PROPOSED 132KV GRID CONNECTION INFRASTRUCTURE FOR THE HYPERION HYBRID FACILITY NEAR KATHU, NORTHERN CAPE PROVINCE

VISUAL IMPACT ASSESSMENT

Produced for:

Hyperion Solar Hybrid (Pty) Ltd

On behalf of:

Savannah Environmental (Pty) Ltd
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1. STUDY APPROACH

1.1. Qualification and experience of the practitioner

Lourens du Plessis, a specialist in visual impact assessment and Geographical Information Systems (GIS), undertook the Visual Impact Assessment (VIA).

He has been involved in the application of Geographical Information Systems (GIS) in Environmental Planning and Management since 1990. He has extensive practical knowledge in spatial analysis, environmental modeling and digital mapping, and applies this knowledge in various scientific fields and disciplines. His expertise are often utilised in Environmental Impact Assessments, State of the Environment Reports and Environmental Management Plans.

He is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments.

Savannah Environmental appointed Lourens du Plessis as an independent specialist consultant to undertake the visual impact assessment for the proposed Grid Connection Infrastructure for the Hyperion Hybrid Facility (HF). He will not benefit from the outcome of the project decision-making.

1.2. Assumptions and limitations

This assessment was undertaken during the planning stage of the project and is based on information available at that time.

1.3. Level of confidence

Level of confidence[1] is determined as a function of:

- The information available, and understanding of the study area by the practitioner:
    - 3: A high level of information is available of the study area and a thorough knowledge base could be established during site visits, surveys etc. The study area was readily accessible.
    - 2: A moderate level of information is available of the study area and a moderate knowledge base could be established during site visits, surveys etc. Accessibility to the study area was acceptable for the level of assessment.
    - 1: Limited information is available of the study area and a poor knowledge base could be established during site visits and/or surveys, or no site visit and/or surveys were carried out.

[1] Adapted from Oberholzer (2005).

- The information available, understanding of the study area and experience of this type of project by the practitioner:

    - 3: A high level of information and knowledge is available of the project and the visual impact assessor is well experienced in this type of project and level of assessment.
    - 2: A moderate level of information and knowledge is available of the project and/or the visual impact assessor is moderately experienced in this type of project and level of assessment.
    - 1: Limited information and knowledge is available of the project and/or the visual impact assessor has a low experience level in this type of project and level of assessment.

These values are applied as follows:

Table 1: Level of confidence.

	Information on the project & experience of the practitioner			
Information on the study area		**3**	**2**	**1**
	3	9	6	3
	2	6	4	2
	1	3	2	1

*The level of confidence for this assessment is determined to be **9** and indicates that the author's confidence in the accuracy of the findings is high:*

- The information available, and understanding of the study area by the practitioner is rated as **3** and
- The information available, understanding and experience of this type of project by the practitioner is rated as **3**.

1.4. Methodology

The study was undertaken using Geographical Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed infrastructure. A detailed Digital Terrain Model (DTM) for the study area was created from topographical data provided by NASA in the form of a 30m SRTM (Shuttle Radar Topography Mission) elevation model.

Visual Impact Assessment (VIA)

The VIA is determined according to the nature, extent, duration, intensity or magnitude, probability and significance of the potential visual impacts, and will propose management actions and/or monitoring programs, and may include recommendations related to the proposed Grid Connection Infrastructure for the Hyperion Hybrid Facility (HF).

The visual impact is determined for the highest impact-operating scenario (worst-case scenario) and varying climatic conditions (i.e. different seasons, weather conditions, etc.) are not considered.

The VIA considers potential cumulative visual impacts, or alternatively the potential to concentrate visual exposure/impact within the region.

The following VIA-specific tasks were undertaken:

- **Determine potential visual exposure**

  The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if the proposed grid infrastructure was not visible, no impact would occur.

  Viewshed analyses from the proposed alignment indicate the potential visibility.

- **Determine visual distance/observer proximity to the grid connection infrastructure**

  In order to refine the visual exposure of the grid connection infrastructure on surrounding areas/receptors, the principle of reduced impact over distance is applied in order to determine the core area of visual influence for the structures.

  Proximity radii for the proposed alignment are created in order to indicate the scale and viewing distance of the structures and to determine the prominence of the structures in relation to their environment.

  The visual distance theory and the observer's proximity to the grid infrastructure are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly negative visual perception of the proposed infrastructure.

- **Determine viewer incidence/viewer perception (sensitive visual receptors)**

  The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers, then there would be no visual impact. If the visual perception of the structure is favourable to all the observers, then the visual impact would be positive.

  It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed infrastructure.

  It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, and purpose of sighting which would create a myriad of options.

- **Determine the visual absorption capacity of the landscape**

  This is the capacity of the receiving environment to absorb the potential visual impact of the proposed structures. The visual absorption capacity (VAC) is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. Conversely, low growing sparse and patchy vegetation will have a low VAC.

  The VAC would also be high where the environment can readily absorb the structure in terms of texture, colour, form and light / shade characteristics of the structure. On the other hand, the VAC for a structure contrasting markedly with one or more of the characteristics of the environment would be low.

The VAC also generally increases with distance, where discernible detail in visual characteristics of both environment and structure decreases.

The digital terrain model utilised in the calculation of the visual exposure of the grid connection infrastructure does not incorporate the potential VAC of the natural vegetation of the region. It is therefore necessary to determine the VAC by means of the interpretation of the vegetation cover, supplemented with field observations.

- **Calculate the visual impact index**

  The results of the above analyses are merged in order to determine where the areas of likely visual impact would occur. These areas are further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the magnitude of each impact.

