteration of surface drainage and runoff Storm water management Establishment of alien plants on disturbed areas Conducting maintenance 	<ul style="list-style-type: none"> Alteration to flow volumes (impediment) Alteration of patterns of flows (increased flood peaks) Solid waste

Table 4.3: Impact Assessment for the proposed access roads and crossing points (TBC, 2022)

	Without mitigation	With mitigation
Extent	Moderate (3)	Low (2)
Duration	Permanent (5)	Long term (4)
Magnitude	Moderate (6)	Minor (2)
Probability	High probable (4)	Probable (5)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss or resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes

The significance of impacts to the substation are considered medium without mitigation measures and **low with the implementation of adequate stormwater infrastructure**. The increase in hard surfaces poses a risk of erosion due to sheet runoff during high rainfall events.

Table 4.4.: Impact Assessment for the proposed substation (TBC, 2022)

	Without mitigation	With mitigation
Extent	Low (2)	Very low (1)
Duration	Long term (4)	Long term (4)
Magnitude	Low (4)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes

Table 4.5: Comparative Impact Table between the findings of the EIA (2007) and the findings of the 2023 Assessments related to this Amendment Application:

Impacts Identified	ACER (2007)		TBC (2022/2023)	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Small scale drainage patterns change	Not assessed	Not assessed	Low	Low
Isolated removal of embankment vegetation areas for select roads	Not assessed	Not assessed	Low	Low
Operation of equipment and machinery outside riparian areas	Not assessed	Not assessed	Low	Low
Soil and building material stockpile management	Not assessed	Not assessed	Low	Low
Domestic and industrial waste	Not assessed	Not assessed	Low	Low
Storage of chemicals, mixes, and fuel	Not assessed	Not assessed	Low	Low
Final landscaping and post-construction rehabilitation	Not assessed	Not assessed	Low	Low
Alteration of surface drainage and runoff	Not assessed	Not assessed	Low	Low
Storm water management	Medium	Low	Low	Low
Operation of transmission line and substation	Not assessed	Not assessed	Low	Low
Establishment of alien plants on disturbed areas	Not assessed	Not assessed	Low	Low
Conducting maintenance	Not assessed	Not assessed	Low	Low

Access roads and crossing points	Not assessed	Not assessed	Medium	Low
Substation	Not assessed	Not assessed	Medium	Low

Considering the distance between the substation and the water resources the impacts to the water courses is considered **low** with adequate mitigations measures, particularly stormwater management.

In order to manage the impacts effectively, the following mitigation management should be put into place as part of the generic EMPr's for the general impacts associated with watercourses:

- The footprint area of the transmission line must be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.
- The infrastructure footprint areas must avoid the delineated water resources and adhere to the prescribed buffer areas.
- Vehicles and equipment required for the suspension of cables across watercourses are permitted to access the buffer areas, but may not intrude into the delineated watercourses.
- The footprint area must be aligned with the existing road/railway reserves wherever possible. Disturbed areas should be sought as the preferred alignment area.
- The locations of all single circuit angle steel towers which hold the transmission line must be located outside of all delineated watercourses.
- Where feasible all access roads should use existing farm roads before new roads are constructed.
- Preferential flow paths should be identified that intersect with new roads so that silt traps and fences can be installed to avoid siltation of watercourses.
- An appropriate stormwater management plan must be developed for all substations.

4.1.2 Cumulative Impacts

The impacts of projects are often assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation this provides a good method of assessing a project's impact. However, in areas where baselines have already been affected, or where future development will continue to add to the impacts in an area or region, it is appropriate to consider the cumulative effects of development.

Cumulative impacts are assessed in context of the extent of the proposed project area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area (all activities, as required for assessment of cumulative impacts including surrounding wind energy facilities, powerlines, and associated infrastructure in the region). Therefore, a reference to the Umsinde-Khangela-Ishwati Emoyeni Grid Transmission Line will be employed in support of the Gamma substation yard and the 400kV turn-in footprint associated infrastructure.

Table 4.6: Cumulative Impacts to biodiversity associated with the proposed project. (TBC, 2022)

	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Low (2)	Low (2)
Duration	Long term (4)	Permanent (5)
Magnitude	Low (4)	Low (4)
Probability	High probable (4)	Definite (5)
Significance	Medium	Medium
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss or resources?	No	No
Can impacts be mitigated?	Yes	

The development of the proposed infrastructure will contribute to cumulative habitat loss, habitat fragmentation at crossing points thereby impacting ecological processes in the region. Increases surface runoff from has the potential to increase water quality perturbations within the catchment.

Residual impacts as reported by water resource baseline and impact assessment (TBC, 2022) identified the potential decline of migratory species, instream sedimentation, erosion, instream and riparian habitat fragmentation.

However, the proposed new layout is not expected to result in an increase in expected impacts or their associated severities. The increased area does not pose a direct risk to the identified watercourses.

Impacts identified and assessed as part of the Freshwater Ecology Assessment Report (M Ryan and A Husted, 2022) are relevant, as they were assessed for the entire grid and associated infrastructure including the corridor associated with the 400kV Droer- Hydra 2 Overhead Powerline and the Gamma substation yard location. No new impacts were identified in the most recent study further to the 2022 assessment, nor are any new impacts expected. It is considered that impacts so far identified and assessed are an accurate representation of the impacts associated with the proposed new layout of the Gamma substation.

In terms of aquatic ecology, there were no identified advantages of the proposed new layout. However, the proposed new layout is not expected to result in an increase in expected impacts or their associated severities. The increased area does not pose a direct risk to the identified watercourses.

All prescribed mitigation measures and supporting recommendations as presented will help to achieve an acceptable residual impact. These measures and recommendations will remain applicable for the requested amendment to the EA. To this end, these measures have been included in the Generic EMPr’s (Generic EMPrs for the substation yard and turn-ins associated with the existing 400kV Droerivier- Hydra 2 Overhead Powerline) for this amendment development as per the requirements of the EIA Regulation, 2014 (as amended).

4.1.3 Conclusion

Conclusions from the 2022 Freshwater Ecology Assessment Report (M Ryan and A Husted, 2022) related to the Emoyeni Grid infrastructure with those applicable specifically to the Gamma Substation extracted included the following:

- The Gamma Substation is located ‘within’ a watercourse identified at a desktop level, as shown below in figure 4.2.
- The towers can be positioned to avoid the watercourses and 18 m buffers are recommended for these systems.
- Watercourses will not be directly affected by the project.

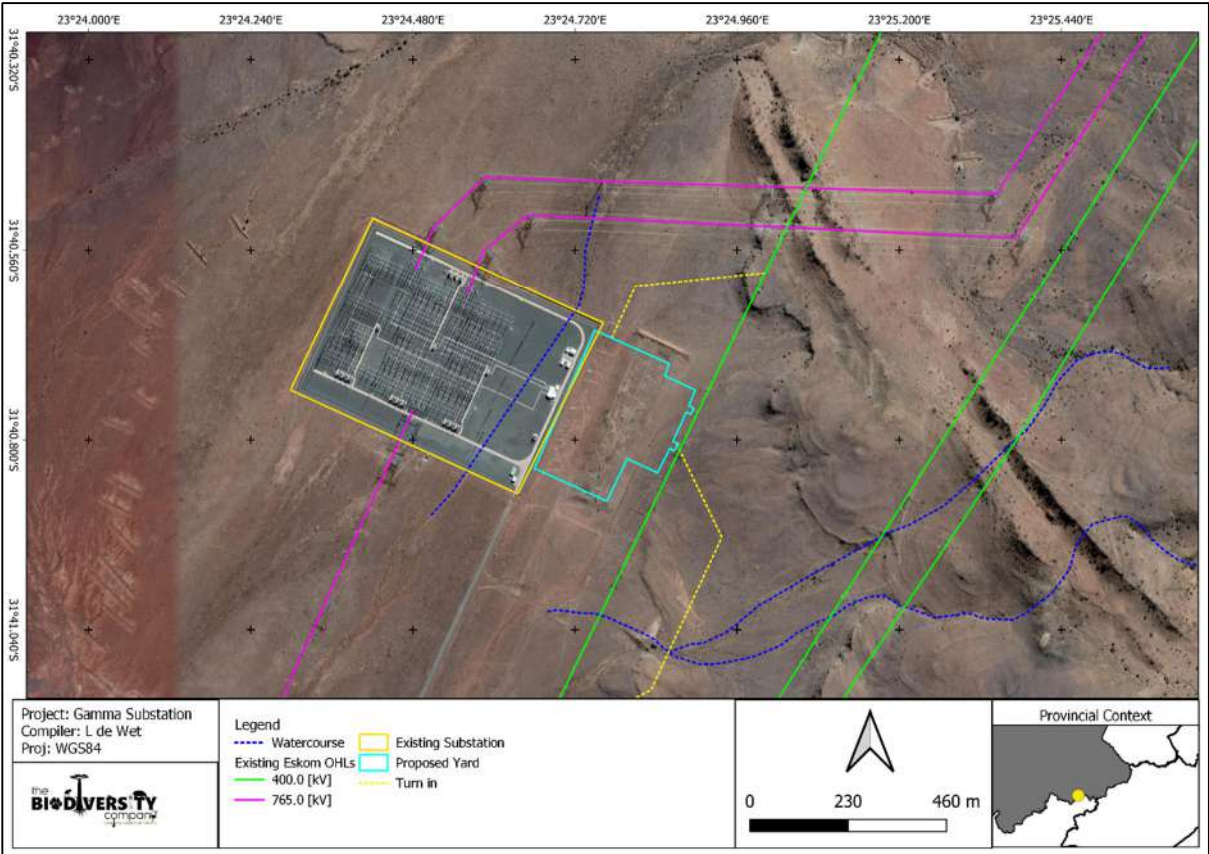


Figure 4.2: Watercourses in relation to the Gamma substation (as per 2023 assessment)

Should the measures described above, and as included in the Generic updated EMPr's for this development be implemented, it is the reasoned opinion of the aquatic specialist that the proposed layout changes i.e., the inclusion of the proposed substation yard within the authorised footprint of the existing 765kV Gamma Substation and the proposed turn-in of the existing Droer-Hydra 2 400kV powerline **be approved**.

4.2. Ecology Assessment (Fauna & Flora) Site Description and Findings

The vegetation of the proposed Gamma Sub-station site falls in the Nama-Karoo Biome, more specifically in the Upper Karoo Bioregion. Construction of the proposed Gamma Substation is expected to destroy most of the vegetation of the site, and, adopting a precautionary principle, it is assumed that all of the vegetation of the site will be cleared for construction.

Faunal habitats identified

As per the faunal assessment undertaken by ACER, 2007, the Gamma-substation site comprises a single faunal habitat of typical Nama-Karoo shrublands, dominated by dwarf (generally <1 m tall) microphyllous shrubs (e.g., *Pentzia* sp., *Eroicephalus* sp., *Rosenia* sp. and *Lycium* sp.), succulents, geophytes and grasses (e.g., *Aristida* sp., *Eragrostis* sp.). Taller shrubs and small trees occur only along a non-perennial river-course and associated drainage lines that bisect the larger area. The cover of grasses in the area may vary with the occurrence of good autumn and summer rains.

Habitats that support sensitive fauna

Riverine rabbits are considered to be habitat specialists that are confined to the riparian shrubs on the narrow alluvial fringes of seasonal, dry river-courses (Skinner & Chimimba 2005). These riparian areas are usually characterised by shrubs between 50-100 cm tall, with vegetation cover provided by *Lycium* sp. and *Salsola* sp. (30%). Ephemeral grass cover may occur in some places, but usually do not comprise more than 5% of the area. Riverine rabbits may forage up to a distance of 2 km away from riparian areas (EWT-RRWG pers. comm.). Potential suitable habitat for riverine rabbit was identified along the non-perennial river-course and associated drainage lines that bisect the larger Gamma-substation area (Figure 4.3). However,

based on assessments by the EWT-RRWG done elsewhere (where Riverine rabbits are present), the habitat in the study area is thought to be of a **low quality**. This is considered to be as a result of overgrazing by domestic herbivores, which has changed vegetation structure and composition.

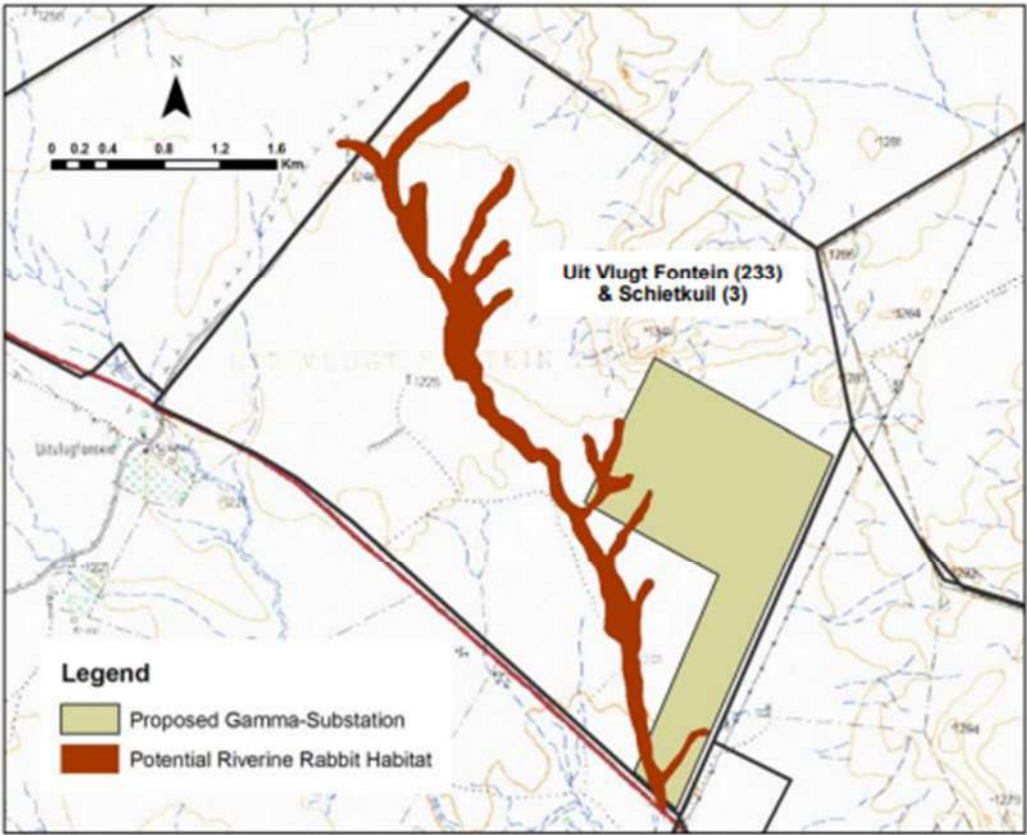


Figure 4.3: Occurrence and extent of distribution of potential riverine rabbit habitat on the larger Gamma-substation site (as per 2007 assessment)

Twenty-two faunal species with conservation concern (i.e., restricted distribution range, SA RDB- NEMBA- and CITES listing, species that are used in traditional healing and to prepare traditional medicines) potentially occur naturally on the proposed Gamma-substation site (Table xx below). These were characterised by butterflies (c. 14 %), reptiles (c. 45%) and mammals (c. 41%). The absence of semi-permanent/permanent water sources in the study area (Wetland Specialist Study) potentially precludes the occurrence of amphibians. Although Riverine rabbits are listed as potentially present in the study area, no records of their occurrence on the proposed substation-site are available (EWT-RRWG, Unpublished data).

Table 4.7: List of fauna (butterflies – Henning 1989, Woodhall 2005; reptiles – Branch 1988, Branch 1998 and mammals – Friedman & Daly 2004, Skinner & Chimimba 2005) that potentially occur naturally on the proposed Gamma-substation site (comprising the Portion I of Farm Uit Vlucht Fontein and the Remainder of Farm Schietkuil No.3 properties) for which conservation concern was identified. See notes below for clarification of abbreviations.

Class	Species	Common Name	Conservation Concern
BUTTERFLIES	<i>Phasis braueri</i>	Brauer's arrowhead	Restricted distribution range
	<i>Spialia sataspes</i>	Boland sandman	Restricted distribution range
	<i>Tsitana uitenhaga</i>	Uitenhage sylph	Restricted distribution range
REPTILES	Chelonians		
	<i>Geochelone pardalis</i>	Leopard tortoise *	Provincial legislation: CITES APP II
	<i>Psammobates tentorius tentorius</i>	Tent tortoise *	Provincial legislation: CITES APP II
	Reptiles - Snakes & Lizards		

	<i>Lamprophis fiskii</i>	Fisk's house snake	SA RDB: Rare
	<i>Acontias meleagris orientalis</i>	Cape legless skink	Restricted distribution range
	<i>Bradypodion karrooicum</i>	Karoo dwarf chameleon *	Provincial legislation: CITES APP II
	<i>Chamaeleo namaquensis</i>	Namaqua chameleon *	Provincial legislation: CITES APP II
	<i>Cordylus polyzonus</i>	Karoo girdled lizard	Provincial legislation: CITES APP II
	<i>Nucras livida</i>	Karoo sandveld	Restricted distribution range
	<i>Pachydactylus oculatus</i>	Golden spotted thick-toed gecko	Restricted distribution range
	<i>Varanus albigularis</i>	Rock monitor *	Provincial legislation: CITES APP II
SMALL, MEDIUM & LARGE MAMMALS	Bats		
	<i>Cistugo lesueurii</i>	Lesueur's wing-gland bat *	SA RDB: Near Threatened
	Insectivores		
	<i>Atelerix frontalis</i>	Southern African hedgehog *	SA RDB: Near Threatened
	Medium Mammals - Herbivores		
	<i>Bunolagus monticularis</i>	Riverine rabbit	SA RDB & National Legislation (NEMBA): Critically Endangered
	<i>Caracal caracal</i>	Caracal *	National legislation: NEMBA - Protected; Provincial legislation: CITES APP II
	<i>Felis nigripes</i>	Black-footed cat	Provincial legislation: CITES APP I
	<i>Felis silvestris</i>	African wild cat	Provincial legislation: CITES APP II
	<i>Mellivora capensis</i>	Honey badger *	SA RDB: Near Threatened; National Legislation: NEMBA - Protected
	<i>Panthera pardus</i>	Leopard *	National legislation: NEMBA - Vulnerable; Provincial legislation: CITES APP I
	<i>Vulpes chama</i>	Cape fox *	National legislation: NEMBA - Protected

Vegetation Biomes and Types

As per the Vegetation Assessment (ACER, 2007), the vegetation of the proposed Gamma Sub-station site on Uit Vlug Fontein falls in the Nama-Karoo Biome (Rutherford and Westfall, 1985; Low and Rebelo, 1996; Mucina and Rutherford, 2006). The Nama-Karoo covers an extensive part of the south-central plateau of South Africa - an area of 248 284 km² (Mucina and Rutherford, 2006). The biome is characterized by low rainfall (70 and 500 mm-a⁻¹) that falls mostly in later summer (Mucina and Rutherford, 2006) resulting in a high summer aridity index (Rutherford and Westfall, 1985) and the biome is classed as arid (Mucina and Rutherford, 2006). Summers are hot (maximum >30oC) and winters are cold (minimum close to 0oC) and frost is common. This climate delivers a short growing season and biomass is generally low (1 – 7-ton ha⁻¹ produced at 500 to 1 500 kg ha⁻¹ a⁻¹; Rutherford and Westfall, 1985).

The vegetation of the Nama-Karoo is dominated by chamaephytes (low-growing shrubs) and hemicryptophytes (graminoids) in a grassy, dwarf shrubland (Edwards, 1983). Graminoids are mostly C4 (Vogel et al. 1978) and shrubs are mostly asteraceous (daisy-family; Mucina and Rutherford, 2006). The Upper Karoo has been much modified by grazing with Mucina and Rutherford (2006) proposing five stages in its degradation.

Low and Rebelo (1996) list the Vegetation Type to be Upper Nama-Karoo (Vegetation Type 50). The most recent vegetation map (Mucina and Rutherford, 2006) refers to it as Eastern Upper Karoo. The latter terminology is adopted.

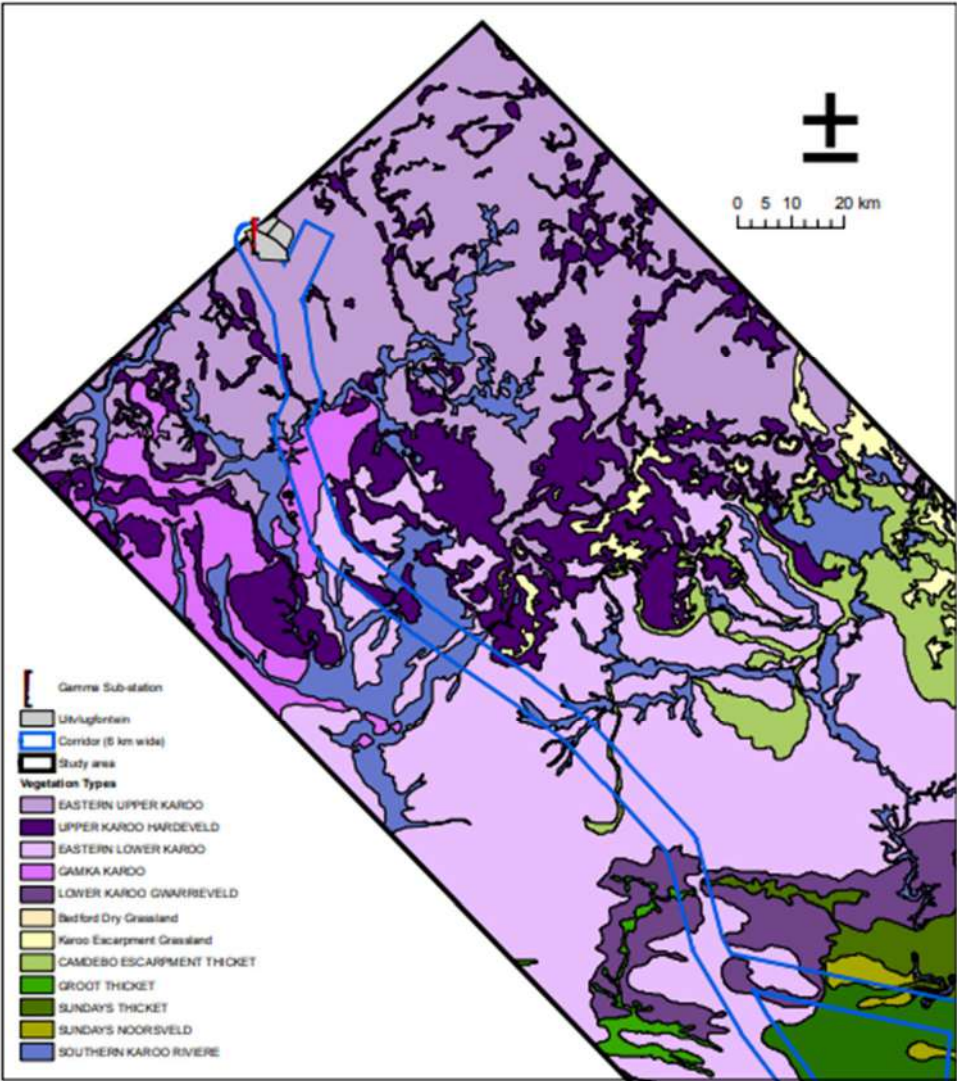


Figure 4.4. The Vegetation Types (Mucina et al., 2005) of the area surrounding the Gamma Sub-station study site. (as per 2007 assessment)

Eastern Upper Karoo vegetation occurs on flat to gently sloping portions of the Upper Karoo. The nearby hills and shale beds have Upper Karoo Hardeveld. It is dominated by dwarf microphyllous shrubs, with grasses becoming prominent after good summer rainfall (Mucina and Rutherford, 2006). The grass component is dominated by *Aristida* and *Eragrostis*.

The Nation Spatial Biodiversity Assessment (Ruget et al., 2004) classified the area proposed for the substation as being low in South African endemics. The Gamma substation site falls in an area with very low numbers of threatened plant species. Overall, the Vegetation Type ranks at very low for conservation value and the transformation of 172 ha of Eastern Upper Karoo for a Sub-station will not jeopardize future conservation plans for the Vegetation Type. Only one non-abundant species of special concern (SSC) was recorded on the Gamma Substation site during the 2007 vegetation assessment, *Boophane disticha* (L.f.) Herb. Or gifbol. *Boophane disticha* is protected by virtue of belonging to the Amaryllidaceae (Nature Conservation Ordinance 19 of 1974) and is not common in the area. There are also members of several protected plant families that were recorded on the site, but these species are protected according to the Cape Nature and Environmental Conservation Ordinance 19 of 1974:

- Amaryllidaceae
- Apocynaceae (including previous Asclepiadaceae)
- Euphorbiaceae
- Iridaceae
- Mesembryanthemaceae

4.2.1. Impact Assessment

Comparative Assessment (Fauna)

The 2007 Ecological & Biodiversity Assessment: Faunal Specialist Study, conducted by M. Landman, GIH Kerley and AF Boshoff (Centre for African Conservation Ecology) and 2007 Vegetation Assessment by Centre for African Conservation Ecology (no authors provided) as part of the Environmental Impact Assessment (EIA) for the proposed Construction of the 765 KV Gamma Substation on the farms Portion I of Farm Uit Vlugt Fontein and the Remainder of Farm Schietkuil No. 3 in the Western Cape and Northern Cape (DEA REF. No. 12/12/20/873), refers.

During construction, potential impacts have been identified for four primary components of the proposed substation.

The Impact Assessment from the 2007 report included the listing of identified impacts:

- Impact Assessment included a list of possible impacts in the Construction phase which included:
 - Sub-station site
 - Loss of faunal habitats through the clearing of vegetation. Although riverine rabbit habitat has been identified at the sub-station site, this habitat is thought to be of low quality.
 - Construction camps
 - Transformation of faunal habitats through the clearing of vegetation, the collection of fuel wood, domestic waste disposal and the establishment of invasive plant species in disturbed areas. In addition, there are concerns related to poaching (especially of animals used for medicinal purposes) and the incidental predation of fauna by domestic dogs
 - Temporary storage of hazardous substances
 - Transformation of fauna habitats through the clearing of vegetation and the establishment of invasive plant species in disturbed areas. In addition, there is a risk of trapping or drowning of animals in pits.
 - Access roads
 - Transformation of faunal habitats through the clearing of vegetation and the establishment of invasive plant species in disturbed areas
- Impact Assessment included a list of possible impacts in the Operational phase which included:
 - The transformation of faunal habitats through the on-going maintenance of cleared areas and the establishment of invasive plant species in disturbed areas. These potential impacts can be managed via the rehabilitation of cleared areas, minimising vegetation disturbance during on-going maintenance, and continuing the invasive plant control programme during operations.
 - Increased impact on raptor-prey populations through increased perch availability. This can be managed by collaborating with the EWT on methods to reduce perch availability on transmission line towers at or near sensitive habitats.
 - Decreased activity of herbivores and predators due to the presence of Electro magnetic frequencies (EMFs). At this stage, no known mitigation is available.
 - Poaching and incidental predation of fauna by domestic dogs during on-going management and maintenance of the sub-station. These can be managed by the strict control of the movement of staff, implementing strict controls over poaching and prohibiting dogs from the sub-station site.

