CEN INTEGRATED ENVIRONMENTAL MANAGEMENT UNIT

Environmental and Rural Development Specialist

FINAL Basic Assessment Report: Proposed Gamma 400 KV Gridline Project

15 May 2023

Project Title:

FINAL Basic Assessment Report: Proposed Gamma 400 KV Gridline Project

Project Applicant: Red Cap Hoogland 1 (Pty) Ltd

DFFE Reference Number: 14/12/16/3/3/1/2710

Environmental Assessment Practitioner:

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Date of submission: 15 May 2023

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additional 5 km allowance for deviations from the gridline route (where in reality, existing roads and tracks will be used for large portions of the route and the length of new access tracks is likely to be considerably less than the entire length of the line).

- The footprint for new access tracks will be up to 46 ha.

- Temporary laydown areas will be identified along the gridline alignment, with the main equipment and construction yards being located in one of the surrounding towns. The total area needed for temporary laydown areas is estimated to be 5 ha.

Section 2 provides details on the project description. A summary of the technical details is given in the table below:

Information	**Description / Details**		
Property Details intersected by the Gamma Grid Refined Corridor See Figure 1 **to** Figure 3**.**	**Farm Name**	**Farm Number**	**21-Digit SG Code**
	SNEEUW KRAAL	46	C09000000000004600000
	SNEEUW KRAAL	47	C09000000000004700000
	DUIKER KRANSE	RE/45	C09000000000004500000
	DUIKER KRANSE	RE/3/45	C09000000000004500003
	VLAK FONTEIN	4/207	C08000000000020700004
	VLAK FONTEIN	1/207	C08000000000020700001
	EZELSFONTEIN	RE/235	C08000000000023500000
	EZELSFONTEIN	RE/235	C08000000000023500000
	GROOTKLIP	RE/238	C08000000000023800000
	RIETKLOOF PLAATEN	RE/239	C08000000000023900000
	GROOTKLIP	RE/238	C08000000000023800000
	WATERVAL	RE/237	C08000000000023700000
	MURRAYSBURG RD	RE/176	C05200000000017600000
	TAAYBOSCHFONTEIN	RE/15	C05200000000001500000
	UIT VLUGT FONTEIN	265	C08000000000026500000
	SCHIETKUIL	1/3	C05200000000000300001
	DOORN KLOOF	RE/224	C08000000000022400000
	AANGRESEND ABRAMS KRAAL	11	C09000000000001100000
	PHAISANT KRAAL	1	C05200000000000100000
	KOOK FONTEIN	RE/226	C08000000000022600000
	KLEINFONTEIN	RE/93	C06300000000009300000
	SCHIETKUIL	3	C05200000000000300000
	TAAYBOSCHFONTEIN	RE/1/15	C05200000000001500001
	ZWARTKOPJES	RE/240	C08000000000024000000
	MODDERFONTEIN	1/228	C08000000000022800001
	MORDANT KLAASSENSKRAAL	RE/11/14	C05200000000001400011
	UIT VLUGT FONTEIN	1/265	C08000000000026500001
	DRUPFONTEIN	1/208	C08000000000020800001
	BRAKFONTEIN	3/225	C08000000000022500003
	PAARDEBERG	2/49	C09000000000004900002
	AASVOGELBERG	1/59	C09000000000005900001

ABRAMS KRAAL	RE/206	C08000000000020600000
DRUPFONTEIN	2/208	C08000000000020800002
VLAK FONTEIN	3/207	C08000000000020700003
GABRIELS BAKEN	2	C05200000000000200000
DUIKER KRANSE	4/45	C09000000000004500004
BRAKFONTEIN	1/225	C08000000000022500001
BRAKFONTEIN	1/225	C08000000000022500001
EZELSFONTEIN	2/235	C08000000000023500002
EZELSFONTEIN	3/235	C08000000000023500003
EZELSFONTEIN	4/235	C08000000000023500004
RIETKLOOF PLAATEN	1/239	C08000000000023900001
ANNEX NOBELS FONTEIN	RE/234	C08000000000023400000
EZELSFONTEIN	5/235	C08000000000023500005
EZELSFONTEIN	1/235	C08000000000023500001
GROOTKLIP	1/238	C08000000000023800001
BRAKFONTEIN	RE/225	C08000000000022500000
AASVOGELBERG	4/59	C09000000000005900004
AASVOGELBERG	2/59	C09000000000005900002
MODDERFONTEIN	3/228	C08000000000022800003
MODDERFONTEIN	4/228	C08000000000022800004
ZWARTKOPJES	1/240	C08000000000024000001
ZWARTKOPJES	2/240	C08000000000024000002

Gamma Refined Grid Corridor co-ordinates	Start (west) - Nuweveld Wind Farm Development Collector Substation	31°51'21.18"S, 22°28'37.98"E
	Middle	31°48'25.48"S 22°58'26.82"E
	End (east) – Gamma Substation	31°40'43.63"S 23°24'29.63"E

Design and Footprint Specifications:

Component	Description	Ha
Overhead lines and pylons	400 kV overhead line in a ~55 m servitude, within a 110 km long Corridor. Conservative pylon footprint: 100 m^2, with an average 400 m span	110 km 2.75 ha (permanent)
Access roads and tracks	Existing access roads and tracks (upgraded to *up to 4.5* m wide where needed) will be used as far as possible and new access tracks would be created where needed (*up to 4.5* m wide).	Up to 46 ha (permanent)
Temporary areas	Temporary laydown areas along the Gridline alignment. The main equipment and construction yards will be located along the alignment or based in one of the surrounding towns	Total estimated area: 5 ha (temporary)
Total disturbance footprint:	**Temporary**	**5 ha**
Total disturbance footprint:	**Permanent**	**48.75 ha**

Photos of areas along the Corridor

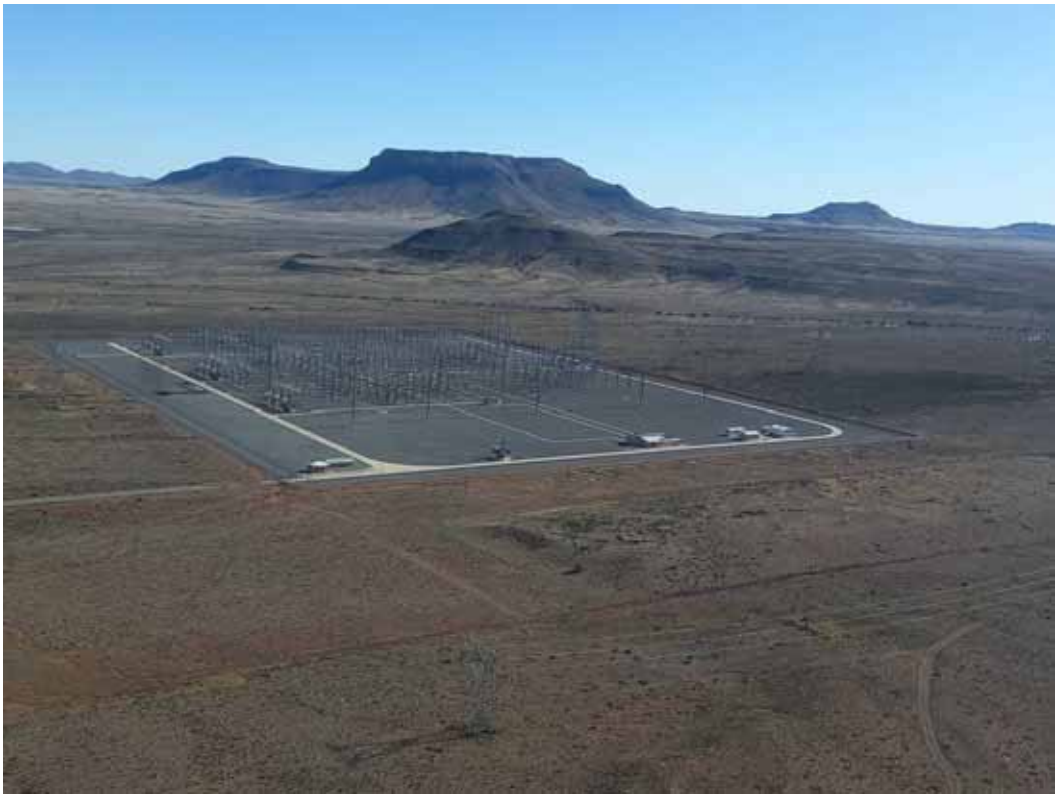
Existing road crossing a drainage area.

Open plains with ridges in the background, with a floodplain wetland in the foreground.

Wooded riparian areas

Looking towards a rock face above a drainage area.

Existing gridline infrastructure on the eastern side of the Corridor, as it crosses a dolerite ridge.



A view of the existing Gamma Substation.

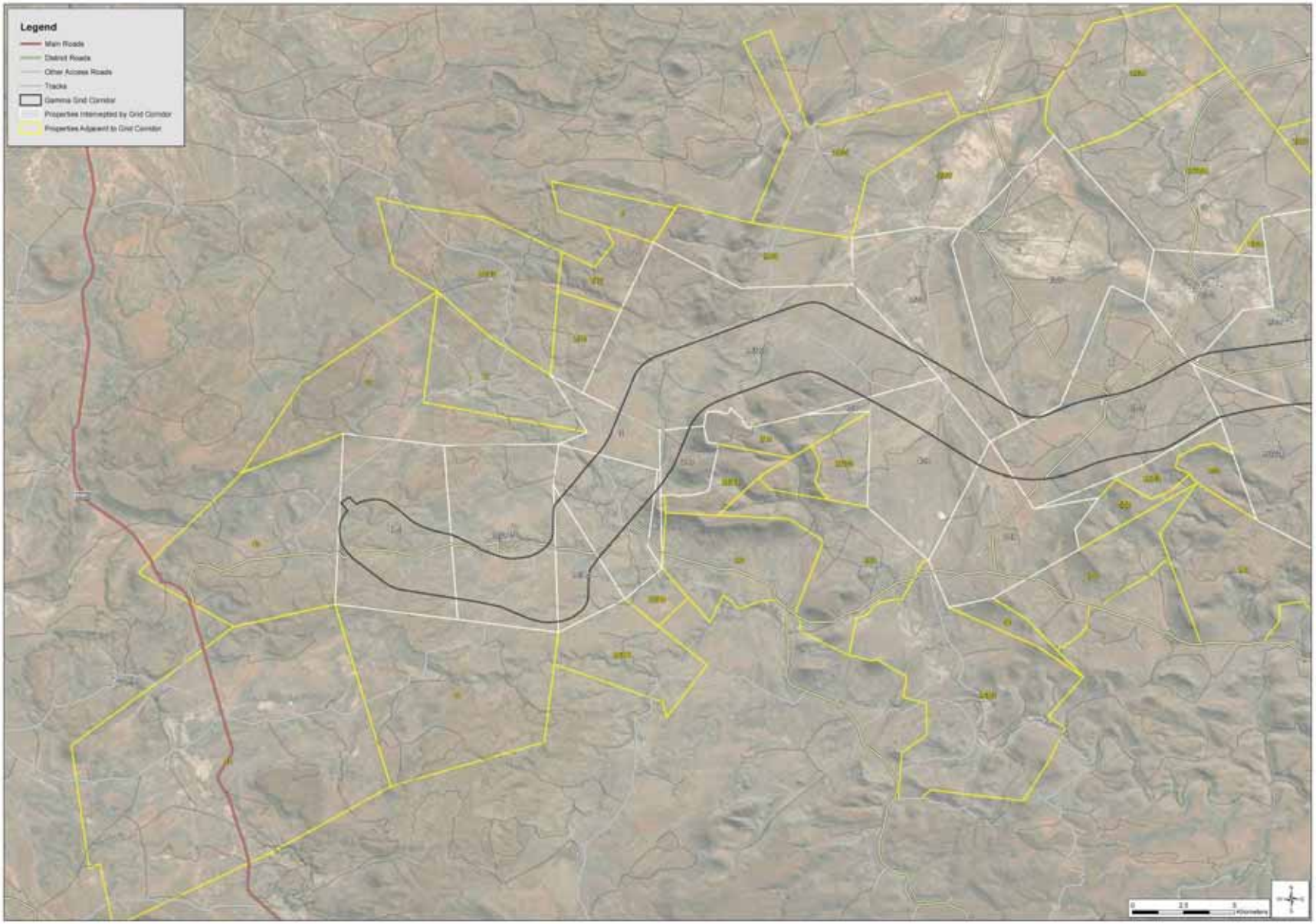


Figure 1: Property details intersected (in white) by the Refined Gamma Corridor, and those adjacent (in yellow) to the Corridor – section 1 (west).

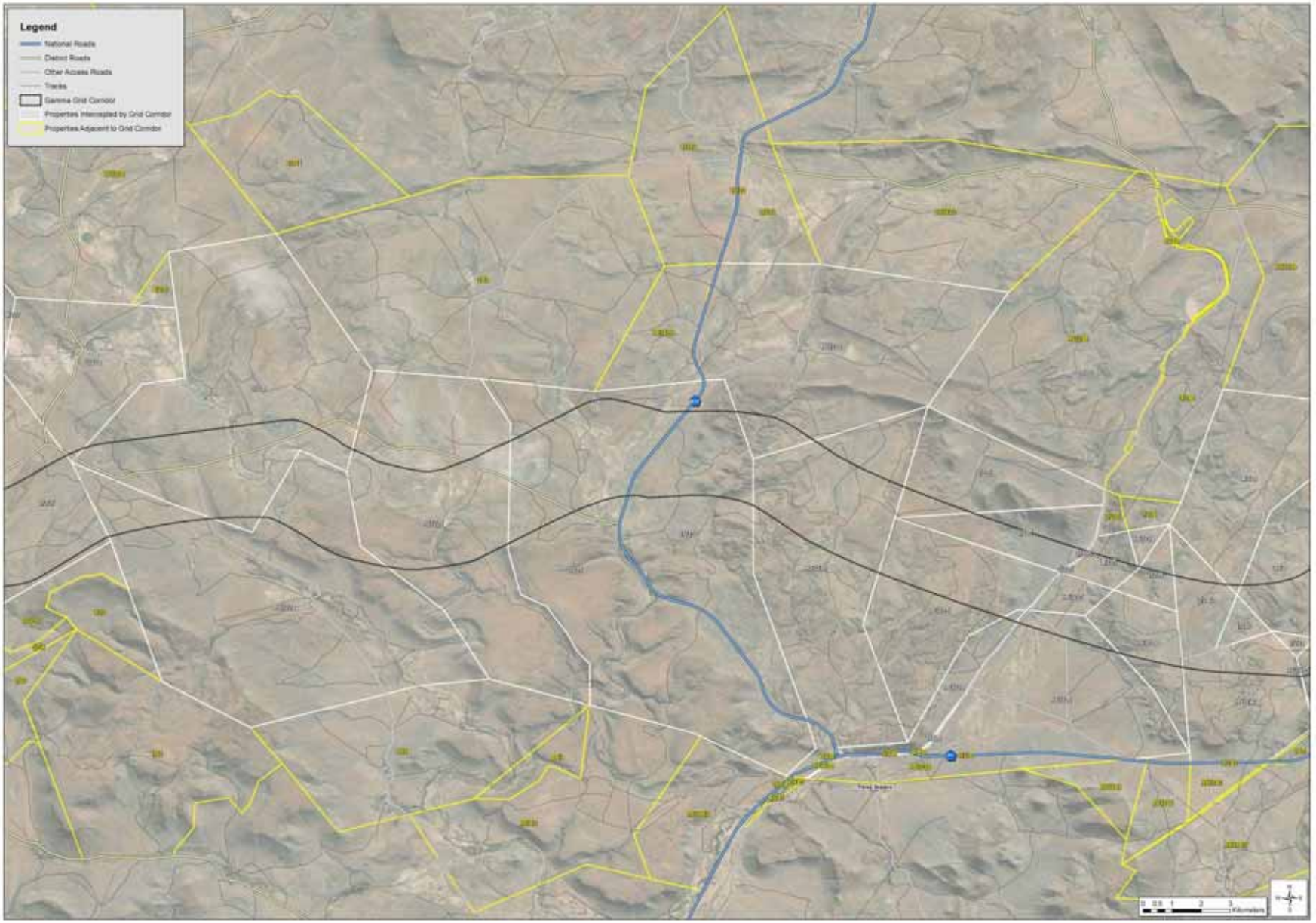


Figure 2: Property details intersected (in white) by the Refined Gamma Corridor, and those adjacent (in yellow) to the Corridor – section 2 (central).

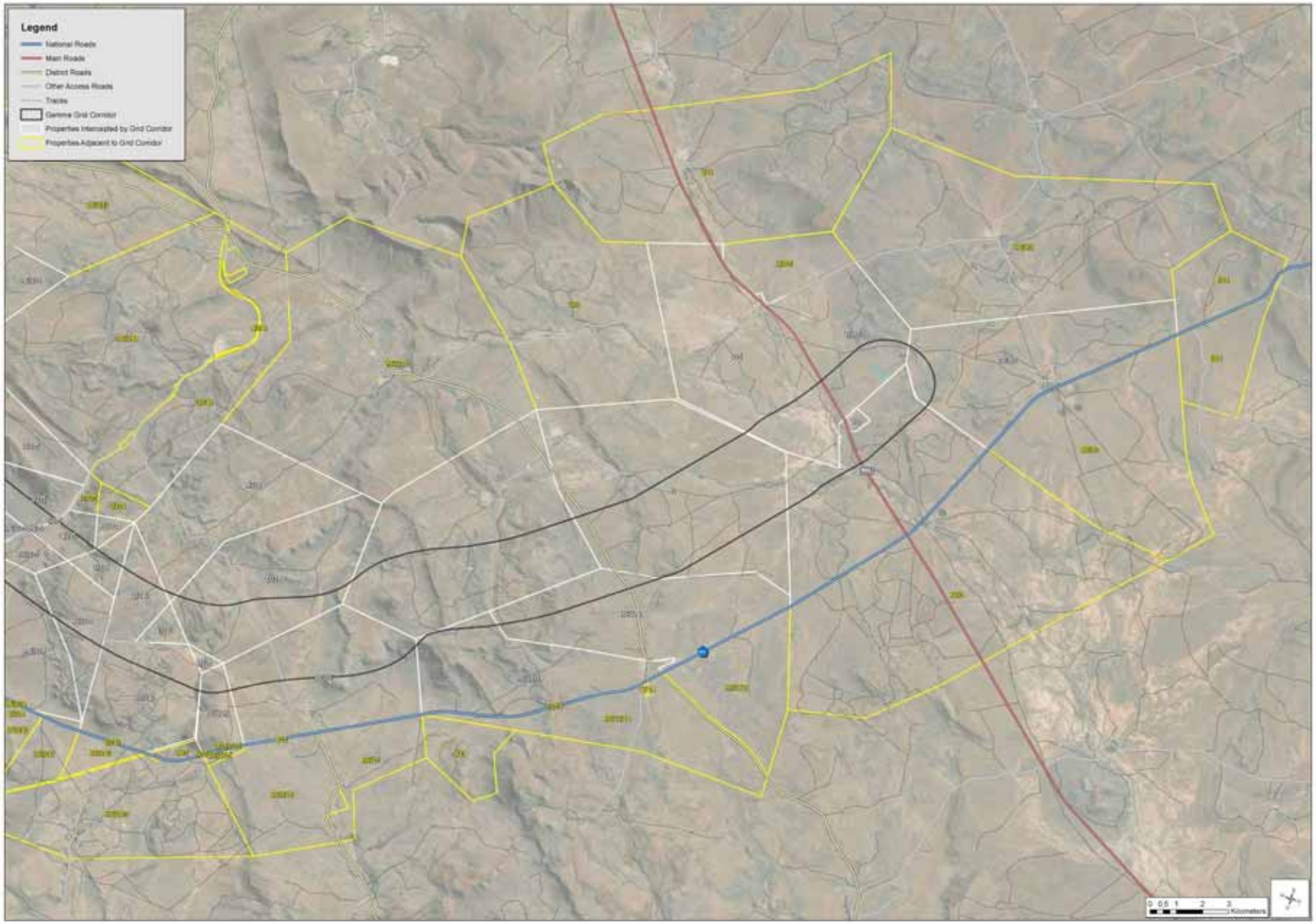


Figure 3: Property details intersected (in white) by the Refined Gamma Corridor, and those adjacent (in yellow) to the Corridor – section 3 (east).

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List of Acronyms and Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
DBAR	Draft Basic Assessment Report
DFFE	Department of Forestry, Fisheries and the Environment
DM	District Municipality
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FBAR	Final Basic Assessment Report
FEPA	Freshwater Ecosystem Priority Area
GDP	Gross Domestic Product
GW	Gigawatts
GWh	Gigawatt Hours
Ha	Hectares
HIA	Heritage Impact Assessment
HV	High Voltage
I&AP	Interested and/or Affected Party
IBA	Important Bird Area
IDP	Integrated Development Plan
IEP	Integrated Energy Plan
IPP	Independent Power Producer
IRP	Integrated Resource Plan
kV	Kilo Volt
LM	Local Municipality
LED	Local Economic Development
MW	Megawatt
NDP	National Development Plan
NEMA	National Environmental Management Act (Act No. 107 of 1998) as amended
NEM:AQA	National Environmental Management: Air Quality Act (Act No. of 2004) as amended

NEM:BA	National Environmental Management: Biodiversity Act (Act No. 10 of 2004) as amended
NEM:PAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003) as amended
NFA	The National Forest Act (Act No. 84 of 1998) as amended
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resources Act (Act No. 25 of 1999) as amended
NPAES	National Protected Area Expansion Strategy
NRTA	National Road Traffic Act (Act No. 93 of 1996) as amended
NWA	National Water Act (Act No. 36 of 1998) as amended
OHSA	Occupational Health and Safety Act (Act No. 85 of 1993) as amended
PES	Present Ecological Status
PPP	Public Participation Process
PIA	Palaeontological Impact Assessment
RE	Renewable Energy
REDZ	Renewable Energy Development Zone
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
SABAP2	Southern African Bird Atlas Project 2
SACAA	South African Civil Aviation Authority
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SALA	Subdivision of Agricultural Land Act (Act No. 70 of 1970)
SANBI	South African National Biodiversity Institute
SDF	Spatial Development Framework
STC	Strategic Transmission Corridor
VIA	Visual Impact Assessment
WEF	Wind Energy Facility
WUL	Water Use License
WULA	Water Use License Application

Content Requirements of a Basic Assessment Report, as per Appendix 1 of the EIA Regulations

Content Requirement (Appendix 1)	**Relevant section of this BA Report**
3 (1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include:	
(a) details of— (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae	Section 1.5 and Appendix 1
(b) the location of the activity, including (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties	Section 2
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken	Section 2
(d) a description of the scope of the proposed activity, including— (i) all listed and specified activities triggered and being applied for; and	Section 2 and 4
(ii) a description of the activities to be undertaken including associated structures and infrastructure	Section 2
(e) a description of the policy and legislative context within which the development is proposed including— (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments	Section 2 and 4
(f) a motivation for the need and desirability for the proposed development	Section 2.4

including the need and desirability of the activity in the context of the preferred location	
(g) a motivation for the preferred site, activity and technology alternative	Section 2 and 3
(h) a full description of the process followed to reach the proposed preferred alternative within the site, including— (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity	Section 3, 5 and 6 Appendix 4

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures	Section 5 and 6
(j) an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated	Section 6
(k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Section 7
(l) an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives	Section 7 and 8
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr	Section 6 and Appendix 5
(n) any aspects which were conditional to the findings of the assessment either	Section 8

by the EAP or specialist which are to be included as conditions of authorisation	
(o) a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed	Front of document and in Appendix 3
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	Section 8
(q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised	CEN recommends that construction should **commence within 10 years** of the date of issue of the EA (should a positive EA be issued), and that construction **be completed within 5 years of the date of commencement**. Section 8 – conditions of authorisation
(r) an undertaking under oath or affirmation by the EAP in relation to— (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and	Front of this document, and Appendix 1
(s) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	N/A
(t) any specific information that may be required by the competent authority; and	Generic EMPr for overhead transmission infrastructure, as is required by Government Notice 435 of 2019: Appendix 5
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act	-

Undertaking by the Environmental Assessment Practitioner

Item 3 1 (r) (i) to (iv) of Appendix 1 of the EIA Regulations (2014 as amended) (i.e. the scope and contents of a basic assessment report) makes the following provision:

3. (1) A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include

(r) an undertaking under oath or affirmation by the EAP in relation to—

(i) the correctness of the information provided in the report;

(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties;

(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and

(iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;

Undertaking by the EAP in accordance with Item 3 1 (r) (i) to (iv) of Appendix 1 of the EIA Regulations (2014 as amended)):

I, Belinda Clark of CEN Integrated Environmental Management Unit (the Environmental Assessment Practitioner (EAP)) responsible for compiling this FINAL Basic Assessment Report (FBAR), undertake that to the best of my knowledge, that this FBAR:

- Includes correct and recent information on the proposed activity as provided by the applicant and their appointed consultants, and as sourced from available publications
- Includes copies of correspondence with Interested and Affected Parties (IAPs).
- Includes a Public Participation Report, with a stakeholder database and plan on how stakeholders have been engaged as part of the public review process during pre-application phase and the DBAR. The PPP Report includes copies of all correspondence with stakeholders.
- Includes copies of available specialist reports in the Appendices to this FBAR, and that recommendations of available specialist reports have been considered in the identification and assessment of alternatives and impacts.

Signature:  _____

Date: _15 May 2023_____

Assumptions, Limitations and Knowledge Gaps

- Specialists assessed the full extent of a "Gamma Assessment Corridor" (see Section 2) and provided sensitivity maps for the assessment corridor incorporating No-Go areas for planning the alignment of the overhead line and pylons positions and roads. Landowner negotiations and the sensitivity maps have been used to refine the corridor and determine the pre-negotiated gridline route within the refined Corridor, which is presented in this BAR. The assessment of impacts of the development activities is based on the assumptions that all new infrastructure will be located outside of specialist identified No-Go areas and that detailed micro-siting of infrastructure and roads will be done by specialists, where required, post decision-making.
- Furthermore, the significance rating of impacts is based on the applicant implementing all mitigation measures for the duration of the construction period, and that Eskom will maintain the gridline infrastructure and undertake long-term monitoring as recommended in specialist reports and the EMPr.
- Because of the vast area within the Gamma Assessment Corridor, specialists were unable to survey the full extent of the Corridor. However, this is dealt with through targeted specialist surveys of the Gamma Assessment Corridor (focussing on more sensitive areas identified by specialists prior to undertaking surveys), and through specialists accessing information on public databases and generated through surveys done for other projects in the area, specialist knowledge and experience, and the use of aerial images. Micro-siting will enable a detailed survey of affected areas and the avoidance of sensitive areas, where required.
- The stakeholder database for public participation was compiled using all possible data sources – i.e. cadastral information within and adjacent to the refined Corridor and stakeholder details from previous stakeholder engagement processes. A copy of the stakeholder database that was used for notifications is inserted in the Public Participation Report (Appendix 4). To capture the broader community, notices were sent to Ward Councillors and farmers' associations, posters were placed at visible locations along the Corridor, and adverts were placed in the media. The applicant has also engaged with each landowner in the refined Corridor, and in-principle agreements with landowners are in place for the pre-negotiated route presented in this BAR.
- Any limitations and gaps in knowledge relevant to each specialist study, are outlined in the respective specialist reports (Appendix 3).

The EAP is of the opinion that these limitations have been addressed in the assessment approach and methodology and the EMPr. The Environmental Authorisation (if issued) will be legally binding on the applicant, and Conditions of approval will be linked to mitigation measures in the BAR. Management, monitoring and reporting measures are provided in the EMPr to facilitate environmental compliance and best practice in construction and operational phases. The above-mentioned limitations / assumptions therefore do not compromise the assessment or findings of this BAR.

1. Introduction

1.1 Electricity Supply, and the Renewable Energy Sector in South Africa

The National Development Plan (NDP) for South Africa outlines a desired state for all citizens to have a decent standard of living, where access to affordable and reliable energy is considered a key component. The NDP's Vision is an energy sector that provides reliable and efficient energy service at competitive rates; that is socially equitable through expanded access to energy at affordable tariffs; and that is environmentally sustainable through reduced greenhouse gas emissions and pollution; by 2030.

Energy in South Africa is generated by various methods, with fossil-fuel based power generating stations still being the dominant source. South Africa's national utility company, ESKOM, sources ~85%[1] of its electricity needs from fossil-fuels. While energy provision is recognised as a development priority, South Africa is a signatory to the Paris Agreement on Climate Change, which sets targets and makes commitments to control and reduce emissions. The energy sector in South Africa contributes almost 80% to the national greenhouse gas emissions, where 50% are from electrical generation and fuel production (Integrated Resource Plan, 2019). Renewable energy is recognised globally, and nationally, as an effective energy alternative for emission reduction, and socio-economic incentives

The Department of Energy (DoE), now known as the Department of Mineral Resources and Energy (DMRE), developed the Integrated Resources Plan (IRP) as the country's electricity infrastructure development plan, founded on 'least-cost electricity supply and demand balance', and considers security of supply and the environmental issues (notably minimising emissions and water use). The first version of the IRP was gazetted in 2011, and set a target to source 17 800 Megawatts (MW) of electricity supply from renewable energy from 2010 to 2030. The IRP was updated in 2019. In the period between 2011 and 2019, a total of 18 000 MW of new generation capacity was committed comprising 9 564 MW of coal power at Medupi and Kusile, 1 332 MW of water pumped storage at Ingula, 6 422 MW of renewable energy by independent power producers (IPPs), and 1 005 MW of Open Cycle Gas Turbine (OCGT) peaking plants currently using diesel at Avon and Dedisa (van der Poel *et. al.*, 20119)[2].

In the IRP 2019, provision has been made for the following new additional capacity by 2030:

- 1 500MW of coal;
- 2 500MW of hydro;

[1] Eskom Generation Plant Mix. 2021. Available: https://www.eskom.co.za/wp-content/uploads/2022/03/GX-0001-Generation-Plant-Mix-Rev-25.docx.pdf [Accessed 9 November 2022].

[2]What you need to know: South Africa's Integrated Resource Plan 2019. Available: https://www.miningreview.com/energy/what-you-need-to-know-south-africas-integrated-resource-plan-2019/ [Accessed: 27 June 2021].

- 6 000MW of solar PV;
- 14 400MW of wind;
- 1 860MW of nuclear;
- 2 088MW for storage;
- 3 000MW of gas/diesel; and
- 4 000MW from other distributed generation, co-generation, biomass and landfill technologies.

There is a notable an increase in solar PV and wind generation in the updated IRP (2019), with wind being the dominant technology, comprising almost 50% of the new additional capacity planned for 2031 (Govender, 2019)[3].

The Renewable Energy Independent Power Producer Procurement Programme is run by the DMRE in conjunction with the Department of Treasury and the Development Bank of South Africa, to procure energy from private investors, through a competitive bidding process.

1.2 Development Overview

Red Cap Energy (Pty) Ltd ('Red Cap') has received Environmental Authorisation for three wind farms and for a 400 kV grid corridor collectively known as 'Nuweveld Wind Farm Development', located close to Beaufort West in the Western Cape Province. The authorised grid corridor links the Nuweveld projects to the Droërivier Substation ~65 km to the south of the wind farms (see Figure 4).

Red Cap is also proposing to develop four additional wind farms and associated grid connections, known as the 'Hoogland Projects'[4]. The Hoogland wind farms are located north and south of the Nuweveld complex, and the Hoogland grid connections will terminate at the Nuweveld Collector Substation (refer to Figure 4).

[3] The Integrated Resource Plan 2019: A promising future road map for generation capacity in South Africa. Available: https://www.cliffedekkerhofmeyr.com/en/news/publications/2019/Corporate/energy-alert-22-october-The-Integrated-Resource-Plan-2019-A-promising-future-roadmap-for-generation-capacity-in-South-Africa.html [Accessed 27 June 2021].

[4] DFFE Reference Numbers:

- Red Cap Hoogland 1 Wind Farm: 14-12-16-3-3-2-2147
- Red Cap Hoogland 2 Wind Farm: 14-12-16-3-3-2-2146
- Red Cap Hoogland 3 Wind Farm: 14-12-16-3-3-1-2604
- Red Cap Hoogland 4 Wind Farm: 14-12-16-3-3-1-2605
- Red Cap Hoogland Northern Grid: 14-12-16-3-3-1-2602
- Red Cap Hoogland Southern Grid: 14-12-16-3-3-1-2603

To expand the capacity of Eskom grid and improve the functionality of the grid in the area, an additional 400 kV grid connection is required from the Nuweveld Collector Substation to the Gamma Substation, ~90 km to the east. Red Cap Hoogland 1 (Pty) Ltd is making an application for this gridline, which is the subject of this Basic Assessment Report (BAR). The additional gridline will improve functionality of the Eskom grid by creating a 400 kV ring-line between the Droërivier Substation, Gamma Substation and Nuweveld Collector Substation, and create opportunities for other renewable energy developments (such as the proposed Hoogland projects) to tie-into the grid either at the Nuweveld Collector Substation or along the proposed 400 kV line. As such, the proposed line will allow Eskom to release further renewable energy potential in an area that is becoming a renewable energy development node in South Africa, thereby helping to alleviate South Africa's power crisis.

Access tracks for construction and maintenance of the line, and temporary construction laydown areas will also be required and form components of the project.

A specialist desktop screening process and preliminary landowner negotiations were used to delineate a grid connection corridor for assessment purposes (the Assessment Corridor). The corridor was ~110 km in length, and varied in width between 6 and 10 km. Specialist site surveys and assessments were undertaken within the Assessment Corridor to map site sensitivity, including 'No-Go' areas. The outcomes of specialist sensitivity mapping and landowner negotiations informed the identification of a pre-negotiated route within a 3 km wide, 110 km long refined Corridor. The gridline will need a ~55 m wide servitude.

Although the corridor and gridline start in the Western Cape (Central Karoo District Municipality and Beaufort West Local Municipality), portions will traverse land in the Northern Cape (Pixley ka Seme District Municipality and Ubuntu Local Municipality) (Figure 5).

The applicant is responsible for constructing electrical infrastructure, but on completion the powerline and associated infrastructure will be ceded to ESKOM and form part of the National Grid infrastructure. ESKOM will be responsible for management, maintenance and decommissioning of infrastructure (the latter is highly unlikely). Construction phase is estimated to be an 18 to 24 month period. Should the DFFE issue an Environmental Authorisation (EA), the duration required is as follows: commencement of construction must start within 10 years of issuing of the EA, and construction must be completed within 5 years of commencement.

1.3 Applicant Details

Applicant name	Red Cap Hoogland 1 (Pty) Ltd (Company Registration Number: 2020/886390/07)
Contact person	Lance Blaine
Postal Address	Unit B2, Mainstream Centre, Hout Bay, Cape Town
Telephone	021 790 1392
Cellular	083 235 6737
Email address	lance@red-cap.co.za

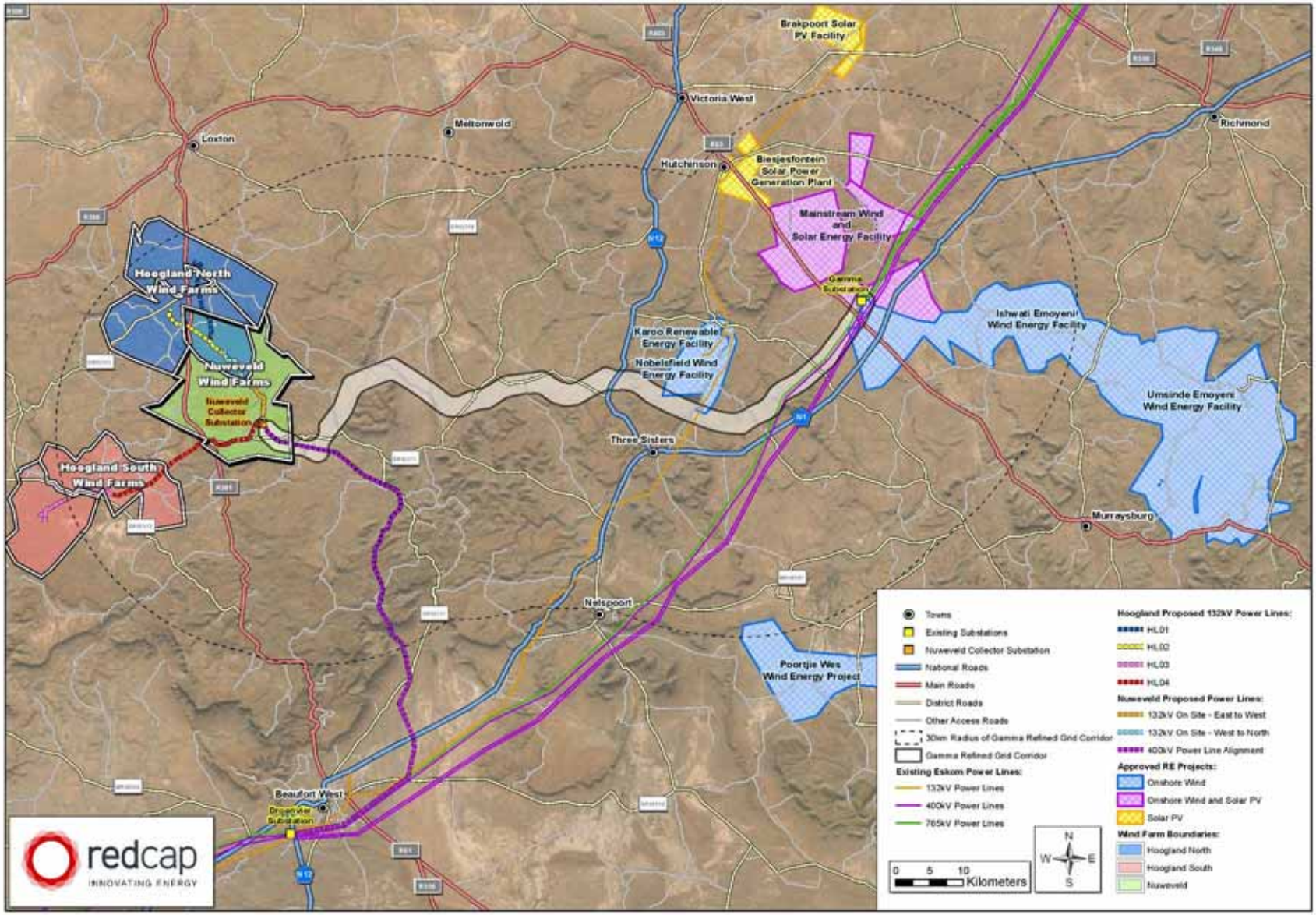

Figure 4: Regional overview of the Gamma Assessment Corridor and existing and/or approved Renewable Energy (RE) projects within a 30 km radius.

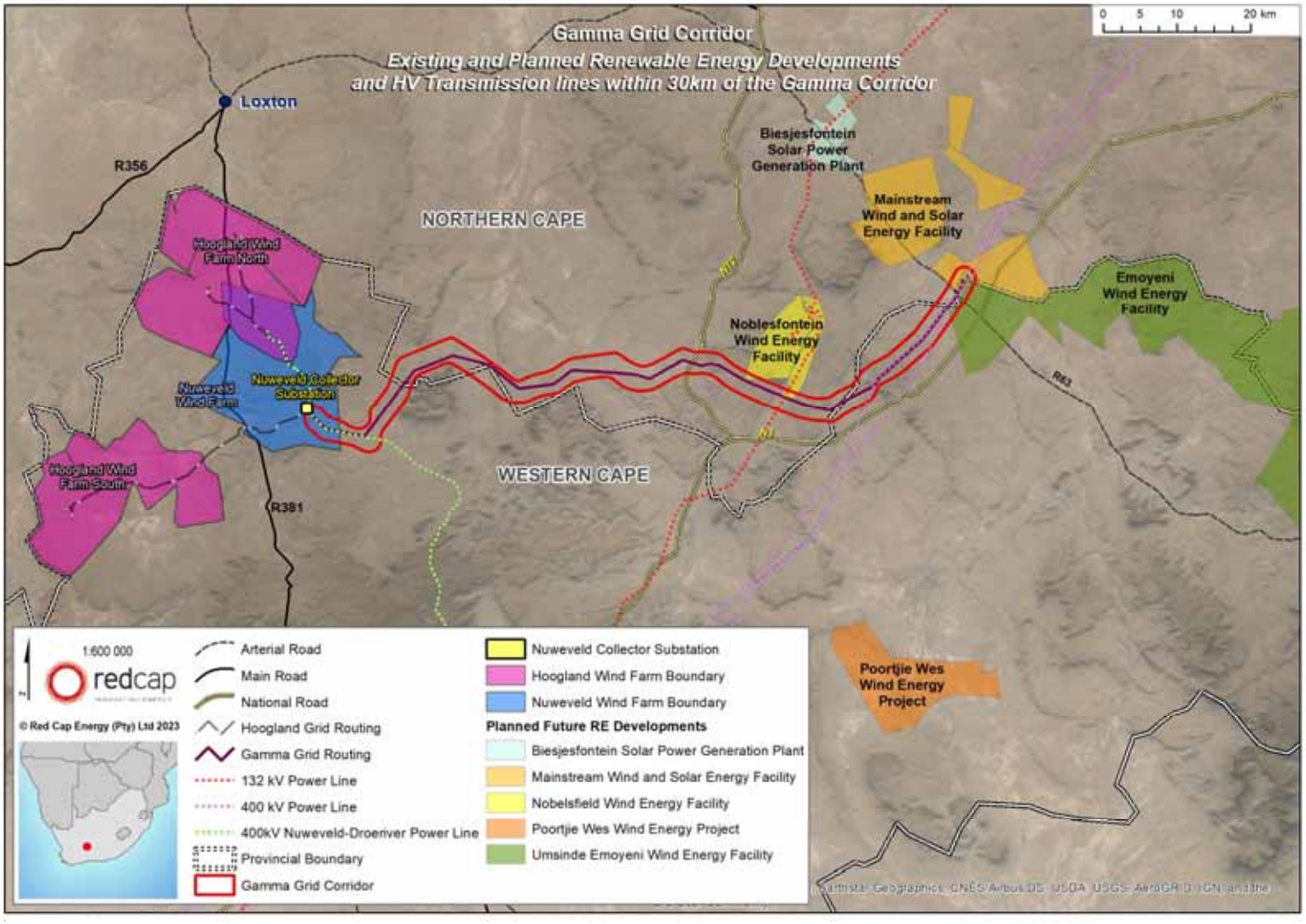

Figure 5: Regional Plan of the Refined Gamma Grid Corridor and Pre-Negotiated Gridline Route in the Western Cape (Central Karoo District Municipality and Beaufort West Local Municipality) and Northern Cape (Pixley ka Seme District Municipality and Ubuntu Local Municipality), and existing and/or approved Renewable Energy (RE) projects within a 30 km radius.

1.4 Objectives and Contents of the Basic Assessment Process and Report

The project triggers activities listed in terms of the Environmental Impact Assessment Regulations, 2014, as amended. These activities require authorisation from the Department of Forestry, Fisheries and the Environment (DFFE), prior to commencement. An application for Environmental Authorisation (EA) is submitted and informed by a Basic Assessment (BA) process as the project is located wholly within a strategic transmission corridor specifically identified for the placement of this infrastructure (i.e. the Central Corridor). The eastern and western extents of the corridor are within the Beaufort West Renewable Energy Development Zone (Figure 6).

The objectives of the Basic Assessment (BA) process, and the scope and contents of the BAR are guided by Appendix 1 of the EIA Regulations (2014, as amended). The content requirements of a BAR in accordance with Appendix 1 is outlined at the front of this report and is not repeated here. Broadly, the purpose of a BAR is to provide a comprehensive description of the development activities and the receiving biophysical and socio-economic environment; and to describe how, through the identification and assessment of alternatives and associated impacts, the preferred development option was determined.

In terms of alternatives, a comprehensive iterative design process has been undertaken to inform the location of a pre-negotiated gridline route within the refined Corridor, including No-Go areas within this corridor. By integrating the screening and assessment of environmental and social constraints alongside the technical components of the project early in a project lifecycle, project risks are reduced, and the mitigation hierarchy is applied by avoiding No-Go areas and minimising the significance of impacts. An outcome of this iterative design approach is that although the BAR presents the pre-negotiated route, impact assessment is applicable to any route in the refined Corridor that avoids specialist identified No-Go areas. As such, this approach eliminates potential fatal flaws of the project (i.e. provided that specialist No-Go areas are observed and other essential mitigation is applied) and negates the need for a comparative assessment of alternative routes within the refined Corridor – the no development alternative, or No-Go option, is, however, considered and assessed.

In summary, the objectives of the BA process are to:

- Describe the development activities.
- Outline the legal and policy framework relevant to the area and development activities.
- Describe the application process, and what has been done to date.
- Describe the Public Participation Process (PPP) with details on what has been done to date, and further actions.
- Describe the biophysical and socio-economic environment in which the development is planned, as per specialist assessments.

- Describe the methodology used to identify and assess the significance of impacts of the development activities on the receiving environment.
- Discuss alternatives by describing the screening and iterative design approach that was used to identify the Assessment Corridor and the refined Corridor and No-Go areas.
- Present the impacts identified by each specialist, the specialists' assessment of each impact and proposed mitigation measures.

The environmental process for the Gamma Gridline project includes the following phases:

- Pre-application Phase: Screening, preliminary design, and pre-application specialist assessment. Pre-application consultations were also held with the DFFE and some key stakeholders to inform the assessment process and the refined assessment corridor.
- Application Phase:
    - Submission of an Application for Environmental Authorisation and a BAR to the DFFE
    - Stakeholder engagement (30 days)
    - Submission of final reports to the DFFE
- Authority review and decision-making phase.

The application for EA and Draft BAR were submitted to the DFFE on 23 February 2023 and 2 March 2023 respectively. The Draft BA Report was made available to all potential I&APs, including the public and key stakeholders (including authorities) for a 30-day review and comment period, **from 3 March to 3 April 2023 (extended to 8 May to provide Organs of State time to comment on the application)**. All comments and inputs received during the comment period for the Draft BA Report were considered and responded to by the project team, and are presented in the Final BAR. Access to the Final BAR will be provided to registered stakeholders for information purposes.

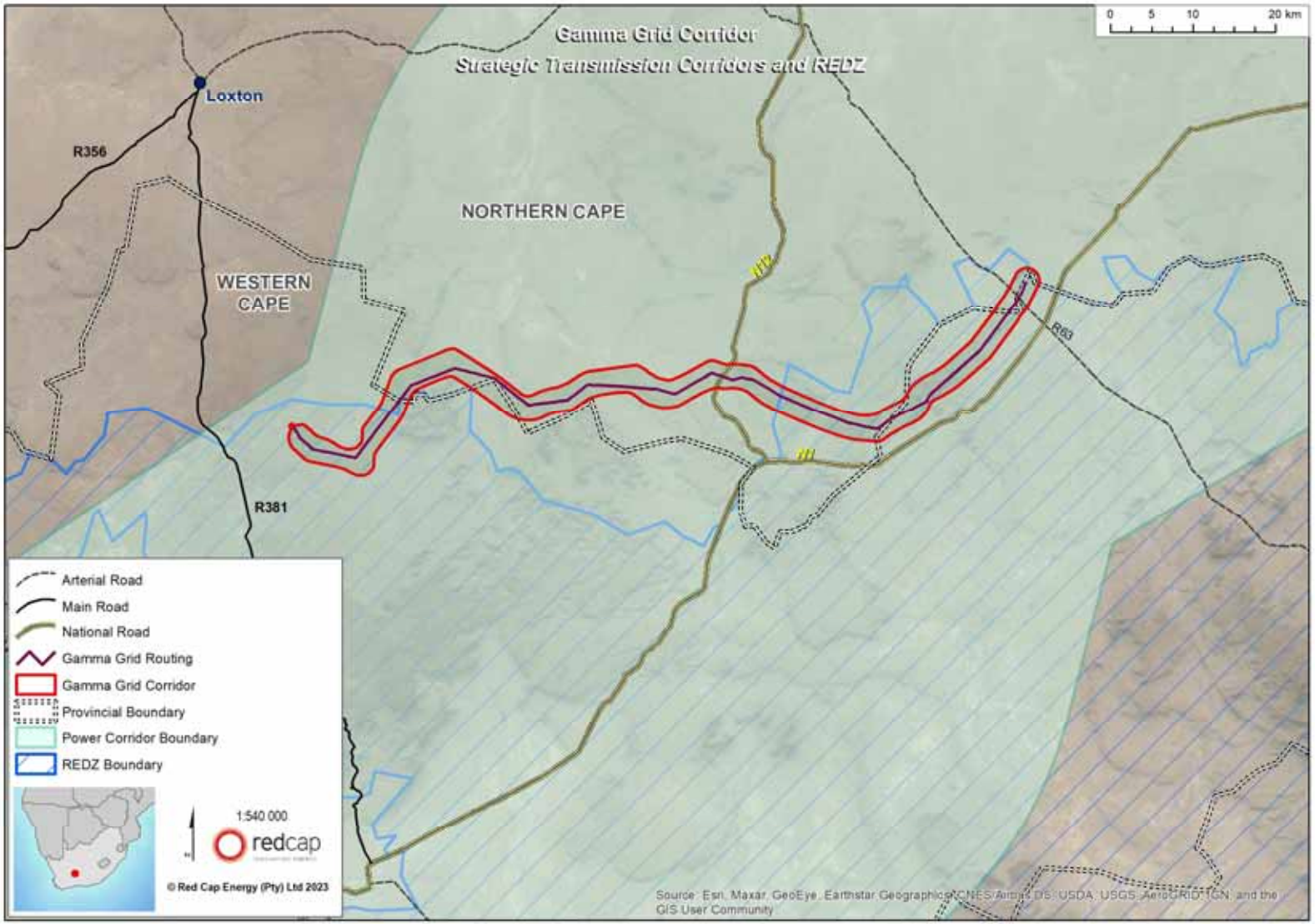

Figure 6: The Refined Gamma Grid corridor and gridline route is wholly situated within the Central Transmission Corridor, and the eastern and western extents are part of the Beaufort West Renewable Energy Development Zone.

1.5 The Project Team

1.5.1 Environmental Assessment Practitioner

In accordance with Regulation 12(1) of the EIA Regulations, an applicant must appoint an independent Environmental Assessment Practitioner (EAP) to manage the Basic Assessment application. An EAP is defined in the National Environmental Management Act as '*the individual responsible for the planning, management, co-ordination or review, of environmental impact assessments, strategic environmental assessments, environmental management programmes, or any other appropriate environmental instruments introduced through regulations*'. The Regulations prescribe requirements of the EAP, related to independence and competency. CEN Integrated Environmental Management Unit has been appointed by the applicant to act as the EAP for this application. A copy of the EAPs signed declaration of independence and *Curriculum Vitae* are given in Appendix 1.

EAP	Dr Belinda Clark CEN Integrated Environmental Management Unit
Contact person	Dr Belinda Clark
Postal Address	140 Kruger Gardens, Admirality Way, Summerstrand, Gqeberha (Port Elizabeth)
Telephone	041 367 4748
Cellular	072 725 6400
Email address	bclark@telkomsa.net / steenbok@aerosat.co.za
Qualification	PhD Botany
Years of Experience	16
Professional Registration	Registered Environmental Assessment Practitioner Number 2019/1336

1.5.2 Specialists

A specialist is defined in the EIA Regulations as '*a person that is generally recognised within the scientific community as having the capability of undertaking, in conformance with generally recognised scientific principles, specialist studies or preparing specialist reports, including due diligence studies and socio-economic studies*'.

During Screening Phase, the DFFE's on-line Screening Tool was utilised to determine specialist studies required for the assessment process. The Screening Tool Report is attached as Appendix 2. The tool summarises available desktop information for the site, and assigns a sensitivity rating to various 'themes' (e.g. terrestrial biodiversity, aquatic etc.). Details on the Screening Tool for the project are provided in Section 6. The following specialist studies have been done as part of this BA process (note that specialist studies are not limited to those identified in the Screening Tool and a Traffic Impact Assessment and Socio-Economic Impact Assessment have also been done). Specialist declarations of independence and copies of *Curriculum Vitae* outlining their respective competency and experiences are included with the specialist reports in Appendix 3:

Study	Specialist	Professional Registration
Landscape/Visual Impact Assessment	Quinton Lawson and Bernard Oberholzer	SACLAP, SACAP
Agricultural Compliance Statement	Johann Lanz	Pri. Sci. Nat. 400268/12
Heritage Impact Assessment	Dr Jayson Orton - ASHA Consulting	Accredited heritage practitioner - Association of Professional Heritage Practitioners (APHP; Member #43). Archaeological accreditation with the Association of Southern African Professional Archaeologists (ASAPA) CRM section (Member #233).
Palaeontology Impact Assessment	Dr John Almond - Natura Viva cc	No relevant registration. PhD Palaeontology Long-standing member of the Archaeology, Paleontology and Meteorites Committee for Heritage Western Cape (HWC) and an advisor on paleontological conservation and management issues for the Paleontological Society of South Africa (PSSA), HWC and SAHRA
Terrestrial Biodiversity Impact Assessment	Simon Todd – 3Foxes Biodiversity Solutions	Pri. Sci. Nat. 400425/11
Plant Species Compliance Statement	Simon Todd – 3Foxes Biodiversity Solutions	Pri. Sci. Nat. 400425/11
Riverine Rabbit Assessment	Simon Todd – 3Foxes Biodiversity Solutions	Pri. Sci. Nat. 400425/11
Karoo Dwarf Tortoise Assessment	Simon Todd – 3Foxes Biodiversity Solutions	Pri. Sci. Nat. 400425/11
Avian Impact Assessment	Chris van Rooyen - Chris van Rooyen Consulting in association with Albert Froneman	Albert Froneman - SACNASP Zoological Science (Pr. Sci. Nat 400177/09)
Aquatic Biodiversity Assessment	Toni Belcher – BlueScience (Pty) Ltd.	Professional Environmental Scientist (Pr. Sci. Nat 400040/10) Professional Ecological Science (Pr. Sci. Nat 400040/10)
High Level Geotechnical Desktop Study	GEOSS	Shane Teek: Pr. Sci. Nat. Candidate: 126397 Michael Baleta: Pr. Sci. Nat. No.: 400695/1 Julian Conrad: Pr. Sci. Nat.: 400159/05
Traffic Impact Assessment	Athol Schwarz	ECSA – Professional Engineering Technologist Member of the South African Institute of Civil Engineering
Socio-Economic Impact Assessment	Marchelle Terblanche – Index Social Services	Not relevant

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1.6 Structure of the Basic Assessment Report

This Final BAR has been prepared in compliance with Appendix 1 of the EIA Regulations 2014 (as amended) and is divided into various chapters and appendices, the contents of which are outlined below.

Table 1: Structure of the Basic Assessment Report

SECTION	CONTENTS
General Site and Project Information	Provides a comprehensive summary of the project components and specifications (i.e., technical details) for the Gamma Grid Corridor and Gridline. The maximum disturbance area and/or footprint of all project components (i.e. temporary and permanent) is provided.
Section 1	**Introduction** Provides an overview of the project; outlines the structure of the report; and provides information on the applicant and project team. The purpose of the BA process is explained.
Section 2	**Project description** Provides a detailed description of the project activities and site details, and outlines the 'Need and Desirability' of the project, guided by the DFFE and Western Cape DEA&DP.
Section 3	**Alternatives** Describes the 'mitigation hierarchy' and how this has been applied to the project. Provides an overview of the comprehensive iterative design process that has been undertaken to inform the refined assessment corridor and the pre-negotiated gridline route.
Section 4	**Administrative and Legal Framework** Outlines the key legislative requirements applicable to the proposed project.
Section 5	**Approach and Process** Outlines the iterative and comprehensive design process and provides the methodology for the assessment. It also includes a summary of the public participation process undertaken to date, as well as further public participation tasks planned.
Section 6	**Description of the Affected Environment, and Impact Assessment** Describes the receiving environment respective to each specialist discipline and assesses the significance of each identified impact for all phases of the development, including cumulative impacts. Provides appropriate mitigation measures.
Section 7	**Impact Assessment Summary and Recommendations** Provides a summary of the potential environmental impacts that have been identified, including cumulative impacts; as well as a summary of key recommendations provided by each specialist. Sensitivity Maps of the Gamma Refined Corridor are provided, showing No-Go areas identified by specialists.
Section 8	**Conclusion** Provides a summary of the process, the findings and the overall conclusion. The proposed conditions of authorisation are also detailed in this section.
Section 9	**Appendices** Appendix 1: EAP Details Appendix 2: Screening Tool Report Appendix 3: Specialist Reports Appendix 4: Public Participation Report Appendix 5: Generic Environmental Management Programme for Overhead Transmission Lines

2. Project Description

The project entails the development of a 400 kV grid connection between the authorised Nuweveld Collector Substation and the 132/400 kV Gamma Substation ~90 km to the east. The additional gridline will allow Eskom to expand the capacity and improve the functionality of the grid in the area by creating a 400 kV ring-line between the Droërivier Substation, Gamma Substation and Nuweveld Collector Substation. The gridline will also create opportunities for other wind farm developments (such as the proposed Hoogland WEF projects) to tie-into the grid either at the Nuweveld Collector Substation or along the new 400 kV line. As such, the proposed new line will allow Eskom to release further renewable energy potential in an area that is becoming a renewable energy development node in South Africa, thereby helping to alleviate South Africa's power crisis.

Access tracks for construction and maintenance of the line will also be required and form components of the project.

2.1 The Project Area

The refined Corridor for the Gamma Gridline is 3 km wide and ~110 km long, running from the Nuweveld Collector Substation in the west to the Gamma Substation in the east (see Figure 4). The Nuweveld Collector Substation is situated ~56 km north of Beaufort West in the Western Cape Province and is part of the authorised Nuweveld WEF. The operational Gamma Substation is located ~90 km to the east of the Nuweveld Collector Substation, ~27 km south-east of Hutchinson. Although the Corridor and gridline start in the Western Cape (Central Karoo District Municipality and Beaufort West Local Municipality), portions of the line would traverse land in the Northern Cape (Pixley ka Seme District Municipality and Ubuntu Local Municipality).

The Corridor is located within a sparsely populated area in the Great Karoo, characterised by small settlements and towns mostly situated along major roads such as the N1 and the N12 in a landscape of predominantly large agricultural holdings. The main type of agriculture is low-density livestock and game grazing, with limited cropping in valley bottoms and often near homesteads because of the dry climate. The physical landscape comprises vast plains and open valleys with dispersed drainage systems amongst a rugged terrain of mesas (table type mountains/hills), koppies, rocky ridges, outcrops and plateaus. The prominent Perdeberg mesa is located south of the Corridor in the west. The Karoo National Park is ~45 km to the south of the Corridor. A number of Renewable Energy (RE) projects (wind and solar) are being developed in the area which is a Renewable Energy Development Zone. There are existing 132, 400 and 765 kV gridlines on the eastern end of the Corridor that run roughly south-west north-east past the Gamma Substation. The Corridor is located wholly within a Strategic Transmission Corridor.

Plate 1: A drainage area in an open valley with a homestead.

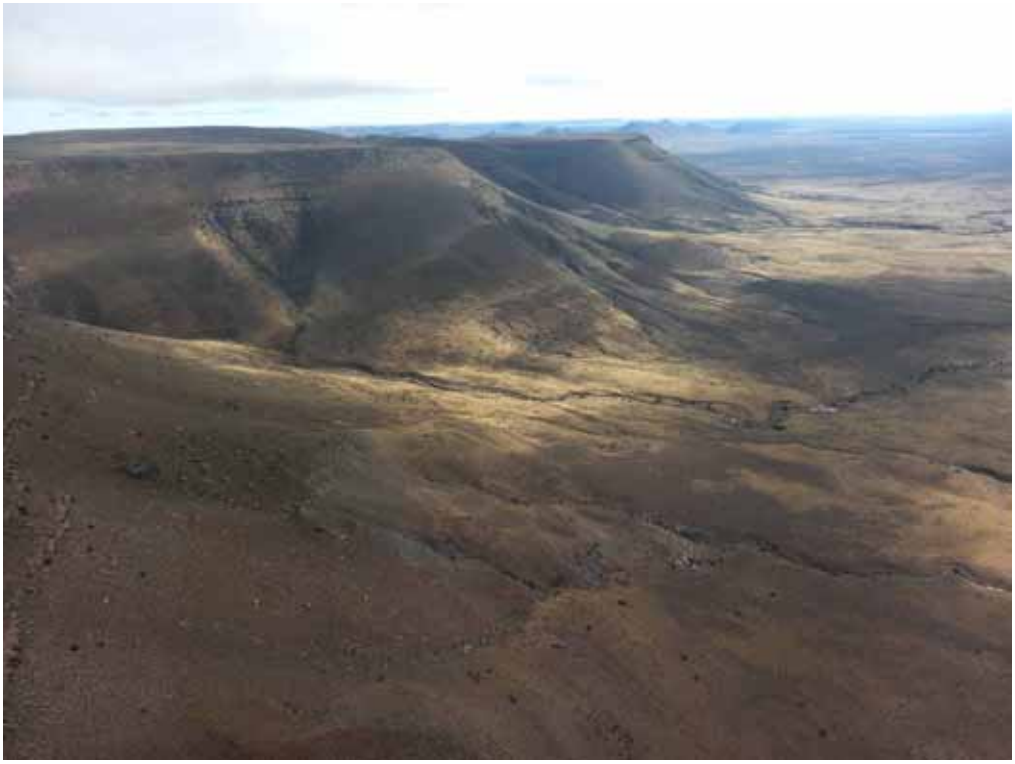


Plate 2: 'Table-top' mesas with drainage down slopes towards wide open valleys.

Plate 3: Outcrops and koppies.

Plate 4: One of the existing gridlines on the eastern end of the Corridor, with a pylon placed to span the riparian area.

Plate 5: The Gamma Substation and a powerline in the foreground in a flat open plan, with koppies and mesas in the background.

2.2 Routing of the Gamma Grid Corridor

During screening phase, a specialist desktop screening process and preliminary landowner negotiations informed the establishment of a broad, 6 – 10 km wide, 110 km long Assessment Corridor.

Further specialist site surveys and assessments were undertaken within the Assessment Corridor to map site sensitivity and define 'No-Go' areas based on various environmental and social sensitivity features. The No-Go areas, together with additional landowner negotiations, have been used to refine the Corridor and identify a pre-negotiated route within the Corridor. The gridline will need a ~55 m wide servitude.

Table 2 provides property details for land that falls within the refined Corridor where the pre-negotiated gridline is proposed. An aerial image showing the refined Corridor and the pre-negotiated gridline is given in Figure 7.

Table 2: Property details of the refined Corridor.