- **Determine impact significance**

  The potential visual impacts are quantified in their respective geographical locations in order to determine the significance of the anticipated impact on identified receptors. Significance is determined as a function of extent, duration, magnitude (derived from the visual impact index) and probability. Potential cumulative and residual visual impacts are also addressed. The results of this section are displayed in impact tables and summarised in an impact statement.

- **Propose mitigation measures**

  Mitigation measures will be proposed in terms of the planning, construction, operation and decommissioning phases of the project.

- **Reporting and map display**

  All the data categories, used to calculate the visual impact index, and the results of the analyses will be displayed as maps in the accompanying report. The methodology of the analyses, the results of the visual impact assessment and the conclusion of the assessment will be addressed in the VIA report.

- **Site visit**

  Undertake a site visit in order to verify the results of the spatial analyses and to identify any additional site specific issues that may need to be addressed in the VIA report.

2. BACKGROUND

Hyperion Solar Hybrid (Pty) Ltd is proposing the construction of a 132kV overhead power line to connect the authorised Hyperion Photovoltaic (PV) 1 & 2 Solar Energy Facilities and proposed Thermal Power Facility (i.e. the Hyperion Hybrid facility) to the national grid via the existing Eskom Kalbas Substation. The proposed grid connection infrastructure is approximately 8km long and includes an assessment corridor of 300m wide.

The proposed grid connection infrastructure will be located approximately 15km north of Kathu within the Gamagara Local Municipality which falls within jurisdiction of the John Taolo Gaetsewe District Municipality, Northern Cape

Province and will cross Remainder of the Farm Kathu 465 (C04100000000046500000), Portion 1 of the Farm Selsden 464 (C04100000000046400001) and Remainder of the Farm Lyndoch 432 (C04100000000043200000).

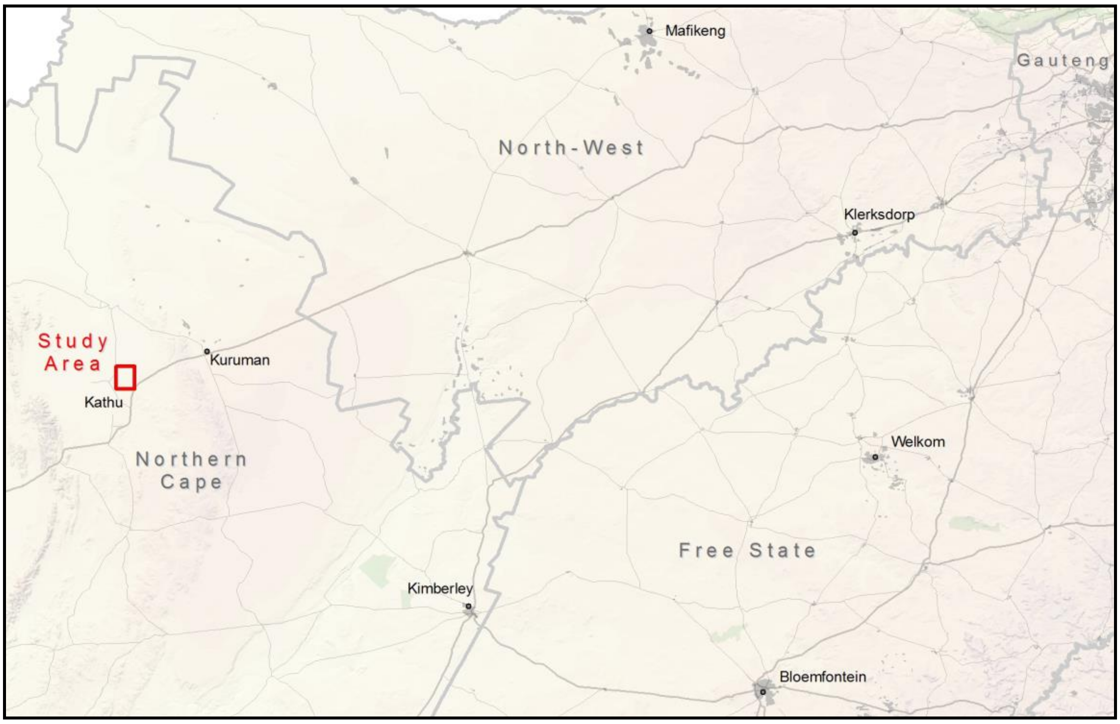


Figure 1: Regional locality of the proposed project area.

The proposed grid connection infrastructure will comprise of:

- 132kV distribution power line from the Hyperion Hybrid Facility to the existing Eskom Kalbas Substation located north of the operational Kathu Solar Park.

The power line towers will be steel monopole structures with a maximum height of 24m above ground level. The servitude will be 32m wide and it is expected that the construction phase will be up to ten months long.

The proposed alignment of the Hyperion Power Line is indicated on the maps within this report. Sample images of monopole tower structures are displayed below.