CONSTRUCTION PHASE

Table 4.8: The assessment of the potential impacts during construction, without and with mitigation (2007):

Without Mitigation									
Nature of Impact	Impact Status	Extent	Duration	Intensity	Frequency	Probability	Legal	Significance	Confidence
Loss of habitat for the riverine rabbit	-	Immediate	Permanent	High	Continuous	Definite	NEMA	Medium	High
Transformation of habitat	-	Small	Short-term	Medium	Time-linked	Definite	NEMA CARA	Medium	High
Poaching	-	Small	Short-term	Medium	Intermittent	Probable	NEMA	Low	High
Trapping and drowning of animals	-	Small	Short-term	Medium	Time-linked	Probable	Nil	Medium	High
Spread of alien invasive plants	-	Immediate	Medium-term	Medium	Continuous	Probable	NEMA	CARA	Medium High
Birds	-	Small	Short-term	Low	Intermittent	Highly Probable	Nil	Low	High
With Mitigation									
Loss of habitat for the riverine rabbit	-	Immediate	Permanent	Medium	Continuous	Highly Probable	NEMA	Low	High
Transformation of habitat	-	Small	Medium-term	Low	Time-linked	Highly Probable	NEMA CARA	Low	High
Poaching	-	Small	Short-term	Low	Intermittent	Probable	NEMA	Low	High
Trapping and drowning of animals	-	Small	Short-term	Low	Time-linked	Probable	Nil	Low	High
Spread of alien invasive plants	-	Immediate	Medium-term	Low	Continuous	Probable	NEMA CARA	Low	High
Birds	-	Small	Short-term	Low	Intermittent	Highly Probable	Nil	Low	High

OPERATION PHASE

Table 4.9: The assessment of the potential impacts during operation, without and with mitigation (2007):

Without Mitigation									
Nature of Impact	Impact Status	Extent	Duration	Intensity	Frequency	Probability	Legal	Significance	Confidence
Loss of habitat for the riverine rabbit	-								
Transformation of habitat	-	Immediate	Permanent	Medium	Continuous	Definite	NEMA CARA	Medium	High
Poaching	-	Small	Permanent	Low	Intermittent	Probable	NEMA	Low	High

Trapping and drowning of animals	-								
Spread of alien invasive plants	-	Immediate	Medium-term	Medium	Continuous	Probable	NEMA	CARA	Medium High
Raptor-prey relations	-	Small	Permanent	Medium	Continuous	Highly Probable	Nil	Low	High
Decreased animal activity due to EMFs	-	Small	Permanent	Unknown	Continuous	Probable	Nil	Unknown	Low
Birds	-	Small	Long-term	Low	Intermittent	Probable	Nil	Low	High
With Mitigation									
Loss of habitat for the riverine rabbit	-								
Transformation of habitat	-	Immediate	Permanent	Low	Continuous	Highly Probable	NEMA CARA	Low	High
Poaching	-	Small	Permanent	Low	Intermittent	Probable	NEMA	Low	High
Trapping and drowning of animals									
Spread of alien invasive plants	-								
Raptor-prey relations	-	Small	Permanent	Low	Continuous	Probable	Nil	Low	High
Decreased animal activity due to EMFs	-	Small	Permanent	Unknown	Continuous	Probable	Nil	Unknown	Low
Birds	-	Small	Long-term	Low	Intermittent	Probable	Nil	Low	High

Impact Assessment from the 2007 Ecological & Biodiversity Assessment: Faunal Specialist Study report included the following:

Table 4.10: Impact Assessment from the 2007 Ecological & Biodiversity Assessment: Faunal Specialist Study report included the following:

Impact	Rating after mitigation
Construction Phase: Substation	
Loss of faunal habitats	Low
Construction Phase: Construction camps	
Transformation of faunal habitats	Low
Poaching and incidental predation of fauna	Low
Construction Phase: Temporary storage of hazardous substances	
Transformation of faunal habitats	Low
Risks due to drowning or trapping of fauna in pits	Low
Construction phase: Access roads	
Transformation of faunal habitats	Low
Operational Phase	
Transformation of faunal habitats	Low
Increased impact on raptor-prey populations	Low
Decreased activity of herbivores	Low
Poaching and incidental predation of fauna by domestic dogs	Low

Flora Impact Assessment (ACER, 2007)

There are no positive impacts for vegetation arising from the proposed Gamma Sub-station. However, there are negative impacts that have been identified for the construction and operation of the proposed Gamma Sub-station.

The Impact Assessment from the 2007 Vegetation Assessment report included the listing of identified impacts:

- Impact Assessment included a list of possible impacts in the Construction phase which included:
 - Loss of 172ha of Eastern Upper Karoo for the substation.
 - Loss of additional areas of vegetation for construction of the access roads.
 - An increased risk of alien infestation due to disturbance.
 - Destabilisation of soils due to removal of the vegetation with resultant erosion.
 - Poaching of harvested plant species due to increased access.
 - “Flash-overs” may cause unplanned fires.
 - Loss of plants of protected species.
- Impact Assessment included a list of possible impacts in the Operational phase which included:
 - Roads cause high intensity runoff from the surface during rainfall events with resultant erosion.
 - Poaching of harvested plant species due to increased access.
 - “Flash-overs” may cause unplanned fires.
- No Impact tables with associated ratings were provided.
- Cumulative Impacts were not assessed

In summary, the significance of the potential impacts to vegetation are considered low, for both construction and operation, as indicated in the assessment tables (without and with mitigation), one each for construction and operation (Table 4.11 below).

Table 4.11: The assessment of the potential impacts to vegetation during both construction and operation, without and with mitigation (2007):

Without Mitigation									
Nature of Impact	Impact Status	Extent	Duration	Intensity	Frequency	Probability	Legal	Significance	Confidence
Loss of 172 ha of Eastern Upper Karoo	-	Limited	Long-term	Medium	Continuous	Definite	NEMA	Low	High
Loss of additional areas of vegetation for access roads	-	Limited	Long-term	Medium	Intermittent	Definite	NEMA	Low	High
Alien infestation	-	Limited	Long-term	Medium	Intermittent	Probable	NEMA and CARA	Medium	High
Destabilisation of soils	-	Limited	Long-term	Medium	Continuous	Highly Probable	CARA	Medium	High
Poaching	-	Limited	Long-term	Low	Intermittent	Improbable	NEMA	Low	High
Loss of protected species	-	Limited	Long-term	Low	Continuous	Highly Probable	NEMA	High	High
Storm water runoff	-	Limited	Long-term	Medium	Intermittent	Highly Probable	CARA	Medium	Medium
Plant poaching	-	Limited	Long-term	Medium	Intermittent	Probable	NEMA	Medium	Medium
Fires	-	Limited	Long-term	Low	Intermittent	Probable	Nil	Low	High

With Mitigation									
Loss of 172 ha of Eastern Upper Karoo	-	Limited	Long-term	Medium	Continuous	Definite	NEMA	Low	High
Loss of additional areas of vegetation for access roads	-	Limited	Long-term	Medium	Intermittent	Definite	NEMA	Low	High
Alien infestation	-	Limited	Long-term	Low	Intermittent	Probable	NEMA and CARA	Low	High
Destabilisation of soils	-	Limited	Long-term	Low	Continuous	Highly Probable	CARA	Low	High
Poaching	-	Limited	Long-term	Low	Intermittent	Improbable	NEMA	Low	High
Loss of protected species	-	Limited	Long-term	Low	Continuous	Probable	NEMA	Low	High
Storm water runoff	-	Limited	Long-term	Low	Intermittent	Probable	CARA	Low	Medium
Plant poaching	-	Limited	Long-term	Low	Intermittent	Probable	NEMA	Low	Medium
Fires	-	Limited	Long-term	Low	Intermittent	Probable	Nil	Low	High

Terrestrial Biodiversity Impact Assessment (Fauna & Flora) (TBC, 2022)

The Biodiversity Company (TBC) conducted a site assessment in April 2022, followed by a Sensitivity Verification in October 2022. Associated site visits were conducted in March 2022, April 2022 and August 2022.

Impact Assessment from the 2022 Terrestrial Biodiversity and Avifauna Assessment Report (L de Wet, L Steyn, J Jacobs and A Husted, TBC, 2022) included impact assessment tables for the full grid line, associated access roads, switching stations and the Gamma Substation yard and 400kV turn-in footprint.

Table 4.12: Ecology Impact tables summarised (impacts specific to avifauna are excluded)

Impact	Rating after mitigation
Construction Phase	
Loss of Vegetation within the development footprint	Medium
Introduction of alien species, especially plants	Low
Destruction of protected plant species	Medium
Displacement of faunal (including avifaunal) communities due to habitat loss, direct mortalities and disturbance	Low
Operational Phase	
Continued fragmentation and degradation of habitats and ecosystems	Low
Spread of alien and/or invasive species	Low
Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with infrastructure, noise, light, dust, vibration)	Low

CONSTRUCTION PHASE

The following potential main impacts on the biodiversity (including avifauna) (based on the framework above) were considered for the construction phase of the TBC, 2022 assessment report.

Table 4.13: Impacts to biodiversity associated with the 2022 assessment: construction phase (also associated with the update of the layout)

Nature: Loss of vegetation within the development footprint		
Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected species.		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Permanent (5)	Long term (4)
Magnitude	Moderate (6)	Low (4)
Probability	Definite (5)	Probable (3)
Significance	High	Medium
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of currently intact vegetation is an unavoidable consequence of the project and cannot be entirely mitigated. The residual impact would however be low.		

Table 4.14: Impacts to biodiversity associated with the proposed construction phase: Introduction of alien species, especially plants (Construction of all infrastructure)

Nature: Introduction of alien species, especially plants		
Degradation and loss of surrounding natural vegetation arising from construction activities.		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Low (4)	Minor (2)
Probability	Probable (3)	Probable (3)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
Long-term broad scale IAP infestation if not mitigated.		

Table 4.15: Impacts to biodiversity associated with the proposed construction phase: Destruction of Protected Plant Species (Construction of powerlines and substations)

Nature: Destruction of protected plant species

Loss of protected plant species, these are mainly provincially protected species		
	Without mitigation	With mitigation
Extent	High (4)	Moderate (3)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	High	Medium
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
The loss of some of the protected species are unavoidable.		

Table 4.16: Impacts to biodiversity associated with the proposed construction phase: Displacement of faunal community (Construction of all infrastructure)

Nature: Displacement of faunal communities due to habitat loss, direct mortalities, and disturbance		
Construction activity may lead to direct mortality of fauna due to earthworks, vehicle collisions, accidental hazardous chemical spills and persecution. Disturbance due to dust and noise pollution and vibration may disrupt behaviour.		
	Without mitigation	With mitigation
Extent	High (4)	Moderate (3)
Duration	Moderate term (3)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Probable (3)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, to some extent. Noise and disturbance cannot be well mitigated. Impacts on fauna due to human presence, such as vehicle collisions, poaching, and persecution can be mitigated.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
It is probable that some individuals of susceptible species will be lost to construction-related activities despite mitigation. However, this is not likely to impact the viability of the local population of any fauna species.		

OPERATIONAL PHASE

The following potential main impacts on the biodiversity (including avifauna) (based on the framework above) were considered for the operational phase of the 2022 assessment report.

Table 4.17: Impacts to biodiversity associated with the proposed operational phase: Continued fragmentation and degradation of habitats and ecosystems (Operation of all infrastructure)

Nature: Continued fragmentation and degradation of habitats and ecosystems		
Disturbance created during the construction phase will leave the project area vulnerable to erosion and IAP encroachment.		
	Without mitigation	With mitigation
Extent	High (4)	Moderate (3)
Duration	Permanent (5)	Moderate term (3)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes, with proper management and avoidance, this impact can be mitigated to a low level.	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
There is still some potential for erosion and IAP encroachment even with the implementation of control measures. Impacts will however be low with the implementation of control measures.		

Table 4.18: Impacts to biodiversity associated with the proposed operational phase: Spread of alien and/or invasive species (Operation of all infrastructure)

Nature: Spread of alien and/or invasive species		
Degradation and loss of surrounding natural vegetation		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Minor (2)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		

Residual Impacts:
Long term broad scale IAP infestation if not mitigated.

Table 4.19: Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of substation and powerline)

Nature: Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with infrastructure, noise, light, dust, vibration)		
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
See Biodiversity Management Outcomes		
Residual Impacts:		
Disturbance from maintenance activities will occur albeit at a low and infrequent level. Less migratory species will be found in the area. Road killings are still a possibility. Migratory routes of fauna may change, fauna and flora species composition may change.		

Table 4.20: Comparative Impact Table between the findings of the EIA (2007) and the findings of the 2022/2023 Assessments related to this Amendment Application:

Impacts Identified	ACER (2007)		TBC (2022/2023)	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Fauna (Construction Phase)				
Loss of habitat for the riverine rabbit	Medium	Low	Unchanged	Unchanged
Transformation of habitat	Medium	Low	Unchanged	Unchanged
Poaching	Low	Low	Unchanged	Unchanged
Trapping and drowning of animals	Medium	Low	Unchanged	Unchanged
Spread of alien invasive plants	Medium	Low	High	Low
NEW IMPACTS				
Loss of vegetation within the development footprint	Not assessed	Not assessed	High	High

Destruction of protected plant species	Not assessed	Not assessed	High	Medium
Displacement of faunal communities due to habitat loss, direct mortalities and disturbance	Not assessed	Not assessed	Medium	Low
Fauna (Operation phase)				
Transformation of faunal habitats through: a) on-going maintenance of cleared areas for access roads & b) establishment of invasive plants in disturbed areas.	Medium	Low	Unchanged	Unchanged
Decreased activity of herbivores (& predators) due to the presence of high intensity electro-magnetic fields (Nellemann et al. 2001, Vistnes & Nellemann 2001, Vistnes et al. 2001, Nellemann et al. 2003).	Low	Low	Unchanged	Unchanged
Poaching & incidental predation of fauna by domestic dogs during ongoing monitoring/control/maintenance of the substation/access roads. [Poaching]	Low	Low	Unchanged	Unchanged
Loss of habitat for the riverine rabbit	Not assessed	Not assessed	Unchanged	Unchanged
Transformation of habitat	Medium	Low	Unchanged	Unchanged
Poaching	Low	Low	Unchanged	Unchanged
Trapping and drowning of animals	Not assessed	Not assessed	Unchanged	Unchanged
Spread of alien invasive plants	Medium	Not assessed	Unchanged	Unchanged
NEW IMPACTS				
Continued fragmentation and degradation of habitats and ecosystems	Not assessed	Not assessed	High	Low
Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with infrastructure, noise, light, dust, vibration)	Not assessed	Not assessed	High	Low

Poaching and incidental predation of fauna by domestic dogs	Not assessed	Not assessed	Low	Low
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Table 4.21: Comparative assessment of the potential impacts to **vegetation** (flora) during both construction and operation, without and with mitigation (EIA 2007) and the findings of the 2022/2023 Assessments related to this Amendment Application

Impacts Identified	ACER (2007)		TBC (2022/2023)	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Fauna (Construction & Operation Phase)				
Loss of 172 ha of Eastern Upper Karoo	Low	Low	Unchanged	Unchanged
Loss of additional areas of vegetation for access roads	Low	Low	Unchanged	Unchanged
Alien infestation	Medium	Low	Unchanged	Unchanged
Destabilisation of soils	Medium	Low	Unchanged	Unchanged
Poaching	Low	Low	Unchanged	Unchanged
Loss of protected species	High	Low	Unchanged	Unchanged
Storm water runoff	Medium	Low	Unchanged	Unchanged
Plant poaching	Medium	Low	Unchanged	Unchanged
Fires	Low	Low	Unchanged	Unchanged
NEW IMPACTS				
Loss of vegetation within the development footprint	Not assessed	Not assessed	High	High
Introduction of alien species, especially plants	Not assessed	Not assessed	High	Low
Destruction of protected plant species	Not assessed	Not assessed	High	Medium

4.2.2. Cumulative Impacts

Cumulative impacts were not assessed as part of the 2007 studies however, they are assessed as part of the 2022 studies and are considered accurate and applicable to the proposed layout change of the Gamma substation. Impacts of the proposed layout change in isolation are expected to be low overall and high when considered cumulatively.

Cumulative impacts (2022) were assessed as Low for the project considered in isolation and High for the project considered as a cumulative impact with surrounding developments.

Table 4.22: Cumulative Impacts to biodiversity associated with the proposed project.

The development of the proposed infrastructure will contribute to cumulative habitat loss, thereby impacting ecological processes in the region.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Moderate (3)	Moderate (3)

Duration	Short term (2)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Low (27)	High (65)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
Should the vegetation be removed, the impact cannot be mitigated.		
Residual Impacts:		
Will result in the loss of: Less migratory species will be found in the area. Road killings are still a possibility. Migratory routes of fauna will change. Fauna and flora species composition may change. Avifauna SCCs will be influenced.		

4.2.3. Conclusion

Conclusions from the 2007 Ecological & Biodiversity Assessment: Faunal Specialist Study report included the following:

- Habitat for Riverine Rabbit (I) is present within the study area and surrounds but is considered of low quality. No individuals were recorded within the study site. Rehabilitation following construction is to be undertaken as per discussions and partnership with the EWT Riverine Rabbit Working Group. .
- With mitigation measures applied as recommended, resulting in low overall impacts on fauna, the development of the Gamma Substation and associated 400kV OHL turn-ins is supported.

Conclusions from the 2007 Vegetation Assessment report included the following:

- One provincially protected species (*Baophane disticha*) and several protected families (Amaryllidaceae, Apocynaceae, Euphorbiaceae, Iridaceae and Mesembryanthemaceae) were recorded but considered to be of least concern as they are abundant and widely spread.
- With mitigation measures applied as recommended, resulting in low overall impacts on flora and vegetation, the development of the Gamma Substation and associated 400kV OHL turn-ins is supported.

Conclusions from the 2022 Terrestrial Biodiversity Assessment report (L de Wet, L Steyn, J Jacobs and A Husted, TBC, 2022) related to the Emoyeni Grid infrastructure, including the Gamma Substation yard footprint and the 400kV powerline turn-in footprint, with those applicable specifically to the Gamma Substation extracted included the following:

- The Gamma Substation is located predominantly in an area of Low Site Ecological Importance (SEI) (Figure 4.5 below).
- The Gamma Substation is located in an area of transformed vegetation, bordering on an area of flat Karoo Scrub.

- Provincially protected plant species were recorded from the study area, and permits are required of these are to be relocated or destroyed prior to the construction of the facility.
 Provided all mitigation measures are adhered to, the development is supported.

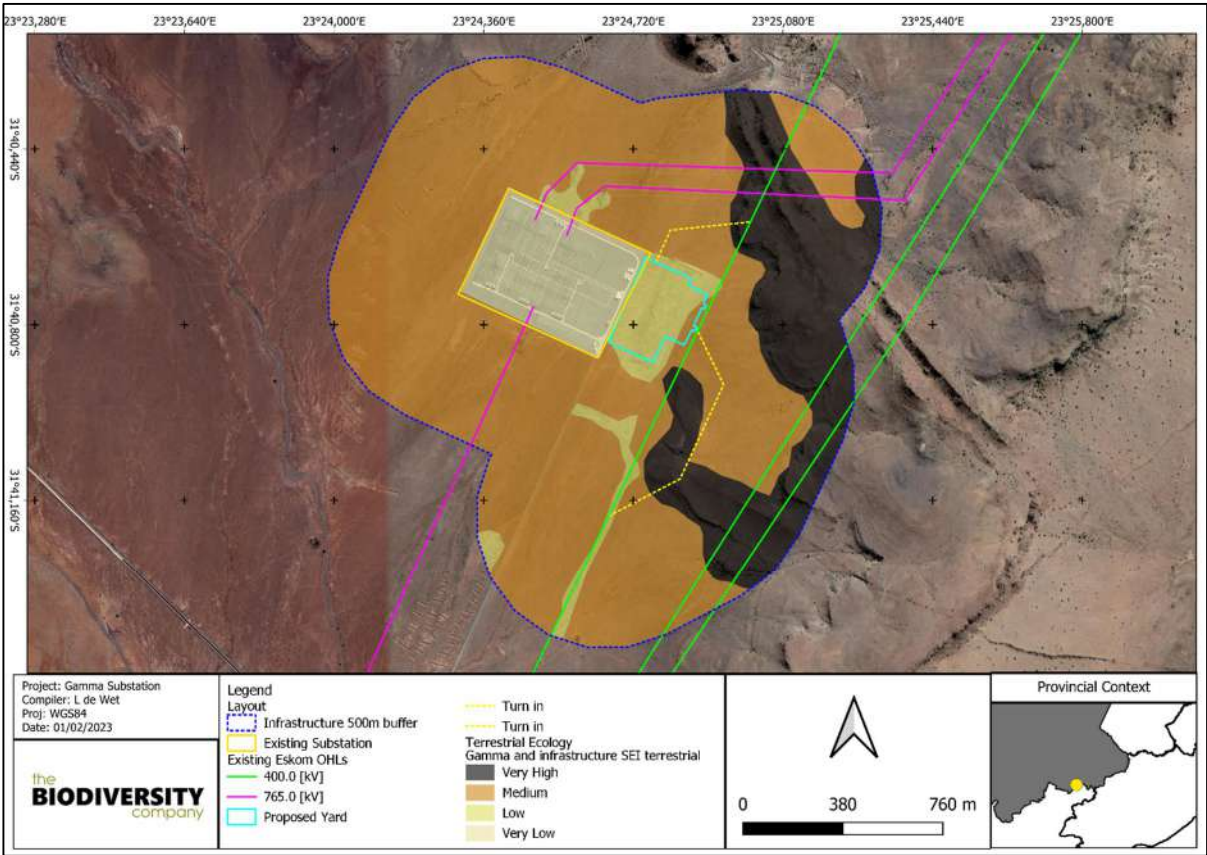


Figure 4.5: Gamma Substation located predominantly in an area of Low-Medium Site Ecological Importance (SEI), with the proposed turn-in's intersecting areas of Very High SEI.

The conclusions of the Site Sensitivity Verification (TBC 2022) for the 132KV grid connection infrastructure, associated access tracks and water course crossings associated with the authorised Emoyeni wind energy facilities include the following:

- The assessment area was identified with the screening tool as possessing a Very High sensitivity within a Terrestrial Biodiversity context with the area and surrounding landscape regarded as part of a CBA.
- Presently there are natural habitats within the assessment area that possess a High and Very High SEI. This is due to the combination of their functional integrity and conservation importance.
- Based on the habitat present, there is a high likelihood of select SCC occurring within the assessment area.
- Several plant SCC that are provincially protected were recorded in the study area.
- The classification of the screening tool was considered to be accurate as far as the impact of the proposed powerline, substation and associated infrastructure is concerned based on actual conditions recorded on the ground during the site visit of March 2022, April 2022 and August 2022.

Mitigation measures prescribed by each of the reviewed specialist reports remain applicable and must be adhered to.

The desktop terrestrial biodiversity theme sensitivity according to the screening tool for a portion of the site area is 'Very High' due to the presence of Critical Biodiversity Area 2 with the remaining having a 'Low' sensitivity. A baseline assessment (April 2022) determined the sensitivity of the karoo

habitat to be 'Low', with surrounding rocky outcrops a 'Very High' sensitivity. The rocky outcrops are not located within the construction and operational area.

Impacts assessed as part of the 2007 reports: Ecological & Biodiversity Assessment: Faunal Specialist Study, conducted by M. Landman, GIH Kerley and AF Boshoff (Centre for African Conservation Ecology) and Vegetation Assessment by Centre for African Conservation Ecology (no authors provided) as part of the Environmental Impact Assessment (EIA) for the proposed Construction of the 765 KV Gamma Substation on the farms Portion I of Farm Uit Vlucht Fontein and the Remainder of Farm Schietkuil No.3 in the Western Cape and Northern Cape (DEA REF. No. I2/I2/20/873) are considered to be relevant for the proposed new layout. Impacts identified and assessed as part of the Terrestrial Biodiversity and Avifauna Assessment Report (L de Wet, L Steyn, J Jacobs and A Husted, TBC, 2022) are also relevant, though assessed for the entire grid and associated infrastructure. No new impacts were identified in the most recent study (2022), nor are any new impacts expected. It is considered that impacts so far identified and assessed are an accurate representation of the impacts associated with the proposed new layout of the Gamma substation.

Cumulative impacts were not assessed as part of the 2007 studies however, they are assessed as part of the 2022 studies and are considered accurate and applicable to the proposed layout change of the Gamma substation. Impacts of the proposed layout change in isolation are expected to be low overall and high when considered cumulatively.

In terms of terrestrial biodiversity (excluding avifauna), there are **no advantages or disadvantages** of the proposed new layout relative to what was previously authorised. However, the proposed new layout is not expected to result in an increase in expected impacts or their associated significance. Disadvantages include an increased area of indigenous vegetation and associated habitat lost and an increase in disturbance and resultant increase in alien invasive species, particularly plants, as identified in the specialist studies. All prescribed mitigation measures and supporting recommendations presented here will help to achieve an acceptable residual impact. These measures and recommendations will remain applicable for the requested extension of the EA. To this end, these measures have been included in the updated EMPr for this development as per the requirements of the Environmental Authorisation.

As such, should the measures described, and as included in the updated EMPr for this development be implemented, it is the reasoned opinion of the specialist that the proposed layout changes i.e., the inclusion of the proposed substation yard within the authorised footprint of the existing Gamma Substation and the proposed turn-in of the Hydra- Droerivier Droer-Hydra 400kV powerline **be approved**.

4.3. Avifauna Assessment Site Description and Findings

The 2007 Avifaunal Specialist Study, conducted by Jon Smallie (Endangered Wildlife Trust) as part of the Environmental Impact Assessment (EIA) for the proposed Construction of the 765 KV Gamma Substation on the farms Portion I of Farm Uit Vlucht Fontein and the Remainder of Farm Schietkuil No.3 in the Western Cape and Northern Cape (DEA REF. No. I2/I2/20/873), refers:

The proposed substation site (3I23CB) consists of 51% "nama karoo" and 49% "grassy karoo" according to Harrison et al (1997). A total of 80 bird species, three of which are considered "near threatened" were recorded in 3I23CB by the Southern African Bird Atlas Project (Harrison et al 1997). A number of other bird species, both Red Data and non-Red Data, have been recorded in the broader area and could potentially also occur on the site, in spite of not being recorded by the atlas project. It must be noted that many "non-Red Data" bird species also occur in the study area and will be impacted on by the substation. Examples of such species are: korhaans, larks, Karoo Robin, pipits, Black-shouldered Kite, Jackal Buzzard, Pale Chanting Goshawk, Rock Kestrel.

The findings of the avifauna assessment report (ACER, 2007) deduced the following associated with the development of the Gamma Substation and associated infrastructure:

- Natural habitat covering an area of approximately 60 hectares, plus a portion of the 80 hectare road access corridor will be totally altered and rendered artificial, and hence almost totally unsuitable to birds. It appears that the access road does not cross the drainage line described above. If this is not the case, the road and its reserve could affect vegetation and hydrology of this drainage line.
- A communication tower will be built at the substation. This potentially poses a collision risk to birds, both through the tower itself and the stay wires supporting it.
- During construction, disturbance levels will be significantly higher in the immediate vicinity than previously. This will consist of machinery, vehicle and other activities
- During the operational phase, there will be some vehicle activity and hence some disturbance, particularly within the road access corridor
- Since the substation will ultimately accommodate five incoming and five outgoing lines, there will be construction activities in the vicinity on an ongoing basis for several years.
- Substation infrastructure provides perching and nesting substrate for certain bird species, in particular crows and smaller species such as sparrows, and swallows
- There is a possibility that species such as crows, and owls could be electrocuted on substation infrastructure.