Farm Name	Farm Number	SG Code
SNEEUW KRAAL	46	C09000000000004600000
SNEEUW KRAAL	47	C09000000000004700000
DUIKER KRANSE	RE/45	C09000000000004500000
DUIKER KRANSE	RE/3/45	C09000000000004500003
VLAK FONTEIN	4/207	C08000000000020700004
VLAK FONTEIN	1/207	C08000000000020700001
EZELSFONTEIN	RE/235	C08000000000023500000
EZELSFONTEIN	RE/235	C08000000000023500000
GROOTKLIP	RE/238	C08000000000023800000
RIETKLOOF PLAATEN	RE/239	C08000000000023900000
GROOTKLIP	RE/238	C08000000000023800000
WATERVAL	RE/237	C08000000000023700000
MURRAYSBURG RD	RE/176	C05200000000017600000
TAAYBOSCHFONTEIN	RE/15	C05200000000001500000
UIT VLUGT FONTEIN	265	C08000000000026500000
SCHIETKUIL	1/3	C05200000000000300001
DOORN KLOOF	RE/224	C08000000000022400000
AANGRESEND ABRAMS KRAAL	11	C09000000000001100000
PHAISANT KRAAL	1	C05200000000000100000
KOOK FONTEIN	RE/226	C08000000000022600000
KLEINFONTEIN	RE/93	C06300000000009300000
SCHIETKUIL	3	C05200000000000300000
TAAYBOSCHFONTEIN	RE/1/15	C05200000000001500001
ZWARTKOPJES	RE/240	C08000000000024000000
MODDERFONTEIN	1/228	C08000000000022800001
MORDANT KLAASSENSKRAAL	RE/11/14	C05200000000001400011
UIT VLUGT FONTEIN	1/265	C08000000000026500001
DRUPFONTEIN	1/208	C08000000000020800001
BRAKFONTEIN	3/225	C08000000000022500003
PAARDEBERG	2/49	C09000000000004900002
AASVOGELBERG	1/59	C09000000000005900001
ABRAMS KRAAL	RE/206	C08000000000020600000
DRUPFONTEIN	2/208	C08000000000020800002
VLAK FONTEIN	3/207	C08000000000020700003
GABRIELS BAKEN	2	C05200000000000200000
DUIKER KRANSE	4/45	C09000000000004500004
BRAKFONTEIN	1/225	C08000000000022500001
BRAKFONTEIN	1/225	C08000000000022500001
EZELSFONTEIN	2/235	C08000000000023500002
EZELSFONTEIN	3/235	C08000000000023500003
EZELSFONTEIN	4/235	C08000000000023500004
RIETKLOOF PLAATEN	1/239	C08000000000023900001
ANNEX NOBELS FONTEIN	RE/234	C08000000000023400000

EZELSFONTEIN	5/235	C08000000000023500005
EZELSFONTEIN	1/235	C08000000000023500001
GROOTKLIP	1/238	C08000000000023800001
BRAKFONTEIN	RE/225	C08000000000022500000
AASVOGELBERG	4/59	C09000000000005900004
AASVOGELBERG	2/59	C09000000000005900002
MODDERFONTEIN	3/228	C08000000000022800003
MODDERFONTEIN	4/228	C08000000000022800004
ZWARTKOPJES	1/240	C08000000000024000001
ZWARTKOPJES	2/240	C08000000000024000002

The start, middle and end co-ordinates of the Gamma Refined Corridor are provided below, from west to east:

Start (west) - Nuweveld Wind Farm Development Collector Substation	31°51'21.18"S, 22°28'37.98"E
Middle	31°48'25.48"S 22°58'26.82"E
End (east) – Gamma Substation	31°40'43.63"S 23°24'29.63"E

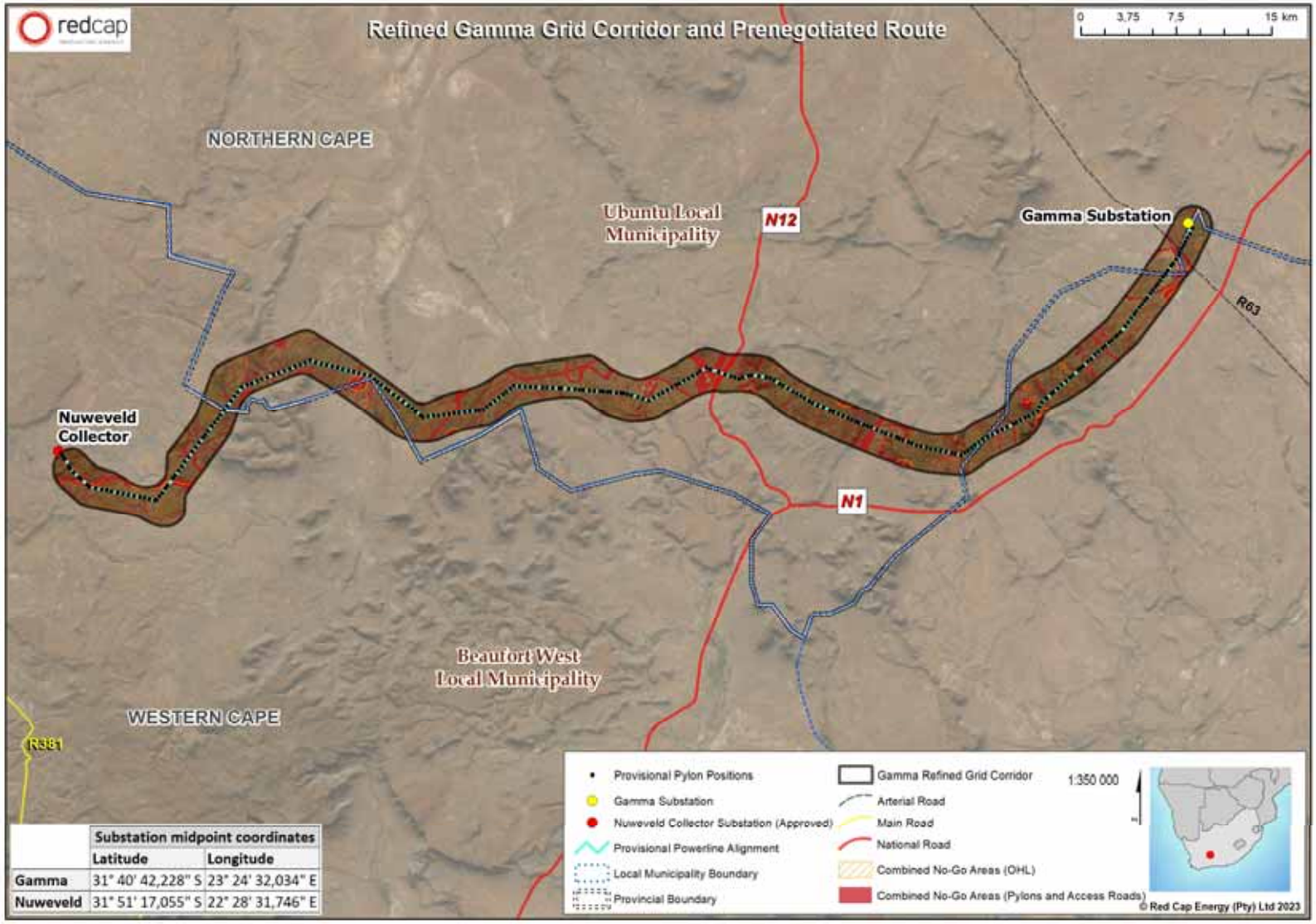


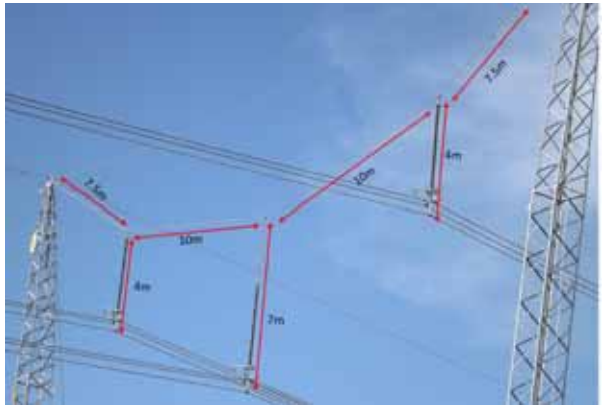
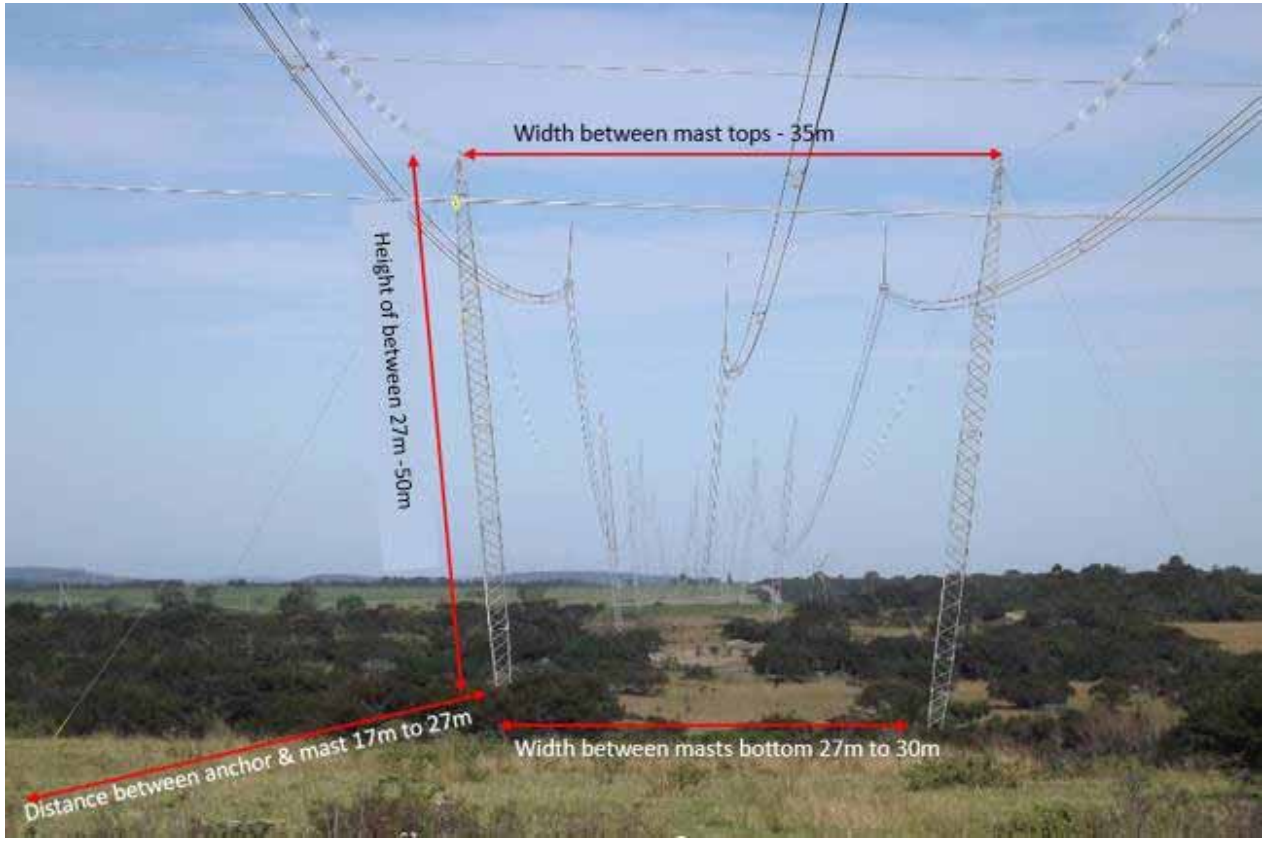
Figure 7: Aerial image showing the Refined Gamma Corridor, and the pre-negotiated gridline route.

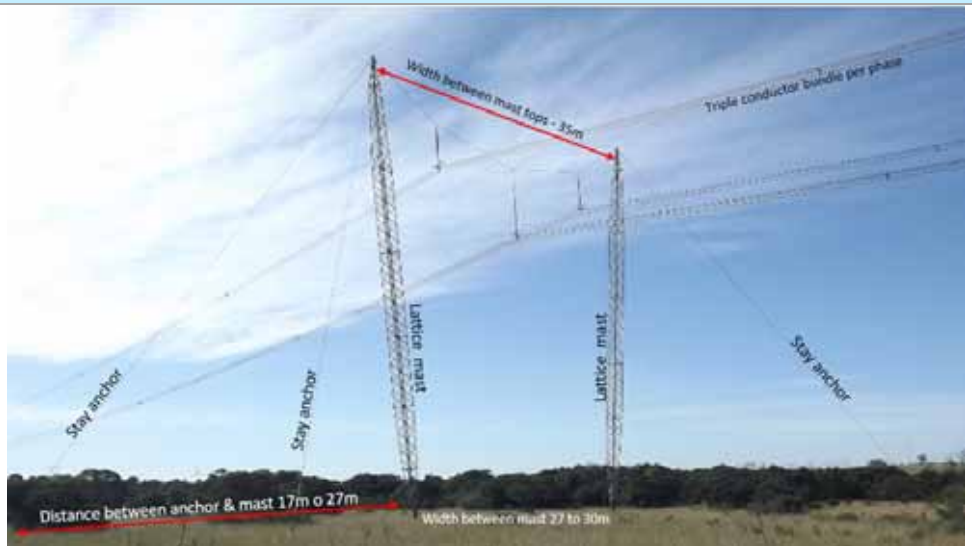
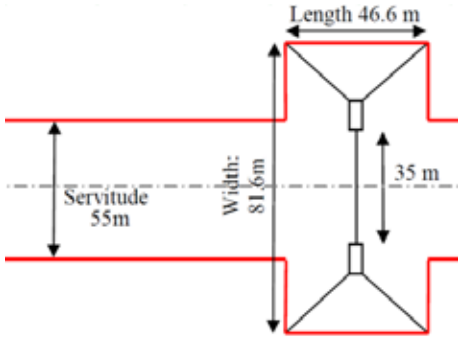
2.3 Grid Connection Components

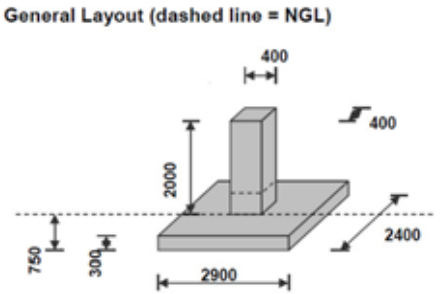
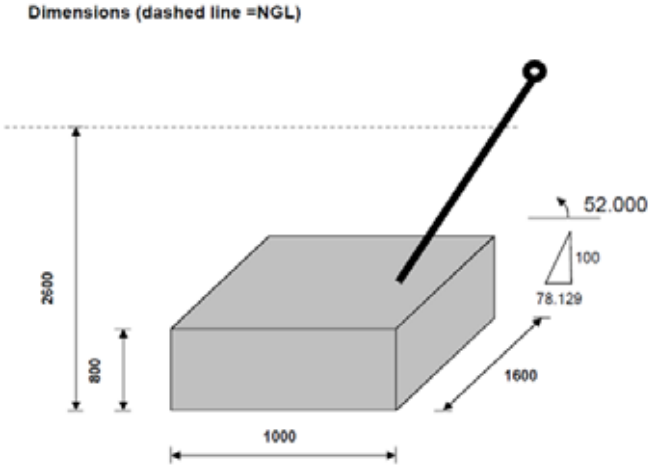
2.3.1 Pylon Types

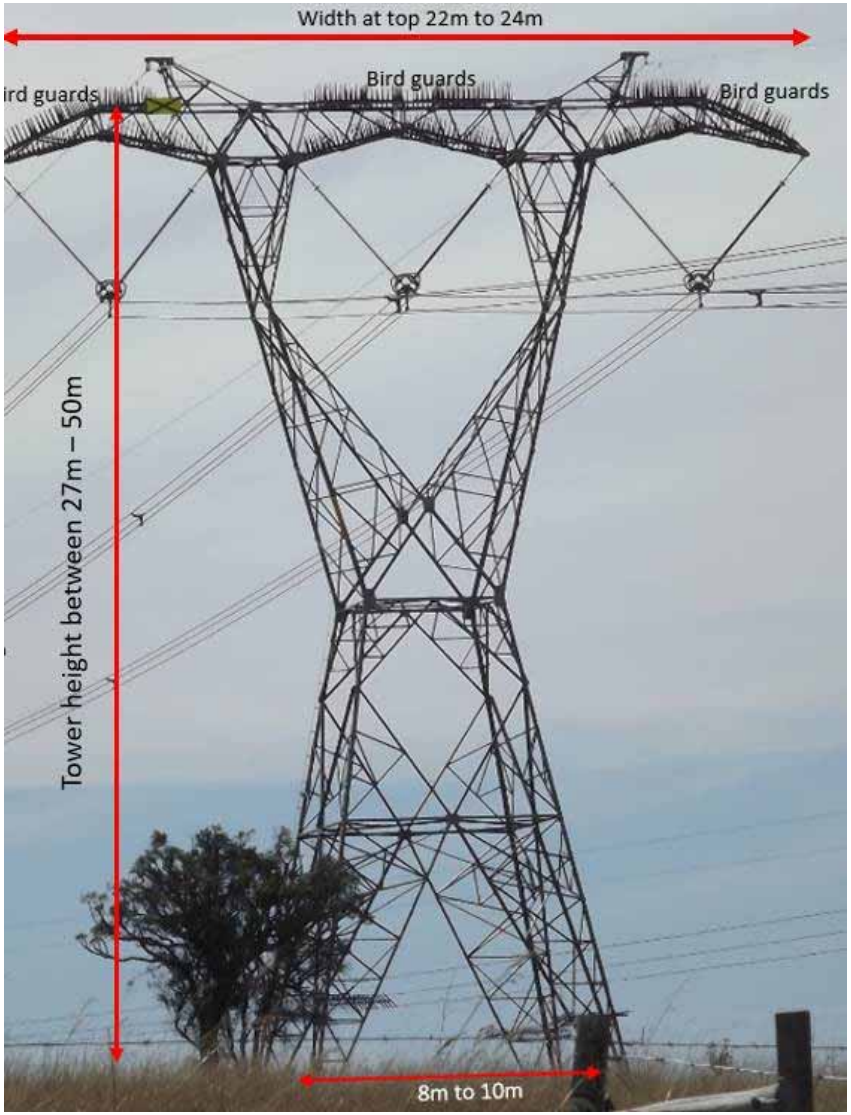
Lattice type pylons are required for the overhead line. The majority will be cross-suspension towers 27 to 42 m in height, but self-supporting towers will be used at turn points, at steep slopes or where a very large distance needs to be spanned. An exception to this is in an area up to 2 km west of, and 500 m east of the N12 where pylons of up to 50 m in height will be required to span and avoid a sensitive habitat. Table 3 describes the types of pylons being considered.

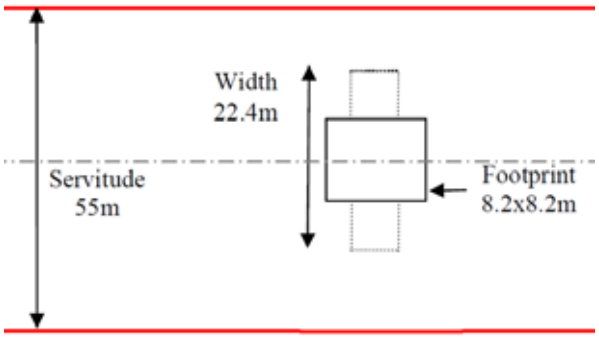
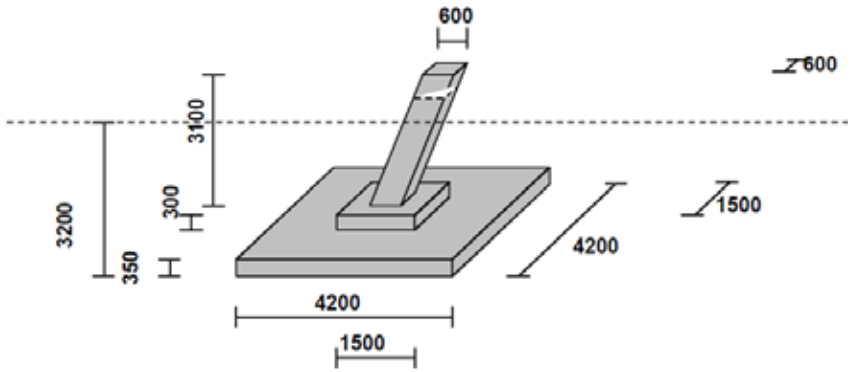
Table 3: Lattice Pylon Types that may be used along the Gamma Gridline.

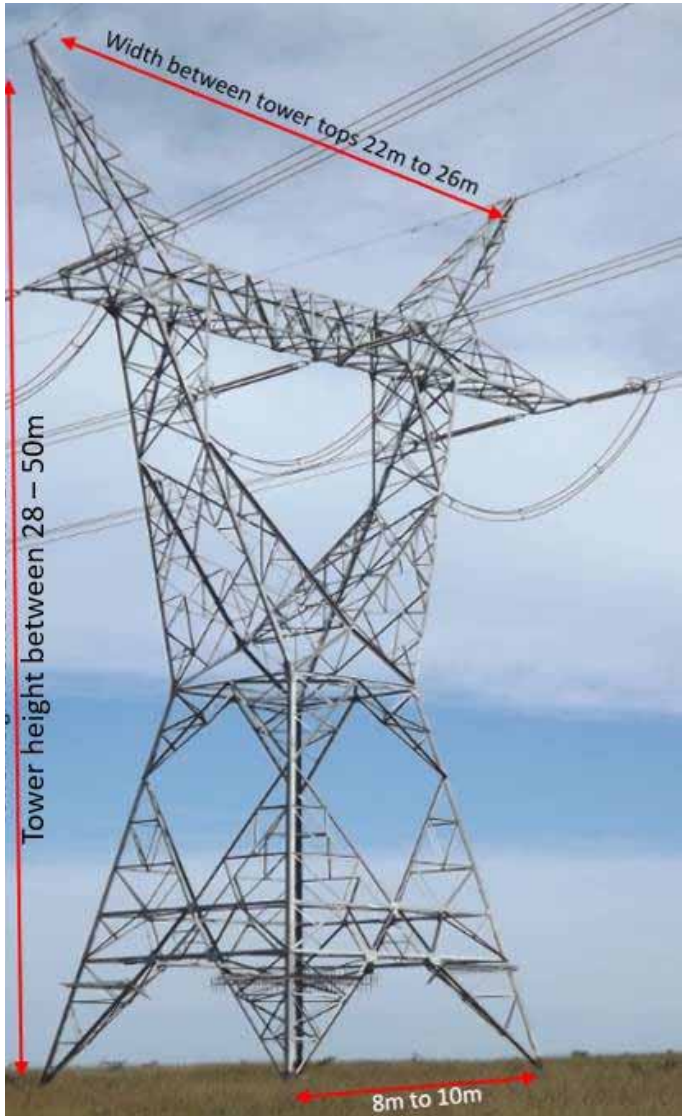
	Tower Type	Description and purpose	Illustration
1.	400kV Intermediate or Suspension Tower. **<u>Option 1:</u>** Cross-Rope Suspension Tower	The tower consists of two main lattice supports with a steel cross rope between the tower tops. The two main lattice supports are supported each with 2 x guyed anchors. The structure is design to support the conductor weight as well as the wind loading specifications. The conductors are supported on insulators from the steel cross rope support as illustrated below:  This tower type is for general use as an intermediate/suspension tower between angle strain points along the alignment and it is also the preferred option due to the smaller size and cost effectiveness. This structure will also be the most common structure used at an estimated 70% to 80% of the total number of structures on the line. Tower heights: 27m to 50 m Tower width: 28m to 35m	**Front View of the tower:**  **Side View of the tower:**

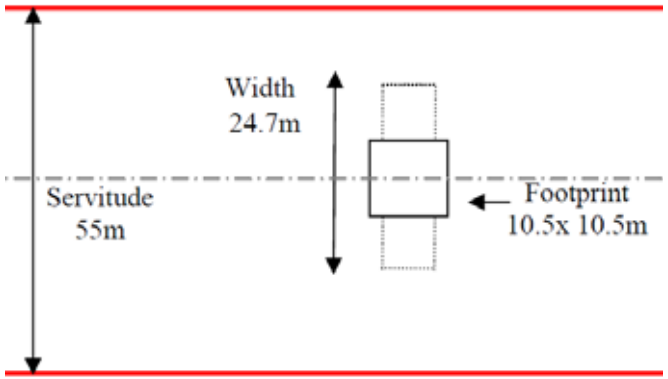
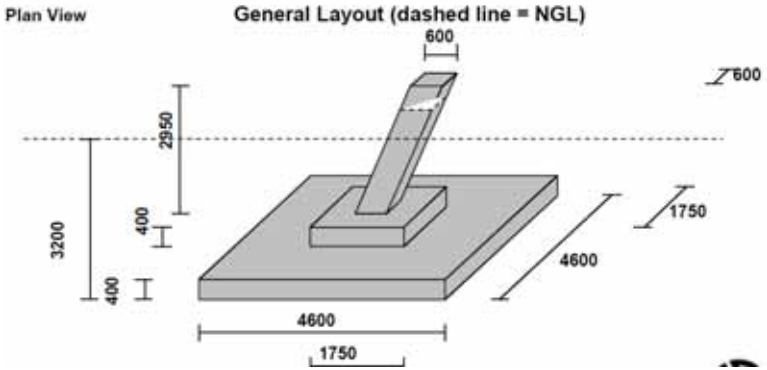
	Tower Type	Description and purpose	Illustration
	Option 1: Cross-Rope Suspension Tower (*Continue*)	Tower footprint: The footprint of the tower is determined by the distances between the outer anchors supporting the structure – in general the stays positioned 17m to 27m from the tower masts at an angle. This forms a square with estimated distances as per the illustration. Typical Foundation sizes: **1)** Typical Tower mast foundation	 

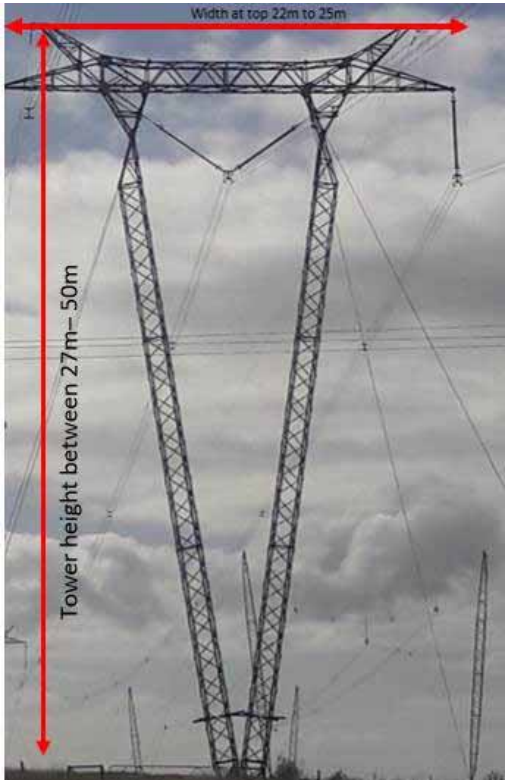
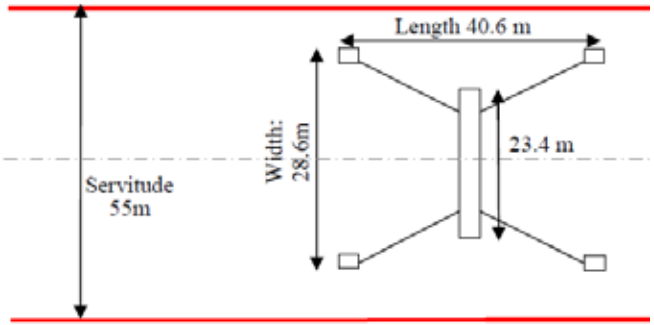
	Tower Type	Description and purpose	Illustration
		2) Typical Anchor or Stay foundation	   
2.	400kV Intermediate or Suspension Tower. **<u>Option 2:</u>**	The tower consists of a self-supporting lattice structure design with 4 x tower legs. The insulators are supported from a steel lattice cross-arm as indicated in the illustration. The tower is fully supported by the 4 x leg foundations and do not have any guyed anchors.	**Front View of the tower:**

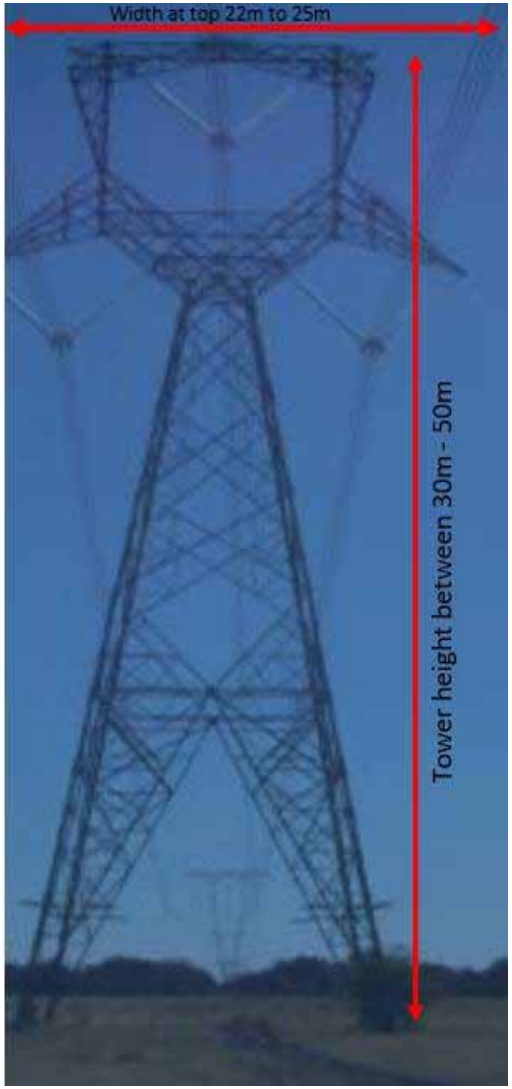
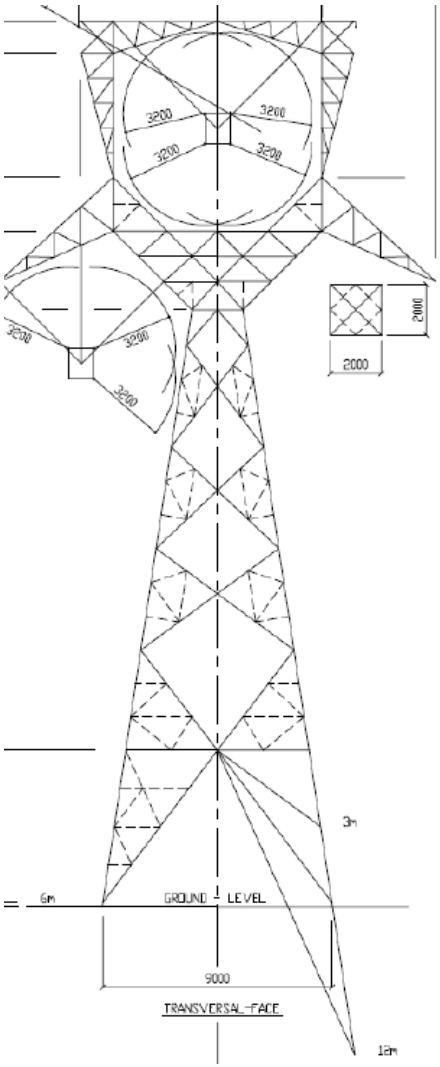
Self-Supporting Suspension Tower.	The structure is design to support the conductor weight as well as the wind loading specifications.	
Option 2: Self-Supporting Suspension Tower. (*Continued*)	Average Tower footprint size: The footprint of the tower is determined by the distances between the outer legs on the ground which are supporting the tower	

		Typical Tower Leg foundation size:	  **Plan View** **General Layout (dashed line = NGL)** 
3.	400kV Inline and Angle Strain Self-	The tower consists of a self-supporting lattice structure design with 4 x tower legs. The insulators are supported	**Front View of the tower:**

	Supporting Tower 400kV Inline and Angle Strain Self-	from a steel lattice cross-arm as indicated below:  The tower is fully supported by the 4 x leg foundations and do not have any guyed anchors. The structure is design to support the conductor tensions associated with the conductor weight and span lengths as well as the wind loading specifications. Average Tower footprint size: The footprint of the tower is determined by the distances between the outer legs	

	Supporting Tower (*continued*)	on the ground which are supporting the strain tower. Typical Tower Leg foundation size:	  

4.	400kV Intermediate or Suspension Tower. Guyed V-Type Tower	The tower consists of a main lattice triangle shape steel support tower that is installed on a centre foundation and supported by 4 x guyed anchors on the side. The structure is design to support heavier conductor weights and can be used where longer spans are required. Also have a smaller footprint than the intermediate cross rope tower. Tower centre foundations and 4 x guy anchor foundations similar to the cross rope tower foundations illustrated under Item 1.	 

5.	Transposition Tower. Required in the case where phasing needs to be swopped along the line.	The tower consists of a self-supporting lattice structure with 4 x tower legs. The insulators are supported from a steel lattice delta type cross-arm/beam as indicated in the illustration. The tower is supported by the 4 x legs with foundations and do not have any guyed anchors. The tower is only used in the case where conductor phasing needs to be swopped around. Normally maximum of 3 x towers required across a distance >100km. Tower foundations similar to the strain lattice tower foundations illustrated under Item 3 above.	 

2.3.2 Access

There is a well-established road network in the area. Access to the west would be via Beaufort West or Loxton using the R381, and access to the central and eastern portions of the corridor would be from the N1 and N12 via Three Sisters. Other than these National and Main Roads, there is also a network of District Roads, farm roads and access tracks throughout the Corridor.

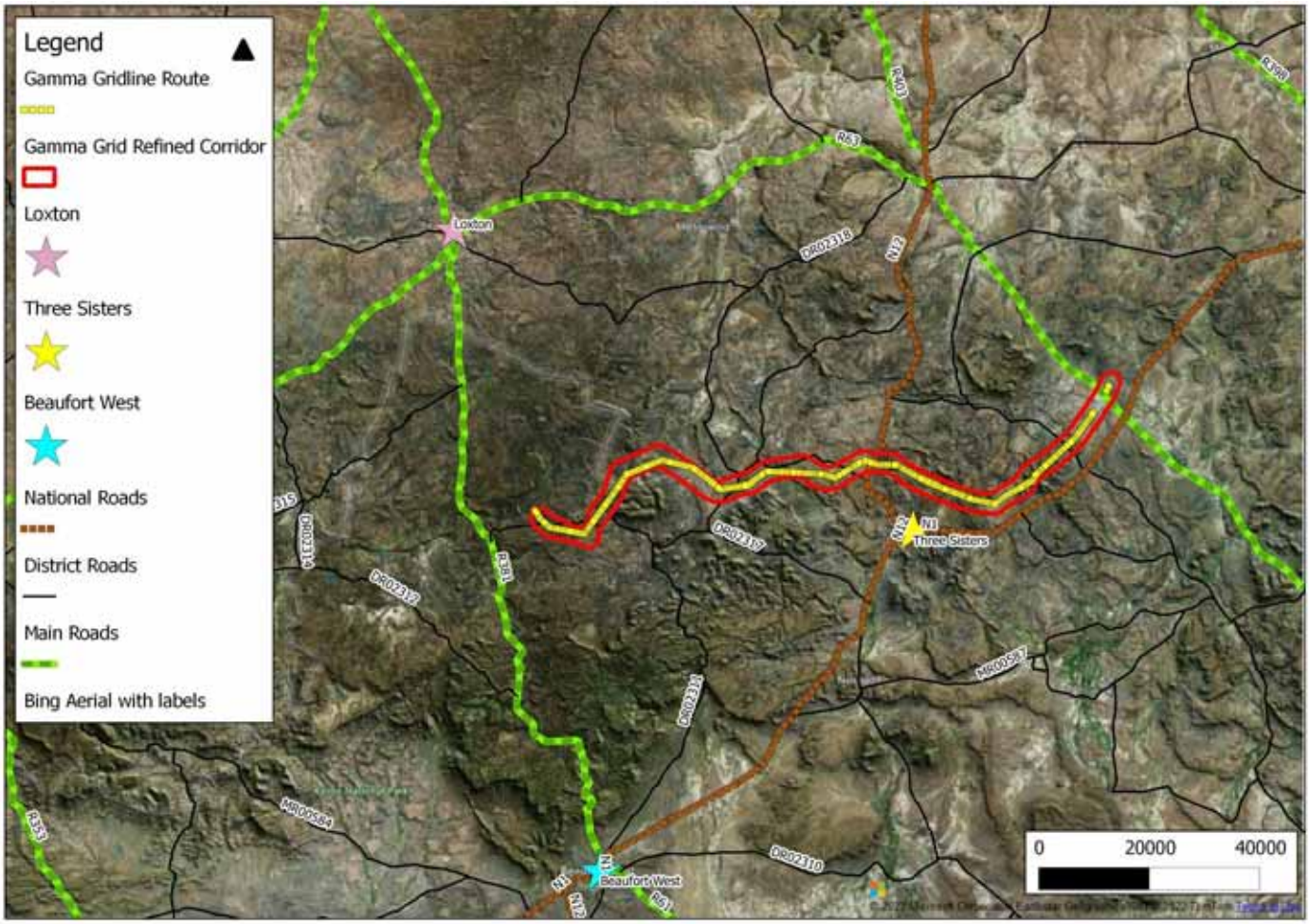


Figure 8: Existing road network for accessing the Gamma Corridor.

Existing access roads and tracks (upgraded to –up to 4.5 m wide where needed) will be used for construction and maintenance as far as possible and new access tracks would also be –up to 4.5 m wide. Where new access tracks are needed, these will avoid areas of very high sensitivity (i.e. No-Go areas) identified by specialists. For example, creating new roads in steep areas and across drainage lines will be avoided, and existing roads/tracks will preferably be used to cross these features.

Access tracks would be upgraded or established during the construction phase to enable access for the construction of the pylons and stringing of the lines. In certain areas, such as when the line spans over a sensitive watercourse, goes up very steep slopes, or spans an ecologically sensitive area, the service track will not run parallel to the line but will be

routed to access the specific pylons (where possible). These tracks would not be rehabilitated as they would continue to provide access for maintenance and management purposes and will be maintained throughout the life of the project.

For this assessment, Red Cap conservatively assumes that access tracks will be required for the entire length of the line (i.e. assuming the new tracks with an average width of 4 m are required for the entire route of the powerline – a conservative assumption as existing tracks will be used wherever possible). The alignment of access tracks will be finalised during micro-siting, post-decision making stage.

2.3.3 Temporary areas

Temporary laydown areas needed for construction will be identified along the gridline route, with the main construction yards being located along the alignment or in one of the surrounding towns. These will be located during micro-siting, and will be outside of specialist's No-Go areas. It is anticipated that the maximum area required for the temporary laydown areas is 5 ha.

2.3.4 Summary of components and disturbance footprints

Table 4 sets out the footprint areas of the different project components, with a total disturbance footprint of ~63 ha of which 5 ha are temporary.

Table 4: Summary of the components and approximate areas of impact

Component	Description	Ha
Overhead lines and pylons	There will be a 400 kV overhead line supported by mostly lattice structure pylons. The spans (distance between pylons) on the pylons are on average 400 m. Each pylon is conservatively assumed to have a footprint of 100 m^2	Corridor length: 110 km 2.75 ha (permanent for establishment of pylons)
Access roads and tracks	Existing access roads and tracks (upgraded to –up to 4.5 m wide where needed) will be used as far as possible and new access tracks would be created where needed (–up to 4.5 m wide).	Up to 46 ha (permanent)
Temporary areas	Temporary laydown areas will be identified along the alignment, with the main equipment and construction yards being located along the alignment or based in one of the surrounding towns. It is anticipated that the total area required for the temporary laydown areas is up to 5 ha.	5 ha (temporary)
Total disturbance footprint:	**Temporary**	**5 ha**
Total disturbance footprint:	**Permanent**	**48.75 ha**

2.3.5 Services

Services will be required for construction phase in the form of water, sanitation, waste removal, and energy.

- Water: for cement mixing, layerworks, and dust control; and potable use (staff drinking water)
- Sanitation: portable chemical loos will be provided for construction staff, in line with the EMPr

- Waste: construction wastes typically include building rubble such as excess concrete, bricks, and wiring; excavated soil and rock material; domestic waste (e.g. plastics, cans); packaging, effluent from chemical loos, and cleared vegetation (some of which will be alien species). The resident engineer and contractor(s) will be responsible for removal of construction waste to a registered waste disposal site. Waste will be stored at the site camp in a dedicated area that is designed to meet the requirements of the National Norms and Standards for storage of general and hazardous waste
- Energy: likely in the form of diesel fired generators to power equipment.

2.3.6 Maintenance Activities

The Gamma gridline will be a valuable asset to the national grid and decommissioning is highly unlikely. Periodic maintenance and repairs will be required, and will be done by ESKOM under their standard operational maintenance procedures.

2.3.7 Timeframes

Construction phase is estimated to be an 18 to 24 month period. Should the DFFE issue an Environmental Authorisation (EA), the duration required is as follows: commencement of construction must start within 10 years of issuing of the EA, and construction must be completed within 5 years of commencement. On completion the gridline would be ceded to Eskom and become part of the National Grid infrastructure, thus it is unlikely that it would be decommissioned.

2.4 Need and Desirability

The proposed Gamma gridline is needed to expand the capacity and improve the functionality of Eskom's grid in the area. This will be achieved by creating a 400 kV ring-line between the Droërivier Substation, Gamma Substation and the Nuweveld Collector Substation, which will create opportunities for other wind farm developments (such as the proposed Hoogland WEFs) to tie-into the grid either at the Nuweveld Collector Substation or along the proposed 400 kV line. Therefore, the proposed line will allow Eskom to release further renewable energy potential in an area that is becoming a renewable energy development node in South Africa, thereby helping to alleviate our power crisis. The need and desirability of the gridline therefore cannot be considered in isolation, but rather as part of a broader RE development node and infrastructure distribution network.

The DEA's Guideline on 'Need and Desirability' (2017) outlines the meaning of the concept, and what must be evaluated to determine if a development meets sustainability principles under South Africa's Constitution and NEMA. 'Need and desirability' relates to the "*nature, scale and location of the development being proposed, as well as the wise use of land*", where 'need' is relevant to 'time', and desirability to 'place'.

The gridline is part of the renewable energy power solution in South Africa. The need for additional (clean) energy in the country is evident (for example, evidenced by persistent national rolling power blackouts, known as loadshedding), and wind energy is a desirable solution to the energy crisis as it:

- Promotes energy diversification and security, and a stable economy.
- Creates clean energy using a renewable resource, and reduces the demand and dependence on limited resources like water and coal.
- Produces less carbon emissions than other non-renewable energy sources, and therefore assists with meeting carbon emission reduction targets in line with global climate change commitments.
- Promotes local economic development by creating jobs and promoting skills development.
- Has the potential for significant social benefit in surrounding communities through direct investment and employment.

The DEA's and DEA&DP's Need and Desirability guidelines (DEA, 2017 and DEA&DP, 2013) have a list of questions to assess the project's contribution to sustainable development on a local, regional and national scale. Various factors are considered in the project's area of influence in both the Northern and Western Cape (see Table 5 and Table 6).

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Table 5: 'Need' for the Gamma 400 kV Gridline

NEED	
CONSIDERATION	**RESPONSE / MOTIVATION**
Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority i.e. is the proposed development in line with the projects and programmes identified as priorities within the Integrated Development Plan (IDP)?	Yes. The relevant municipalities within the Gamma Grid corridor area are the Central Karoo District Municipality and Beaufort West Local Municipality in the Western Cape and the Pixley ka Seme District Municipality and Ubuntu Local Municipality in the Northern Cape - renewable energy projects are prioritised in the various municipal strategies and policy documents. The Western Cape primarily relies on energy from coal-powered plants located elsewhere in South Africa. The need to support RE projects in the Province for energy security (and associated economic performance and growth), diversification of the economy, and climate change mitigation is a priority in the Western Cape's Provincial Spatial Development Framework (PSDF) (2014). Emphasis is placed on developing RE projects in 'suitable rural locations (as per recommendations of the Strategic Environmental Assessments for wind energy (DEADP) and renewable energy (DEA))'. The SDF also highlights the value of safeguarding the Province's 'scenic and cultural landscape' and protecting areas that are under threat from large-scale infrastructure projects. The Gamma Grid Corridor is wholly located within a Strategic Transmission Corridor – an area specifically intended to host high voltage transmission infrastructure. A Visual Impact Assessment (VIA) has been done to inform the alignment of the Corridor, and the pre-negotiated route within the Corridor to reduce impacts on the scenic and cultural landscape. The VIA found that visual and sense of place impacts of the project are tolerable. Most of the energy in the Central Karoo is sourced from Eskom, and derived from coal-fired power plants. The CKDM's SDF (Draft, September 2019) identifies the risks of greenhouse gas emissions, and notes the growing development and potential of renewable energy projects (onshore wind and solar) in the region. The need to create 'green energy opportunities' is part of the CKDM's Spatial Planning Mission. Policy A5 of the Municipal Spatial Priorities in the SDF deals with supporting and promoting the renewable energy economy in the District. The SDF recognises the significant potential of the area for wind and solar energy and recommends that '*The Karoo should leverage this asset to encourage Independent Power Producers to locate in the region, also making the Central Karoo a well-managed and desirable place to locate, if one is connected to this industry*'. Guidelines for Policy A5 are to: • Actively seek out green energy projects to be located in the region. • Put in place incentives to encourage green energy operators to locate in the Central Karoo. As with the Provincial SDF, the importance of vistas and viewsheds is emphasised, and that these must not be undermined by infrastructure development. The VIA found that visual and sense of place impacts of the project are tolerable in this Strategic Transmission Corridor. The potential of RE projects to 'secure a bright future for the region and its residents' is highlighted in the foreword of the Pixley ka Seme District Municipality's SDF (2013 – 2018). The report recommends that RE projects must be investigated as a means of diversifying the economy from reliance on mining and agriculture. A Renewable Energy Hub has been proposed for the region, stretching from the coast to past De Aar. Because of the high solar radiation index, RE projects are predominantly solar, but WEF developments are growing.
Should development, or if applicable, expansion of the town/ area concerned in	Yes. South Africa's electricity mix is dominated by coal-fired power generation which contributed 83.5% to system demand in 2020[5]. While energy provision is recognised as a development priority, South Africa is a signatory to the Paris Agreement on Climate Change, which sets targets and makes

[5] https://www.enerdata.net/publications/daily-energy-news/renewables-accounted-161-south-africas-power-mix-2020.html

NEED	
CONSIDERATION	**RESPONSE / MOTIVATION**
terms of this land use (associated with the activity being applied for) occur at this point in time?	commitments to control and reduce emissions. The energy sector in South Africa contributes almost 80% to the national greenhouse gas emissions, where 50% are from electrical generation and fuel production (Integrated Resource Plan, 2019). Renewable energy is recognised globally, and nationally, as an effective energy alternative for emission reduction, and socio-economic incentives. The (then) Department of Energy (DoE) developed the Integrated Resources Plan (IRP) as the country's electricity infrastructure development plan, founded on 'least-cost electricity supply and demand balance', and considers security of supply and the environmental issues (notably minimising emissions and water use). In the period between 2011 and 2019, a total of 18 000 MW of new generation capacity was committed comprising 9 564 MW of coal power at Medupi and Kusile, 1 332 MW of water pumped storage at Ingula, 6 422 MW of renewable energy by independent power producers (IPPs), and 1 005 MW of Open Cycle Gas Turbine (OCGT) peaking plants currently using diesel at Avon and Dedisa (van der Poel *et. al.*, 20119)[6]. Provision has been made in the IRP (2019) for 14 400 MW of wind generate energy by 2030. The need for a safe and reliable source of clean energy in South Africa is an urgent priority, especially with ongoing load-shedding. This strategy is evident in the 2019 IRP whereby the largest portion share of new generation capacity between now and 2030 will be wind energy. Functional gridline infrastructure with sufficient capacity is required to evacuate and distribute energy generated by WEFs. The Gamma gridline will contribute to this urgent need.
Does the community/ area need the activity and the associated land use concerned (is it a societal priority)?	Yes. The SDF's for the Western and Northern Cape, and the District Municipalities all indicate the need to prioritise the delivery of clean energy to the communities, to mitigate climate change impacts by reducing dependence on energy created by coal-fired systems, and to diversify the economy with alternative energy development. A Socio-Economic Study has been done that demonstrates the direct benefits of the gridline and WEF development in the area to the local communities through direct and induced job opportunities (with associated skills development and transfer), and support for local businesses when purchasing goods. There will also be secondary economic benefits from contractors in the area requiring accommodation and other services in construction phase - as well as through the facilitation of additional renewable energy generation. Renewable energy is recognised globally, and nationally, as an effective energy alternative for emission reduction, and generating socio-economic benefits. The Renewable Energy Independent Power Producer Procurement Program (REIPPPP) was launched in 2011, a competitive procurement program for renewable energy through public-private partnerships. Since its inception, US $16 billion in private-sector investment has been committed for 79 awarded projects totalling 5 243 MW of renewable energy[7]. Renewable energy projects attract foreign investment to the country and thereby create socio-economic benefits on a local level by means of job creation, skills development, funding of enterprise development and socio-economic development projects, as well as the establishment of Community Trusts. A percentage of the operational revenue of the RE projects that the Gamma Gridline will facilitate will be used to support local socio-economic development initiatives, in line with REIPPPP specifications. It is important that the local community is actively involved in deciding how funds are used to ensure that relevant and urgent needs are addressed.
Are there necessary services with appropriate capacity	There is a well-established road network in the area. Access to the west would be via Beaufort West or Loxton using the R381, and access to the central and eastern portions of the corridor would be from the

[6]What you need to know: South Africa's Integrated Resource Plan 2019. Available: https://www.miningreview.com/energy/what-you-need-to-know-south-africas-integrated-resource-plan-2019/ [Accessed: 27 June 2021].

[7] Partnership on Transparency in the Paris Agreement. Available: https://www.transparency-partnership.net/gpd/south-africas-renewable-energy-independent-power-producer-procurement-programme [Accessed 29 June 2021].

NEED	
CONSIDERATION	**RESPONSE / MOTIVATION**
currently available (at the time of application), or must additional capacity be created to cater for the development?	N1 and N12 via Three Sisters. Other than these National and Main Roads, there is also a network of District Roads, farm roads and access tracks throughout the Corridor. Existing access roads will be used as far as possible, but some additional tracks may need to be developed. This will be determined post-decision making phase during specialist micro-siting, and any new roads will be outside of specialist No-Go areas. In construction phase, contractor(s) will be responsible for providing portable toilets and drinking water for staff, and only minimal municipal services will be needed (for example sourcing non-potable municipal water for construction works and disposal of construction waste at registered landfill sites). The contractor will also be responsible for removal of construction waste and wastewater from portable toilets. Waste will be removed from site to a licenced waste disposal and/or recycling site that has the capacity to accept the type and volumes of waste. Electricity for construction phase will be supplied to the site via generators. If the need for services arises during construction or operational phases, the necessary approvals/ agreements will be sought from the relevant authority.
Is this development provided for in the infrastructure planning of the municipality, and if not, what will the implication be on the infrastructure planning of the municipality (priority and placements of services)?	Yes. The development of the Gamma Gridline is not specifically mentioned in the Provincial and District Municipality's policy documents, however several references are made to the grid network within the area and its strategic importance, as well as the need to prioritise alternative energy projects. As above, the development is not dependent on municipal infrastructure services and will have little impact on existing infrastructure. The gridline will contribute to the national grid infrastructure and enable more effective availability and distribution of electricity.
Is this project part of a national programme to address an issue of national concern or importance?	Yes. The DoE's mandate is to ensure the efficient supply of electricity to South Africa. Economic growth in the country is significantly impacted by energy constraints, especially with load-shedding since 2015. The gridline will be part of Eskom's national grid infrastructure, and will allow for the evacuation of energy from WEFs thereby promoting the delivery of reliable and sustainable energy to the national grid. The National Development Plan aims to ensure that half of the new future generation capacity comes from renewable energy sources and recognises the importance of the transition to a low carbon economy. The Gamma gridline will evacuate energy produced by WEFs thereby facilitating the development of these RE facilities, and will therefore indirectly contribute toward South Africa's transition to low carbon economy and to meeting its commitments under the Paris Agreement.
Do location factors favour this land use (associated with the activity applied for) at this place?	Yes. The project is designed to create a 400 kV ring-line between the Droërivier Substation, Gamma Substation and Nuweveld projects. The gridline is wholly situated within a Strategic Transmission Corridor, intended specifically for gridline infrastructure development. Furthermore, RE facilities associated with the project are located in the region specifically due to the optimal wind and solar resources here. The predominant land use in the region is large agricultural holdings, mainly with low-density livestock and game grazing, and limited cropping in valley bottoms and often near homesteads because of the dry climate. Generally, wind energy and associated gridline infrastructure development can operate in this landscape without significantly impacting on farming operations. The landscape is vast and sparsely populated, with little impact to the natural environment other than farming, roads and infrastructure. The visual quality of the area is of significant value to the tourism industry and 'sense of place' for people who live in the area. A Visual Impact Assessment has been done to sensitively align the pre-negotiated gridline and place infrastructure away from the most sensitive

NEED	
CONSIDERATION	**RESPONSE / MOTIVATION**
	viewsheds and receptors (refer to Section 6 for more details on the visual impact of the project, and suggested mitigation measures). The visual impact of the gridline in the operational phase is considered to be acceptable (medium negative significance rating) by the visual specialists in this Strategic Transmission Corridor. Much of the central and western area of the refined Corridor is part of a Critical Biodiversity Area network in the Northern Cape CBA Map and/or the Western Cape Biodiversity Map. There are also numerous drainage lines and wetlands. An iterative process was followed to identify firstly the Assessment Corridor, and secondly to refine the corridor and align the pre-negotiated gridline. Desktop specialist studies and preliminary landowner consultations informed the Assessment Corridor alignment, and this was refined after further detailed surveys and assessment. Very high sensitivity areas are classified as 'No-Go' areas and will be avoided. It will not be possible to completely avoid CBA areas due to the length of the Corridor. However, avoidance of specialist identified No-Go areas and specialist micro-siting post-decision phase will ensure that infrastructure avoids very high sensitivity areas and that additional mitigation is applied in high sensitivity areas that cannot be avoided to reduce the significance of impacts. The terrestrial biodiversity study rated impacts of the gridline on CBAs and ESAs as low negative in both construction and operational phases.
Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements / aspects), and specifically also on the socio-economic objectives of the area? Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programmes?	Yes. The Socio-Economic Specialist study done by Index Consulting identified a number of positive impacts of the gridline – in construction phase, positive economic impacts for the local and national economies are anticipated through direct employment, procurement of capital goods, general construction and building material and infrastructure elements. In addition, downstream opportunities will further result in indirect employment and income through induced effects of the project. A general increase in the quality of livelihoods will manifest for participating households. Training and skills development will indirectly address poverty alleviation over the medium to long-term, as the people involved in the project will acquire skills. Strong emphasis has been placed on measures to include municipal structures in the processes to enhance participation and transparency. During operations positive impacts relate to direct employment (limited) and economic contribution through downstream business opportunities from the provision of electricity and the improvement of livelihoods as a result of an increase in earnings. Negative socio-economic impacts in both construction and operational phases are also identified. Construction phase can result in as an influx of jobseekers, intrusion impacts for landowners, security risks, traffic impacts and health and safety risks at the construction site. These will be short term impacts, and of low to very low significance with mitigation in place. Negative operational phase socio-economic impacts will all be of low to very low significance with mitigation in place too.
What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	The Screening and Basic Assessment process is designed to identify and assess impacts of the project on the biophysical and socio-economic environment, with the intention of presenting a development option that meets the principles of sustainable development. Screening and more detailed surveys by specialists provided a good understanding of the sensitivity of the receiving environment, and which areas need to be avoided in development planning and/or where additional mitigation is needed in terms of design or construction methods. Generic EMPr for overhead transmission lines will be used to ensure that an environmentally and socio-economically sustainable approach is implemented. The EMPr is a 'living' document, and an adaptive management approach is used where changes are made to address unforeseen impacts as they may arise. An Environmental Control Officer will be responsible for overseeing the implementation of the EMPr in construction phase. Section 6 and 7 of the BAR address the assessment of impacts of the project in more detail.

NEED	
CONSIDERATION	**RESPONSE / MOTIVATION**
What measures were taken to ensure the participation of all interested and affected parties? What measures were taken to ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge?	Regulation 41 of the EIA Regulations outlines the public participation process to be followed in an environmental assessment process. The process adopted for the Gamma gridline project is in line with the Regulations. For details, please refer to the Public Participation Report in Appendix 4. A number of environmental assessments have been undertaken in recent times for the Hoogland and Nuweveld Projects, and Red Cap therefore has a comprehensive stakeholder database for the region and the surrounding community is familiar with the process.
Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area.	All specialist studies assessed the cumulative impact of the development on their respective disciplines, of other RE and grid projects (approved and at planning stage) within a 30 km radius of the Gamma Grid corridor. The method that has been used to assess cumulative impacts is explained in Section 5, and the cumulative socio-economic impact of the project is provided in Section 6. Positive cumulative impacts are assessed for (medium and high positive): • The provision of (renewable) energy with indirect economic benefits (such as economic growth on a national scale). • Increased employment, new business opportunities, induced benefits for other businesses, and increased skills development and livelihood opportunities. This will take place on a national and regional level. • Local municipalities with a better skilled population and higher employability levels, and capacity building of municipal staff when actively involved in the process. Negative cumulative impacts are assessed for (low and medium negative): • Influx of job seekers. • Land devaluation. • Visual intrusion, changes in sense of place and associated decline in tourism.
Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources for the proposed	Yes. As previously discussed, the gridline is needed to evacuate energy from renewable energy generation facilities. The area is suited to wind and solar energy generation because of its optimal wind and solar resources. Provincial and District Municipal Policy documents all promote renewable energy projects. Natural resources are used for agriculture in the area. Agriculture can continue and the gridline will not significantly impact on farming practices. Johann Lanz did an Agricultural Site Verification and Compliance Report that confirmed the development will have negligible agricultural impact and will therefore be acceptable in terms of its impact on the agricultural production capability of the area. This is substantiated by the facts that the amount of agricultural land loss resulting from the development is insignificant, and that the land is of very low agricultural potential.

NEED	
CONSIDERATION	**RESPONSE / MOTIVATION**
development alternative?)	
What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)?	The public participation process is the best way of ensuring that that the local community's concerns are heard, and addressed in development planning and the assessment process. Refer to the Public Participation Report in Appendix 4 for details on the process. The BA process also requires that landowner agreements are in place for the pre-negotiated gridline at the time of submitting the BAR. The gridline will facilitate the evacuation of (affordable) renewable energy for distribution to the broader public that will facilitate economic development and growth in South Africa, and the project contributes to climate change mitigation.
What measures were taken to ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge?	A stakeholder database was compiled including landowners within and adjacent to the refined Corridor. Landowners have been contacted telephonically (where possible) to inform them of the project, and notify them that they will receive a copy of the Draft BAR for review and comment by means of their specified means of communication (in most cases email). Notices have been placed in two newspapers, and 6 site notices have been placed in areas accessed by the public in the region. Notices are in English, Afrikaans and isiXhosa. The broader community has been notified via the ward councillors and community organisations and farmers associations. The Draft BAR was copied to a flash drive and given to Ward Councillors, and as an audio presentation. All reports are also hosted on the EAP's website. To accommodate IAPs with limited data access, the EAP hosted all public participation information on a data-free website.
How was a risk-averse and cautious approach applied in terms of socio-economic impacts?	A risk- averse and cautious approach was followed through the identification and avoidance of all specialist identified No-Go areas. Screening was undertaken at the pre-feasibility stage to allow environmental and social impacts to be considered early in the project lifecycle and evaluated in an integrated manner with the engineering design considerations. The screening process was specifically based on the identification and mapping of No-Go areas of the corridor to identify and avoid all very high environmental and socio-economic sensitive areas. The mapping considered the impacts of a) pylons and access roads, and b) overhead lines (spanning) separately. Further, avoidance recommendations proposed by the specialists during subsequent surveys have been taken into account to refine the Corridor and determine a suitable alignment of the pre-negotiated gridline as presented in this BAR. Provided that No-Go areas are avoided and other recommended mitigation is strictly applied, no fatal flaws have been identified by any of the specialists.

Table 6: Desirability

DESIRABILITY	
CONSIDERATIONS	**RESPONSE / MOTIVATION**
Is the development the best practicable environmental option (BPEO) for this land/ site?	The project is located wholly within a Strategic Transmission, specifically identified to host high voltage transmission infrastructure such as the Gamma Gridline. The current land use in the Corridor is predominantly low-density livestock farming with limited cropland farming in valleys. The agricultural specialist concluded that the area is of low agricultural productivity, and that the development footprint would have a negligible impact on farming. The Corridor also includes large tracts of undisturbed natural environment, parts of which are included in the CBA network of the Western Cape and/or Northern Cape Biodiversity Plans. Specialist studies have been done to describe the terrestrial and aquatic biodiversity status of the area, and indicate whether Species of Conservation Concern (SCC) listed in the Screening Tool Report were observed or are likely to occur based on the habitat type and condition. On this basis, specialists provided sensitivity maps, identifying areas of very high and high sensitivity, where the former needs to be avoided in the alignment of the gridline, and infrastructure and road placement in the latter needs to be finalised during specialist micro-siting post-decision making stage. The pre-negotiated gridline presented in this BAR avoids specialist No-Go areas, and mitigation measures suggested by specialists are included in the EMPr. While some loss of natural area (and environmental impact) is anticipated, the impact of this is rated as low negative (with mitigation in place) by all biodiversity specialists.
How will this development use and/or impact on non-renewable and renewable natural resources and the ecosystem of which they are part?	The project will not use resources beyond construction phase. The project is intended to facilitate the generation of renewable energy and thereby contribute to a reduction in the reliance of non-renewable coal as an energy resource, and shift to renewable energy.
Would the approval of this application compromise the integrity of the existing approved Municipal IDP and SDF as agreed to by the relevant authorities?	No. As above, the Provincial and District Municipal SDFs emphasise the importance of investing in and developing RE projects in the area. The public participation process includes officials from municipal departments. The socio-economic specialist engaged with municipal officials in meetings, by telephone and with questionnaires in July to September 2022. Comments raised during these engagements are captured in the Socio-Economic Report, and are addressed under the assessment of impacts and when providing mitigation measures. No fatal flaws have been identified.
Would the approval of this application compromise the integrity of the existing environmental management priorities for the area (e.g. as defined in Environmental Management Framework (EMF)), and if so, can it be justified in terms of sustainability considerations?	No. There is not EMF for the area. However, as above, the Corridor is traversed by CBAs in the Northern Cape and Western Cape Biodiversity Plans. It is not possible to avoid all CBAs in the grid alignment because of the large expanse of these areas making them difficult to span in this Strategic Transmission Corridor. The specialists considered CBAs in their surveys and assessments, and when developing sensitivity maps that are used to indicate No-Go areas and other areas where micro-siting will be required.
How will the activity or the land use associated with the activity applied for, impact on sensitive natural and cultural areas (built and rural/ natural environment)?	Impacts of the project on the natural and cultural/heritage/archaeological/palaeontological environment have been assessed by specialists, and the impacts are presented in Section 6. As above, the iterative design and assessment process ensures the avoidance of 'very high' sensitive environments identified as No-Go areas by specialists.

DESIRABILITY	
CONSIDERATIONS	**RESPONSE / MOTIVATION**
How will the development impact on people's health and wellbeing (e.g. in terms of noise, odours, visual character and sense of place, etc.)?	Impacts of the gridline, and especially pylons, on sense of place and the visual character of the area have been assessed in the VIA. The socio-economic specialist study assessed impacts on local communities from construction activities (noise, disturbance, intrusion, influx of people in search of work, safety etc.). This sparsely populated area has few sensitive visual receptors, and no significant negative impacts on people's health and well-being are expected. Mitigation measures are provided to prevent impacts on local communities associated with an influx of people and activities to the area. Visual impacts are addressed through pylon placement outside of sensitive viewsheds / visual receptors.
How will this development disturb or enhance landscapes and/or sites that constitute the nation's cultural heritage?	Visual, palaeontological and archaeological specialists were appointed to undertake specialist investigations that would contribute towards the Screening and BA phases of the project. No-Go areas were identified in the preceding assessment phases which informed the layout of the Assessment and refined Corridors. The aspects considered in the heritage impact assessment include: archaeology, palaeontology, graves, built environment and the cultural landscape. Details are provided in Section 6.
Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area	As above for cumulative socio-economic impacts; the terrestrial and aquatic biodiversity specialists assessed the cumulative impact of the project and other RE and grid development within a 30 km radius on the ecological and biophysical environment. No significant cumulative impacts are anticipated with mitigation measures in place.
Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area	The mitigation hierarchy has been followed with the intention of avoiding areas of very high sensitivity in development planning, and applying specific mitigation in less sensitive areas (most importantly, specialist micro-siting of infrastructure). No-go areas were identified based on desktop information, through consultation with key focus groups, and by specialist surveys and mapping. No-go areas have been avoided in the alignment of the pre-negotiated gridline route presented in this BAR. The avoidance of high sensitivity areas was not possible in all areas, and specialists have recommended micro-siting in these areas to place infrastructure and roads in the least sensitive area. Mitigation measures have been provided to manage environmental impacts, and are included in the EMPr. While some loss of habitat and environmental impacts are expected, the nature of the activities and the limited footprint relative to the landscape scale renders the impacts of the project to be acceptable. This is based on avoiding No-Go areas and further micro-siting to limit development to areas of least sensitivity on a fine-scale, as well as the implementation of all mitigation measures. Current farming activities and ecological connectivity and function will persist. Habitat within the Corridor is suitable for the faunal SCCs listed in the Screening Tool Report, and the presence of the Riverine Rabbit is confirmed and the availability of suitable habitat for the Karoo Dwarf Tortoise is verified. However, these habitats can be readily avoided, and direct impacts on the species are assessed to be of low significance. Indirect impacts, particularly predation by crows, is likely to represent a more persistent, long-term threat to the Karoo Dwarf Tortoise but can be reduced to an acceptable level through mitigation listed as conditions of authorisation. The biggest risk of the project to avifauna is collisions with high voltage powerlines, especially for heavy bodied birds. The specialist rated this impact as high negative without mitigation and low with mitigation. Avifaunal No-Go areas were identified separately for pylons and for gridlines due to their varying risks, and No-Go areas and/or additional specialist mitigation for both aspects are

DESIRABILITY	
CONSIDERATIONS	**RESPONSE / MOTIVATION**
	included in the overall No-Go map used to inform the alignment of the pre-negotiated gridline. In summary, impacts of the project will be acceptable by avoiding to No-Go areas and implementing mitigation measures.