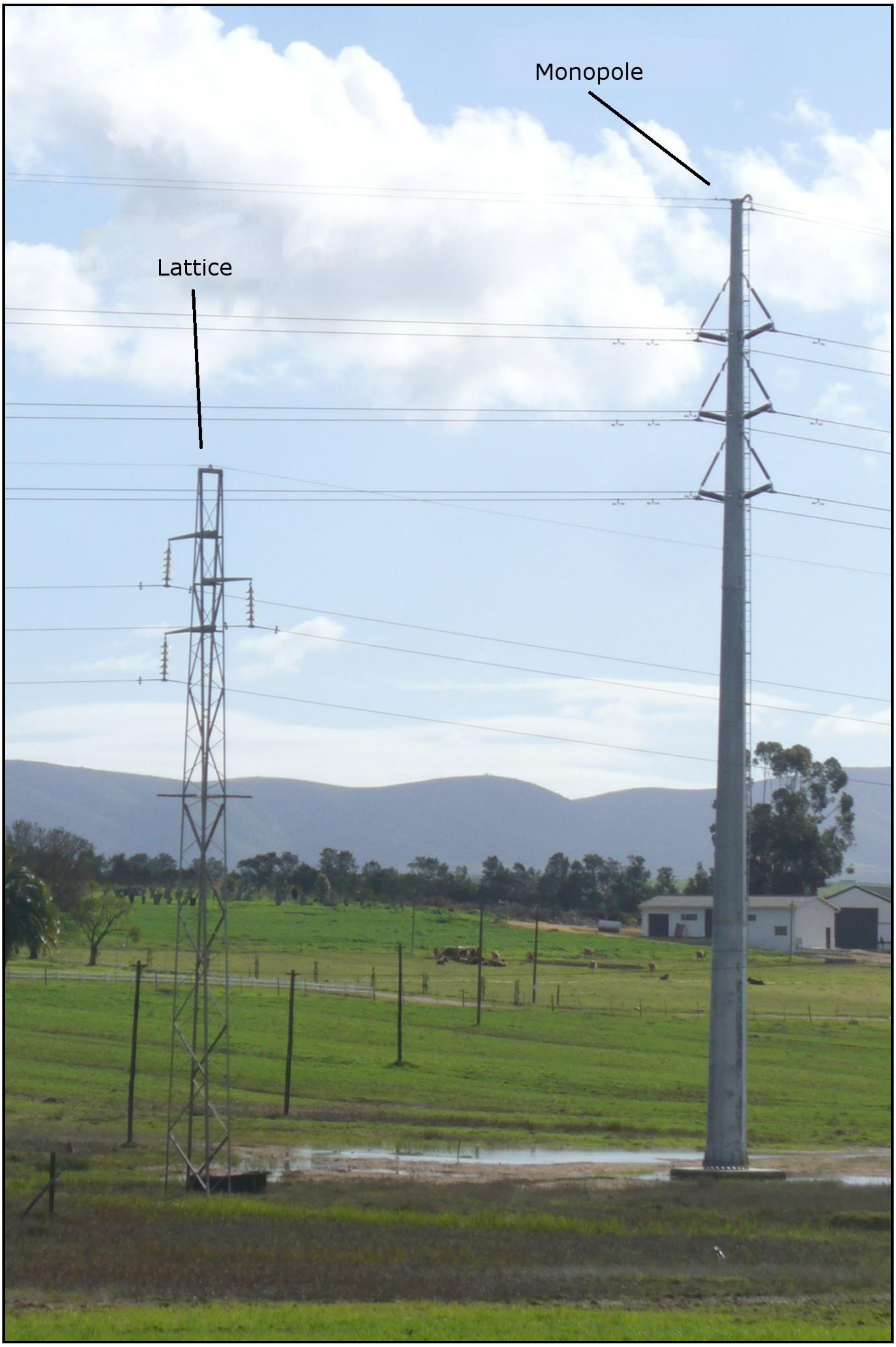


Figure 2: Conventional lattice power line tower compared to a steel monopole structure.

Figure 3: Longer distance view of power line towers.

3. SCOPE OF WORK

This report is the undertaking of a Visual Impact Assessment (VIA) of the proposed grid connection infrastructure as mentioned above.

The determination of the potential visual impacts is undertaken in terms of nature, extent, duration, magnitude, probability and significance of the construction and operation of the proposed infrastructure.

The study area for the visual impact assessment encompasses a geographical area of 115km² (the extent of the full page maps displayed in this report) and includes a minimum 3km buffer zone (area of potential visual influence) from the power line alignment.

The broader study area includes a number of homesteads or farm residences, the Kathu Solar Park, existing distribution power lines associated with this SEF, and the sites for the future Hyperion PV1 and PV2 SEFs.

Anticipated issues related to the potential visual impact of the proposed grid connection infrastructure include the following:

- The visibility of the infrastructure to, and potential visual impact on, observers travelling along the secondary road (T25) within the study area.

- The visibility of the infrastructure to, and visual impact on residents of homesteads within the study area.

- The potential visual impact of the infrastructure on the visual character or sense of place of the region.

- The potential visual impact of the infrastructure on tourist routes or tourist destinations (if present).

- The visual absorption capacity of the natural vegetation (if applicable).

- Potential cumulative visual impacts (or consolidation of visual impacts), with specific reference to the location of the proposed infrastructure within an area with existing (or authorized) SEFs.

- Potential visual impacts associated with the construction phase.

- The potential to mitigate visual impacts and inform the design process.

It is envisaged that the issues listed above may constitute a visual impact at a local and/or regional scale.

4. RELEVANT LEGISLATION AND GUIDELINES

The following legislation and guidelines have been considered in the preparation of this report:

- The Environmental Impact Assessment Regulations, 2014 (as amended);
- Guideline on Generic Terms of Reference for EAPS and Project Schedules (DEADP, Provincial Government of the Western Cape, 2011).

5. THE AFFECTED ENVIRONMENT

The proposed alignment of the Hyperion Power Line spans across the Remainder of the Farm Kathu 465, Portion 1 of the Farm Selsden 464 and the Remainder of the Farm Lyndoch 432. These farms are located in a rural area, currently zoned as agriculture, at a distance of between 11km and 16km from the town of Kathu.