All construction activities should be undertaken according to generally accepted environmental best practice, with care taken to destroy as little as possible natural vegetation, and to minimise unnecessary disturbance on site. Once operational, the substation should be monitored in order to detect any bird electrocutions, bird impacts on the substation, and bird collisions with the communications tower.

The abovementioned study as part of the Environmental Authorisation (EA) process (DEA REF. NO. 12/12/20/873) has been reviewed by The Biodiversity Company (TBC) who conducted a site assessment in April 2022, followed by a Sensitivity Verification in October 2022. Associated site visits were conducted in March 2022, April 2022 and August 2022.

4.3.1. Impact Assessment

The 2007 Avifaunal Specialist reports details that many other Red Data species have been recorded in the broader area and could occur on the Substation site, despite not being recorded in 3I23CB during the atlas period and include the species of Ludwig’s Bustard, Secretary bird, Martial Eagle, Tawny Eagle, Karoo Lark. Furthermore, many “non-Red Data” bird species also occur in the study area and will be impacted on by the substation. Examples of such species are: korhaans, larks, Karoo Robin, pipits, Black-shouldered Kite, Jackal Buzzard, Pale Chanting Goshawk and Rock Kestrel. The assessment table presented below shows the impacts that are assessed in accordance with a set of criteria supplied by ACER (Africa).

Table 4.23: Assessment of Identified Impacts according to criteria supplied by ACER (Africa)

Nature	Extent	Duration	Intensity	Frequency	Probability	Significance	Confidence
Habitat Destruction	Immediate area of construction	Permanent	Low	Continuous	Definite	Low since the site is not particularly attractive or unique habitat in this landscape. Small species such as larks will be most affected as they have relatively small territories, which may be completely destroyed. Mitigation measures will not affect this impact to any great extent. The road will not need to cross the drainage line. If this layout is changed, and the drainage line is crossed this	High

						will result in destruction of vegetation along this drainage line	
Disturbance	Small area – radius of 2km	Short term	Medium	During construction	Definite	Low since birds can and will move away from the area temporarily and the site is not particularly attractive or unique as bird habitat. Mitigation measures will not affect this impact to any great extent	High
Electrocution of birds on substation infrastructure	Immediate area	Permanent	Low	Intermittent	Improbable	Low significance. Species likely to be affected in this way, are crows and other non-threatened species. Most Red Data species are sensitive to disturbance and will not enter the yard.	High
Collision of birds with communication tower	Immediate area of construction	Permanent	Low	Intermittent	Improbable	Low – since this impact typically occurs with birds at high densities such as during migration. Such congregations of birds at the proposed site are unlikely	High
Impact on quality of supply	Immediate area	Permanent	Low	Intermittent	Improbable	Low – mitigation will not be possible initially; situation will need to be monitored	High

The Impact Assessment from the 2022 Terrestrial Biodiversity and Avifauna Assessment Report (L de Wet, L Steyn, J Jacobs and A Husted, TBC) included impact assessment tables for the full grid line, associated access roads, switching stations and the Gamma Substation (including the proposed Gamma substation yard footprint and the 400kV turn-in infrastructure footprint) as can be seen below.

It is detailed in the 2022 report that 221 avifauna species could be expected to occur within the area. Seventeen (17) of these expected species are regarded as threatened (Table 4.24). One of the species has a low likelihood of occurrence due to a lack of suitable habitat and food sources in the project area or based on the range restrictions of the species.

Table 4.24: Threatened avifauna species that are expected to occur within the project area.

Species	Common Name	Conservation Status		Likelihood of occurrence
		Regional (SANBI, 2016)	IUCN (2021)	
Anthus crenatus	Pipit, African Rock	NT	NT	Moderate
Aquila verreauxii	Eagle, Verreaux's	VU	LC	Confirmed
Ardeotis kori	Bustard, Kori	NT	NT	Confirmed
Ciconia microscelis	Stork, Woolly-necked	Unlisted	NT	Low
Ciconia nigra	Stork, Black	VU	LC	Moderate
Circus macrourus	Harrier, Pallid	NT	NT	Low
Circus maurus	Harrier, Black	EN	EN	High
Coracias garrulus	Roller, European	NT	LC	High
Eupodotis vigorsii	Korhaan, Karoo	NT	LC	Confirmed

Falco biarmicus	Falcon, Lanner	VU	LC	Confirmed
Geocolaptes olivaceus	Woodpecker, Ground	Unlisted	NT	High
Grus paradisea	Crane, Blue	NT	VU	Confirmed
Neotis ludwigii	Bustard, Ludwig's	EN	EN	Confirmed
Phoenicopterus roseus	Flamingo, Greater	NT	LC	Low
Polemaetus bellicosus	Eagle, Martial	EN	EN	Confirmed
Sagittarius serpentarius	Secretarybird	VU	EN	Confirmed
Terathopius ecaudatus	Bateleur, Bateleur	EN	EN	Low

ARCUS (2015) conducted a 12-month bird survey between October 2013 and October 2014. . The 12- month bird survey was undertaken as part of the EIA process for the authorised Umsinde and Khangela Wind Energy Facilities in the vicinity of the Gamma Substation. A combined total of 181 species was recorded in their assessment over four seasons. Their assessment included 29 priority species (priority species in the context of wind farm developments) and 28 South African endemic or near endemic species. A total of 13 Regional Red Data species were also observed (Table 4.25).

Table 4.25: Red data species and priority species recorded by ARCUS 2015

Species	Threat Status	Priority species
Blue Crane	NT	P
Karoo Korhaan	NT	P
Verreaux's Eagle	VU	P
Northern Black Korhaan		P
African Rock Pipit	NT	P
Jackal Buzzard		P
Pale Chanting Goshawk		P
Steppe Buzzard		P
African Fish Eagle		P
Southern Black Korhaan	VU	P
Secretary bird	VU	P
African Harrier-hawk		P
Black Harrier	EN	P
Black-chested Snake Eagle		P
Black-shouldered Kite		P
Booted Eagle		P
Cape Eagle-Owl		P
Greater Flamingo	NT	P
Greater Kestrel		P
Grey-winged Francolin		P
Steppe Buzzard		P
Lanner Falcon	VU	P
Lesser Kestrel		P
Ludwig's Bustard	EN	P
Martial Eagle		
Sparrowhawk, Rufous-breasted		P
Double-banded Courser	NT	
Kori Bustard	NT	

During the same assessment a nest survey was also conducted, and the nests of seven species were recorded (Table 4.26) in the vicinity of the Umsinde and Khangela WEF's which are in the general vicinity (approximately 45km east of) the Gamma Substation.

Table 4.26: Nests recorded by ARCUS (2015) in the project area.

Species	Number of nests	Locality
Verreaux's Eagle	21	Five are situated within the Umsinde and Khangela WEF site boundary
Martial Eagle	1	Nest outside the WEF site approximately 3.2 km west from the WEF site boundary
Jackal Buzzard	7	Five of which are situated within the WEF site;
Rock Kestrel	22	Seven of which are situated within the WEF site
Rufous-breasted Sparrowhawk	1	Situated within the WEF site
Pale Chanting Goshawk	1	Nest situated within the WEF site
Peregrine Falcon	1	Nest situated approximately 3.5 km south of the WEF site boundary

The following section provides the results from the field survey for the 132kV Emoyeni Grid corridor, including the Gamma Substation and 400kV turn-in infrastructure that was undertaken during March/April 2022 and updated after the August 2022. It details that ninety-nine (99) bird species were recorded in the first survey. Eight of the species incidentally recorded moving between point count locations are provided in Table 4.27. The Karoo Korhaan were observed in most counts, followed by the Blue Crane. The location of the SCCs that were recorded in and around the project area is shown in Table 4.27, while photographic evidence of the species is shown in Figure 4.6.

Table 4.27: Species of conservation concern observed during the survey (VU, Vulnerable; EN, Endangered; NT, Near Threatened; LC, Least Concerned)

Common Name	Scientific Name	Regional (SANBI, 2016)	IUCN (2021)	Total Number of birds	Total Sightings
Blue Crane	Grus paradisea	NT	VU	51	17
Karoo Korhaan	Eupodotis vigorsii	NT	LC	49	19
Kori Bustard	Ardeotis kori	NT	NT	2	2
Ludwig's Bustard	Neotis ludwigii	EN	EN	11	6
Martial Eagle	Polemaetus bellicosus	EN	EN	1	1
Secretarybird	Sagittarius serpentarius	VU	EN	2	1
Verreaux's Eagle	Aquila verreauxii	VU	LC	5	3
Lanner Falcon	Falco biarmicus	VU	LC	3	2

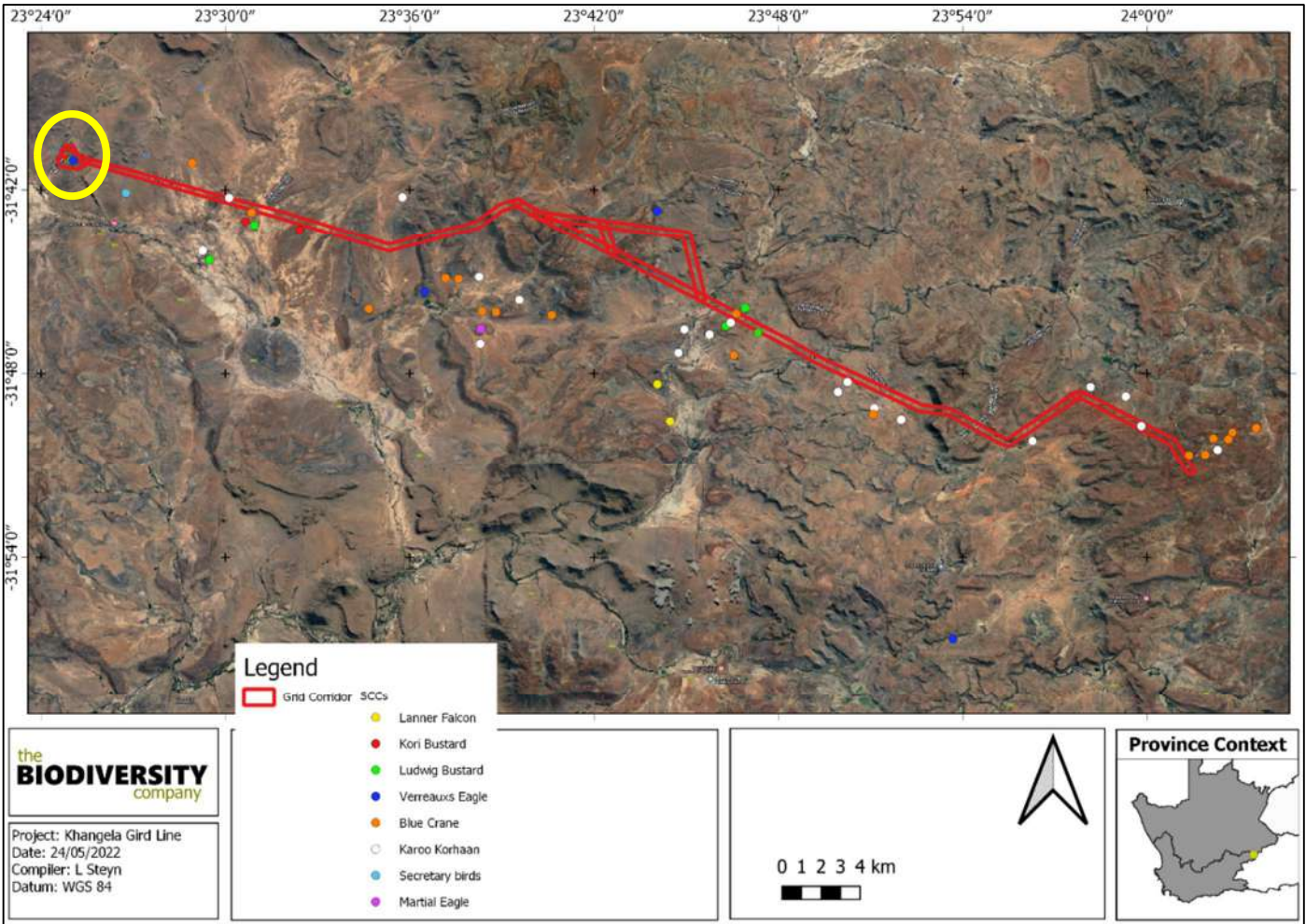


Figure 4.6: The location of the recordings of the species of conservation concern, with one confirmed Verreaux Eagle nest within the existing pylons near the Gamma Substation (circles in yellow), TBC, 2022.

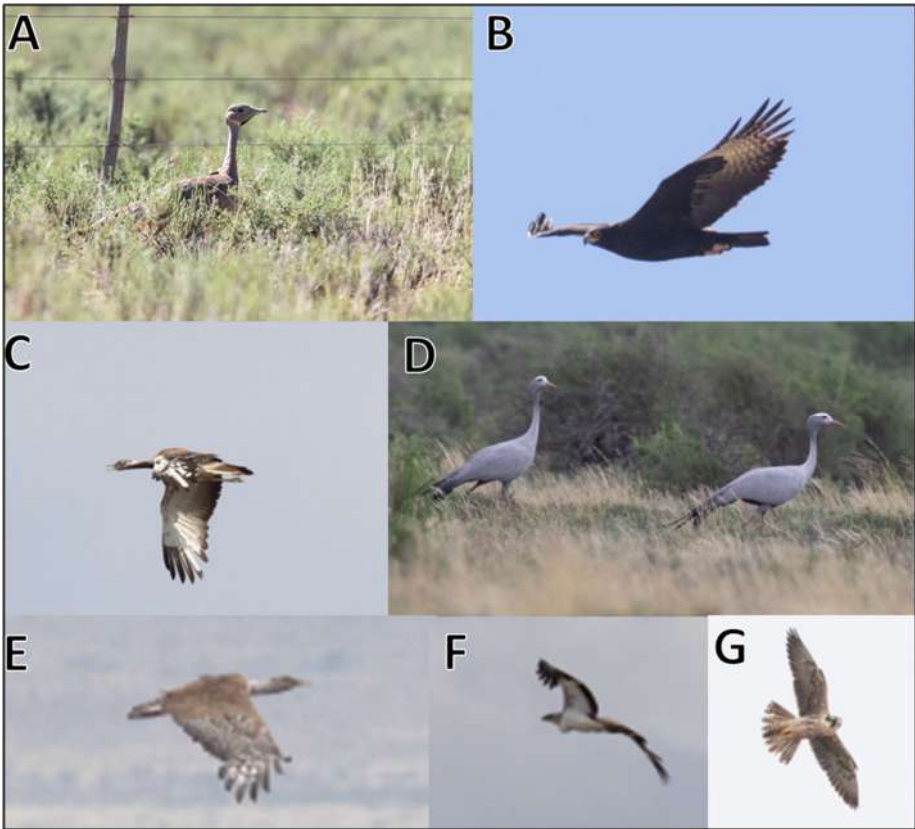


Figure 4.7: Photographs of the recorded species, A Karoo Korhaan, B) Verreauxs Eagle, C) Ludwigs Bustard, D) Blue Crane, E) Kori Bustard, F) Martial Eagle (Juvenile) and G) Lanner Falcon

A number of species were found that would be regarded as high-risk species (Table 4.28 and Figure 4.7). Risk species are species that would be sensitive to habitat loss, that are regarded as collision prone species and species that would have a high electrocution risk. The powerline poses a collision and electrocution risk to the identified risk species.

Table 4.28: At risk species found in the survey.

Common Name	Scientific Name	Collisions	Electrocution	Habitat Loss	Priority score (Ralston et al., 2017)*
African Harrier-Hawk	Polyboroides typus	X	X		95
Amur Falcon	Falco amurensis			X	105
Black Sparrowhawk	Accipiter melanoleucus	X	X		85
Black-headed Heron	Ardea melanocephala	X	X		
Blue Crane	Grus paradisea	x	X	X	115
Egyptian Goose	Alopochen aegyptiaca	X	X		
Greater Kestrel	Falco rupicoloides			X	87
Hadedda (Hadada) Ibis	Bostrychia hagedash	X	X		
Hamerkop	Scopus umbretta	X			
Helmeted Guineafowl	Numida meleagris		X		
Jackal Buzzard	Buteo rufofuscus	X	X		125
Karoo Korhaan	Eupodotis vigorsii	X	X	X	95

Kori Bustard	Ardeotis kori	X	X	X	105
Ludwig’s Bustard	Neotis ludwigii	X	X	X	115
Martial Eagle	Polemaetus bellicosus	X	X	X	130
Northern Black Korhaan	Afrotis afraoides	X	X		90
Pied Crow	Corvus albus		X		
Rock Kestrel	Falco rupicolus			X	
Secretarybird	Sagittarius serpentarius		X	X	125
South African Shelduck	Tadorna cana	X	X		
Spotted Eagle-Owl	Bubo africanus		X		85
Spur-winged Goose	Plectropterus gambensis	X	X		
Verreaux’s Eagle	Aquila verreauxii	X	X	X	145
White-necked Raven	Corvus albicollis		X		

The 2022 Avifaunal Report done by TBC identifies that the impact associated with collisions of avifauna with powerlines are high due to the high number and density of avifauna Species of Conservation Concern (SCC) within the site (a Verreaux’s Eagle nest, located on a 400kV pylon structure is indicated with a blue dot with a yellow circle on the map below). Furthermore, the Gamma Substation is located mainly in an area of High Site Ecological Importance (SEI), with some infrastructure in an area of Very High SEI as shown below. It is important to note that a buffer was not placed around the nest as it was found in an existing powerline, and it is thus assumed that the eagles are habituated to powerline infrastructure to some extent. The specialist proposed that construction activities be undertaken during when the nest is not active.

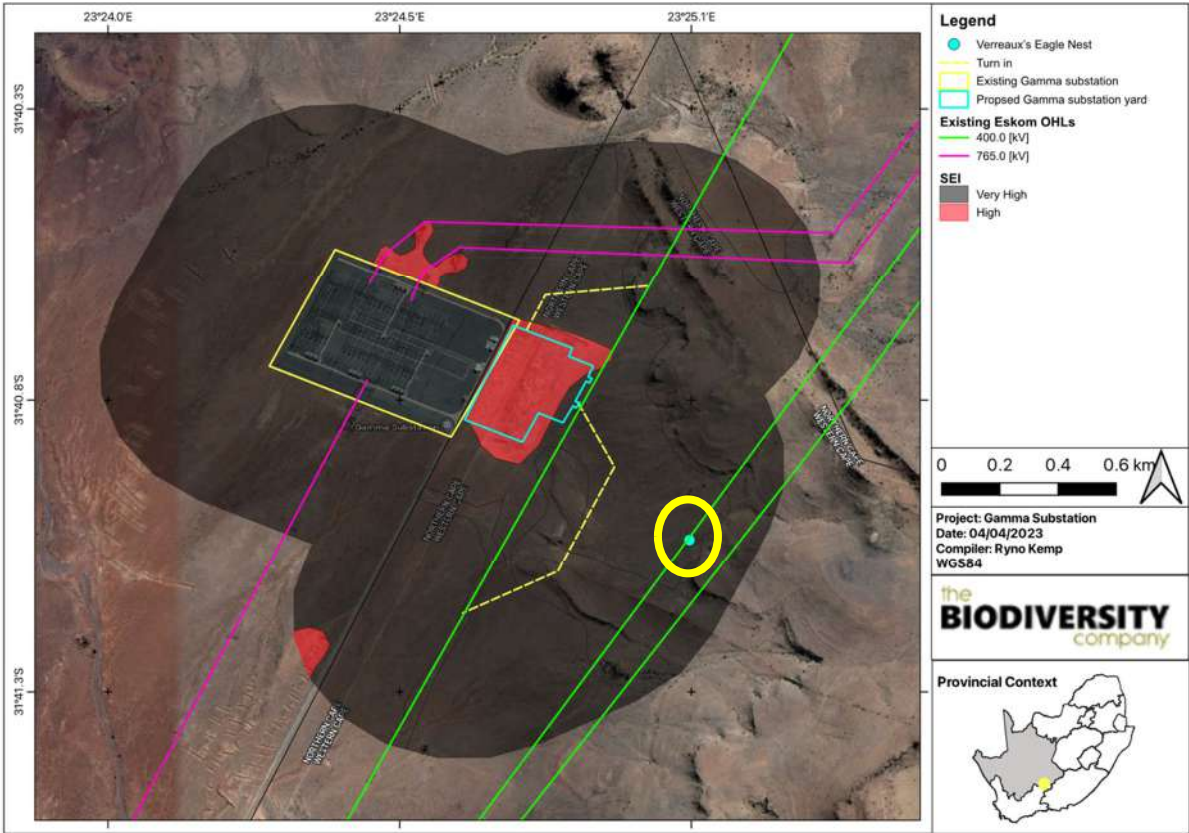


Figure 4.8: Gamma Substation and corresponding Verreaux's Eagle nest (circled in yellow), TBC, 2023

The 2022 Biodiversity and Avifauna Assessment Report identify that the principle impacts of the operational phase are electrocution and collisions due to the powerlines. Birds prone to collisions can be divided into five categories; 1) large species with high body weight ratio to wing span resulting in low manoeuvrability, 2) species that are distracted in flight this include predatory birds and smaller species with areal displays, 3) species flying at high speeds, 4) crepuscular species that are active in low light conditions, and 5) species with limited narrow forward vision (Jenkins et al., 2010; Noguera et al., 2010). Species that tend to fly in flocks also may be influenced more by collisions as the birds flying in the rear will not be able to detect the powerlines. Large passerines are particularly susceptible to electrocution because owing to their relatively large bodies, they are able to touch conductors and ground/earth wires, or earthed devices are simultaneously. The chances of electrocution are increased when feathers are wet, during periods of high humidity or during defecation. Prevailing wind direction also influences the rate of electrocution casualties. Winds parallel or diagonal to cross-arms are the most detrimental, due to exacerbating the difficulty in manoeuvrability during landing or take-off.

Further impacts to avifauna associated with the construction phase of a development include the collection of eggs, nest destruction and poaching as detailed in the table below.

Table 4.29: Impacts to avifauna associated with construction of the development.

Nature: Poaching		
Collection of eggs, nest destruction and poaching		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	Moderate (6)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	Medium	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none">All personnel should undergo environmental induction with regards to avifauna and in particular awareness about not harming, collecting or hunting terrestrial species (e.g., guineafowl, francolin), and owls, which are often persecuted out of superstition.Signs must be put up stating that should any person be found poaching any species they will be fined and/or subject to strict disciplinary action.		
Ideally, construction within 500m of the existing Verreaux’s Eagle nest should be conducted between January and April outside the breeding period of Verreaux’s eagles (note that stringing of the 400kV turn-ins may extend into May). However, if this is not possible, the following mitigations need to be put in place for construction to continue within the 500m buffer:		
<ul style="list-style-type: none">Construction of an artificial nesting platform as soon as April/May 2023 to encourage them to move their current breeding location. The construction of the artificial nesting platform and location of the platform must be undertaken in consultation with a suitably qualified Avifaunal Specialist.Implementing a scientifically sound monitoring program to determine the level of disturbance during construction, only if eagles utilise their current nesting location in close proximity to the substation. A suitably qualified Avifaunal Specialist must be appointed to undertake the monitoring.		
Residual Impacts:		
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers		

Table 4.30: Impacts to biodiversity associated with the proposed operational phase: Collisions with powerlines, connection lines and fences.

Nature: Collision with powerlines and connection lines		
The powerlines and connections create a collision risk to avifauna.		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Permanent (5)	Long term (4)
Magnitude	Very High (10)	Low (4)
Probability	Highly probable (4)	Highly Probable (4)
Significance	High	High
Status (positive or negative)	Negative	Negative
Reversibility	None	None
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none">Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.Powerlines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) or similar diverters that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites.		
Specific mitigation recommendations for the 400kV OHL:		
<ul style="list-style-type: none">Removal of earth wire or increase wire thickness to make it more visible;Use ‘Self Support’ structures and avoid ‘Cross Rope’ structures;Bands or stripes on Conductors (2 black, neoprene bands (35x35cm), crossed, with a bright strip, fixed every 10 m with plastic peg);Static vibration damper, spirals, BFDs or ‘pig-tails’ (White polypropylene spirals, 1 m long, 30 cm diameter, staggered on two static wires to effect marking every 5 m);All the parts of the infrastructure must be nest proofed and anti-perched devices placed on areas that can lead to electrocution;All exposed parts must be covered (insulated) to reduce electrocution risk;All conductor wires in the same horizontal plane.The design of the proposed line must be as per Birdlife specifications.		
Ideally, construction within 500m of the existing Verreaux’s Eagle nest should be conducted between January and April outside the breeding period of Verreaux’s eagles (note that stringing of the 400kV turn-ins may extend into May). However, if this is not possible, the following mitigations need to be put in place for construction to continue within the 500m buffer:		
<ul style="list-style-type: none">Construction of an artificial nesting platform as soon as April/May 2023 to encourage them to move their current breeding location. The construction of the artificial nesting platform and location of the platform must be undertaken in consultation with a suitably qualified Avifaunal Specialist.Implementing a scientifically sound monitoring program to determine the level of disturbance during construction, only if eagles utilise their current nesting location in close proximity to the substation. A suitably qualified Avifaunal Specialist must be appointed to undertake the monitoring.		
Residual Impacts:		
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers		

Table 4.3I: Impacts to biodiversity associated with the proposed operational phase: Electrocution by Powerlines

Nature: Impacts to biodiversity associated with the proposed operational phase: Electrocution by Powerline		
	Without mitigation	With mitigation
Extent	High (4)	High (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	Moderate (6)
Probability	Highly probable (4)	Improbable (2)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation:		
<ul style="list-style-type: none">• Ensure that monitoring is sufficiently frequent (preferably monthly for the first year, followed by quarterly thereafter or advised by the avifaunal specialist based on the results of year 1) to detect electrocutions reliably and that any areas on the powerline along which electrocutions of birds occurred are repaired as soon as possible.• During the first year of operation, quarterly reports summarizing interim findings should be compiled by the owner of the powerlines and submitted to BirdLife South Africa. If the findings indicate that electrocutions have not occurred or are minimal with no red-listed species, an annual report can be submitted.• Any carcasses found beneath power lines should be reported to the Eskom / EWT Incident Reporting Hotline (0860 111 535, email wep@ewt.org.za)• Infrastructure should be consolidated where possible/practical in order to minimise the amount of ground and air space used.• Birdlife Verreuxs Eagle guidelines must be followed, to the extent applicable to the grid connection and related infrastructure.		
Residual Impacts:		
There is a possibility that the eggs to be poached could be that of an SCC with decreasing numbers		

Table 4.32: Impacts to biodiversity associated with the proposed operational phase: Ongoing displacement and direct mortalities of faunal community (Operation of substation and powerline)

Nature: Ongoing displacement and direct mortalities of faunal (including avifauna) community (including SCC) due to disturbance (road collisions, collisions with infrastructure, noise, light, dust, vibration)		
The operation and maintenance of the proposed development may lead to disturbance or persecution of fauna in the vicinity of the development.		
	Without mitigation	With mitigation
Extent	High (4)	Low (2)
Duration	Long term (4)	Short term (2)
Magnitude	High (8)	Low (4)
Probability	Highly probable (4)	Improbable (2)
Significance	High	Low
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	

Mitigation:
See Biodiversity Management Outcomes
Residual Impacts:
Disturbance from maintenance activities will occur albeit at a low and infrequent level. Less migratory species will be found in the area. Road killings are still a possibility. Migratory routes of fauna may change, fauna and flora species composition may change.