3. Consideration of Alternatives

The Principles of NEMA provide that a precautionary approach must be taken, and impact avoidance prioritised, when planning a development or change in land use. The mitigation hierarchy is fundamental to the avoidance and mitigation of anticipated impacts, and is largely applied by means of considering reasonable and feasible alternatives early in the assessment process (i.e. at screening phase). Where impacts and/or sensitive environments cannot altogether be avoided through alternatives (e.g. localities, designs, technologies, footprints etc); mitigation measures are used to reduce the significance of predicted impacts on the receiving biophysical and socio-economic environment[8]. Figure 9 outlines the mitigation hierarchy, where the first priority is always on impact avoidance. After measures to avoid and minimise impacts have been incorporated into the project design, and where negative impacts remain, rehabilitation measures and/or offsets are applied.

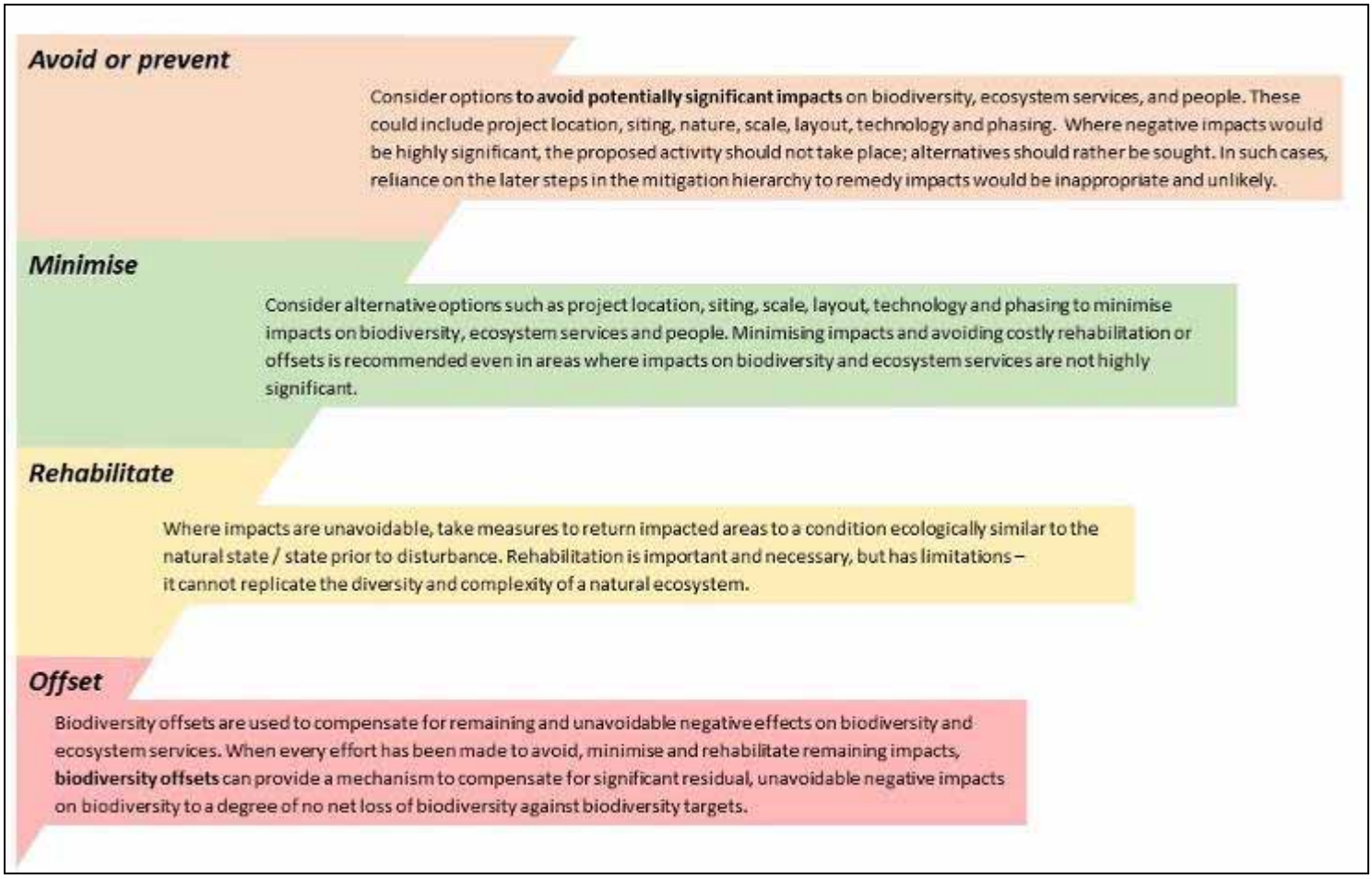

Figure 9: Mitigation Hierarchy (adapted from Mining and Biodiversity Guideline, DEA et al, 2013)

[8] Note that in instances where impacts cannot be avoided, and suitable mitigation is not available to reduce the significance of the impact to an acceptable level; then the project may be considered as fatally flawed.

3.1 Site / Location Alternatives

The purpose of the project is to create a 400 kV link between the authorised Nuweveld Collector Substation and the 132/400 kV Gamma Substation. As such, in this instance the consideration of location alternatives is not possible.

3.2 Corridor (Layout) Alternatives

A comprehensive iterative design process has been undertaken to inform the location and extent of the refined Gamma Grid Corridor and the alignment of the pre-negotiated gridline route within the corridor.

Initially Red Cap identified a broad Corridor for screening assessment at the start of the project (Corridor 1). The alignment and location of the broad corridor was determined by the need to create a connection between the Nuweveld Collector Substation in the west and the Gamma substation in the east.

During screening phase, specialists were provided with the Corridor area and tasked to do a desktop screening exercise using existing information and their knowledge of the area to identify No-Go Areas and High Sensitivity Areas. Where relevant, specialists considered the sensitivity of the area to pylons and overhead lines separately. The combined (i.e. indicating sensitivity for both pylon placement and overhead lines on a single figure) outcomes of the screening sensitivity assessment are shown in Figure 10.

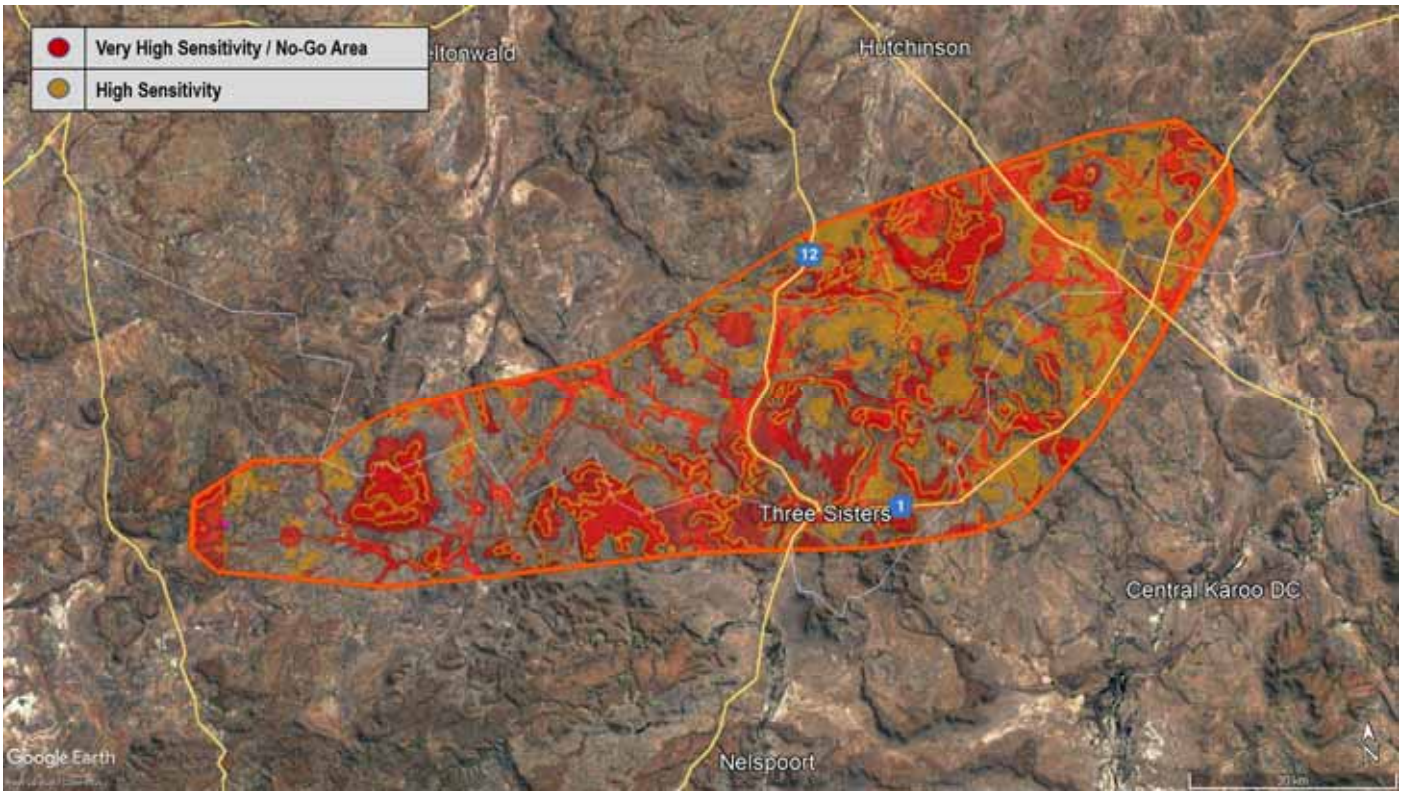

Figure 10: Combined 'Very High' and 'High' sensitivity areas at Screening Stage.

Based on the outcomes of the screening exercise, technical considerations and initial landowner engagements; the Corridor was refined to define the Assessment Corridor (or Corridor 2) to avoid the most challenging biophysical and socio-economic sensitivities.

Specialists were then tasked to do a site survey of the Assessment Corridor and to provide updated sensitivity maps with No-Go areas and High Sensitivity Areas. Specialist reports (either Site Verification, where required, and Compliance Statements or Impact Assessments) presented in this BAR are based on this survey and the updated sensitivity layers. Impacts assessed in specialist reports assume any routing within the Assessment Corridor that avoids No-Go areas.

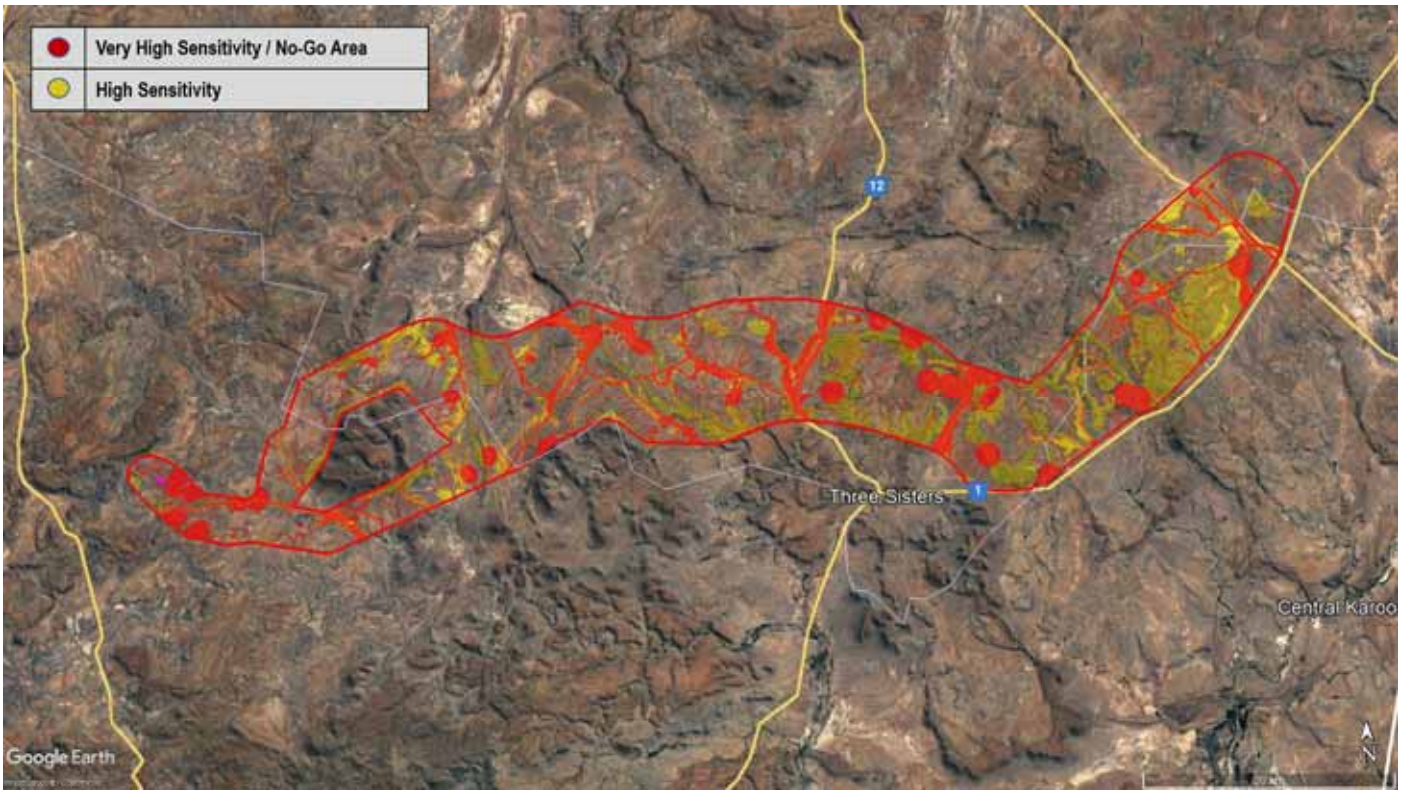

Figure 11: Combined 'Very High' and 'High' sensitivity areas within the Gamma Grid Assessment Corridor.

Based on the outcomes of detailed specialist assessment and ongoing landowner negotiations, the corridor was further refined to avoid the most biophysically and socio-economically sensitive areas to produce the refined corridor presented in this BAR (see Figure 12).

Figure 12: Combined 'Very High' and 'High' sensitivity areas within the Gamma Grid Refined Corridor.

The refined Corridor, or Corridor 3, is the preferred Corridor alignment, and the pre-negotiated gridline route is aligned within this Corridor.

By integrating the screening and assessment of environmental and social constraints alongside the technical components of the project early in a project lifecycle, risks of the project were reduced considerably. This approach supports the application of the mitigation hierarchy by demonstrating the avoidance and minimisation of impacts.

Based on the process described above, no corridor alternatives have been assessed within this BAR.

However, the project has been assessed against the '**No-Go' alternative**. The 'No-Go' alternative is the option of not constructing the project where the status quo would prevail.

3.3 Gamma Gridline Route Alternatives

No gridline alignment / route / layout alternatives have been identified.

As per the requirements of GN 145, a pre-negotiated gridline alignment has been presented within this BAR and avoids the no-go areas identified by the various specialists. However, the impacts assessed in specialist reports and in this

BAR are applicable to any routing within the refined Corridor that completely avoids No-Go areas. Specialist micro-siting post-decision making stage is a key mitigation measure of most of the specialist studies, and will be used to finalise the position of infrastructure and roads, especially in areas of high sensitivity.

3.4 Activity Alternatives

As the purpose of the project is to create a 400 kV link between the authorised Nuweveld Collector Substation and the 132/400 kV Gamma Substation, the consideration of activity alternatives is not possible in this instance.

3.5 Pylon Types

Lattice type pylons are required for the overhead line. Different pylon types will be used at different areas depending on the topography and span characteristics as shown in Table 3 under Item 2.3.1. Majority of the pylons to be used along the Gamma gridline are likely to be the Cross-Rope Suspension Tower type. Self-supporting towers will only be used at turn points in the alignment.

With regards to impact avoidance and assessment, the pylon type is probably most relevant to avifaunal impacts, with relevance to birds being able to safely perch above dangerous hardware. The avifaunal specialist study identified electrocution risk being determined by the pole/tower design. However, the risk of the electrocution is considered to be '*effectively zero due to the large clearances on the proposed 400kV tower designs, which cannot be bridged by even the largest species*'. All pylon types will be to Eskom specification, and the final selection of the pylon type at detailed design stage will first be checked by the avifaunal specialist. No alternative assessment has therefore been done for potential pylon types.

3.6 No-Go Option

The 'No-Go' alternative assumes that the project is not developed, and the activity does not go ahead. The status quo remains, with predominantly agricultural land use and natural open space (i.e. negative biophysical impacts would be avoided). The need and desirability of the project has been addressed in Section 2.4 – should the project not proceed the indirect socio-economic impacts of the project, which aligns with both national and local planning documents, would be foregone. The No-Go alternative provides the baseline scenario against which the impacts of the development are assessed in Section 6.

4. Administrative and Legal Framework

An overview of legislation that pertains to the EIA process is given below. Emphasis is placed on NEMA and the EIA Regulations and the National Heritage Resources Act as the development triggers applications for approval in terms of these Acts and Regulations.

4.1 The National Environmental Management Act and the Environmental Impact Assessment Regulations (2014 as amended) – Basic Assessment Application

The project triggers activities listed in terms of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended promulgated under Section 24(5) read with section 44 of the National Environment Management Act (Act 107 of 1998) as amended (NEMA). These activities require authorisation from the National Department of Forestry, Fisheries and the Environment (DFFE), prior to commencement. The 400 kV gridline triggers (amongst others) activity 9 under Listing Notice 2, however an application for Environmental Authorisation (EA) will be submitted and informed by a Basic Assessment (BA) process as the project lies wholly within a Strategic Transmission Corridor (STC)[9] specifically identified for the placement of this infrastructure. Activities that are being applied for are given in Table 7.

The competent review authority for the BA process is the DFFE. A pre-application meeting has held with the DFFE (reference number 2022-08-0023) and meeting minutes were approved on 14 October 2022. The meeting notes are included in the Public Participation Report (Appendix 4).

The 'Adoption of the Standard for the Development and Expansion of Power Lines and Substations within identified Geographical Areas and Exclusion of this Infrastructure from the Requirement to obtain an Environmental Authorisation' was gazetted on 27 July 2022 (GNR 2313). The Standard indicates that if a transmission line falls within a STC, and falls entirely within areas verified to be of low and medium sensitivity, then the Standard applies and a BA process is not required. In the instance of the Gamma Gridline, specialist studies have been done across the full extent of the Assessment Corridor and areas of low, medium, high and very high sensitivity have been identified and mapped. The refined Corridor and pre-negotiated gridline within the Corridor has been aligned to avoid very high sensitivity (No-Go) areas, but in some isolated areas high sensitivity areas are not completely avoidable along the gridline route. Therefore, a Basic Assessment application must be submitted for the full extent of the Gamma Gridline.

[9] The Gamma Gridline corridor is wholly located within STC. Government Notice 113 of 2018 (GN113/2018) (namely the identification of procedures to be followed when applying for or deciding on environmental authorisations for large scale electricity transmission and distribution development when occurring in geographical areas of strategic importance) makes provision for undertaking an expedited Basic Assessment Process where Activity 9 of Listing Notice 2 is triggered, as is the case with this application.

4.2 The National Heritage Resources Act

Section 38 of the National Heritage Resources Act (Act No. 25 of 1999) lists categories of development that require a Heritage Impact Assessment and approval from the Heritage Resources Agency. The following categories are relevant to the proposed activities:

Section 38(1) (a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; (c) any development or other activity which will change the character of a site (i) exceeding 5 000 m^2 in extent; or(ii) involving three or more existing Erven or subdivisions thereof. Because of these triggers, a heritage and palaeontological study are required. These have been done by Dr Jayson Orton and John Almond respectively. The studies have been submitted to the three competent authorities online on the SAHRIS site (South African Heritage Resources Agency (SAHRA) (submitted online 1 March 2023, case ID 20789), Heritage Western Cape (HWC) and gwao-Boswa Ya Kapa Bokoni (Heritage Northern Cape)) as the project is located within the Western and Northern Cape.

Table 7: Activities Triggered under the Listing Notices of the EIA Regulations (2014 as amended).

Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
12	The development of (ii) infrastructure or structures with a physical footprint of 100 square metres or more where such development occurs— (a) within a watercourse (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse	The Corridor hosts several ephemeral watercourses. No pylons are to be placed within "active" river channels, but some will occur within 32m of these features. Existing tracks and roads will be used as far as possible to minimise any new impacts on these systems, but some new access tracks will cross watercourses to ensure access to the grid. Therefore, more than 100m^2 will be disturbed within 32m of watercourses.
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.	The Corridor hosts several ephemeral watercourses. No pylons are to be placed within "active" river channels, and existing tracks and roads will be used as far as possible to minimise any new impacts on watercourses, but some access tracks will have to cross watercourses to ensure access to the grid. Therefore, more than 10 m^3 of material will be infilled and / or excavated from watercourses.
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity	More than 1 ha of indigenous vegetation will be cleared for temporary lay-down areas[10].
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development ii. will occur outside an urban area, where the total land to be developed is bigger than 1 hectare	The Corridor is located outside urban areas, and the area to be developed exceeds 1 ha in size. Development of transmission infrastructure is considered 'industrial development'. Majority of land within the Corridor is used for agricultural purposes.
Activity No(s):	**Provide the relevant Scoping and EIA Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
9[11]	The development of facilities or infrastructure for the transmission and distribution of	The capacity of the Gamma Grid line is 400 kV

[10] ***As the proposed gridline and associated access tracks are linear activities they excluded from this listed activity.***

	electricity with a capacity of 275 kilovolts or more, outside an urban area or industrial complex	
Activity No(s):	**Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended.**	**Describe the portion of the proposed project to which the applicable listed activity relates.**
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres g. in the Northern Cape: ii. outside urban areas: (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;i. in the Western Cape: ii. Areas outside urban areas; (aa) Areas containing indigenous vegetation	While existing roads will be used where these run along the proposed gridline route, access tracks (of up to 4.5 m wide) will need to be established for construction and maintenance of pylons. Relatively large parts of the proposed Gridline and access tracks in the Northern Cape include CBAs and ESAs in the Northern Cape CBA Map (2016), which is a systematic biodiversity conservation plan. The planned gridline (and required access roads) within the Western Cape are predominantly outside urban areas, and contain indigenous vegetation.
14	The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs: (a) within a watercourse; (c) if no development setback has been adopted, within 32 metres of a watercourse measured from the edge of a watercourse g. in the Northern Cape ii. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.	The Corridor hosts several ephemeral watercourses. No pylons are to be placed within "active" river channels, but some may occur within 32 m of these features in CBAs. Some access tracks will cross watercourses to ensure access to the grid. Therefore, more than $10m^2$ will be disturbed within 32 m of watercourses. Large parts of the Corridor are within CBAs in terms of the Northern Cape CBA map. The Northern Cape Department of Environment and Nature Conservation has not confirmed in writing whether they have formally adopted this plan, however it is referenced as a systematic biodiversity plan on SANBI's BGIS platform. The map is not gazetted as a Bioregional Plan. The DEA&DP have confirmed in writing that the WCBSP has not been adopted by the Province, nor gazetted as a Bioregional Plan, therefore this activity is not relevant to the portion of the development in the Western Cape.
18	The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre g. in the Northern Cape	Existing access tracks *will* need to be widened and lengthened by more than a kilometre for use during construction phase and/or for maintenance purposes in operational phase. Some of the access tracks would need to cross watercourses and / or wetlands or their respective buffer areas

[11] The Gamma Gridline corridor is wholly located within STC. Government Notice 113 of 2018 (GN113/2018) (namely the identification of procedures to be followed when applying for or deciding on environmental authorisations for large scale electricity transmission and distribution development when occurring in geographical areas of strategic importance) makes provision for undertaking an expedited Basic Assessment Process where Activity 9 of Listing Notice 2 is triggered, as is the case with this application.

	(ii) Outside urban areas (within): (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; and(ii) Areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland i. in the Western Cape (ii) All areas outside urban areas: (aa) Areas containing indigenous vegetation	and would require clearing of indigenous vegetation. CBAs in the NC CBA Map would also be affected by expansion of access tracks.

4.2.1 Other legislation to consider

Legislation, policy or guideline	Applicability to the project	Administering authority
NEM: Biodiversity Act 24 of 2004.	The revised list of threatened ecosystems published in terms of the Act (November 2022) has been checked to determine the threat status of ecosystems in the Corridor. This has relevance to the assessment of biodiversity impacts, as well as the applicability of certain listed activities published under Listing Notice 3 of the EIA Regulations that pertain to endangered and critically endangered ecosystems. There are no threatened ecosystems listed under the NEM: Biodiversity Act List of Threatened Ecosystems in the Corridor (November 2022) Species within the final footprint of infrastructure or roads that need to be developed will be identified during micro-siting. The aim is to avoid placing infrastructure and roads where populations of SCCs occur. However should this be unavoidable, permits will be sought for any species listed under the Biodiversity Act prior to construction commencing.	DFFE
NEM: Waste Act 59 of 2008; the National Norms and Standards for the Storage of Waste of 29 November 2013;	The volumes and types of waste that will be generated by construction or operational activities will not trigger the need for a Waste Licence. The norms and standards for storage of waste; and the Waste Classification Regulations published under the NEM:Waste Act are used as a guide for waste management in the EMPr.	DFFE
NEM: Air Quality Act 39 of 2004 and subsequent amendments	As a measure to reduce emissions from industrial sources and to improve ambient air quality, Listed Activities and associated Minimum Emission Standards (MES) were initially published in 2010 in Government Notice 248 (DEA, 2010), with the most recent revision applicable in 2019 (Government Notice 867, DEA, 2019) No activities are triggered that would require an Air Emission Licence application. However, the provisions of the Dust Control Regulations apply in terms of dust generating activities during construction phase.	DFFE
National Dust Control Regulations (2013).	The National Dust Control Regulations were published on 1 November 2013 (DEA, 2013b). It lists guidance on the requirements for monitoring dust fallout and provides limit values for acceptable dustfall rates for residential and non-residential areas. The latter will apply (although construction activities are not expected to be a major dust nuisance).	DFFE
Electricity Regulation Act. 4 of 2006	The Gamma Gridline will enable evacuation of renewable energy generated at the Nuweveld and Hoogland WEF (and / or others). This will be in line with the specifications of the IRP (2019) and the REIPPPP.	DoE
National Energy Act 34 of 2008		DoE
Protected Areas Act 57 of 2003	There are no Protected Areas within the Corridor. The nearest Protected Area is the Karoo National Park, ~30 km to the south of the western extent of the Corridor. There are conservancies within 5 km of the Corridor (notably the Riverine Rabbit Conservancy Area which is just north of the western extent of the Assessment Corridor).	DFFE
Civil Aviation Act (13 of 2009)	Electrical equipment may interfere with radio navigation equipment and pylons may present potential physical obstacles to low flying aircraft and may need to be fitted with aviation warning lights or other visual aids as required by the CAA in certain areas. The CAA is included as a commenting authority in the BA process, and a copy of this FBAR has been sent to them. The REIPPPP process also requires that the CAA does their own assessment. The DFFE's Screening Tool Report ranks the	Civil Aviation Authority (CAA)

	Civil Aviation Theme as 'low sensitivity' (requiring no further action in the EIA process).	
Conservation of Agricultural Resources Act (43 of 1983) (CARA)	The Act regulates the conservation of natural agricultural resources through maintaining the production potential of land, combating erosion, preventing the degradation or destruction of water sources, protecting vegetation, and controlling weeds and invader plants. Similar principles are covered in more recent legislation such as NEMA and NEM:BA. An Agricultural Compliance Statement has been done by Johan Lanz and the Corridor is confirmed to be of low agricultural sensitivity. The EMPr includes measures to manage construction activities in a manner that does not result in erosion, pollution, unnecessary destruction of vegetation, and alien vegetation encroachment. No specific applications are required in terms of CARA.	Department of Agriculture, Land Reform and Rural Development (DALRRD)
Hazardous substances Act (15 of 1973)	The Act deals with the production, import, use, handling and disposal of hazardous substances. Hazardous substances are defined as '*substances that are toxic, corrosive, irritant, strongly sensitising, flammable and pressure generating under certain circumstances and may injure, cause ill-health or even death in humans*'. It is likely that hazardous substances will be used in construction phase.	Department of Health (DoH)
National Road Traffic Act (93 of 1996) (NRTA)	Large components such as pylon sections will need to be transported as 'abnormal loads' to the site. The NRTA Regulations prescribe limitations regarding the mass and/or dimensions of goods that can be transported on public roads. The Corridor will be accessed via existing roads (refer to the description and map under Section 2.3.2) and details in the TIA. Traffic and transport related permits and approvals will need to be obtained from all the relevant transport authorities before going ahead with construction. SANRAL and Western and Northern Cape Department of Transport and Public Works have been included in the stakeholder database, and a copy of this FBAR has been shared with them for comment.	Western Cape Department of Transport and Public Works Northern Cape Department of Roads and Public Works

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5. Assessment Approach and Process

The establishment of the Gamma Gridline requires a Basic Assessment process to be done, and submission of an Application for EA to the DFFE. The process is regulated under the EIA Regulations (2014 as amended), and Appendix 1 of the Regulations outlines the content requirements of the BAR. These are addressed at the front of this report and are repeated here. The Regulations prescribe the process that must be followed including public participation, and the timeframes for submission of reports, public participation on draft reports, and the review, decision-making and appeals periods. The regulated process is outlined in Figure 13. Note that the 57 days allocated to the authority review process is less than the standard timeframe of 107 days for review because the Gamma Gridline is within a STC. Broadly, the process includes the following steps:

5.1 Screening/Pre-Application Stage

This stage is not mandatory but it is advisable to do as much of the 'groundwork' up front before submitting an application to the DFFE because once this is done, the formal process is initiated and regulated timeframes apply. Importantly, Screening is designed in line with the precautionary principle of NEMA where the 'mitigation hierarchy' is applied to strive for a sustainable development. The goal is to avoid impacts through a risk-averse design process and identify environmental sensitivities and project risks up front. As part of this BA process, the Screening Stage included landowner negotiations, pre-application consultation meetings with key stakeholders and the DFFE, developing a comprehensive understanding of the biophysical and socio-economic features and sensitivities of the area, and identifying risks/impacts and alternative Corridor alignments to ensure impact avoidance early in the process. A Pre-Application meeting was held with the DFFE where the proposed approach to the BA process was discussed and agreed upon, and a pre-application reference number was issued. The meeting notes were approved on 14 October 2022 and are included in Appendix 4.

Red Cap delineated a broad Corridor based on Eskom's indications that additional capacity is needed between the authorised Nuweveld Collector Substation and the 132/400 kV Gamma Substation (i.e. Corridor 1 – see Section 3.1). The aim was to keep the Corridor as short as possible to reduce the disturbance area which included technically and economically feasible route options, that was also acceptable to landowners. The DFFE's Screening Tool was applied to the Corridor area, and the sensitivity of environmental themes and suggested specialist studies identified in the report were considered. Red Cap appointed specialists to do a desktop assessment of the full Corridor (Corridor 1), and to identify and classify, or verify, environmentally sensitive areas. Specialist studies were not limited to those in the Screening Report only, and a Socio-Economic Impact Assessment and Traffic Impact Assessment have also been done. Refer to Table 9 for a list of specialist studies that have been done, the Sensitivity of the Theme as per the Screening Tool Report, and the relevant Protocol and/or Guideline that has been applied to the specialist assessment.

The specialists have done extensive work in the area and have a solid understanding of RE and infrastructure projects and the regional environmental features.

Specialist desktop sensitivity maps were considered by Red Cap, and a refined Corridor was developed (the Assessment Corridor – see Section 3). Landowner negotiations, technical and financial considerations and physical terrain features were also relevant to the process. A survey of the area within the Assessment Corridor was done by the specialists and the EAP by vehicle, on foot and via a helicopter fly-over. Updated sensitivity maps were produced, indicating, inter alia, 'No-Go' and 'high sensitivity' areas within the Assessment Corridor, separately for a) pylons and roads and b) the overhead line where relevant (see Section 6). For example, separate sensitivity assessments were done for a) pylons and roads and b) the overhead line in the VIA and the Avifaunal Assessment because the impacts of footprint vs overhead infrastructure are likely to be different. The criteria that were used to determine sensitivity are explained in Table 8. The information was discussed with technical engineers and Red Cap, and the Corridor was updated accordingly (the refined Corridor). A pre-negotiated gridline route is provided within this Corridor which avoids all 'No-Go' areas. Therefore, the corridor and routing produced as part of the iterative design process is the most feasible and reasonable Corridor alternative and pre-negotiated Gridline alignment (also known as the preferred alternative), which is presented in this BAR.

Table 8: Sensitivity categories used for sensitivity mapping

No-Go	Areas or features that are considered of such sensitivity or importance that any adverse effects upon them may be regarded as a fatal flaw.
High	Areas or features that are considered to have high sensitivity. Development in these areas must be avoided as far as practically possible and must remain within any acceptable limits of change as determined by the specialist. Development should also comply with any other restrictions or mitigation measures identified by the specialist.
Medium	Medium sensitivity areas are considered to be developable; however, the nature of the effects should remain within any acceptable limits of change as determined by the specialist. Development should also comply with any other restrictions or mitigation measures identified by the specialist.
Low	Low sensitivity areas that are considered to be developable however specialists may still wish to define acceptable limits of change should they deem this necessary.

Based on the surveys and the preferred Corridor area, specialists verified or disputed the sensitivity of the themes in the Screening Tool Report (based on their respective disciplines), and did a Compliance Statement and/or Specialist Assessment (see Table 9). Impacts of the project during construction, operation and decommissioning phases were assessed by specialists with and without mitigation, and compared with the no-go alternative. Cumulative impacts of the project were also assessed by each specialist, based on other RE and infrastructure projects within a 30 km radius of the Corridor (see Figure 4). The methodology used to assess impacts is explained in Section 5.3. The assessment of impacts in Section 6 is based on the full Corridor area.

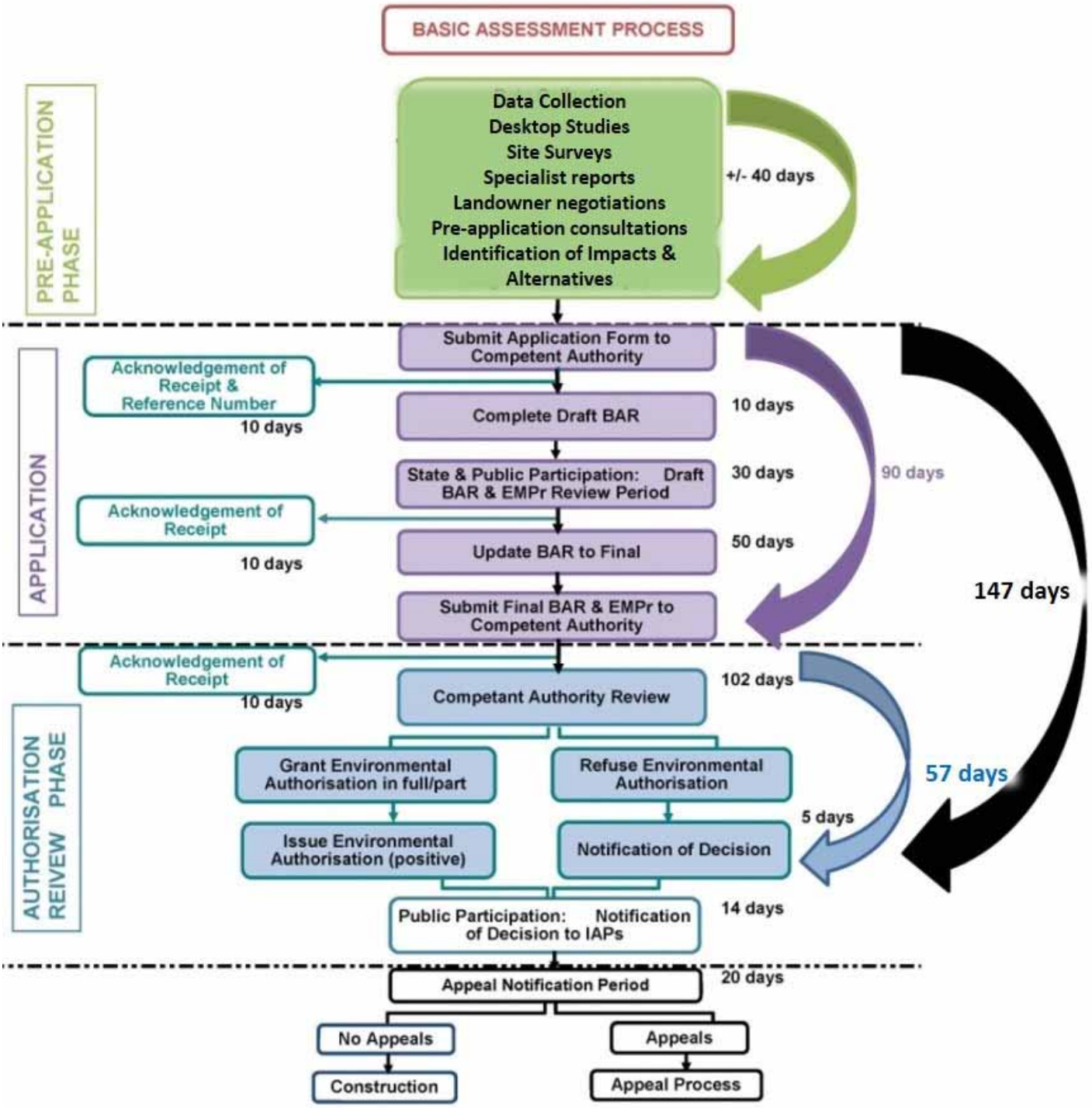


Figure 13: Basic Assessment Process according to the EIA Regulations (2014 as amended).

Table 9: Specialist Studies done as part of the Gamma Grid Basic Assessment Process [12]

Study	Screening Tool Report Sensitivity	Applicable Protocol	Type of Study that has been done
Landscape/Visual Impact Assessment	None indicated	None specified – comply with Appendix 6 of the EIA Regulations	Impact Assessment
Agricultural Impact Assessment	Medium	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Agricultural Resources (20 March 2020) Government Gazette No. 43110	Site Sensitivity Verification and Compliance Statement
Heritage Impact Assessment	Very high	Site Sensitivity Verification Requirements Where a Specialist Assessment is Required but no Specific Protocol has been Published (20 March 2020) Government Gazette No. 43110	Site Sensitivity Verification and Impact Assessment
Palaeontology Impact Assessment	Very high	Site Sensitivity Verification Requirements Where a Specialist Assessment is Required but no Specific Protocol has been Published (20 March 2020) Government Gazette No. 43110	Site Sensitivity Verification and Impact Assessment
Terrestrial Biodiversity Impact Assessment	Very high	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (20 March 2020) Government Gazette No. 43110	Site Sensitivity Verification and Impact Assessment
Plant Species Assessment	Medium	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species (30 October 2020) Government Gazette No. 43855	Site Verification and Compliance Statement
Riverine Rabbit Assessment	High	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species (30 October 2020) Government Gazette No. 43855	Impact Assessment
Karoo Dwarf Tortoise Assessment	High	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species (30 October 2020) Government Gazette No. 43855	Impact Assessment
Avian Impact Assessment	High	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species (30 October 2020) Government Gazette No. 43855	Site Sensitivity Verification and Impact Assessment
Aquatic Biodiversity Assessment	Very High	Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity (20 March 2020) Government Gazette No. 43110	Site Sensitivity Verification and Impact Assessment
High Level Geotechnical Desktop Study	None indicated	None specified – comply with Appendix 6 of the EIA Regulations	Desktop Report
Traffic Impact Assessment	None indicated	None specified – comply with Appendix 6 of the EIA Regulations	Impact Assessment
Socio-Economic Impact Assessment	None indicated	None specified – comply with Appendix 6 of the EIA Regulations	Impact Assessment

[12] Note that the Screening Tool Report includes RFI, Civil Aviation and Defence Themes, the latter two of these are indicated as 'low sensitivity' and no sensitivity is reported for RFI. Specialist studies have not been done. These are addressed by the EAP in Section 6.

5.2 Application, Review and Decision-Making Stage

The EAP prepared a DBAR and submitted an EA Application form and DBAR to the DFFE on 23 February 2023 and 2 March 2023 respectively. The DFFE responded on 24 February 2023 with a reference number (14/12/16/3/3/1/2710). The DBAR was sent to stakeholders on 2 March 2023 for a 30 day public participation process. The commenting period was extended by a further 30 days to allow Organs of State to comment. Details on the process are provided in the PPP Report in Appendix 4. The stakeholder commenting period has ended, and comments submitted by stakeholders have been considered by the project team and addressed in this Final BAR. The Final BAR must be submitted to the DFFE within 90 days of receipt of the Application form. Thereafter, the DFFE will issue a decision within 57 days of submission of the report. Should the DFFE accept the application and issue an EA, all registered I&APs and key stakeholders will be notified of the decision and the appeal process. In this regard, registered I&APs and key stakeholders must be notified within 14 days from the date of the decision, whereafter I&APs and key stakeholders have a 20-day period from the date of notification to submit an appeal (should they wish to do so).

5.3 Impact Assessment Rating Methodology

Impacts of the project can occur during construction, operational, and decommissioning stages; however the latter is highly unlikely because the grid infrastructure will be ceded to Eskom and become part of the National grid. Different types of impacts may occur (i.e. direct, indirect and cumulative), and can have positive or negative outcomes.

- **Direct impacts** are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity (e.g. vegetation loss to install a pylon foundation).
- **Indirect impacts** of an activity are indirect or induced changes that may occur as a result of the activity (e.g. sedimentation of a drainage area as a result of uncontrolled erosion of exposed soils during construction phase). These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.
- **Cumulative impacts** are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities (e.g. attracting predatory birds to the area with increased perch sites can cumulatively impact on tortoise numbers). Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

The assessment of impacts requires a judgement call, therefore a standardised method must be used to prevent bias and ensure confidence in the significance rating. The method developed by Zutari (2019) has been adopted for this impact assessment, and was provided to all specialists to use. The method is quantitative, and professional judgement is used to assign scores to a set of criteria on a 7-point scale (see Table 10). Specialists then have an opportunity to

comment on the quantitative impact rating with qualitative observations, if required (for example, if the calculated impact rating is disputed).

For each impact, a comparison has been between the preferred development option, and the 'no-go' option; with and without mitigation measures in place. Note that the specialists' post-mitigation impact assessments are for any route alternative within the refined Corridor that avoids No-Go areas and are not specific to the pre-negotiated gridline route. However, the impact assessment outcome is based on the notion that the pre-negotiated gridline route would avoid 'No-Go' areas identified by each specialist; that recommended mitigation measures will be implemented, and that micro-siting of infrastructure will be done post-decision making phase where high sensitivity areas cannot be avoided.

In instances where project impacts result in an inconsequential effects with zero intensity, these are deemed to be 'insignificant' and the formal rating method described below did not apply.

5.3.1 Calculating Impact Significance

The significance of each impact is calculated with and without mitigation measures in place. The numerical ratings for each criterion are used in an equation whereby the consequence of the impact can be calculated. Consequence is calculated as follows:

Consequence = type x (intensity + duration + extent)

To calculate the significance of an impact, the probability (or likelihood) of that impact occurring is applied to the consequence.

Significance = consequence x probability.

Table 10: Assessment criteria for the evaluation of impacts

Criteria	Numeric Rating	Category	Description
Duration	1	Immediate	Impact will self-remedy immediately
	2	Brief	Impact will not last longer than 1 year
	3	Short term	Impact will last between 1 and 5 years
	4	Medium term	Impact will last between 5 and 10 years
	5	Long term	Impact will last between 10 and 15 years
	6	On-going	Impact will last between 15 and 20 years
	7	Permanent	Impact may be permanent, or in excess of 20 years
Extent	1	Very limited	Limited to specific isolated parts of the site
	2	Limited	Limited to the site and its immediate surroundings
	3	Local	Extending across the site and to nearby settlements
	4	Municipal area	Impacts felt at a municipal level

Criteria	Numeric Rating	Category	Description
	5	Regional	Impacts felt at a regional level
	6	National	Impacts felt at a national level
	7	International	Impacts felt at an international level
Intensity	1	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
	2	Very low	Natural and/ or social functions and/ or processes are slightly altered
	3	Low	Natural and/ or social functions and/ or processes are somewhat altered
	4	Moderate	Natural and/ or social functions and/ or processes are moderately altered
	5	High	Natural and/ or social functions and/ or processes are notably altered
	6	Very high	Natural and/ or social functions and/ or processes are majorly altered
	7	Extremely high	Natural and/ or social functions and/ or processes are severely altered
Probability	1	Highly unlikely / None	Expected never to happen
	2	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
	3	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
	4	Probable	Has occurred here or elsewhere and could therefore occur
	5	Likely	The impact may occur
	6	Almost certain / Highly probable	It is most likely that the impact will occur
	7	Certain / Definite	There are sound scientific reasons to expect that the impact will definitely occur

Based on the consequence and probability of the impact occurring, the impact would fall into a significance category of very low (1 – 35), low (36 – 72), medium (73 – 108) or high (109 – 147) as described in Table 11.

Table 11: Interpretation of Significance

Interpretation of Significance		
High -	High +	These beneficial or adverse effects are considered to be very important considerations and are likely to be material for the decision-making process. In the case of negative impacts, substantial mitigation will be required.
Medium -	Medium +	These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such issues may become a decision-making issue if leading to an increase in the overall adverse effect on a particular resource or receptor. In the case of negative impacts, mitigation will be required.
Low -	Low +	These beneficial or adverse effects may be experienced on the receiving environment, but natural or socio-economic processes are likely to continue. They are unlikely to be critical in the decision-making process but could be important in the subsequent design of the project. In the case of negative impacts, some mitigation is likely to be required.
Very Low -	Very Low +	These beneficial or adverse effects will not have an influence on the decision, neither will they need to be taken into account in the design of the project. In the case of negative impacts, mitigation may not necessarily be required.
Insignificant		Any effects are beneath the levels of perception and inconsequential

Other considerations in the assessment of impacts are the level of confidence in the assessment rating (as per Table 12); the reversibility of the impact (as per Table 13); and the irreplaceability of the resource (as per Table 14).

Table 12: Definition of confidence ratings.

Category	**Description**
Low	Judgement is based on intuition
Medium	Determination is based on common sense and general knowledge
High	Substantive supportive data exists to verify the assessment

Table 13: Definition of reversibility ratings.

Category	**Description**
Low	The affected environment will not be able to recover from the impact - permanently modified
Medium	The affected environment will only recover from the impact with significant intervention
High	The affected environmental will be able to recover from the impact

Table 14: Definition of irreplaceability ratings.

Category	Description
Low	The resource is not damaged irreparably or is not scarce
Medium	The resource is damaged irreparably but is represented elsewhere
High	The resource is irreparably damaged and is not represented elsewhere

5.3.2 Cumulative Impacts

Cumulative impact "*means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that itself may not be significant, but may be significant when added to the existing and foreseeable impacts culminating from similar or diverse activities*" (NEMA EIA Reg GN R982 of 2014).

For cumulative effects analysis to be a useful tool to decision makers and stakeholders, it must be limited to effects that can be meaningfully evaluated, rather than expanded to the point where the resource or receptors are no longer significantly affected or the effects are no longer of interest to stakeholders. To this end, four important aspects require consideration prior to the evaluation of cumulative effects:

- The determination of an appropriate area of influence (i.e. spatial and, to a lesser extent, temporal boundaries for evaluation of cumulative effects of the project);
- Identification of Valued Environmental and Social Components (VECs);
- External natural and social stressors; and
- The evaluation of relevant projects for consideration in the cumulative effects analysis

The nearest operational wind farm from the site is the Noblesfontein Wind Farm located to the north of the corridor. The South African Renewable Energy EIA Application Database (REEA) ("REEA_OR_2022_Q1") shows several renewable energy projects (and associated electrical grid connections) authorised within 30 km of the Gamma Corridor. These projects include (Figure 4):

- Biesiespoort PV Facility (east of Nobelsfontein);
- Modderfontein Wind Energy Facility (south of Nobelsfontein)[13];
- Mainstream Wind and Solar Energy Facility (north and northwest of the Gamma Substation);
- Aurora Power Solutions (APS) Betelgeuse PV Solar Project Four (east of the Gamma Substation);
- Umsinde Emoyeni Wind Energy Facility Phase 2 (east of APS Betelgeuse PV Solar Project Four); and
- Ishwati Emoyeni Wind Energy Facility (east of Umsinde Emoyeni Wind Energy Facility Phase 2).

[13] The EA for the Modderfontein Project has lapsed.

In terms of existing High Voltage lines in the area, the Kromrivier Traction / Nobelsfontein 1 132 kV live traverses the corridor near Three Sisters, and in the east the refined Gamma Corridor follows the routing of the Gamma / Kappa 1 765 kV and the Droerivier / Hydra 2 400 kV powerlines. Another 765 kV line is proposed by Eskom in this corridor. Further to the east, the Hydra / Droerivier 1 and the Droeriview / Hydra 3 400 kV lines also fall within the refined Gamma Corridor (see Figure 4). Projects within a 30 km radius from the Corridor are therefore included in the cumulative impact assessment of this project.

The IFC (2012) defines Cumulative Impact Analysis (CIA) as a process of (a) analysing the potential impacts and risks of proposed developments in the context of the potential effects of other human activities and natural environmental and social external drivers on the chosen VECs over time, and (b) proposing tangible measures to avoid, reduce, or mitigate such cumulative impacts and risk to the extent possible.

As standard impact assessment considers project impacts with existing stressors (i.e. the change to the baseline environmental or social condition), the key task for CIA is to ascertain how the potential impacts of a proposed development might combine, cumulatively, with the potential / future impacts of the other anticipated or ongoing human activities and other natural stressors (such as droughts or extreme climatic events). These cumulative impacts (collective future impacts) are identified and assessed using the impact assessment methodology described above.

6. Description and Sensitivity of the Biophysical and Socio-Economic Environment, and Impact Assessment

To make good decisions about what constitutes a sustainable development, a comprehensive understanding of the baseline environment is important. 'Environment' is a broad term and encompasses biophysical and socio-economic features. The Environmental Impact Assessment Regulations and specifically Listing Notice 3 identify 'sensitive environments' that represent a range of biodiversity features in geographical areas that need to be safe-guarded for biodiversity persistence and the provision of ecosystem services to people. The DFFE's Screening Tool collates best available information and/or modelled data to inform the sensitivity of South Africa's environment according to various 'themes'. This extends beyond ecological aspects, and considers agriculture, the archaeological and cultural/heritage environment, palaeontology, sensitive viewsheds, and areas that fall within controlled airspaces and defence areas. Depending on the area and the type of development, the Screening Tool assigns a sensitivity rating to each theme. The Gamma Grid Corridor includes terrestrial and aquatic environments, in a landscape that is predominantly used for low intensity agriculture. Renewable Energy projects and grid infrastructure developments are growing in the area which is part of a Renewable Energy Development Zone and a Strategic Transmission Corridor. The natural environment is however still largely intact.

Specialist studies were undertaken to describe the environment within the Assessment Corridor, identify Corridor-specific sensitivities for gridline planning and impact avoidance, and to assess impacts of the planned Gamma Gridline on the receiving environment. The section that follows is a summary description of the Corridor's baseline environment with extracts from specialist studies of pertinent information relevant to the sensitivity mapping and impact assessment that follows. For more detail, the reader should refer to specialist reports in Appendix 4.

6.1 Baseline Environmental Description

6.1.1 Terrestrial Ecology

There are no Protected Areas or Conservation Areas within a 5 km or 10 km radius of the Gamma Refined Corridor (Figure 14). The nearest Protected Areas to the Corridor are the Karoo National Park (33 km SW of the western end of the Corridor), Mountain Zebra-Camdeboo National Park (48 km SW of the eastern end of the Corridor), and the Victoria West Nature Reserve (38 km north of the central part of the Corridor). NPAES Expansion Areas (2018) are mapped in the central part of the Corridor, which are important to create landscape-scale biodiversity linkages with CBAs to the north-west. No Conservation Areas are identified in the Assessment Corridor on the DFFE's Protected Areas and Conservation Areas database. However, a sign on a gate indicating a Riverine Rabbit Conservancy was observed during the survey ~2 km north of the western extent of the Assessment Corridor (Figure 15).

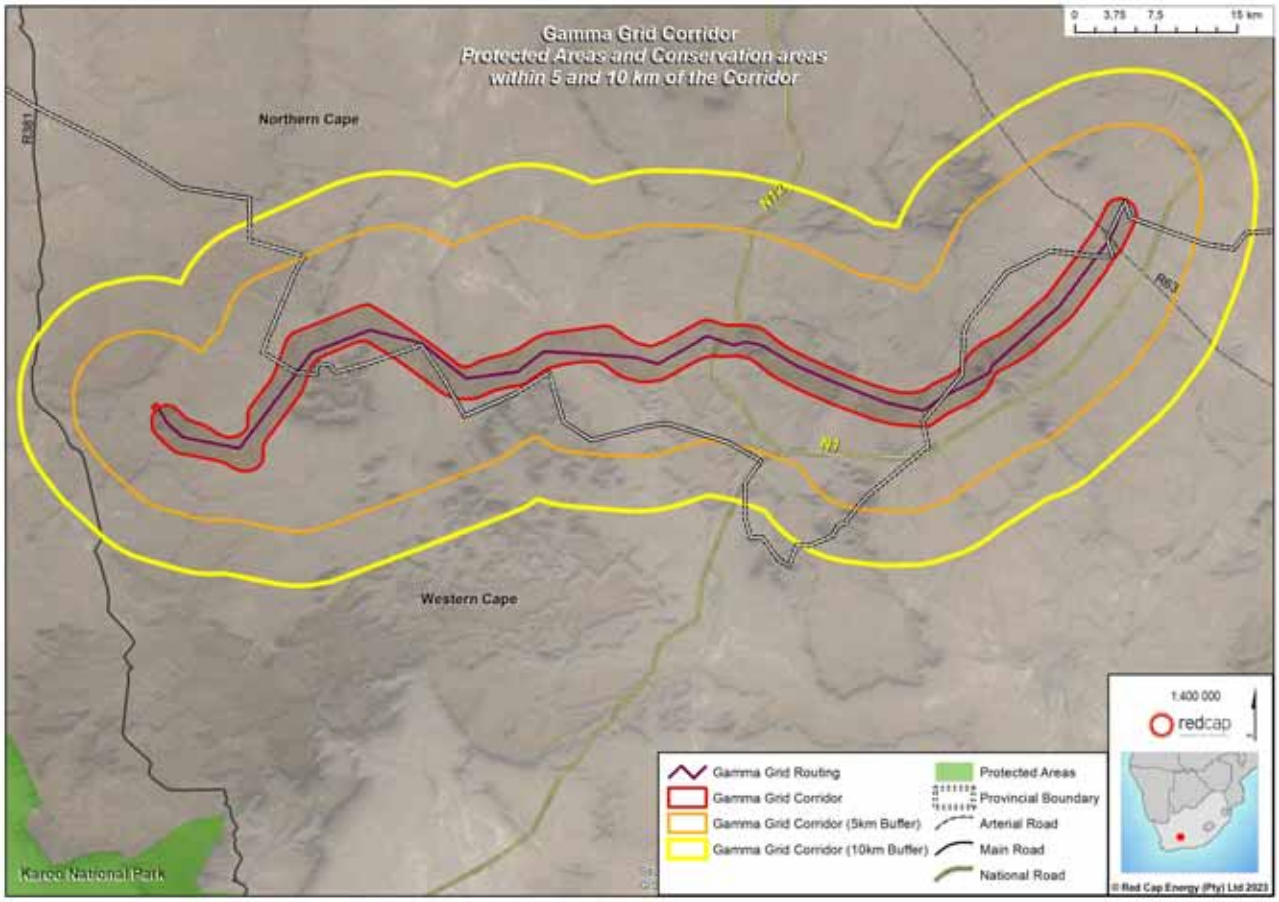


Figure 14: Protected Areas and Conservation Areas within 5 km and 10 km radius of the Gamma Refined Corridor.

Figure 15: Google Earth image showing the western extent of the Gamma Assessment corridor, and the waypoint where a sign indicating a 'Riverine Rabbit Conservancy' was observed during the site survey.

VEGMAP (2018) identifies 3 vegetation types in the Corridor (Figure 16), all of which are part of the Nama Karoo biome – the largest part of the Corridor is within the 'Eastern Upper Karoo' vegetation type with scattered sections of 'Upper Karoo Hardeveld'. Parts of the larger drainage features are described as 'Southern Karoo Riviere'. The vegetation specialist however refined the vegetation description in the Assessment Corridor based on field surveys, and indicated that there are more extensive areas of Upper Karoo Hardeveld and riparian vegetation than indicated in VEGMAP. Eastern Upper Karoo vegetation has a threat status on a national level of 'least threatened'. It consists mostly of low woody and low succulent shrubs. The large open plains in the Corridor correspond with this vegetation type, and have low species richness. Few SCCs are expected to occur in these areas. Upper Karoo Hardeveld vegetation is rated as 'Least Concern'. It occurs on very rocky ground and is often associated with steep slopes and has a higher species diversity than the open plains and is more likely to host plant SCCs. Vegetation on most of the rocky hills in the Corridor corresponds with this vegetation type. Southern Karoo Riviere vegetation is found along the major watercourses in the Corridor. It has a threat status of 'Least Concern' but because it occurs in drainage areas it represents areas that are considered ecologically significant. The significance of the habitat is elevated because the Riverine Rabbit occurs in riparian areas (Todd, 2022).

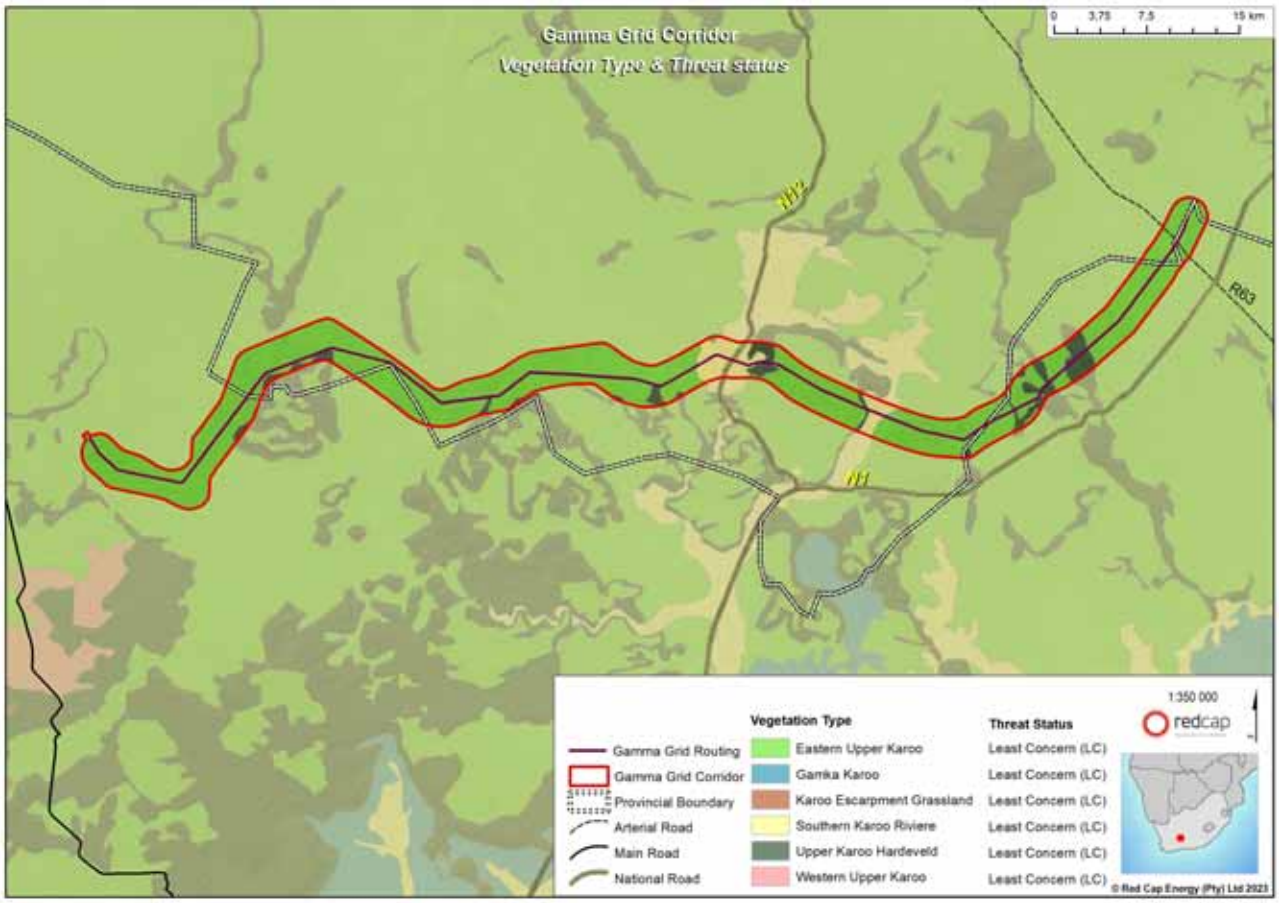


Figure 16: Vegetation Types in the Gamma Refined Corridor according to VEGMAP (2018).

Four plant SCCs[14] are listed in the DFFE's Screening Tool Report for the Corridor area. Habitat types that are known to host these species occur within the Corridor. *Isolepis expallescens* (VU) is a habitat specialist and is associated with damp areas along stream channels. While the species was not observed in the specialist survey, it is likely to be present in drainage areas. *Hereroa concava* (VU) is endemic to a small area in the Great Karoo between Beaufort West, Richmond and De Aar. The species occurs in sheltered places among shrubs on flats and plateaus with shale outcrops. It was not observed by the specialist in the current survey, nor in any of the previous surveys done in the area and does thus not likely occur within the Corridor. However, due to the size of the Assessment Corridor and because the species is scattered in its distribution, it could have been overlooked. *Tridentea virescens* (Rare) is widespread and is found sporadically on stony ground or in floodplains with loam soils. The species was not observed in the survey, but it is inconspicuous and can easily be overlooked. During the survey, the vegetation specialist observed a population of ~30 individuals *Rhinephyllum broomii* (DDD) in the west of the Corridor, on a small shale outcrop near to the Krom River. None of the other listed species were observed, but the Assessment Corridor area is extensive and some of the species are cryptic therefore it is likely that they could have been missed (Todd, 2022).

The MammalMap database lists up to 70 mammal species in the area. Reptile diversity in the wider area is relatively high and approximately 63 reptile species have been recorded in the region. The diversity of amphibians in the study area is relatively low with only 11 species having been recorded in the broad area. Suitable habitat exists within the Assessment Corridor to support populations of animal SCCs listed in the Screening Tool Report and in other sources; such as Riverine Rabbit *Bunolagus monticularis* (CR), Karoo Dwarf Tortoise *Chersobius boulengeri* (EN), Mountain Reedbuck *Redunca fulvorufula* (EN), Black-footed Cat *Felis nigripes* (VU), Grey Rhebok *Pelea capreolus* (NT), and Brown Hyena *Hyaena brunnea* (NT). Important habitats in the Corridor for mammals are riparian areas, rocky hills and steep slopes.