The former of these farms accommodates the Kathu Solar Park and the Kalbas Substation. Portion 1 of the Farm Selsden 464 is located between the Solar Park and the proposed Hyperion Hybrid Facility and the Remainder of the Farm Lyndoch 432 is the location of the Hyperion Hybrid Facility.

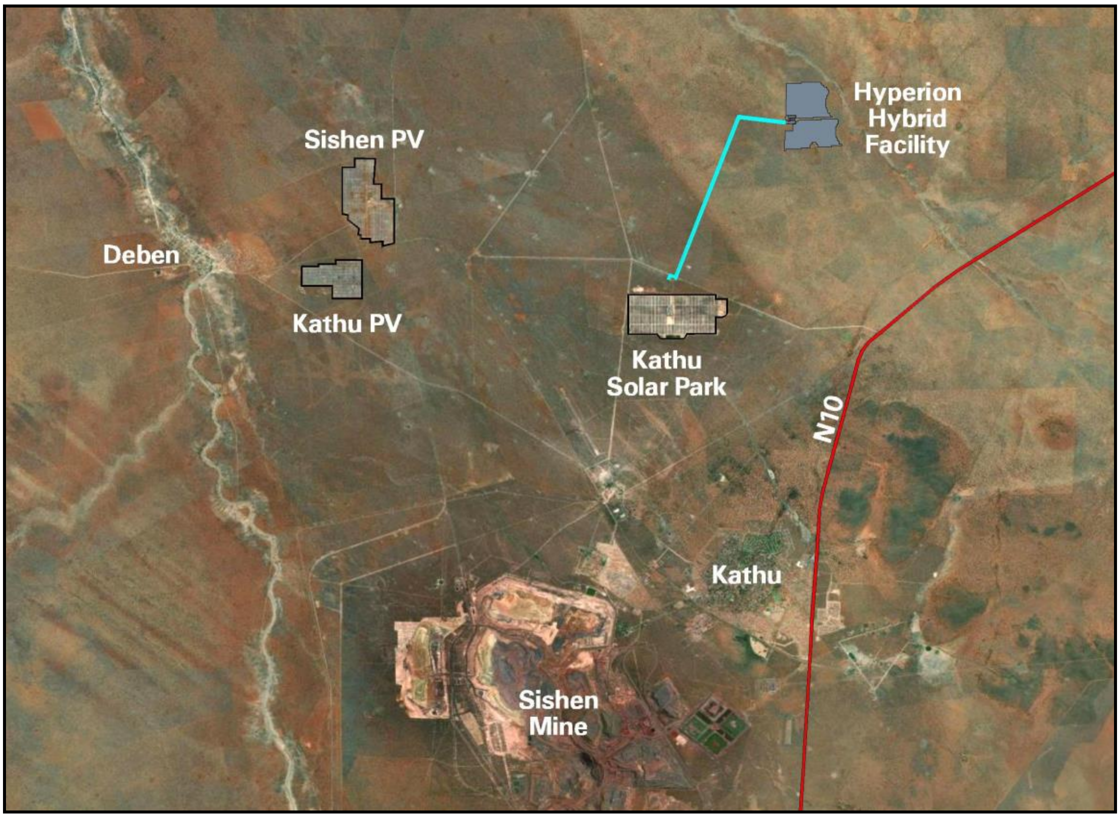


Figure 4: Regional overview.

The larger region is renowned for the Sishen Iron Ore Mine located west of Kathu. It has also in recent years become an attraction for renewable energy power producers due to the high solar resource of the area. There are already a number of operational solar energy facilities in and around the study area. Some of these include the Kathu Solar Park, and the Sishen and Kathu PV SEFs. Other SEFs the have been authorised, but not yet constructed, include the San Solar PV SEF and the Hyperion PV projects.

The study area occurs on land that ranges in elevation from 1144m (in the north-west) to 1340m (in the south-east). The topography of the study area is predominantly flat with an even slope towards the north-west. The proposed alignment itself is located at an average elevation of 1177m above sea level.

The Vlermuisleegte non-perennial river (a dry river bed for most of the year) is the most prominent hydrological feature within this arid region. This drainage line and some scattered dry pans account for the sum total of hydrological features in the study area.

The area is sparsely populated (less than 5 people per km^2), with the highest concentrations occurring in the towns of Kathu and Deben, and at the Sishen Mine.

Cattle and game farming is undertaken within the study area, with very little agricultural activity due to the scarcity of perennial water (for irrigated agriculture) and the low annual rainfall (for dryland agriculture).

The land cover is predominantly *grassland* and *low shrubland*, interspersed with *open woodland*. The study area falls within the Savanna Biome (Eastern Kalahari Bushveld Bioregion) and the vegetation type is described as *Kathu Bushveld.*

Significant tracts of land south of the study area have been transformed by mining, prospecting activities and settlements. In addition to the towns and the mine settlements, a number of isolated homesteads occur throughout the study area, usually located along or in close proximity to the N14 national road, the R380 arterial road or secondary roads. These roads provide for the motorised access to the solar energy facilities located within the region.

Besides the infrastructure associated with the Sishen Mine, and the built structures within Kathu, there are very limited developments within the study area. The largest infrastructure occurs at the Kathu Solar Park, where the Kalbas Substation is located.

No formally protected areas or major tourist attractions were identified within the study area. [2]

Refer to **Maps 2** and **3** for the topography and land cover maps of the study area.