Table 4.33: Comparative Impact Table between the findings of the EIA (2007) and the findings of the 2023 Assessments related to this Amendment Application:

Impacts Identified	ACER (2007)		TBC (2022/2023)	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Construction Phase				
Loss of vegetation within the development footprint (new impact)	Not Assessed	Not Assessed	High	Medium
Displacement of faunal (including avifaunal) communities due to habitat loss, direct mortalities and disturbances	Low	Low	Medium	Low
Collection of eggs, nest destruction and poaching (new impact)	Not Assessed	Not Assessed	Medium	Low
Operational Phase				
Continued fragmentation and degradation of habitats and ecosystems	Not Assessed	Not Assessed	High	Low
Ongoing displacement and direct mortalities of faunal community (including SCC) due to disturbance (road collisions, collisions with infrastructure, noise, light, dust, vibration) (new impact)	Not Assessed	Not Assessed	High	Low
Collision of birds with communication tower	Not Assessed	Low	Unchanged	Unchanged
Collisions with powerlines and connection lines (new impact)	Not Assessed	Not Assessed	High	High
Electrocution by substation infrastructure	Not Assessed	Low	Unchanged	Unchanged

Electrocution by powerlines (new impact)	Not Assessed	Not Assessed	High	Low
Impact on quality of supply	Not Assessed	Low	Unchanged	Unchanged

Impacts assessed as part of the 2007 report: Avifaunal Specialist Study, conducted by J Smallie (EWT) as part of the Environmental Impact Assessment (EIA) for the proposed Construction of the 765 KV Gamma Substation on the farms Portion I of Farm Uit Vlugt Fontein and the Remainder of Farm Schietkuil No. 3 in the Western Cape and Northern Cape (DEA REF. No. 12/12/20/873) are considered to be relevant for the proposed new layout. Impacts identified and assessed as part of the Terrestrial Biodiversity and Avifauna Assessment Report (L de Wet, L Steyn, J Jacobs and A Husted, TBC, 2022) are also relevant, though assessed for the entire grid and associated infrastructure including the Gamma Substation and 400kV turn-in footprint. No new impacts further to those that were identified in the most recent study (2022), nor are any new impacts expected. It is considered that impacts so far identified and assessed are an accurate representation of the impacts associated with the proposed new layout of the Gamma substation.

The desktop terrestrial biodiversity theme sensitivity according to the screening tool for a portion of the site area is ‘High’ due to the presence of SCC. A baseline assessment (April 2022) determined the sensitivity of the habitat to be ‘High’ and ‘Very High’.

4.3.2. Cumulative Impacts

Cumulative impacts were not assessed in the 2007 Avifaunal Study (ACER, 2007) whereas, cumulative impacts were assessed as Low for the project considered in isolation and High for the project considered as a cumulative impact with surrounding developments. The table below details the cumulative impacts to biodiversity.

Table 4.34: Cumulative impacts to biodiversity associated with the proposed project.

The development of the proposed infrastructure will contribute to cumulative habitat loss, thereby impacting ecological processes in the region.		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Moderate (3)	Moderate (3)
Duration	Short term (2)	Long term (4)
Magnitude	Low (4)	Moderate (6)
Probability	Probable (3)	Definite (5)
Significance	Low (27)	High (65)
Status (positive or negative)	Negative	Negative
Reversibility	Moderate	Moderate
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		
Should the vegetation be removed, the impact cannot be mitigated.		
Residual Impacts:		
Will result in the loss of:		

- **Less migratory species will be found in the area.**
 - **Road killings are still a possibility.**
 - **Migratory routes of fauna will change.**
 - **Fauna and flora species composition may change.**
 - **Avifauna SCCs will be influenced.**

Cumulative impacts are assessed as part of the TBC, 2022 studies and are considered accurate and applicable to the proposed layout change of the Gamma substation i.e., the inclusion of the Gamma Substation yard and the 400kV turn-in's associated with the existing 400kV Droerivier-Hydra 2 Overhead Powerline. Impacts of the proposed layout change in isolation are expected to be low overall and high when considered cumulatively with other proposed, existing and planned renewable energy facilities and grid connection infrastructure.

There are no advantages of the proposed update to the layout. However, the proposed new layout is not expected to result in an increase in impacts or their associated severities as previously identified. Disadvantages include an increased risk of collisions with powerlines, as identified in the specialist studies.

4.3.3 Mitigation measures

In order to manage the impacts of the proposed Gamma infrastructure effectively, the following **additional** mitigation management impacts are associated with the development.

Table 4.35: Additional mitigation actions required to reduce the significance of the impacts associated with the development are as follows:

Management Outcome: Habitats				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
All development areas must be clearly demarcated. No development is to occur in areas possessing 'Very High' SEI wherever practicable. Only the 'High' SEI areas that have been authorised for development should be intruded into. Pylons may only be considered in "Very High SEI" areas where is it not feasible to span the area entirely. In such instances the minimum possible number of pylons with the smallest possible footprint must be utilised and the disturbance footprint must be strictly controlled. A service track (jeep track) is permissible in Very High SEI areas only to the extent required to establish and maintain the powerline, and only if no other access options are available in areas of lower sensitivity.	Life of operation	Project Manager	Infringement into these areas	Ongoing
Areas of indigenous vegetation outside of the direct project footprint, should under no circumstances be fragmented or disturbed further.	Life of operation	Project Manager	Natural Areas (Karoo scrub, Rocky outcrops and Riparian thicket)	Ongoing
All activities must make use of existing roads and tracks as far as practically and feasibly possible.	Life of operation	Project Manager	Roads and paths used	Ongoing
All laydown areas, chemical toilets etc. should be restricted to existing transformed areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. Use of re-usable/recyclable materials are recommended.	Construction	Project Manager Foreman	Laydown areas and material storage & placement.	Ongoing

Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion.	Life of operation	Project Manager	Site footprint rehabilitation	Ongoing
Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation.	Life of operation	Project Manager	Rehabilitated areas	Ongoing
A spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.	Life of operation	Project Manager Contractors Foreman	Spill events, Vehicles dripping.	Ongoing
Eroded areas must be rehabilitated using the appropriate techniques and re-vegetated using indigenous flora.	Life of operation	Project Manager Contractor	Erosion area	Annually
Management Outcome: Avifauna				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency
A qualified ecologist or suitably experienced Environmental Officer must be on site when construction begins to identify avifauna species that will be directly disturbed. The area must be walked though prior to construction to ensure no avifaunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated.	Construction	Project Manager Contractor	Presence of any fauna	Ongoing

Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances nocturnal avifauna.	Construction	Project Manager Contractor Foreman	Noise levels	Ongoing
No trapping, killing, or poisoning of any avifauna is to be allowed	Life of operation	Project Manager Contractor	Evidence of trapping or carcasses	Ongoing
The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on avifauna	Construction Phase	Project Manager Contractor	Construction	Ongoing
The design of the grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins <i>et al.</i> , 2015).	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds or bird strikes	During Phase
Infrastructure should be consolidated where possible in order to minimise the amount of ground and air space used.	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of bird collisions	During phase

<p>Powerlines must be fitted with industry standard bird flight diverters in order to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23-68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) or similar diverters that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its visibility under low light conditions when most species move from roosting to feeding sites.</p> <p>Specific mitigation recommendations for the 400kV OHL:</p> <ul style="list-style-type: none"> • Removal of earth wire or increase wire thickness to make it more visible; • Use 'Self Support' structures and avoid 'Cross Rope' structures; • Bands or stripes on Conductors (2 black, neoprene bands (35x35cm), crossed, with a bright strip, fixed every 10 m with plastic peg); • Static vibration damper, spirals, BFDs or 'pig-tails' (White polypropylene spirals, 1 m long, 30 cm diameter, staggered on two static wires to effect marking every 5 m); • All the parts of the infrastructure must be nest proofed and anti-perched devices placed on areas that can lead to electrocution; • All exposed parts must be covered (insulated) to reduce electrocution risk; 	<p>Planning and construction</p>	<p>Environmental Officer & Contractor, Engineer</p>	<p>Presence of bird collisions</p>	<p>During phase</p>
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<ul style="list-style-type: none"> All conductor wires in the same horizontal plane. 				
All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase
Install anti-perch devices such as spikes to prevent Pied Crows from nesting/perching. This is especially important to impede excessive predation on <i>Psammobates</i> sp.	Planning and construction	Environmental Officer & Contractor, Engineer	Over predation of tortoise	During phase
Any exposed parts must be covered (insulated) to reduce electrocution risk	Planning and construction	Environmental Officer & Contractor, Engineer	Presence of electrocuted birds	During phase

<p>Ideally, construction within 500m of the existing Verreaux’s Eagle nest should be conducted between January and April outside the breeding period of Verreaux’s eagles (note that stringing of the 400kV turn-ins may extend into May). However, if this is not possible, the following mitigations need to be put in place for construction to continue within the 500m buffer:</p> <ul style="list-style-type: none">Construction of an artificial nesting platform as soon as April/May 2023 to encourage them to move their current breeding location. The construction of the artificial nesting platform and location of the platform must be undertaken in consultation with a suitably qualified Avifaunal Specialist.Implementing a scientifically sound monitoring program to determine the level of disturbance during construction, only if eagles utilise their current nesting location in close proximity to the substation. A suitably qualified Avifaunal Specialist must be appointed to undertake the monitoring.	Planning and construction	Environmental Officer & Contractor, Engineer Avifaunal Specialist to monitor	Presence of Verreaux’s eagles making use of the nest.	During phase
Management Outcome: Environmental Awareness Training				
Impact Management Actions	Implementation		Monitoring	
	Phase	Responsible Party	Aspect	Frequency

<p>All personnel to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within the project area to inform contractors and site staff of the presence of species, their identification, conservation status and importance, biology, habitat requirements and management requirements within the Environmental Authorisation and the EMPr.</p>	<p>Life of operation</p>	<p>Project Manager Health and Safety Officer Contractor Environmental Officer</p>	<p>Compliance to the training.</p>	<p>As needed</p>
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4.3.4 Conclusion

Conclusions from the 2007 Avifaunal Specialist report included the following:

- Impacts are of low significance overall.
- Monitoring must take place once the substation is operational.
- No mitigation measures are recommended as all impacts are low prior to mitigation.

Conclusions from the TBC, 2022 Terrestrial Biodiversity and Avifauna Assessment report (L de Wet, L Steyn, J Jacobs and A Husted, TBC, 2022) related to the Emoyeni Grid infrastructure with those applicable specifically to the Gamma Substation yard and 400kV turn-in footprint extracted included the following:

- The Gamma Substation is located mainly in an area of High Site Ecological Importance (SEI), with some infrastructure in an area of Very High SEI.
- Impact associated with collisions with powerlines are high due to the high number and density of avifauna Species of Conservation Concern (SCC) within the site (a Verreaux’s Eagle nest).
- The development (full grid line and associated infrastructure) in a previously authorised powerline route and the authorised 132kV Emoyeni Grid, therefore, is not regarded as a fatal flaw.
- Provided all mitigation measures are adhered to, the development is supported.

The conclusions of the Site Sensitivity Verification (TBC 2022) for the 132KV grid connection infrastructure, associated access tracks and water course crossings associated with the authorised Emoyeni wind energy facilities (that included the proposed Gamma Substation yard and proposed 400kV powerline turn in footprint) include the following and remain valid for the Part 2 Amendment Application:

- The assessment area was identified with the screening tool as possessing a High and Medium sensitivity within a Faunal context. The Gamma Substation occurs in an area with a High sensitivity. However, the implementation of specific mitigating measures proposed to be implemented will allow for the significance of impacts to be reduced and deemed acceptable for development.
- Presently there are natural habitats within the assessment area that possess a High and Very High SEI. This is due to the numbers and density of avifaunal SCC i.e., the presence of a Verreaux Eagle nest within a pylon structure of an existing 400kV OHL to the east of the Gamma Substation.
- The classification of the screening tool was considered to be largely accurate for most of the grid route however, much of the grid route (assigned Medium sensitivity) should be assigned a higher sensitivity (High) due to the number and density of SCC.
- The sensitivity of the Gamma substation was considered to be accurate at a High sensitivity with the surrounds a Very High sensitivity.

All prescribed mitigation measures and supporting recommendations presented here will help to achieve an acceptable residual impact. These measures and recommendations will remain applicable for the duration of the construction phase of the proposed development. To this end, these measures have been included in the Generic EMPr's for this development as per the requirements of the Environmental Authorisation.

4.4. Visual Assessment Site Description and Findings

In 2007, a full scoping and environmental impact report, inclusive of specialist studies, was undertaken for the proposed 765kV Gamma Substation near Victoria West on the boundary of the Northern and Western Cape (ACER, 2007). The impact assessment entailed the construction of the Gamma Substation alongside the existing 400kV power lines on an area of land approximately 170ha. The visual impact assessment (VIA) for the Environmental Impact Assessment (EIA) was originally undertaken by Cave Klapwijk and Associates (CKA) in May 2007. Environmental Authorisation (EA) was granted on the 19 November 2007. Construction of a portion of the originally assessed development footprint of the Gamma Substation was undertaken following approval.

A desktop assessment of the current affected environment was undertaken in January 2023 to determine the status of the physical landscape characteristics now. As per the previous VIA undertaken in 2007, this consisted of describing the current physical landscape characteristics in terms of the prevailing topography, vegetation cover and land use within the study area. The findings are detailed below.

Topography

The landform of the study area slopes gently south to south-east towards the R63. Low hills form a low horseshoe enclosure to the west, north and east which could provide a low visual barrier. The flat open topography allows direct views onto the site from the R63 and N1. The R63 and N1 are considered the critical viewpoints as these carry most of the viewers that would be exposed to the visual impact.

Vegetation

The study area was reported to be located on the interface between the Upper Nama Karoo and the Eastern Mixed Nama Karoo of the Nama Karoo Biome. It was concluded that the low open vegetation provided no screening of the substation and infrastructure or a visually diverse landscape that could increase the Visual Absorption Capacity of the landscape. Any object or structure would remain visible within this vegetation type.

Land Use

The land use in the study area was predominantly determined at the time to be sheep and goat farming combined with game farming for the hunting market. Urban areas such as Victoria West, Murraysburg, Richmond and Three Sisters were all determined to be at least 40km away. Generally, the economic activity in the areas were deemed not to rely on the visual and aesthetic environment.

The R63 from Murraysburg to Victoria West and the N1 from Three Sisters to Richmond were the main arterial and national routes identified to occur in the study area. These routes were determined to contain critical views towards the site as they carried the most viewers that would be exposed to the visual impact. Additionally, a guesthouse (Skeitkuil Holiday Farm) located adjacent to the N1/R63 intersection was identified to be close to the site but was deemed not to be visually affected.

The current visual comparative assessment study was undertaken by Tosca de Villiers of NuLeaf Planning and Environmental (2023); study was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed development.

Topography

The topography of the study area is flats and gently sloping plains interspersed with hills and rocky areas located in the northeast and north-western portions of the study area. The elevation ranges from 1175m above sea level (a.s.l.) in the south east (along the Brak river) to 1625m a.s.l. at the top of the Bulberg. The existing Gamma Substation itself is located in a lower lying area at an average elevation of 1225m a.s.l. and has an even slope to the south towards the Brak River and Skietkilspruit.

Vegetation

Regionally, the site is located some 40km south east of the town of Victoria West (at the closest) on the boundary of the Northern Cape and Western Cape Province, within a region commonly referred to as the Central Karoo. The study area falls within the arid Nama-Karoo Biome; a biome characterised by its dry semi-desert climate and associated desert-like vegetation. The vegetation cover of the study area is identified as Eastern Upper Karoo, dominated by low shrubs and grasses. Overall, the Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low by virtue of the low growing vegetation and sparsely populated/limited development overall.

Land use

The dominant land use (at present) within the region is sheep farming. There are very limited agricultural activities due to the limited rainfall (less than 300mm per annum) and arid climate. The land cover within the study area is predominately low shrubland (Nama Karoo), bare rock and soil with small, scattered areas of agriculture (rainfed and irrigated) and grasslands. As a result, the landscape is characterised by wide-open expanses of extreme isolation.

Since the initial VIA undertaken by CKA in 2007, **the landscape characteristics comprising the topography, vegetation, as well as land use and land cover of the study area have remained unchanged.** Overall, the study area has retained its low population density with predominately undeveloped, rural and natural character, interspersed with existing industrial infrastructure which includes the Victoria Cap Substations, as well as numerous existing high voltage power lines. The only noticeable change is that the Gamma Substation (as assessed in 2007) has been constructed. Therefore, in the opinion of the author, the status of the environment has largely remained the same.

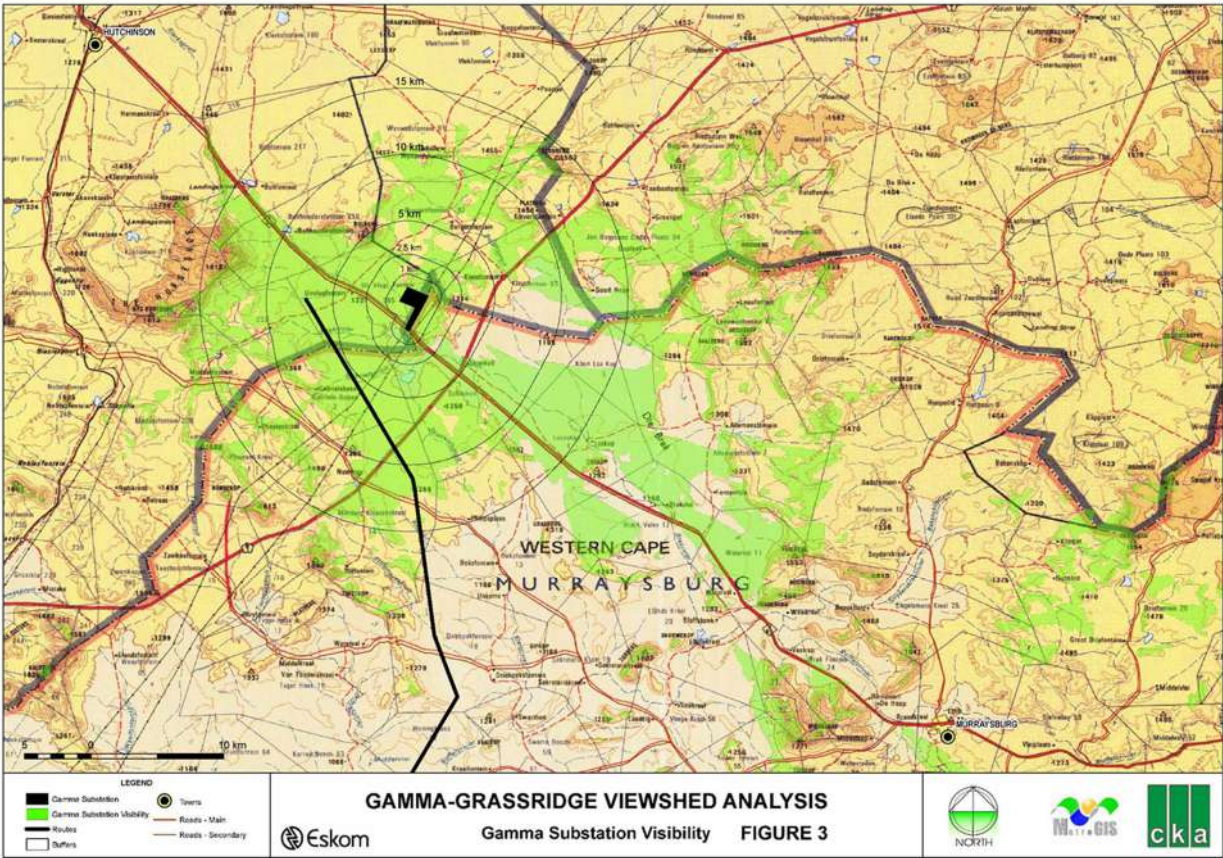


Figure 4.9: Viewshed analysis of the existing Gamma Substation as assessed in 2007 by CKA

The viewshed generated during the initial visual study undertaken by CKA in 2007. It was determined that the viewshed, based on the GIS assessment and fieldwork, extends for the main part beyond a distance of 15km and that local variations in topography and man-made structures would cause local obstruction of views.

The VAC was also concluded to be regarded as low. This implied that the landscape was unable to accept the visual change. In other words, the area would be visually highly impacted on because the characteristics of the landscape were unable to naturally provide amelioration.

4.4.1. Impact Assessment

The viewshed analysis undertaken in 2007, concluded that visibility decreases exponentially over distance and that the visual impact of the substation would be insignificant beyond 10 km. Based on the application of the above, the following affected areas and/or visual receptors potentially sensitive to the Gamma Substation were identified:

- Observers located in the visually exposed areas within the 10km zone. No specific observers were listed.
- The hills and mountains around Murraysburg.
- Travellers moving in a northerly direction on the N1 (located approximately 5km away).
- Observers travelling along the R63 (located within 1km of the site) running north-west to south-east along its southern boundary. It was determined that the views from this road will be within the high impact 1km zone.

The methodology followed applied the concept that the Gamma Substation would be more visible to receptors located within a short distance. These receptors would then experience a higher adverse visual impact than those located at a moderate or long distance from the Gamma Substation. The

distance of the potentially sensitive receptors from the Gamma Substation was then considered when rating the visual impact of the development on identified sensitive receptors. Refer to Figure 4.9 (CKA, 2007).

The distance radii chosen was as follows:

- 0 – 1km (Short distance)
- 1km – 2.5km (Moderate distance)
- 5km – 10km (Long distance)
- 10km – 15km (Very long distance).

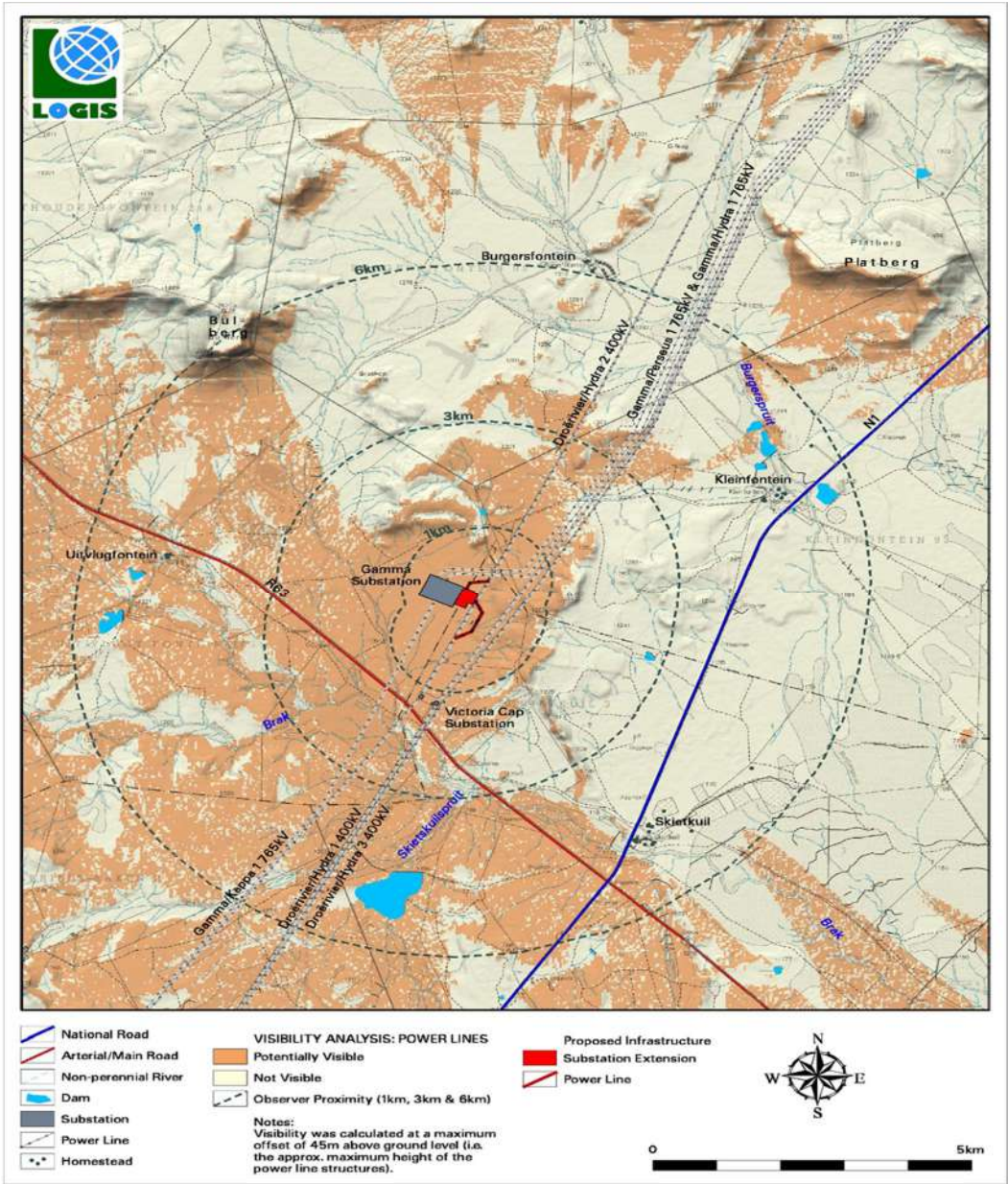


Figure 4.10: Viewshed analysis of the proposed amendments (i.e., Substation extension & 400kV powerline turn-in)

A visibility analysis was undertaken from the proposed Substation extension and 400kV powerline turn-in at an offset of the highest proposed infrastructure (i.e., the power lines) at 45m (i.e., the approximate maximum height of the power line structures) above ground level. The result of this analysis represents the potential total visual exposure of the existing Gamma Substation and Power line dimensions (indicated in green). The viewshed

analysis was repeated at an offset of 45m to indicate the visual exposure (shown in red) of the proposed amendments. The results of the visibility analyses are displayed on Figure 4.11 below.

It is clear that the proposed Substation extension and 400kV powerline turn-in, would have a relatively small influence on the overall visual exposure, due to the presence of the already tall power line existing power line structures and Gamma Substation. There are no additional sensitive visual receptors located within the area of increased visual exposure.