Habitat within the Corridor represents an important area for the Riverine Rabbit. Areas of potential habitat have been mapped, and divided into 'optimal' habitat (i.e. high quality habitat), and 'sub-optimal' habitat (i.e. degraded areas that are not likely to support resident populations, and/or minor drainage areas that are important for connectivity and for supporting habitat persistence through, for example, flow regulation) (Figure 17). Resident populations of the Riverine Rabbit are only expected to occur within optimal habitat areas. The total extent of optimal habitat within the Assessment Corridor is estimated at 2648 ha, while the areas of suboptimal habitat is estimated at 3767 ha. The areas potentially occupied by Riverine Rabbits within the Assessment Corridor amount to 26.48km^2, which represents less than 1% of the overall / total Area of Occupancy (AOO) of the species. A reasonable estimate of density of individuals within the Assessment Corridor is 160 and 450 individuals, but this is variable (Todd, 2022).

[14] Due to the sensitive nature of the fourth species and its vulnerability to exploitation, details cannot be disclosed.

Figure 17: Map of areas considered to represent potentially suitable Riverine Rabbit habitat within the Gamma Assessment Corridor based on ground-truthed mapping from satellite imagery (Todd, 2022).

There are fairly extensive tracts of potentially suitable habitat for the Karoo Dwarf Tortoise within the Corridor, which have been split into areas considered to represent favourable habitat, and areas considered to be less favourable/sub-optimal and hence less likely to harbour the species (Figure 18). The total extent of favourable habitat within the Assessment Corridor is estimated at 11 689 ha, while the areas of suboptimal habitat is estimated at 5 868 ha. The majority of the area of mapped suitable habitat is in the area east of the N12 and north of the N1, where there are extensive areas of dolerite outcrops that are not well represented elsewhere in the Corridor. Given that the ability of the Karoo Dwarf Tortoise to disperse is limited, areas with extensive dolerite ridges are considered likely to be particularly important for this species. It is not possible to provide a reliable estimate of the population size within the Corridor because there are no reliable estimates of population density for this species that can be extrapolated across the range and there are widespread population declines therefore it is not possible to ascertain what proportion of optimal habitat in the Corridor would be occupied. However, to assess the potential impacts on this species, a 1 km buffer around the ~110 km length of the pre-negotiated routing was assumed to be significantly impacted through the construction of the line (which is extremely unlikely). On this basis, the total extent of affected mapped habitat for the Karoo Dwarf Tortoise and within 1 km of the gridline would represent less than 0.2% of the AOO for this species (Todd, 2022).

Figure 18: Map of areas considered to represent potentially suitable Karoo Dwarf Tortoise habitat within the Gamma Assessment Corridor based on ground-truthed mapping from satellite imagery (Todd, 2022).

Temporary pools in the many drainage lines in the Assessment Corridor can be used by toads and frogs for seasonal breeding purposes (Todd, 2022).

The SABAP2 data indicates that a total of 187 bird species could potentially occur within the Gamma Grid Assessment Corridor. Of these, 53 species are classified as powerline sensitive species, 11 of which are SCCs. Eight of the 11 SCCs have SABAP2 reporting rates >2%, indicating medium to high potential of occurrence in the Assessment Corridor. Verreaux's Eagle *Aquila verreauxii*, Tawny Eagle *Aquila rapax* (Regionally Endangered), Ludwig's *Bustard Neotis ludwigii,* Blue Crane *Grus paradisea* and Karoo Korhaan *Eupodotis vigorsii* (Regionally Near threatened) were recorded during field survey. The Corridor also contains breeding Martial Eagle *Polemaetus bellicosus* (Globally and Regionally Endangered) and habitat for Secretarybird *Sagittarius serpentarius* (Globally Endangered, Regionally Vulnerable). The closest IBA to the Corridor is in the Karoo National Park (van Rooyen, 2022) (Figure 19).

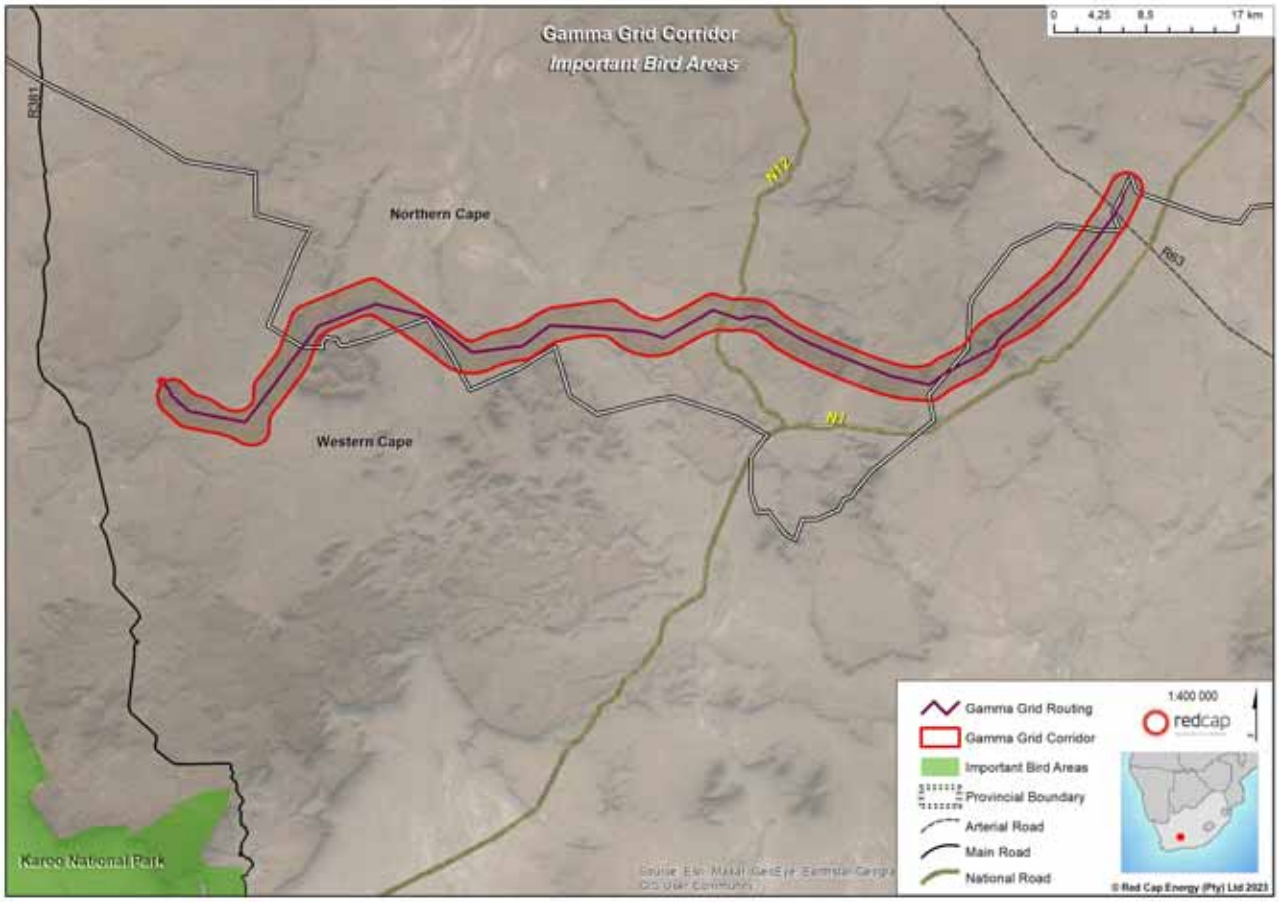


Figure 19: Important Bird Areas in proximity to the Gamma Refined Corridor.

Bird habitat types influence the distribution and behaviour of priority avifauna species. The specialist identified 6 habitat types within the Corridor:

- Nama Karoo vegetation: mixture of grassland and shrub vegetation, punctuated by rugged relief.
- Drainage woodland: trees and taller woody shrubs, restricted mostly to watercourses. The habitat provides suitable foraging and nesting substrate for a number of woodland associated species and some of the raptors.
- Surface water: non-perennial drainages and dams, with associated wetlands within the Corridor are important for most of the avifauna for drinking, bathing and in some instances foraging. Flocks of Blue Cranes roost in dams in winter, and large raptors (e.g. Martial Eagle, Tawny Eagle and Verreaux's Eagle) use the dams and drainage lines for bathing and drinking.
- Mesas, koppies, rocky ridges, outcrops and plateaus: the Perdeberg is a prominent mesa on the western side of the Corridor, however numerous rocky ridges and outcrops occur throughout. They are important areas for nesting and foraging for Verreaux's Eagle, Black Stork and Jackal Buzzard.
- Agricultural lands: these are limited in the Corridor due to the dry climate and are found mostly in valleys and near homesteads. These are important feeding areas in arid landscapes. They are especially important for Blue Crane and Ludwig's Bustard (Shaw, 2013 *in* van Rooyen, 2022).

- Alien trees: there are not many areas of tall trees in the Corridor, and these are largely restricted to alien trees near homesteads. Stands of *Eucalyptus* trees have become important refuges for some powerline sensitive species which use them for roosting and nesting.
- High voltage lines: these are an important breeding substrate for raptors in the Karoo, due to the lack of large trees (Jenkins *et al.* 2013 *in* van Rooyen, 2022). Both Verreaux's Eagle and Martial Eagle have been recorded breeding on high voltage lines in the Corridor (van Rooyen, 2022).

CBAs and ESAs in the Northern Cape CBA Map and the West Cape Biodiversity Plan (BP) occur throughout the Corridor especially in the central and western parts (Figure 20 and Figure 21). Most of the CBAs identified in the Western Cape BP are selected based on areas of intact Eastern Upper Karoo vegetation, and important water resource protection areas identified as 'Very High Sensitivity' under the Shale Gas SEA, River Type and FEPA River Corridors. The vegetation specialist indicated that the vegetation is not unique or of ecological significance, and the CBA is therefore of low irreplaceability with regards to vegetation type. The low irreplaceability status is further motivated by the relatively low degree of transformation of vegetation in the area. The extensive CBA network in the Northern Cape BP is a result of the location of the Provincial PAES Focus Area (Todd, 2022).

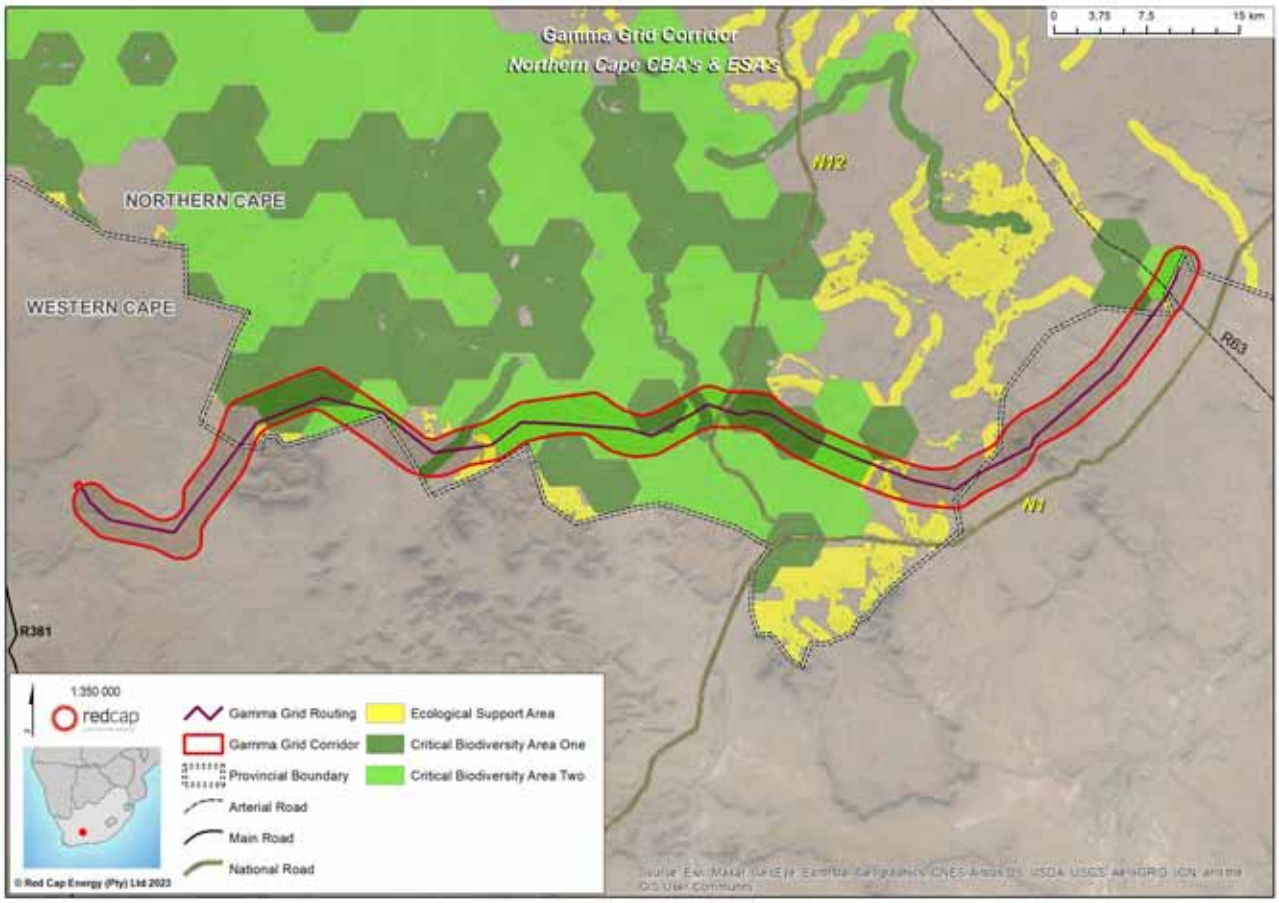


Figure 20: Critical Biodiversity Areas and Ecological Support areas in the Gamma Refined Corridor, identified in the Northern Cape Biodiversity Map.

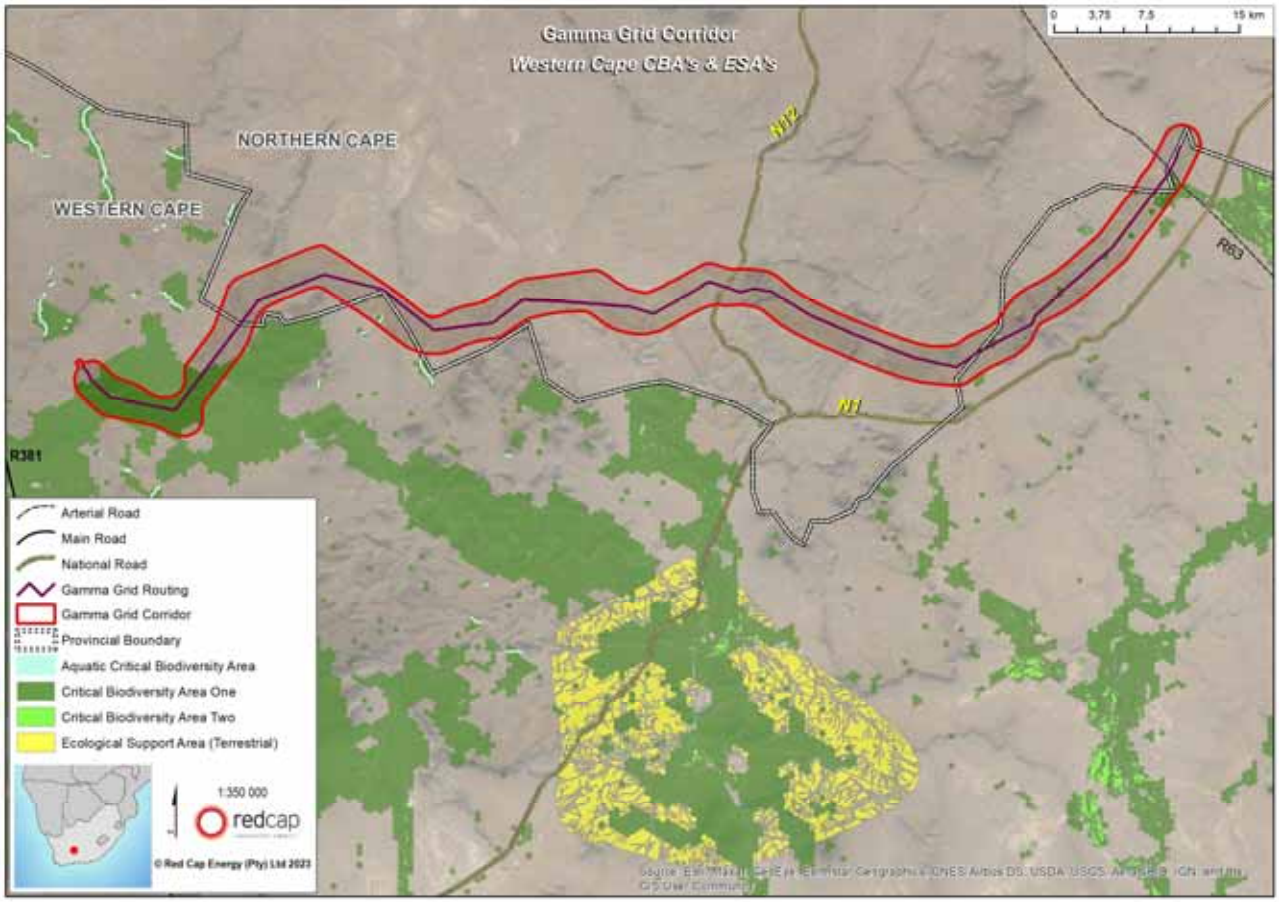


Figure 21: Critical Biodiversity Areas and Ecological Support areas in the Gamma Refined Corridor, identified in the Western Cape Biodiversity Plan.

6.1.2 Aquatic Biodiversity

Numerous non-perennial watercourses drain through the Assessment Corridor. Rivers include the upper reaches of the Buffels River tributaries, the Sout River and its tributaries, and the Krom and Kareespruit Rivers. There are few modifications to the upper reaches of these rivers, and their habitat ecological integrity is in a natural condition. The wetlands associated with the larger rivers and dams in the area are classified as valley bottom and floodplain wetlands. Wetlands are also largely natural, with the only notable impact being modification of indigenous vegetation by adjacent land use activities and access tracks. The larger watercourses in the study area have a high ecological importance and sensitivity while the smaller tributaries/drainage features are of a moderate ecological importance and sensitivity. The larger watercourses are less sensitive to impacts, while the smaller tributaries are less ecologically important but more sensitive to flow, water quality and habitat modification. The wetland features within the study area are considered to be of moderate ecological importance and sensitivity. The valley bottom wetlands are closely associated with the rivers in the area and are important ecological corridors for the movement of biota. Since most of the watercourses in the Assessment Corridor are non-perennial and are dry for large parts of the year, few indigenous fishes occur and the amphibian diversity is likely to be relatively low. No aquatic SCCs are known to occur in the local area (Belcher, 2022).

The Wagenaarskraal Tributary of the Sout River and the Sout River itself, as well as the Upper Brak River are Freshwater Ecosystem Priority Areas (FEPA) River Sub-catchments. The downstream Brak River and its tributaries are mapped as an 'Upstream Catchment'. These systems must not be allowed to degrade, and must be retained in a near natural condition or rehabilitated. Several instream wetland areas in the larger watercourse channels (particularly in the Sout River System) are mapped as FEPA Wetlands (Upper Nama Karoo Channelled and Unchanneled valley-bottom wetlands). The schietspruit, Tierhoekspruit and Krom tributaries of the Sout River are mapped as aquatic CBAs while the larger Sout River Catchment is mapped as a terrestrial CBA. All the other rivers are mapped as aquatic ESAs (Belcher, 2022). There are no surface water or groundwater Strategic Water Source Areas in the Corridor.

Figure 22: NFEPA Watercourses and Wetlands in the Gamma Assessment Corridor (NBA, 2018).

6.1.3 Archaeology/Cultural Heritage

The baseline description of the archaeological and cultural heritage environment in the Corridor is extracted from the specialist study (Orton, 2022):

The description is based on a combination of desktop information, data recorded in previous assessments in the area, and a survey done of the Assessment Corridor as part of the current BA process.

The Assessment Corridor is located in a rural context dominated by dolerite mountains in the west and by plains with dolerite ridges in the east. Vegetation height is low, but trees occur along the watercourses and occasionally in association with the dolerite. Rock outcrops are generally limited to the dolerite areas with the intervening spaces being flat plains.

Heritage resources in the Corridor are generally quite widely dispersed on the flat, open plains but more tightly clustered in valleys and along dolerite outcrops. A list of heritage resources in the area and their significance grade is given in Table 2 in the specialist report. Resources that have a 'high' grading include farmsteads, graves and dolerite boulders with name engravings over many years.

Heritage resources in the area are divided into 5 categories – 1) Palaeontology, 2) Archaeology, 3) Graves, 4) Historical Aspects and the Built Environment, and 5) Cultural Landscapes and Scenic Routes. Palaeontology is addressed in a separate study done by Dr J Almond.

6.1.3.1 Archaeology

The broader area has been relatively well studied and substantial desktop information is provided in the specialist report on the different types of archaeological features in the area surrounding the Assessment Corridor. A vast amount of

material is referred to as 'background scatter' which is defined as "widespread isolated artefacts whose distribution results from either primary or secondary causes" (Orton, 2016 *in* Orton, 2022). Late Stone Age Sites are mostly located along watercourses. These sites are usually scatters of stone artefacts, often accompanied by ostrich eggshell fragments and sometimes pottery, but may also include fragments of bone and even archaeological deposits. Painted rock shelters also occur.

'Rock gongs' are (usually) dolerite rocks that are naturally perched in such a way that when struck they release a ringing musical note. The gongs are identified by heavily worn patches where they have been repeatedly struck. Parkington *et al.* (2008) *in* Orton (2022) have studied a number of gongs from Nelspoort and Vosburg, to the south-east and north-east of the Corridor respectively, but Orton (2021b) recorded two further examples in the Nuweveld just beyond the western end of the Assessment Corridor, both of which were surrounded by extensive stone artefact scatters indicating occupation of the area.

Rock art sites occur in low density through the wider area, with three painted 'geometric tradition' sites and several engraved 'fine line' tradition sites on record from the Nuweveld in Western Cape, in the central part of the Corridor in the Northern Cape, and ~45 km south-east of the eastern end of the Corridor. A site with graves, stone artefacts and engravings occurs in the south-western end of the Corridor and is likely one of the most important archaeological sites in the area.

Recent surveys by Orton showed that 19th Century occupation of the area was widespread with many small abandoned and ruined stone-walled farmsteads scattered along the watercourses of the area. The structures included houses (both formal rectangular flat roofed houses and lobed dwellings that might have had temporary roofs), kraals, and various small outbuildings of unknown function but likely including storage spaces and chicken coops. These early packed stone structures are invariably collapsed reducing them to archaeological sites in terms of the NHRA definitions.

The engraving tradition in the Karoo continued beyond the Stone Age as testified to by the many recent 'scratched' engravings that are known to occur. Horses are an extremely common subject in these recent engravings.

The following archaeological resources were observed in the recent survey (which was limited on foot):

- One unusual scatter of 9 stone artefacts, all of them quite large and thus likely to be from the Early Stone Age.
- One potential example of a Stone Age stone-walled enclosure. It had an 'informal' appearance, possibly due to its walling having tumbled over time. Alternatively, it was simply made by moving stones to the side to create a clearing rather than a walled enclosure. Without any associated finds it is not possible to be sure whether this is a Stone Age or historical feature.

- A range of many historical features including stone-walled livestock enclosures (*kraals*), ruined houses in brick or stone and sometimes with an associated ash dump, smaller stone-walled dwellings, other small indeterminate features with very low stone walls, and a stone boundary beacon.
- Historical engravings were found in three areas on the farm Wagenaarskraal in Northern Cape. Many of these are likely to be less than 100 years of age and thus not archaeological, but they do nonetheless represent a continuation of a long-standing Stone Age tradition in the central Karoo. One of these is on a small but prominent dolerite hill ~400 m south-west of the farmstead. This hill is known locally as "The Visitor's Book" because visitors to the farm have been engraving their names there for more than 150 years (Orton, 2022).

6.1.3.2 Graves

Graves occur throughout the area, with farm graveyards being obvious and generally located close to the farmsteads making them easy to identify and avoid in gridline planning. Unmarked precolonial graves are of greater concern. These are mostly found in coastal sands, but there have been records in the surrounding vicinity. Orton found a very unusual find of an LSA occupation site with some engraved rocks and three graves with packed stone mounds over them in 2021. An informal burial ground for railway workers was recorded by Binneman in 2011 in the central part of the study area. During the current survey, 2 graveyards were found on farmsteads in the Northern Cape, but many more are expected to occur. The graves varied in style with some being simple stone mounds and others including a formal headstone, and are expected to be a farm workers' graveyard. Another graveyard was found at Wagenaarskraal in the Northern Cape, with graves related to the previous family who owned the farm before it was acquired by the MacRoberts family in 1870. The current family graveyard is also on the farm (Orton, 2022).

6.1.3.3 Historical aspects and the Built Environment

Historical buildings occur widely across the Karoo with most dating back to the 19th century. In rural areas buildings tend to be clustered into farm complexes with relatively few isolated structures. The complexes can include a variety of styles, while isolated structures are often small Karoo-style labourer's cottages. Due to the consolidation of farms into larger holdings in order to increase commercial viability, there are far fewer occupied farmsteads today than would have been the case in the past. These unoccupied buildings deteriorate faster due to the lack of maintenance and are usually encountered as archaeological sites.

Farmsteads occur throughout the area but tend to be very far apart. Historical buildings in the Assessment Corridor are found in association with farmsteads. The two most significant ones seen during the recent survey were those at Schietkuil and Wagenaarskraal. The former lies just outside the Corridor, and the latter in the central part of the Assessment Corridor. The house at Wagenaarskraal has been altered, but is a 19th Century structure. The room at the north-western end is a registered local museum that houses a large collection of historical rifles as well as various artefacts and documents related to the history of the farm (Orton, 2022).

6.1.3.4 Cultural landscapes and scenic routes

Cultural landscapes are the product of the interactions between humans and nature in a particular area. There are 4 cultural landscapes in the Corridor area:

- The 'natural or primeval' landscape – the oldest landscape with very little human modification, inhabited for thousands of years by the indigenous Bushmen hunter-gatherers and more recent Khoekhoe herders who left little trace of their passing but did mark the landscape with engravings, paintings, rock gongs, and graves. A significant area was found in the south-western part of the Assessment Corridor, in a remote valley in the dolerite hills. It has engravings and burial sites.
- The 'Trekboer' landscape - more permanent traces in the form of stone-built residential and farming structures (now in ruin) along with related features like threshing floors and graves. The early farmers fitted into the natural landscape but created small enclaves of "domesticated space" where they placed their farm complexes. The stone structures are characteristic of the landscape, when earliest trekboers 'settled down'. Grey poplar (*Populus x canescens*) is typical of trekboer farm structures who grew these fast-growing trees for construction purposes.
- 'Modern' landscape - livestock and game farming. This landscape comprises widely spaced farm complexes, and a network of farm fences and tracks. The farm complexes are generally marked by the presence of many trees and sometimes patches of agricultural lands.
- Areas with high visual sensitivity – prominent features are the escarpment edge, the Karoo National Park, and mountain passes of the area. These features are all far away from the Assessment Corridor (i.e. between ~18 and 30 km distance) and will not be effected by the proposed gridline. However, the small Perdeberg massif in the western part of the study area is also regarded as sensitive (Winter and Oberholzer, 2013), although it is excluded from the refined Corridor.
- The relatively undisturbed wilderness atmosphere that pervades the wider Karoo region can also be regarded as part of the cultural landscape. Driving along public roads leaves one marvelling at the tremendous sense of wide open space and, away from the hills of the escarpment, the endless Karoo plains punctuated by dolerite dykes and koppies. The Molteno Pass section of the R381 has been rated as being a 'locally significant route' but this significance can certainly be extended to the rest of this road for its scenic value. However, the R381 is a local road rather than a tourist route. The three small dolerite hills commonly known as 'The Three Sisters' lie just south of the N1, just over 1 km outside the southern edge of the Corridor. These hills are a prominent and well-known visual landmark in the central Karoo area.

Plate 6: A photo of the prominent 'Three Sisters'.

The specialist survey confirmed the sensitivity of archaeological and heritage resources is generally low in the Assessment Corridor, however there are smaller pockets of high and medium sensitivity sites expected to occur throughout the area, but these are focused on dolerite outcrops and watercourses. The following heritage resource types were identified in the specialist survey of the Assessment Corridor:

- Fossils are likely to occur sporadically;
- Stone Age and historical archaeological sites are likely to occur sporadically but with a greater likelihood along dolerite dykes, where engravings may be found, and close to water sources;
- Graves occur but almost exclusively in association with farmsteads;
- Farmsteads occur throughout the area but are widely dispersed. They include mature trees and fields that together form cultural landscapes. Isolated structures away from farmsteads tend to not occur in this area; and
- The wider Karoo region is an important cultural landscape and includes specific areas such as Karoo National Park, the escarpment edge and the well-known Three Sisters hills (Orton, 2022).

6.1.4 Palaeontology

The Corridor area is underlain by:

- Potentially fossiliferous continental sediments of the Teekloof Formation (Lower Beaufort Group, Karoo Supergroup) of Middle to Late Permian age. The uppermost Teekloof Formation bedrocks are characterized by common but sparsely distributed fossil sites of vertebrates and other groups (e.g. petrified wood). Most of these sites are of

limited scientific interest but they include occasional scientifically important specimens, most notably fossil vertebrate remains, whose occurrence is largely unpredictable; and

- A range of Late Caenozoic superficial sediments, most of which, with the possible exception of consolidated older alluvial deposits, are, at most, sparsely fossiliferous. The bedrocks within most of the Corridor are extensively mantled with Late Caenozoic colluvial, eluvial and alluvial deposits and gravely soils that are usually paleontologically insensitive over most of the Karoo region. Concentrations of fossil mammalian remains might occur within older, calcretised alluvium but the specialist is unaware of any recorded sites.

Several previous and ongoing field-based PIA studies within and on the margins of the Assessment Corridor (e.g. Nuweveld East WEF, Mura Solar projects, Modderfontein WEF, iLanga Solar projects, Victoria West Grid Connection project) indicate that occasional vertebrate and other fossil sites of scientific and conservation value definitely occur in the area, but these are often sparsely distributed and unpredictable. The slopes of Vaalkop on Farm Leeukloof 43, situated at the western end of the Corridor, are identified as a Very High Palaeosensitivity area (i.e. No-Go areas). The Biesiespoort Station area within the adjoining Noblesfontein WEF and Modderfontein WEF project areas (Farms Nobelsfontein 248, Matjiesfontein 220 and Modderfontein 228) is considered to be a High Sensitivity area on the basis of the long history of key vertebrate fossil collection here, but lies just outside and just to the north of the Assessment Corridor. Based on the specialist survey and other recent palaeontological studies done as part of the above-mentioned RE projects, most of the area within the Assessment Corridor is likely to be of Low Palaeosensitivity. This is due to extensive cover by unfossiliferous superficial sediments, intensive dolerite intrusions, and near-surface weathering. Good exposures of potentially fossiliferous, consolidated older alluvial deposits were not encountered during the survey, even along larger water courses such as the Soutrivier. The potential for unrecorded fossil sites of high scientific / conservation significance within the Lower Beaufort Group bedrocks and older alluvial deposits cannot be excluded (Almond, 2022).

6.1.5 Agriculture

Agricultural sensitivity in the Screening Tool is based on the land capability rating and whether the land is used for cropland or not. All cropland is classified as at least 'High' sensitivity, based on the logic that if it is under crop production, the area must be suitable for crops, irrespective the land capability rating. The arid climate with low rainfall (175 to 240 mm per annum) and and high evaporation (between 1 235 and 1 480 mm per annum) (Schulze, 2009 *in* Lanz, 2022) constrains land capability. Moisture availability therefore limits agriculture to grazing, except for where irrigation is possible.

While the vast majority of the Assessment Corridor is considered by the agricultural specialist to be of Low agricultural sensitivity, isolated patches of cultivated lands, situated along watercourses and near homesteads are 'High' sensitivity areas. The land has a long term grazing capacity of 24 to 28 hectares per large stock unit.

6.1.6 Geotechnical Conditions

A desktop Geotechnical study of the Corridor was done by GEOSS with the intention of providing a summary of the geology of the area, and to identify any potential geotechnical challenges related to the underlying geology that is important for planning purposes. The elevation of the Corridor area ranges between ~1170 and 1751 metres above mean sea level. Higher lying areas are characterised by dolerite intrusions and lower lying areas by drainage channels infilled with quaternary sediments (i.e. ephemeral river beds). Most rivers in the Corridor drain in a southerly to south-westerly direction. According to the 1:250 000 geological map done by the Council of Geosciences, the Corridor is mostly underlain by mudstones and sandstones of the Karoo-aged Teekloof Formation of the Beaufort Group, which have been intruded by Jurassic-aged dolerites, and overlain by quaternary-aged alluvium. Fossil assemblage zones have been identified in the area.

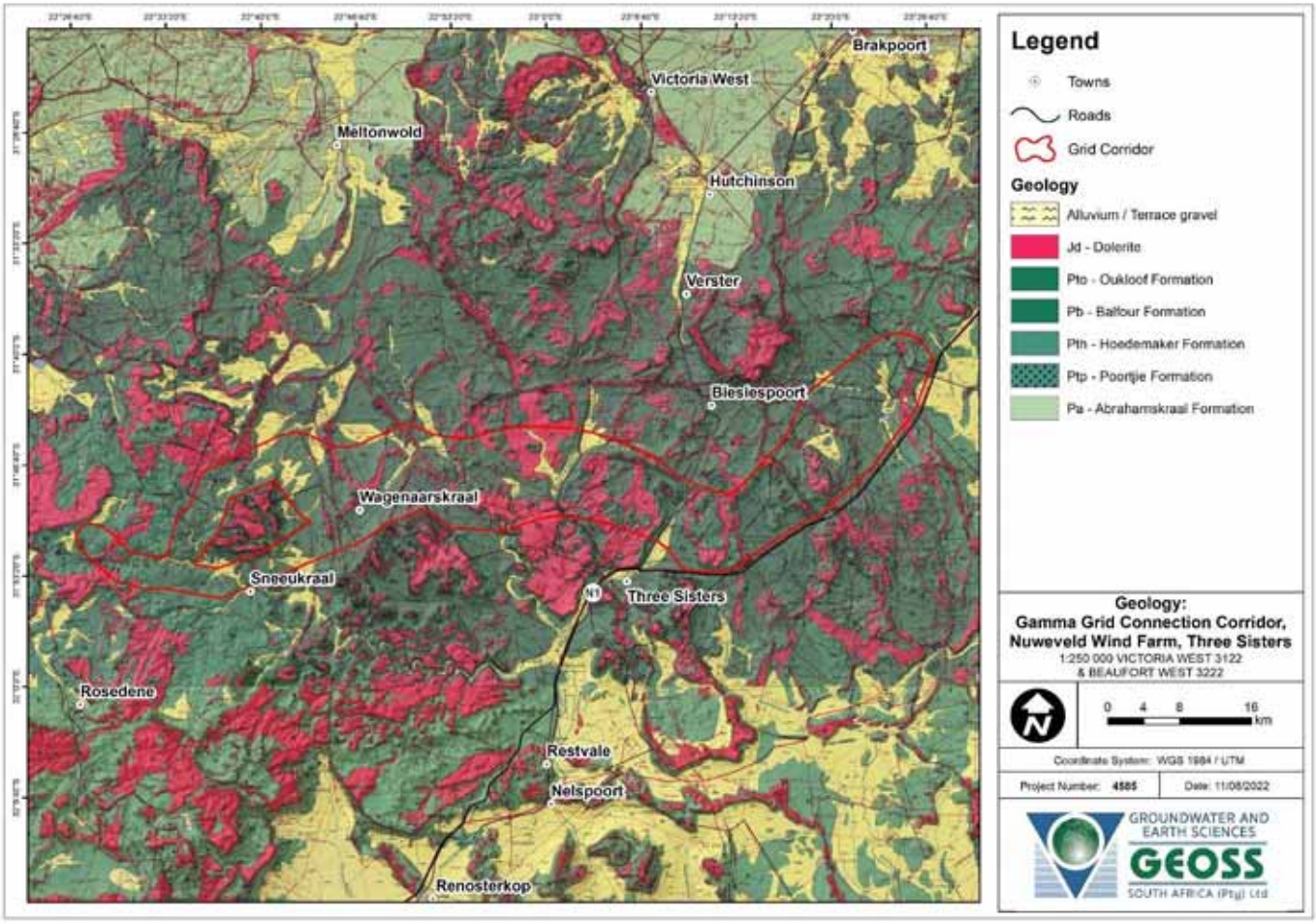


Figure 23: Geological setting of the area (3122 – Victoria West, GCS 1989).

The main geological formations are shown in Table 15.

Table 15: Geological Formations in the study area (CGS, 1991* in *GEOSS, 2022).

Code	Member	Formation	Group	Description
	*Quaternary-aged sediments*			Alluvium
Jd	*Intrusive*			*dolerite*
Pto	Oukloof	Teekloof	Beaufort	Purple mudstone, sandstone
Pth	Hoedemaker			Red and purple mudstone, subordinate sandstone
Ptp	Oukloof			Purple green, and grey mudstone, sandstone

The 'Wienert-N' value for the area is greater than 5, which means residual soils are typically shallow, transported soils of variable thickness with calcrete pedocretes (Brink, 1979 *in* GEOSS, 2022). According to Weinert, physical weathering (disintegration) will predominate in areas where the N-value is larger than 5 and the residual soils are typically only thinly developed.

Geotechnical constraints that are relevant to the environmental assessment are as follows:

- Problems with slope stability may be experienced where sandstones and shales/mudrocks of the Karoo Supergroup are closely intercalated, as weathering of the fine-grained rocks may result in undercutting (Brink, 1983). Porewater pressure may develop at the interface between sand- and mud-/siltstones (Brink, 1983 *in* GEOSS, 2022). These areas are subject to erosion.
- Dolerite is erosion-resistant.
- Topographically, the region has been classified in terms of development based on classes suggested by Stiff *et al*. (1996) (*in* GEOSS, 2022). The majority of the region is classified as "favourable" due to the generally flat nature of the site.
- Intergranular and fractured, and fractured aquifers are dominant in the area. The intergranular and fractured aquifers have an indicative yield potential of 0.1 to 0.5 L/s (DWAF, 2002). The fractured aquifers indicate a yield potential of between 0.5 to 2.0 L/s (DWAF, 2002). The regional groundwater quality is classified as "ideal to marginal" with an associated electrical conductivity (EC) of 0 – 300 mS/m (DWAF, 2002 *in* GEOSS, 2022).
- Some soils may be slightly potentially expansive, but this is not expected to hamper development.
- There is little evidence of surface ponding across the site area. However, cognisance of this should be taken in further investigations, particularly in areas where slopes are shown to be less than 2°.
- There are regions which are characterised by erosion scars, and this need to be evaluated in detailed design phase.
- It is not necessary to design structures to withstand seismic loads in this area. Seismicity of the region is low.

6.1.7 Visual Features

The Assessment Corridor is located on an upland plateau with the Nuweveld mountains to the south. The area is characterised by horizontal sills of erosion-resistant dolerite forming flat-topped *koppies* or mesas, such as the Perdeberg, Brandersberg and Three Sisters that are the main scenic features of the study area. Vegetation is a mix of dwarf shrubland and grasses, with succulent shrubs in places. There are few tall trees other than alien trees, mostly around homesteads, and indigenous riparian woodland. There are farmsteads and guest farms in the area, and farming is mostly with dorper sheep, goats and game. The flat-topped koppies and mesas within a vast landscape are characteristic features of this part of the Great Karoo, an area noted mainly for its empty, uncluttered landscapes and dark, star-lit skies at night. Isolated farmsteads form green oases in the semi-arid landscape, sheltered from the heat by poplars and other exotic trees. The overall feeling is one of stillness and remoteness. Landscape features with visual or scenic value and sensitive receptors are described in Table 16 (Lawson and Oberholzer, 2022).

Table 16: Visual Features and Sensitive Receptors (Lawson and Oberholzer, 2022)

Scenic Resource	Landscape features within or adjacent to the development site.
Topographic features	Characteristic landforms include the dolerite *mesas* and *koppies*. Vertical dolerite dykes form long knobbly ridges and rock outcrops. These topographic features contribute to scenic and natural heritage value, providing visual interest or contrast in the expansive landscape.
Water Features	The Kromrivier, which rises near Leeukloof, forms small scenic gorges in places. Other drainage courses are largely dry, except during short rainy periods. There are a number of small farm dams.
Cultural landscapes	Intact wilderness or rural landscapes, contribute to scenic value and sense of place, along with patches of cultivated land and tree copses in alluvial valleys. Cultural landscapes include archaeological and historical sites identified in the Heritage Assessment.
Sensitive Receptors	Receptors adjacent to the site or in the local surroundings.
Protected Areas	There are no known nature reserves or other formally protected areas within the Assessment Corridor although various areas within the corridor are included in the Critical Biodiversity Area network.
Guest Farms	There are a number of small guest farms within the grid corridor, but these are some distance (at least 1 km) from the pre-negotiated powerline alignment.
Human settlements	There are no towns or villages within the viewshed or within 5km of the proposed gridline. Farmsteads within the viewshed are more than a kilometer from the pre-negotiated powerline alignment.
Scenic routes, arterial roads	Scenic sections of district roads have been identified. Main arterial routes that cross the grid corridor include the N12 National Road and the R63 Route. A railway line crosses the Assessment Corridor near Three Sisters.
Heritage sites	These form part of the heritage study, but could have visual implications.

6.1.8 Traffic

The Traffic Impact Assessment done by Schwarz (2022) indicates that there is a well-established road network in the area. A combination of national roads and first, second and third-order roads, provides access to the Grid Corridor from the local towns and the major commercial centres within South Africa. Access to the west would be via Beaufort West or Loxton using the R381, and access to the central and eastern portions of the Corridor would be from the N1 and N12 via Three Sisters. Other than these National and Main Roads, there is also a network of District Roads, farm roads and access tracks throughout the Corridor. An overview of the road network is given in Figure 24.

Figure 24: An overview of the road network in the Gamma Assessment Corridor area (Schwarz, 2022).

6.1.8.1 Access

Access to the Nuweveld Wind Farms will be used to access the portion of the Grid Connection that falls within the WEF's boundaries. Access to the servitude (when established) for the Gamma Gridline that falls outside the WEF boundaries will be provided from the public road network. Access to the Grid Corridor from the public roads will be provided by existing and/or new private roads/tracks, in agreement with the relevant landowners.

The Grid Corridor covers a large area, and has therefore been divided into 8 zones related to access (see Figure 25). Each zone will be accessed from the existing road network.

Figure 25: Eight zones in the Gamma Assessment Corridor with relevance to access (Schwarz, 2022).

6.1.8.2 Transportation Routes

Commuter routes

There are a few small towns in the region that are within ~150 km of the Corridor. It is assumed that the construction workforce will come from the surrounding community to meet the REIPPPP requirements. The main commuter routes will be from either Beaufort West or Victoria West, depending on which zone construction work is been done.

Freight routes

Majority of the materials and equipment for construction will be supplied from South Africa, and routes from Container Terminals are therefore not relevant. The most likely transportation routes for domestically supplied and manufactured components from the major commercial centres to the proposed developments are either Cape Town or Johannesburg (or any supplier along these routes). Distances between the Corridor and the major centres is shown in Table 17. Although the closest major commercial centre is in the greater Cape Town area, many components will be fabricated in Johannesburg and transported to the proposed development.

Table 17: Distances from major commercial centres in South Africa (Schwarz, 2022)

Commercial Centres	Distance
Cape Town	696 km
Johannesburg (via N1)	1003 km
Johannesburg (via N12)	968 km

6.1.8.3 Traffic Volumes

The estimated trip generation from the project is based on data from similar projects in the area. Commuter trips relate to the movement of the workforce to and from the site; while freight trips refer to the movement of materials and equipment to and from the site.

The baseline traffic volumes for the road network adjacent to the proposed development are based on the AADT values obtained from the various counting stations. The values used are the average values between intersections, which have been adjusted by a growth factor relevant to the road. The adjusted AADT values used in this assessment are provided in Figure 26.

Current traffic volumes in the Assessment Corridor are extremely low.

Figure 26: Baseline traffic AADT data (Schwarz, 2022).

6.1.9 Socio-Economic Characteristics

The Gamma Corridor straddles the Northern and Western Cape, over the Central Karoo and Pixley ka Seme District Municipalities (DMs). The largest portion of the Corridor is located within the Ubuntu Local Municipality (LM), within the Pixley ka Seme DM.

The broader region has several typically small, sparsely populated Karoo towns scattered throughout the area, and larger towns with higher population densities that serve the purpose of agricultural service centres. There are no towns within the Assessment Corridor. The dominant land use in the Assessment Corridor is agriculture, with large farms on average 6 000 ha to 12 000 ha in extent. Farming is adapted to the dry climate, and mainly revolves around small livestock and game farming (hunting), with limited crops in valley bottoms often near or around farmsteads. Whilst commercial farmers own most of the farms in the study area, some of the surrounding towns have made commonage available that emerging farmers can rent (Ubuntu LM IDP, 2017-2022 *in* Terblanche, 2022).

Few and a limited number of farmsteads are scattered in and around the Assessment Corridor. A few holiday accommodation / guest farms are located on the outskirts of the Assessment Corridor. Infrastructure features such as the N12 and R62 roads, a railway line, Nobelsfontein wind turbines, Eskom powerlines, the Gamma Substation and Victoria Series Capacitator Substation are present in the eastern portion of the Assessment Corridor (Terblanche, 2022).

The study area in general experiences high levels of unemployment, poverty and social grant dependence and low levels of education. Poverty reduction is a critical challenge. Despite the strategic location of the area in terms of transport corridors, the area is still largely undeveloped. The local economy is largely based on agriculture; mainly goat, sheep and game farming. The manufacturing sector contributes only marginally to employment. Increasing the access to basic services and health, education and social services remain a challenge. Economic empowerment is limited by inadequate available employment opportunities and a lack in entrepreneurship and skills. To address these socio-economic challenges, the municipalities in the study area are increasing their focus on skills development of the local communities, sustainable job creation and employment equity by targeting previously disadvantaged groups such as women, the disabled and the youth. Renewable energy investment has been identified as a major opportunity to attain these development goals (Terblanche, 2022).

The nearest operational WEF is the Nobelsfontein WEF to the north of the Gamma Corridor. There are 6 authorised RE projects within a 30 km radius of the Corridor, but the EAs for the Biesiespoort and Modderfontein projects have lapsed. The Kromrivier Traction / Nobelsfontein 1 132 kV live traverses the Corridor near Three Sisters, and in the east the Gamma Corridor follows the routing of the Gamma / Kappa 1 765 kV and the Droerivier / Hydra 2 400 kV powerlines. Another 765 kV line is proposed by Eskom in this Corridor. Further to the east, the Hydra / Droerivier 1 and the Droerivier / Hydra 3 400 kV lines also fall within the Corridor.

6.2 Specialist Sensitivity Classification

The DFFE's on-line Screening Tool collates available desktop information for the Corridor area, and assigns a sensitivity rating to various 'themes' (e.g. terrestrial biodiversity, aquatic etc.). Specialist studies either verify or dispute the sensitivity rating based on site-specific assessments, and other available information. Table 18 outlines the different themes and their allocated sensitivity rating for the area within the Gamma Grid Corridor, with comments on whether the sensitivity ratings have been confirmed or disputed by the specialist studies.

All specialists assessed the full extent of the Corridor and provided a map and/or description of the sensitivity of the area, ranging from 'Low' to 'Very High Sensitivity', where 'Very High' areas are regarded as 'No-Go' areas. Table 8 describes the sensitivity categories provided to all specialists to use as a basis for sensitivity ratings. The sensitivity maps and descriptions, as well as recommendations of specialist studies and the outcomes of landowner negotiations have been used to identify the pre-negotiated route presented in this BA Report. The final alignment of infrastructure within the route is subject to micro-siting of infrastructure post decision-making stage, provided that No-Go areas are avoided at all times.

Table 18: Sensitivity Ratings of Themes for the Gamma Grid Corridor area (as per the DFFE Screening Tool Report)

Theme	Screening Tool Sensitivity	Verified/Disputed Sensitivity	Comment
Agriculture	Medium	Verified - Low	*Relates to the agricultural production potential of the land. The agricultural specialist* ***disputed*** *medium sensitivity and* ***confirmed low sensitivity***
Animal Species	High: Avifauna – 4 SCCs Medium: Avifauna – 4 SCCs High: Mammals – 1 species - *Bunolagus monticularis* Medium: Reptiles – 1 SCC - *Chersobius boulengeri*	Avifauna SCCs – confirmed to be High Sensitivity Verified - *Bunolagus monticularis* Verified –*Chersobius boulengeri*	*Optimal habitat for* B. monticularis *within the Corridor is confirmed by the specialist, therefore the* ***high sensitivity classification for this species is confirmed*** *Extensive tracts of suitable habitat for the Karoo Dwarf Tortoise are mapped within the Corridor therefore the* ***medium sensitivity classification is confirmed for reptiles. However the Avifauna specialist indicates a high sensitivity for bird species***
Aquatic Biodiversity	Very High	Disputed - Very High for full Corridor Confirmed – Larger watercourses – High; Smaller tributaries - Medium	*Aquatic specialist* ***disputed*** *the overall sensitivity rating of Very High for the full Corridor area, and* ***confirmed*** *the larger watercourses are* ***high sensitivity*** *features, while the smaller tributaries/drainage features are* ***medium sensitivity*** *features*
Archaeological and Cultural Heritage	Low	Confirmed – Low (most of the Corridor)	*The specialist* ***confirmed*** *the low sensitivity for most of the Corridor,* ***but with pockets of high sensitivity.*** *Many other smaller* ***high and medium sensitivity sites*** *are expected to occur throughout the area, but focused on dolerite outcrops and water courses*
Civil Aviation	Low	Low	*Addressed by the EAP, and confirmed as low sensitivity*

			because there are no registered landing strips in the Corridor. Registered aerodromes in the area surrounding the Assessment Corridor are the Victoria West Airfield, Karoo Gateway Airport, but these are between 30 and 60 km away from the Assessment Corridor. There are existing high voltage lines in the area, and the Corridor is planned in a Strategic Transmission Corridor
Defence	Low	Low	*Addressed by the EAP, and confirmed as low sensitivity because there are no defence bases in the Corridor. There are existing high voltage lines in the area, and the Corridor is planned in a Strategic Transmission Corridor*
Palaeontology	Very High	Disputed – Very High Confirmed - Low	*The specialist **disputed** the sensitivity rating and **confirmed a low Palaeontological sensitivity in the Grid Corridor***
Plant Species	Medium	Disputed – Medium Confirmed - Low	*Refers to Species of Conservation Concern recorded or modelled to be in the area – 4 Plant SCCs listed Specialist **disputed** medium sensitivity, and indicated **low sensitivity***
Terrestrial Biodiversity	Very High	Confirmed – Very High	*The specialist **confirmed** the Corridor is part of a CBA1 and 2 and ESA1 and 2 networks that aquatic environments are listed FEPA catchments, and that parts of the Corridor are within the PAES.*

6.2.1 Terrestrial Biodiversity, Plant and Animal Species Sensitivity

6.2.1.1 Terrestrial Biodiversity

According to the Screening Tool, the Assessment Corridor area has 'Very High' and 'Low' Sensitivity terrestrial biodiversity areas. CBAs and ESAs are present in the Assessment Corridor, as well as the Northern Cape's PAES Focus Area where the entire NPAES Focus Area extent within the Northern Cape section of the Corridor is classified as a CBA. The terrestrial ecologist confirmed the above information for the Assessment Corridor, but, noting that the CBAs are based on large hexagonal planning units and actual features that require protection have not been mapped in detail in the biodiversity plans, the specialist interrogated the underlying drivers of the biodiversity priority areas (i.e. CBAs, ESAs and PAES Focus Areas) to identify sensitive features / habitats and to determine their sensitivity to the proposed development (see Table 19). In this regard, habitats that support sensitive or rare species within this well represented and mostly intact landscape were either assigned Very High sensitivity (i.e. No-Go areas in the case of optimal Riverine Rabbit habitat) or High sensitivity (in the case of optimal Karoo Dwarf Tortoise habitat).

The development footprint of the gridline would be less than 60 ha, and gridline infrastructure would be distributed linearly along the 110 km length. As a result, the extent of habitat loss and disruption in any one area or habitat would be low and would not compromise the ecological integrity of these areas. Given the low transformation rate and extensive nature of the affected vegetation types, the development footprint would have minimal impact on the future ability to meet conservation targets for these vegetation types. (Todd, 2022). Therefore the specialist confirmed that although there are extensive CBAs in the landscape, the sensitivity of these features to the proposed development type is low apart from the habitat for SCCs (as above).

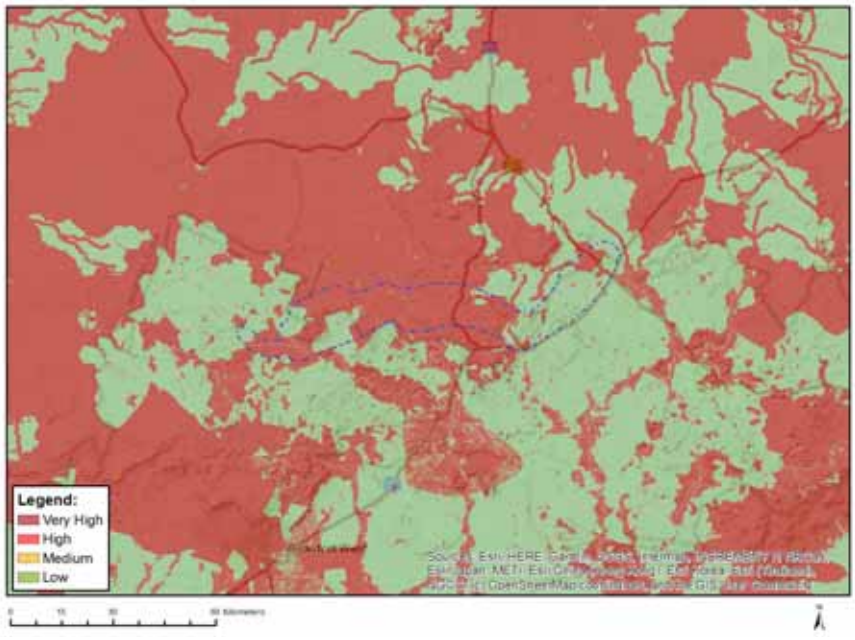


Figure 27: Map showing the Screening Tool Terrestrial Biodiversity Sensitivity Rating for the Gamma Grid Assessment Corridor.

Table 19: Summary of the various underlying drivers of the CBAs present within the Gamma 400kV Gridline Corridor and the potential impact of the development on these features or reasons (Todd, 2022).

Feature	CBA Basis: Description & Irreplaceability	Consequence & Potential Impact Analysis
Eastern Upper Karoo	These areas have been selected in order to meet the representivity requirement for the Eastern Upper Karoo vegetation type. As this vegetation type is still largely intact and is classified as Least Threatened, it is considered to have low irreplaceability.	Habitat loss associated with the Gamma Grid within this vegetation type would not compromise the ability to meet future conservation targets. There are still extensive tracts of intact similar habitat available in the area and the affected areas have low irreplaceability. As a result, the implications of the development for habitat loss within the Eastern Upper Karoo vegetation type are minimal and would not impact the conservation status of this vegetation type or the affected habitat types present within the study area in any meaningful manner.
Upper Karoo Hardeveld	These areas have been selected in order to meet the representivity requirement for the Upper Karoo Hardeveld vegetation type. As this vegetation type is still largely intact and is classified as Least Threatened, it is considered to have low irreplaceability.	Habitat loss of Upper Karoo Hardeveld vegetation associated with the Gamma Grid would be low as most of the areas of Upper Karoo Hardeveld would be avoided by the pre-negotiated route. The loss of the affected areas would not compromise the ability to meet future conservation targets for this vegetation type. There are still extensive tracts of intact similar habitat available in the area and the affected areas have low irreplaceability. As a result, the implications of the development for habitat loss within the Upper Karoo Hardeveld are minimal and would not impact the conservation status of this vegetation type in any meaningful manner.
Water Resource Protection	These areas have been designated as a CBA to protect drainage features or wetlands from development impact. This could be direct impact such as habitat loss within the wetlands or indirect impact such as damage through erosion and consequent siltation.	The development of the grid connection could potentially pose some threat to the integrity of the hydrological systems and processes operating within the affected CBAs. However, it is important to note that the CBAs are based on large hexagonal planning units and actual features that require protection have not been mapped in detail in the biodiversity plans. These features have however been mapped in detail in the specialist report in an ecological context and have also been mapped in the freshwater specialist study. The mapping, along with the required mitigation and avoidance measures suggested in the terrestrial and aquatic biodiversity studies, would ensure that impacts on the hydrological systems of the study area are minimised.
Shale Gas Very High Sensitivity (WC only)	These areas have been identified as being very high sensitivity in the Shale Gas SEA.	The sensitivities mapped in the Shale Gas SEA are specific to shale gas exploration and development. Other development types such as power transmission pose very different risks to these areas. While these are generally still considered to represent more sensitive parts of the landscape, the potential impacts posed by the grid connection are very different from those posed by Shale Gas development, which has a far more intensive and intrusive nature compared to a power line. Areas considered unsuitable for Shale Gas development are not necessarily unsuitable for a power line development. The detailed, ground-truthed sensitivity mapping produced as part of the terrestrial biodiversity study for the Gamma Grid are considered to represent a more realistic representation of the sensitivity of the site and the actual development

		constraints for the power line.
Ecological Processes/Landscape Structural Elements	These areas have been identified as being important for ecological processes such as dispersal.	Given the low overall footprint of the development and the low existing level of impact in the broader study area, the development is unlikely to impact important ecological processes. In addition, the avoidance that has been implemented for the major drainage systems of the site and areas of potential Riverine Rabbit habitat are intended to ensure that the ecological functioning of the affected area is maintained.
Northern Cape PAES	The whole of the area identified as CBA 1 and CBA 2 within the Northern Cape section of the corridor falls within a provincial Protected Area Expansion Strategy Focus Area.	While transformation within PAES Focus Areas is undesirable, the overall development footprint is estimated at less than 60 ha, which is not significant in terms of habitat loss within the PAES Focus Area. The construction and operation of the grid connection would not compromise the ecological and conservation value of the PAES Focus Area. There are already several power lines in the affected area (a Strategic Transmission Corridor) and the sensitive ecological features that would ultimately be the target for formal conservation would be largely avoided by the power line.

The drivers of the status of portions of the Assessment Corridor's designation as either ESA or CBA have been identified and described by the specialist, and considered in the context of the nature of the development activities and the likely impact on terrestrial biodiversity priority areas (seeTable 19). On this basis, areas of very high ecological sensitivity within the CBA and ESA network have been identified as 'No-Go' areas by the terrestrial biodiversity specialist. As such, features of significance within the CBAs of the study area that are sensitive to the development would be protected from impact through the detailed sensitivity mapping conducted as part of this study. As a result, and assuming avoidance of No-Go areas, the specialist has found that the area is of low sensitivity to the proposed development type, and that the overall impact of the development within the areas of CBA and ESA is seen as being low and would not compromise the ability to meet these targets elsewhere or significantly compromise the biodiversity value or ecological functioning of the affected CBAs. Furthermore, micro-siting of infrastructure in high sensitivity areas at detailed design stage will allow the developer to largely avoid impacts on the underlying features (i.e. vegetation and aquatic areas) of these biodiversity priority areas by placing infrastructure and roads in the least-possible sensitive areas.

6.2.1.2 Plant Species

The Plant Species Theme is mostly rated as 'medium sensitivity' by the Screening Tool in the Gamma Assessment Corridor, with small areas in the west rated as 'low sensitivity'. The medium sensitivity rating is based on 4 SCCs listed for the Assessment Corridor. While none of these were observed in the Assessment Corridor by the terrestrial ecologist (either during the survey for this project or during previous extensive surveys of the region), they are likely to occur sporadically based on the known habitat requirements and the ecological condition of vegetation within the Corridor. However, as these plant species were not observed during the survey, and secondly, because the potential for conflict between the development and these species is low since any populations of SCCS are likely to be avoided during

micro-siting of infrastructure (which is recommended as a condition of authorisation), the specialist has assigned a low sensitivity rating for the Assessment Corridor for the Plant Species theme.

The specialist has spent extensive time in the area on other projects, and if present these species are certainly not common or widespread (Todd, 2022).

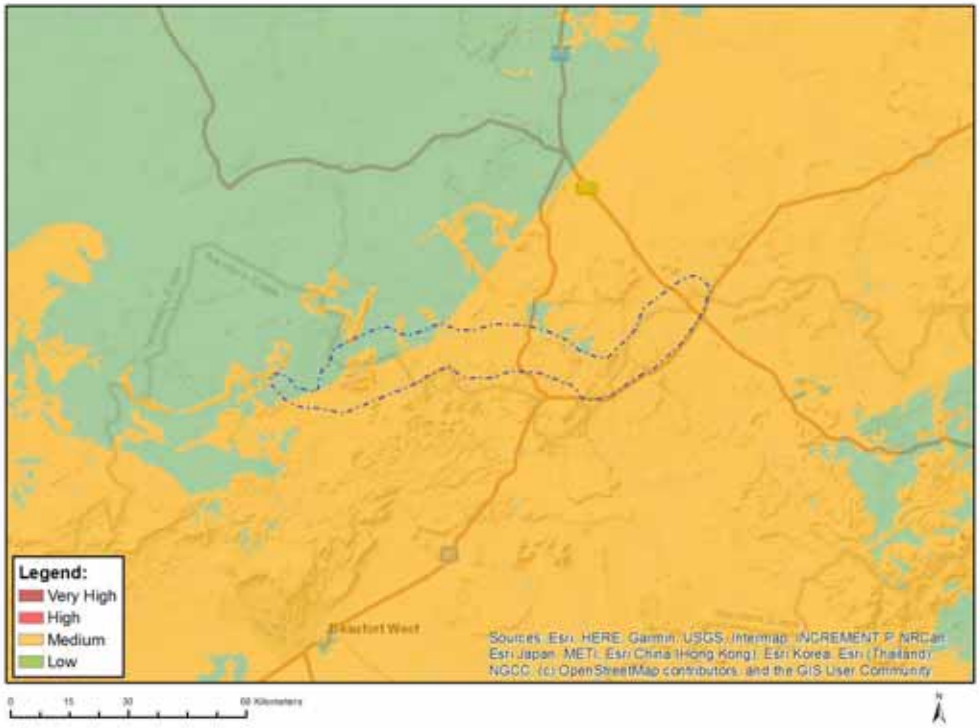


Figure 28: Map showing the Screening Tool Plant Species Sensitivity Rating for the Gamma Grid Assessment Corridor

6.2.1.3 Animal Species (Mammal and Reptile Species)

The Animal Species Theme is mostly rated as 'medium sensitivity' according to the Screening Tool, but some areas are assigned 'high sensitivity'. The latter is a function of avifaunal SCCs, and the known location of the Riverine Rabbit and Karoo Dwarf Tortoise in the area. Listed SCCs include 8 avifauna species (addressed separately under 'Avifauna'), 1 mammal (i.e. the Riverine Rabbit), and 1 reptile (i.e. the Karoo Dwarf Tortoise). The terrestrial ecologist confirmed the sensitive ratings for the habitats associated with the listed mammal and reptile SCCs, because suitable habitat is found within the Assessment Corridor and the species have been observed within the area in recent and historic surveys.