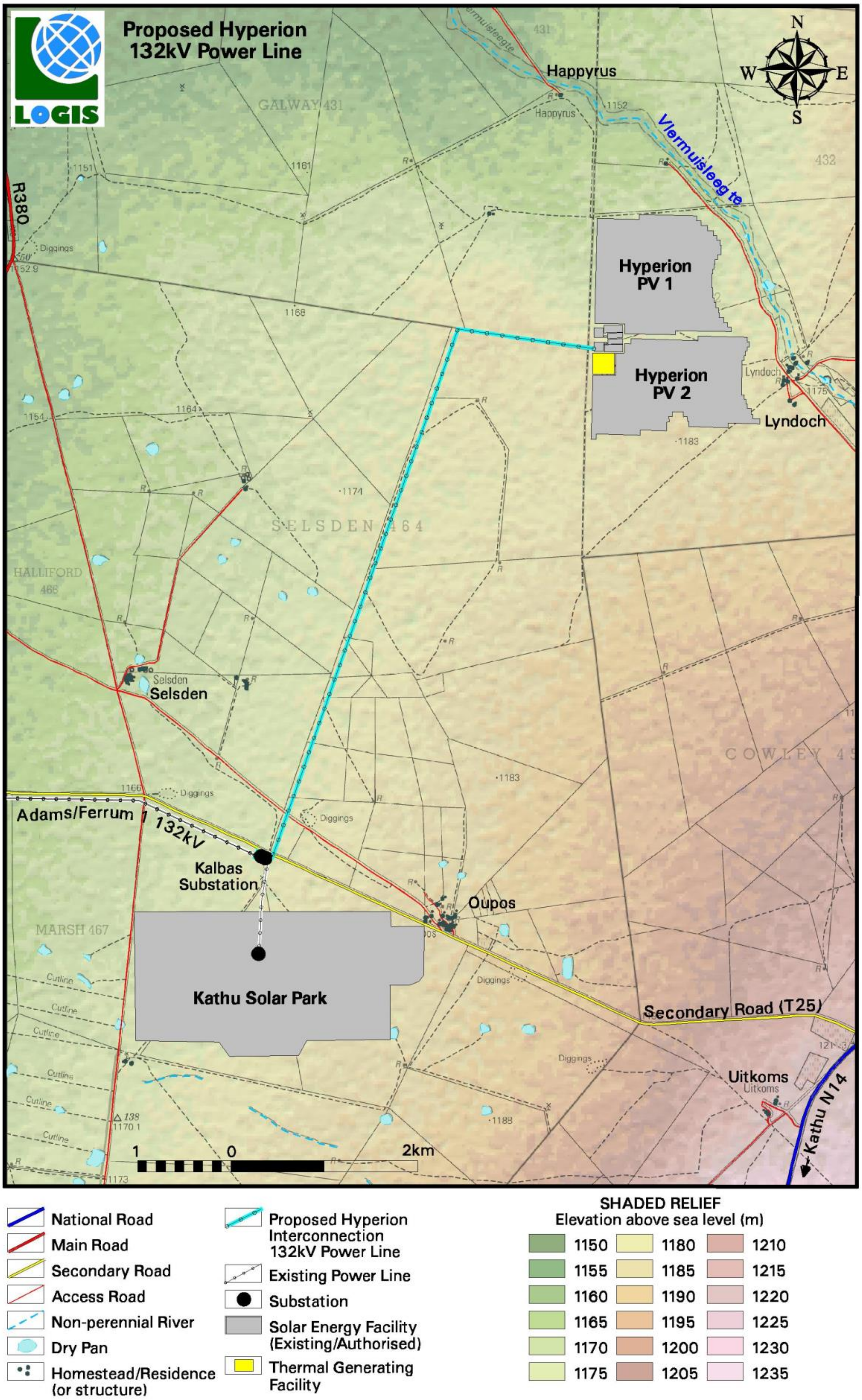
Figure 5: Typical vegetation occurring in the study area.

[2] Sources: DEAT (ENPAT Northern Cape), NBI (Vegetation Map of South Africa, Lesotho and Swaziland), NLC2013-14 (ARC/CSIR), REEA_OR_2020_Q2 and SAPAD2019-20 (DEA).