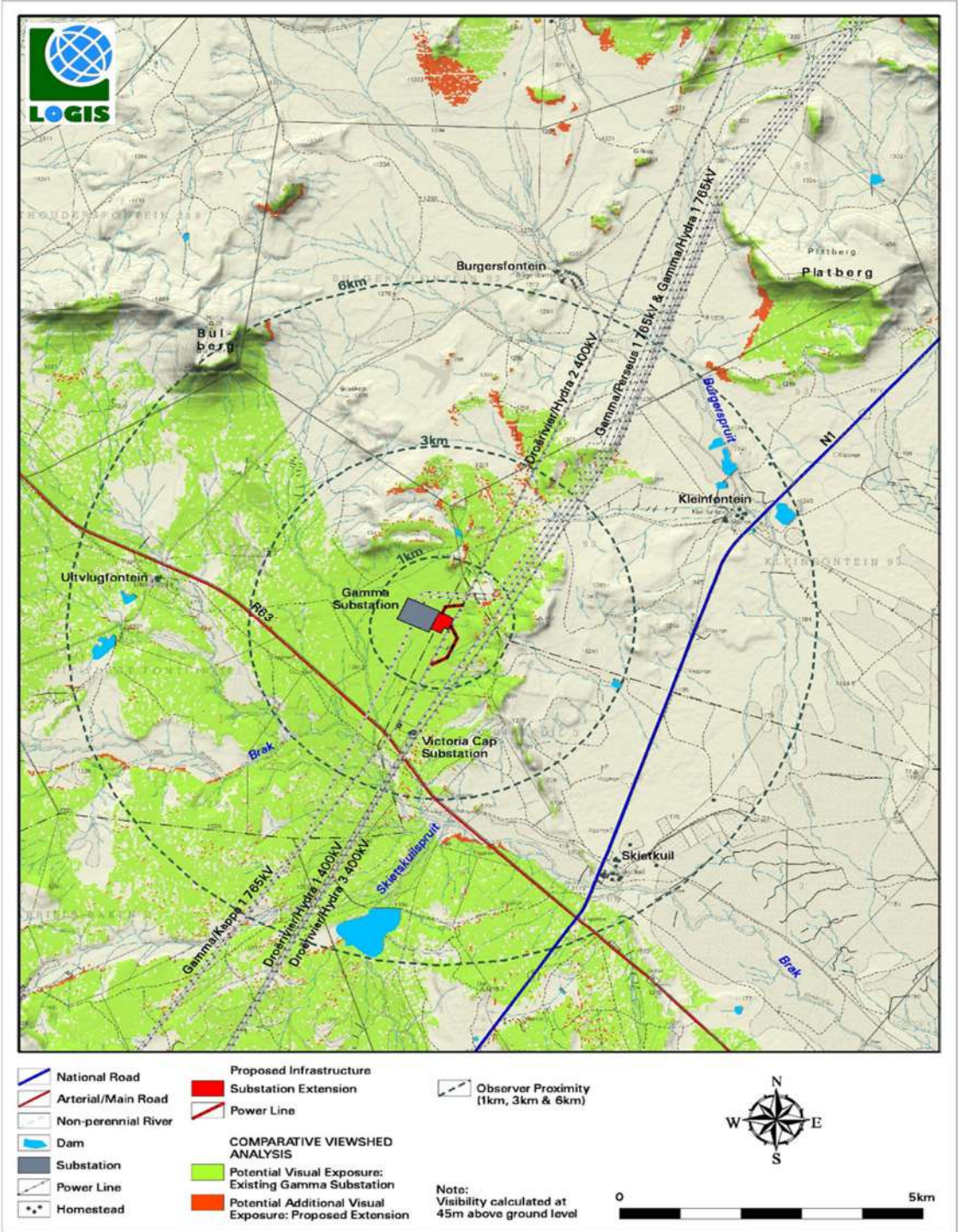


Figure 4.11: Comparative Viewshed Analysis Map.

Potential sensitive visual receptors within an approximately 6km radius include:

- Observers travelling along the N1
- Observers travelling along the R63
- Residents of Uit Vlug Fontein

Table 4.36: Visual Assessment Criteria – Intensity Rating.

Visual Assessment Criteria	Intensity Rating		
	High	Medium	Low
Visibility from existing major roads e.g., N1	Highly visible within 1 km	Partially visible due to roads approximately 2 km from the proposed development	Low visibility due to roads approximately 3 km or more from the proposed development
Visibility from general surrounding landscape	Not obscured by natural landform	Partially obscured by landform	Mostly obscured by surrounding landform
Visual intrusion on landscape character and sense of place	Dominates sense of place	Partially influences sense of place	Has little effect on sense of place
Visual association with existing industrial development	Existing development is easily visible from proposed development (within 2 km)	Existing development is partially visible from proposed development (>2-<5 km)	Existing development is barely noticeable (>6 km) from the proposed development
Visibility from homesteads, game farms, local communities, villages and towns	Highly visible. Dominates view within 500 – 1 000 m	Visible but does not dominate view within range 1 000 - 2 500 m	Visible but are not obviously noticeable in the view > 2 500 m

Table 4.37: Visual Assessment Criteria – Significance Rating

Visual Assessment Criteria	Significance Rating		
	High	Medium	Low
Visibility from existing major roads e.g., N1	Particularly interferes with scenic views from the road	Partially interferes with scenic views from the road	Components are too far from the road to interfere with scenic views
Visibility from general surrounding landscape	Compromises particularly scenic distant views of the landscapes	Particularly noticeable in scenic landscapes	Hardly noticeable in scenic landscapes
Visual intrusion on landscape character and sense of place	Compromises proclaimed conservation and wilderness areas is within 500 – 1 000 m of a natural feature e.g. pans	Compromises particularly scenic landscape features e.g. pans, undisturbed valleys; within 1 000 – 2 500 m	Compromises built up areas which exhibit an industrial character; is less visible, homestead greater than 2 500 m away

Visual Assessment Criteria	Significance Rating		
	High	Medium	Low
Visual association with existing industrial development	Where the development is within 200 m from existing industrial development	Where the development is within 1 000 m from existing industrial development	Where the development is further than 2 500 km from existing development. The visual intrusion is not associated with the other development
Visibility from homesteads, game farms, local communities, villages and towns	Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 500 -1 000 m of the community	Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 1 000 – 2 500 m of the homestead	Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 2 500 m and greater of the homestead

In order to assess the impact of the proposed substation yard and 400kV turn-in infrastructure on the potentially sensitive receptor locations listed above, the VIA undertaken by CKA in 2007 utilised a matrix that took into account a number of factors which was then applied to the development of the Gamma Substation. The matrix adopted was based on the factors as listed below:

- Nature of the Impact
- Extent
- Duration
- Intensity
- Frequency of occurrence
- Probability of occurrence
- Legal requirements
- Significance
- Status of the impact
- Degree of confidence in predictions

Based on the application of this matrix, it was determined that the impact of the Gamma Substation would be as follows during the construction and operational phase:

Table 4.38: Impact table summarising the significance ratings as determined in 2007

765kV Gamma Substation		
Theme	Aesthetics	
Legal requirements	None	
Stage	Construction and Decommissioning	Operation
Extent	Local	Local extending to 15 km
Duration of impact	Short term	Long term
Intensity	High within 1 000 m	High within 1 000 m, medium along roads, low beyond 5 000 m

765kV Gamma Substation		
Frequency of occurrence	Continuous for duration of construction	Continuous
Probability of occurrence	Highly probable	Highly probable
Nature of the impact	Negative	Negative
Cumulative Impact	Low	Medium
Confidence in predictions	Medium	Medium
Ability to adapt	Low (-)	Low (-)
Level of significance	High	Low
Mitigation measures	Limit extent of construction area. Rehabilitate all disturbed areas to reduce visual scarring. Blend earthworks and road access cuttings into the landscape. Limit footprint area to strip only the minimum area required to set up the construction area. Focus all night lighting downwards and limit to that what is necessary only.	Limit night lighting to the minimum.
Level of significance after mitigation	Potentially high	Potentially low
EMP requirements	Yes – environmental rehabilitation and implementation of the design mitigation measures	Environmental maintenance and rehabilitation
Discussion: The visual impact extends beyond the 15 km radius, but the significance thereof is low due to the existing visual clutter and degradation by the existing transmission lines and substation. The area has a low visual absorption capacity due to the low and sparse vegetation, but the development is partially screened to the north, east and west by the low surrounding hills. Critical viewpoints are from the NI and R3. Visual intrusion could be exacerbated at night if the substation is to be lit up at night.		

The impact ratings as determined for the Gamma Substation in 2007 were regarded as significantly low. These findings were based on the field observations and the assessment undertaken, notwithstanding the large extent and height of the substation, the low VAC and the close proximity to the R63 and the NI. The significance was also noted to be tempered by the low surrounding hills, the already altered landscape due to existing transmission lines, substation and major roads and the lack of economic activities that rely on the visual environment such as game reserves, conservation areas and lodges.

The visual comparative assessment conducted by Nuleaf (2023) presented the findings below,

Table 4.39: Impact table summarising the significance of the visual impacts of the proposed infrastructure on sensitive visual receptors in close proximity.

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed infrastructure
--

	<i>Without mitigation</i>	<i>With mitigation</i>
Extent	Very short distance (4)	Very short distance (4)
Duration	Short term (2)	Short term (2)
Magnitude	Very High (10)	High (8)
Probability	Improbable (2)	Very Improbable (1)
Significance	Low (24)	Low (14)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Construction activities may potentially result in a low temporary visual impact both before and after mitigation.

Table 4.40: Impact table summarising the significance of visual impacts on sensitive visual receptors in close proximity to the proposed infrastructure.

<i>Nature of Impact:</i> Visual impact on observers in close proximity to the infrastructure.		
	<i>Without mitigation</i>	<i>With mitigation</i>
Extent	Very short distance (4)	Very short distance (4)
Duration	Long term (4)	Long term (4)
Magnitude	High (8)	High (8)
Probability	Very Improbable (1)	Very Improbable (1)
Significance	Low (16)	Low (16)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	

The proposed infrastructure is expected to have a low visual impact on observers within a 1km radius (and potentially up to a 3km radius) of the infrastructure. The visual impact of the substation extension and 400kV power line turn-in will largely be absorbed by the presence of the existing Gamma Substation and numerous high voltage power line infrastructure already in the study area.

Table 4.41: Impact table summarising the significance of the visual impacts of associated infrastructure on sensitive visual receptors within the region.

<i>Nature of Impact:</i> Visual impact on observers travelling along the roads and residents at homesteads within a 1.5 – 3km radius of the grid connection infrastructure.		
	<i>Without mitigation</i>	<i>With mitigation</i>
Extent	Short distance (3)	Short distance (3)
Duration	Long term (4)	Long term (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Improbable (2)	Improbable (2)
Significance	Low (26)	Low (26)
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	

The proposed infrastructure will have a low visual impact on observers traveling along the R63 and residents of Uit Vlug Fontein within a 1 – 6km radius of the infrastructure.

Table 4.42: Visual Assessment Criteria (CKA, 2007)

Visual Assessment Criteria	Significance Rating		
	High	Medium	Low
Visibility from existing major roads e.g. N1	Particularly interferes with scenic views from the road	Partially interferes with scenic views from the road	Components are too far from the road to interfere with scenic views
Visibility from general surrounding landscape	Compromises particularly scenic distant views of the landscapes	Particularly noticeable in scenic landscapes	Hardly noticeable in scenic landscapes
Visual intrusion on landscape character and sense of place	Compromises proclaimed conservation and wilderness areas is within 500 - 1 000 m of a natural feature e.g. pans	Compromises particularly scenic landscape features e.g. pans, undisturbed valleys; within 1 000 - 2 500 m	Compromises built up areas which exhibit an industrial character; is less visible, homestead greater than 2 500 m away
Visual association with existing industrial development	Where the development is within 200 m from existing industrial development	Where the development is within 1 000 m from existing industrial development	Where the development is further than 2 500 km from existing development. The visual intrusion is not associated with the other development
Visibility from homesteads, game farms, local communities, villages and towns	Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 500 -1 000 m of the community	Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 1 000 - 2 500 m of the homestead	Where the visibility of the development interferes with the way of life such as a tourism enterprise and/or obstructs scenic distant views by being within 2 500 m and greater of the homestead

In light of the results and findings of the Visual Impact Assessment undertaken for the proposed amendments to the Gamma Substation (i.e. substation extension and 400kV power line turn-in), the below table indicates a summary of the impact ratings as determined for the development based on the viewshed modelled, as well as, present day land uses:

Table 4.43: Impact table summarising the significance ratings as determined in 2023.

Significance Ratings Summary (2023)		
	Pre-mitigation impact rating	Post mitigation impact rating
Potential visual impact of construction on sensitive visual receptors in close proximity to the facility	Low (24) (negative)	Low (14) (negative)
Potential visual impact on sensitive visual receptors in close proximity to the infrastructure during the operational phase	Low (16) (negative)	Low (16) (negative)
Potential visual impact on sensitive visual receptors within the area (between 1 – 6km) during the operational phase	Low (26) (negative)	Low (26) (negative)
Potential visual impact of lighting on sensitive visual receptors in the region	Low (26) (negative)	Negligible (11) (negative)
Potential visual impact of the proposed infrastructure on the sense of place of the region	Low (20)	Low (20)

	(negative)	(negative)
Potential visual impact on tourist access routes and tourist destinations within the region	Low (24) (negative)	Low (24) (negative)

The impact ratings as determined in 2007 were expected to be contained to low for the Gamma Substation and associated infrastructure. In comparison, with the addition of the proposed amendments to the Gamma Substation (i.e. substation extension and 400kV power line turn-in), it is expected that the impact ratings will still be low considering the present-day land uses and expected visual exposure. Therefore, no increase in the visual impact is anticipated.

Table 4.44: Comparative Impact Table between the findings of the EIA (2007) and the findings of the 2023 Assessments related to this Amendment Application.

Impacts Identified	CKA (2007)		Nuleaf (2023)	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Aesthetics (viewing distance, visual absorption capacity of the surrounding landscape, scale of the surrounding environment and landform)	Low	Low	Low	Low
Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed infrastructure (new impact)	Not Assessed	Not Assessed	Low	Low
Visual impact on observers in close proximity to the infrastructure (new impact)	Not Assessed	Not Assessed	Low	Low
Visual impact on observers travelling along the roads and residents at homesteads within a 1.5 – 3km radius of the grid connection infrastructure (new impact)	Not Assessed	Not Assessed	Low	Low
Potential visual impact of lighting at night on visual receptors in close proximity to the proposed infrastructure (new impact)	Not Assessed	Not Assessed	Low	Negligible
The potential impact of the development of the proposed grid connection infrastructure on the sense of place of the region (new impact)	Not Assessed	Not Assessed	Low	Low
Visual impact of the proposed development on the tourist access routes (N1 and R63) and tourist destinations within the region (new impact)	Not Assessed	Not Assessed	Low	Low

4.4.2. Cumulative Impacts

Cumulative visual impacts can be defined as the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments. Cumulative visual impact is not just the sum of the impacts of two developments. The combined

effect of both may be much greater than the sum of the two individual effects, or even less. The cumulative impact of the proposed amendment to the Gamma Substation on the landscape and visual amenity is a product of:

- The distance between the substation and power lines;
- The distance over which the structures are visible;
- The overall character of the landscape and its sensitivity to the structures;
- The siting and design of the substation and power line; and
- The way in which the landscape is experienced.

The cumulative impacts as assessed by CKA in the original VIA undertaken in 2007 stated

As the proposed development is to be located adjacent an existing, but smaller substation (Victoria Cap Substation) and alongside several existing transmission lines, the cumulative impacts would increase. This increase cannot be measured empirically. However, it can be assumed that, as visual impacts reduce exponentially with distance, doubling the size and volume of a development may increase the impact exponentially. No quantification of the impacts in terms of an impact rating were made.

A comparative assessment was conducted in the 2023 study which took in consideration the proposed amendments, it is stated that there is no change to the visibility compared with the currently authorized and constructed Gamma Substation and its associated power lines. It is expected that the proposed amendments would be equally visible and noticeable from both the roads and homesteads identified above, therefore signifying a negligible change to the potential visual impact from the currently authorised development at the Gamma Substation.

Table 4.45: Impact table summarising the significance of the cumulative visual impact of the proposed infrastructure when considered with other development in the area on sensitive visual receptors within the region.

<i>Nature of Impact:</i>		
The potential cumulative visual impact of the proposed infrastructure when considered with other development in the area on sensitive visual receptors within the region		
	<i>Overall impact of the proposed project considered in isolation</i>	<i>Cumulative impact of the project and other projects in the area</i>
Extent	Very low (1)	Very low (1)
Duration	Long (4)	Long (4)
Magnitude	Moderate (6)	Moderate (6)
Probability	Very Improbable (1)	Improbable (2)
Significance	Negligible (11)	Low (22)
Status (positive or negative)	Negative	Negative
Reversibility	Reversible (1)	Reversible (1)
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation potential	Very Difficult	

The cumulative visual impacts of the proposed amendment to the Gamma Substation is ultimately expected to be of **low significance**, when considered with the existing infrastructure in the area on sensitive visual receptors within the region. Particularly when considering its remote location and the general low occurrence of potential sensitive visual receptors.

Comparatively since 2007 only the Gamma Substation (the subject of the assessment) has been constructed within the study area. **Additionally, no specific cumulative impact ratings were undertaken in the original 2007 VIA undertaken by CKA.** These variations in data therefore make it difficult to comparatively compare the cumulative impacts expected in 2007 and what can be expected to date (2023) as a result of the proposed amendments to the Gama Substation.

It can however, be stated that since the proposed infrastructure is limited in size and located adjacent to the existing Gamma Substation, as well as, numerous high voltage power lines it is expected that it will likely be seen as an extension of the existing infrastructure on the site already, therefore resulting in a low significance. Taking into account all the above findings, the potential cumulative visual impact is therefore expected to be within acceptable limits, as it is not expected to contribute significantly to the increased cumulative visual impact of grid infrastructure in the region.

4.4.3. Conclusion

Since the initial VIA undertaken by CKA in 2007, the landscape characteristics comprising the topography, vegetation and land use of the study area have remained unchanged.

Overall, the study area has retained its low population density with predominately undeveloped, rural and natural character, interspersed with existing industrial infrastructure which includes the Victoria Cap Substations, as well as, numerous existing high voltage power lines. The only noticeable change is that the Gamma Substation (as assessed in 2007) has been constructed. Therefore, in the opinion of the author, the status of the environment has largely remained the same.

In consideration of the proposed amendments, there is no (zero) change to the visibility compared with the currently authorized and constructed Gamma Substation and its associated power lines. It is expected that the proposed amendments would be equally visible and noticeable from both the roads and homesteads identified above, therefore signifying a negligible change to the potential visual impact from the currently authorised development at the Gamma Substation.

The impact ratings as determined in 2007 were expected to be contained to be low for the Gamma Substation and associated infrastructure. In comparison, with the addition of the proposed amendments to the Gamma Substation (i.e. substation extension and 400kV power line turn-in), it is expected that the impact ratings will still be low considering the present-day land uses and expected visual exposure. Therefore, no increase in the visual impact is anticipated.

The cumulative visual impacts of the proposed amendment to the Gamma Substation is ultimately expected to be of low significance, when considered with the existing infrastructure in the area on sensitive visual receptors within the region. Particularly when considering its remote location and the general low occurrence of potential sensitive visual receptors. The potential cumulative visual impact is therefore expected to be within acceptable limits, as it is not expected to contribute significantly to the increased cumulative visual impact of grid infrastructure in the region.

The sensitivity of the visual environment for the proposed amendment to the Gamma Substation, as determined by the Site Sensitivity Verification Report undertaken, is moderate, owing to the low VAC of the area, the presence of an arterial road (R63) located within 1 – 2km of the proposed amendments, as well as the presence of the existing Substation and high voltage power lines on the site. The visual impact is already in place and the proposed amendment is expected to contribute to the existing visual clutter.

Based on the above assessment, there has been no changes in the land cover and minimal changes in land uses (i.e. the construction of the Gamma Substation). Additionally, the impacts as assessed at present will be low. Therefore, it is recommended that the proposed Part 2 Amendment of the Existing Gamma Substation and 400kV Powerlines be supported, subject to the conditions and recommendations as stipulated in the current EA, and

according to the Environmental Management Programme (EMPr), as well as, the suggested mitigation measures, as provided in this and the original Visual Impact Assessment report compiled in 2007.

4.5. Soil and Agricultural Potential Site Assessment and Findings

No separate Soil and Agricultural assessment was carried out for the Gamma substation in terms of the EIA report (ACER, 2007).

The following 2007 studies for the Gamma Substation were however undertaken in 2007 and reviewed by TBC for the purposes of the assessment of the soil and agricultural potential for the additional infrastructure for the Gamma Substation:

- 1 The 2007 Geotechnical Aspects Regarding Foundation Conditions at Gamma Substation’s Two Proposed Sites conducted by PG Hansmeyer, and 2007 Specialist Report:
- 2 Land Use (no authors provided) as part of the Environmental Impact Assessment (EIA) for the proposed Construction of the 765 KV Gamma Substation on the farms Portion I of Farm Uit Vlugt Fontein and the Remainder of Farm Schietkuil No.3 in the Western Cape and Northern Cape (DEA REF. No. 12/12/20/873)

The Biodiversity Company (TBC) then conducted a site assessment in April 2022, followed by a Sensitivity Verification in October 2022. Associated site visits were conducted in March 2022, April 2022 and August 2022.

The geotechnical assessment study (2007) assessed two sites for the Gamma Substation - that is the Kleinfontein site adjacent to the NI and the “inland” site on Uit Vlugt Fontein, some 3km due west of the above site. Both sites were deemed to underlain by greyish-blue shale of the Beaufort Group intruded by NW trending dolerite dykes which form prominent landmarks in the otherwise flat topography of the two site’s immediate surroundings – see Plate 1 below.



Plate 1: dolerite ridge on adjacent the Remainder of farm Schietkuil

The Uit Vlugt Fontein site was observed to be blanketed by ivory coloured, partially to well cemented calcrete, some 1.0 to 1.5m thick, sequentially underlain by shale bedrock in various stages of weathering. As indicated by the local borrow pits, road cuttings, access roads and drainage courses, the immediate surroundings of the Uit Vlugt Fontein site were blanketed by calcrete – see Plate 2 below.



Plate 2: Calcrete exposed in cutting in tarred road near Uit Vlugt Fontein

Although both sites were underlain by fairly competent founding material – that is shale bedrock, the Uit Vlugt Fontein site’s calcrete was concluded as to be used not only as a founding medium but also for construction of pavement layers. Based on these observations, it was recommended that the Gamma Substation be located on Uit Vlugt Fontein.

The Land Use study (2007) noted that approximately 80% of the Karoo veld types are severely degraded, an outcome of nearly two centuries of a specific land-management pattern which involved:

- Effectively stable stock numbers on the rangeland, leading to an unvarying level of demand for herbage. In contrast, the supply of herbage is dependent on rainfall which is extremely variable. Thus the incremental supply of herbage in any given year could vary from nothing to twice the long-term notional average, while the pressure from live-stock remained the same. The prudent response to these conditions is to impose a very light stocking rate, thus allowing for the possibility that carry-over herbage from good years could sustain the system in poor years; but
- Observed persistent heavy stocking relative to the productivity of the system over the entire time-span, thus precluding the opportunity to preserve fodder or to allow recovery periods for the plants.

This thus concluded that the development being limited to civil engineering works, within the boundary fence of the site would therefore have no impact on the land use of the surrounding unaffected area and no mitigation actions would be necessary there.

4.5.1. Impact Assessment

No impact assessment was conducted as part of the 2007 Geotechnical Aspects Regarding Foundation Conditions at Gamma Substation’s Two Proposed Sites report as this is not a requirement for a Geotechnical investigation. Cumulative impacts were not assessed as this is not a requirement of a Geotechnical investigation. The Impact Assessment from the 2007 Specialist report: Land Use study included a description of possible impacts but no impact tables. Impacts included:

- No impact on the land use was expected.
- Erosion is identified as a potential impact where disturbance occurs as a result of construction.

No impact assessment was conducted for the TBC, 2022 Agricultural Compliance Statement Report (I Baker, M Mamera, TBC, 2022) as a Low sensitivity for agriculture as defined by the screening tool required a compliance statement and not a full impact assessment. Cumulative impacts were not assessed.

The Site Sensitivity Verification (TBC August, 2022) for the 132KV grid connection infrastructure, associated access tracks and water course crossings associated with the authorised Emoyeni wind energy facilities (including the proposed Gamma Substation Yard and the 400kV powerline turn in footprint), does not include an impact assessment and associated tables due to its nature as a Site Sensitivity Verification.

4.5.2. Cumulative Impacts

The impact assessment as above still applies for cumulative view on the impacts. i.e.

- No serious impacts are expected.
- Erosion should be avoided, particularly the sedimentation of nearby water sources.

4.5.3. Conclusion

Conclusions from the 2007 Geotechnical Aspects Regarding Foundation Conditions at Gamma Substation's Two Proposed Sites report included the following:

- The current Gamma substation site is 'underlain by greyish-blue shale of the Beaufort Group intruded by NW trending dolerite dykes'.
- The current Gamma substation site is 'covered in partially to well cemented calcrete sequentially underlain by shale bedrock in various stages of weathering.'
- Some powerful excavation was determined to be necessary with concrete aggregate anticipated to have to be imported from De Aar and Port Elizabeth.

Conclusions from the 2007 Specialist Report: Land Use included the following:

- No serious impacts are expected.
- Erosion should be avoided, particularly the sedimentation of nearby water sources.

Conclusions from the TBC, 2022 Agricultural Compliance Statement report (I Baker and M Mamera, TBC, 2022) related to the Emoyeni Grid infrastructure with those applicable specifically to the Gamma Substation extracted included the following:

- The Gamma Substation is located in an area of Low Agricultural potential.
- The substation area is not associated with any arable soils with suitable land use limited to grazing and wildlife farming.

The Site Sensitivity Verification (TBC 2022) for the 132KV grid connection infrastructure, associated access tracks and water course crossings (including the Gamma Substation and 400kV turn-in footprint), does not include an impact assessment and associated tables due to its nature as a Site Sensitivity Verification. The conclusions of the Site Sensitivity Verification (TBC 2022) for the 132KV grid connection infrastructure, associated access tracks and water course crossings associated with the authorised Emoyeni wind energy facilities include the following:

- The assessment area was identified with the screening tool as possessing a Low land capability.
- The Gamma Substation area has Low land capability.
- The classification of the screening tool was considered to be accurate.

Mitigation measures prescribed by each of the reviewed specialist reports remain applicable and must be adhered to

In order to manage the impacts effectively, the following additional mitigation management should be put into place for the general impacts associated with soils:

- To minimise the footprint of construction as much as possible.
- Where soil is removed/disturbed, ensure it is stored for rehabilitation and revegetated as soon as possible.
- Implement all appropriate soil conservation measures, including contouring, re-vegetation, geotextiles and slope stabilisation (for all infrastructure).
- Management of stormwater and discharge from the facility, to avoid scouring of the receiving area.

The desktop agricultural theme sensitivity according to the screening tool for the site area is ‘Low’ due to the lack of agricultural potential. A compliance statement assessment confirmed the ‘Low’ classification of the Gamma substation area (April 2022), which was then confirmed by the Sensitivity Verification (October 2022). Impacts identified as part of the 2007 Specialist Report: Land Use as part of the Environmental Impact Assessment (EIA) for the proposed Construction of the 765 KV Gamma Substation on the farms Portion I of Farm Uit Vlugt Fontein and the Remainder of Farm Schietkuil No. 3 in the Western Cape and Northern Cape (DEA REF. No. 12/12/20/873) are considered to be relevant for the proposed new layout. **No new impacts** were identified further to those identified in the most recent study (2022), nor are any new impacts expected. It is considered that impacts so far identified and assessed are an accurate representation of the impacts associated with the proposed new layout of the Gamma substation.