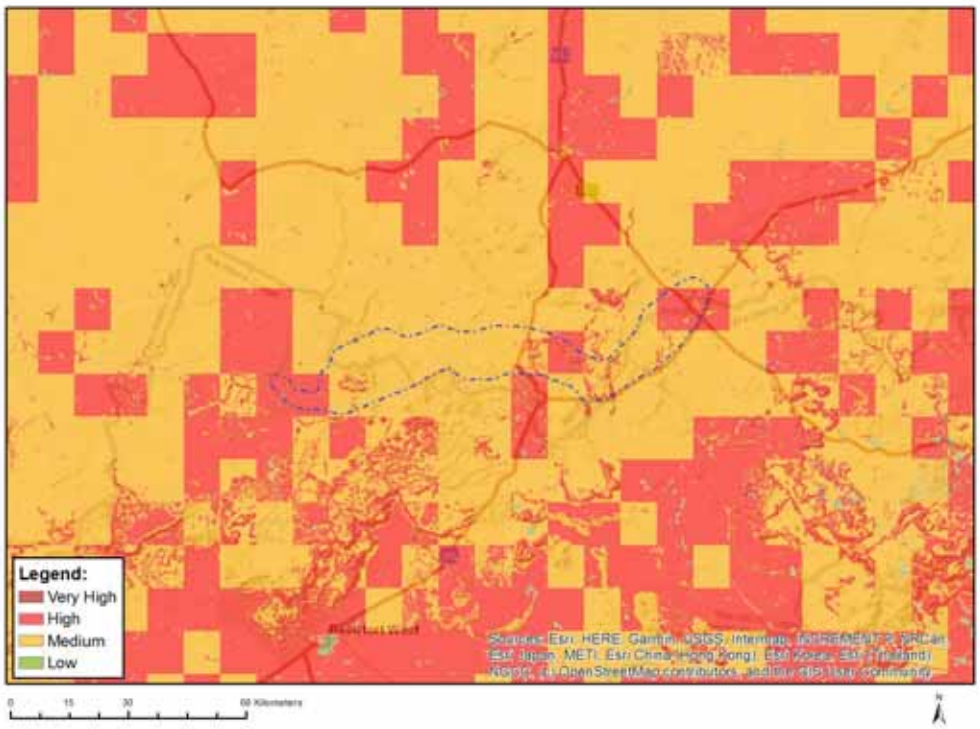


Figure 29: Map showing the Animal Species Sensitivity Rating for the Gamma Grid Assessment Corridor.

Given the IUCN status of the **Riverine Rabbit** (C2a (i)) and its' estimated population size, the Conservation Importance (CI) of Riverine Rabbit habitat within the Corridor is considered to be High. As there is not a large amount of transformation within the areas of confirmed Riverine Rabbit habitat; optimal habitat is considered to have High Functional Integrity (FI). As the CI and FI are both High, the Biodiversity Importance (BI) of optimal Riverine Rabbit habitat within the Corridor is considered to be High as well. These areas are considered to have a Medium resilience. Therefore, the overall Site Ecological Importance (SEI) is considered to be High for the optimal, intact, Riverine Rabbit habitat. The implications thereof in terms of the Species Assessment Guidelines for areas of optimal habitat within the Corridor are "*Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities*." Areas within the Corridor with High SEI for Riverine Rabbit have therefore been mapped as 'No-Go' areas.

The IUCN status of the **Karoo Dwarf Tortoise** is Endangered under criterion A4ace and, and the Conservation Importance of the site is considered to be High. As the rocky hills habitat has experienced very little direct transformation to date, it is considered to have High Functional Integrity. As the CI and FI are both High, the BI of the site is considered to be High as well. The habitat within the Corridor is considered to have a Medium resilience. Thus, the overall SEI of suitable habitat for the Karoo Dwarf Tortoise in the Corridor is considered to be High. The same guidelines for impact avoidance from the Species Assessment Guidelines as above for the Riverine Rabbit apply here.

6.2.1.4 Sensitivity Mapping

Terrestrial Ecological sensitivity rating incorporates the following features in the 'Very High' and 'High' Sensitivity layers (note that the 'constraints' mapping for terrestrial ecology applies to physical footprints (i.e. pylon footprints and access roads) - overhead lines may traverse these areas)):

- Very High Sensitivity (No-Go Areas):
    - Riverine Rabbit Intact and Optimal Riparian areas – that provide 'optimal habitat' for the Riverine Rabbit and are of general ecological importance. Aquatic habitats that will be used by amphibians will be captured in this layer, and no additional areas need to be identified for amphibians observed in the area (Karoo Toad, Clawed Toad, Boettger's Dainty Frog, Tandy's Sand Frog and Poynton's River Frog, and the Giant Bullfrog).
    - A population of ~30 individuals of *Rhinephyllum broomii* on the western side of the Corridor.
- High Sensitivity Areas:
    - Riverine rabbit 'sub-optimal' habitat - considered to be degraded or otherwise less likely to maintain resident populations of Rabbits, and minor drainage features which do not represent habitat, but which may be important for connectivity and also support the areas of habitat in terms of water flow regulation etc.
    - Suitable habitat for the Karoo Dwarf Tortoise – favourable habitat in large mountain complexes. There are fairly extensive tracts of potentially suitable habitat for the Karoo Dwarf Tortoise within the Grid Corridor[15].

The composite terrestrial ecology constraints/sensitivity map is shown in Figure 30. The major sensitive features include the areas of potential Riverine Rabbit and Karoo Dwarf Tortoise habitat, the larger drainage systems of the site and mountain complexes.

[15] The areas of Karoo Dwarf Tortoise habitat have been mapped as high sensitivity since this habitat does not have confirmed presence of Karoo Dwarf Tortoises and is not highly threatened by the development of the power line through these areas. As a result, the sensitivity of Karoo Dwarf Tortoise habitat is considered to be somewhat lower than the areas of optimal Riverine Rabbit habitat.

Plate 7: Avoiding multiple access tracks is important to limit disturbance and erosion scars.

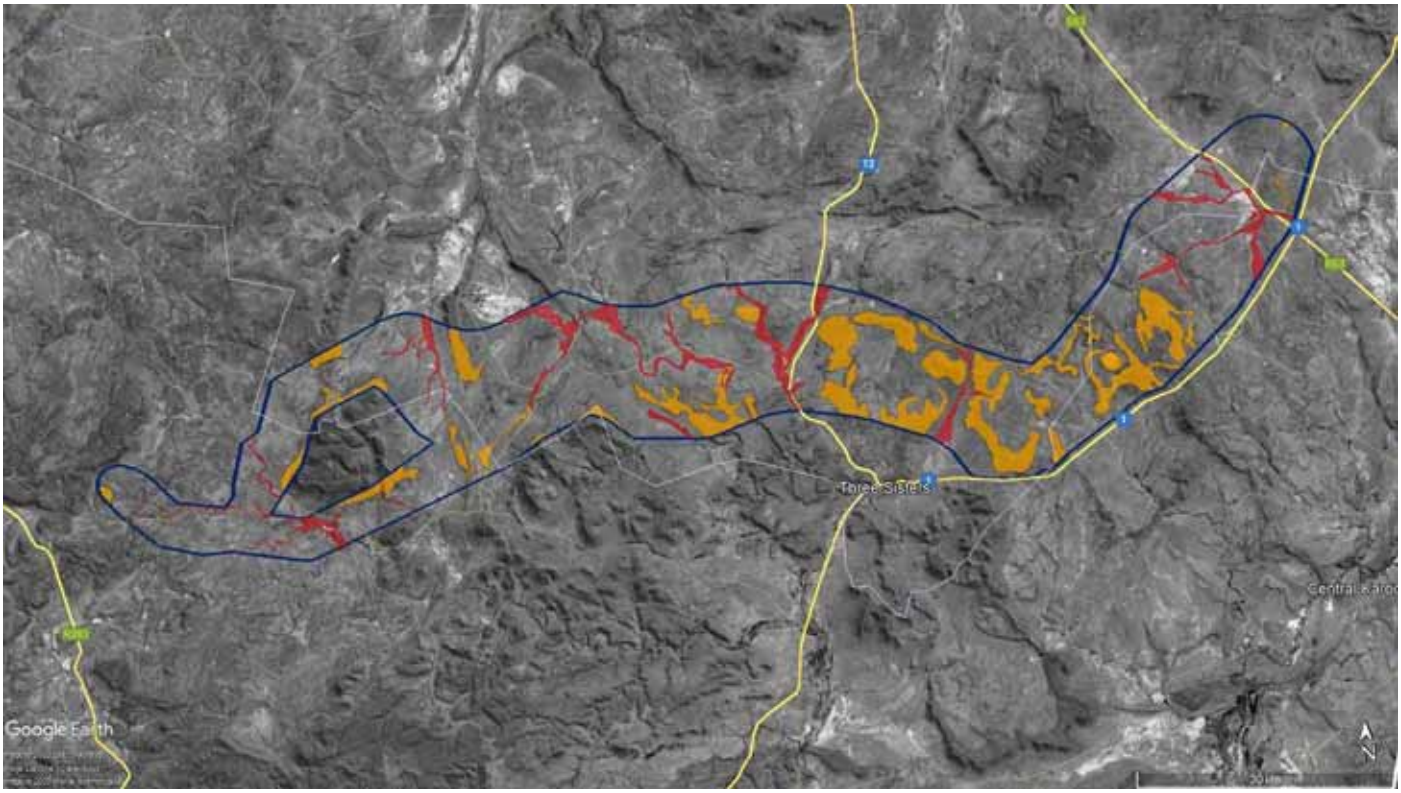


Figure 30: Ecological constraints map for physical infrastructure and roads in the Gamma Grid Assessment Corridor (red = No-Go areas, orange = High Sensitivity areas).

6.2.2 Avifauna Sensitivity

The Screening Tool assigns a 'High' and 'Medium Sensitivity' rating to the animal species theme in the Corridor, which includes Avifauna (see Figure 29). The 'High' classification for avifauna is linked to the potential occurrence of SCCs namely Ludwig's Bustard *Neotis ludwigii* (Globally and Regionally Endangered), Black Stork *Ciconia nigra* (Regionally Vulnerable), Verreaux's Eagle *Aquila verreauxii* (Regionally Vulnerable), and Lanner Falcon *Falco biarmicus* (Regionally Vulnerable). The 'Medium' classification is linked to Caspian Tern *Hydroprogne caspia* (Regionally Vulnerable), Ludwig's Bustard, Verreaux's Eagle and Black Stork.

Verreaux's Eagle, Tawny Eagle *Aquila rapax* (Regionally Endangered), Ludwig's Bustard, Blue Crane and Karoo Korhaan *Eupodotis vigorsii* (Regionally Near threatened) were recorded during the field survey. In addition, the Assessment Corridor contains breeding Martial Eagle *Polemaetus bellicosus* (Globally and Regionally Endangered) and habitat for Secretarybird *Sagittarius serpentarius* (Globally Endangered, Regionally Vulnerable). The specialist therefore recommended a general 'High Sensitivity' rating for the Assessment Corridor for avifauna.

Separate sensitivity layers were created for pylons and roads and overhead lines as the impact on avifauna for a) footprint impacts (loss of habitat), and b) impacts from overhead lines (mainly colissions) differs. Section 11 of the Avifauna specialist report provides a detailed explanation of how sensitivity ratings were determined. The 'Very High' (No-Go) and 'High Sensitivity' outputs include the following habitats / features:

- Very High Sensitivity (No-Go areas):
    - For Pylons and Roads:
        - Dams of 5 ha and bigger and irrigated pivots (of which, none occur in the Assessment Corridor) are important habitats. Dams are used by flocks of Blue Cranes to roost in, and they congregate in flocks on irrigated lands to forage. Irrigated lands are also important for Ludwig's Bustard, and a 500 m buffer has been added to reduce the risk of powerline collisions. This is not applicable to roads. An exception to the powerline exclusion zone is the dam situated at 31°48'16.44"S, 22°57'51.38"E. Routing the line around this dam would traverse sensitive Riverine Rabbit habitat that also falls within a Northern Cape CBA. In this instance, it would be preferable to route the line through the exclusion zone and mark the line with LED type bird flight diverters to ensure visibility of the line during low light conditions, should the dam at any given time be used as a roost site by Blue Cranes.
        - Verreaux's Eagle nests – 1 km buffer, except where nests are on existing powerlines.
        - Martial Eagle nests – 2.5 km, except where nests are on existing powerlines
    - Overhead lines:
        - Dams: as above.
        - Irrigated lands;

        - Verreaux's Eagle nests – 1 km buffer, except where nests are on existing powerlines
        - Martial Eagle nests – 2.5 km, except where nests are on existing powerlines High Sensitivity Areas:
- High Sensitivity areas:
    - Pylons and Roads:
        - The dam situated at 31°48'16.44"S, 22°57'51.38"E – 500m buffer
        - Verreaux's Eagle nests – 1 km buffer where nests are on existing powerlines
        - Martial Eagle nests – 2.5 km buffer where nests are on existing powerlines
    - Overhead lines:
        - The dam situated at 31°48'16.44"S, 22°57'51.38"E – 500m buffer
        - Verreaux's Eagle nests – 1 km buffer where nests are on existing powerlines
        - Martial Eagle nests – 2.5 km buffer where nests are on existing powerlines

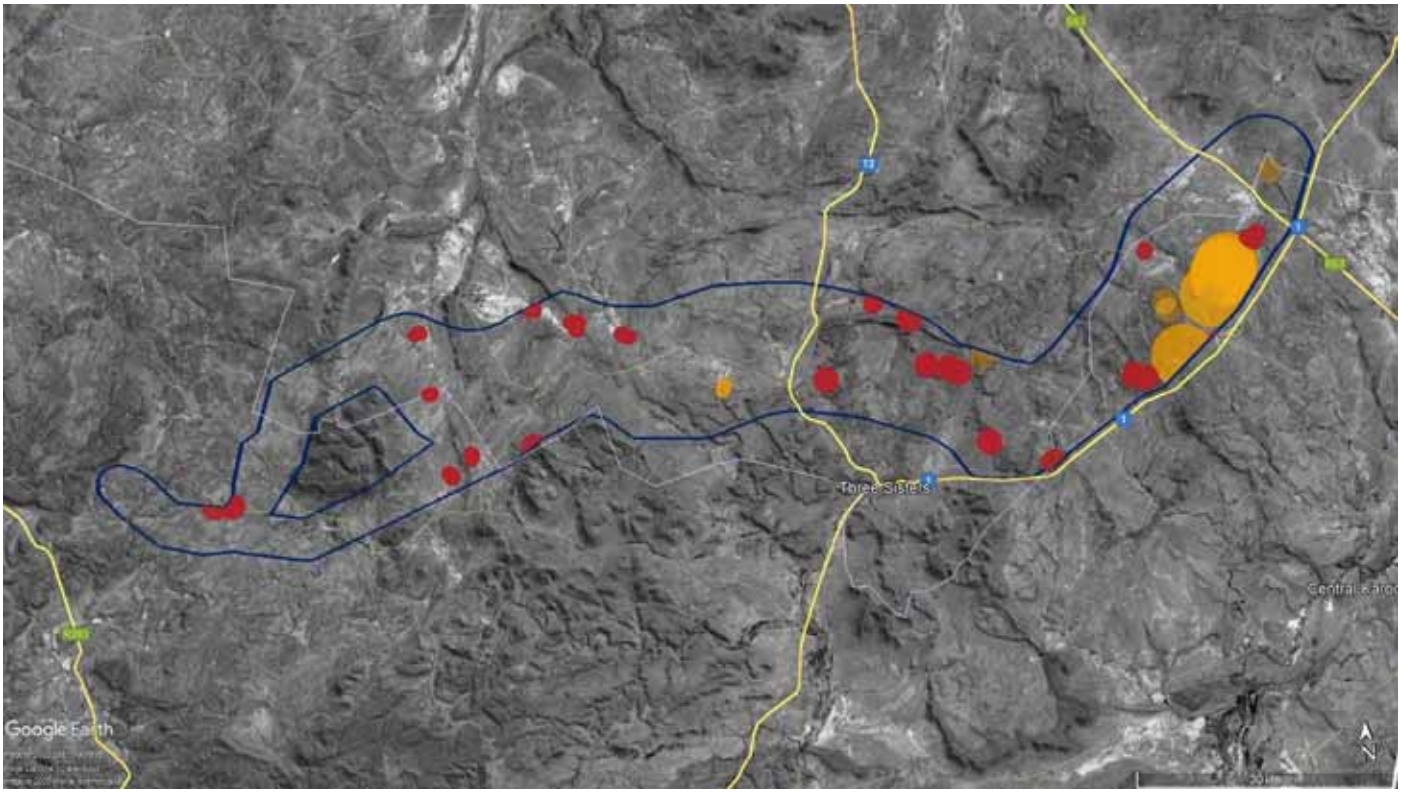


Figure 31: Composite Avifauna constraints map for physical infrastructure and roads and overhead lines in the Gamma Grid Assessment Corridor (red = No-Go areas, orange = High Sensitivity areas).

6.2.3 Aquatic Biodiversity Sensitivity

The DFFE's Screening Tool maps a large part of the Assessment Corridor as 'Low Sensitivity', with parts being 'Very High Sensitivity'. The latter corresponds with wide valley floor wetlands associated with the main channel of the larger rivers.

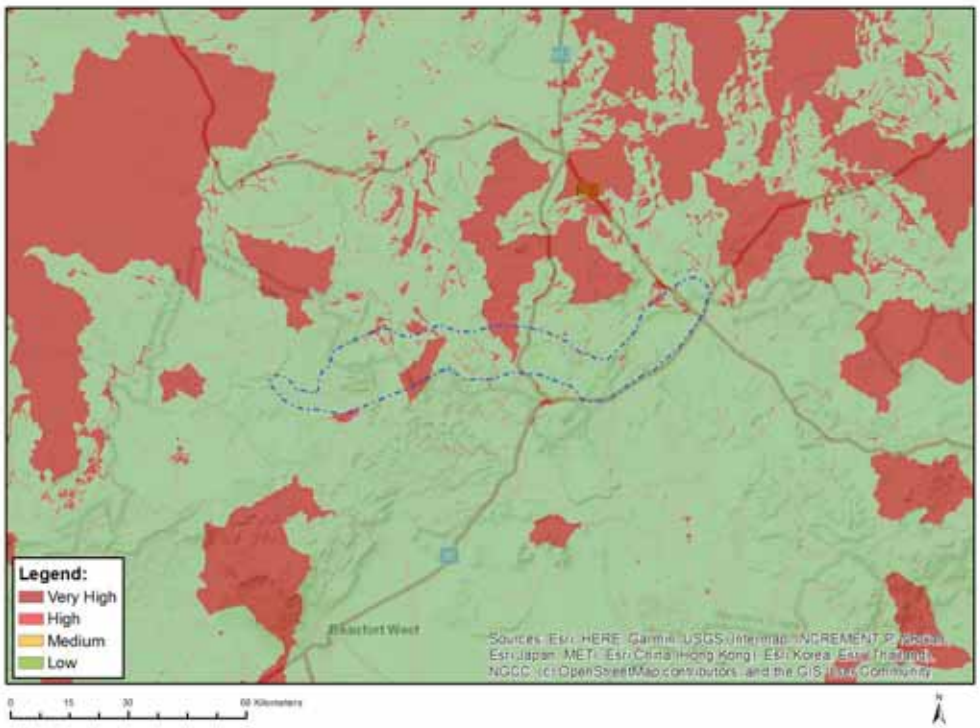


Figure 32: Map showing Screening Tool Aquatic Biodiversity Sensitivity Rating for the Gamma Grid Assessment Corridor.

The only FEPA River Sub catchments are the Wagenaarskraal Tributary of the Sout River and the Sout River itself, as well as the Upper Brak River. The downstream Brak River and its tributaries are mapped as an Upstream Catchment. The goal for River FEPAs is that they should not be allowed to degrade but should be retained in a near natural condition or rehabilitated. There are several instream wetland areas within the channel of the larger watercourses, particularly in the Sout River System, that have been mapped as FEPA Wetlands (Upper Nama Karoo Channelled and Unchanneled valley-bottom wetlands). The Skietkuilspruit, Tierhoekspruit and Krom tributaries of the Sout River are mapped as aquatic CBAs while the larger Sout River Catchment is mapped as a terrestrial CBA. All the other rivers are mapped as aquatic ESAs (Belcher, 2022).

The Aquatic specialist found that the larger watercourses throughout the Assessment Corridor are high sensitivity features, while the smaller tributaries/drainage features are medium sensitivity features. The 'High Sensitivity' rating is linked to the importance of these larger aquatic ecosystems in providing a diversity of habitats and being important refugia for biota as well as corridors for the movement within the landscape (Belcher, 2022).

A summary of the aquatic ecological condition, ecological importance and sensitivity and recommended ecological category as well as the sensitivity and associated buffers for the aquatic features, based on the field assessment, is provided in Table 20. The sensitivity to aquatic features is only relevant to the physical footprint of the development (i.e. pylons and roads), as the overhead line can traverse sensitive aquatic areas.

Table 20: Sensitivity Classification and Recommended Buffers (Belcher, 2022).

Aquatic feature	PES	EIS	REC	Sensitivity	Recommended Buffer
Large rivers	B/C	High	B/C	High	35 m around surrounding valley bottom and floodplain wetland buffer
Small tributaries and drainage lines	A/B	Moderate	A/B	Medium	35 m
Valley bottom wetlands	B	Moderate	B	Medium	35 m

The proposed development footprints must avoid the delineated aquatic features indicated to be of high aquatic sensitivity, and the placement of infrastructure in areas of medium sensitivity and the recommended buffer areas (35 m) must be limited as far as possible.

Plate 8: An existing track over a drainage line that has been washed away. High rainfall occurred just prior to the photograph being taken (i.e. July 2022). Access roads over drainage lines need careful placement and design.

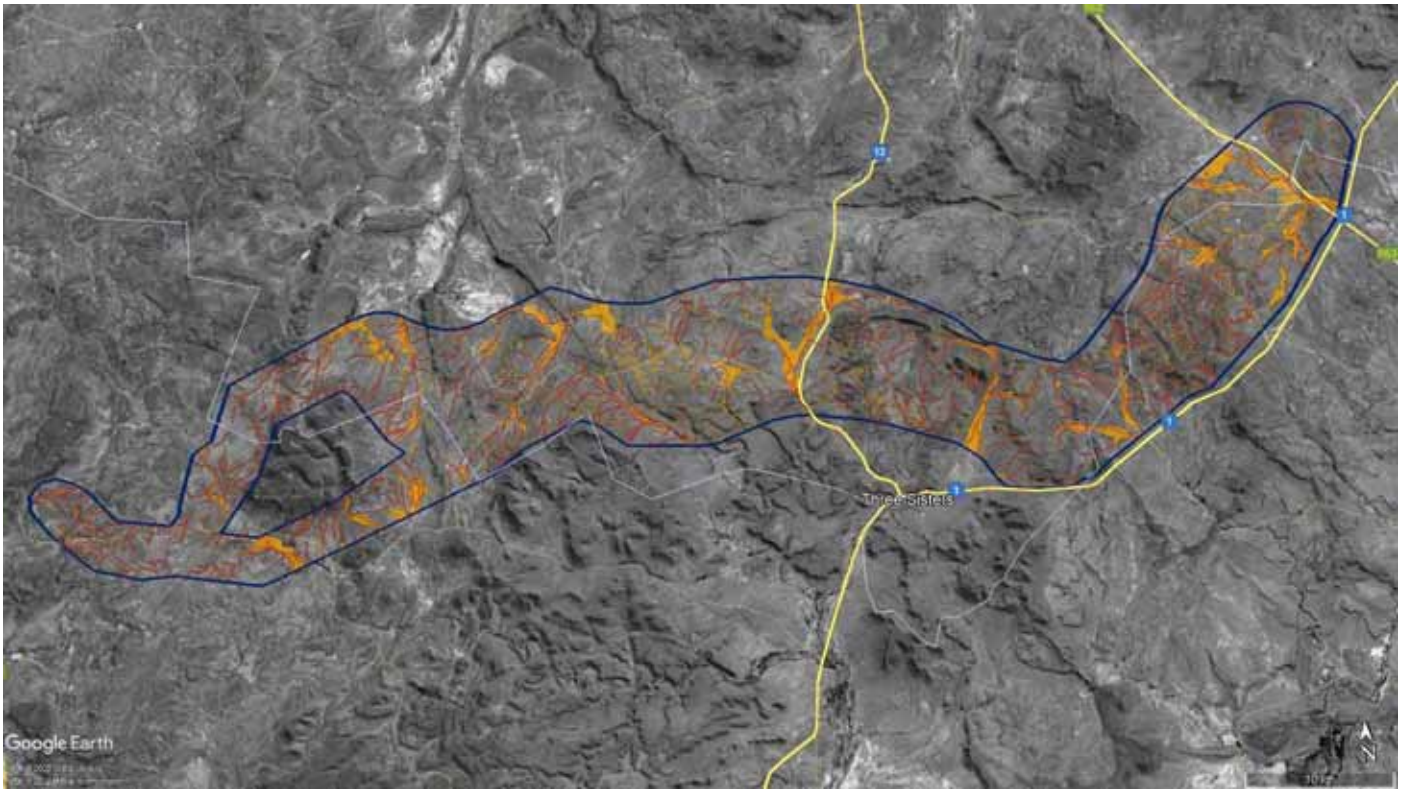


Figure 33: Aquatic Biodiversity constraints map for physical infrastructure and roads in the Gamma Grid Assessment Corridor (red = No-Go areas, orange = High Sensitivity areas).

6.2.4 Archaeology, Cultural/Heritage Sensitivity

The DFFE's Screening Tool classifies the sensitivity of the Archaeological/Cultural/Heritage theme for the Assessment Corridor as 'Low'.

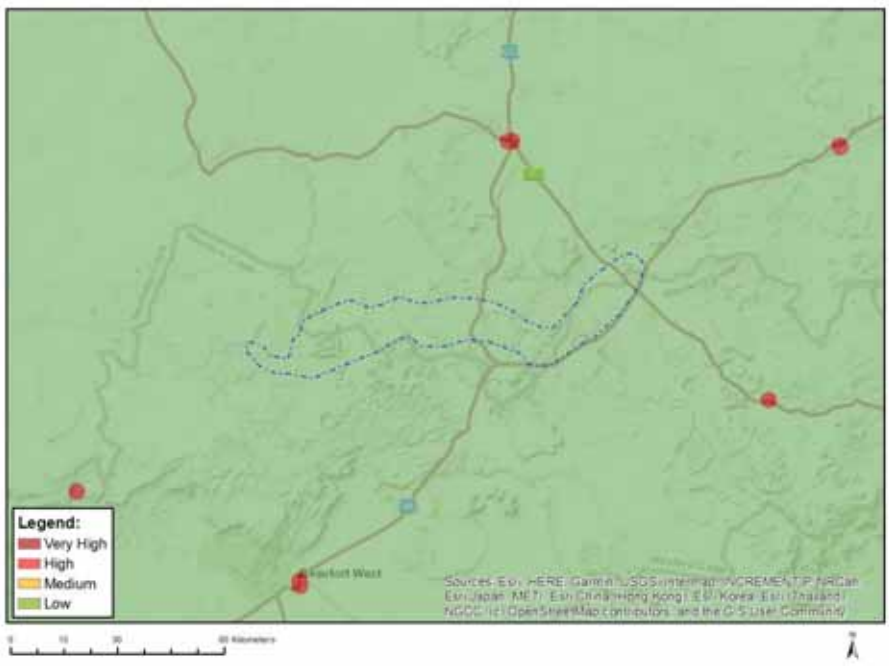


Figure 34: Map showing the Archaeology and Cultural/Heritage Sensitivity Rating for the Gamma Grid Assessment Corridor.

The specialist's survey showed that majority of the site is of low sensitivity, but several pockets of high sensitivity do occur. Many other smaller high and medium sensitivity sites are expected to occur throughout the area, but these are focused on dolerite outcrops and watercourses (Orton, 2022).

The heritage specialist report gives a statement on the significance of recorded archaeological/heritage sites, and a provisional grading of each is provided. Section 38(3)(b) of the NHRA requires an assessment of the significance of all heritage resources. In terms of Section 2(vi), ''cultural significance'' means aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. The reasons that a place may have cultural significance are outlined in Section 3(3) of the NHRA. The known and expected archaeological resources in the area are of variable cultural significance at the local level for their historical, scientific and social values. Many would be of 'very low' to 'low' significance and graded NCW or IIIC respectively for Western Cape, and GPC or GPB for Northern Cape. Others are, or are expected to be, of 'medium' to 'high' significance and can be graded IIIB or IIIA for Western Cape and GPA, IIIB or IIIA for Northern Cape. Graves are deemed to have 'high' cultural significance at the local level for their social value. Where present, they are allocated a grade of IIIA in both provinces. Built environment resources are expected to be largely confined to farm complexes and, based on those seen during the field study, are expected to have variable cultural significance from 'very low' to 'medium-high' for their architectural, historical and social values. In Western Cape they would likely vary from NCW to about IIIB. The one known exception is the Wagenaarskraal farmstead (in Northern Cape) which has 'high' local significance for historical reasons. The cultural landscape is largely a natural landscape with aesthetic value and is rated as having 'medium' cultural significance at the local level. It can be graded IIIB on the Western Cape system (Orton, 2022).

Heritage resources are generally quite widely dispersed on the flat, open plains in the Assessment Corridor, but more tightly clustered in valleys and along dolerite outcrops. Therefore, wide plains are preferred for development over tighter valleys and rocky areas. Because the spans will be in the region of 400 m, it is likely that physical impacts on the ground will be very limited. In some circumstances (e.g. where cultural significance is low) it may be acceptable for powerlines to span over archaeological sites but it will be important that access roads and pylons avoid them, preferably with a 30 m buffer. Farmsteads should be avoided by as far as possible to reduce contextual impacts to them and their enclosing cultural landscapes. Wagernaarskraal, with its long and regionally significant history, is especially important in this regard. From the point of view of the wider landscape there is very little that can be done to avoid impacts but their severity may be reduced by following the recommendations of the visual specialists. The major cultural landscape concerns for the area (i.e. the escarpment and Karoo National Park), are more than 17 km from the nearest edge of the Corridor and are therefore of no concern (Orton, 2022).

The specialist provided a list of 'heritage indicators' to guide the alignment of a heritage-sensitive gridline alignment within the Corridor. They will also guide the final placement of infrastructure and required mitigation after the pre-development walkthrough has been done. The indicators are:

- Indicator: Uncontrolled damage to fossils should be minimised as far as possible.
- Indicator: Buffers of at least 30 m should be maintained around archaeological sites as far as possible.
- Indicator: As an ideal, buffers of at least 200 m should be maintained around the most significant rock art sites (i.e. grade IIIA) as far as possible but lower significance sites should be buffered by at least 30 m.
- Indicator: Direct damage to archaeological sites should be avoided as far as possible and, where some damage to significant sites is unavoidable, scientific/historical data should be rescued.
- Indicator: Direct impacts to graves must be avoided completely with a 30 m buffer.
- Indicator: The laydown areas should be away from public view unless these are located in urban areas / small towns outside of the Corridor.
- Indicator: Farm complexes should be avoided by at least 200 m and isolated structures by 50 m (Orton, 2022).

The specialist's sensitivity mapping, which incorporates the spatial indicators listed above, is shown in Figure 35. Grade IIIA heritage sites and a 50 m buffer are 'No-Go' areas, Grade IIIB heritage sites with a 10 m buffer and/or GPA sites are 'High Sensitivity' areas.

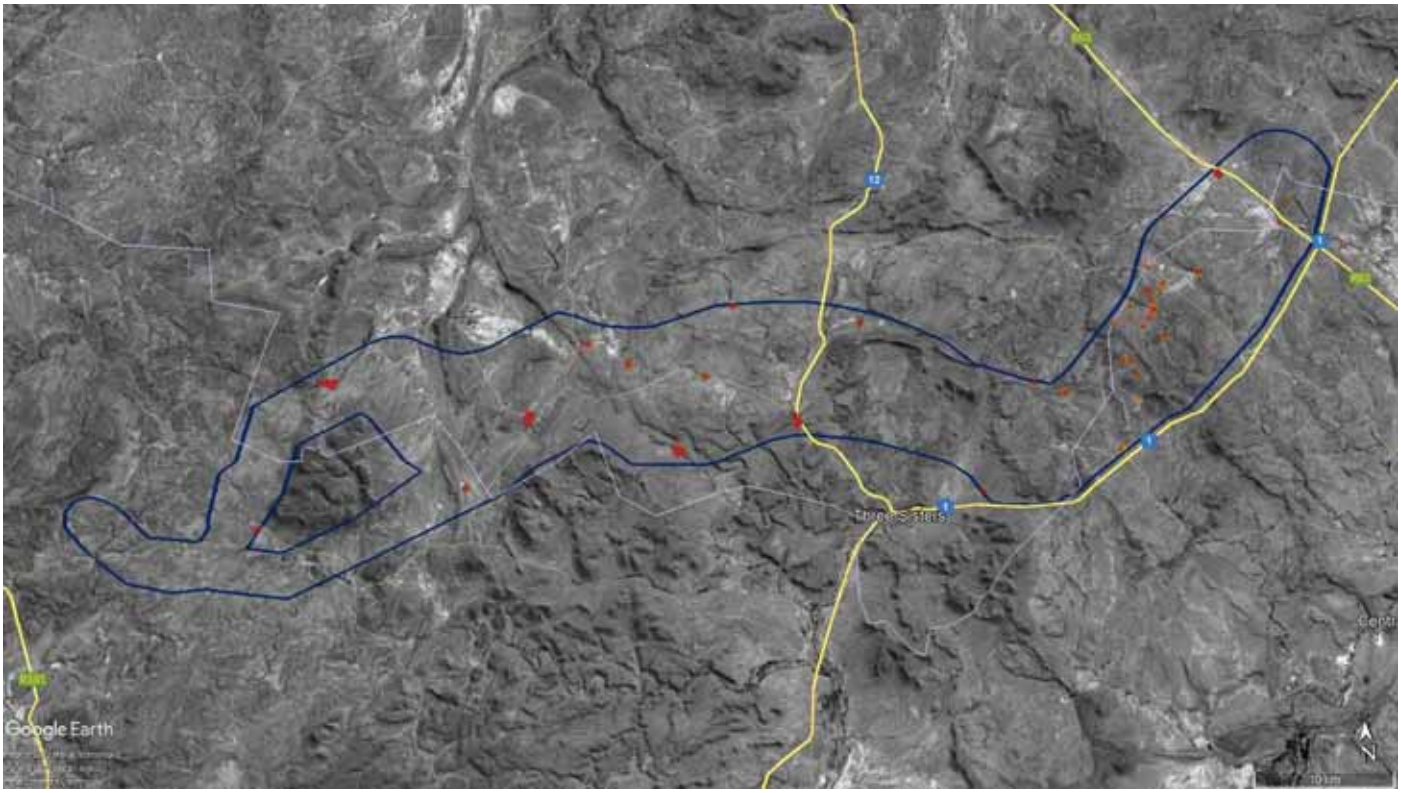


Figure 35: Heritage (archaeological) constraints map for physical infrastructure and roads in the Gamma Grid Assessment Corridor (red = No-Go areas, orange = High Sensitivity areas).

6.2.5 Palaeontology Sensitivity

The DFFE's Screening Tool Report identified a 'Very High' Sensitivity to the general Corridor area, with sections of 'Medium' and 'Low' sensitivity. 'Very High' sensitivity is assigned to the Lower Beaufort Group sediments, 'Medium' palaeosensitivity to substantial deposits of Late Caenozoic alluvium associated with major drainage lines, and 'Zero' palaeosensitivity to Karoo dolerite intrusions.

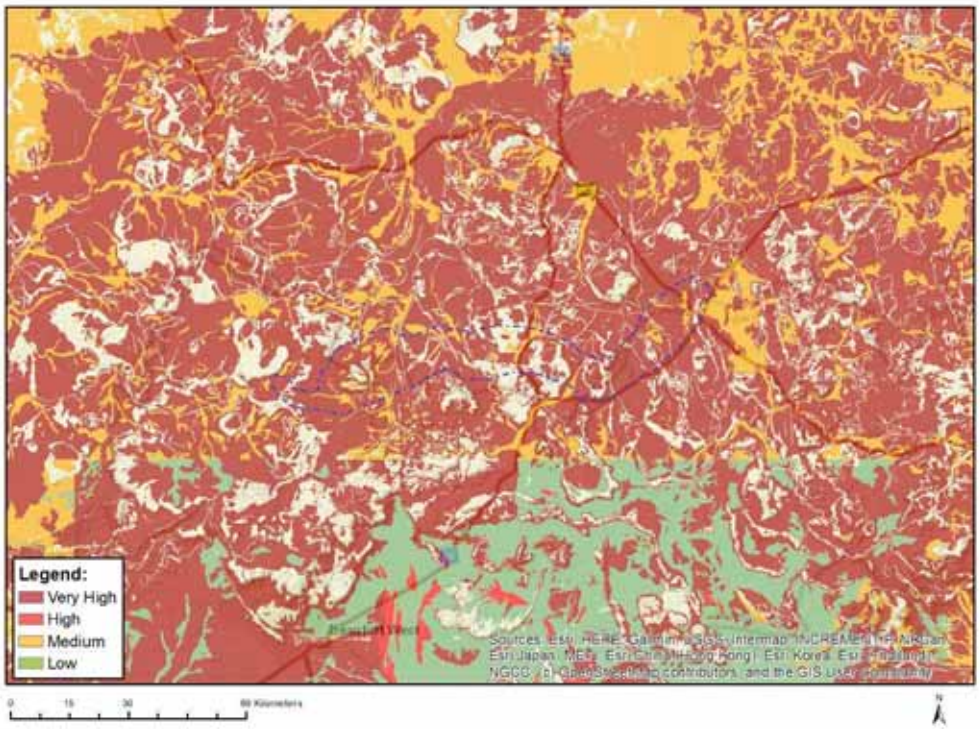


Figure 36: Map showing the Screening Tool Palaeontology Sensitivity Rating for the Gamma Grid Assessment Corridor.

The specialist's previous experience with RE projects in the region, as well as a recent paleontological heritage drive-through of the Gamma Grid Assessment Corridor indicate that, in practice, most of the area is of Low Palaeosensitivity. This is largely due to widespread cover by unfossiliferous superficial sediments and near surface weathering as well as dolerite intrusions. Good exposures of potentially fossiliferous, consolidated older alluvial deposits were not encountered during the drive-through, even along larger watercourses such as the Soutrivier. Fossil sites of significant scientific and conservation value are usually sparsely scattered, although occasional high concentrations of well-preserved vertebrate remains may be found in areas of good bedrock (especially mudrock) exposure (*cf* Nuweveld and Hoogland WEF project areas). Based on the recent site visit, such mudrock exposures are scarce within the Gamma Grid Corridor. Most, but not all of the previously recorded fossil sites of scientific importance within the Assessment Corridor outlined in Section 5.3 of the specialist report will have already been collected. The potential for further, *unrecorded* sites of high palaeosensitivity within the largely understudied project area remains significant, however; such fossil sites are generally highly localized, unpredictable and can only be recognized through paleontological fieldwork that is focused on specific areas. Based on available information and the recent survey, no areas of Very High paleontological sensitivity

are delineated in the Assessment Corridor. The slopes of Vaalkop on Farm Leeukloof 43 has previously been identified as a Very High Palaeosensitivity research area for the Hoedemaker Member within the Nuweveld East WEF project area (Almond 2020a), and this area is excluded from the Gamma Grid Assessment Corridor.

No palaeontological constraints are proposed by the specialist for final routing of the pre-negotiated gridline within the Corridor. A targeted pre-construction paleontological walk-down of potentially sensitive areas where infrastructure and roads are planned along the pre-negotiated gridline will be done at detailed design stage to finalise footprints and roads to avoid or mitigate fossiliferous areas along the pre-negotiated route, if these are encountered.

6.2.6 Agriculture Sensitivity

The DFFE's Screening Tool Report classifies the sensitivity of the Corridor as 'Medium', although the area is predominantly rated as 'low sensitivity' with some 'medium sensitive' areas. The sensitivity rating in the Report is based on the land capability rating and whether the land is used for cropland or not, and does not consider the sensitivity of the area to the land use (i.e. the gridline), which will be low because agriculture can continue beneath the powerline and the footprint on the ground is relatively small.

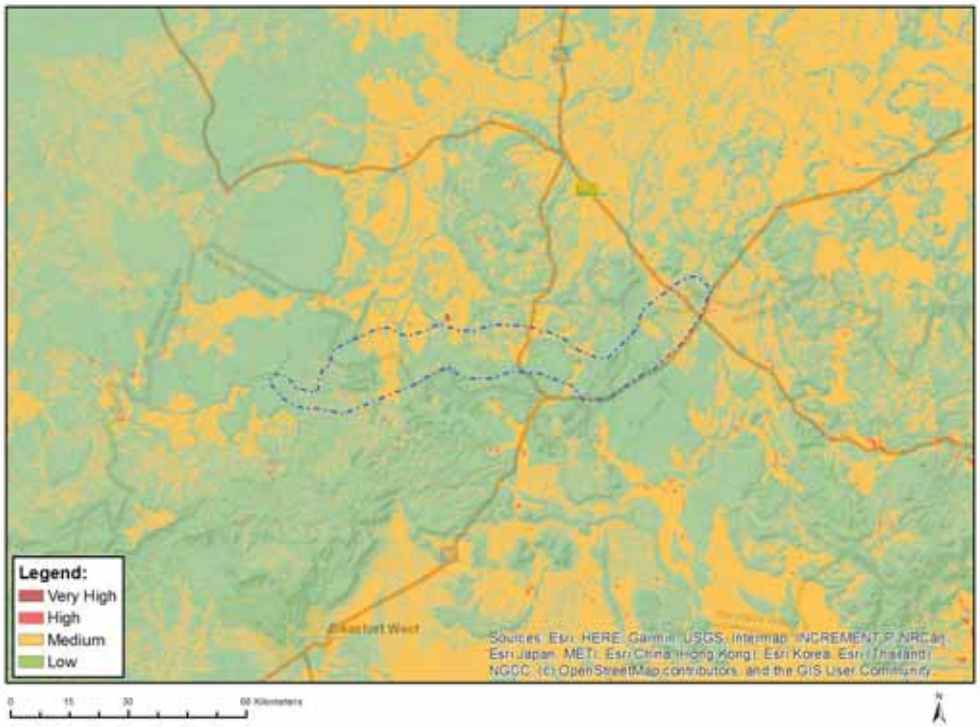


Figure 37: Map showing the Screening Tool Agriculture Sensitivity Rating for the Gamma Grid Assessment Corridor

According to the agricultural specialist, the difference in agricultural production potential between areas classified as low and medium sensitivity within the Assessment Corridor is insignificant, and are largely distinguished based on terrain. The low and medium sensitivity is predominantly because the arid climate constrains land capability (low rainfall of 175 to 240mm per annum). There are a few, small, isolated patches of high agricultural sensitivity within the corridor – i.e.

patches of cultivated lands, mostly along water courses and associated with farmsteads. Although cultivated lands in the Corridor fulfil the criteria of being classified as 'high sensitivity', agricultural production potential of cultivated lands beneath overhead lines is not at risk of being impacted. Cultivated lands within the Assessment Corridor have been demarcated and are classified as 'High' sensitivity areas to avoid in planning the position of infrastructure and roads (Lanz, 2022). Due to the scale of the Assessment Corridor in comparison to the limited areas of cultivated lands, the High Sensitivity areas are not visible when shown on an overview map of the full extent of the Corridor. As an example, Figure 38 shows cultivated lands on the eastern end of the Corridor near a homestead and along a watercourse. The Assessment Corridor area is therefore of low agricultural sensitivity and a Compliance Statement has been done by Lanz (2022).

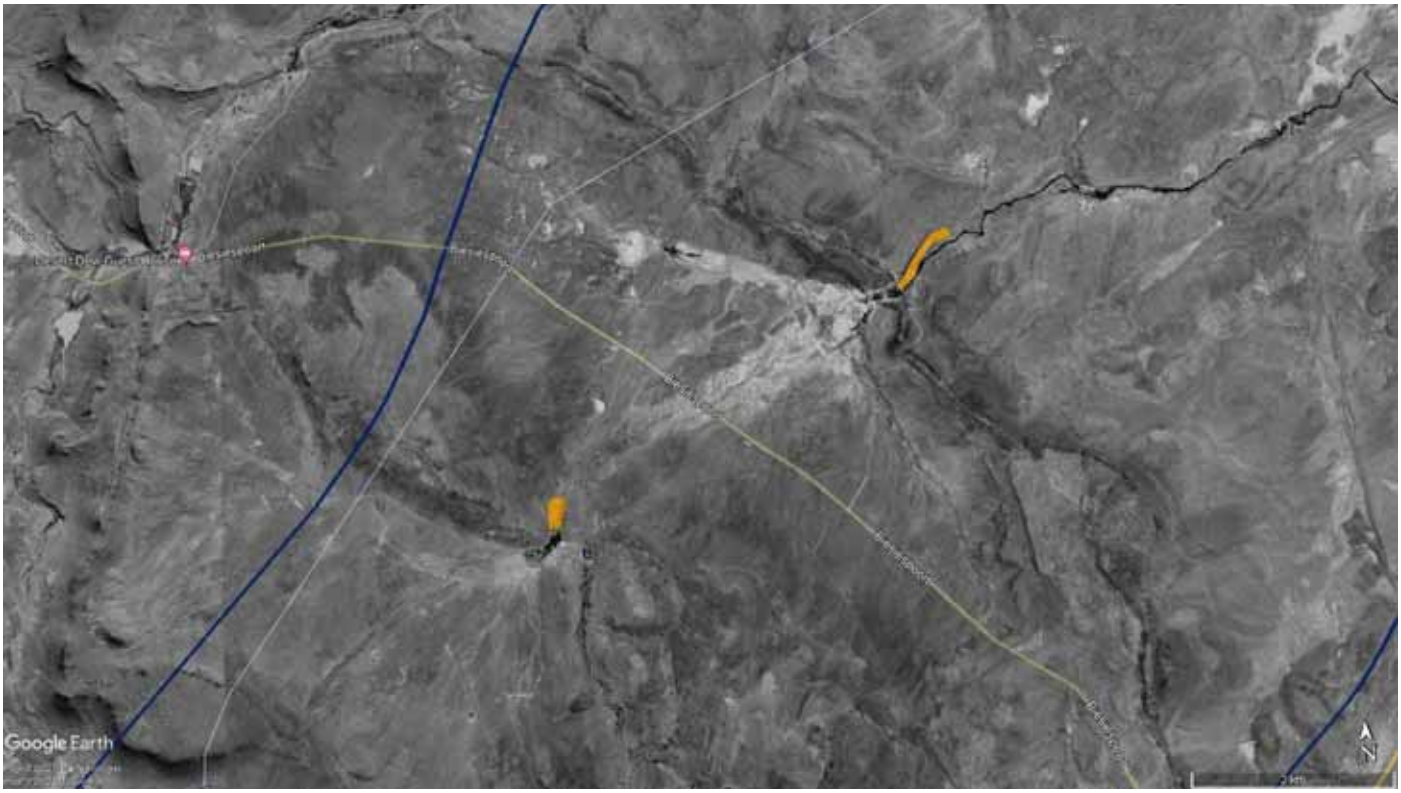


Figure 38: An example of two 'High Sensitivity' agricultural areas in the eastern end of the Gamma Grid Assessment Corridor.

6.2.7 Geotechnical Features

The Corridor has been broadly divided into 3 zones with similar geological and geotechnical characteristics – these are Karoo sandstones and mudstones, Karoo dolerite, and areas of thicker soil cover (generally within drainage channels) (see 'A', 'B' and 'C' in Figure 39).

6.2.7.1 Sandstones and Mudstones

Problems with slope stability may be experienced where sandstones and shales/mudrocks of the Karoo Supergroup are closely intercalated, as weathering of the fine-grained rocks may result in undercutting. Pore water pressure may develop at the interface between sand- and mud-/siltstones. Where sandstones are thickly bedded and highly jointed, joint-controlled block and wedge failures can potentially occur (Brink, 1983 *in* GEOSS, 2022). Karoo sandstone is often not desirable in construction (e.g. as an aggregate) as it may cause concrete to deteriorate over time (Brink, 1977 *in* GEOSS, 2022). The following has been observed when making use of Karoo sandstones in construction (after Brink, 1983 *in* GEOSS, 2022):

1. Deflection and shrinkage of reinforced members.
2. Corrosion of reinforcing steel.
3. Coincident cracking of concrete and reinforcement.
4. Surface crazing or pattern cracking.
5. Premature distress of roads constructed using aggregates derived from Karoo sandstones.

Therefore control of material properties is required when making use of Karoo sandstones in construction (GEOSS, 2022).

6.2.7.2 Dolerite

The end of the Karoo age was terminated by the intrusion of dolerite dykes and sills into the Karoo sedimentary rocks. During the late 1960s and early 1970s, several tests were undertaken to determine strength properties of dolerite rock. The general description of dolerite was as follows, bluish-grey, very hard to extremely hard rock, variably fine- and medium-grained, variably jointed and fractured, with calcite, chlorite and zeolite minerals present on the joint and fracture surfaces in varying amounts (Brink, 1983 *in* GEOSS, 2022). Of relevance to this assessment, dolerite rocks are considered to be erosion resistant (GEOSS, 2022).

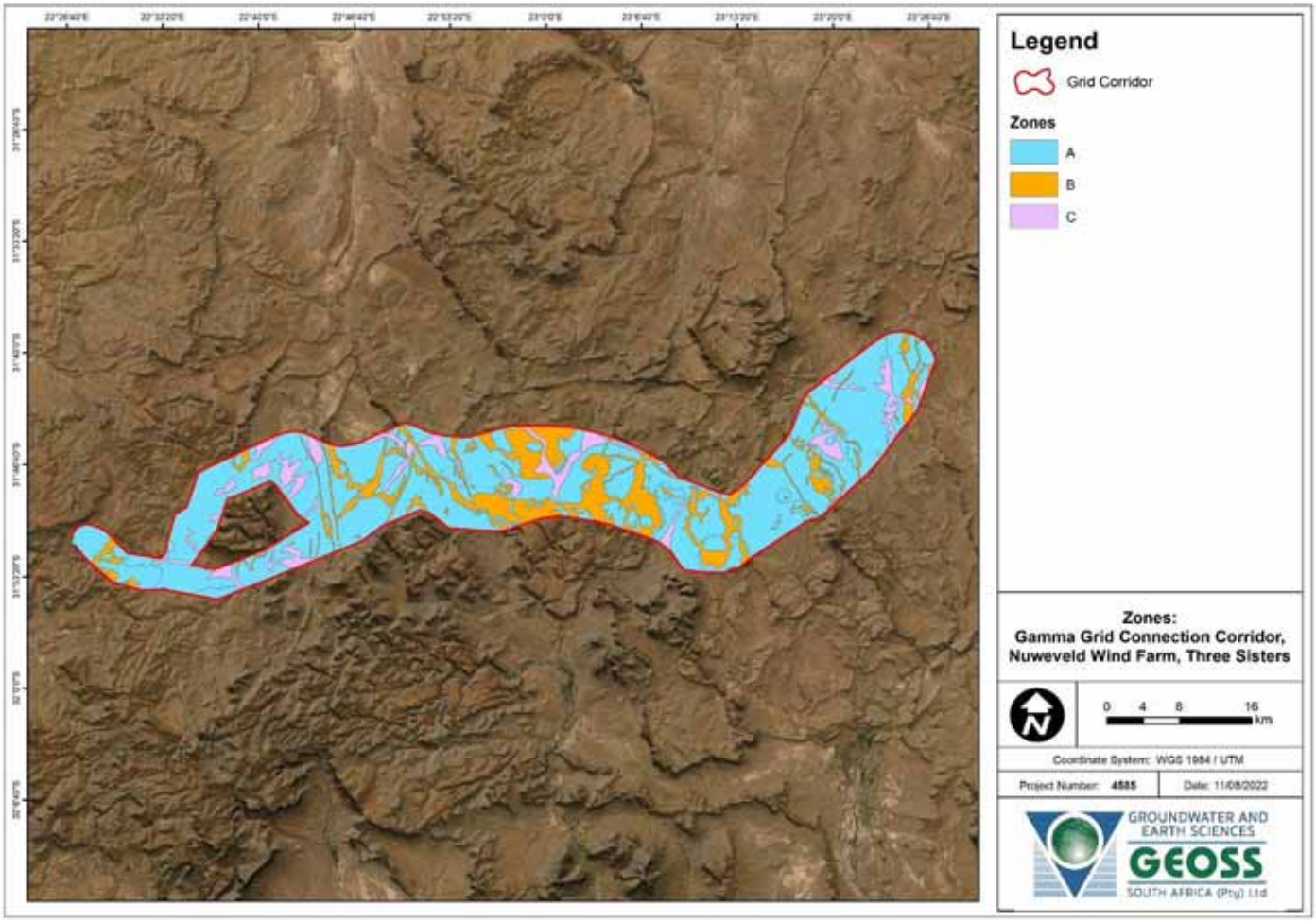


Figure 39: Geological zones within the Gamma Grid Assessment Corridor – A: Karoo sandstones and mudstones, B: Karoo dolerite, and C: areas of thicker soil cover (generally within drainage channels) (GEOSS, 2022).

The topography is generally undulating, and areas of strong relief are usually present where intrusive dolerite sills create a capping characterised by a landscape of mesas and buttes. Based on the slope classification, the majority of the region is classified as geotechnically "favourable" due to the generally flat nature of the site (see Figure 40). However there are areas where slopes are very steep which will be important to consider when planning the alignment of roads in particular.

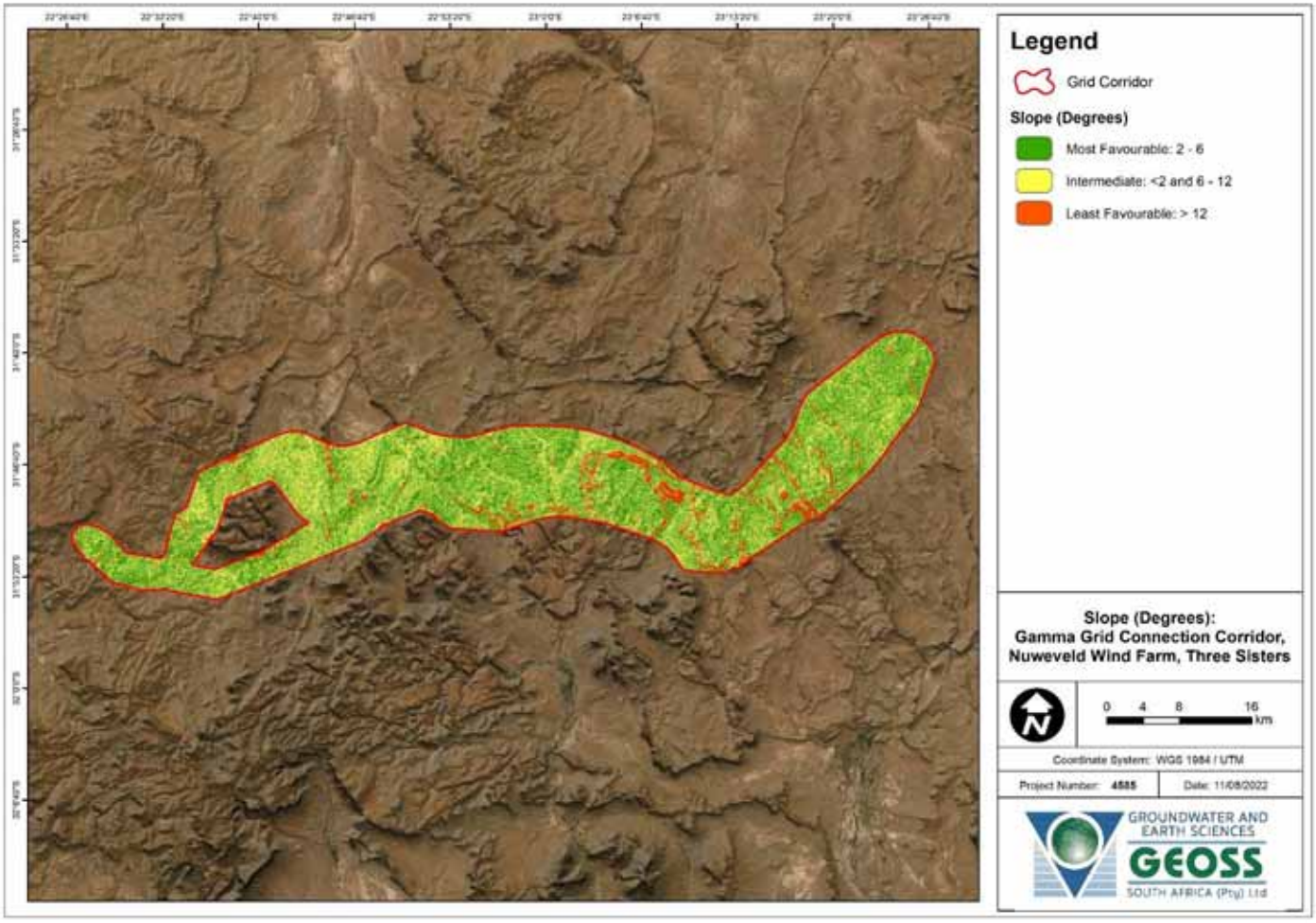


Figure 40: Slope classification of the Gamma Grid Assessment Corridor (based on Stiff* et. al*., 1996* in *GEOSS, 2022).

6.2.8 Visual Features

The DFFE's Screening Tool Report does not provide a sensitivity map for the Corridor, but indicates that a Landscape/Visual impact assessment is required. A VIA has been done, and includes project-scale visual sensitivity mapping. Scenic resources and sensitive receptors within the study area have been categorised into 'Very High' sensitivity (i.e. 'No-Go' areas), 'High' sensitivity, 'Medium' sensitivity and 'Low' visual sensitivity zones. Separate sensitivity layers were created for pylons and roads, and overhead lines.

Table 21: Visual Sensitivity Mapping Categories: 400kV Gamma Grid Corridor (pylon placement and access roads)

Scenic Resources	No-go areas	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Prominent topographic features, peaks, geological outcrops	Feature (150 m wide)	within 250 m	within 350 m	-
Linear topographic features, ridges	-	within 150 m	within 250 m	-
Steep slopes	Slopes > 1:4	Slopes > 1:6	Slopes > 1:10	-
Scenic water features >120ha	within 100 m	within 150 m	within 250 m	-
Linear water features	-	within 100 m	within 150 m	-
Cultural landscapes	within 150 m	within 250 m	within 350 m	-
Sensitive Receptors				
Guest farms	within 250 m	within 350 m	within 500 m	-
Settlements / towns	within 250 m	within 350 m	within 500 m	-
Farmsteads	within 250 m	within 350 m	within 500 m	-
National Routes	within 200 m	within 300 m	within 400 m	-
Scenic poorts / passes	within 250 m	within 350 m	within 500 m	-
Arterial route	within 150 m	within 250 m	within 350 m	-
Main district road	within 100 m	within 150 m	within 250 m	-
Passenger Rail Lines	within 150 m	within 250 m	within 350 m	-

Table 22: Visual Sensitivity Mapping Categories: 400kV Gamma Grid Corridor (overhead powerlines)

Scenic Resources	No-go areas	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Prominent topographic features, peaks, geological outcrops	Feature (150 m wide)	within 250 m	within 350 m	-
Linear topographic features, ridges	-	within 150 m	within 250 m	-
Steep slopes	-	Slopes > 1:2	Slopes > 1:4	-
Scenic water features >120 ha	within 100 m	within 150 m	within 250 m	-
Linear water features	-	within 100 m	within 150 m	-
Cultural landscapes	within 150 m	within 250 m	within 350 m	-
Sensitive Receptors				
Guest farms	within 250 m	within 350 m	within 500 m	-

Settlements / towns	within 250 m	within 350 m	within 500 m	-
Farmsteads	within 250 m	within 350 m	within 500 m	-
National Routes	-	within 300 m	within 400 m	-
Scenic poorts / passes	-	within 350 m	within 500 m	-
Arterial route	-	within 250 m	within 350 m	-
Main district road	-	within 150 m	within 250 m	-
Passenger Rail Lines	-	within 250 m	within 350 m	-

Figure 41: Composite Visual Sensitivity constraints map for pylons, new access roads and overhead lines in the Gamma Grid Assessment Corridor (red = No-Go areas, orange = High Sensitivity areas).

6.2.9 Traffic – Status of the existing road network

Schwarz (2022) did an assessment of the existing road network that would be used to access the project. In general, besides the Molteno Pass and the De Jager's Pass, no obvious problems were identified or associated with the transport of personnel or freight to the various zones of the Grid Corridor. However, as part of detailed design and preparation for construction, logistics contractors will need to confirm certain aspects such as clearances, bridge capacities etc., as this will depend on the actual vehicle configuration to be used. A summary of the status of the various roads is as follows:

- National Road (N1): The road is in good condition with a speed limit of 120 km/h
- National Road (N12): The road north of the Three Sisters is in good condition with a speed limit of 120 km/h

- Trunk Roads: The Trunk Roads in the area are very diverse, from first-world paved roads to third-world gravel roads. There is a noticeable difference in the condition of the roads in the Northern Cape and Western Cape, the roads in the Western Cape are generally of a better condition as they are better maintained
    - TR016: The road is in fair condition with a speed limit of 120 km/h
    - TR05801: According to the Western Cape Road Information System, the Functional Class of this road is Level 2, with an RCAM classification of R2b. The road is situated in a 20 m wide servitude, sections of the road are paved
    - The paved sections of the R381, consist of a single paved carriageway, with one lane in each direction and unpaved shoulders
- District Roads
    - Most of these roads consist of a gravel carriageway, approximately 7 m wide, within a 20 m wide servitude. As a result of the width, road users have to reduce speed when passing oncoming vehicles. Although most of these roads are suitable for off-road vehicles, the use of these roads by heavy vehicles will have to be accessed on a case-by-case base, as the conditions change seasonally.
    - The condition of these roads is not consistent and varies from very poor to satisfactory. However, several sections of these roads are very stony, which could result in mechanical damage to vehicles.
    - DR 02311: The road is situated in a 20 m wide servitude, consisting of an 8.5 m wide gravel road, and is approximately 58.5 km long. Sections of the road, through the De Jager's Pass, are extremely treacherous, with no barriers and steep drop-offs
- Minor roads: Minor roads in the area, have a functional classification of level 5 and are categorised as Local Access roads, providing direct access to properties. Most of these roads consist of a gravel carriageway, within a 20 m wide servitude (Schwarz, 2022).

6.2.10 Socio-Economic Sensitivity

The DFFE's Screening Tool Report does not include a 'socio-economic' theme, but identifies the need to do a Socio-Economic Impact Assessment. A SEIA has been done by Marchelle Terblanche of Index Consulting in accordance with Appendix 6 of the EIA Regulations.

Sensitive receptors from a social and socio-economic perspective include any existing infrastructure and land uses that could potentially be negatively impacted as a result of constructed activities (noise, dust, visual, traffic, etc.) or during the operational phase, which is in the case of an electricity grid, usually due to visual impacts and potential negative economic impacts (land devaluations, tourism. etc.). Agricultural land uses can generally continue unhindered once the grid is operational. The following features with social / socio-economic relevance have been identified in the Corridor:

Table 23: Land Uses and/or Sensitive Receptors in the Gamma Grid Assessment Corridor (Terblanche, 2022)

Land Uses / Sensitive receptors	Details	Number of sensitive receptors and their localities within the Corridor
Farmsteads / houses (with related infrastructure)	Scattered residences, farm infrastructure, including some cropping near farmsteads	10 – west of N12 5 – east of N12
Tourism / accommodation establishments	Holiday accommodation, guest farms on periphery of corridor	See details below
Infrastructure	N12 – traverse north to south	Centre
	R63 – traverse north to south-east	Eastern section
	Various gravel and smaller access roads	Various
	Railway line – traverse north to south	Eastern section
	9 Turbines (Nobelsfontein Wind Farm)	Eastern section
	2 Substations	East of R63

There are a few small and limited number tourism / accommodation establishments scattered in the project vicinity that experience their peak seasons during the winter hunting season and during school holiday periods. The establishments are also popular as overnight facilities for holiday-makers making their way to the coastal regions. Accommodation establishments and their distances to the Gamma Grid Assessment Corridor are indicated in Table 24.

Table 24: Holiday accommodation / tourism establishments[16]

Establishment	Locality / Distance from corridor	Number of guests / rooms	Type / Facility
Booiskraal Farm Stay	On periphery; West of corridor	8 guests	Guest farm, Self-catering
Desert Dew Guest House	Approximately 3 km north of corridor	29 guests	Guest house, self-catering / restaurant
GaMamadi Guest Farm	Approximately 0.3 km inside south-eastern section of corridor	12 guests	Guest farm with restaurant
Karoo Guest House	Approximately 0.5 km outside south-eastern section of Gamma corridor	Unknown	Guest house
Joalani Guest Farm	Approximately 0.5 km outside south-eastern section of Gamma corridor	18 guests	Guest farm, self-catering
Skietkuil Holiday Farm	Approximately 0.5 km outside eastern section of Gamma corridor. East of the N1 national road.	22 guests	Guest farm, self-catering / restaurant
Travalia Guest Farm	5 km south of Gamma corridor	25 rooms; 1 cottage	Guest farm, self-catering / restaurant
Three Sisters Guest Farm	7 km south of Gamma corridor	9 en-suite rooms	Guest farm, self-catering

[16] Additional accommodation establishments not identified at this stage will be updated once BA public participation has been done

Visual constraints mapping incorporates these features adequately and dedicated socio-economic constraints mapping is not considered necessary.