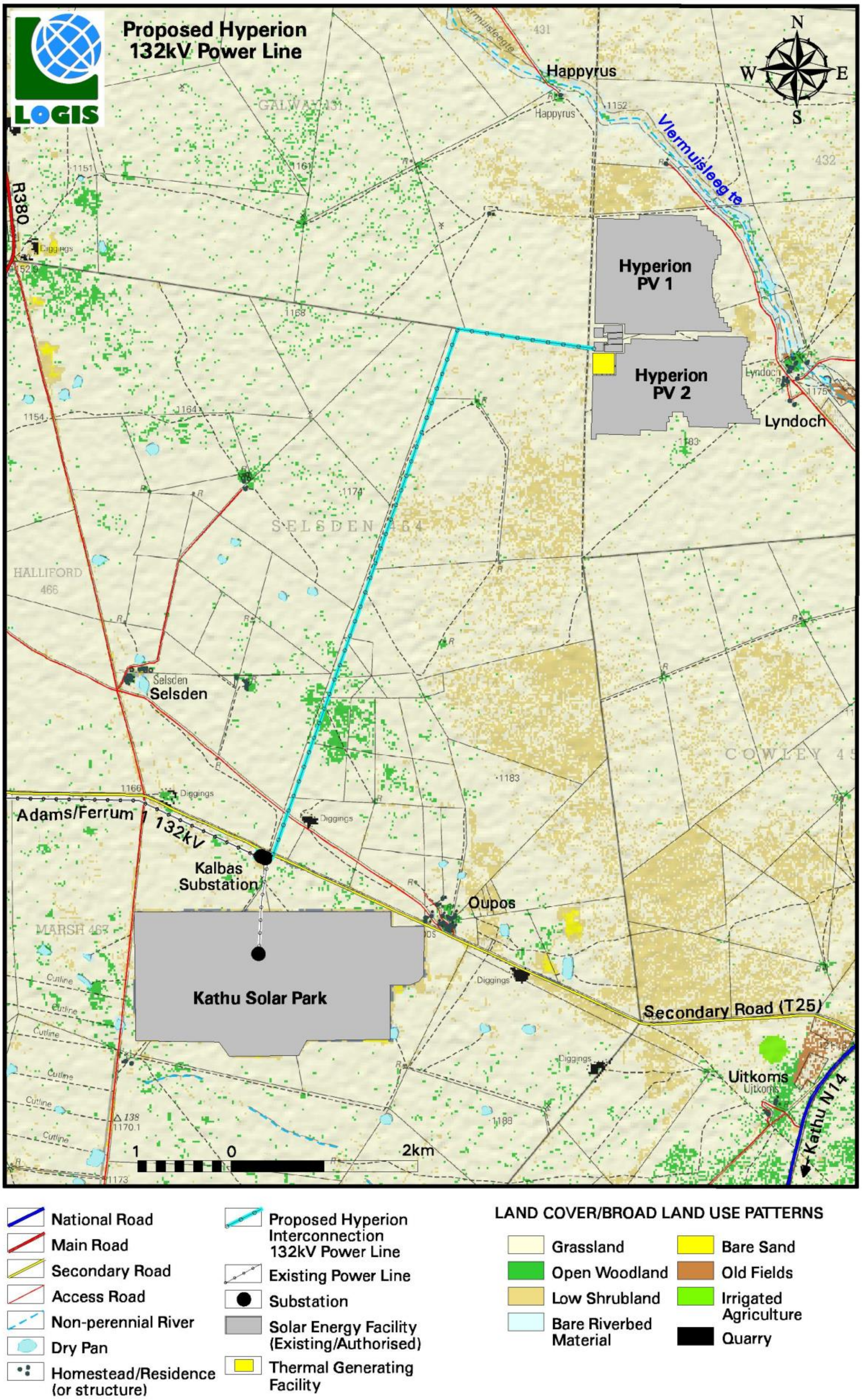
Figure 6: Visual quality of the receiving environment.

Figure 7: Open woodland within the study area.

Figure 8: Kathu Solar Park (Photo: Google.com).



Map 1: Shaded relief map of the study area.



Map 2: Land cover and broad land use patterns.

6. RESULTS

6.1. Potential visual exposure

There is only one alternative presented for the Hyperion Hybrid Facility grid connection infrastructure. The power line is proposed to traverse westwards (from the Hyperion Hybrid Facility) for approximately 1.5km, before veering in a south-westerly direction for 6km towards the Kalbas Substation.

The potential visual exposure (visibility) of the power line is shown on **Map 3**. The visibility analysis was undertaken along the alignment at an offset of 24m above average ground level (i.e. the approximate height of the power line structures), for a distance of 3km from the centre line. The viewshed analysis was restricted to a 3km radius due to the fact that visibility beyond this distance is expected to be negligible/highly unlikely for the relatively constrained vertical dimensions of this type of power line (i.e. a 132kV power line with steel monopole towers).