In terms of soils there are no advantages of the proposed new layout. However, the proposed new layout **is not expected to result in an increase in expected impacts or their associated severities**. Disadvantages include an additional erosions risk associated with construction. All prescribed mitigation measures and supporting recommendations presented here will help to achieve an acceptable residual impact. These measures and recommendations will remain applicable for the requested extension of the EA. To this end, these measures have been included in the updated EMPr for this development as per the requirements of the Environmental Authorisation.

As such, should the measures described above, and as included in the updated EMPr for this development be implemented, it is the reasoned opinion of the specialist that the proposed layout changes i.e. the inclusion of the proposed substation yard within the authorised footprint of the existing Gamma Substation and the proposed turn-in of the Droer-Hydra 2 400kV powerline be approved.

4.6. Heritage Assessment Site Description and Findings

The Heritage Impact Assessment previously undertaken for the Eskom Gamma Substation was completed by van Schalkwyk and Wahl from eThembeni Cultural Heritage in 2007.

The assessment determined that the study area comprised a diverse, natural and physical environment and considerably varying climatic conditions. The following landscape description refers to the various power line route options and should be read in conjunction with the accompanying map.

Numerous heritage resources were found to be present along the proposed power line route, including buildings and structures; an historical settlement; the landscape of the Camdeboo Karoo and the Springbokvlakte; archaeological sites; graves and traditional building techniques. However, the aim of the 2007 heritage impact assessment was to evaluate the six kilometre wide proposed corridor in terms of general heritage resource presence, to obtain a ‘best fit’ for the eventual power line route

At the site of the Gamma Sub-station, there was note of presence of miscellaneous Middle Stone Age stone knapping debris some 50 metres north of a windmill, at S31. 41.400; E23 24.620. Artefacts were water washed and weathered, on patinated shale, and were part of colluvial down slope wash. Another concentration of archaeological material was present immediately to the west of the existing entrance gate to the property, at S31 41.950; E23 24.325. Here very weathered Early Stone Age flakes and cores were mixed with Middle Stone Age knapping detritus. It appeared that episodes of

soil deflation and pedogenesis had caused the two temporally disparate traditions to mix. Artefacts were eroding open, exposed by down slope wash, and also mixed with other colluvial debris.

These sites were deemed to have **low heritage significance** for their scientific value

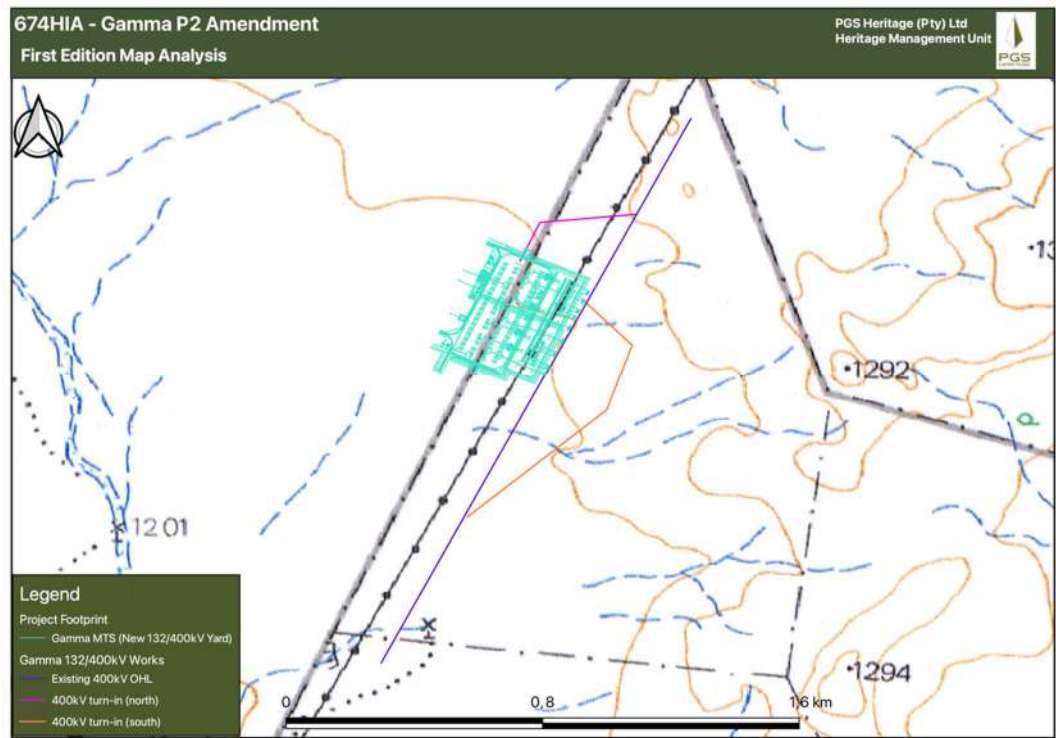


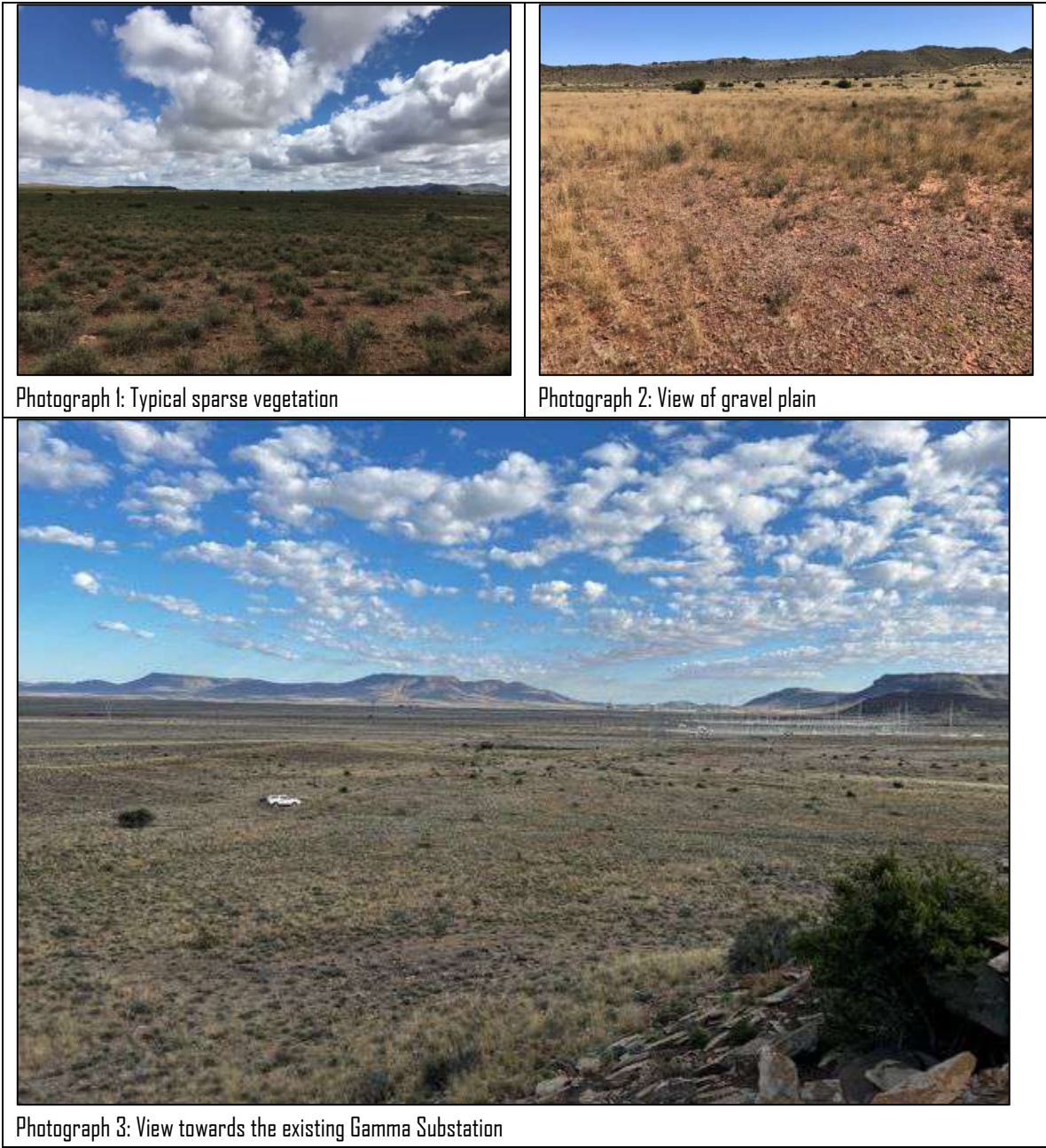
Figure 4.12 - Enlarged section of 3123CB Ed 1 1973 sheet.

A follow up site visit was conducted by an archaeologist from PGS in **July 2022** with the general vicinity of the area being assessed.

The Vegetation type is classified as Eastern Upper Karoo (Mucina & Rutherford, 2006; SANBI, 2022).

Eastern Upper Karoo vegetation is characterised by “Flats and gently sloping plains (interspersed with hills and rocky areas of Upper Karoo Hardeveld in the west, Besemkaree Koppies Shrubland in the northeast and Tarkastad Montane Shrubland in the southeast), dominated by dwarf microphyllous shrubs, with ‘white’ grasses of the genera *Aristida* and *Eragrostis* (these become prominent especially in the early autumn months after good summer rains). The grass cover increases along a gradient from southwest to northeast” (Mucina & Rutherford, 2006; SANBI, 2022).

The area is characterised by Middleton Formation (Brownish-red and greenish-grey mudstone, subordinate siltstone and sandstone)(Council of Geoscience, 2022). Figure 4.13 provides a general views and landscape features of the proposed development area.



Photograph 1: Typical sparse vegetation

Photograph 2: View of gravel plain

Photograph 3: View towards the existing Gamma Substation

Figure 4.13: Characteristics of the surrounding area around the Gamma Substation

Historical maps (1900 and 1912) and topographic maps (1:50 000) were utilized to observe the development of the area, as well as the location of possible historical structures and burial grounds within or immediately adjacent to the study area that could possibly be older than 60 years and thus protected under Section 34 and 36 of the NHRA. However, **no structures were identified within the study area.**

Previous studies of the areas surrounding the region have shown a rich archaeological and historical history. The creation of the REDZ and the ensuing applications for WEFs in this area has resulted in several HIAs having been compiled for the region since 2011. These reports have addressed the region’s archaeological and palaeontological heritage, with very few addressing issues and impacts related to the cultural landscape of the area. Presently, the research done by Winter (2021) for the Modderfontein WEF presents the only available report documenting the historical and cultural research, in terms of the cultural landscape for the area.

The evaluation of satellite imagery and the analysis of the studies previously undertaken in the area has indicated that certain areas may be sensitive from a heritage perspective. Archaeological surveys and studies in the Karoo have shown rocky outcrops, dry riverbeds, riverbanks and confluence to be prime localities for archaeological finds and specifically Stone Age sites (Orton, 2012; Fourie, 2015). The following areas within the study area have been referenced as having possible heritage sensitivity:

- Drainage lines/ Dry water course

Drainage lines, such as dry riverbeds, erosion dongas as well as sheet erosion has been shown to yield rich archaeological deposits due to the exposure of archaeological material as well as the fact that human settlement is drawn to water sources in arid regions (Kruger 2012; Orton 2012; PGS 2012).

- Ridges/Outcrops

Numerous ridges, koppies and mountains have been identified in the study area and are associated with human settlement and activity. Stonewalling from herders, rock engravings and knapping sites associated with Later Stone Age manufacturing technology is known to occur in these areas (Arthur, 2008, Kruger 2012; Orton 2012; PGS 2011 and 2012, Van Ryneveld 2008).

The original application was subject to an HIA completed by van Schalkwyk and Wahl from eThembeni Cultural Heritage in 2007. The original study noted:

“...the presence of miscellaneous Middle Stone Age stone knapping debris some 50 metres north of a windmill, at S31. 41.400; E23 24.620. Artefacts are water washed and weathered, on patinated shale, and are part of colluvial down slope wash.

Another concentration of archaeological material is present immediately to the west of the existing entrance gate to the property, at S31 41.950; E23 24.325. Here very weathered Early Stone Age flakes and cores are mixed with Middle Stone Age knapping detritus. It appears that episodes of soil deflation and pedogenesis have caused the two temporally disparate traditions to mix. Artefacts are eroding open, exposed by down slope wash, and are mixed with other colluvial debris.

These sites have low heritage significance for their scientific value and, as is the case for all heritage resources, a permit from SAHRA is required for any alteration to them.”

A site visit was conducted by an archaeologist from PGS (Henk Steyn) between 20th – 21st July 2022 to assess the landscape of the study area. During the field work, **no further archaeological sites, structures or burial grounds and graves were identified.**



Figure 4.14: - Fieldwork tracklogs.

Impact Assessment

The impact assessment rating is based on the rating scale as contained in the terms of reference and environmental Impact methodology. The following section considers the original assessment in relation to the new proposed layout to the approved Gamma substation.

The original study (ACER, 2007) found that most archaeological finds were out of context.

The following general observations apply for the impact assessment undertaken in this 2023 comparative assessment report:

- No additional heritage resources were identified. Despite an intensive walkthrough of the footprint area, no evidence for any archaeological or heritage sites could be identified. As a result, **no impact is expected from the proposed Phase 2 amendment on heritage.**
- It is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the size of the study area and the subterranean nature of some heritage sites. The impact assessment conducted for heritage sites assumes the possibility of finding heritage resources during the project life and has been conducted as such.

Table 4.46: Assessment of the Impact of the proposed Phase 2 Amendment on unidentified heritage resources (2023).

Nature: Damage to unidentified heritage resources within the proposed development area.		
	Without mitigation	With mitigation
Extent	2	1
Duration	5	5
Magnitude	4	2
Probability	2	1
Significance	Low (22)	Low (8)
Status (positive or negative)	Negative	Negative
Reversibility	Very Low (irreversible)	Very Low (irreversible)
Irreplaceable loss of resources?	Yes (Complete loss of resources)	Yes
Can impacts be mitigated?	Yes	
Mitigation: During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the chance find procedure should be implemented.		
Residual Impacts: Considering the nature of the site identified in the present study, the residual risk will be low.		

The impact calculation shows a **LOW negative** rating pre- and post-mitigation.

Table 4.47: Assessment of the Impact of the proposed Phase 2 Amendment on the cultural landscape (2023).

Nature: During the construction phase, the possibility of impacting on the cultural landscape within the proposed development area is considered lower since the phase I of the Gamma substation project has already been completed.		
	Without mitigation	With mitigation
Extent	Local (2)	Local (2)
Duration	Permanent (5)	Permanent (5)
Magnitude	Low (3)	Low (2)
Probability	Probable (3)	Improbable (2)
Significance	Medium (30)	Low (18)
Status (positive or negative)	Negative	Negative
Reversibility	Very Low (irreversible)	Very Low (irreversible)
Irreplaceable loss of resources?	Yes (Complete loss of resources)	Yes
Can impacts be mitigated?	Yes	
Mitigation: Mitigation measures as stated within this report, will reduce the impact of this facility on the overall load. However, it should be noted that even with the implementation of the mitigation measures, the negative visual impact on the broader cultural landscape, will remain unchanged. The mitigation measures proposed for heritage resources will reduce the negative cumulative impact on the cultural landscape and should be implemented as recommended. The following general mitigation measures are proposed:		

Planning: Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude.
Operations: Maintain the general appearance of the development as a whole.
Decommissioning: Remove infrastructure not required for the post-decommissioning use. Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications
Residual Impacts: Considering the nature of the site identified in the present study, the residual risk will be moderate and possibly permanent.

Table 4.48: Heritage Management Plan for EMPr implementation.

Area and site no.	Mitigation measures	Phase	Timeframe	The responsible party for implementation	Monitoring Party (frequency)	Target	Performance indicators (monitoring tool)
General project area	Implement chance find procedures in case where possible heritage finds are uncovered.	Construction and operation.	During construction and operation	Applicant ECO Heritage Specialist	ECO (monthly / as or when required)	Ensure compliance with relevant legislation and recommendations from SAHRA under Section 34-36 and 38 of NHRA	ECO Monthly Checklist/Report

Table 4.49: Comparative Impact Table between the findings of the EIA (2007) and the findings of the 2023 Assessments related to this Amendment Application:

Impacts Identified	eThembeni Cultural Heritage (2007)		PGS (2023)	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Cultural heritage artefacts (damage to heritage resources/artifacts)	Low	Low	Low	Low
Damage on cultural landscape (new impact)	N/A	N/A	Medium	Low

Cumulative Impacts

The following must be considered in the analysis of the cumulative effect of development on heritage resources:

- Fixed datum or dataset:** There is no comprehensive heritage data set for the Beaufort West region and thus we cannot quantify how much of a specific cultural heritage element is present in the region. The region has never been covered by a heritage resources study that can account for all heritage resources. Further to this none of the heritage studies conducted can with certainty state that all heritage resources within the study area has been identified and evaluated;

- Defined thresholds:** The value judgement on the significance of a heritage site will vary from individual to individual and between interest groups. Thus, implicating that heritage resources' significance can and does change over time. And so, will the tipping threshold for impacts on a certain type of heritage resource;
- Threshold crossing:** In the absence of a comprehensive dataset or heritage inventory of the entire region we will never be able to quantify or set a threshold to determine at what stage the impact from developments on heritage resources has reached or is reaching the danger level or excludes the new development on this basis. (Godwin, 2011)

Presently, the research done by Winter (2021a, 2021b) for the Modderfontein WEF and Great Karoo Renewable Energy WEF, Solar Energy Facility and Grid Connection presents the only available report documenting the historical and cultural research, in terms of the cultural landscape for the area. Without a regional database of this information, it is impossible to offer a true cumulative impact of the addition of the new proposed layout to the approved Gamma substation. Cumulative impact assessment on cultural landscapes for the area is therefore based on minimal information and assumptions drawn from the general information of the area and the limited local cultural landscapes assessments that have been done for other proposed WEF facilities in the Karoo region where the cultural landscape is most similar.

Table 4.50: Cumulative Impact Table for heritage resources.

Nature: The extent that the addition of this project will have on the overall impact of developments in the region on heritage resources. Cumulative impacts to heritage resources would occur during the construction and operation phase when the ground surface is cleared for the power pylons and service roads are excavated.		
	<i>Overall impact of the proposed project considered in isolation</i>	<i>Cumulative impact of the project and other projects in the area</i>
<i>Extent</i>	Low (1)	High (3)
<i>Duration</i>	Long-term (4)	Long-term (4)
<i>Magnitude</i>	Low (4)	Moderate (6)
<i>Probability</i>	Unlikely (2)	Unlikely (2)
<i>Significance</i>	Low (18)	Low (26)
<i>Status (positive or negative)</i>	Negative	Negative
<i>Reversibility</i>	Low	Low
<i>Irreplaceable loss of resources?</i>	Yes	Yes
<i>Can impacts be mitigated?</i>	Yes	Yes
Mitigation: It can clearly be noted that the wider study area in general is abundant with Stone Age and historical remains. However, until a regional detailed study is commissioned by HWC or SAHRA, no further mitigations measures can be proposed other than those already recommended for the site-specific mitigation of sites in this report.		
Residual Impacts: Considering the nature of the site identified in the present study, the residual risk will be moderate.		

Table 4.5I: Cumulative Impact Table for cultural landscape.

<p>Nature:</p> <p>The extent that the addition of this project will have on the overall impact of developments in the region on the cultural landscape.</p> <p>Cumulative impacts to the cultural landscape would occur during the construction and operation phase when the ground surface is cleared for the power pylons and service roads are excavated.</p>		
	<i>Overall impact of the proposed project considered in isolation</i>	<i>Cumulative impact of the project and other projects in the area</i>
<i>Extent</i>	Low (1)	High (3)
<i>Duration</i>	Long-term (4)	Long-term (4)
<i>Magnitude</i>	Low (4)	Moderate (6)
<i>Probability</i>	Unlikely (2)	Unlikely (2)
<i>Significance</i>	Low (18)	Low (26)
<i>Status (positive or negative)</i>	Negative	Negative
<i>Reversibility</i>	Low	Low
<i>Irreplaceable loss of resources?</i>	Yes	Yes
<i>Can impacts be mitigated?</i>	Yes	Yes
<p>Mitigation:</p> <p>It can clearly be noted that the wider study area in general is abundant with heritage resources. However, until a regional detailed cultural landscape study is commissioned by HWC or SAHRA, no further mitigations measures can be proposed other than those already recommended for the site-specific mitigation of sites in this report.</p>		
<p>Residual Impacts:</p> <p>Considering the nature of the site identified in the present study, the residual risk will be moderate.</p>		

Considering the development of other renewable facilities in and around the Beaufort West REDZ, the cumulative unmitigated impacts on heritage resources and cultural landscape consist of a medium negative impact mostly confined to the construction phase of the project. This could potentially result in an unacceptable loss of cultural heritage resources. However, by implementing the mitigation measures as listed in this report the cumulative impacts can be managed to **low negative**.

Conclusion

The evaluation of the original HIA has shown that the status quo of the Gamma Substation project area has primarily stayed the same and no significant changes from a heritage resources perspective was identified. The impact rating has stayed the same. The study considered the original assessment in relation to the proposed second phase of construction for the approved substation and associated infrastructure. The original study found that most archaeological finds were out of context. Considering that no further heritage resources were identified, **no impact is expected from the second phase of the construction project on heritage**. Therefore, the impact calculation shows a **LOW negative rating pre and post-mitigation**.

It is the considered that the overall impact of the proposed Phase 2 amendment on heritage resources will be **Low**. Provided that the general recommendations and mitigation measures outlined are implemented, the impact would be acceptably Low or could be totally mitigated to the degree that the project amendment could be approved from a heritage perspective.

4.7. Palaeontology Assessment Site Description and Findings

Butler (2022) conducted a Palaeontological Impact Assessment for the proposed Power Line and Grid connection for the authorised Umsinde Emoyeni and Khangela Emoyeni Wind Energy Facilities. This study included the development of a 132kV powerline, 132kV on-site substations/ switching stations, extended development corridor that will enable the 132kV powerline to connect either to the south face of the Gamma substation yard or approach from the east, as well as new access/service tracks and watercourse crossing points associated with the authorised Umsinde Emoyeni and Khangela Emoyeni Wind Energy Facilities.

The author found that the development is underlain by Quaternary superficial deposits, Balfour and the Teekloof Formations of the Adelaide Subgroup (Beaufort Group, Karoo Supergroup) with large areas of the development footprint underlain by Jurassic dolerite. (See Figure 4.15). The Gamma substation and associated powerline connections is underlain by the Hoedemaker Member (Teekloof Formation, Adelaide Subgroup Karoo Supergroup) while the grid connection is partially underlain by Jurassic Dolerite as well, as can be observed in Figure 4.15 below.

Butler (2022) found that no Palaeontological Impact assessment was conducted for the Eskom Gamma Substation in 2007. And thus, this study has been commissioned for the Phase 2 Amendment.

A site investigation was conducted for the entire development (which assessed a corridor that included the proposed Gamma Substation yard and proposed 400kV turn-in footprint). A few weathered, isolated fossils were identified in the Gamma Substation development and an overall medium palaeontological significance was allocated to the whole development project.

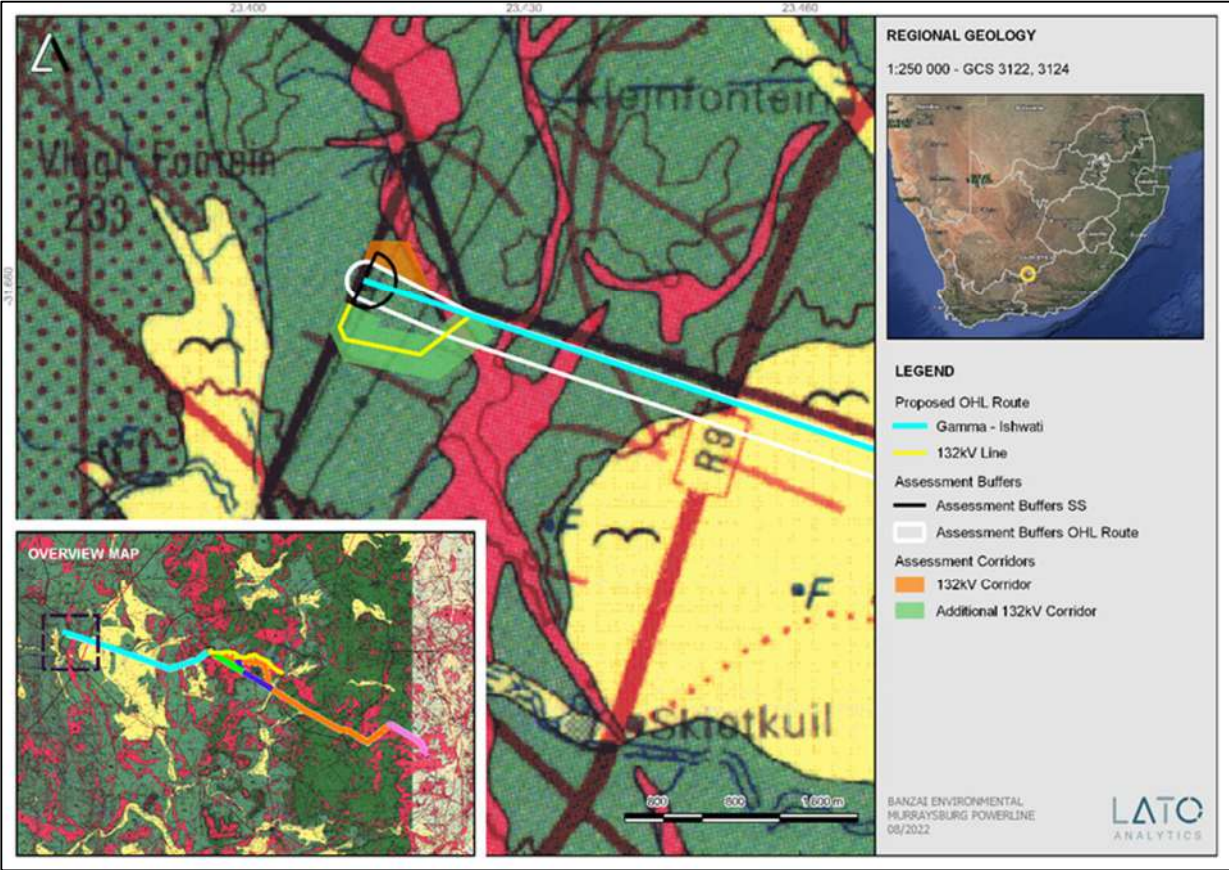


Figure 4.15: Extract of the 1:250 000 Victoria West 3122 (1989) Geological map (Council of Geoscience, Pretoria) indicating the Gamma substation and western margin of the proposed development underlain by Jurassic dolerite (red, Jd), Quaternary superficial deposits (yellow, single bird figure), and Teekloof (Pto/Pth, dark green) Formation of the Adelaide Subgroup (Image taken from Butler,2022).