6.2.11 Civil Aviation and Defence Themes

The Screening Tool Report includes sensitivity ratings for 'Civil Aviation' and 'Defence' Themes. Both are assigned a Low sensitivity rating. No specialist studies are recommended to address impacts on these themes. There are no registered landing strips or defence bases in the Corridor. Registered aerodromes in the area surrounding the Assessment Corridor are the Victoria West Airfield, Karoo Gateway Airport, but these are between 30 and 60 km away from the Assessment Corridor. The gridline infrastructure would not be positioned in a high risk buffer area of the registered airfields. There are existing high voltage lines in the area, and the Corridor is planned in a Strategic Transmission Corridor. The EAP is therefore of the opinion that no further assessment of impacts of the powerline infrastructure on aviation or defence is necessary.

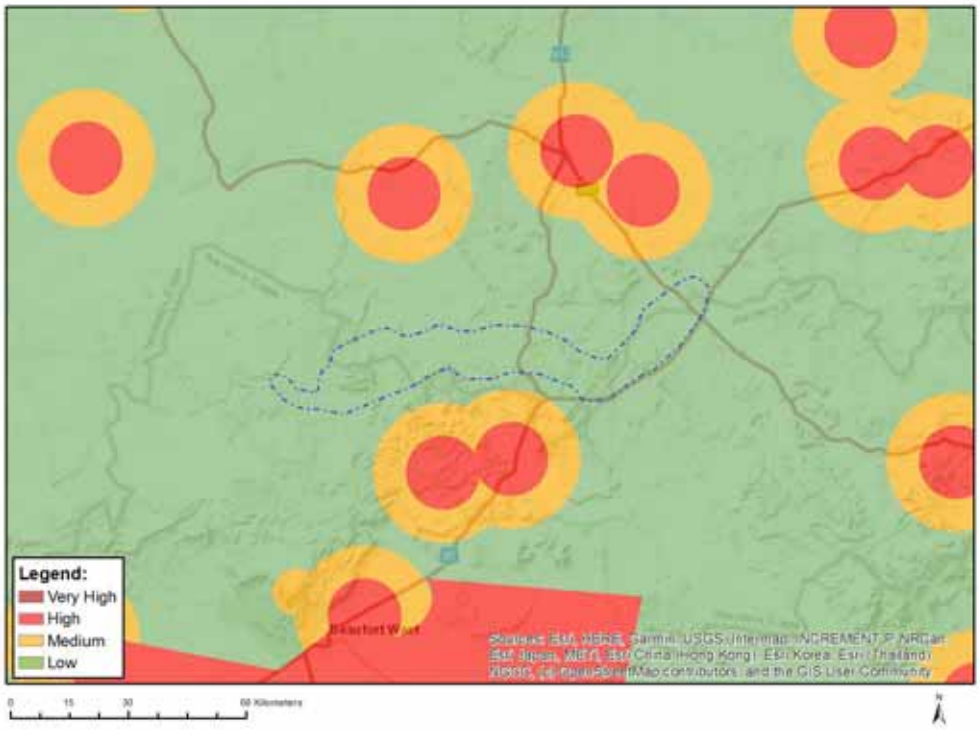


Figure 42: Map of Screening Tool Civil Aviation Theme Sensitivity (Source: DFFE Screening Tool Report).

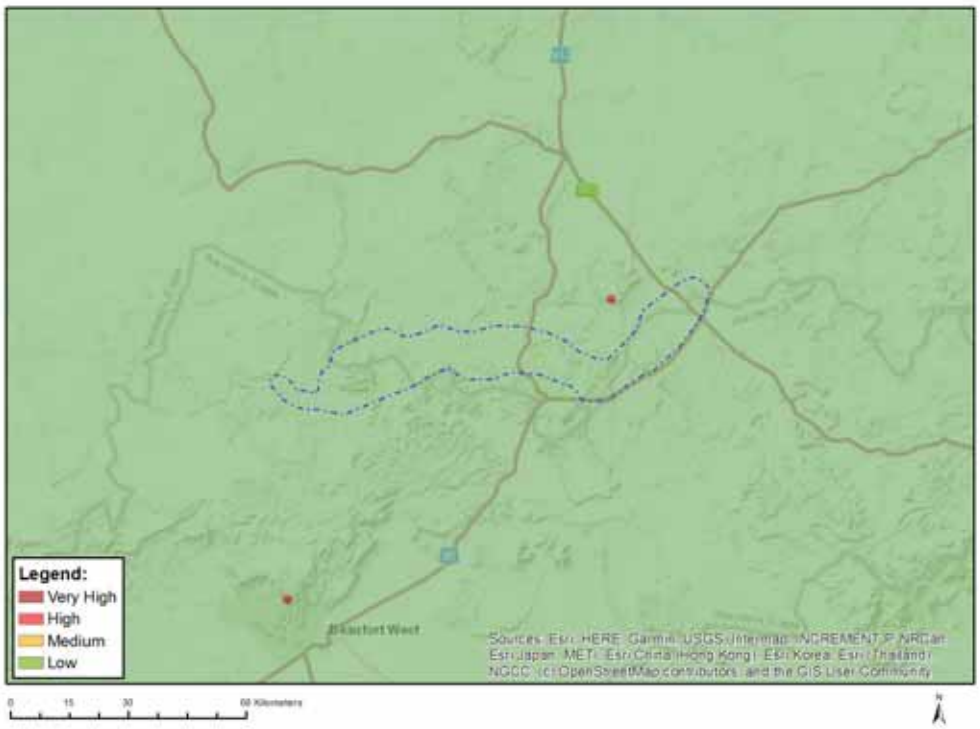


Figure 43: Map of Screening Tool Defence Theme Sensitivity (Source: DFFE Screening Tool Report).

The Draft BAR was sent to the Civil Aviation Authority and the Department of Defence for comment. An application has been submitted to the CAA in November 2022 (Hoogland Gamma Line CAA_2022_11_273).

6.2.12 RFI

The Karoo Central Astronomy Advantage Areas (KCAAA) were developed in terms of the Astronomy Geographic Advantage legislation (AGA Act of 2007). These regulations protect, preserve and properly maintain the KCAAAs in respect of radio frequency interference or interference in any other manner. The project is located outside of the eastern boundary the KCAAA, an area set aside for the purposes of radio Astronomy in 100 MHz to 2,170 MHz range and related scientific endeavours. The Gamma Grid is located outside the KCAAA, as such, the site is considered low sensitivity for RFI.

6.3 Impact Assessment

Impacts of the development have been assessed by each specialist using the impact assessment methodology outlined in Section 5.3 of this BA Report. The EAP reviewed the specialist assessments, and reports were updated where required. The EAP accepts the impacts that have been identified, and the significance rating assigned to each impact by specialists as presented in their final reports. A discussion on each impact is available in the various specialist reports.

The Generic EMPr for Overhead Transmission Lines includes a comprehensive set of mitigation measures which are not repeated under each impact in this Section. Mitigation measures listed here are only those identified by specialists that are in addition to the standard mitigation in the EMPr. Impacts of decommissioning are addressed where relevant, but these are highly unlikely because the grid infrastructure will be ceded to Eskom once construction is complete and will become part of the National Grid.

Eskom will be responsible for operational maintenance and this will be done in accordance with Eskom's Standard Operating Procedures, and Maintenance Management Plans (if applicable). Where specialists have provided specific mitigation for operational phase impacts, these are included in Section 7 of this BA Report as a 'condition of approval'.

6.3.1 Terrestrial Ecology Impacts

The following impacts on terrestrial biodiversity, the Karoo Dwarf Tortoise, and the Riverine Rabbit have been assessed by Simon Todd of 3Foxes Biodiversity Solutions. A Compliance Statement has been done for Plant Species, and the impact on plant SCCs is deemed to be insignificant.

6.3.1.1 Construction Phase

Table 25: Construction Phase Impacts on Critical Biodiversity Areas and Ecological Process Areas

Project phase	Construction			
Impact	Construction phase impact on CBAs, ESAs and ecological processes within the site.			
Description of impact	Impacts on Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and general ecological processes within the site			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Minimise the development footprint as far as possible. • Locate temporary-use areas such as construction camps and lay-down areas in low sensitivity or previously disturbed areas. • Avoid mapped No-Go areas in the placement of pylons and access tracks. • Minimise the development footprint in areas mapped as high sensitivity (i.e. near watercourses and other ecologically significant features). • Clearly demarcate riparian areas near to the development footprint as No-Go areas with appropriate signage and barriers. • Appropriate design of roads and other infrastructure to minimise faunal impacts and allow fauna to pass over, through or underneath these features as appropriate. • Monitoring of construction activities to ensure that the development footprint within CBAs is restricted to the authorised development footprint.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level

Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Medium - negative**		**Low - negative**	
Comment on significance	The footprint within areas of mapped high and very high sensitivity habitat would be low and with mitigation it is likely that negative impacts on important biodiversity features can be reduced to a low level.			

Table 26: Construction Phase Impacts on NPAES Focus Areas

Project phase	Construction			
Impact	Construction phase impact NPAES Focus Areas			
Description of impact	Impacts on NPAES Focus Areas and the ability to meet conservation targets			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Existing roads through the NPAES areas should be used as far as possible. • Locate temporary-use areas such as construction camps and lay-down areas in low sensitivity or previously disturbed areas. • Avoid mapped Very High sensitivity areas in the placement of pylons and access tracks. • Minimise the development footprint in areas mapped as high sensitivity (i.e. near watercourses and other ecologically significant features).			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered

Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Medium - negative**		**Very Low - negative**	
Comment on significance	The footprint within NPAES Focus Areas is less than 30ha and considered acceptable as it will not significantly impact the availability of habitat for inclusion in future conservation areas.			

Table 27: Construction Phase Impacts on the Riverine Rabbit

Project phase	Construction			
Impact	Construction phase impacts on the Riverine Rabbit			
Description of impact	Habitat loss, vehicle collisions, and disturbance			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Avoid mapped 'No-Go' areas in the placement of pylons and access roads. • Where any new roads or overhead lines (and associated pylon placement) traverse areas mapped as High Riverine Rabbit habitat sensitivity, infrastructure and roads within the route should be micro-sited by a suitably qualified ecological specialist before construction commences to ensure any impacts are minimised. Existing tracks through these areas should be used where possible. • Clearly demarcate riparian areas near the development footprint as 'No-Go' areas, with appropriate signage and barriers. • All vehicles should adhere to a low speed limit on site. Heavy vehicles must be restricted to 30 km/h and light vehicles to 40 km/h. • Driving between sunset and sunrise should be minimised as this is when Riverine Rabbits are most active, and the collision risk is highest. • Should rabbits be killed by traffic, then the traffic management to and from the site should be reviewed in collaboration with the EWT Drylands Programme to identify additional mitigation and avoidance that needs to be implemented to further reduce roadkill. • No dogs should be allowed on site and precautions to ensure there is no poaching or other direct faunal disturbance on site must be implemented.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium	Impact will last between 5 and 10 years	Short term	Impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/or social functions and/or processes	Moderate	Natural and/or social functions and/or processes are

		are moderately altered		moderately altered.
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere, and could therefore occur.
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is irreparably damaged but is represented elsewhere
Significance	**Medium Negative**		**Low Negative**	
Comment on significance	The development would contribute to the cumulative impact on Riverine Rabbits, especially due to vehicle collisions, but this would be transient and the overall contribution to the cumulative impact would be low.			

Table 28: Construction Phase Impacts on the Karoo Dwarf Tortoise

Project phase	Construction			
Impact	Construction phase impacts on the Karoo Dwarf Tortoise			
Description of impact	Habitat loss, vehicle collisions, and disturbance			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Limit the placement of pylons and access tracks in areas classified as High SEI for the Karroo Dwarf Tortoise, as far as possible. • All vehicles should adhere to a low speed limit on site. Heavy vehicles must be restricted to 30 km/h and light vehicles to 40 km/h. • Construction staff should remain within the construction footprint and on designated access tracks, and must not wonder into the veld. • No fauna, including tortoises, should be disturbed or removed from the veld. • No holes or trenches should be left open for extend periods as tortoises may fall in and become trapped. Trenches should have soil ramps that allow tortoises and other small fauna to escape. Holes should also be checked regularly for tortoises and other animals that may have fallen in. • A 'Search-and-Rescue' must be done before construction in areas of high quality (sensitivity) Karroo Dwarf Tortoise habitat as identified and mapped during a pre-construction walkthrough of the gridline.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Medium	Impact will last between 5 and 10 years	Short term	Impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/or social functions and/or processes are moderately altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere, and could therefore occur.

Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The environment will only recover from the impact with significant intervention	High	The affected environment will be able to recover from the impact
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is irreparably damaged but is represented elsewhere
Significance	**Medium Negative**		**Low Negative**	
Comment on significance	The footprint of the development within areas of suitable habitat for the Karoo Dwarf Tortoise would be low, and with mitigation it is likely that the identified negative impacts can be reduced to a low level.			

6.3.1.2 Operational Phase

Table 29: Operational Phase Impacts on CBAs and Ecological Processes

Project phase	**Operation**			
Impact	Operational phase impact on CBAs and ESAs			
Description of impact	Impacts on Critical Biodiversity Areas (CBAs), Ecological Support Areas (ESAs) and general ecological processes within the site			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• All service vehicles on site should adhere to a low speed limit on site. Heavy vehicles should be restricted to 30km/h and light vehicles to 40km/h. • Service staff should remain within the power line footprint areas and access routes and should not be allowed to wander into the veld. • No fauna including tortoises should be disturbed or removed from the veld. • A log should be kept detailing and fauna-related incidences or mortalities that occur on site, including roadkill, electrocutions etc. These should be reviewed annually by the Environmental Officer and used to inform operational management and mitigation measures.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant	Medium	The affected environment will only recover from the impact with significant intervention

		intervention		
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Low - negative**		**Low - negative**	
Comment on significance	The power line would require maintenance activities which would generate some disturbance within the areas of CBA. However, this would be occasional and the overall impacts associated with the operation of the power line would be very low.			

Table 30: Operational Phase Impacts on the Riverine Rabbit

Project phase	Operation			
Impact	Operation phase impacts on the Riverine Rabbit			
Description of impact	Possible operational phase impacts to the Riverine Rabbit from maintenance vehicles (vehicle collisions and noise disturbance).			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Night driving along the gridline access road must be limited as far as possible. • All vehicles travelling along the gridline access road must adhere to a maximum speed limit of 40 km/h. • No additional disturbances must take place in the riparian areas • Any erosion problems along the gridline access road must be remedied at least annually.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Ongoing	Impact will last 15 and 20 years	Ongoing	Impact will last 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/or social functions and/or processes are somewhat altered	Low	Natural and/or social functions and/or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur.	Unlikely	Has not yet happened, but could happen, once in the lifetime of the project therefore there is a possibility that the impact may occur.
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is irreparably damaged but is represented elsewhere	Medium	The resource is irreparably damaged but is represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Operational phase impacts on the Riverine Rabbit are likely to be low, as activities would be occasional and of low intensity.			

Table 31: Operational Phase Impacts on the Karoo Dwarf Tortoise

Project phase	Operation	
Impact	Operation phase impacts on the Karoo Dwarf Tortoise	
Description of impact	Possible operational phase impacts to the Karoo Dwarf Tortoise from maintenance vehicles (collisions and disturbance), and predation by crows especially when breeding. Crows use pylons for nesting, and will likely increase in density in the area with more pylons; hence an increased predation impact on the tortoise.	
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts
Potential mitigation	• Pylons positioned within or near (<1 km) areas mapped as Karoo Dwarf Tortoise habitat must be designed to discourage the use of the pylons by crows.	

	• Conduct annual surveys along the power line to census crow nesting sites and log tortoise carcases observed along the power line and especially under crows' nests if present. • Crow nests identified during annual surveys and located within 1 km of suitable Karoo Dwarf Tortoise habitat must be removed. • Apply additional mitigation in consultation with a terrestrial ecologist to prevent roadkill mortalities and/or to discourage predation by crows if monitoring shows these aspects are causing persistent impacts on the species.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Ongoing	Impact will last 15 and 20 years	Ongoing	Impact will last 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/or social functions and/or processes are moderately altered	Low	Natural and/or social functions and/or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Unlikely	Has not yet happened, but could happen, once in the lifetime of the project therefore there is a possibility that the impact may occur.
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Medium	The resource is irreparably damaged but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Medium Negative**		**Low Negative**	
Comment on significance	Operational phase impacts on the Karoo Dwarf Tortoise would be low, as activities would be occasional and of low intensity, and crow activity can be discouraged.			

6.3.1.3 Decommissioning

Table 32: Decommissioning Phase Impacts on the Riverine Rabbit

Project phase	Decommissioning	
Impact	Decommissioning phase impacts on the Riverine Rabbit	
Description of impact	Impacts on the Riverine Rabbit due to decommissioning activities e.g. disturbance, vehicle collisions and habitat loss.	
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts
Potential mitigation	• All vehicles should adhere to a low speed limit on site. Heavy vehicles must be restricted to 30 km/h and light vehicles to 40 km/h. • During decommissioning, driving between sunset and sunrise should be minimised as this is when Riverine Rabbits are most active, and the collision risk is highest. • Ensure riparian areas near the development footprint are clearly demarcated as No-Go areas with appropriate signage and barriers.	

	• Should rabbits be killed by traffic, then the traffic management to and from the site should be reviewed in collaboration with the EWT Drylands Programme to identify additional mitigation and avoidance that needs to be implemented to further reduce roadkill. • No dogs should be allowed on site and precautions to ensure there is no poaching or other direct faunal disturbance on site must be implemented. • Where any roads or overhead lines traverse areas mapped as High Riverine Rabbit Sensitivity habitat, any remaining open and disturbed areas after decommissioning should be rehabilitated with local plant species appropriate for the affected habitat.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/or social functions and/or processes are moderately altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere, and could therefore occur.
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The environment will only recover from the impact with significant intervention	Medium	The environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is irreparably damaged but is represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Decommissioning phase impacts would be low after mitigation as the duration would be low, and the intensity of the activity is likely to be relatively low and dispersed along the extent of the gridline.			

Table 33: Decommissioning Phase Impacts on the Karoo Dwarf Tortoise

Project phase	Decommissioning	
Impact	Decommissioning phase impacts on the Karoo Dwarf Tortoise	
Description of impact	Impacts on the Karoo Dwarf Tortoise due to decommissioning activities e.g. disturbance and collisions.	
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts
Potential mitigation	• Limit the placement of pylons and access tracks in areas classified as High SEI for the Karroo Dwarf Tortoise, as far as possible. • All vehicles should adhere to a low speed limit on site. Heavy vehicles must be restricted to 30 km/h and light vehicles to 40 km/h. • Decommissioning staff should remain within the construction footprint and on designated access tracks, and must not wonder into the veld. • No fauna, including tortoises, should be disturbed or removed from the veld. • No holes or trenches should be left open for extend periods as tortoises may fall in and become trapped.	

	Trenches should have soil ramps that allow tortoises and other small fauna to escape. Holes should also be checked regularly for tortoises and other animals that may have fallen in. • No litter or other material from the power line or decommissioning activity should be left lying around as tortoises and other fauna may become trapped in fibres, plastic and other waste material.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/or social functions and/or processes are moderately altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere, and could therefore occur.
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The environment will only recover from the impact with significant intervention	Medium	The environment will only recover from the impact with significant intervention
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	Medium	The resource is irreparably damaged but is represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Decommissioning phase impacts would be low after mitigation as the duration would be low, and the intensity of the activity is likely to be relatively low and dispersed along the extent of the gridline.			

6.3.1.4 Cumulative Impacts

Table 34: Cumulative Impacts on Broad-Scale Ecological Processes

Project phase	Operation	
Impact	Cumulative impact on broad-scale ecological processes	
Description of impact	Cumulative habitat loss and impact on broad-scale ecological processes	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts
Potential mitigation	• Avoid mapped No-Go areas in the placement of pylons and access tracks. • Minimise the development footprint in areas mapped as high sensitivity (i.e. near watercourses and other ecologically significant features). • Clearly demarcate riparian areas near to the development footprint as No-Go areas with appropriate signage and barriers.	

Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Low - negative		Low - negative	
Comment on significance	The long-term contribution of the Gamma grid to cumulative impact on ecological processes would be low. Much of the line is already in close proximity to existing roads and power lines and the dispersed nature of the footprint would result in low impacts on ecological processes.			

Table 35: Cumulative impacts on the Riverine Rabbit

Project phase	Operation			
Impact	Cumulative Impacts on the Riverine Rabbit			
Description of impact	Cumulative impacts on the Riverine Rabbit as a result of habitat loss, disturbance and increased vehicle-related mortality.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Avoidance of areas of mapped optimal Riverine Rabbit during construction and maintenance activities. • Adherence to the speed limits of 40km/h for light vehicles and 30km/h for heavy vehicles when off of public roads. • Erosion and alien vegetation management along the power line, with annual surveys and annual implementation of clearing and erosion remediation.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered

Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Low - negative		Low - negative	
Comment on significance	The contribution of the current project to cumulative impacts on the Riverine Rabbit is likely to be low as the footprint in areas of favourable habitat would be minimal and long-term disturbance associated with the operation of the power line would be low.			

Table 36: Cumulative impacts on the Karoo Dwarf Tortoise

Project phase	Operation			
Impact	Cumulative impacts on the Karoo Dwarf Tortoise as a result of the gridline development.			
Description of impact	Cumulative impacts as a result of habitat loss, disturbance, increased predation and poaching.			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Rehabilitation of disturbed areas • Annual monitoring and management of erosion and alien vegetation along the powerline			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long	Impact will last between 10 and 15 years	Long	Impact will last between 10 and 15 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Moderate	Natural and/or social functions and/or processes are moderately altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere, and could therefore occur.
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The environment will only recover from the impact with significant intervention	Medium	The environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is irreparably damaged but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	**Low Negative**		**Low Negative**	

Comment on significance	The long-term contribution of the Gamma Grid to the impact on the Karroo Dwarf Tortoise would be low. If High SEI habitats are avoided, much of the gridline will be outside of tortoise's habitat. Sections of the line are planned in close proximity to existing lines.

6.3.1.5 No-Go Alternative

Assuming that the project does not go ahead, the grid would not be built and the current land use would continue into the future. The area is currently used for extensive livestock and/or game farming which are considered to be largely compatible with long-term biodiversity maintenance. Many fauna species are to some degree negatively affected by farming including many predators which are targeted due to their negative impact on livestock, while some species may also be vulnerable to habitat loss or degradation and may experience depressed populations within the farming landscape. In terms of vegetation and plant species, extensive grazing may result in changes in composition towards less palatable species and a reduction in plant cover. It is however important to recognise that the development does not represent an alternative to extensive livestock farming, but rather an additional impact independent of the current land use. Overall, the no-go alternative is considered to result in a low negative impact on terrestrial biodiversity.

6.3.1.6 Conclusions and Recommendations

The Gamma 400kV Gridline Corridor is mapped as falling primarily within the Eastern Upper Karoo vegetation type with a lesser extent of Upper Karoo Hardeveld and Southern Karoo Riviere. All of these vegetation types have only been impacted to a limited extent by transformation, and are classified as Least Threatened. In terms of fauna, there are several listed mammals which occur in the area and which would potentially be impacted by the development. This includes the Riverine Rabbit, Black-footed Cat, Brown Hyena, Grey Rhebok and Mountain Reedbuck. The Riverine Rabbit is of greatest potential concern as it has the highest threat status and has also been confirmed present within the Gamma 400kV Gridline Corridor. The extent of habitat loss within the areas of Riverine Rabbit habitat would however be minimal and would not compromise the local population of this species. The Karoo Dwarf Tortoises is also present within the Corridor and is associated with the rocky hills of the area. The footprint within these areas would also be relatively low and would not significantly impact habitat availability for the Karoo Dwarf Tortoise.

A large proportion of the grid route would traverse CBAs and ESAs. These features cannot easily be avoided as they occupy a significant proportion of the area between the Nuweveld site and the Gamma Substation. The footprint within the CBAs would be less than 30 ha located entirely outside of areas mapped to be of very high ecological sensitivity and mostly located outside of areas mapped to be of high ecological sensitivity. Given the linear nature of this impact, it would not compromise the ecological functioning of the CBAs or destroy the underlying biodiversity features present. The impact of the development on CBAs and ESAs is therefore considered acceptable.

The majority of the Corridor where it goes through the Northern Cape lies within a NPAES Focus Area. While development within NPAES Focus Areas is considered undesirable, the overall footprint of the power line infrastructure and roads within the NPAES would be less than 30 ha and as this would be linear and distributed along the power line route, the impact in any one place would be minimal and would not compromise the value of the area for future conservation expansion or compromise the ability to meet conservation targets.

In terms of the sensitivity mapping conducted as part of this study, there are numerous constraints operating across the Corridor, associated firstly with the drainage features of the Corridor and associated Riverine Rabbit habitat and secondly with the mountains, slopes and dolerite outcrops of the Corridor which are ecologically significant in their own right, but also represent Karoo Dwarf Tortoise habitat. The development footprint within the very high sensitivity areas will be avoided by pylon placement and access roads and disturbance to high sensitivity areas will be reduced to the minimum possible and a significant impact on these features is not expected to occur. The pre-negotiated gridline route alignment is considered acceptable and would generate low impacts on fauna, flora and ecological processes, provided that key mitigation is strictly applied.

6.3.2 Impacts on Avifauna

The following impacts of the Gridline on Avifauna have been assessed by Chris van Rooyen and Albert Froneman.

6.3.2.1 Construction Phase

Table 37: Displacement of powerline sensitive avifauna due to disturbance

Project phase	Construction	
Impact	Displacement of powerline sensitive avifauna due to disturbance	
Description of impact	Displacement of powerline sensitive avifauna due to disturbance from construction of the gridline. Disturbance by construction activities, vehicles and personnel could lead to displacement; which could lead to breeding failure if displacement happens during a critical part of the breeding cycle. Construction activities in close proximity to breeding locations could be a source of disturbance and could lead to temporary breeding failure or even permanent abandonment of nests. Birds breeding on the existing powerline infrastructure in the Corridor are most likely to be affected by displacement.	
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts
Potential mitigation	• Conduct an avifaunal walk-through of the final powerline alignment to identify priority species that may be breeding within the final footprint. If a SSC nest is occupied, the avifaunal specialist must consult with the contractor to find ways of minimizing the potential disturbance to the breeding birds during the construction period, if possible. This could include measures such as delaying some of the activities until after the breeding season. • Construction activities must be restricted to the immediate footprint • Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. • Maximum use must be made of existing roads and the construction of new roads must be kept to a minimum to reduce the extent of habitat fragmentation	

	• Vegetation clearance must be limited to what is absolutely necessary and the mitigation measures proposed by the vegetation specialist must be strictly implemented • Where technically possible, the proposed gridline must run next to existing high voltage lines as far as possible to reduce habitat fragmentation. • Measures to control noise and dust should be applied according to current best practice in industry. • Avoid No-Go areas.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very High	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Almost Certain/Highly Probably	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere, and could therefore occur.
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The environment will only recover from the impact with significant intervention	High	The effected environment will be able to recover from the impact.
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not rare	Low	The resource is not irreparably damaged, or is not rare
Significance	**Low Negative**		**Low Negative**	
Comment on significance	In the case of SCC eagle nests on High Voltage lines, the infrastructure No-Go zone can be relaxed. It is preferable to place new powerlines next to existing lines, even if this means temporary disturbance of a pair of breeding eagles. By placing the line next to an existing line, the creation of a new collision risk in a pristine area is avoided, the collision risk that the new line poses is also mitigated to an extent, and the habitat fragmentation is less severe. The short-term disturbance of the eagles is less severe than long-term collision risk that the new power line will pose in a pristine area.			

Table 38: Displacement of powerline sensitive avifauna due to habitat transformation

Project phase	Construction
Impact	Displacement of powerline sensitive avifauna due to habitat transformation associated with construction of the gridline.
Description of impact	Displacement of powerline sensitive avifauna due to habitat transformation. The construction of infrastructure and roads will cause habitat transformation, which could impact on birds breeding, foraging and roosting in close proximity, which could result in temporary or permanent displacement. For the gridline, the direct habitat transformation is limited to pylon footprints and the narrow access tracks under the powerline. The habitat in the Corridor is highly uniform from a bird impact perspective. The loss of habitat for priority species due to direct habitat transformation is likely to be fairly minimal. However, some studies show that while the physical disturbance footprint may be limited, the effects of the habitat fragmentation may be more significant; where certain species are

	seen close to or under power lines and roads, but are found at significantly greater numbers at a distance from these features and some species select nesting sites away from roads. The physical encroachment increases the disturbance and barrier effects that contribute to the overall habitat fragmentation effect of the infrastructure (Raab *et al.* 2010 *in* van Rooyen, 2022).			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Construction activities must be restricted to the immediate footprint • Maximum use must be made of existing roads and the construction of new roads must be kept to a minimum to reduce the extent of habitat fragmentation • Vegetation clearance must be limited to what is absolutely necessary and the mitigation measures proposed by the vegetation specialist must be strictly implemented • Where technically possible, the proposed gridline must run next to existing high voltage lines as far as possible to reduce habitat fragmentation.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere, and could therefore occur.
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The environment will not be able to recover from the impact – permanent.	Medium	The environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not rare	Low	The resource is not irreparably damaged, or is not rare
Significance	**Low Negative**		**Low Negative**	
Comment on significance	None			

6.3.2.2 Operational Phase

Table 39: Mortality of powerline sensitive Avifauna species due to collision with the 400 kV Overhead Line

Project phase	Operations			
Impact	Mortality of powerline sensitive Avifauna species due to collision with the 400 kV Overhead Line			
Description of impact	Mortality of powerline sensitive Avifauna species due to collision with the 400 kV Overhead Line			
Mitigatability	High	Mitigation exists, and will considerably reduce the significance of the impacts		
Potential mitigation	• Avoid No-Go areas. • Eskom-approved Bird Flight Diverters must be fitted to the gridline where it traverses areas of medium and high avifauna sensitivity, according to the applicable Eskom Engineering Infrastructure (Eskom Unique Identifier 240 – 93563150: The utilisation of bird flight diverters on Eskom Overhead Lines). • Mark the line at the dam situated at 31°48'16.44"S, 22°57'51.38"E with LED type bird flight diverters to ensure visibility of the line during low light conditions, should the dam at any given time be used as a roost site by Blue Cranes.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and nearby settlements	Local	Extending across the site and nearby settlements
Intensity	Very High	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The environment will only recover from the impact with significant intervention	Medium	The environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably, but is represented elsewhere	Medium	The resource is damaged irreparably, but is represented elsewhere
Significance	**High Negative**		**Low Negative**	
Comment on significance	None			

Electrocution Impacts

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed

components (Van Rooyen 2004). The electrocution risk is largely determined by the pole/tower design. Relevant to the proposed 400kV gridline, the risk of the electrocution will be effectively zero due to the large clearances on the proposed 400kV tower designs, which cannot be bridged by even the largest species (van Rooyen, 2022).

6.3.2.3 Decommissioning

Since decommissioning is highly unlikely, the avifaunal specialist did not identify any impacts on birds as a result of decommissioning activities.

6.3.2.4 Cumulative Impacts

Table 40: Cumulative Impacts - Displacement of powerline sensitive avifauna due to disturbance

Project phase	Construction			
Impact	Displacement of powerline sensitive avifauna due to disturbance			
Description of impact	Displacement of powerline sensitive avifauna due to disturbance from construction of the gridline, and all other grid connections and substations within a 35 km radius of the Gamma Grid Corridor.			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Construction activities must be restricted to the immediate footprint • Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species. • Maximum use must be made of existing roads and the construction of new roads must be kept to a minimum to reduce the extent of habitat fragmentation • Measures to control noise and dust should be applied according to current best practice in industry. • Avoid No-Go areas.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The effected environment will be able to recover from the impact.	High	The effected environment will be able to recover from the impact.
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not rare	Low	The resource is not irreparably damaged, or is not rare

Significance	Medium Negative	Low Negative
Comment on significance	In the case of SCC eagle nests on High Voltage lines, the infrastructure No-Go zone can be relaxed. It is preferable to place new powerlines next to existing lines, even if this means temporary disturbance of a pair of breeding eagles. By placing the line next to an existing line, the creation of a new collision risk in a pristine area is avoided, the collision risk that the new line poses is also mitigated to an extent, and the habitat fragmentation is less severe. The short-term disturbance of the eagles is less severe than long-term collision risk that the new power line will pose in a pristine area.	

Table 41: Cumulative Impacts - Displacement of powerline sensitive species due to habitat transformation

Project phase	Construction			
Impact	Displacement of powerline sensitive avifauna due to habitat transformation			
Description of impact	Displacement of powerline sensitive avifauna due to habitat transformation associated with construction of the gridline, and all other grid connections and substations within a 35 km radius of the Gamma Grid Corridor.			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Construction activities must be restricted to the immediate footprint • Maximum use must be made of existing roads and the construction of new roads must be kept to a minimum to reduce the extent of habitat fragmentation • Vegetation clearance must be limited to what is absolutely necessary and the mitigation measures proposed by the vegetation specialist must be strictly implemented • Where technically possible, the proposed gridline must run next to existing high voltage lines as far as possible to reduce habitat fragmentation.			
Assessment	Without mitigation		With mitigation	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Almost Certain / Highly Probable	It is most likely that the impact will occur.	Probable	The impact has occurred here or elsewhere, and could therefore occur.
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The environment will not be able to recover from the impact – permanent.	Medium	The environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not rare	Low	The resource is not irreparably damaged, or is not rare
Significance	Medium Negative		Low Negative	
Comment on significance	None			

Table 42: Cumulative Impacts - Mortality of powerline sensitive avifauna due to collision with the 400 kV Overhead Line

Project phase	Operations			
Impact	Mortality of powerline sensitive Avifauna species due to collision with the 400 kV Overhead Line			
Description of impact	Mortality of powerline sensitive Avifauna species due to collision with the 400 kV Overhead Line, and all planned and existing High Voltage lines in a 35 km radius of the Corridor			
Mitigatability	High	Mitigation exists, and will considerably reduce the significance of the impacts		
Potential mitigation	• Eskom-approved Bird Flight Diverters must be fitted to the gridline where it traverses areas of medium and high avifauna sensitivity, according to the applicable Eskom Engineering Infrastructure (Eskom Unique Identifier 240 – 93563150: The utilisation of bird flight diverters on Eskom Overhead Lines). • Mark the line at the dam situated at 31°48'16.44"S, 22°57'51.38"E with LED type bird flight diverters to ensure visibility of the line during low light conditions, should the dam at any given time be used as a roost site by Blue Cranes • Maintain the LED type bird flight diverters at the dam situated at 31°48'16.44"S, 22°57'51.38"E throughout operations.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	Very High	Natural and/ or social functions and/ or processes are majorly altered	Moderate	Natural and/or social functions and/or processes are moderately altered.
Probability	Certain/ Definite	There are sound scientific reasons to expect that the impact will definitely occur	Likely	The impact may occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The environment will only recover from the impact with significant intervention	Medium	The environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably, but is represented elsewhere	Medium	The resource is damaged irreparably, but is represented elsewhere
Significance	**High Negative**		**Medium Negative**	
Comment on significance	None			

6.3.2.5 No-Go Alternative

The 'no-go' alternative is the option of not developing the Gamma Gridline infrastructure and the status quo being maintained. The low human population is definitely advantageous too avifauna. The No-Go option would therefore eliminate any additional impact on the ecological integrity of the area as far as avifauna is concerned.

6.3.2.6 Conclusions and Recommendations

Large dams, irrigated lands, and SCC Eagle nests are identified as Very High and High Sensitivity areas for impact avoidance, with buffers. Very High Sensitivity areas are incorporated in the No-Go layer. The most significant risk is collision with overhead lines. Using Eskom approved Bird Flight Diverters mitigates this risk from the Gamma Gridline to Low significance, however the cumulative impact across the area is of Medium significance.

The expected pre-mitigation impacts of the proposed development on avifauna range from Low to High significance and have a negative status. However, with appropriate mitigation, the post-mitigation significance of the identified impacts should be reduced to Low negative. No fatal flaws were discovered in the course of the investigation. It is therefore recommended that the activity is authorised, on condition that the proposed mitigation measures listed in the impact tables and repeated in the EMPr are strictly implemented.

6.3.3 Aquatic Biodiversity Impacts

The following impacts on aquatic biodiversity have been assessed by Toni Belcher of Blue Science (Pty) Ltd.

6.3.3.1 Construction Phase

Table 43: Disturbance of aquatic habitats within the watercourses with the associated impact to sensitive aquatic biota

Project phase	Construction			
Impact	Aquatic Ecosystem Integrity			
Description of impact	Disturbance of aquatic habitats within the watercourses with the associated impact to sensitive aquatic biota			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Locate all infrastructure outside of No-Go sensitivity areas (note that these are mapped and described as 'High Sensitivity' areas in the specialist report). • Limit the placement of infrastructure in areas of medium aquatic sensitivity as far as possible. • Rationalise infrastructure as far as possible by sharing of the infrastructure or using existing disturbed areas (e.g., roads and access tracks). • Existing roads through features mapped as medium sensitivity must be utilised as far as possible. In terms of new service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings, but if these are required, then a specific walkdown should be conducted with the specialist to identify the most suited crossing position. • Where these crossings do occur, it needs to be monitored for erosion. • Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion. • Minimise any works within aquatic ecosystems and buffers. • Apply the generic EMPr for power line development.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year

Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The proposed activities have a very low potential aquatic ecosystem impact that wilth mitigation will be further reduced			

Table 44: Increased sedimentation and surface water contamination

Project phase	Construction			
Impact	Aquatic Ecosystem Integrity			
Description of impact	Increased sedimentation and risks of contamination of surface water runoff			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Construction sites and laydown areas should be placed at least 35m away from the delineated aquatic features • Apply the generic EMPr for power line development			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact

				will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The proposed activities have a very low potential aquatic ecosystem impact that with mitigation will be further reduced			

Table 45: Stress on available water resources due to abstraction for construction activities

Project phase	Construction			
Impact	Aquatic Ecosystem Integrity			
Description of impact	Demand for water for construction could place stress on the existing available water resources			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Source water from legal supply sources only (e.g. new or existing water allocation to a property and/or municipal supply). • Ensure that any new abstraction from a natural resource is assessed to determine safe abstraction rates and volumes, and that the use is approved by the DWS.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Short term	Impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	

Comment on significance	The proposed activities have a very low potential aquatic ecosystem impact that with mitigation will be further reduced

6.3.3.2 Operational Phase

Table 46: Disturbance and Degradation of Aquatic features and vegetation along access tracks and/or gridline infrastructure

Project phase	Operation			
Impact	Aquatic habitat disturbance			
Description of impact	Ongoing disturbance and degradation of aquatic features and associated vegetation along access tracks or adjacent to the infrastructure that needs to be maintained			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Access project infrastructure using existing roads and access tracks established during maintenance activities. • Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion. • Locate all infrastructure outside of high sensitivity areas. • Limit the placement of infrastructure in areas of medium aquatic sensitivity as far as possible. • Rationalise infrastructure as far as possible by sharing of the infrastructure or using existing disturbed areas (e.g. roads and access tracks)			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Very limited	Limited to specific isolated parts of the site	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The proposed activities have a very low potential aquatic ecosystem impact that with mitigation will be further reduced			

Table 47: Erosion and invasion of disturbed areas with alien invasive vegetation

Project phase	Operation			
Impact	Aquatic habitat disturbance			
Description of impact	Disturbance of cover vegetation and soil and modified runoff characteristics that have the potential to result in erosion of hillslopes and watercourses and invasion of disturbed areas with alien vegetation			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Invasive alien plant growth and signs of erosion should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants. • The project infrastructure and access tracks must be designed to mitigate the stormwater runoff impacts leaving the developed areas. • Where necessary, stormwater management systems at access tracks must be designed to dissipate stormwater over a broad area covered by natural vegetation or to direct stormwater to berms or channels and swales adjacent to hardened surfaces. This will need to be addressed at design phase (i.e. pre-commencement), but is required to address an operational phase impact.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site and to nearby settlements	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The proposed activities have a very low potential aquatic ecosystem impact that with mitigation will be further reduced			

6.3.3.3 Decommissioning Phase

Table 48: Increased activity at the site and associated increased disturbance to aquatic areas

Project phase	Decommissioning
Impact	Disturbance of aquatic habitats and water quality impacts
Description of impact	Increased disturbance of aquatic habitat due to the increased activity on the site

Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Minimise works within aquatic ecosystems as far as possible. • Rehabilitate disturbed areas			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The proposed activities have a very low potential aquatic ecosystem impact that with mitigation will be further reduced			

Table 49: Increased risk of sedimentation and contamination of surface water

Project phase	Decommissioning			
Impact	Disturbance of aquatic habitats and water quality impacts			
Description of impact	Increased sedimentation and risks of contamination of surface water runoff			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Laydown areas should be placed at least 30 m away from the delineated aquatic features • Apply the generic EMPr for power line development to decommissioning activities			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The proposed activities have a very low potential aquatic ecosystem impact that with mitigation will be further reduced			

6.3.3.4 Cumulative Impacts

Land use in the area currently consists mostly of low-density livestock farming due to the limited water supply and poor carrying capacity of the cover vegetation. Current land and water use impacts on the watercourses and surrounding area are therefore low to very low. The cumulative impact of the project activities, together with the existing activities in the area, could have the potential to reduce the integrity of the watercourses if not properly mitigated and managed. The nature of the proposed powerline allows it to have minimal impact on the surface water features since the pylons can be placed far enough away from the freshwater features (35m buffers) to not impact them. The largest potential impact of

these projects is a result of the associated access track, which can be mitigated such that its impact on the aquatic ecosystems will be of low significance. One could thus expect that the cumulative impact of the proposed project would be low, provided mitigation measures are implemented. Availability of water is a limiting factor in the further development of this area; however, the water requirements of the project are during the construction phase and are low.

Table 50: Cumulative Impacts: Increased activity in the area and increased disturbance to aquatic habitats

Project phase	Construction			
Impact	Cumulative Aquatic Ecosystem Impacts			
Description of impact	Increased disturbance of aquatic habitat due to the increased activity in the wider area			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Minimise works within aquatic ecosystems as far as possible. • Construct in the dry season. This is only relevant to works adjacent to the larger watercourses that have instream wetland habitat and are mapped as No-Go areas. • Rationalise infrastructure as far as possible by sharing of the infrastructure or using existing disturbed areas (e.g. roads and access tracks). • Apply the generic EMPr for power line development			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The cumulative impact of the proposed activities have a very low significance that with mitigation will be further reduced			

Table 51: Cumulative Impacts: Degradation of the ecological condition of aquatic ecosystems

Project phase	Operation			
Impact	Cumulative Aquatic Ecosystem Impacts			
Description of impact	Degradation of ecological condition of aquatic ecosystems			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Apply the generic EMPr for power line development. • Invasive alien plant growth and signs of erosion should be monitored on an ongoing basis to ensure that the disturbed areas do not become infested with invasive alien plants. • Minimise works within aquatic ecosystems as far as possible. • Infrastructure and access tracks designed to mitigate the stormwater runoff impacts leaving the developed areas. • Ensure road crossings structures are properly designed to not result in blockage in the watercourses or erosion.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The cumulative impact of the proposed activities have a very low significance that with mitigation will be further reduced			

Table 52: Cumulative Impacts: Increased activity in the area and increased disturbance to aquatic habitats

Project phase	Decommissioning			
Impact	Cumulative Aquatic Ecosystem Impacts			
Description of impact	Increased disturbance of aquatic habitat due to the increased activity in the wider area			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of impacts		
Potential mitigation	• Decommission works near aquatic features should preferably be undertaken in the dry season. • Minimise works within aquatic ecosystems as far as possible. • Apply the EMPr for power line development to decommissioning activities			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Very Low Negative		Very Low Negative	
Comment on significance	The cumulative impact of the proposed activities have a very low significance that with mitigation will be further reduced			

6.3.3.5 No-Go Alternative

The 'No-Go' alternative is the option of not constructing the project where the status quo would prevail. In this instance, potential very low significance impacts on aquatic ecology would be avoided should the No-Go alternative be selected.

6.3.3.6 Conclusions and Recommendations

Based on the aquatic specialist's site assessment, the larger rivers in the study area were found to be of high sensitivity that is linked to the importance of these larger aquatic ecosystems in providing a diversity of habitats and being important refugia for biota as well as corridors for the movement within the landscape.

The potential aquatic ecosystem impacts of the proposed project are likely to be very low in terms of any potential impact on aquatic ecosystem integrity for all phases of the proposed development as the proposed works avoid the delineated aquatic features indicated to be of high aquatic sensitivity (i.e. these are classified as 'Very High Sensitivity' / 'No-Go' areas in the composite site sensitivity map), and because the placement of infrastructure in areas of medium sensitivity including recommended buffer areas (35m) will be limited as far as possible (i.e. these are classified as 'High Sensitivity' areas in the composite site sensitivity map), and impacts will be appropriately mitigated (i.e. through design measures and ongoing monitoring).

Based on the findings of this specialist assessment, there is no reason, from a freshwater perspective, why the proposed activity (with the implementation of the suggested mitigation measures) should not be authorized.

6.3.4 Archaeology/Cultural/Heritage

Construction phase impacts include impacts to palaeontology (but these are dealt with separately), archaeology, graves and the cultural landscape. Operation and decommissioning phase impacts would be limited to impacts to the cultural landscape. These impacts have been identified and rated by Orton (2022).

6.3.4.1 Construction Phase

Table 53: Impacts to archaeological resources and graves

Project phase	Construction			
Impact	Impacts to archaeological resources and graves			
Description of impact	Direct impacts (damage or destruction) would occur on these resources during earthmoving activities.			
Mitigatability	High	Mitigation exists, and will considerably reduce the significance of the impacts		
Potential mitigation	• Avoid No-Go areas. • Do a pre-construction survey to identify any sites that need to be avoided through micrositing of pylons or possibly archaeological mitigation			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years.	Permanent	Impact may be permanent, or in excess of 20 years.
Extent	Very Limited	Limited to specific isolated parts of the site	Very Limited	Limited to specific isolated parts of the site

Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Very low	Natural and/or social functions and/or processes are slightly altered.
Probability	Probable	The impact has occurred here or elsewhere, and could therefore occur.	Rare/Improbable	Conceivable, but only in extreme cases
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Low	The affected environment will not be able to recover from the impact – permanently modified	Low	The affected environment will not be able to recover from the impact – permanently modified
Resource irreplaceability	High	The resource is irreparably damaged, and is not represented elsewhere	High	The resource is irreparably damaged, and is not represented elsewhere
Significance	**Low Negative**		**Very Low Negative**	
Comment on significance	Significance is low because archaeological sites are widely dispersed, and avoidance should be easy to achieve. Mitigation is generally easy to implement, making the post-mitigation impact Very Low.			

Table 54: Impacts to the Cultural landscape

Project phase	Construction			
Impact	Impacts to the cultural landscape			
Description of impact	Direct impacts to the cultural landscape – construction equipment and powerlines in the landscape – changes the rural/natural character of the area to a more industrial one.			
Mitigatability	Low	Mitigation does not exist, or will only slightly effect the significance of impacts.		
Potential mitigation	• Keep the construction period as short as possible • Ensure that disturbed areas that are not required for operations are rehabilitated			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Local	Extending across the site, and to nearby settlements.	Local	Extending across the site, and to nearby settlements.
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/or social functions and/or processes are slightly altered.
Probability	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact

Resource irreplaceability	Low	The resource is not irreparably damaged, or is not scarce	Low	The resource is not irreparably damaged, or is not scarce
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Significance is low because of the short duration of construction. Mitigation will only very slightly reduce the intensity of impacts, but not enough to reduce the significance to Very Low.			

6.3.4.2 Operational Phase

Table 55: Impacts to the Cultural landscape

Project phase	Operations			
Impact	Impacts to the cultural landscape			
Description of impact	Direct impacts to the cultural landscape – visual intrusion of the landscape by powerlines. With time, the powerlines will become an accepted part of the landscape. If the WEF that the gridline is supporting are built, then all of these electrical installations would result in a new electrical 'layer' to the cultural landscape.			
Mitigatability	Low	Mitigation does not exist, or will only slightly effect the significance of impacts.		
Potential mitigation	• Ensure that maintenance vehicles stay on designated roads to prevent new landscape scarring.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	The impact will be permanent, or greater than 20 years	Permanent	The impact will be permanent, or greater than 20 years
Extent	Local	Extending across the site, and to nearby settlements.	Local	Extending across the site, and to nearby settlements.
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not scarce	Low	The resource is not irreparably damaged, or is not scarce
Significance	**Medium Negative**		**Medium Negative**	
Comment on significance	The long duration of the impact drives the significance rating. In time, the powerline may be seen as an accepted part of the landscape and the impact may be low negative. Mitigation makes little difference to the significance rating but it is important that maintenance vehicles remain on designated tracks and do not cause new landscape scarring.			

6.3.4.3 Decommissioning Phase

Table 56: Decommissioning Phase impacts to the Cultural landscape

Project phase	Decommissioning			
Impact	Impacts to the cultural landscape			
Description of impact	Direct impacts to the cultural landscape – construction equipment to dismantle powerlines in the landscape – changes the rural/natural character of the area to a more industrial one.			
Mitigatability	High	Mitigation exists and will considerably reduce the significance of the impact.		
Potential mitigation	• Keep the construction period as short as possible • Ensure that disturbed areas are rehabilitated			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Brief	Impact will not last longer than 1 year	Brief	Impact will not last longer than 1 year
Extent	Local	Extending across the site, and to nearby settlements.	Local	Extending across the site, and to nearby settlements.
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/or social functions and/or processes are slightly altered.
Probability	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not scarce	Low	The resource is not irreparably damaged, or is not scarce
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Mitigation will reduce the intensity of the impact, but makes little difference to the overall impact, and is therefore not sufficient to reduce the significance.			

6.3.4.4 Cumulative Impacts

The cumulative impact assessment considers all existing, approved and proposed RE and infrastructure development projects in a 30 km radius of the Assessment Corridor. There are currently very few electrical facilities in the area, however there is the potential for many more, especially at the west and east ends of the Corridor. The nature of electrical projects is that impacts are generally avoided and, for the most part micrositing of infrastructure is feasible; although this is less the case with solar energy. Cumulative impacts to archaeology, palaeontology and graves are of little concern because pre-construction surveys generally reveal such finds and micrositing results in reduction or avoidance of impacts on these resources. Mitigation is also often readily implementable. However, impacts to the

cultural landscape will get progressively worse as more and more electrical facilities are constructed. These are visual impacts on the cultural landscape and, because of the size and extent of the infrastructure concerned, they cannot be meaningfully reduced through mitigation. Adhering to visual mitigation measures will generally result in visually sensitive parts of the landscape being avoided but visual clutter will still accrue. As such, the cumulative assessment largely focuses on impacts to the cultural landscape (Orton, 2022).

Table 57: Assessment of cumulative impacts to the Cultural landscape

Project phase	Operations			
Impact	Impacts to the cultural landscape			
Description of impact	The cumulative impact of existing, approved and planned energy facilities and infrastructure to the cultural landscape.			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of impacts.		
Potential mitigation	• As per the individual impacts listed above.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	The impact will be permanent, or greater than 20 years	Permanent	The impact will be permanent, or greater than 20 years
Extent	Municipal	Impacts felt at a municipal level	Municipal	Impacts felt at a municipal level
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain/definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment only recover from impact with significant intervention	Medium	The affected environment only recover from impact with significant intervention
Resource irreplaceability	Medium	The resource is irreparably damaged, but is represented elsewhere	Medium	The resource is irreparably damaged, but is represented elsewhere
Significance	**High Negative**		**Medium Negative**	
Comment on significance	Because the cumulative assessment combines different types/areas of heritage, the ratings for the assessment criteria are higher, resulting in a higher significance rating. The impact is reduced to medium significance, given that energy development has already commenced in the area, and that the Corridor is within a REDZ and an EGI Corridor.			

6.3.4.5 Evaluation of impacts relative to sustainable social and economic benefits

Section 38(3)(d) of the NHRA requires an evaluation of the impacts on heritage resources relative to the sustainable social and economic benefits to be derived from the development. While the powerline itself does not directly result in much socio-economic benefit aside from construction phase jobs, the important factor is that it will assist with getting more electricity into the national electricity grid. The project will only be built if at least some of the associated wind farms at its western end are built and, therefore, its socio-economic value lies in the provision of electricity from these wind farms. The South African economy is in dire need of a larger and more stable electricity supply. The knock-on effects of this will be considerable as the economy will be better able to grow. These are clear economic and social benefits and, if mitigation is applied as suggested above, then the socio-economic benefits outweigh the residual impacts (Orton, 2022).

6.3.4.6 No-Go Alternative

If the project were not implemented then the status quo remains (negligible heritage impact). Although the heritage impacts of the project would be greater than the existing impacts, the loss of socio-economic benefits is more significant and suggests that the No-Go option is less desirable in heritage terms (Orton, 2022).

6.3.4.7 Conclusions and Recommendations

Heritage resources are generally quite widely dispersed on the flat, open plains but more tightly clustered in valleys and along dolerite outcrops. For this reason wide plains are preferred for development over tighter valleys and rocky areas. Because the spans will be in the region of 400 m, it is likely that physical impacts on the ground will be very limited. In some circumstances (e.g. where cultural significance is low) it may be acceptable for powerlines to span over archaeological sites but it will be important that access roads and pylons avoid them, preferably with a 30 m buffer. Farmsteads should be avoided by as far as possible to reduce contextual impacts to them and their enclosing cultural landscapes. Wagernaarskraal, with its long and regionally significant history, is especially important in this regard.

From the point of view of the wider landscape there is very little that can be done to avoid impacts but their severity may be reduced by following the recommendations of the visual specialists. The major cultural landscape concerns for the area (i.e. the escarpment and Karoo National Park) are more than 17 km from the nearest edge of the Corridor and are therefore of no concern.

The specialist provided a set of ‘heritage indicators’ to guide the final positioning of gridline infrastructure and roads at detailed design phase during micro-siting. A pre-construction survey of the final alignment will be crucial to realising the mitigation aims. With such a survey and adherence to any recommendations stemming from its results the impacts to heritage resources are expected to be acceptable. As such, it is the opinion of the heritage specialist that the proposed

powerline may be authorised in its entirety, but subject to the following recommendations which are included in the project EMPr, and should be included as conditions of authorisation:

- A pre-construction palaeontological survey should be done, focusing on sensitive areas;
- A pre-construction archaeological survey should be done along the entire alignment;
- Sensitive viewsheds (e.g. ridges) as indicated by the visual consultants must be avoided;
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

6.3.5 Palaeontology

Development of the Gamma Gridline infrastructure and roads, will entail excavation into the superficial sediment cover (i.e. soils, surface gravels, alluvium etc.), and into the underlying potentially fossiliferous Lower Beaufort Group bedrock. Therefore, construction phase activities may impact on legally protected and scientifically important fossil heritage sites by destroying, damaging, disturbing, or permanently sealing-in fossils, at or beneath the surface, making them no more available for research or public good. Excavations to construct new access roads or upgrade/expand existing roads, are expected to exert a far greater palaeontological impact than the other project components. The uppermost Teerkloof Formation bedrocks that are most likely to be affected by excavations are characterised by common, but sparsely distributed fossil sites of vertebrates and other groups. Most of these are of limited scientific interest, but some have important fossil vertebrate remains. Most of the important fossil specimens in the Assessment Corridor have already been recorded and are therefore not under threat by the development and no mitigation is required. However, the potential of finding unrecorded high palaeosensitivity fossil sites in the understudied Corridor is substantial. The bedrock within most of the Assessment Corridor is mantled by late Caenozoic colluvial, eluvial and alluvial deposits and gravelly soils that are generally of low palaeosensitivity over most of the Karoo region. However, concentrations of fossil mammalian remains might occur within the older, calcretised alluvium, however the specialist was unaware of any recorded sites.

The impact of the gridline on palaeontological resources as assessed by Dr Almond is presented below. Impacts are limited to construction phase. Once the infrastructure has been constructed, operational and decommissioning stage activities will not further impact on palaeontological resources, and these phases are not separately assessed.

6.3.5.1 Construction Phase

Table 58: Impacts on Palaeontological Resources

Project phase	Construction			
Impact	Impacts to palaeontological resources			
Description of impact	Disturbance, damage or destruction of fossils preserved at or beneath the ground surface due to surface disturbance and excavations (e.g. for access roads and pylons)			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Do a pre-construction walk down of potentially sensitive areas of the project footprint by a palaeontological specialist • Apply a Chance Fossil Finds Procedure during construction phase • Avoid areas identified as Very High palaeontological Sensitivity (i.e. No-Go areas)			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years.	Permanent	Impact may be permanent, or in excess of 20 years.
Extent	Very Limited	Limited to specific isolated parts of the site	Very Limited	Limited to specific isolated parts of the site
Intensity	Moderate	Significant loss of important fossil heritage within the project footprint	Low	Minor loss of important fossil heritage within the project footprint
Probability	Likely	Loss of scientifically valuable fossil heritage is likely.	Probable	Loss of scientifically valuable fossil heritage is probable, but not certain.
Confidence	Medium	Most of the project area is unstudied, but some previous studies have been done in the area.	Medium	Most of the project area is unstudied, but some previous studies have been done in the area.
Reversibility	Low	Damage or loss of fossils cannot be rectified	Low	Damage or loss of fossils cannot be rectified
Resource irreplaceability	Medium	The resource is irreparably damaged, but may well be represented elsewhere	Medium	The resource is irreparably damaged, but may well be represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Construction impacts on palaeontological resources must be mitigated during pre-construction and construction phases. This should lead to an appreciable reduction in impact significance.			

6.3.5.2 Cumulative Impacts

Table 59: Cumulative impacts on palaeontological heritage resources due to RE projects and transmission lines within a ~30 km radius of the Gamma Corridor

Project phase	Construction	
Impact	Cumulative impacts to palaeontological resources by construction activities of all RE projects and transmission lines within a ~30 km radius of the Gamma Corridor	
Description of impact	Disturbance, damage or destruction of fossils preserved at or beneath the ground surface due to surface disturbance and excavations (e.g. for access roads and pylons)	
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts

Potential mitigation	• Construction-phase mitigation for each RE project must be fully implemented • Apply a Chance Fossil Finds Procedure during construction phase • Avoid areas identified as Very High palaeontological sensitivity (i.e. No-Go areas)			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years.	Permanent	Impact may be permanent, or in excess of 20 years.
Extent	Very Limited	Limited to specific isolated parts of the site	Very Limited	Limited to specific isolated parts of the site
Intensity	High	Significant loss of important fossil heritage within the project footprint	Moderate	Significant but moderate loss of important fossil heritage within the project footprint
Probability	Almost Certain/Highly Probably	Loss of scientifically valuable fossil heritage is almost certain	Likely	Loss of scientifically valuable fossil heritage is likely.
Confidence	Medium	Most of the project area is unstudied, but some previous studies have been done in the area.	Medium	Most of the project area is unstudied, but some previous studies have been done in the area.
Reversibility	Low	Damage or loss of fossils cannot be rectified	Low	Damage or loss of fossils cannot be rectified
Resource irreplaceability	Medium	The resource is irreparably damaged, but may well be represented elsewhere	Medium	The resource is irreparably damaged, but may well be represented elsewhere
Significance	**Medium Negative**		**Low Negative**	
Comment on significance	Construction impacts on palaeontological resources must be mitigated during pre-construction and construction phases. This should lead to an appreciable reduction in impact significance.			

6.3.5.3 No-Go Alternative

The No-Go alternative means that the status quo remains. Current impacts on palaeontological resources are:

1. Background low-level damage to, or loss of, fossils exposed at the surface due to small-stock farming (vehicle movement, irrigation infrastructure, small-scale agriculture);
2. Ongoing natural weathering and erosion processes that destroy fossil material at or near the surface and expose and prepare-out previously buried fossils; and
3. Loss of fossils through illegal collection of fossils is a potentially important, but minor (hopefully) factor in the area.

These existing impacts will continue to operate at low levels. The potential benefit of an improved palaeontological database and fossil collections for the region (i.e. as per mitigation measures), would not accrue in the No-Go alternative. The impact significance of the No-Go alternative is therefore rated as Very Low negative (Almond, 2022).

6.3.5.4 Conclusions and Recommendations

Only construction phase impacts of the gridline have been assessed on palaeontological resources. These are rated to be low negative with, and without mitigation in place. Significant further impacts during operational and

decommissioning phases are not expected. The provisional cumulative impact of the development and all other RE and electrical infrastructure development in a 30 km radius of the Corridor is rated as medium negative without mitigation. This can be reduced to low negative if all the proposed monitoring and mitigation measures for all the RE projects are consistently and fully implemented – however, this is beyond the control of Red Cap. The anticipated cumulative impacts following full mitigation are within acceptable limits. The impact of the No-Go alternative is rated as very low negative. No fatal flaws have been identified. Provided that the mitigation measures listed above are included in the Generic EMPr and are fully implemented, there are no objections on palaeontological heritage grounds to the Gamma Gridline being authorised.

6.3.6 Agriculture

6.3.6.1 Impact Assessment

A Site Verification and Agricultural Compliance Statement was done by Lanz (2022). The specialist has confirmed that the agricultural impact of the proposed development is insignificant, and as such, a formal assessment of impacts has not been done. The reasons for this are:

- The land has low agricultural potential, and agriculture is limited to grazing.
- The arid climate restricts cultivated lands to areas that can be irrigated (i.e. near homesteads and along watercourses). Where these do occur, they can easily be avoided by careful placement of infrastructure.
- Agricultural production is not sensitive to powerline development and can continue unimpacted beneath the infrastructure.
- The physical footprint of the development and direct impact on agricultural land is insignificant considering the scale of activities in relation to the agricultural landscape.

Potential impacts are minor disturbance to the land during construction and decommissioning, and some nuisance disturbance to agricultural activities during construction that can cause erosion and loss of topsoil. There is likely to be some nuisance disturbance to agricultural activities during construction. However, nuisance disturbances are unlikely to translate into a change in agricultural production potential and therefore do not constitute an agricultural impact. These insignificant impacts can be mitigated by implementing recommendations in the Generic EMPr and avoiding isolated cultivated areas.

6.3.6.2 Cumulative Impacts

For a cumulative impact to be significant, the impact of the proposed development must directly lead to the sum of impacts of all developments to cause the acceptable level of change of the environment in the surrounding area (i.e. 30 km radius of the Corridor) to be exceeded. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

In this instance, the potential cumulative agricultural impact of importance is a regional loss of future agricultural production potential. Therefore it must be determined what level of loss of future agricultural production potential is acceptable in the area, and will the loss associated with the proposed development, when considered in the context of all past, present or reasonably foreseeable future impacts, cause that level in the area to be exceeded.

Power lines and pylons have an insignificant agricultural impact and an insignificant cumulative agricultural impact. Due to the relatively small footprint of the associated access tracks required for construction and maintenance of the power line, their impact on agriculture is also considered to be insignificant. Many times more electricity grid infrastructure than currently exists, or is currently proposed, can be accommodated before acceptable levels of change, in terms of loss of production potential, are exceeded in the surrounding area.

Therefore the cumulative impact of loss of future agricultural production potential by the addition of the project to the area can confidently be assessed as negligible / insignificant. In terms of cumulative impact, the proposed development is therefore acceptable.

6.3.6.3 No-Go Alternative

The No-Go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. The 'No-Go' option has no agricultural impacts. Therefore, the extent to which the development (insignificant impact) and the No-Go alternative will impact agricultural production are more or less equal, which results in there being, from an agricultural impact perspective, no preferred alternative between the development and the No-Go option.

6.3.6.4 Conclusions and Recommendations

Lanz (2022) concluded that the proposed development will have negligible agricultural impact and will therefore be acceptable in terms of its impact on the agricultural potential of land within the Corridor. This is substantiated by the fact that the amount of agricultural land loss resulting from the development is insignificant, and that the land is of very low agricultural potential. 'Cultivated lands' are considered to be of 'High Sensitivity' but these are restricted and can easily be avoided by infrastructure and roads.