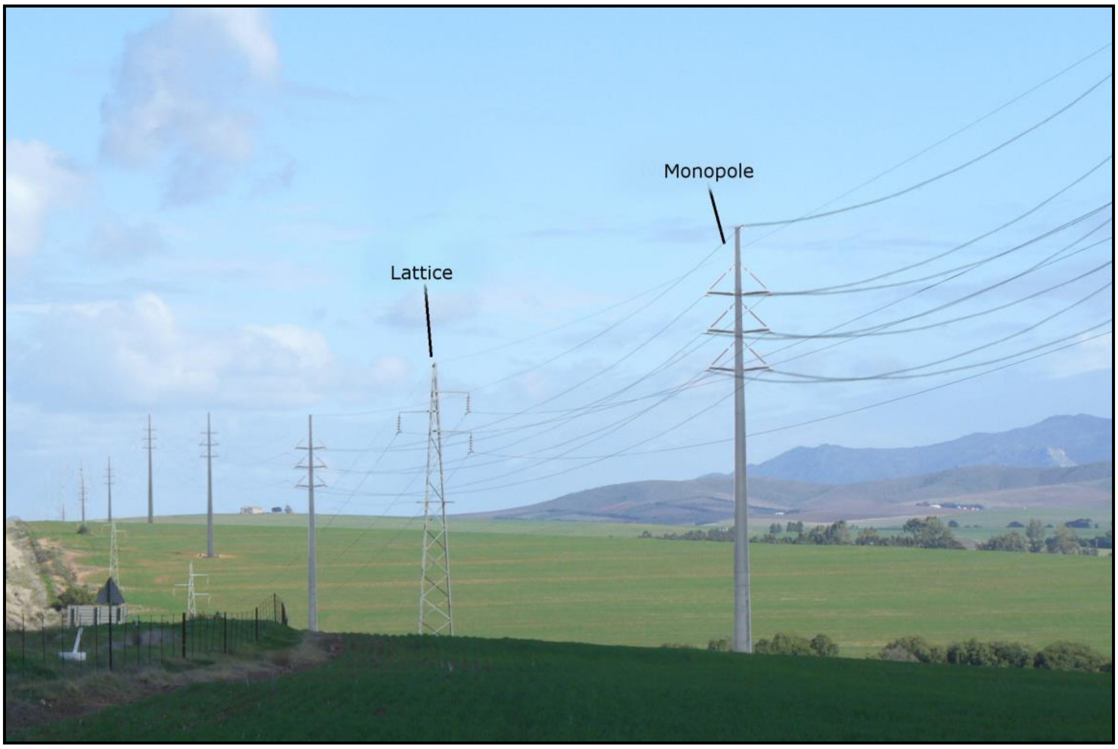
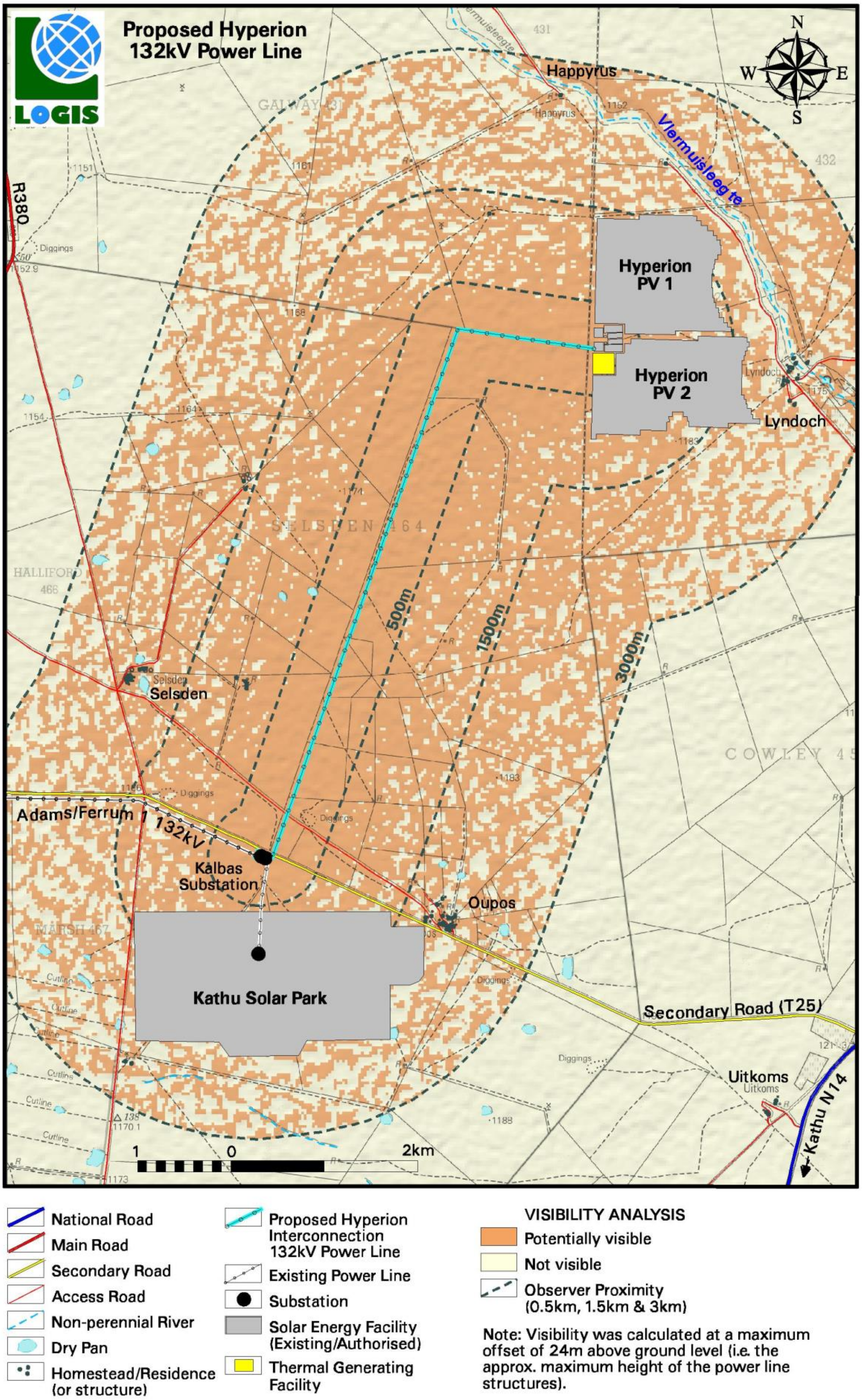


Figure 9: Examples of 132kV overhead power lines.

It is expected that the power line may be visible within the 3km visual corridor and potentially highly visible within a 500m radius of the power line structures due to the generally flat terrain it traverses. Beyond 500m the visibility becomes more scattered due to the undulating nature of the topography. The power line structures are unlikely to be visible beyond a 3km radius of the structures.

The majority of the exposed areas fall within vacant open space, generally devoid of observers or potential sensitive visual receptors. The power line will however be visible from the T25 secondary road where it traverses the road before entering the Kalbas Substation. It may also be visible, at distances exceeding 1.5km from the Oupos and Selsden homesteads.



Map 3: Viewshed analysis of the proposed grid connection infrastructure.

6.2. Visual distance / observer proximity to the grid connection infrastructure

The proximity radii are based on the anticipated visual experience of the observer over varying distances. The distances are adjusted upwards for larger power line structures (e.g. 400kV) and downwards for smaller power lines (e.g. 132kV). This methodology was developed in the absence of any known and/or acceptable standards for South African power line infrastructure.

The proximity radii (calculated from the power line) are indicated on **Map 4**, and include the following:

- 0 – 0.5km - Short distance view where the structures would dominate the frame of vision and constitute a very high visual prominence.

- 0.5 – 1.5km - Medium distance views where the structures would be easily and comfortably visible and constitute a high visual prominence.

- 1.5 - 3km - Medium to longer distance view where the structures would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a medium visual prominence.