4.7.1 Impact Assessment

When comparing the layout of the substation and grid connection of the 2022 study (which assessed a corridor that included the proposed Gamma Substation yard and proposed 400kV turn-in footprint) (Figure 4.15) with the present study (Figure 4.16), it is evident that the 2022 layout is underlain by the Hoedemaker Member as well as Jurassic Dolerite. The present study is totally underlain by the Hoedemaker Formation (Hoedemaker, Teekloof Formation, Adelaide Subgroup, Beaufort Group, Karoo Supergroup).

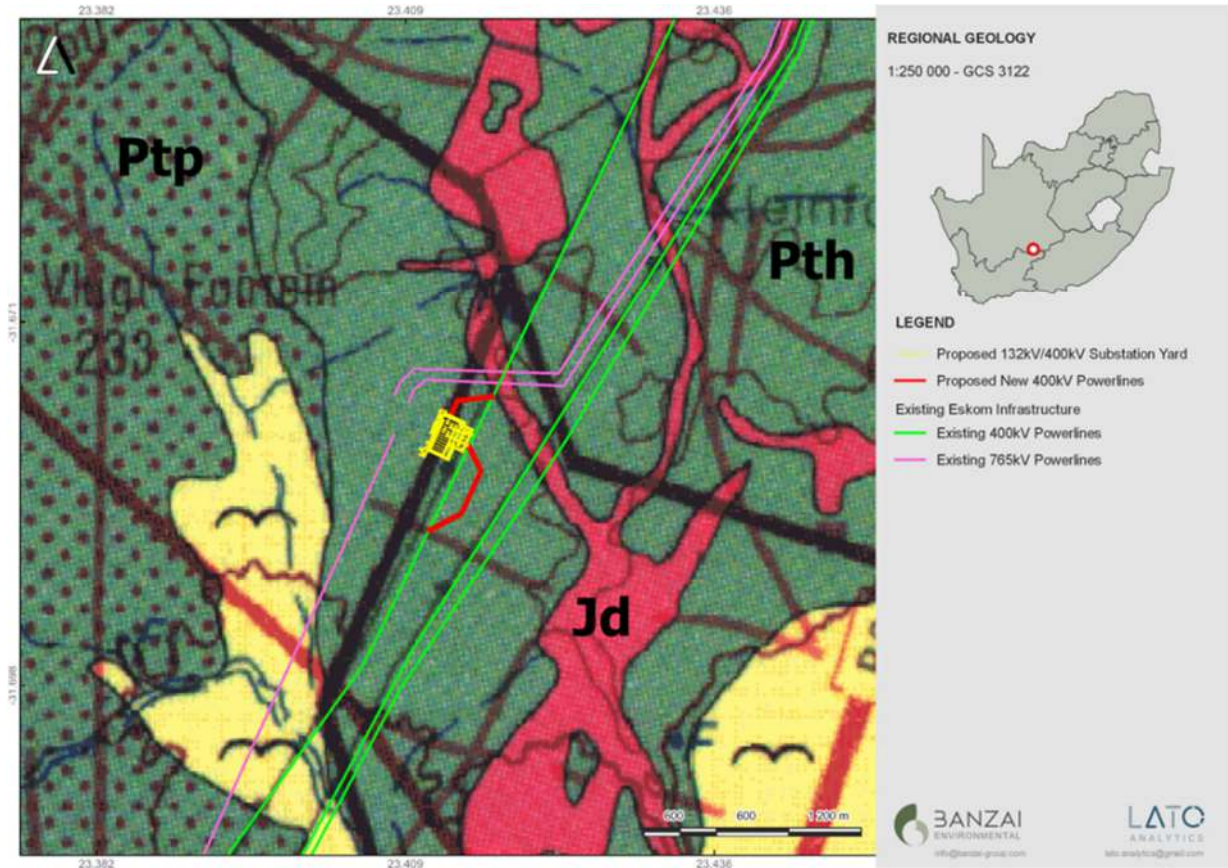


Figure 4.16: Extract of the 1:250 000 Victoria West 3122 (1989) Geological Map (Council for Geosciences, Pretoria) indicating the geology of the 765kv Gamma Substation. The substation development is completely underlain by the Hoedemaker Member (Pth, green) (Teekloof Formation) of the Adelaide Subgroup, Beaufort Group, Karoo Supergroup.

Table 4.52: Impact table of the construction phase of 765kv Gamma Substation and associated grid connection.

Nature: Loss of Fossil Heritage		
	Without mitigation	With mitigation
Extent	Local (3)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Medium (48)	Low (20)
Status (positive or negative)	Negative	Neutral
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	
Mitigation:		

- If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find.
- The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates.
- A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.
- The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site.
- Once Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

The EO will close off the chance find procedure and would be required to implement any requirements issued by the Authority and to add it to the operational management plan.

Residual Impacts:

Loss of Fossil Heritage

Table 4.53: Comparative Impact Table between the findings of the EIA (2007) and the findings of the 2023 Assessments related to this Amendment Application:

Impacts Identified	NOT CONDUCTED (2007)		Banzai Environmental (2023)	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
Loss or degradation of local palaeontological heritage resources of scientific and / or conservation value	Not Assessed	Not Assessed	Medium	Low

4.7.2 Cumulative Impacts

A two day-site-specific field survey of the development footprint was conducted on foot on 25 and 26 June 2022. Only isolated weathered, fossil fragments were identified in the substation footprint. The scarcity of fossil heritage in the study area indicates that the impact of the proposed development will be of a medium significance in palaeontological terms. Various electricity projects have been completed in a 30 km radius of the project. The Palaeontological Sensitivity of these projects will vary from Zero to Very High. However, it is important to note that the quality of

preservation of these different sites will most probably vary and it is thus difficult to allocate a Cumulative Sensitivity to the projects. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will vary between **Low and Medium**.

It is thus considered that the proposed development is feasible and will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may thus be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

Table 4.54: Cumulative Impact Rating for Loss of Fossil Heritage.

<i>Nature: Loss of Fossil Heritage</i>		
	Overall impact of the proposed project considered in isolation	Cumulative impact of the project and other projects in the area
Extent	Local (3)	Local (1)
Duration	Permanent (5)	Permanent (5)
Magnitude	High (8)	Low (4)
Probability	Probable (3)	Improbable (2)
Significance	Medium (48)	Low (20)
Status (positive or negative)	Negative	Neutral
Reversibility	Irreversible	Irreversible
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Local (1)
Mitigation: <ul style="list-style-type: none"> If a chance find is made the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find. The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager. The ESO or site manager must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS co-ordinates. A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates. Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found. <p>Upon receipt of the preliminary report, the Heritage Agency will inform the ESO (or site manager) whether a rescue excavation or rescue collection by a palaeontologist is necessary.</p> <ul style="list-style-type: none"> The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage agency will also be able to advise on the most suitable method of protection of the find. In the event that the fossil cannot be stabilized the fossil may be collected with extreme care by the ESO (site manager). Fossils finds must be stored in tissue paper and in an appropriate box while due care must be taken to remove all fossil material from the rescue site. 		

- Once Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

The EO will close off the chance find procedure and would be required to implement any requirements issued by the Authority and to add it to the operational management plan

4.7.3 Conclusion

Only isolated weathered, fossil fragments were identified in the proposed substation yard and 400kV powerline turn-in footprint. The scarcity of fossil heritage in the study area indicates that the impact of the proposed development will be of a **Low significance in palaeontological terms**. It is therefore considered that the proposed development is feasible and will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may thus be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

*** A comparison with original layout from 2007 could not be made from a PIA perspective as the assessment was not undertaken, therefore the 2022 layout has been used as source for the layout as this has been assessed recently and included the footprint of the Gamma Substation Yard and 400kV turn-ins.**

Overall Impact Statement:

Aquatic: Based on the letter submitted to Acer in 2007 by aquatic ecologist the findings indicated that it appears that there are no wetland or riverine areas that will be directly impacted by the construction and operation of the planned sub-station. The probability that a wetland or riverine area would be impacted is low at a medium confidence level. As a full aquatic assessment was not available for review the aquatic specialist could not accurately compare the significance of impacts identified during the 2007 EIA. Therefore the TBC, 2022 Aquatic Assessment and site verification which included the Gamma Substation footprint and 400kV turn-in footprint was used as comparative assessment to determine change in significance of impacts and identify any additional impact and mitigation measures associated with the updated to the layout for the Gamma Substation. As per the TBC, 2022, impacts associated with the Gamma substation and 400kV turn-in footprint were determined to be of **Low significance** with the implementation of the mitigation measures to be included within the Generic EMPs. It was the specialist’s opinion that should the measures described above, and as included in the Generic updated EMP’s for this development be implemented, it is the reasoned opinion of the aquatic specialist that the proposed layout changes i.e. the inclusion of the proposed substation yard within the authorised footprint of the existing 765kV Gamma Substation and the proposed turn-in of the existing Droer-Hydra 2 400kV powerline be approved.

Ecology (Fauna & Flora): Impacts assessed as part of the 2007 reports: Ecological & Biodiversity Assessment: Faunal Specialist Study, conducted by M. Landman, GIH Kerley and AF Boshoff (Centre for African Conservation Ecology) and Vegetation Assessment by Centre for African Conservation Ecology (no authors provided) as part of the Environmental Impact Assessment (EIA) for the proposed Construction of the 765 KV Gamma Substation on the farms, Portion 1 of Farm Uit Vlugt Fontein and the Remainder of Farm Schietkuil in the Western Cape and Northern Cape (DEA REF. No. 12/12/20/873) were determined to be of **Low significance**, these findings are considered to be relevant for the proposed updated layout. Impacts identified and assessed as part of the Terrestrial Biodiversity and Avifauna Assessment Report (L de Wet, L Steyn, J Jacobs and A Husted, TBC, 2022) are also relevant, though assessed for the entire grid and associated infrastructure which includes the Gamma substation yard footprint and the 400kV turn-in footprint. As per the 2022 Biodiversity Assessment impacts were determined to be of **Low- Medium significance** with the implementation of mitigation measures. No new impacts were identified further to those identified in the most recent study (2022), nor are any new impacts expected further to those identified. It is considered that impacts so far identified and assessed are an accurate representation of the impacts associated with the proposed new layout of the Gamma substation. As such, should the measures described above as per the TBC, 2022 Assessment, and as included in the updated EMPr for this development be implemented, it is the reasoned opinion of the specialist that the proposed layout changes

i.e. the inclusion of the proposed substation yard within the authorised footprint of the existing Gamma Substation and the proposed turn-in of the Droerivier -Hydra 2 400kV powerline be approved.

Avifauna: Based on the 2007 Avifaunal Specialist report (ACER, 2007), impacts were rated as overall Low significance. No mitigation measure was recommended based on the overall **Low significance** of the impact rating. Conclusions from the TBC, 2022 Terrestrial Biodiversity and Avifauna Assessment report (L de Wet, L Steyn, J Jacobs and A Husted, TBC, 2022) related to the Emoyeni Grid infrastructure with those applicable specifically to the Gamma Substation yard and 400kV turn-in footprint extracted included indicated that the Gamma Substation is located mainly in an area of High Site Ecological Importance (SEI), with some infrastructure in an area of Very High SEI. The impact associated with collisions with powerlines are **high significance** due to the high number and density of avifauna Species of Conservation Concern (SCC) within the site (a Verreaux's Eagle nest, located on an existing 400kV pylon structure). It is considered that impacts so far identified and assessed are an accurate representation of the impacts associated with the proposed new layout of the Gamma substation and associated 400kV turn-in infrastructure. However, should the measures described in the TBC, 2023 Avifauna Comparative Assessment, and as included in the Generic EMPr's for this development be implemented and taking into consideration the existing infrastructure (i.e. existing 765kV, 400kV powerlines including the 132kV grid infrastructure that have been authorised, it is the reasoned opinion of the specialist that the proposed layout changes i.e. the inclusion of the proposed substation yard within the authorised footprint of the existing Gamma Substation and the proposed turn-in of the Droerivier-Hydra 2 400kV powerline be approved.

Visual: In consideration of the proposed amendments, there is no (zero) change to the visibility compared with the currently authorized and constructed Gamma Substation and its associated power lines. It is expected that the proposed amendments would be equally visible and noticeable from both the roads and homesteads identified above, therefore signifying a negligible change to the potential visual impact from the currently authorised development at the Gamma Substation. The impact ratings as determined in 2007 were expected to be contained to **low** for the Gamma Substation and associated infrastructure. In comparison, with the addition of the proposed amendments to the Gamma Substation (i.e. substation extension and 400kV power line turn-in), it is expected that the impact ratings will still be **low** considering the present-day land uses and expected visual exposure. Therefore, no increase in the visual impact is anticipated.

Soil & Agricultural Potential: No separate soil and agricultural potential assessment was undertaken as part of the EIR (ACER, 2007). No impact assessment was conducted as part of the 2007 Geotechnical Aspects Regarding Foundation Conditions at Gamma Substation's. The Impact Assessment from the 2007 Specialist report: Land Use study included a description of possible impacts but no impact tables or impact ratings. No impact assessment was conducted for the TBC, 2022 Agricultural Compliance Statement Report (I Baker, M Mamera, TBC, 2022) (which has also been reviewed as part of the comparative assessment as it includes the assessment of the Gamma Substation yard and the 400kV turn-in infrastructure footprint) as a **Low sensitivity** for agriculture as defined by the screening tool required a compliance statement. The Site Sensitivity Verification (TBC August 2022) for the 132KV grid connection infrastructure, associated access tracks and water course crossings associated with the authorised Emoyeni wind energy facilities (including the proposed Gamma Substation Yard and the 400kV powerline turn in footprint), does not include an impact assessment and associated tables due to its nature as a Site Sensitivity Verification. In terms of soils there are no advantages of the proposed new layout. However, the proposed new layout is not expected to result in an increase in expected impacts or their associated severities. As such, should the measures described in the comparative assessment, and as included in the Generic EMPr for this development be implemented, it is the reasoned opinion of the specialist that the proposed layout changes i.e., the inclusion of the proposed substation yard within the authorised footprint of the existing Gamma Substation and the proposed turn-in of the Droerivier-Hydra 2 400kV powerline be approved.

Heritage: The original study (ACER, 2007) found that most archaeological finds were out of context and therefore no impact ratings were prescribed. As per the 2022 site verification and the 2023 comparative assessment **no additional heritage resources were identified**. Despite an intensive walkthrough of the footprint area, no evidence for any archaeological or heritage sites could be identified. As a result, **no impact is expected from the proposed Phase 2 amendment on heritage**. It is necessary to realise that the heritage resources located during the fieldwork do not necessarily represent all the possible heritage resources present within the area. Various factors account for this, including the size of the study area and the

subterranean nature of some heritage sites. The impact assessment conducted for heritage sites assumes the possibility of finding heritage resources during the project life and has been conducted as such and determined to of **Low significance**.

Palaeontology: A comparison with original layout from 2007 could not be made from a PIA perspective as the assessment was not undertaken, therefore the 2022 site sensitivity verification and assessment that includes the Gamma substation yard and the 400kV turn-in infrastructure footprint has been used as source for the update to layout as this has been assessed recently. Only isolated weathered, fossil fragments were identified in the proposed substation yard and 400kV powerline turn-in footprint. The scarcity of fossil heritage in the study area indicates that the impact of the proposed development will be of a **Low significance** in palaeontological terms. It is therefore considered that the proposed development is feasible and will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may thus be authorised in its whole extent, as the development footprint is **not considered sensitive in terms of palaeontological resources**.

Therefore based on the findings of the comparative assessments between the original findings of the specialist assessments undertaken during the EIR (ACER, 2007) and the 2022 site sensitivity verifications and 2023 comparative assessment of the Gamma Substation yard and the 400kV turn-in footprint it can be concluded that no impacts associated with the proposed amendment have been deemed **acceptable** by the relevant specialist provided that the additional mitigation measures as specified in this report are included within the Generic EMPs. As many of the 2007 reports do not contain specific impact ratings, the comparative assessment has made provision for a detailed impact assessment using a specified methodology.

CUMULATIVE IMPACT STATEMENT:

Aquatic: The development of the proposed infrastructure will contribute to cumulative habitat loss, habitat fragmentation at crossing points thereby impacting ecological processes in the region. Increases surface runoff from has the potential to increase water quality perturbations within the catchment and identified to be of Medium significance. Residual impacts as reported by water resource baseline and impact assessment (TBC, 2022) identified the potential decline of migratory species, instream sedimentation, erosion, instream and riparian habitat fragmentation. However, the proposed new layout is not expected to result in an increase in expected impacts or their associated severities. The increased area does not pose a direct risk to the identified watercourses.

Ecology (Fauna & Flora): Cumulative impacts were not assessed as part of the 2007 studies however, they are assessed as part of the 2022 studies and are considered accurate and applicable to the proposed layout change of the Gamma substation. Impacts of the proposed layout change in isolation are expected to be **low overall and high when considered cumulatively**.

Avifauna: Cumulative impacts were not assessed as part of the 2007 studies however, they are assessed as part of the 2022 studies and are considered accurate and applicable to the proposed layout change of the Gamma substation i.e. the inclusion of the Gamma Substation yard and the 400kV turn-in's associated with the existing 400kV Droerivier -Hydra 2 Overhead Powerline. Impacts of the proposed layout change in isolation are expected to be **low overall and high when considered cumulatively** with other proposed, existing and planned renewable energy facilities and grid connection infrastructure.

Visual: The cumulative visual impacts of the proposed amendment to the Gamma Substation is ultimately expected to be of **low significance**, when considered with the existing infrastructure in the area on sensitive visual receptors within the region. Particularly when considering its remote location and the general low occurrence of potential sensitive visual receptors. The potential cumulative visual impact is therefore expected to be within acceptable limits, as it is not expected to contribute significantly to the increased cumulative visual impact of grid infrastructure in the region.

Soil & Agricultural Potential: No separate soil and agricultural potential assessment was undertaken as part of the 2007 EIR (acer, 2007) and their cumulative impacts were not assessed. As per the screening tool report findings and site sensitivity verification based on the **Low sensitivity** only a compliance statement was undertaken as part of the comparative assessment and therefore cumulative impact were not assessed.

Heritage: Considering the development of other renewable facilities in and around the Beaufort West REDZ, the cumulative unmitigated impacts on heritage resources and cultural landscape consist of a **medium negative impact** mostly confined to the construction phase of the project. This could potentially result in an unacceptable loss of cultural heritage resources. However, by implementing the mitigation measures as listed in this report the cumulative impacts can be managed to low negative.

Palaeontology: Various electricity projects have been completed in a 30 km radius of the project. The Palaeontological Sensitivity of these projects will vary from Zero to Very High. However, it is important to note that the quality of preservation of these different sites will most probably vary and it is thus difficult to allocate a Cumulative Sensitivity to the projects. If all the mitigation measures are carried out, a conservative estimate of the Cumulative impacts on fossil Heritage will vary between **Low and Medium**. It is thus considered that the proposed development is feasible and will not lead to detrimental impacts on the palaeontological reserves of the area. The construction of the development may thus be authorised in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources.

Based on the cumulative impact assessments undertaken as part of the comparative assessment for the Part 2 Amendment. The cumulative impacts were identified to be of No significance, Low- Medium Significance and High significance identified for Avifaunal impacts. However as per the specialist conclusions, with the implementation of the prescribed mitigation measures the updated to the Gamma Substation and proposed 400kV turn-in of the existing Droerivier powerline is deemed acceptable.

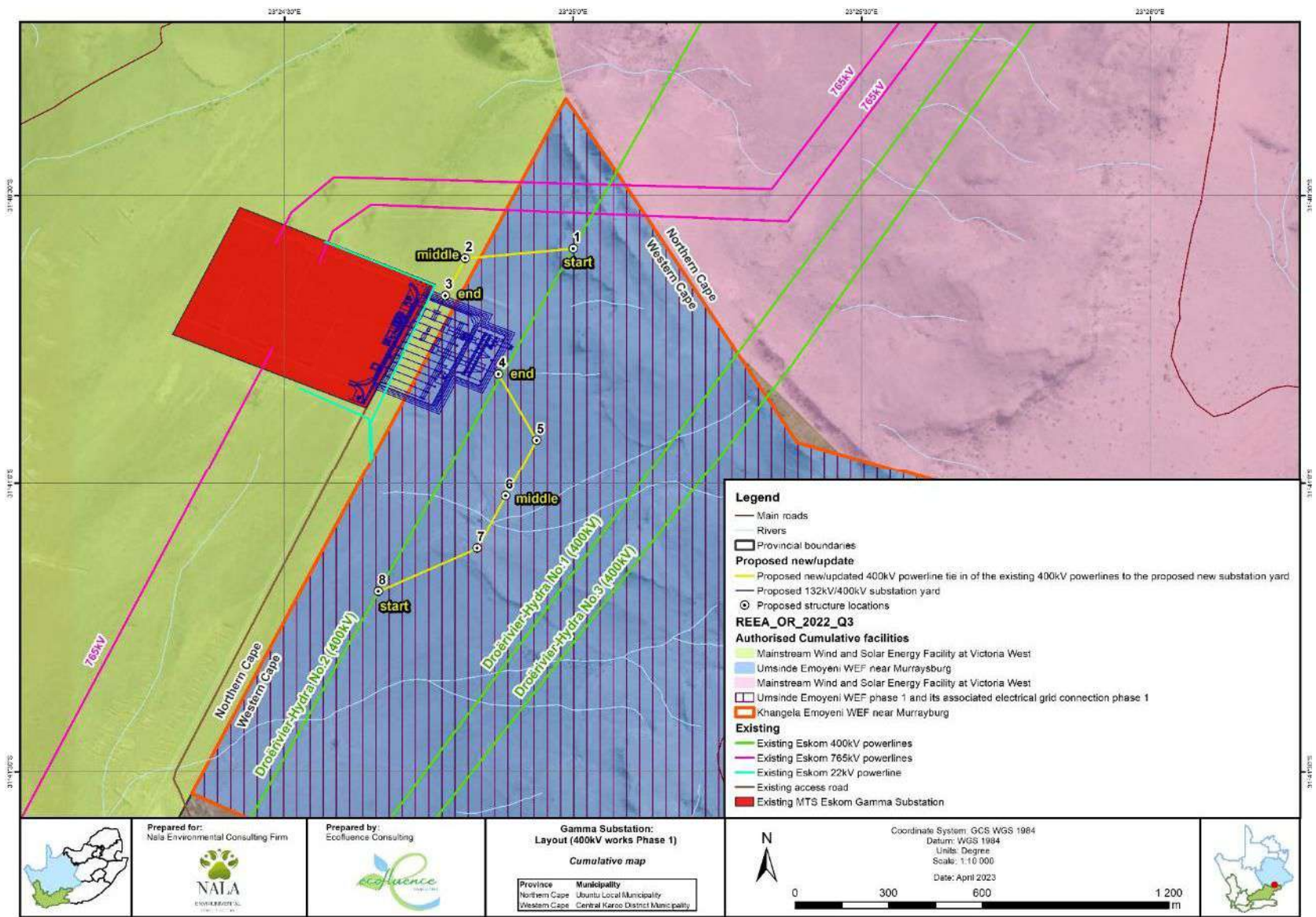


Figure 4.17. Cumulative Map associated with the proposed Gamma Substation Yard and 400kV turn-in infrastructure.

SECTION 5- ADVANTAGES AND DISADVANTAGES OF THE PROPOSED AMENDMENTS

In terms of Regulation 32(l)(a)(ii), this section provides details of the advantages and disadvantages of the proposed amendment.

Table 5.1: Description of the advantages and disadvantages specified within specialist assessments:

Advantages of the amendment	Disadvantages of the amendment
General	
The site for the substation is best suited due to its close proximity to the existing 400 kV transmission lines and the reactive voltage correction apparatus for the 400 kV and 765 kV lines can then be housed within one structure (i.e.: The need for such a facility arises out of the physics of long distance power transmission, where compensation for capacitive voltage generation on power lines has to be provided to avoid uncontrolled voltage rise especially on lightly loaded lines)	Construction will 'disrupt' the surrounding environment and landscape once more when construction is set to occur.
The building of the substation in close proximity to the existing 400kV lines provides opportunity for the increased demand for grid infrastructure which is linked to upcoming Renewable Energy projects in the Northern and Western Cape Provinces	N/A
The 132kV/400kV yard and 400kV OHL turn-ins will enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686), which has been selected as a preferred bidder with a private off-taker and has been registered as a Strategic Integrated Project (SIP).	N/A
The placing of all the transmission lines closer together and building the proposed Gamma Sub-station at its new position makes great economic sense (saving Eskom substantial capital in terms of transmission line construction costs (R2.5 million/km)).	N/A
Construction will temporarily bring in monetary flow into the surrounding towns economy.	There will be minor disruption to the social and socio-economic environment, and the few employment opportunities created (no long-term employment will be created)
The addition of the substation yard and planned turn-in infrastructure will allow for strengthening of the grid connection infrastructure in South Africa.	N/A
As the proposed substation yard and turn-in infrastructure had already been planned as part of the original assessment in 2007, no new infrastructure is being considered therefore no additional footprint will be impacted by the proposed update to the authorised layout.	N/A
Aquatic	
Watercourses will not be directly affected by the project.	N/A
The proposed new layout is not expected to result in an increase in expected impacts or their associated severities for freshwater ecology. The increased area does not pose a direct risk to the identified watercourses.	N/A
Avifauna	

The proposed new layout is not expected to result in an increase in impacts or their associated severities provided the recommended mitigation measure are implemented.	Risk of avifauna collisions with powerlines as previously identified.
N/A	Disturbance to existing Verreaux Eagle nest
Ecological & Biodiversity	
The proposed updated layout is not expected to result in an increase in expected impacts or their associated severities as previously assessed (172ha) and authorised 60ha. The updated layout footprint is 42ha.	An increased area of indigenous vegetation and associated habitat lost and an increase in disturbance and resultant increase in alien invasive species, particularly plants, as identified in the specialist studies during construction.
Heritage	
No additional heritage resources were identified. Despite an intensive walkthrough of the footprint area, no evidence for any archaeological or heritage sites could be identified. As a result, no impact is expected from the proposed Phase 2 amendment on heritage	<p>The study area occurs within a greater historical and the archaeological site as identified during the desktop and fieldwork phase. Soil clearance for infrastructure as well as the proposed reclamation activities could uncover the following:</p> <ul style="list-style-type: none"> • High density concentrations of stone artefacts • Unmarked graves • Resulting in delays and increased costs for construction
Palaeontological	
The scarcity of fossil heritage in the study area indicates that the impact of the proposed development will be of a Low significance in palaeontological terms	Destructive impacts on palaeontological heritage can only occur during the construction phase while the excavations will change the current topography and destruct or permanently seal-in fossils at or below the ground surface
Soil and Agricultural Potential	
In terms of soil, the proposed new layout is not expected to result in an increase in expected impacts or their associated severities	In terms of soil, disadvantages include an additional erosions risk associated with construction
Visual	
Beyond the 6km offset from the proposed facility, potential visual exposure becomes extremely scattered and very low. Sensitive visual receptors are not likely to be visually exposed to the proposed infrastructure, despite lying within the viewshed.	Potential visual exposure in the short to medium distance (i.e., between 1 and 3km), is scattered throughout with visually screened areas to the north and east. Sensitive visual receptors are observers travelling along the R63. These receptors are likely to experience a high visual impact
The proposed Substation extension and 400kV powerline turn-in, would have a relatively small influence on the overall visual exposure, due to the presence of the already tall power line existing power line structures and Gamma Substation	In the medium to long distance (i.e. between 3 and 6km offset), the extent of potential visual exposure is fragmented throughout the area with large visually screened areas lying to the north and east of the site. Sensitive visual receptors include residents of Uit vlugt Fontein, as well as, observers travelling along the N1 in a northerly direction as well as the R63. These receptors are likely to experience a moderate visual impact
There is no (zero) change to the visibility compared with the currently authorized and constructed Gamma Substation and its associated power lines	During construction, there may be an increase in heavy vehicles utilising the roads to the substation that may cause, at the very least, a visual nuisance to other road users in the area.
The proposed infrastructure is expected to have a low impact of lighting on sensitive visual receptors	Construction activities may potentially result in a low temporary visual impact both before and after mitigation.
The anticipated visual impact of the proposed infrastructure on tourist access routes (i.e., the N1 and R63) and tourist destinations (i.e.,	N/A

accommodation and attractions) within the region is therefore expected to be of low significance.	
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Based on the above, it can be concluded from the specialist studies that the advantages outweigh the disadvantages as the new layout is not expected to result in an increase in expected impacts or their associated severities provided the recommended mitigation measures have been included within the EMPs and are implemented. Based on the latest Information, the proposed updated layout of the Eskom Gamma Substation is acceptable from the specialist investigations undertaken.