The only potential source of disturbance to the land is during construction and decommissioning, but the possible impacts of erosion and topsoil loss are addressed in the geotechnical and aquatic ecology assessments, and can be mitigated through standard construction mitigation measures included in the Generic EMPr. In addition, there is likely to be some nuisance disturbance to agricultural activities during construction. However, nuisance disturbances are highly unlikely to translate into a real change in agricultural production potential and therefore do not constitute an actual agricultural impact.

Therefore, no fatal flaws have been identified from an agricultural impact point of view, and it is recommended that the development be approved

6.3.7 Geotechnical Impacts

The impact of the project on the geological environment will predominantly relate to the impact on the soils / rock units beneath the site (for example, from erosion). This would take place when topsoil is stripped, during excavations for foundations, trenching and the construction of access tracks and associated infrastructure. The most significant impact on soils and rocks is likely to be from bulk earthworks when construction platforms and access tracks. The primary concern associated with geotechnical works is increased soil erosion due to stripping of vegetation at the start of the project in construction phase. The construction of paved and/or hard-surfaced areas increases runoff and often localises discharge of stormwater, which may lead to increased erosion and consequently loss of topsoil. If these conditions persist for long periods, disturbance of the soil may extend beyond the footprint of the structures and roads (GEOSS, 2022).

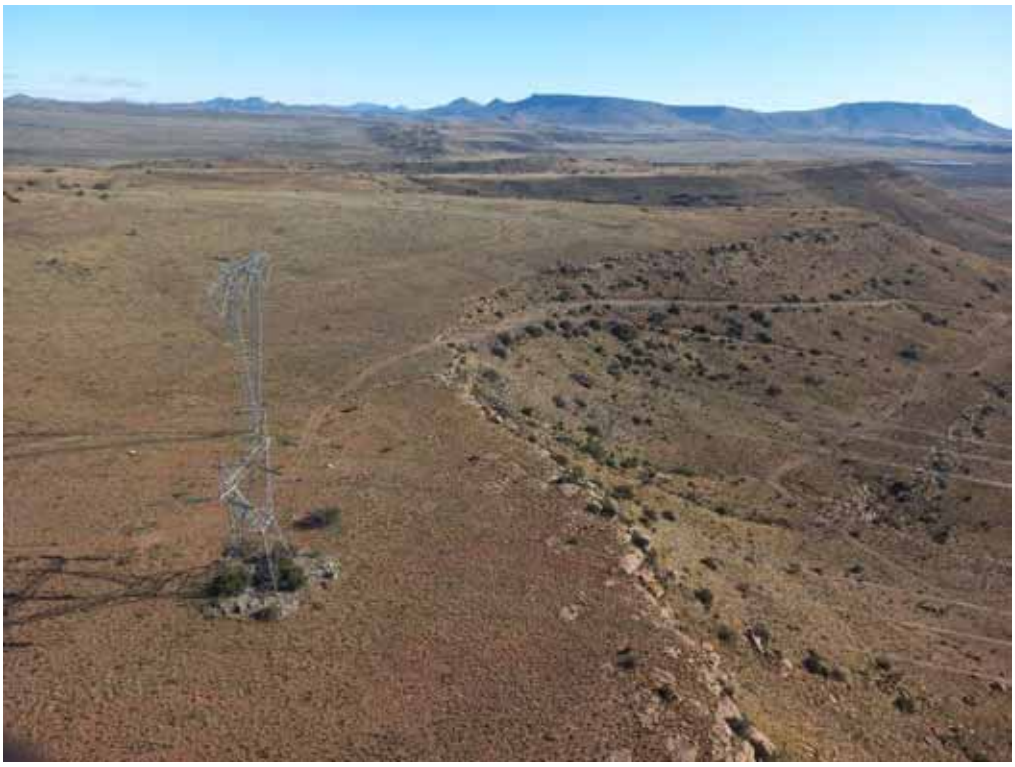


Plate 9: An existing pylon situated on a flat top, with an access track traversing a slope. The disturbance impact on soils seems to be limited to the pylon footprint and the access track with no obvious signs of erosion. The soils and rock in these areas are less prone to erosion, but care must be taken along access tracks to prevent channelized runoff and accelerated flow down slopes.

Plate 10: Pylons and access tracks in wide open floodplains near a main channel – exposed soils are at risk of surface wash and erosion, and stormwater management measures are important.

6.3.7.1 Construction Phase

Table 60: Soil contamination, destabilisation and erosion

Project phase	Construction			
Impact	Geological Impact – soil erosion and contamination			
Description of impact	Stripping of vegetation during construction causing erosion; Excavation of rock; Machinery and earth moving plant causing spills contaminating soils.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Only strip vegetation necessary for the next phase of construction. • Install temporary drainage to divert stormwater away from active construction activities, where required. • Park within designated areas. • Stormwater Management Plan must be developed in the pre-construction phase and should detail the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e. extension, energy dissipaters, spreaders, etc). • No-Go Areas (areas that shall be excluded from any construction activity or general access by the construction team) within the development sites or servitudes shall be clearly indicated on maps and included with the micro-siting reports or attached to the EMPr. • Implement the generic EMPr for overhead transmission infrastructure			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years

Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Likely	The impact may occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Low Negative		Very Low Negative	
Comment on significance	The significance of the impact on the geological environment is considered low without mitigation and very low to negligible with appropriate mitigation measures.			

Plate 11: Berms along an access track up a slope to slow runoff and prevent erosion.

6.3.7.2 Operational Phase

Table 61: Soil contamination, destabilisation and erosion

Project phase	Operation			
Impact	Geological Impact – soil erosion and contamination			
Description of impact	Concentration of runoff and/or ponding due to hard surfaces, i.e. paved areas; reinstated and compacted ground surrounding turbines; borrow areas; and support structures. Concentration of natural drainage (and increasing runoff) due to paved areas. Increased siltation within natural water courses due to increased runoff and soil erosion.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Investigate and confirm the geotechnical suitability of each pylon position prior to construction (i.e. that soil with an adequate bearing capacity is obtained beneath each footing). • Select pylon positions on 1:4 slopes or shallower, where possible. • Favour dolerite as a cement aggregate (as opposed to Karoo sandstones and mudstones). • Any road cuttings should be designed by an appropriately qualified professional. • Drainage in the region should be designed and managed appropriately. • Stormwater Management Plan must be developed in the pre-construction phase and should detail the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. Effective stormwater management must include effective stabilisation (gabions and Reno mattresses) of exposed soil. • Suitable stormwater management systems must be installed along roads and other areas and monitored during the first few months of use. Any erosion / sedimentation must be resolved through whatever additional interventions maybe necessary (i.e., extension, energy dissipaters, spreaders, etc). • No regular maintenance activities to take place outside of the authorised footprint and all vehicles to remain on authorised roads and tracks. • Implement the generic EMPr for overhead transmission infrastructure.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last between 10 and 15 years	Long term	Impact will last between 10 and 15 years
Extent	Local	Extending across the site and to nearby settlements	Limited	Limited to the site and its immediate surroundings
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Low Negative		Very Low Negative	

Comment on significance	The significance of the impact on the geological environment is considered low without mitigation and very low to negligible with appropriate mitigation measures.

6.3.7.3 Decommissioning Phase

Table 62: Soil contamination, destabilisation and erosion

Project phase	Decommissioning			
Impact	Geological Impact – soil erosion and contamination			
Description of impact	Soil/rock destabilisation and erosion due to infrastructure removal. Spillages from vehicles. Increased siltation within natural water courses due to increased runoff and soil erosion.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Vehicles should be well maintained, parked over drip trays/hard-surfaced areas, and parked within designated areas. • Land rehabilitation to near natural state, i.e. removal of foundations and backfilling of any resultant voids within the soil, as well as removal of hard surfaced areas. Replacement soil should be sourced locally to ensure homogeneity. • Reinstate natural topography where cut-to-fill embankments have been constructed. • Implement generic EMPr for overhead transmission infrastructure.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Limited	Limited to the site and its immediate surroundings	Very limited	Limited to specific isolated parts of the site
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Likely	The impact may occur	Rare / improbable	Conceivable, but only in extreme circumstances, and/or might occur for this project although this has rarely been known to result elsewhere
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	Low Negative		Very Low Negative	
Comment on significance	The significance of the impact on the geological environment is considered low without mitigation and very low to negligible with appropriate mitigation measures.			

6.3.7.4 Cumulative Impacts

Table 63: Soil contamination, destabilisation and erosion

Project phase	Construction and operation			
Impact	Soil erosion, contamination and destabilisation			
Description of impact	Widespread soil destabilisation, erosion and contamination due to agricultural activities and renewable energy development, including associated transmission infrastructure. Increased siltation within natural water courses due to increased runoff and soil erosion.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Do not enter No-Go areas • Limit disturbance footprints to the area absolutely necessary for the project • Use existing access tracks where feasible • Observe limits of acceptable disturbance for areas of high, medium and low sensitivity • Implement the generic EMPr for overhead transmission infrastructure.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Regional	Impacts felt at a regional / provincial level	Local	Impacts felt at a regional / provincial level
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Low	The resource is not damaged irreparably or is not scarce
Significance	Medium Negative		Low Negative	
Comment on significance	The region has experienced impacts on geological/geotechnical conditions (e.g. soil erosion) due to conventional agricultural practise in the area occurring for many years rendering the cumulative impact without mitigation negative medium. With mitigation, these cumulative impacts (of construction of the Gamma Gridline and agricultural practises) the significant rating is considered negative, but low.			

6.3.7.5 No-Go Alternative

In the event of the development not proceeding (i.e. the no-go alternative being selected) project related geotechnical impacts would be avoided; however regional cumulative impacts (such as from agriculture and renewable energy development in the region would persist). As the project is located wholly within a Strategic Transmission Corridor

(specifically identified to host high voltage transmission infrastructure), cumulative impacts from this infrastructure can be anticipated in the region. The impact of the No-Go alternative is therefore neutral.

6.3.7.6 Conclusions and Recommendations

The desktop geotechnical study provides a high-level overview of envisaged risks from a geotechnical standpoint, and gives broad recommendations for high-level designs. GEOSS has endeavoured to highlight and characterise all potential geotechnical risks that are presented by the site. However, due to the variable nature of earth materials, there will be differences on a local and site specific scale. Therefore it is critical that foundation excavations be inspected prior to casting to ensure that soil with an adequate bearing capacity is obtained beneath each footing. These works should be carried out by an appropriately qualified individual.

Based on the findings of this study and the above-mentioned recommendations being implemented, development should proceed provided the mitigation measures are implemented.

6.3.8 Visual Impacts

The proposed 400kV powerline and along with access roads would have a visual impact on scenic resources and on sensitive receptors, including the individual farmsteads in the area. National routes, such as the N12, as well as main district roads are visual corridors from which the Karoo landscape is mainly experienced by both inhabitants and visitors to the area. Scenic passes and poorts along these routes have increased visual sensitivity. Potential visual impacts associated with the proposed project are assessed by Lawson and Oberholzer (2022), and are presented below for all phases of the project.

The sensitivity of scenic resources and sensitive receptors in the surrounding landscape was outlined in Section 6.2.8 that deals with 'Specialist Sensitivity Classification'. The sensitivity of these features are differentiated for overhead lines and pylons and roads, and form the basis of the visual sensitivity map that is used to guide the alignment of the preferred pre-negotiated gridline within the Corridor.

A number of qualitative and quantitative criteria are used to assess the significance of visual impacts. These are:

- **Visibility:** A number of significant viewpoints have been identified, together with their relative distances and anticipated visibility of the connection grid (see Table 5 in the VIA report). This is based on the worst-case scenario, (i.e. the visibility of a 42 m lattice 400 kV line). Viewpoints have been selected based on proximity to the proposed powerline and the potential sensitivity of identified receptors, including users of arterial routes and guest farms and farmsteads. Degrees of visibility are as follows (but these are subject to foreground topography or trees):
    - High Visibility: Prominent feature within the observer's view frame 0 – 500 m
    - Moderate Visibility: Only prominent with clear visibility as part of the wider landscape 500 m-1 km

- Marginal Visibility: Seen in very clear visibility as a minor element in the landscape 1 - 2km

- **Visual Absorption Capacity:** This is the potential of the landscape to screen the proposed overhead powerline from view. Visibility tends to be restricted in the broken topography of the plateau, but more extensive in the open plains. Powerlines located on ridgelines tend to be more visible in the landscape, particularly when seen in silhouette. On the other hand, power lines tend to be less visible when seen against a backdrop, such as a belt of trees or a hillside. The sparse Karoo vegetation provides little screening effect. However dense clumps of trees around farmsteads tend to reduce visibility by receptors.
- **Landscape Integrity:** Visual quality is enhanced by scenic or rural quality and intactness of the landscape, as well as absence of other visual intrusions. Natural or pristine landscapes have higher visual quality and therefore higher value. Cultural landscapes, such as rural or farming scenes also have visual scenic value. Industrial activity and visual 'clutter', including substations and power lines, detract from these scenes. The eastern part of the Assessment Corridor has already been altered to some extent by existing Eskom power lines and the Eskom Gamma Substation (i.e. these lines already detract from the visual quality of the landscape where these occur). The pre-negotiated alignment partly runs parallel to these existing lines as far as possible and is congruent with this infrastructure. Therefore although the proposed Gamma line has the potential to add to visual clutter in the Corridor, its alignment in the eastern section of the Corridor parallel to existing lines minimises the visibility of the line or fragmentation of the rural landscape to a certain extent.
- **Visually Sensitive Resources:** Natural and cultural landscapes, or scenic resources, form part of the 'National Estate' and may have local, regional or even national significance, usually, but not only, of tourism importance. These particularly include the scenic dolerite *koppies* and mesas, river features and scenic sections of district roads within the study area.
- **Visual Impact Intensity:** is determined by combining all the above-mentioned variables, and is used to determine visual impact significance.

Table 64: Visual Impact Intensity of the proposed Gamma Gridline Infrastructure (Lawson and Oberholzer, 2022).

Visual Criteria	Comments	Visual Impact Intensity
Visual exposure	Extent of viewshed is limited by the scale of the pylons.	Medium
Visibility	Visible from parts of the N12, main district roads and farmsteads.	Medium
Visual absorption capacity	Visually exposed plain and ridges (in places).	Medium
Landscape integrity / intactness	Effect on rural farming character. Existing Eskom powerlines along part of the powerline route in the east add to the congruence of the powerline with the landscape in this area.	Med-high
Landscape / scenic	Effect on scenic dolerite koppies and outcrops, and N12.	Medium

sensitivity		
Impact intensity		**Medium**

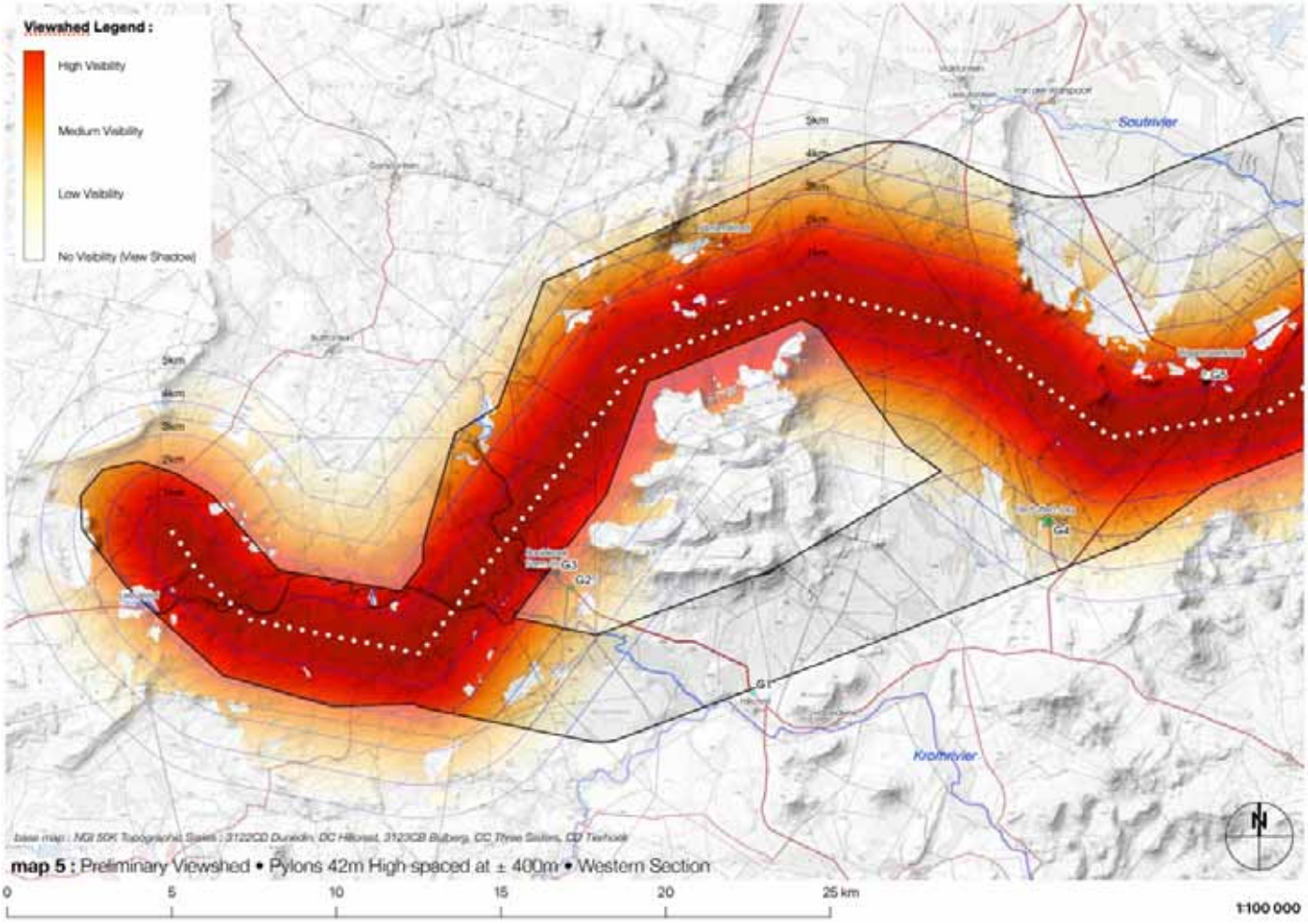


Figure 44: Viewshed of the pre-negotiated gridline route (a)

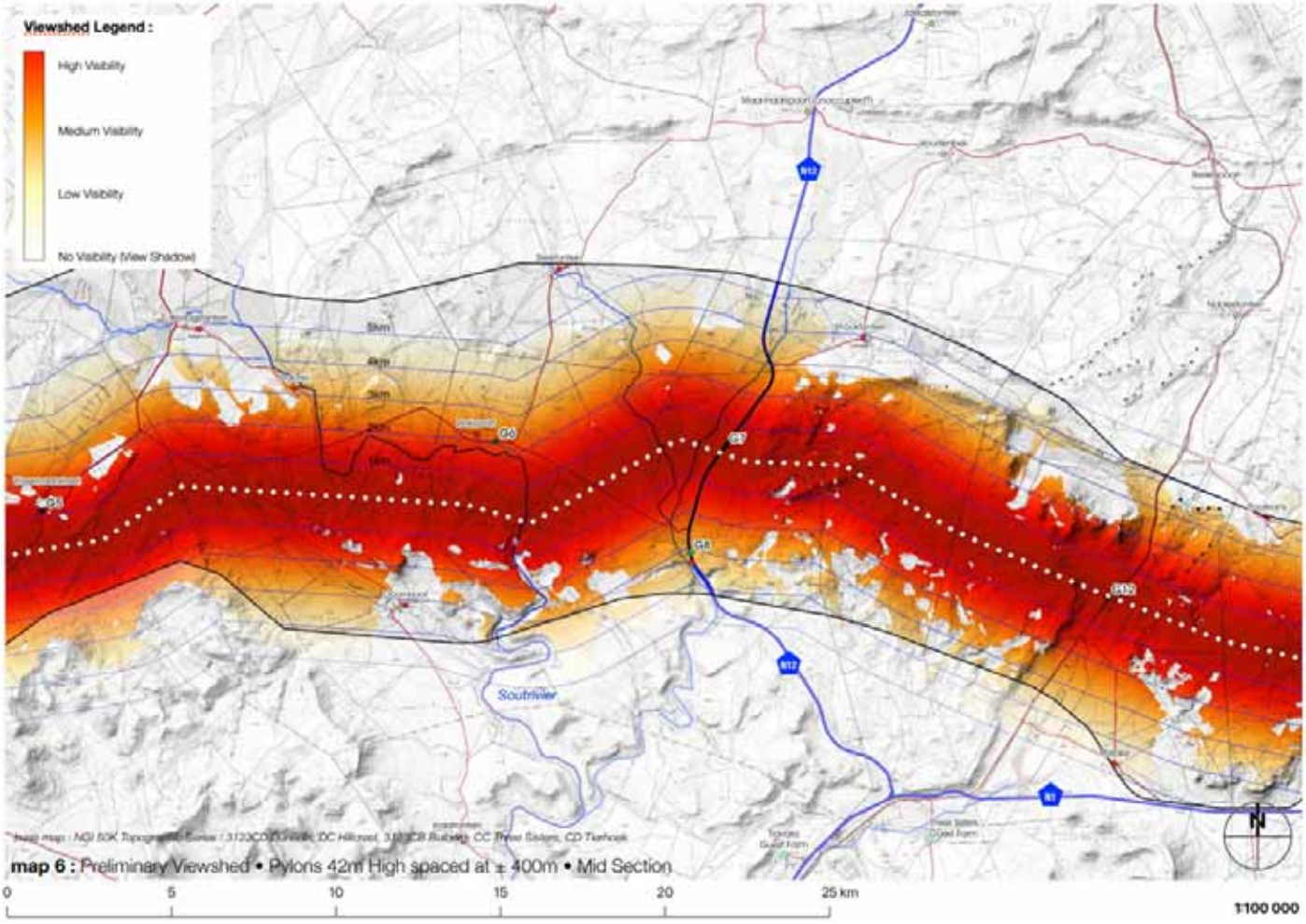


Figure 45: Viewshed of the pre-negotiated gridline route (b).

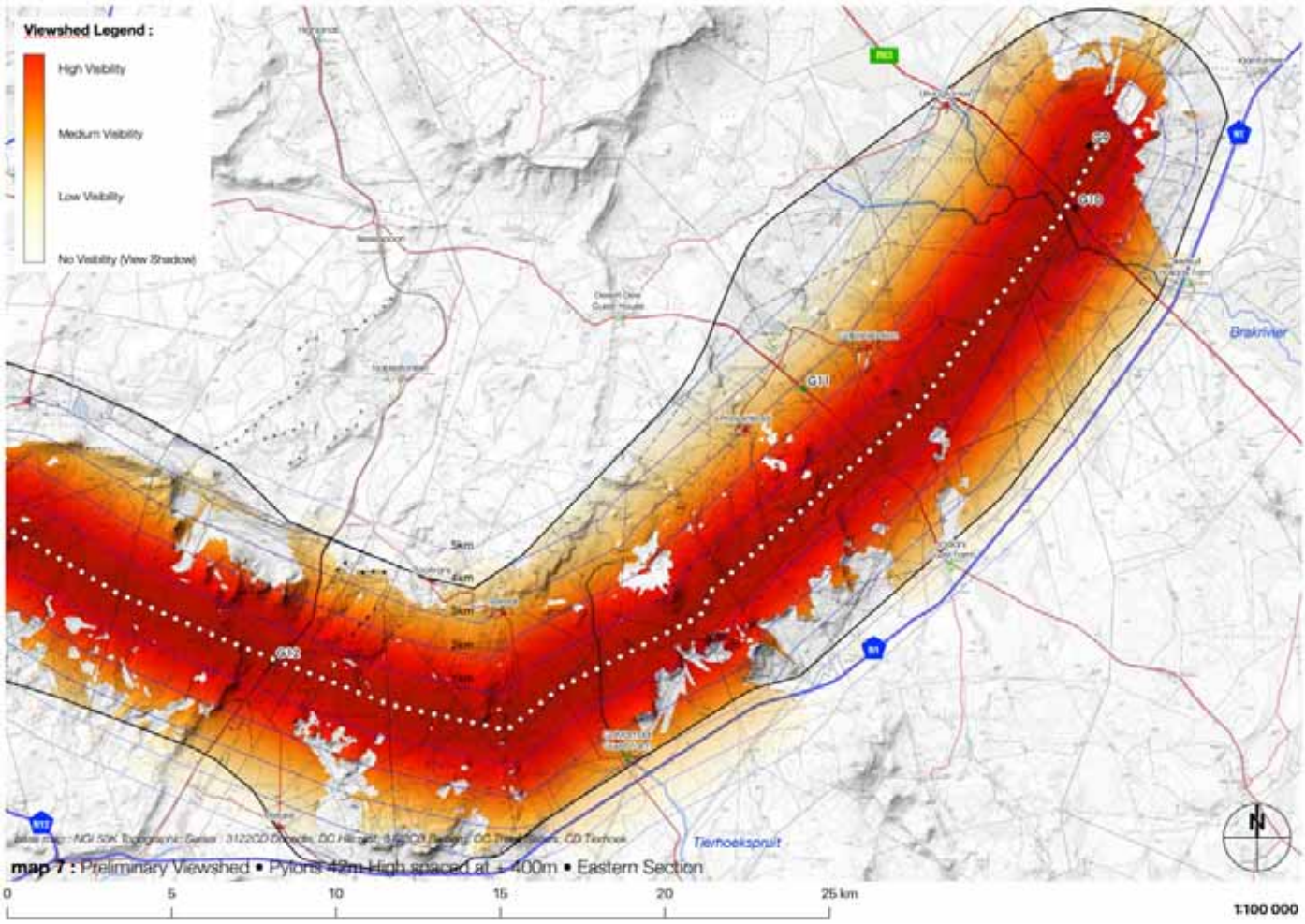


Figure 46: Viewshed of the pre-negotiated gridline route (c)

6.3.8.1 Construction Phase

Table 65: Visual Intrusion of construction activities

Project phase	Construction			
Impact	Visual Intrusion from construction activities			
Description of impact	Potential visual scarring of the landscape from earthworks for access roads, especially on steep slopes. Noise and dust generated by construction cranes and trucks when erecting pylons and building access roads.			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Use existing roads and tracks as far as possible for construction • Locate staging areas in unobtrusive positions away from farmsteads, scenic features, and scenic routes • Rehabilitate / revegetate disturbed areas as soon as construction is complete in the area • Dust suppression and litter control measures at construction camp and stockpiles to be monitored by the ECO (refer to the Generic EMPr).			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	Moderate	Natural and/ or social	Moderate	Natural and/ or social functions

		functions and/ or processes are moderately altered		and/ or processes are moderately altered
Probability	Certain / Definite	There are sound scientific reasons to expect the impact will definitely occur	Almost Certain / Highly Probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not scarce	Low	The resource is not irreparably damaged, or is not scarce
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Post-mitigation significance depends on effectiveness of mitigation implementation.			

6.3.8.2 Operational Phase

Table 66: Visual Intrusion Impacts of the 400 kV Powerline

Project phase	Operational			
Impact	Visual Intrusion of the 400 kV Powerline			
Description of impact	Potential visual intrusion impact of the 400 kV powerline on the rural landscape, scenic resources and sensitive receptors, including guest farms.			
Mitigatability	Medium	Mitigation exists, and will notably reduce the significance of the impacts		
Potential mitigation	• Avoid visually sensitive skylines, where possible, when routing the powerline • Avoid visual No Go areas when routing the powerline (including scenic gorges and cliffs and slopes steeper than 1:4 for pylon placement) • Align the proposed gridline as close to existing Eskom infrastructure as possible • Monitor visual mitigation measures on an on-going basis, including the maintenance of rehabilitated areas.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Ongoing	Impact will last between 15 and 20 years	Ongoing	Impact will last between 15 and 20 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / Definite	There are sound scientific reasons to expect the impact will definitely occur	Almost Certain / Highly Probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the	High	Substantive supportive data exists to verify the assessment

		assessment		
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not scarce	Low	The resource is not irreparably damaged, or is not scarce
Significance	**Medium Negative**		**Medium Negative**	
Comment on significance	There is little or no opportunity for visual screening of pylons.			

6.3.8.3 Decommissioning Phase

Table 67: Visual intrusion of pylon foundations and roads/tracks

Project phase	Decommissioning			
Impact	Visual Intrusion of remaining pylon foundations and roads/tracks in the rural landscape			
Description of impact	Effect of visual clutter of disused or abandoned pylons and structures			
Mitigatability	High	Mitigation exists, and will considerably reduce the significance of the impacts		
Potential mitigation	• Remove all pylons during decommissioning. Recycle material wherever possible and/or remove to a licenced landfill site • Rehabilitate all impacted areas to a visually acceptable standard, and signed off by the competent authority • Access roads that are no longer needed must be ripped and vegetated			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last between 1 and 5 years	Short term	Impact will last between 1 and 5 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain / Definite	There are sound scientific reasons to expect the impact will definitely occur	Almost Certain / Highly Probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not irreparably damaged, or is not scarce	Low	The resource is not irreparably damaged, or is not scarce
Significance	**Low Negative**		**Low Negative**	

Comment on significance	Decommissioning would only occur in the very long term if at all. Some slabs and structures would possibly remain.

6.3.8.4 Cumulative Impacts

The development of various renewable energy facilities in the region and their associated grid connections, when seen together with existing Eskom powerlines in the area, particularly in the eastern portion of the Assessment Corridor , would result in cumulative visual impacts resulting in some change to the largely rural character and sense of place of the area. The proposed powerline would follow existing Eskom powerlines in places, increasing the congruency of the project with existing infrastructure in this area, and thereby mitigating cumulative visual impacts on the landscape to a certain extent.

The entire proposed Grid Corridor falls within the Central Strategic Transmission Corridor, specifically intended for the placement of high-voltage overhead transmission infrastructure. In addition, the landscape in the eastern portion is already partly transformed by existing powerlines and the Gamma Substation (Lawson and Oberholzer, 2022).

Table 68: Cumulative Visual Impacts

Project phase	Operational			
Impact	Additional powerlines in the landscape, with others in a 30 km radius of the Gamma Corridor			
Description of impact	Combined visual effect of the Gamma Gridline, seen together with other Eskom powerlines			
Mitigatability	Low	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Align the proposed gridline as close to existing high voltage lines as possible			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Ongoing	Impact will last between 15 and 20 years	Ongoing	Impact will last between 15 and 20 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / Definite	There are sound scientific reasons to expect the impact will definitely occur	Almost Certain / Highly Probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will not recover from the impact without significant intervention	High	The affected environment will be able to recover from the impact

Resource irreplaceability	Low	The resource is not irreparably damaged, or is not scarce	Low	The resource is not irreparably damaged, or is not scarce
Significance	**Medium Negative**		**Medium Negative**	
Comment on significance	The entire Gamma Grid Corridor is within the Central Strategic Transmission Corridor which is specifically designed to accommodate high-voltage overhead transmission infrastructure.			

6.3.8.5 No-Go Alternative

The 'No-Go' alternative is the option of not constructing the project where the status quo would prevail. In the No-Go alternative, the absence of powerlines, as proposed, would mean that there would be no additional visual intrusion on the rural landscape and on settlements in the area. Landscape features and skylines would therefore remain intact where other powerlines do not exist (however, important to note that the entire Gamma Corridor is within a Strategic Transmission Corridor, and parts are within a Renewable Energy Development Zone). The downside is that renewable energy development in the region would be constrained. It is envisaged that the potential visual impact significance of the No-Go alternative would be 'neutral' as there would be no further visual impacts or benefits and the baseline is likely to persist as a stable status quo for the foreseeable future.

6.3.8.6 Conclusions and Recommendations

The planning of the route for the proposed grid connection has followed an iterative process, including a visual screening phase where visual sensitivity was identified, including 'No-Go' areas for the powerline development.

Scenic resources and sensitive receptors in the Corridor include a number of farms and guest farms, and have been, or will be avoided in the final alignment of the powerline. A range of visual and scenic features have been mapped, along with visual sensitivity maps and recommended buffers, which informed the preliminary routing of the powerline, and the pre-negotiated gridline route presented in this BAR.

The refined Corridor in which the powerline servitude would be located largely succeeds in avoiding visual constraints. Micro-siting of pylons could be considered if necessary within the Corridor during the pre-construction phase.

The grid connection could affect the rural quality, or sense of place, of the general area, including potential cumulative visual impacts when combined with existing Eskom connecting powerlines. Visual impacts of the project in all phases have been assessed above. The 400kV grid connection would have little scope for visual screening mitigation. The visual impact significance for the 400kV grid is considered moderate (-) and the grid corridor is therefore considered acceptable provided the mitigation measures are implemented, most importantly avoiding particularly scenic resources and particularly sensitive receptors.

The cumulative visual impact of existing and approved overhead transmission infrastructure in the region, along with the 400kV grid connection considered in this assessment is considered to be of moderate (-) significance. Given that the proposed overhead line is located within the Central Strategic Transmission Corridor (an area specifically identified to host this infrastructure), cumulative impacts associated with transmission infrastructure are to be expected.

It is the opinion of the Visual Specialists that the proposed grid connection does not present a potential fatal flaw in visual terms and could be authorised. Should the route of the proposed pre-negotiated grid connection be changed, the visual specialists must verify that this does not affect the visual impact significance as assessed in this report and must approve the revised route in writing.

6.3.9 Traffic Impacts

Construction phase will increase the number of vehicles on the road, and impact on the local road network. The most significant sources of construction traffic impacts will be from commuter trips and transportation of equipment and materials. The two activities are unlikely to take place simultaneously. Other than transporting transformers, no other abnormal loads are anticipated. Construction phase is estimated to be 24 months. The construction activities and duration might vary depending on the construction schedule (Schwarz, 2022).

Movement of construction personnel to the site will take place at the beginning of the work day (i.e. morning peak), and at the end of the workday (i.e. afternoon peak). Statistics show that the morning peak is more concentrated as the afternoon peak, while it has the same number of trips, is more spread out. Following the precautionary approach, the TIA adopted the morning concentrated peak as a worst-case scenario. The delivery of equipment and materials to the site is envisaged to occur during normal working hours, throughout the day. No night deliveries are anticipated and are strongly discouraged. Given the distance from the origin of the material and components and the development, it is assumed that most deliveries will only start arriving at the site an hour or two after work on site commences and will stop an hour or two before work on site concludes for the day. These activities constitute the Diurnal Traffic. The envisaged traffic timeframes are therefore:

- Morning Peak Traffic - between 6:30 to 7:30
- Diurnal Traffic - between 7:30 to 16:30
- Afternoon Peak Traffic - between 16:30 to 17:30

Baseline traffic in the Assessment Corridor is very low, and roads in the region operate well below their capacity and provide an adequate level of service.

The traffic volume generated during the peak construction phase of the development is estimated at:

- Peak Traffic: The maximum number of vehicles on the public road network during the Peak Traffic commuting personnel to the various zones is in the order of 10 vehicles per hour (vph). The most significant increase in traffic volumes resulting from the morning and evening peaks will be on the:
    - DR02317/1-4, during the connection activities at the authorised Nuweveld Collector Substation and construction of Zone 1 of the Gamma Gridline, and
    - TR01608, taking a precautionary approach, during possible future expansion of the Gamma Substation and Zone 9 of the Gamma Gridline under the hypothetical scenario that the Gamma Substation is expanded at the same time that the Gamma Gridline is constructed in this zone.
- Diurnal Traffic: The maximum number of vehicles on the roads in any given hour resulting from deliveries of equipment and material to the site is expected to be in the order of 1.25 vph for the substation, and 0.25 vph for the Transmission Line. The maximum number of additional vehicles on any one section of the road, within a given hour, is not expected to exceed 1.25. The most significant increase in traffic volumes resulting from deliveries to the sites will be on the N1 and TR01608 (Schwarz, 2022).

The overhead transmission line from Nuweveld Collector Substation to the Gamma Substation, will be operated and maintained by Eskom. It is envisaged that the overhead transmission line will be inspected biannually. The operator will use the public road to gain access to the servitude and conduct the inspection of the overhead transmission line along with the servitude, before emerging on the public road at the other end. Therefore, the impact of the overhead transmission line inspection on the public road is negligible in operational phase (Schwarz, 2022).

Decommissioning of the infrastructure is highly unlikely. However, should it take place in the long term, a separate TIA would need to be done at the time since many of the relevant characteristics (i.e. access routes, road geometry, traffic volumes, etc.) would have changed over the operational life of the development. Therefore, the TIA done by Schwarz (2022) as part of the current BA process does not cover impacts of the decommissioning phase.

Regarding cumulative traffic impacts, the only roads that would be affected by cumulative traffic effects are the TR05801 and DR02317. The traffic on these roads includes assumed traffic volumes from operational activities on the approved Nuweveld Wind Farms, construction of the proposed Hoogland Wind farms and activities associated with this Grid Connection, which includes any work performed at the Nuweveld Collector Substation and construction activities performed in Zone 1.

The public roads that would be affected by the daily commuting of personnel to and from the site, as well as the occasional delivery of supplies are:

- DR02317 (between the TR05801 and the last entrance to WTG)
- TR05801 (north of the DR02317)

- TR05801 (south of the DR02317)

Considering the above, Schwarz (2022) assessed the traffic impact of the construction phase of the development and the results are presented in the tables that follow.

6.3.9.1 Construction Phase

Table 69: Increased Road Incidents

Project phase	Construction			
Impact	Increased Road Incidents			
Description of impact	The increased traffic volumes on the public roads will increase the potential of incidents on the road network within the study area			
Mitigatability	Low	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Post relevant road signage along affected routes • Create a local WhatsApp Group, notifying users of expected deliveries and proposing alternative routes • Compile a Transport Management Plan once the contractor has been appointed and all the relevant details of the construction process are known. The Transport Management Plan needs to address, inter alia: o clearly define the route to the site for specific vehicles needed to transport equipment and materials o schedule delivery to avoid local congestion o all equipment and material transported via the DR02311 and the TR05801 shall be limited to a gross vehicle mass of ten tonnes • Ensure all vehicles are roadworthy, visible, properly marked, and operated by an appropriately licenced operator. • Provide drivers with advanced driver training • The treacherous southern section of the gravel road, between Beaufort West and site, TR05801, is to be upgraded by the developer, to improve the safety of the road for all road users, including the personnel commuting to and from the site on a daily basis • Make drivers aware of the extremely treacherous conditions through the passes on both the TR 05801 and the DR02311. • The developer shall implement the necessary steps to protect the pedestrians and livestock on the roads, specifically where the roads pass through farming homesteads, as these are a serious safety concern.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	Very High	Natural and/ or social functions and/ or processes are majorly altered	Very High	Natural and/ or social functions and/ or processes are majorly altered
Probability	Certain / Definite	There are sound scientific reasons to expect the impact will definitely occur	Certain / Definite	There are sound scientific reasons to expect the impact will definitely occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment	Low	The affected environment will

		will not be able to recover from the impact - permanently modified		not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Medium Negative**		**Medium Negative**	
Comment on significance	Reversibility is Low if the incident results in a fatality Resource irreplaceability is High if the incident results in a fatality.			

Table 70: Road Degradation

Project phase	Construction			
Impact	Road Degradation			
Description of impact	The increased traffic volumes on the public roads will increase the potential for localised degradation of the road network within the study area.			
Mitigatability	Medium	Mitigation exists and will notably reduce the significance of impacts		
Potential mitigation	• Create a local WhatsApp Group and post notices of road conditions and propose alternatives. • The developer shall contribute to the maintenance of the road network, affected by the development, during the construction and operational phases of the development. • A photographic record of the road condition should be maintained throughout the various phases of the development. This provides an objective assessment and mitigates any subjective views from road users. • Upgrade unpaved roads to a suitable condition for proposed construction vehicles. • Ensure that the roads are left in the same or better condition, post-construction.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	Medium	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not irreparably damaged, nor is it scarce	Low	The resource is not irreparably damaged, nor is it scarce
Significance	**Low Negative**		**Low Positive**	
Comment on significance	Intensity is Medium due to the risk of mechanical damage to vehicles and Low post-mitigation due to the reduced risk of mechanical damage to vehicles			

Table 71: Dust from construction vehicles on public roads

Project phase	Construction			
Impact	Dust			
Description of impact	The increased traffic volumes on unpaved public roads will generate more dust. The larger the vehicle the more dust is likely to be generated, this dust hinders the drivers wishing to over-take without a clear view for over-taking, resulting in drivers taking unnecessary chances, which could result in unfavourable consequences.			
Mitigatability	Low	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Reduce travel speed on the gravel road to reduce dust • Use dust suppression on gravel roads if required • Regular preventative maintenance of roads should be conducted over weekends to minimise the impact on the normal construction period			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged, and is not represented elsewhere	High	The resource is irreparably damaged, and is not represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Reversibility is Low if the incident results in a fatality Resource irreplaceability is High if the incident results in a fatality			

Table 72: Intersection Safety

Project phase	Construction	
Impact	Intersection Safety	
Description of impact	The increased traffic volumes at intersections will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities. Especially at the intersection on the main roads, when vehicles from the site need to cross over oncoming traffic	
Mitigatability	Medium	Mitigation exists and will notably reduce the significance of impacts
Potential mitigation	• The various intersections will need to be accessed and upgraded by the developer to accommodate the expected transportation requirements. This upgrade would need to be implemented to facilitate the delivery of loads to the site. • Compile a Transport Management Plan once the contractor has been appointed and all the relevant details of	

	the construction process are known. • The developer shall implement the necessary steps to protect the pedestrians and livestock on the roads, specifically where the roads pass through farming homesteads, as these are a serious safety concern. • The developer shall ensure that the contractor provides the necessary driver training to key personnel, to minimise the potential of incidents on the public road network. • Temporary signs warning motorists of construction vehicles should be erected on the approaches to the access roads. • Reduce speed at intersections and use appropriate traffic warning signs. • Identify alternative routes where possible. • Request the assistance of local law enforcement. • Ensure all vehicles are roadworthy, visible, properly marked, and operated by an appropriately licenced operator. • Consultation with the local road authorities, regarding the upgrading of several intersections on the public road network.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Very Limited	Limited to specific isolated parts of the site	Very Limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged, and is not represented elsewhere	High	The resource is irreparably damaged, and is not represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Reversibility is Low if the incident results in a fatality Resource irreplaceability is High if the incident results in a fatality			

Table 73: Stringing Transmission Lines across existing infrastructure – temporary delay in traffic

Project phase	Construction		
Impact	Stringing Transmission Lines Across Existing Infrastructure – temporary delay in traffic		
Description of impact	During the stringing of overhead transmission lines across public roads, the traffic will be temporarily delayed		
Mitigatability	Low	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts	
Potential mitigation	• Construct temporary structures on either side of the road to support the transmission lines over the public road thus mitigating road closure		
Assessment	**Without mitigation**		**With mitigation**

Nature	Negative		Negative	
Duration	Immediate	The impact will self-remedy immediately	Brief	The impact will not last longer than 1 year
Extent	Very Limited	Limited to specific isolated parts of the site	Very Limited	Limited to specific isolated parts of the site
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will occur	Certain / definite	There are sound scientific reasons to expect that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Very Low Negative**		**Very Low Negative**	
Comment on significance	This will occur whenever the overhead transmission line crosses a public road. All work is to be done in accordance with the local authority's requirements.			

6.3.9.2 Cumulative Impacts

Table 74: Cumulative Impact – Increased Road Incidents

Project phase	Construction	
Impact	Increased Road Incidents	
Description of impact	The increased traffic volumes on the public roads will increase the potential of incidents on the road network within the study area	
Mitigatability	Low	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts
Potential mitigation	• Post relevant road signage along affected routes • Create a local WhatsApp Group, notifying users of expected deliveries and proposing alternative routes • Compile a Transport Management Plan once the contractor has been appointed and all the relevant details of the construction process are known. • Ensure all vehicles are roadworthy, visible, properly marked, and operated by an appropriately licenced operator. • Provide drivers with advanced driver training • Make drivers aware of the extremely treacherous conditions through the passes on both the TR 05801 and the DR02311. • The developer shall implement the necessary steps to protect the pedestrians and livestock on the roads, specifically where the roads pass through farming homesteads, as these are a serious safety concern.	
Assessment	**Without mitigation**	**With mitigation**
Nature	Negative	Negative
Duration	Short term – Impact will be between 1 and 5 years	Short term – Impact will be between 1 and 5 years

Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	Very High	Natural and/ or social functions and/ or processes are majorly altered	Very High	Natural and/ or social functions and/ or processes are majorly altered
Probability	Certain / Definite	There are sound scientific reasons to expect the impact will definitely occur	Certain / Definite	There are sound scientific reasons to expect the impact will definitely occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged and is not represented elsewhere	High	The resource is irreparably damaged and is not represented elsewhere
Significance	**Medium Negative**		**Medium Negative**	
Comment on significance	Reversibility is Low if the incident results in a fatality Resource irreplaceability is High if the incident results in a fatality.			

Table 75: Cumulative Impacts – Road Degradation

Project phase	Construction			
Impact	Road Degradation			
Description of impact	The increased traffic volumes on the public roads will increase the potential for localised degradation of the road network within the study area.			
Mitigatability	Medium	Mitigation exists and will notably reduce the significance of impacts		
Potential mitigation	• Create a local WhatsApp Group and post notices of road conditions and propose alternatives. • Developer to contribute to the maintenance of the public roads during the construction phases of the development. • A photographic record of the road condition should be maintained throughout the various phases of the development. This provides an objective assessment and mitigates any subjective views from road users. • Upgrade unpaved roads to a suitable condition for proposed construction vehicles. • Ensure that the roads are left in the same or better condition, post-construction.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	Medium	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on	Medium	Determination is based on

		common sense and general knowledge		common sense and general knowledge
Reversibility	High	The affected environment will be able to recover from the impact	High	The affected environment will be able to recover from the impact
Resource irreplaceability	Low	The resource is not irreparably damaged, nor is it scarce	Low	The resource is not irreparably damaged, nor is it scarce
Significance	**Low Negative**		**Low Positive**	
Comment on significance	Intensity is Medium due to the risk of mechanical damage to vehicles and Low post-mitigation due to the reduced risk of mechanical damage to vehicles			

Table 76: Cumulative impacts – Dust

Project phase	Construction			
Impact	Dust			
Description of impact	The increased traffic volumes on unpaved public roads will generate more dust. The larger the vehicle the more dust is likely to be generated, this dust hinders the drivers wishing to over-take without a clear view for over-taking, resulting in drivers taking unnecessary chances, which could result in unfavourable consequences.			
Mitigatability	Low	Mitigation does not exist, or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Reduce travel speed on the gravel road to reduce dust • Use dust suppression on gravel roads if required • Regular preventative maintenance of roads should be conducted over weekends to minimise the impact on the normal construction period			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Local	Extending across the site to surrounding settlements	Local	Extending across the site to surrounding settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged, and is not represented elsewhere	High	The resource is irreparably damaged, and is not represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Reversibility is Low if the incident results in a fatality Resource irreplaceability is High if the incident results in a fatality			

Table 77: Cumulative Impacts – Intersection Safety

Project phase	Construction			
Impact	Intersection Safety			
Description of impact	The increased traffic volumes at intersections will increase the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities. Especially at the intersection on the main roads, when vehicles from the site need to cross over oncoming traffic			
Mitigatability	Medium	Mitigation exists and will notably reduce the significance of impacts		
Potential mitigation	• Compile a Transport Management Plan once the contractor has been appointed and all the relevant details of the construction process are known. • Reduce speed at intersections and use appropriate traffic warning signs • Identify alternative routes where possible • Request the assistance of local law enforcement • Ensure that all construction vehicles are roadworthy • Ensure all vehicles are roadworthy, visible, properly marked, and operated by an appropriately licenced operator. • Consultation with the local road authorities, regarding the upgrading of several intersections on the public road network			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will be between 1 and 5 years	Short term	Impact will be between 1 and 5 years
Extent	Very Limited	Limited to specific isolated parts of the site	Very Limited	Limited to specific isolated parts of the site
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	High	Natural and/ or social functions and/ or processes are notably altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	Low	The affected environment will not be able to recover from the impact - permanently modified	Low	The affected environment will not be able to recover from the impact - permanently modified
Resource irreplaceability	High	The resource is irreparably damaged, and is not represented elsewhere	High	The resource is irreparably damaged, and is not represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Reversibility is Low if the incident results in a fatality Resource irreplaceability is High if the incident results in a fatality			

6.3.9.3 No-Go Alternative

The 'No-Go' alternative means that the development will not go ahead. In this instance, the increase in the traffic volume will not transpire, resulting in the following impacts:

- Road Degradation

Less traffic on the roads means that the rate of degradation of the roads will be less. However, the maintenance of the roads will not be augmented by the proposed development. Improved maintenance of the roads will improve the quality of life for the road users and increase the economic opportunities in the area.

- Road Safety

Less traffic on the roads means less probability of an incident, reducing the likelihood of a fatality.

The negative impacts on the road network due to the development are counteracted by the improved road maintenance and economic prospects the development will bring to the local community, and the impact the development has on a national scale. The impact of the No-Go alternative is therefore neutral.

6.3.9.4 Conclusions and Recommendations

The TIA specialist concluded that the construction of the Gamma Grid Connection will cause an increase in traffic volumes on the road network during the construction phase. However, the impact of additional traffic on the surrounding road network is that the existing road network is currently operating at well below its capacity and provides an adequate level of service, although the road network is not well maintained due to budgetary constraints within various spheres of government. The increase in traffic volumes will lead to greater wear and tear, especially during construction, but will not have an undue detrimental impact on the road network within the study area if the mitigation measures are implemented.

It is the reasoned opinion of the specialist, from a traffic and transportation perspective, that the construction of the transmission lines within the Grid Corridor can be approved, as there are no constraints or notable impacts that would jeopardise the implementation of the Grid Connection, subject to the following recommendations being made 'Conditions of Authorisation':

- All remedial work or modifications to any of the public roads shall be done in consultation with and have the approval of the local road's authority (as is standard practice this will be finalised during design phase, and be a requirement of the municipal planning approval process).
- Compile a Traffic Management Plan once the contractor has been appointed and all the relevant details of the construction processes are known.
- Implement the transport impact mitigation measures.

6.3.10 Socio-Economic Impacts

An assessment of the project activities on the socio-economic environment of the project's area of influence has been done by Index Consulting. A summary of the specialist's main findings from the assessment of construction and operational phase impacts is as follows:

- Construction phase

- It is anticipated that construction will take place over a period of up to 24 months. Construction phase holds various positive and negative social and socio-economic impacts for the receiving environment.
- The labour force in the study area has limited skills with low education levels. In addition, the manufacturing sector contributes only marginally to employment. It is therefore anticipated that unskilled labour for construction will be available from the direct project sending area, but that the majority of the semi- and skilled workers will be deployed from other provinces.
- The improvement of skills and training requirements amongst the workforce, SMME's and municipal structures has been identified as a great need in the study area.
- Communication and transparency between the IPP's and municipal structures are required from the on-set of the project.
- A number of positive impacts will manifest for the local, regional and national economies as a result of construction phase.
- Efficient management of the construction process and efficient land use management practices are required to reduce the significance of negative impacts that could occur for landowners and the broader study area.

- Operational phase:
  - Once operational, Eskom will be the owner of the Gamma Grid. At this stage it is not anticipated that the grid will be decommissioned and for purposes of the impact assessment, the duration of the project is thus permanent. The line will be a valuable asset to the national grid and particularly to the Eskom power line network. The grid will require intermittent maintenance and repair work, which will be undertaken by Eskom staff and contractors.
  - Positive economic impacts during the operational phase relate to the contribution of renewable energy to the national grid, and (limited) direct and indirect employment for operations and maintenance of the powerline and impacts that manifest due to procurement of capital goods, general construction and building material and infrastructure elements.
  - Negative impacts may also manifest for landowners should their property values depreciate and if impacts on sense of place and tourism occur, mainly as a result of visual impacts and poor land use management practices. Mitigation is therefore essential, and is provided in the section below.

6.3.10.1 Construction Phase

Table 78: Temporary employment

Project phase	**Construction**	
Impact	**Temporary employment**	
Description of impact	Direct, indirect and induced employment creation as a result of construction activities and positive spin-off effects on the local, regional and national economies through procurement of goods and services.	
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts

Potential mitigation	• Although mitigatability of the impact is "low", emphasis is placed on employment of locals and local supporting industries (SMME's, etc.) from the Project's direct sending area. • Maximise local content through the Preferential Procurement Plan and Contractor Services Management Plan (CSMP) for all contractors that are used. • Involve the Ubuntu and BWLM LED Units and the PKSDM and CKDM from the early processes (from financial close already if possible). Determine their existing processes with regards to a labour desk and streamline the employment process between the various stakeholders. • Employ a Community Employer Relations Officer / Community Liaison Officer (CLO). Communication with communities should only take place through this one channel to ensure transparency, limit unrealistic expectations and to avoid conflict.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	National	Impacts felt at a national level	National	Impacts felt at a national level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Medium Positive**		**Medium Positive**	
Comment on significance	Temporary increase in employment for the local and national economies (to lesser extent) is definite, with a pre-mitigation "low" intensity and Medium (positive) significance. Post mitigation the intensity of temporary employment could increase to "moderate".			

Table 79: Local Procurement

Project phase	**Construction**			
Impact	**Local Procurement**			
Description of impact	Positive impacts on the local, regional and national economies as a result of procurement of capital goods, general construction and building material and infrastructure elements.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Maximise the local content of procurement in consultation with the local authorities.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	National	Impacts felt at a national level	National	Impacts felt at a national level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Moderate	Natural and/ or social functions and/ or processes

				are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Medium Positive**		**Medium Positive**	
Comment on significance	Mitigation will enhance the intensity of the impact from "low" to "moderate" with Medium (positive) overall significance for the local, regional and national economies. Although the specific Procurement Policy has not been formulated yet, 25% of the DMRE scorecard is based on local content.			

Table 80: Induced Local Economic Impacts

Project phase	**Construction**			
Impact	**Induced local economic impacts**			
Description of impact	Expenditure during construction results in the creation of downstream business opportunities, especially with regards to service and manufacturing sectors. Local businesses benefit due to an increase in income levels and higher spending power. Downstream opportunities further result in indirect employment and incomes through indirect and induced effects of the project. A general increase in livelihoods will manifest for participating households.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	Apart from the recommendation to maximise local content of the Project, no mitigation is possible.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	National	Impacts felt at a national level	National	Impacts felt at a national level
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Very low	Natural and/ or social functions and/ or processes are slightly altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce

Significance	Medium Positive	Medium Positive
Comment on significance	Direct and induced impacts of Medium (positive) overall significance are likely to manifest locally and nationally over the short-term.	

Table 81: Training/Skills development

Project phase	Construction			
Impact	Training / Skills Development			
Description of impact	Training / skills development during the construction phase that will increase the employability of the region's workforce, thereby addressing poverty alleviation over the medium to long term.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	Where feasible, the Developer should: • Provide on-the-job training to lower skilled workers. • Make the skill requirements clear to the municipalities in advance and do a skills analysis of the available labour force. • Require larger contractors to work with small SMMEs to train and transfer skills and include this in their respective CSMP. • Capacitate the local relevant local government structures by involving them as early as possible in the project; remain transparent throughout the processes.			
Assessment	Without mitigation		With mitigation	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Likely	The impact may occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	Low Positive		Low Positive	
Comment on significance	Pre-mitigation training/skills development of workers/SMMEs and local government is rated with a Low (positive) significance, as training is at the discretion of each individual contractor. Mitigation has the potential to increase the intensity and likelihood of the impact manifesting, but the overall significance remains Low (positive).			

Table 82: Employment Equity

Project phase	Construction
Impact	Employment Equity

Description of impact	The purpose of Employment Equity is to improve the inclusion of previously disadvantaged individuals in the project processes.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Formulate an Employment Equity Plan prior to construction commencing and include targets for the employment of PDI's, women, Youth and the disabled.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	National	Impacts felt at a national level	National	Impacts felt at a national level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Low Positive**		**Medium Positive**	
Comment on significance	Pre-mitigation the impact on Employment Equity is rated with a Low (positive) significance. Post-mitigation the intensity will increase (from "low" to "medium"), as well as the significance to Medium. The impact is felt at national level, as Black South Africans and PDI's can be drawn from the entire country. Maximisation of locals from the Project direct sending area would however be more advantages.			

Table 83: Influx of jobseekers / temporary workers

Project phase	**Construction**	
Impact	**Influx of jobseekers / temporary construction workers**	
Description of impact	An outside labour force and/or an influx of jobseekers can result in a number of negative impacts for the local and regional municipalities, especially with regards to social issues that remain after the construction period has ended.	
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts
Potential mitigation	<u>Employment / Temporary construction workers</u>: • Clearly identify the beneficiary communities / labour sending area. Give preference to locals that originate from the towns closest to the construction site, and expand the labour sending area progressively. • Work through limited communication channels (e.g. Ward Councillors and the Employer Relations Officer / CLO). • No recruitment of temporary workers at the access to the construction sites. • Contractors to provide a transport and housing plan: (i) no workers are allowed to be housed on site or in informal housing / settlements; (ii) include arrangements that enable workers from outside the area to return home over weekends or at regular intervals.	

	• Be vigilant not to raise unrealistic expectations amongst the local communities and workers with regards to employment, skills requirements, local procurement and so forth. • It is also recommended that the Developer embarks on a Social Awareness Campaign for the workforce that focuses on sexual health, unwanted pregnancies and related social issues. <u>Security, safety and environmental health</u>: • 24-hour security, where possible demarcate and fence the construction site to prevent trespassing of livestock and people, material stores to be secured, access control and no trespassing of workers outside designated construction areas. • Consult with landowners to ensure that the R100 000 per annum committed towards security measures are effectively implemented. • If feasible, join the local community policing forum or similar initiative for the duration of construction. • Keep the local SAPS, other emergency services, ward Councillors, landowners and other relevant stakeholders informed about the construction progress and time-lines. • Develop a Fire / Emergency Management Plan in conjunction with affected and neighbouring landowners. • Display "danger" warning signs and "no public access" signs at all potential accesses, paths and along the periphery of the construction areas in English and the local languages. • Ensure implementation of the provisions of the Occupational Health and Safety Act No. 85 of 1993 and adhere to the Emergency and Safety plan procedures for the duration of the construction phase. <u>Awareness / community engagement</u>: • Keep open communication channels with the landowners and address any potential issues as a matter of priority. • Make contact details of the main contractor and procedures to lodge complaints available to the local communities. • Make a complaints register / log book available at the entrance to the construction site and act immediately should issues arise. • Where required, draw up a land use management plan with individual landowners to protect livestock and farmland, which addresses restricted access areas, procedures when farm gates are opened and closed and so forth. • Rehabilitate the veld to its original state post construction.

Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge

Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Negative impacts associated with the influx of an outside workforce / jobseekers are "likely" to manifest pre-mitigation, with Low (negative) overall significance. Mitigation will reduce the probability of the impact to "probable" and the intensity from "moderate" to "low", and the significance post-mitigation will remain Low (negative). Confidence in the rating is "medium" as the Ubuntu LM indicated that impacts associated with an influx of workers have occurred in the past. The BWLM however did not have experiences with large-scale construction projects where examples of such occurrences could be drawn from.			

Table 84: Intrusion impacts

Project phase	**Construction**			
Impact	**Intrusion impacts**			
Description of impact	Intrusion impacts refer to noise, visual/aesthetic impacts and dust/fume emissions as a result of earthworks, movement of construction vehicles on access roads and general construction activities. The severity of intrusion impacts will increase if sensitive receptors (farmsteads, guest houses, scenic routes, etc.) are located in close proximity to the construction areas. Dust could also impact the livelihood of landowners if the quality of wool is affected.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Comply with the generic EMPr for overhead transmission lines with regards to noise and dust. • Implement all mitigation and management measures of the Visual Specialist to reduce visual impacts during construction.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	impact will last between 1 and 5 years	Short term	impact will last between 1 and 5 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Low Negative**		**Low Negative**	
Comment on significance	The probability of the impact occurring could reduce from "definite" to "almost certain", but would depend on the effectiveness of the mitigation implementation and general management of the construction process. The overall significance remains Low (negative).			

6.3.10.2 Operational Phase

Table 85: Impacts on National Power Supply

Project phase	**Operation**			
Impact	**Impacts on national power supply**			
Description of impact	The Grid will allow Eskom to release further renewable energy potential into the national grid to address the national energy crisis, thereby contributing to development.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	None.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	National	Impacts felt at a national level	National	Impacts felt at a national level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**High Positive**		**High Positive**	
Comment on significance	A High (positive) Impact will occur, even though the intensity is rated as 'low'.			

Table 86: Impact on Land Values

Project phase	**Operation**			
Impact	**Impacts on land values**			
Description of impact	Devaluation of farmland values as a result of impacts on the landscape character of the study area and sense of place.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Avoid the powerline alignment closer than 1 km from any sensitive receptors. • In the eastern section of the powerline, place the infrastructure as far as possible within existing Eskom electricity servitudes. • Implement the VIA mitigation and avoid no-go areas.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered

Probability	Probable	The impact has occurred here or elsewhere and could therefore occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Low Negative**		**Low Negative**	
Comment on significance	It is expected that, should devaluation of farm land values occur, it will be a temporary occurrence that should diminish over the short to medium-term. The impacts has a Low (negative) overall significance.			

Table 87: Land Use Impacts

Project phase	**Operation**			
Impact	**Land use impacts**			
Description of impact	Existing land uses that occur are agriculture (grazing), limited crop production mainly in close proximity to homesteads, residential and a few guest houses. The Agricultural Compliance Statement confirmed that the proposed Project will have negligible agricultural impact. A buffer of at least 1 km will be maintained between the powerline infrastructure and residences/guest houses.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Avoid the powerline alignment closer than 1 km from any sensitive receptors. • In the eastern section of the powerline, place the infrastructure as far as possible within existing Eskom servitudes.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Very low	Natural and/ or social functions and/ or processes are slightly altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur	Unlikely	Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Very Low Negative**		**Very Low Negative**	
Comment on significance	The impact on existing land uses are deemed to be negligible.			

Table 88: Impacts on Tourism

Project phase	Operation			
Impact	**Tourism impacts**			
Description of impact	Potential negative impacts on the existing tourism landscape as a result of visual impacts and/or impacts on the sense of place, including impacts on guest houses and guest farms.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Avoid sensitive areas. • Erect the powerline where visual intrusion for sensitive receptors are the least. • Implement a buffer of at least 1 km or more between the powerline and accommodation establishments.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Limited	Limited to the site and its immediate surroundings	Limited	Limited to the site and its immediate surroundings
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	There are a limited number of guest houses / guest farms in the project vicinity. However for this assessment the intensity of the impact Is rated as "moderate" resulting in Low (negative) overall significance. Mitigation will reduce the likelihood of the impact manifesting, but the significance remains Low (negative).			

Table 89: Impacts on Sense of Place

Project phase	Operation			
Impact	**Impacts on sense of place**			
Description of impact	The social impact associated with the long-term impact on sense of place (landowners' / community's perception of their living environment and how they make meaning of their experiences in that environment) for this project mainly relate to changes in the landscape character and visual impacts of the powerline infrastructure.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Implement all mitigation measures as proposed by the VIA Specialist to limit visual intrusion to the maximum. • Maintain the servitude / access track for the duration of the project.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements

Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Low	Judgement is based on intuition	Low	Judgement is based on intuition
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Impacts on sense of place is rated with a Low (negative) significance. Confidence is "low" as sense of place is a personal experience and cannot be rated accurately in a scientific manner.			

Impacts that were considered but found to be insignificant

Employment and induced Economic Impacts: For ongoing maintenance of the powerline and servitude, limited employment (if any) will manifest, as Eskom will most likely make use of their existing maintenance teams. Opportunities for downstream supporting industries and local procurement are possible during these maintenance procedures. Impacts on employment, local procurement and induced economic impacts during the operational phase are however deemed to be insignificant.

6.3.10.3 Decommissioning Phase

The Gamma Grid will become part of the national grid and it is unlikely that it will be decommissioned. Should it be decommissioned, the affected land will be rehabilitated to its pre-project state. In the unlikely event that decommissioning occurs, the impacts are expected to be similar to construction phase impacts and can generally be mitigated effectively. Impacts include:

- Influx of workers;
- Traffic and intrusion impacts and general impacts on the sense of place;
- Potential security issues;
- Impacts on road infrastructure; and
- Health and Safety impacts for workers and community members.