SECTION 6- REQUIREMENTS FOR ADDITIONAL MITIGATION AS A RESULT OF THE PROPOSED AMENDMENTS

As required in terms of Regulation 32(l)(a)(iii), consideration was given to the requirement for additional measures to ensure avoidance, management and mitigation of impacts associated with the proposed layout update. From the specialist inputs provided into this amendment motivation, it is concluded that the following mitigation measures further to those proposed within the previous processes would be required to manage potential impacts within acceptable levels. The following mitigation measures have been included within the generic EMPs (Appendix L & M):

Table 6.1: Mitigation measures.

Specialist Study	Additional Mitigation Measures
Aquatic Impact Assessment	<ul style="list-style-type: none"> The footprint area of the transmission line must be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. The infrastructure footprint areas must avoid the delineated water resources and adhere to the prescribed buffer areas. Vehicles and equipment required for the suspension of cables across watercourses are permitted to access the buffer areas but may not intrude into the delineated watercourses. The footprint area must be aligned with the existing road/railway reserves wherever possible. Disturbed areas should be sought as the preferred alignment area. The locations of all single circuit angle steel towers which hold the transmission line must be located outside of all delineated watercourses. Where feasible all access roads should use existing farm roads before new roads are constructed. Preferential flow paths should be identified that intersect with new roads so that silt traps and fences can be installed to avoid siltation of watercourses. An appropriate stormwater management plan must be developed for all substations.
Ecology Impact Assessment	<ul style="list-style-type: none"> All laydown, chemical toilets etc. should be restricted to outside of the project area. No materials may not be stored within the project area, and all materials must be removed from the project area once the construction phase has been concluded. No permanent construction structures/formwork should be permitted. No storage of vehicles or equipment will be allowed outside of the designated project areas. Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood and wind events. This will also reduce the likelihood of encroachment by alien invasive plant species. All livestock should always be kept out of the project area, especially areas that have been recently re-planted. It should be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. A fire management plan needs to be complied and implemented to restrict the impact that fire might have on the surrounding areas. Plant search and rescue must be conducted prior to construction. Any protected plant that may be present needs a relocation or destruction permit for any individual that may be removed or destroyed due to the development. If left undisturbed the sensitivity and importance of these species needs to be part of the

	<p>environmental awareness program. All protected and red-list plants should be relocated, along with as many other geophytic species as possible.</p> <ul style="list-style-type: none"> • A qualified environmental control officer must be on site when construction begins. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated. Should any large nests be observed within the project area construction should stop immediately and a qualified specialist must be contacted. • The areas to be developed must be specifically demarcated to prevent movement of staff or any individual into the surrounding environments. Signs must be put up to enforce this. • The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must still be enforced to ensure that road killings, dust and erosion is limited. The speed limits should be restricted to a maximum of 30 km/h within the project area. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from highly sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • Schedule activities and operations during least sensitive periods, to avoid migration, nesting and breeding seasons. Driving on access roads at night should be restricted in order to reduce or prevent wildlife road mortalities which occur more frequently during this period. • Any holes/deep excavations must be dug and planted in a progressive manner and should not be left open overnight. Should the holes remain open overnight they must be covered temporarily to ensure no small fauna species fall in. • Ensure that cables and connections are insulated successfully and adequately to reduce electrocution risk. • Compilation of and implementation of an Alien Invasive Plant Management Plan for the project area. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. The footprint of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests from entering the site. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used due to the presence of faunal SCC in the area.
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	<ul style="list-style-type: none"> • Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This includes wetting of exposed soft soil surfaces. No non-environmentally friendly suppressants may be used as this could result in the pollution of valuable water sources. • Waste management must be a priority and all waste must be collected and stored effectively. • Litter, spills, fuels, chemical and human waste in and around the project area must be cleared and safely/appropriately stored immediately. • A minimum of one toilet must be provided per 10 persons. Portable toilets must be pumped dry to ensure the system does not degrade over time and spill into the surrounding area. • The Contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected shall be disposed of at a licensed disposal facility. • Where a registered disposal facility is not available close to the project area, the Contractor shall provide a method statement regarding waste management. Under no circumstances may domestic waste be burned on site or stored in pits. • Refuse bins will be emptied and secured. Temporary storage of domestic waste shall be in covered waste skips. Maximum domestic waste storage period will be 10 days. • All personnel and contractors to undergo Environmental Awareness Training. A signed register of attendance must be kept for proof. Discussions are required on sensitive environmental receptors within and near the project area such as the nearby rocky outcrops and to inform contractors and site staff of the presence of red-listed faunal species (such as the Riverine rabbit), their identification, conservation status and importance, biology, habitat requirements and management requirements in line with the Environmental Authorisation and within the EMPr. The avoidance and protection of the high sensitivity areas must be included in a site induction. Contractors and employees must all undergo the induction and be made aware of the “no-go” areas to be avoided. • Speed limits of 30 km/h must be put in place to reduce erosion. Dust generated, especially by earth moving machinery, must be minimised through wetting of the soil surface, and putting up signs to enforce speed limits. Speed bumps must be built to force slow speeds. Signs must be put up to enforce this. • Where possible, existing access routes and walking paths must be made use of. • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events and strong winds. This is to be done according to the Re-vegetation and Habitat Rehabilitation Plan. • The stormwater must be managed as part of the plan for the existing Gamma substation.
Avifauna Impact Assessment	<ul style="list-style-type: none"> • All development areas must be clearly demarcated. No development is to occur in areas possessing ‘Very High’ SEI wherever practicable. Only the ‘High’ SEI areas that have been authorised for development should be intruded into. Pylons may only be considered in “Very High SEI” areas where is it not feasible to span the area entirely. In such instances the minimum possible number of pylons with the smallest possible footprint must be utilised and the disturbance footprint must be strictly controlled. A service track (jeep track) is permissible in Very High SEI areas only to the extent required to

	<p>establish and maintain the powerline, and only if no other access options are available in areas of lower sensitivity</p> <ul style="list-style-type: none"> • Areas of indigenous vegetation outside of the direct project footprint, should under no circumstances be fragmented or disturbed further • All activities must make use of existing roads and tracks as far as practically and feasibly possible • All laydown areas, chemical toilets etc. should be restricted to existing transformed areas. Any materials may not be stored for extended periods of time and must be removed from the project area once the construction phase has been concluded. Use of re-usable/recyclable materials are recommended • Progressive rehabilitation of areas that have been cleared of invasive plants will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank Any woody material removed can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion • Areas that have been disturbed but will not undergo development must be revegetated with indigenous vegetation • A spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use • Eroded areas must be rehabilitated using the appropriate techniques and re-vegetated using indigenous flora. • A qualified ecologist or suitably experienced Environmental Officer must be on site when construction begins to identify avifauna species that will be directly disturbed. The area must be walked through prior to construction to ensure no avifaunal species remain in the habitat and get killed. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances nocturnal avifauna. • No trapping, killing, or poisoning of any avifauna is to be allowed. • The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on avifauna. • The design of the grid lines must be of a type or similar structure as endorsed by the Eskom-EWT Strategic Partnership on Birds and Energy, considering the mitigation guidelines recommended by Birdlife South Africa (Jenkins et al., 2015). • Infrastructure should be consolidated where possible to minimise the amount of ground and air space used • Powerlines must be fitted with industry standard bird flight diverters to make the lines as visible as possible to collision-susceptible species. Shaw et al (2021) demonstrated that large avifauna species mortality was reduced by 51% (95% CI: 23–68%). Recommended bird diverters such as flapping devices (dynamic device) and thickened wire spirals (static device) that increase the visibility of the lines should be fitted 5 m apart. The Inotec BFD88 bird diverter is highly recommended due to its visibility under
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	<p>low light conditions when most species move from roosting to feeding sites. Specific mitigation recommendations for the 400kV OHL:</p> <ul style="list-style-type: none"> ○ Removal of earth wire or increase wire thickness to make it more visible; ○ Use 'Self Support' structures and avoid 'Cross Rope' structures; ○ Bands or stripes on Conductors (2 black, neoprene bands (35x35cm), crossed, with a bright strip, fixed every 10 m with plastic peg); ○ Static vibration damper, spirals, BFDs or 'pig-tails' (White polypropylene spirals, 1 m long, 30 cm diameter, staggered on two static wires to effect marking every 5 m); ○ All the parts of the infrastructure must be nest proofed and anti-perched devices placed on areas that can lead to electrocution; ○ All exposed parts must be covered (insulated) to reduce electrocution risk; ○ All conductor wires in the same horizontal plane. <ul style="list-style-type: none"> • All the parts of the infrastructure must be nest proofed and anti-perch devices placed on areas that can lead to electrocution. • Install anti-perch devices such as spikes to prevent Pied Crows from nesting/perching. This is especially important to impede excessive predation on <i>Psammobates</i> sp. • Ideally, construction within 500m of the existing Verreux's Eagle nest should be conducted between January and April outside the breeding period of Verreux's eagles (note that stringing of the 400kV turn-ins may extend into May). However, if this is not possible, the following mitigations need to be put in place for construction to continue within the 500m buffer: <ul style="list-style-type: none"> ○ Construction of an artificial nesting platform as soon as April/May 2023 to encourage them to move their current breeding location. The construction of the artificial nesting platform and location of the platform must be undertaken in consultation with a suitably qualified Avifaunal Specialist. ○ Implementing a scientifically sound monitoring program to determine the level of disturbance during construction, only if eagles utilise their current nesting location in close proximity to the substation. A suitably qualified Avifaunal Specialist must be appointed to undertake the monitoring.
Visual Impact Assessment	<ul style="list-style-type: none"> • Limit extent of construction area. Rehabilitate all disturbed areas to reduce visual scarring. Blend earthworks and road access cuttings into the landscape. Limit footprint area to strip only the minimum area required to set up the construction area. Focus all night lighting downwards and limit to that what is necessary only. • Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude. • Ensure that vegetation is not unnecessarily removed during the construction phase. • Plan the placement of lay-down areas (if required) and temporary construction equipment camps to minimise vegetation clearing (i.e., in already disturbed areas) wherever possible. • Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads. • Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities. • Reduce and control construction dust using appropriate and effective dust suppression techniques as and when required (i.e., whenever dust becomes apparent).

	<ul style="list-style-type: none"> • Restrict construction activities to daylight hours whenever possible to reduce lighting impacts. • Rehabilitate all disturbed areas immediately after the completion of construction works. • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. • Maintain the general appearance of the infrastructure. • Remove infrastructure not required for the post-decommissioning use. • Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications. • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. • Maintain the general appearance of the servitude. • Remove infrastructure not required for the post-decommissioning use. • Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications. • Planning & operation: • The possibility of limiting aircraft warning lights to the turbines on the perimeter according to CAA requirements, thereby reducing the overall impact, must be investigated. • Shield the sources of light by physical barriers (walls, vegetation, or the structure itself). • Limit mounting heights of lighting fixtures, or alternatively use footlights or bollard level 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 types of low impact lighting. • Make use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes. • Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. • Maintain the general appearance of the servitude. • Remove infrastructure not required for the post-decommissioning use. • Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications. • Retain / re-establish and maintain natural vegetation in all areas outside of the development footprint. • Plan ancillary infrastructure in such a way and in such a location that clearing of vegetation is minimised. • Use existing roads wherever possible. Where new roads are required to be constructed, these should be planned carefully, taking due cognisance of the local topography. Roads should be laid out along the contour wherever possible and should never traverse slopes at 90 degrees. Construction of roads should be undertaken properly, with adequate drainage structures in place to forego potential erosion problems. • Rehabilitate all construction areas.
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	<ul style="list-style-type: none"> • Ensure that vegetation is not cleared unnecessarily to make way for infrastructure. • Maintain the general appearance of the facility. • Monitor rehabilitated areas and implement remedial action as and when required. • Decommissioning • Remove infrastructure not required for the post-decommissioning use of the site. • Rehabilitate all areas. Consult an ecologist regarding rehabilitation specifications. • Monitor rehabilitated areas post-decommissioning and implement remedial actions. • Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself) • Limiting mounting heights of lighting fixtures, or alternatively using footlights or bollard level lights; • Making use of minimum lumen or wattage in fixtures • Making use of down-lighters or shielded fixtures. • Making use of Low-Pressure Sodium lighting or other types of low impact lighting. • Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
Soil and Agricultural Impact Assessment	<ul style="list-style-type: none"> • Erosion should be avoided, particularly the sedimentation of nearby water sources. • To minimise the footprint of construction as much as possible. • Where soil is removed/disturbed, ensure it is stored for rehabilitation and revegetated as soon as possible. • Implement all appropriate soil conservation measures, including contouring, re-vegetation, geotextiles, and slope stabilisation (for all infrastructure). • Manage stormwater and discharge from the facility to avoid scouring of the receiving area.
Heritage Impact Assessment	<ul style="list-style-type: none"> • Implement a chance to find procedures in cases where possible heritage finds are uncovered. • During the construction phase, it is important to recognize any significant material being unearthed, making the correct judgment on which actions should be taken. It is recommended that the chance find procedure should be implemented.
Palaeontology Impact Assessment	<ul style="list-style-type: none"> • If fossil remains are discovered during any phase of construction, either on the surface or exposed by excavations the Chance Find Protocol must be implemented by the ECO or site manager in charge of these developments. • It is the responsibility of the Environmental Site Officer (ESO) / Environmental Control Officer (ECO) or site manager of the project to train the workmen and foremen in the procedure to follow when a fossil is accidentally uncovered. In the absence of the ESO, a member of the staff must be appointed to be responsible for the proper implementation of the chance find protocol as not to compromise the conservation of fossil material.

SECTION 7- PUBLIC PARTICIPATION

A public participation process is being conducted in support of a Part Two application for amendment for the existing 765kV Gamma substation and associated 400kV powerline turn-in infrastructure, Northern Cape Province. The public participation undertaken for the project includes:

- » Placement of site notices at the site on **17 January 2023** (refer to **Appendix C2**).
- » Placement of process notices at the Gamma sub-station, Beaufort West Public Library, Ubuntu Local Municipality and the Beaufort West Local Municipality on the **17 January 2023** (refer to **Appendix C2**).
- » The draft motivation report being made available for public review on <https://nalaenvironmental.co.za/projects/part-2-amendment-application-for-the-765kv-gamma-substation-northern-and-western-cape-provinces/> . from **18 April 2023 to 22 May 2023 (both days inclusive)**.
- » A process notification to IGAP's and stakeholders announcing the amendment process and registration was distributed on the **3 February 2023**.
- » Written notification to registered IGAPs regarding the availability of the amendment motivation report was distributed on **18 April 2023** (refer to **Appendix C3 & C4**).
- » Placement of advertisements in DIE BURGER newspaper on **2 February 2023** (refer to **Appendix C2**)
- » All project documentation was also uploaded onto Nala Environmental website which allows for IGAP's and stakeholders to access project information (<https://nalaenvironmental.co.za/projects/>).

Comments received during the public review period will be included in the final submission to the DFFE for consideration in the decision-making process (**Appendix C7**). Public participation carried out in line with the 30 day review period will be included within the final Motivation report submitted to DFFE. Proof of communication made to obtain comments from relevant Organs of State and key stakeholders will also be included were relevant in **Appendix C3-C4**.

SECTION 8- CONCLUSION

Based on the specialist findings as part of this comparative assessment, that impact was deemed to be of **Low significance** with the exception of a **High significance** associated with the collision of avifauna with powerlines. In terms of the comparative impact assessment between the 2007 FEIR report and this 2023 comparative assessment, it must be noted that many of the specialists had not included impact tables and had also not assessed the cumulative Impacts associated with the Gamma Substation including the addition of the Gamma Substation Yard and 400kV turn-in infrastructure. Therefore, the specialist appointed to undertake the comparative assessment undertook a review of the original specialists as undertaken for the EIR (2007) and further to this undertook additional assessments that were previous not undertaken as part of the EIR (2007) i.e., Palaeontology and Soil & Agricultural potential assessments. It must be noted that the appointed specialists to undertake the comparative assessment associated with this Part 2 Amendment process have been involved in the impact assessment for the Emoyeni Grid Infrastructure, for a Basic Assessment process that was undertaken (DFFE Ref: I4/12/16/3/3/1/2626), the final Basic Assessment report was submitted to the DFFE for decision making on the 26 January 2023. The Emoyeni Grid Basic Assessment consisted of grid corridor that has been assessed by these same specialists which included the proposed Gamma Substation Yard and proposed 400kV turn-in footprint as proposed in this amendment. Therefore, the appointed specialist has based their comparative assessments on the site sensitivity verification's and impact assessments undertaken in 2022 and submitted in 2023 as these have been undertaken recently and include the footprints associated with the proposed Part 2 Amendment. Note: The Emoyeni Grid Basic Assessment, has assessed a 400m grid corridor spanning from the authorised Umsinde Emoyeni and Khangela Emoyeni Wind Energy Facilities to the existing Gamma Substation and assessed a 1,92km² extended corridor at the Gamma Substation site to assess turn-In of the proposed powerlines to the Gamma Substation site. Therefore, the entire footprint of the Gamma Substation yard including the proposed turn-in of the existing 400kV Droerivier- Hydra 2 Powerline has been assessed and site sensitivity verifications undertaken as per the results of the DFFE Screening Tool. The site sensitivity verification reports have been appended to the comparative assessments. It is concluded that the proposed amendment for the update of the layout of the existing Gamma Substation to include the 132kV/400kV substation yard and the existing 400kV Droerivier Hydra 2 powerline turn-in to the substation yard is not expected to result in an increase to the significance ratings for the identified potential impacts (i.e. of Low significance with the exception of a High significance associated with the collision of avifauna with powerlines) with the implementation of the mitigation measures proposed.

The identified impacts further to the Impacts associated with the original EIR (2007) have been identified under the current amendment, with the implementation of additional mitigation measures which have been included within the generic EMPs (Appendix L-M). There are no impacts associated with the amendment to the layout of the existing Gamma Substation to include the 132kV/400kV substation yard and the existing 400kV Droerivier Hydra 2 powerline turn-in to the substation yard as the updated layout of the proposed 132kV/400kV substation yard and 400kV turn-in infrastructure falls within the scope and footprint of what was originally assessed in the original EIA process (2007) and the further assessment of the Emoyeni grid corridor undertaken in 2022 which included the footprint of the Gamma Substation Yard and 400kV turn-in infrastructure.

In terms of aspects relating to aquatic aspects, biodiversity, heritage, palaeontology, surface hydrology , visual and soil and agricultural potential the proposed changes to the EA will not increase the significance of impacts originally identified in the Environmental Impact Report (ACER 2007), additional impacts can be mitigated to an acceptable level of low significance.

The amendment in itself does not constitute a listed activity. The mitigation measures described in the original Environmental Impact Report (ACER 2007) are adequate to manage the expected impacts for the project and additional mitigation measures proposed by the specialists for the new layout to the existing 765kV Gamma Substation and associated powerline turn-in infrastructure have been included within the generic EMPs (Appendix L - M).

Given the above, it is requested that the layout to the existing 765kV Gamma Substation and associated powerline turn-in infrastructure in the Environmental Authorisation be amended to update of the layout of the existing Gamma Substation to include the 132kV/400kV substation yard and the existing 400kV Droerivier Hydra 2 powerline turn-in to the substation yard (Updated layout of the authorised infrastructure to accommodate the updated configuration/layout now proposed to be implemented)

Taking into consideration the conclusions of the studies undertaken for the proposed amendment associated, with the updated layout to the existing 765kV Gamma Substation and associated powerline turn-in infrastructure (as detailed in **Appendix D – J**), **it is concluded that this amendment is considered acceptable from an environmental perspective, provided that the original mitigation measures stipulated in the EMPs and additional mitigation measures in this motivation report and generic EMPs are implemented.**

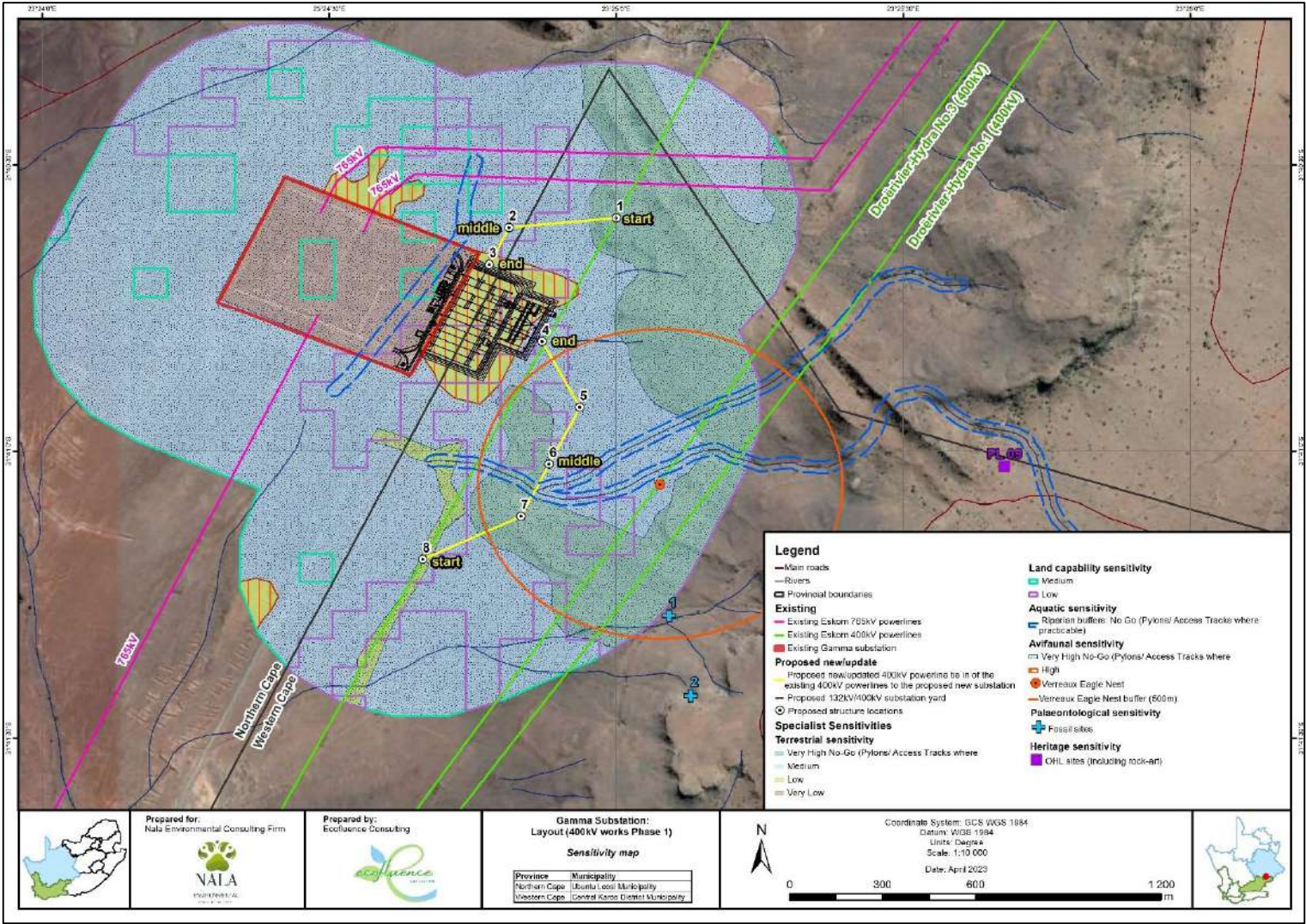


Figure 8.1: Proposed amendment for the update of the layout of the existing Gamma Substation to include the 132kV/400kV substation yard and the existing 400kV Droerivier Hydra 2 powerline turn-in to the substation yard with specialist environmental sensitivities.

SECTION 9- TERMS OF REFERENCE AND ENVIRONMENTAL IMPACT METHODOLOGY

TERMS OF REFERENCE:

The report amendment report must reflect:

- An assessment of all impacts related to the proposed changes;
- Advantages and disadvantages associated with the changes;
- Comparative assessment of the impacts before the changes and after the changes; and
- Measures to ensure avoidance, management and mitigation of impacts associated with such proposed changes, and any changes to the EMP.

The assessment must be clear on whether each of the proposed changes to the EA will:

- Increase the significance of impacts originally identified in the EIA report or lead to any additional impacts; or
- Have a zero or negligible effect on the significance of impacts identified in the EIA report; or
- Lead to a reduction in any of the identified impacts in the EIA report.

Please take note that should there be no change to impacts and their significance ratings as identified in the EIA process (as the corridor has already been assessed), no impact tables will be necessary to include. Should there be an increase or decrease in significance or additional impacts not identified within the EIA process, the Impact Assessment Methodology and table format should be used and additional mitigation measures, if any, should be included.

ENVIRONMENTAL IMPACT METHODOLOGY:

The impact significance rating methodology, as provided by Nala, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended).

Direct, indirect and cumulative impacts associated with the projects must be assessed in terms of the following criteria:

- » The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- » The **duration**, wherein it will be indicated whether:
 - the lifetime of the impact will be of a very short duration (0-1 years) – assigned a score of 1;
 - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;

- medium-term (5–15 years) – assigned a score of 3;
 - long term (> 15 years) - assigned a score of 4; or
 - permanent - assigned a score of 5;
- » The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- » The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- » the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- » the **status**, which will be described as either positive, negative or neutral.
- » the degree to which the impact can be reversed.
- » the degree to which the impact may cause irreplaceable loss of resources.
- » the *degree* to which the impact can be *mitigated*.

The **significance** is calculated by combining the criteria in the following formula:

$$S = (E+D+M) P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- » < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- » 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- » > 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

Table 9.1: Example of Impact table summarising the significance of impacts (with and without mitigation).

Nature: [Outline and describe fully the impact anticipated as per the assessment undertaken]		
	Without mitigation	With mitigation
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	Medium (36)	Low (24)
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind		
Residual Impacts: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).		