Short-term positive impacts would occur for the local and regional economies as a result of employment, procurement, SMME opportunities, and an increase in household incomes, economic spin-offs and induced impacts related thereto. As decommissioning is unlikely and the timing with regards to the replacement of infrastructure, if it occurs, cannot be determined at this stage, it is recommended that a detailed SEIA be undertaken at the time of decommissioning to determine the actual impacts on the changing social environment at that stage. No rating has therefore been provided by the specialist for socio-economic impacts from decommissioning activities as they will be irrelevant

6.3.10.4 Cumulative Impacts

Operational and approved WEF and High Voltage Lines in the 30 km radius of the Gamma Corridor are considered in the assessment of cumulative socio-economic impacts (see Section **Error! Reference source not found.**).

Table 90: Cumulative Impacts: Employment, Economic Contribution and Induced Impacts

Project phase	**Construction and Operational**			
Impact	**Employment, economic contribution and induced impacts**			
Description of impact	As a result of construction, maintenance and repairs the construction and operational phases of the various RE and powerline projects will result in positive cumulative impacts nationally and locally in terms of employment (permanent, temporary, indirect), new business opportunities, improvement of incomes and spin-offs for benefitting businesses. This results in increasing skill levels and improvement of livelihoods.			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	No mitigation is required.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	National	Impacts felt at a national level	National	Impacts felt at a national level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**High Positive**		**High Positive**	
Comment on significance	National and local economic benefits are definite to manifest due to the cumulative effect of the projects, with a High positive significance.			

Table 91: Cumulative Impacts: Impacts for the Local and District Municipalities

Project phase	**Construction and Operational**			
Impact	**Impacts for the Local and District Municipalities**			
Description of impact	Positive cumulative impacts for the municipalities with regards to: (i) a better skilled population resulting in higher employability levels; and (ii) capacity building of municipal staff when they are involved in the various process (e.g. employment, permitting, communication and liaison, support programmes, monitoring, SMME training and so forth).			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Involve the Municipal structures from the onset of the projects. • Hold preliminary discussions and draw up a MoU so that roles and responsibilities are clear.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Positive		Positive	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Regional	Impacts felt at a regional / provincial level	Regional	Impacts felt at a regional / provincial level
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	Medium	Determination is based on common sense and general knowledge	Medium	Determination is based on common sense and general knowledge
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Medium Positive**		**Medium Positive**	
Comment on significance	On-going and permanent projects will have a positive Medium significance for capacity building in the affected municipal structures as well as skills development for the population during the construction and lifespan of the projects.			

Table 92: Cumulative Impacts: Land Values

Project phase	**Operational**		
Impact	**Impact on land values**		
Description of impact	Possible devaluation of farmland due to visual impacts of infrastructure, changes in the landscape character and/or sense of place due to various developments. However, the cumulative impact of developments of this scale would boost the local economy, thereby also improving property values. In addition the increase in demand for land in the study area for renewable energy purposes could increase the asking price of specific farm portions over the short to medium term.		
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts	
Potential mitigation	• Avoid placing infrastructure at sensitive localities. • Implement all the mitigation measures as proposed by the VIA Specialist. • Continuous Environmental Monitoring, communication and transparency between Developers and Landowners in construction phase.		
Assessment	**Without mitigation**		**With mitigation**

Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Negligible	Natural and/ or social functions and/ or processes are negligibly altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Low	Judgement is based on intuition	Low	Judgement is based on intuition
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Low Negative**		**Low Negative**	
Comment on significance	Pre- and post-mitigation: the cumulative impact on land values are rated with a Low (negative) significance. Confidence in the rating is "low" as results of research regarding this topic are inconsistent and no real consensus exists. Asking price of properties might even increase due to local economic injections.			

Table 93: Cumulative Impacts: Influx of jobseekers/temporary workers

Project phase	**Construction**			
Impact	**Influx of jobseekers / Temporary construction workers**			
Description of impact	Cumulative impacts associated with an influx of 'outsiders' due to the various projects in the study area.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Employment of locals from the study area as far as possible. • Hold contractors accountable through their CSMP's to employ a local labour force through the labour desk, provide a transport and housing plan, etc.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	On-going	Impact will last between 15 and 20 years	On-going	Impact will last between 15 and 20 years
Extent	Municipal area	Impacts felt at a municipal level	Municipal area	Impacts felt at a municipal level
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	Medium	The affected environment will only recover from the impact with significant intervention
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Low Negative**		**Low Negative**	

Comment on significance	Pre- and post-mitigation cumulative impacts of Low (negative) significance could manifest for the local and district municipalities. However, mitigation is essential as it will reduce the intensity of the impact (from "moderate" to "low") and the likelihood (from "likely" to "probable").

Table 94: Cumulative Impacts: Intrusion

Project phase	**Operational**			
Impact	**Intrusion impacts**			
Description of impact	Cumulative intrusion impacts as a result of combined impacts of noise, air/dust pollution, and visual impacts			
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts		
Potential mitigation	• Place grid infrastructure parallel with existing Eskom powerlines whenever possible. • Avoid No-Go areas.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Low	Natural and/ or social functions and/ or processes are somewhat altered	Low	Natural and/ or social functions and/ or processes are somewhat altered
Probability	Certain / definite	There are sound scientific reasons to expect that the impact will definitely occur	Almost certain / Highly probable	It is most likely that the impact will occur
Confidence	High	Substantive supportive data exists to verify the assessment	High	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected environment will only recover from the impact with significant intervention	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Medium Negative**		**Medium Negative**	
Comment on significance	A cumulative intrusion impact of Medium (negative) significance is expected, due to visual impacts that would manifest. Dust/air, noise and so forth can usually be mitigated.			

Table 95: Cumulative Impacts: Tourism

Project phase	**Operational**		
Impact	**Impacts on tourism**		
Description of impact	Cumulative impact as a result of the various existing and future WEF and powerline projects that could possibly increase tourism risks. No clear data (and especially local data) exists to back this statement, as studies are inconclusive and would depend on variables, such as the receiving environment, location, technologies, size of the wind farms, etc. Also, local economic boosts due to these developments may be a catalyst for added tourism development and opportunities.		
Mitigatability	Low	Mitigation does not exist; or mitigation will slightly reduce the significance of impacts	
Potential mitigation	• Implement all measures proposed in the VIA to minimse impacts on visual intrusion for sensitive receptors. • Ensure effective land use management at the sites and their surrounds.		
Assessment	**Without mitigation**		**With mitigation**
Nature	Negative		Negative

Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	Moderate	Natural and/ or social functions and/ or processes are moderately altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Almost certain / Highly probable	It is most likely that the impact will occur	Likely	The impact may occur
Confidence	Low	Judgement is based on intuition	Low	Judgement is based on intuition
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Medium	The resource is damaged irreparably but is represented elsewhere	Medium	The resource is damaged irreparably but is represented elsewhere
Significance	**Medium Negative**		**Low Negative**	
Comment on significance	Mitigation will reduce the likelihood of the impact manifesting, which could reduce the significance from Medium to Low (negative). Confidence in the rating is "low" as no conclusive evidence exists to back the assessment of negative tourism risks.			

Table 96: Cumulative Impacts: Sense of Place

Project phase	**Operational**			
Impact	**Impacts on sense of place**			
Description of impact	Collective impacts of the various WEF and powerline developments that cause changes to the landscape character, negative intrusion impacts, increase in stock theft and crime, increase in traffic and poor land use management practices that alter the landowners' perception of their living environment.			
Mitigatability	Medium	Mitigation exists and will notably reduce significance of impacts		
Potential mitigation	• Implement mitigation and management measures as proposed by the VIA and HIA Specialists.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Permanent	Impact may be permanent, or in excess of 20 years	Permanent	Impact may be permanent, or in excess of 20 years
Extent	Local	Extending across the site and to nearby settlements	Local	Extending across the site and to nearby settlements
Intensity	High	Natural and/ or social functions and/ or processes are notably altered	Moderate	Natural and/ or social functions and/ or processes are moderately altered
Probability	Likely	The impact may occur	Probable	The impact has occurred here or elsewhere and could therefore occur
Confidence	Low	Judgement is based on intuition	Low	Judgement is based on intuition
Reversibility	High	The affected environmental will be able to recover from the impact	High	The affected environmental will be able to recover from the impact
Resource irreplaceability	Low	The resource is not damaged irreparably or is not scarce	Low	The resource is not damaged irreparably or is not scarce
Significance	**Medium Negative**		**Low Negative**	
Comment on significance	Cumulative impacts on sense of place is rated with a Medium (negative) significance that can be mitigated to Low (negative).			

6.3.10.5 No-Go Alternative

The 'No-Go' alternative assumes that the project is not developed, and the activity does not go ahead. In this case the benefits of the project, which are indirectly linked to renewable energy generation in the region, would be foregone and the opportunity to provide renewable energy contributing to national targets would not be achieved. The status quo in the area would therefore remain. Recipients of the negative impacts associated with the project (such as sense of place, traffic, potential devaluation of farmland, visual impacts, intrusion impacts etc.) would most likely view this as a positive aspect. However, from a social and socio-economic point of view; job creation, local procurement, indirect spin-offs for local businesses and any induced impacts associated with manufacturing and service delivery and the subsequent improvement of the quality of lives of benefitting households, directly and indirectly, would not materialize and the viability of renewable energy projects in the region would be threatened. Potential negative and positive impacts associated with the project would not be incurred and the ratings of the No-Go alternative would be 'neutral'.

6.3.10.6 Conclusions and Recommendations

From a social and socio-economic perspective, negative impacts that could manifest for this project are either of low significance or can be mitigated to acceptable levels and benefits range from medium to high significance. No issues of high negative significance have been identified by the specialist. Based on the findings of this SEIA, it is the opinion of the specialist that the construction and operation of the Gamma Gridline and associated infrastructure may proceed, provided that the mitigation, management measures and requirements as set out in this report be incorporated in the EMPr and implemented wherever applicable.

7. Environmental Impact Statement

A summary of the significance of predicted impacts at all phases of the project, pre- and post-mitigation is given in Table 97; inclusive of the cumulative impact. The impact of the No-Go alternative for each aspect has also been assessed.

Table 97: Impact Summary Table

Aspect	Development Phase	Impact	Significance Without Mitigation	Significance With Mitigation	No-Go Alternative
Terrestrial Ecology	Construction	Destruction / Disturbance / Fragmentation in CBAs and ESAs	Medium (-)	Low (-)	Low (-)
Terrestrial Ecology	Construction	Loss of habitat in an NPAES Focus Areas	Medium (-)	Very Low (-)	
Terrestrial Ecology – Animal Species – Riverine Rabbit	Construction	Habitat loss, vehicle collisions, and disturbance	Medium (-)	Low (-)	
Terrestrial Ecology – Animal Species – Karoo Dwarf Tortoise	Construction	Habitat loss, vehicle collisions, and disturbance	Medium (-)	Low (-)	
Terrestrial Ecology – Animal Species – Avifauna	Construction	Displacement of powerline sensitive avifauna due to disturbance	Low (-)	Low (-)	
Terrestrial Ecology – Animal Species – Avifauna	Construction	Displacement of powerline sensitive avifauna due to habitat transformation	Low (-)	Low (-)	
Terrestrial Ecology – Animal Species – Avifauna	Cumulative Impacts - Construction	Displacement of powerline sensitive avifauna due to disturbance	Medium (-)	Low (-)	
Terrestrial Ecology – Animal Species – Avifauna	Cumulative Impacts - Construction	Displacement of powerline sensitive avifauna due to habitat transformation	Medium (-)	Low (-)	
Terrestrial Ecology – Animal Species – Karoo Dwarf Tortoise	Cumulative impacts: Construction and Operational	Habitat loss, disturbance, increased predation and poaching	Low (-)	Low (-)	
Terrestrial Ecology	Operational	Destruction / Disturbance / Fragmentation in CBAs and ESAs	Low (-)	Low (-)	
Terrestrial Ecology – Animal Species – Riverine Rabbit	Operational	Vehicle collisions and noise disturbance – maintenance activities	Low (-)	Low (-)	
Terrestrial Ecology – Animal	Operational	Mortality of powerline sensitive Avifauna species due to	High (-)	Low (-)	

Species – Avifauna		collision with the 400 kV Overhead Line			
Terrestrial Ecology – Animal Species – Avifauna	Cumulative Impacts - Operational	Mortality of powerline sensitive Avifauna species due to collision with the 400 kV Overhead Line	High (-)	Medium (-)	
Terrestrial Ecology – Animal Species – Karoo Dwarf Tortoise	Operational	Vehicle collisions and noise disturbance – maintenance activities Predation by crows	Medium (-)	Low (-)	
Terrestrial Ecology – Animal Species – Riverine Rabbit	Cumulative	Impacts on the Riverine Rabbit as a result of habitat loss, disturbance and increased vehicle-related mortality.	Low (-)	Low (-)	
Terrestrial Ecology – Animal Species – Karoo Dwarf Tortoise	Decommissioning	Disturbance and collisions	Low (-)	Low (-)	
Terrestrial Ecology – Animal Species – Riverine Rabbit	Decommissioning	Disturbance, collisions, habitat loss	Low (-)	Low (-)	
Aquatic Biodiversity	Construction	Destruction/Modification of Aquatic Habitats and the associated impact on sensitive aquatic biota	Low (-)	Low (-)	
Aquatic Biodiversity	Construction	Stress on available water resources due to abstraction for construction activities	Low (-)	Low (-)	
Aquatic Biodiversity	Construction	Increased sedimentation and surface water contamination	Low (-)	Low (-)	
Aquatic Biodiversity	Cumulative Impacts - Construction	Increased activity in the area and increased disturbance to aquatic habitats	Low (-)	Low (-)	Very Low (-)
Aquatic Biodiversity	Operational	Disturbance and Degradation of Aquatic features and vegetation along access tracks and/or gridline infrastructure	Low (-)	Low (-)	
Aquatic Biodiversity	Operational	Erosion of hillslopes and invasion of disturbed areas with alien invasive vegetation	Low (-)	Low (-)	
Aquatic Biodiversity	Cumulative impacts - Operational	Degradation of the ecological condition of aquatic ecosystems	Low (-)	Low (-)	
Aquatic Biodiversity	Decommissioning	Additional disturbance to aquatic areas (e.g. removal / degradation of aquatic habitat and impact to aquatic biota	Low (-)	Low (-)	
Aquatic Biodiversity	Decommissioning	Increased risk of sedimentation and contamination of surface water	Low (-)	Low (-)	
Aquatic Biodiversity	Cumulative Impacts - Decommissioning	Increased activity in the area and increased disturbance to aquatic habitats	Low (-)	Low (-)	
Archaeology/Cultural/Heritage	Construction	Impacts to archaeological resources and graves	Low (-)	Very Low (-)	
Archaeology/Cultural/Heritage	Construction	Impacts to the cultural landscape	Low (-)	Low (-)	

Archaeology/Cultural/Heritage	Operations	Impacts to the cultural landscape	Medium (-)	Medium (-)	Negligible Impact
Archaeology/Cultural/Heritage	Cumulative Impacts: Operations	Impacts to the cultural landscape	High (-)	Medium (-)	
Archaeology/Cultural/Heritage	Decommissioning	Impacts to the cultural landscape	Low (-)	Low (-)	
Palaeontology	Construction	Impacts to palaeontological resources	Low (-)	Low (-)	Very Low (-)
Palaeontology	Cumulative Impacts - Construction	Cumulative impacts to palaeontological resources by construction activities of all RE projects and transmission lines within a ~30 km radius of the Gamma Corridor	Medium (-)	Low (-)	
Agriculture	The specialist has confirmed that the agricultural impact of the proposed development is insignificant. A Site Verification and Agricultural Compliance Statement was done by Lanz (2022), and as such, a formal assessment of impacts has not been done.				
Geotechnical	Construction	Soil contamination, destabilisation and erosion, and siltation of watercourses	Low (-)	Very Low (-)	Neutral
Geotechnical	Operational	Soil contamination, destabilisation and erosion, and siltation of watercourses	Low (-)	Very Low (-)	
Geotechnical	Cumulative Impacts – Construction and Operational	Soil contamination, destabilisation and erosion, and siltation of watercourses	Low (-)	Very Low (-)	
Geotechnical	Decommissioning	Soil contamination, destabilisation and erosion, and siltation of watercourses	Medium (-)	Low (-)	
Visual	Construction	Visual Intrusion from construction activities	Low (-)	Low (-)	Neutral
Visual	Operational	Visual Intrusion from the 400 kV powerline	Medium (-)	Medium (-)	
Visual	Decommissioning	Visual Intrusion of remaining pylon foundations and roads/tracks	Low (-)	Low (-)	
Visual	Cumulative Impacts - Operational	Additional powerlines in the landscape, with others in a 30 km radius of the Gamma Corridor	Medium (-)	Medium (-)	
Traffic	Construction	The increased traffic volumes on the public roads will increase the potential of incidents on the road network within the study area	Medium (-)	Medium (-)	Neutral
Traffic	Construction	The increased traffic volumes on the public roads will increase the potential for localised degradation of the road network within the study area	Low (-)	Low (+)	
Traffic	Construction	Dust from construction vehicles on public roads	Low (-)	Low (-)	
Traffic	Construction	The increased traffic volumes at intersections will increase	Low (-)	Low (-)	

		the potential risk of accidents at the intersections, resulting in serious injuries or even fatalities			
Traffic	Construction	Stringing Transmission Lines Across Existing Infrastructure – temporary delay in traffic	Very Low (-)	Very Low (-)	
Traffic	Cumulative Impacts - Construction	Increased Road Incidents	Medium (-)	Medium (-)	
Traffic	Cumulative Impacts - Construction	Localised degradation of the road network within the study area	Low (-)	Low (+)	
Traffic	Cumulative Impacts - Construction	Dust from construction vehicles on public roads	Low (-)	Low (-)	
Traffic	Cumulative Impacts - Construction	Intersection Safety	Low (-)	Low (-)	
Socio-Economic	Construction	Temporary Employment	Medium (+)	Medium (+)	Neutral
Socio-Economic	Construction	Local Procurement	Medium (+)	Medium (+)	
Socio-Economic	Construction	Induced Local Economic Impacts	Medium (+)	Medium (+)	
Socio-Economic	Construction	Training/Skills development	Low (+)	Low (+)	
Socio-Economic	Construction	Employment Equity	Low (+)	Medium (+)	
Socio-Economic	Construction	Influx of jobseekers / temporary construction workers	Low (-)	Low (-)	
Socio-Economic	Construction	Intrusion Impacts	Low (-)	Low (-)	
Socio-Economic	Cumulative Impacts - Construction	Influx of jobseekers / Temporary construction workers	Low (-)	Low (-)	
Socio-Economic	Operational	Impacts on National Power Supply	High (+)	High (+)	
Socio-Economic	Operational	Devaluation of farmland values	Low (-)	Low (-)	
Socio-Economic	Operational	Impacts on existing land uses	Very Low (-)	Very Low (-)	
Socio-Economic	Operational	Tourism Impacts	Low (-)	Low (-)	
Socio-Economic	Operational	Impacts on Sense of Place	Low (-)	Low (-)	
Socio-Economic	Cumulative Impacts – Construction and Operational	Employment, economic contribution and induced impacts	High (+)	High (+)	
Socio-Economic	Cumulative Impacts – Construction and Operational	Impacts for the Local and District Municipalities	Medium (+)	Medium (+)	
Socio-Economic	Cumulative Impacts – Operational	Devaluation of farmland values	Low (-)	Low (-)	
Socio-Economic	Cumulative Impacts – Operational	Intrusion Impacts	Medium (-)	Low (-)	
Socio-Economic	Cumulative Impacts – Operational	Impacts on Sense of Place	Medium (-)	Low (-)	

7.1 Key Findings

The key findings of the various specialist studies that were done to address project impacts, as well as of the Basic Assessment process, are as follows:

- Terrestrial Ecology:
    - Provided that identified No-Go areas are avoided, and that infrastructure placement in areas of high sensitivity are micro-sited by a terrestrial ecologist, impacts on terrestrial ecology can be kept to tolerable levels.
    - The Gamma gridline would not compromise the features of priority biodiversity areas present within the Corridor, nor compromise the ability to meet regional conservation targets for vegetation types within the Corridor, provided that infrastructure is positioned in least sensitive areas.
    - Populations of Plant SCCs can be avoided through micro-siting of infrastructure.
    - Loss of optimal habitat for Animal SCCs (notably the Riverine Rabbit and the Karoo Dwarf Tortoise) has been avoided through specialist sensitivity mapping. Mitigation measures are provided to reduce the significance of construction, operational and decommissioning phase impacts on these species to acceptable levels.
- Avifauna:
    - The most significant risk of the project is collision with overhead lines. Avoiding No-Go areas, and using Eskom approved Bird Flight Diverters on lines in areas of high sensitivity mitigates this risk from the Gamma Gridline to acceptable levels.
- Aquatic Biodiversity:
    - Provided that areas of high aquatic sensitivity (mapped as No-Go areas in sensitivity mapping for the project) are avoided, potential aquatic ecosystem impacts of the proposed project are likely to be very low.
- Archaeology and cultural heritage:
    - From the point of view of the wider landscape there is very little that can be done to avoid impacts on the cultural landscape. However, as the gridline is located more than 17 km from major cultural landscape features in the region (i.e. the escarpment and Karoo National Park) the location of the project is considered to be acceptable from a cultural landscape perspective.
    - As project infrastructure can be sited to avoid archaeological features, impacts on these resources can readily be managed to tolerable levels.
- Paleontology:
    - Most of the area is of Low palaeosensitivity.
    - Fossil sites are generally highly localized, and therefore project infrastructure can be sited to avoid these areas thereby avoiding impacts on these resources.
- Agriculture:

- The proposed development will have negligible agricultural impact as the amount of agricultural land loss in this very low agricultural potential area is considered to be insignificant.

- Geotechnical:
  - The geotechnical conditions of the area do not present a fatal flaw to the project.
- Visual:
  - Although cumulative visual impacts are significant (assessed to be of medium negative sensitivity by the visual specialists), the project is located in a Strategic Transmission Corridor specifically intended to host large scale transmission infrastructure. As such, cumulative impacts, including visual impacts, are to be anticipated in the area, and the project is considered to be acceptable from a visual perspective.
- Traffic:
  - The existing road network is currently operating at well below its capacity and provides an adequate level of service, and increased traffic volumes will not have an undue detrimental impact on the road network.
- Socio-economic:
  - The project will allow Eskom to release further renewable energy potential into the national grid to address the national energy crisis, thereby contributing to development. This benefit of the project has been assessed to be of High socio-economic significance.
  - Negative impacts that could manifest for this project are either of low significance or can be mitigated to acceptable levels.

7.2 Key Recommendations from Specialist Studies

Table 98 lists the 'key' recommendations from the various specialist studies that were done to address project impacts. Please note that all specialist mitigation measures (as reflected in the impact assessment tables in Section 6, and the EMPr) are however applicable, and must be implemented.

Table 98: Specialists' Key Recommendations

Terrestrial Ecology (including animal species SCCs – Riverine Rabbit and Karoo Dwarf Tortoise)
• Avoid mapped 'No-Go' areas in the placement of pylons and access roads, as well as temporary disturbance areas needed for construction (e.g. laydown areas, site camps, access tracks). • A pre-construction walk-down of the final power line route must be done by a terrestrial ecologist for micro-siting the final positions of pylons and any new access roads that may be required; as well as to identify protected and listed species for permitting requirements. Micro-siting must focus on areas identified as 'High Sensitivity' for the Riverine Rabbit and Karoo Dwarf Tortoise. The specialist must advise on the pylon design to prevent crows nesting in proximity to Karoo Dwarf Tortoise habitat. • All pylon footprints must be surveyed by the ecologist to avoid possible populations of plant SCCs, and to place infrastructure in the least sensitive areas to minimise impacts on the features that make up CBAs and ESAs. • The final design of roads and other infrastructure must consider faunal movement, and must allow fauna to pass over,

through or underneath these features as appropriate.

- A log of faunal kills must be kept in construction phase, and reviewed monthly by the ECO. Should rabbits and/or tortoises be killed by traffic, then the traffic management to and from the site should be reviewed in collaboration with the EWT Drylands Programme to identify additional mitigation and avoidance that needs to be implemented to further reduce roadkill.
- Apply additional mitigation in consultation with a terrestrial ecologist to prevent roadkill mortalities and/or to discourage predation by crows if monitoring shows these aspects are causing persistent impacts on the Karoo Dwarf Tortoise.
- Areas disturbed during construction that will not remain as permanent features must be rehabilitated.
- Comply with the EMPr for the project.

Avifauna

- Avoid No-Go areas.
- Eskom-approved Bird Flight Diverters must be fitted to the gridline where it traverses areas of medium and high avifauna sensitivity (to be confirmed by the specialist), according to the applicable Eskom Engineering Infrastructure (Eskom Unique Identifier 240 – 93563150: The utilisation of bird flight diverters on Eskom Overhead Lines).
- Mark the line at the dam situated at 31°48'16.44"S, 22°57'51.38"E with LED type bird flight diverters to ensure visibility of the line during low light conditions, should the dam at any given time be used as a roost site by Blue Cranes
- Maintain the LED type bird flight diverters at the dam situated at 31°48'16.44"S, 22°57'51.38"E throughout operations
- Conduct an avifaunal walk-through of the final powerline alignment to identify priority species that may be breeding within the final footprint and to identify any sensitivities that may arise between the conclusion of the Environmental Authorisation process and the construction phase. If an SSC nest is occupied, the avifaunal specialist must consult with the contractor to find ways of minimizing the potential disturbance to the breeding birds during the construction period, if possible.
- Comply with the EMPr for the project.

Aquatic Biodiversity

- Avoid No-Go areas.
- Minimise any works within aquatic ecosystems and buffers.
- Do a pre-construction walkthrough of specific areas at detailed design stage to micro-site pylon positions within the refined corridor. Pylon foundations must be demarcated, and access tracks delineated during this process to avoid sensitive aquatic areas.
- Disturbed areas must be rehabilitated in line with the requirements of the Generic EMPr for power line development. *The EAP has recommended that an Aquatic Rehabilitation and Monitoring Plan must be done by an aquatic specialist once detailed designs are available.*
- Existing roads through features mapped as medium sensitivity in the aquatic impact assessment[17] (i.e. high sensitivity in the consolidated project mapping) must be utilised as far as possible. In terms of new service tracks, these must be kept to a minimum and should ideally not result in any new / permanent water course crossings, but if these are required, then a specific walk down should be conducted with the specialist to identify the most suited crossing position. Where these crossings do occur, ensure they are properly designed and maintained to not result in blockage in the watercourses or erosion.
- The design of an access track and other infrastructure should aim to reduce the intensity of runoff, particularly on the steeper slopes, and reduce the intensity of the discharge into the adjacent drainage lines.
- Erosion and alien vegetation monitoring and control measures should take place at least biannually for the first 3 years of the project,
- Stormwater runoff infrastructure must be maintained to mitigate both the flow and water quality impacts of any stormwater leaving developed areas.
- A Water Use Authorisation must be obtained for any activities that trigger Section 21 activities under the NWA.
- Comply with the EMPr for the project.

Archaeology/Cultural Heritage

[17] The Aquatic Specialist mapped watercourses as being of high and medium sensitivity. In the consolidated mapping for this Basic Assessment report the sensitivity of these features was elevated to very high and high sensitivity respectively to maintain consistency with other specialist disciplines.

• Avoid archaeological and visual No-Go areas. • A pre-construction archaeological survey should be carried out along the entire alignment, including pylons, new access roads and construction camps. • All disturbed areas not required during operation must be rehabilitated. • If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution. • Comply with the EMPr for the project.
Palaeontology
• At detailed design stage, the final layout must be evaluated by a paleontologist to determine which areas, if any, need a pre-construction survey. Potentially sensitive areas must be surveyed to micro-site the final position of infrastructure and new roads (where required) to avoid sensitive paleontological sites. Application of a Chance Fossil Finds Procedure during construction phase. • Comply with the EMPr for the project.
Agriculture
• Comply with the EMPr for the project.
Geotechnical
• Investigate and confirm the geotechnical suitability of each pylon position prior to construction (i.e. that soil with an adequate bearing capacity is obtained beneath each footing). • A Stormwater Management Plan must be developed in the pre-construction phase and should detail the stormwater structures and management interventions that must be installed to manage the increase of surface water flows • Implement generic EMPr for overhead transmission infrastructure.
Visual
• Avoid visual No-Go areas. • Comply with the EMPr for the project.
Traffic
• All remedial work or modifications to any of the public roads shall be done in consultation with and have the approval of the local road's authority (as is standard practice this will be finalised during and be a requirement of the municipal planning approval process). • Compile a Traffic Management Plan once the contractor has been appointed and all the relevant details of the construction processes are known. • Implement the transport impact mitigation measures / comply with the EMPr for the project.
Socio-Economic
• Involve the Ubuntu and BWLM LED Units and the PKSDM and CKDM from the early processes (from financial close already if possible). Determine their existing processes with regards to a labour desk and streamline the employment process between the various stakeholders. • Maximise local employment and procurement as far as possible. • Avoid visual No-Go areas. • Consult with landowners to ensure that the R100 000 per annum committed towards security measures are effectively implemented. • Keep open communication channels with the landowners and address any potential issues as a matter of priority. • Comply with the EMPr for the project.

7.3 Sensitivity Mapping

Table 99 outlines the input from all the specialist assessments discussed in Section 6. Based on their respective field of study, specialists identified key features/areas and provided a sensitivity rating. The Avifaunal and Visual Impact

Assessment specialists did this separately for pylons and access roads; and overhead lines. The reason for this was to consider that aerial impacts of the overhead line differ from the footprint impacts of the pylons and access roads and have different development restrictions. These outputs were provided spatially in a ‘sensitivity map’. A consolidated No-Go and High Sensitivity areas map has been compiled considering all sensitive features, where No-Go layers have been avoided in the alignment of the pre-negotiated gridline route. The ‘No-Go’ maps with the Gamma Refined Corridor and pre-negotiated gridline route are shown in Figure 47 to Figure 51.

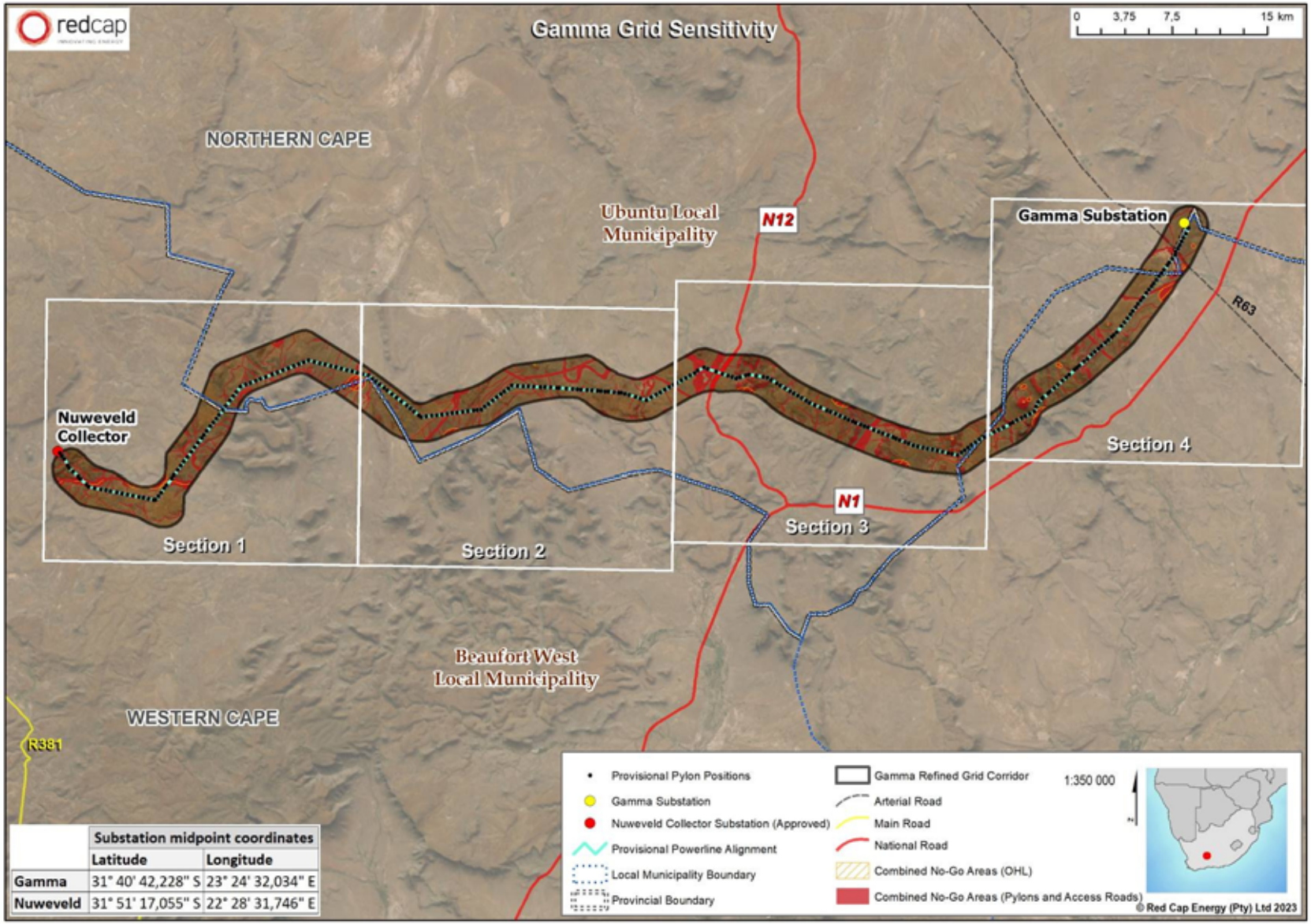
Table 99: 'No-Go' and Sensitivity Criteria used for Sensitivity Mapping

	Pylons and Roads	Overhead Lines
Terrestrial Ecology	**No-Go:** • Riverine Rabbit optimal habitat **High Sensitivity Areas:** • Riverine Rabbit sub-optimal habitat • Karoo Dwarf Tortoise Favourable habitat (large mountain complexes)	Not relevant
Avifauna	**No-Go (Pylons only):** • Dams greater than 5 ha in size – 500m buffer[18] • Irrigated lands • Verreaux's Eagle nests – 1 km buffer, except where nests are on existing powerlines (then High) • Martial Eagle nests – 2.5 km, except where nests are on existing powerlines **High Sensitivity Areas:** • The dam situated at 31°48'16.44"S, 22°57'51.38"E – 500m buffer • Verreaux's Eagle nests – 1 km buffer where nests are on existing powerlines • Martial Eagle nests – 2.5 km buffer where nests are on existing powerlines	**No-Go:** • Dams greater than 5 ha in size – 500m buffer • Irrigated lands (note none occur in the Refined Corridor) • Verreaux's Eagle nests – 1 km buffer, except where nests are on existing powerlines (then High) • Martial Eagle nests – 2.5 km, except where nests are on existing powerlines **High Sensitivity Areas:** • The dam situated at 31°48'16.44"S, 22°57'51.38"E – 500m buffer • Verreaux's Eagle nests – 1 km buffer where nests are on existing powerlines • Martial Eagle nests – 2.5 km buffer where nests are on existing powerlines
Aquatic Ecology	**No-Go:** • Large rivers including a 35 m buffer • Valley bottom and floodplain wetlands with a high EIS including a 35m buffer **High Sensitivity Areas:**	Not relevant

[18] An exception to the powerline exclusion zone is the dam situated at 31°48'16.44"S, 22°57'51.38"E. Routing the line around this dam would traverse sensitive Riverine Rabbit habitat that also falls within a Northern Cape CBA. In this instance, it would be preferable to route the line through the exclusion zone and mark the line with LED type bird flight diverters to ensure visibility of the line during low light conditions, should the dam at any given time be used as a roost site by Blue Cranes

	• Small tributaries and drainage lines • Valley bottom wetlands with a moderate EIS including a 35 m buffer	
Heritage (including Archaeology, Graves, Built Environment, Cultural landscape)	**No-Go:** • Grade III Heritage sites and a 50 m buffer **High Sensitivity Areas:** • Grade IIIB heritage sites with a 10 m buffer and/or GPA sites	Not relevant
Palaeontology	None identified	Not relevant
Agriculture	**High Sensitivity Areas:** Cultivated land (None are known to currently occur in the Refined Corridor)	Not relevant
Geotechnical	None identified	Not relevant
Visual	**No-Go (excluding areas near existing high voltage lines as reflected in visual sensitivity mapping for the project):** • Prominent topographic features, peaks, geological outcrops (150 m wide) • Steep slopes: >1:4 • Scenic water features >120ha: within 100 m • Cultural landscapes: within 150 m • Guest farms: within 250 m • Settlements or towns: within 250 m • Farmsteads: within 250 m • National routes: within 200 m • Scenic ports/passes: within 250 m (other than when the local viewshed provides visual screening, at the discretion of the specialist and as reflected in visual sensitivity mapping for the project) • Arterial route: within 150 m • Main District road: within 100 m • Passenger rail lines: within 150 m **High Sensitivity Areas:** • Prominent topographic features, peaks, geological outcrops (within 250 m) • Linear topographic features, ridges (within 150 m) • Steep slopes: >1:6 • Scenic water features >120ha: within 150 m	**No-Go (excluding areas near existing high voltage lines as reflected in visual sensitivity mapping for the project):** • Prominent topographic features, peaks, geological outcrops (150 m wide) • Scenic water features >120ha: within 100 m • Cultural landscapes: within 150 m • Guest farms: within 250 m • Settlements or towns: within 250 m • Farmsteads: within 250 m **High Sensitivity Areas:** • Prominent topographic features, peaks, geological outcrops (within 250 m) • Linear topographic features, ridges (within 150 m) • Steep slopes: >1:2 • Scenic water features >120ha: within 150 m • Linear water features: within 100 m • Cultural landscapes: within 250 m • Guest farms: within 350 m • Settlements or towns: within 350 m • Farmsteads: within 350 m

	• Linear water features: within 100 m • Cultural landscapes: within 250 m • Guest farms: within 350 m • Settlements or towns: within 350 m • Farmsteads: within 350 m • National routes: within 300 m • Scenic ports/passes: within 350 m • Arterial route: within 250 m • Main District road: within 150 m • Passenger rail lines: within 250 m	• National routes: within 300 m • Scenic ports/passes: within 350 m • Arterial route: within 250 m • Main District road: within 150 m • Passenger rail lines: within 250 m



	Substation midpoint coordinates	
	Latitude	Longitude
Gamma	31° 40' 42,228" S	23° 24' 32,034" E
Nuweveld	31° 51' 17,055" S	22° 28' 31,746" E

Figure 47: The Refined Gamma Corridor and Pre-Negotiated Gridline Route with a composite No-Go layer (overview)

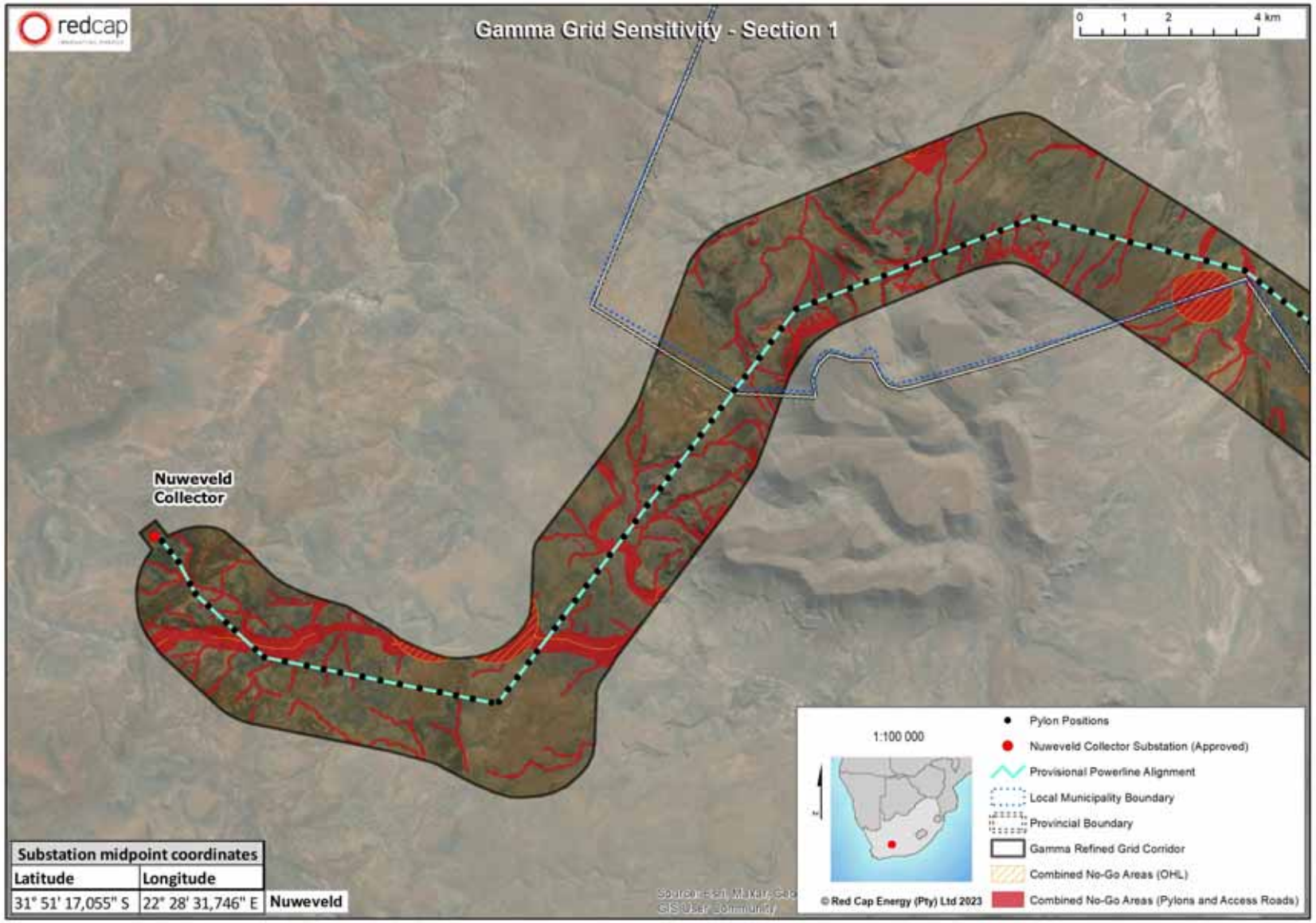


Figure 48: The Refined Gamma Corridor and Pre-Negotiated Gridline Route with a composite No-Go layer (Section 1)

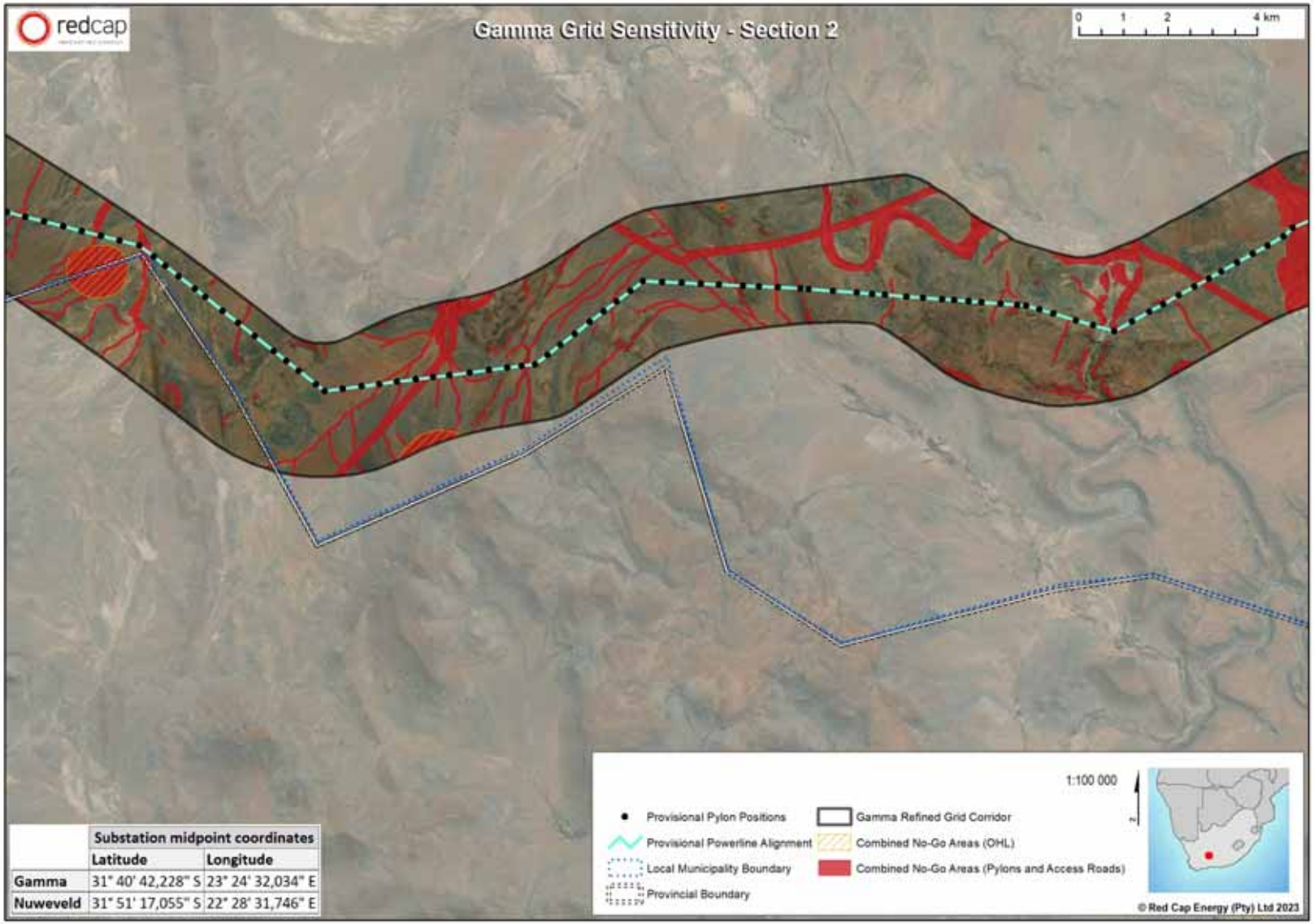


Figure 49: The Refined Gamma Corridor and Pre-Negotiated Gridline Route with a composite No-Go layer (Section 2)

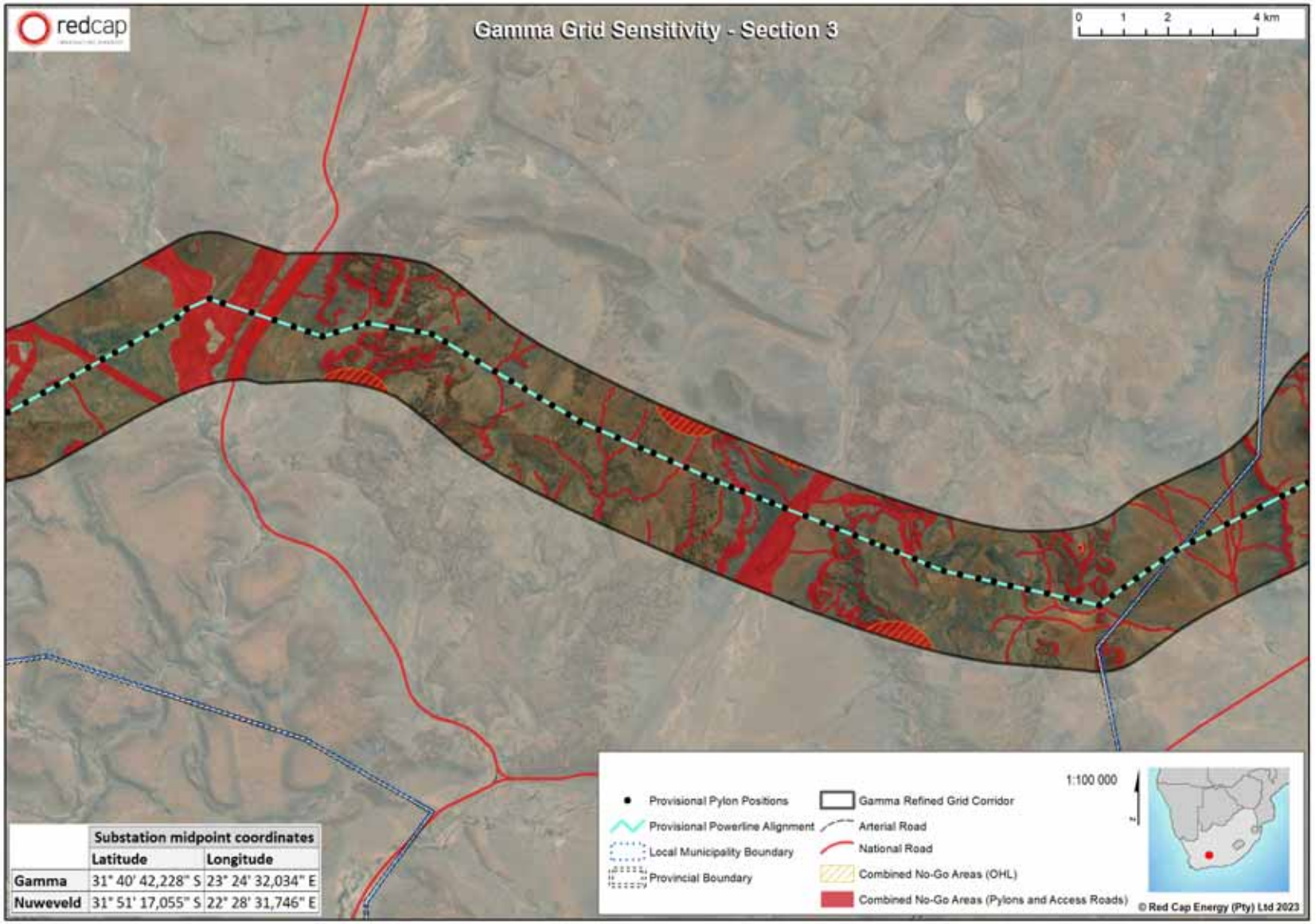


Figure 50: The Refined Gamma Corridor and Pre-Negotiated Gridline Route with a composite No-Go layer (Section 3)

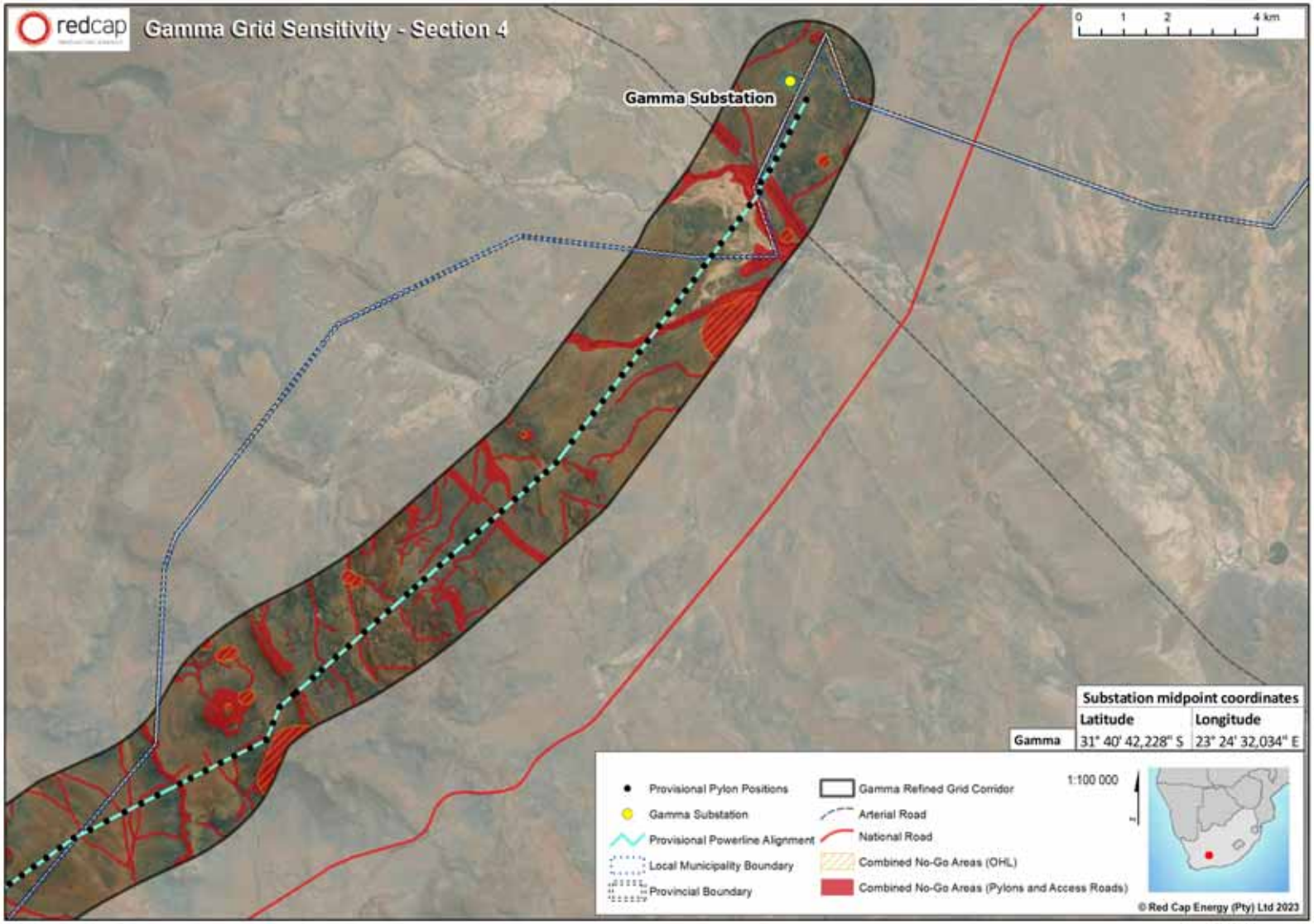


Figure 51: The Refined Gamma Corridor and Pre-Negotiated Gridline Route with a composite No-Go layer (Section 4)

8. Conclusion

Renewable energy is recognised globally, and nationally, as a clean (low emission) and effective energy alternative to fossil fuels. In the context of severely constrained energy supply in South Africa which limits production and economic growth, the development of the renewable energy industry is also expected to lead to significant direct and indirect socio-economic benefits. Furthermore, South Africa is a signatory to the Paris Agreement on Climate Change, which sets targets and makes commitments to control and reduce emissions; yet ESKOM, sources ~85%[19] of its electricity needs from fossil-fuels. To address the country's energy demands, and the need for complying with emission reduction targets; the Department of Energy developed the Integrated Resources Plan (IRP). The latest revision of the IRP (2019) makes provision for an additional 14 400MW of wind energy by 2030, however more recent planning by Eskom indicates that up to 53 000MW of new renewable energy generation capacity is, in fact, required in South Africa over the next 10 years (Engineering News, 2022).

This Basic Assessment has been conducted to inform an application for Environmental Authorisation for a 400 kV gridline between the authorised Nuweveld Collector Substation and the 132/400 kV Gamma Substation. The need for the gridline has been identified by Eskom to allow for approved and planned RE developments to evacuate renewable energy, and therefore contribute to collective measures to alleviate South Africa's energy crisis. The gridline will also provide additional capacity and improve stability and functionality of the National Grid.

The Provincial and District Municipal planning policies emphasise the importance of RE projects in the area to diversify the economy, and the project is located wholly within a Strategic Transmission Corridor specifically intended to accommodate large scale electrical transmission infrastructure. The project is therefore needed at this point in time and considered desirable at this location from a strategic planning perspective.

In line with the 'mitigation hierarchy', an iterative design process was followed to identify sensitive features in the area, to develop the refined Gamma Grid Corridor, and to inform the alignment of the pre-negotiated gridline within the refined Corridor. A precautionary approach was taken, where the first priority was impact avoidance. This was done by describing and assessing the biophysical environment within a broader screening Corridor, and identifying sensitive environments at an early stage in the planning process. The preferred alignment of the gridline servitude is based on landowner willingness (with signed agreements in place), technical aspects, and avoidance of 'No-Go' areas identified by all specialist studies.

Specialist studies were done to address identified project impacts, in line with the requirements of the DFFE's Screening Tool and relevant Protocols and/or Appendix 6 of the EIA Regulations.

[19] Eskom Generation Plant Mix. 2021. Available: https://www.eskom.co.za/wp-content/uploads/2022/03/GX-0001-Generation-Plant-Mix-Rev-25.docx.pdf [Accessed 9 November 2022].

Post-mitigation specialist impact assessment assumes any alignment within the refined Corridor that completely avoids No-Go areas – as such, impact assessment is applicable to any gridline alignment within the refined corridor that avoids No-Go areas. A key mitigation measure identified by terrestrial and aquatic ecologists, the palaeontologist and archaeologist is the need to do a pre-construction walkthrough of specific areas at detailed design stage to micro-site pylon positions within the refined corridor. Pylon foundations will be demarcated, and access tracks delineated during this process. Micro-siting will therefore enable the final placement of infrastructure and roads in least sensitive areas on the ground.

The impact assessment considers impacts from construction, operational and decommissioning activities and addresses the cumulative impact of the project together with other existing, approved or proposed RE projects and existing and planned High Voltage Powerlines in a 30 km radius. Decommissioning is however highly unlikely since the infrastructure will be ceded to Eskom on completion, and will form part of the National Grid. The No-Go option is discussed for each impact and essentially entails the avoidance of negative impacts of the project, as well as foregoing the significant benefit of increased renewable energy generation in the region.

The applicant will be responsible for all planning, pre-construction and construction activities and associated management requirements. Eskom will however be responsible for maintaining infrastructure and roads in operational phase. Therefore operational phase mitigation measures provided by specialist studies are included as 'Conditions of Approval' rather than just mitigation. Operational phase management will be done by Eskom in line with their Standard Operating Procedures and their overarching EMP for gridline infrastructure.

After mitigation, all predicted impacts and benefits are assessed to be of very low or low significance, other than:

- Avifauna: the risk of collisions with the overhead powerline (Medium negative),
- Archaeology: changes to the cultural landscape (Medium negative).
- Visual: visual intrusion of infrastructure in a rural landscape (Medium negative).
- Traffic: increase in road incidents (Medium negative).
- Socio-Economic:
    - Temporary Employment (Medium Positive)
    - Local Procurement (Medium Positive)
    - Induced Local Economic Impacts (Medium Positive)
    - Impacts on National Power Supply (High Positive)
    - Employment, economic contribution and induced impacts (High Positive)
    - Impacts for the Local and District Municipalities (Medium Positive)

Based on the findings, the project does not present any fatal flaws; and no significantly high negative impacts were identified after assessment and mitigation. If all recommendations of specialists, and mitigation measures in the impact assessment tables and EMPr are implemented, the development will be in line with sustainable development principles; and anticipated socio-economic benefits will accrue without compromising ecosystem integrity. Positive socio-economic impacts related to employment creation, skills development, local procurement, employment equity, increase in GDP, and provision of reliable and renewable energy. Anticipated negative socio-economic impacts are all low or very low negative after mitigation. Therefore based on the findings and recommendations of independent specialist studies and incorporation of these into the project design presented in this BAR; it is the considered opinion of the EAP that the project should be authorised on environmental and socio-economic grounds.

8.1 Proposed Conditions of Authorisation

Micro-Siting

- A Terrestrial Ecologist, Aquatic Ecologist, Archaeologist, Paleontologist, and an Avifaunal Specialist must conduct post-authorisation micro-siting of the grid infrastructure and new roads (including watercourse crossings) with the design engineers to ensure that local sensitivities are avoided outside of No-Go areas and that the design satisfies specialist requirements.
- A Geotechnical specialist must inspect the founding conditions of each pylon pre-construction.
- Recommendations from specialist's micro-siting will be incorporated into the final layout plan and included in updated EMPr for the project.

Management Planning

- Compile a stormwater management plan, including erosion protection measures and designs of stormwater attenuation infrastructure and watercourse crossings, in consultation with the aquatic ecologist prior to commencement.
- Compile an Aquatic Rehabilitation and Monitoring Plan, in consultation with the aquatic ecologist prior to commencement.
- Compile a Riverine Rabbit and Karoo Dwarf Tortoise monitoring plan prior to commencement.
- Compile a Traffic Management Plan once the contractor has been appointed and all the relevant details of the construction processes are known.

Monitoring

- Monitor Riverine Rabbit and Karoo Dwarf Tortoise roadkill during construction in conjunction with other monitoring programmes being done for surrounding WEF projects.
- Survey the powerline annually during operations and record crow nests on pylons and tortoise carcasses at these locations.

- Erosion and alien vegetation monitoring and control measures should take place at least biannually for the first 3 years of the project.

Terrestrial Ecology

- Avoid mapped 'No-Go' areas
- Remove crow nests located on pylons within 1 km of suitable Karoo Dwarf Tortoise habitat

Avifauna

- Avoid mapped 'No-Go' areas.
- Eskom-approved Bird Flight Diverters must be fitted to the gridline where it traverses areas of medium and high avifauna sensitivity, according to the applicable Eskom Engineering Infrastructure (Eskom Unique Identifier 240 – 93563150: The utilisation of bird flight diverters on Eskom Overhead Lines).
- Mark the line at the dam situated at 31°48'16.44"S, 22°57'51.38"E with LED type bird flight diverters to ensure visibility of the line during low light conditions, should the dam at any given time be used as a roost site by Blue Cranes.
- Maintain the LED type bird flight diverters at the dam situated at 31°48'16.44"S, 22°57'51.38"E throughout operations.

Aquatic Ecology

- Avoid mapped 'No-Go' areas.
- Where necessary, water use authorisations must be obtained for groundwater abstraction from new or existing boreholes and any physical activity in the regulated area of a watercourse.

Heritage

- Avoid mapped 'No-Go' areas.
- If any archaeological material or human burials are uncovered during the course of development then work in the immediate area should be halted. The find would need to be reported to the heritage authorities and may require inspection by an archaeologist. Such heritage is the property of the state and may require excavation and curation in an approved institution.

Palaeontology

- The final layout must be evaluated by a palaeontologist to determine which areas, if any, need a pre-construction survey.
- Implement the Fossil Chance-Finds Protocol included in the EMPr during the construction phase.

Visual

- Should the route of the proposed pre-negotiated grid connection be changed, the visual specialists must verify that this does not affect the visual impact significance as assessed in this report and must approve the revised route in writing.

Traffic

- The developer shall upgrade unpaved roads to a suitable condition for proposed construction vehicles.

- All remedial work or modifications to any of the public roads shall be done in consultation with and have the approval of the local road's authority (this will form part of the municipal planning approval process).
- The developer shall contribute to the maintenance of the road network, affected by the development, during the construction of the proposed development.
- The developer shall ensure that the condition of the roads impacted by the construction of the development is left in a similar or better state once the construction phase is complete.
- The treacherous southern section of the gravel road, between Beaufort West and site, TR05801, is to be upgraded by the developer, to improve the safety of the road for all road users, including the personnel commuting to and from the site on a daily basis
- Make drivers aware of the extremely treacherous conditions through the passes on both the TR 05801 and the DR02311.
- The developer shall implement the necessary steps to protect the pedestrians and livestock on the roads, specifically where the roads pass through farming homesteads, as these are a serious safety concern

Socio-Economic

- Set targets for use of local labour and maximise the use of local sub-contractors where possible through tendering and procurement.
- Maximise local content through the Preferential Procurement Plan and Contractor Services Management Plan (CSMP) for all contractors that are used.
- Involve the Ubuntu and BWLM LED Units and the PKSDM and CKDM from the early processes (from financial close already if possible). Determine their existing processes with regards to a labour desk and streamline the employment process between the various stakeholders.
- Employ a Community Employer Relations Officer / Community Liaison Officer. Communication with communities should only take place through this one channel to ensure transparency, limit unrealistic expectations and to avoid conflict.

General

- Comply with the provisions of the Generic EMPr for overhead transmission lines, including specialist project-specific mitigation incorporated into this EMPr.
- The developer must appoint an ECO to assist with pre-construction planning and compliance, and to audit environmental management during construction phase.

8.2 Way Forward

The Final BAR has been submitted to the DFFE for review and decision making. The DFFE has 57 days to issue a decision. All registered stakeholders have been informed of the submission of the FBAR to the DFFE. Stakeholders can view the Final BAR and Public Participation Report on the EAP's website to see how their comments have been addressed. Once the DFFE has made a decision on the application, all registered stakeholders will be informed.