- Greater than 3km - Long distance view where the structures may still be visible though not as easily recognisable. This zone constitutes a low visual prominence for the power line.

The visual distance theory and the observer's proximity to the 132kV power line are closely related, and especially relevant, when considered from areas with a high viewer incidence and a potentially negative visual perception of the proposed infrastructure.

6.3. Viewer incidence / viewer perception

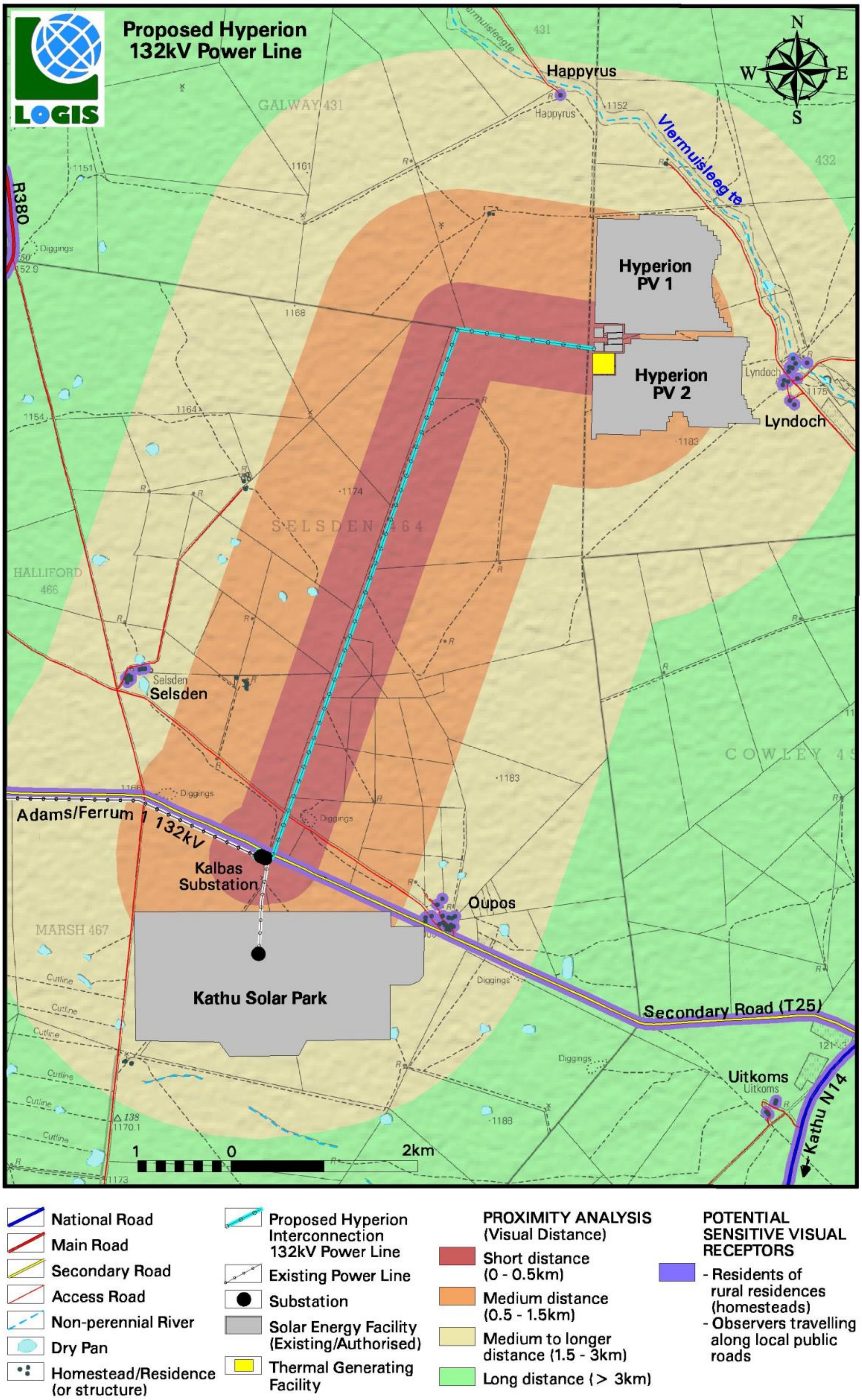
The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact.

It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed solar energy facility and its related infrastructure. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer: regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

Viewer incidence is calculated to be the highest along the secondary road (T25) traversing from the N14 national road to the R380 arterial road. Travellers using this road may be negatively impacted upon by visual exposure to the grid connection infrastructure.

Additional sensitive visual receptors are located at the farm residences (homesteads) throughout the study area. It is expected that the viewer's perception, unless the observer is associated with (or supportive of) the solar energy facility, would generally be negative.

Due to the remote location of the proposed power line, there are only a few potential sensitive visual receptors located within a 6km radius of the proposed facility. These are residents of, or visitors, to Selsden, Oupos, Happyrus and Lyndoch. Refer to **Map 4**.



Map 4: Proximity analysis and potential sensitive visual receptors.

6.4. Visual absorption capacity

The broader study area is located within the Savanna Biome characterised by large open grassland, *low shrubland*, open woodland and bare soil in places (**Figure 10**).

Overall, the Visual Absorption Capacity (VAC) of the receiving environment is deemed low by virtue of the nature of the vegetation and the low occurrence of urban development. In addition, the scale and form of the proposed structures mean that it is unlikely that the environment will visually absorb them in terms of texture, colour, form and light/shade characteristics.

Where homesteads and settlements occur, some more significant vegetation and trees may have been planted, which would contribute to the visual absorption capacity (i.e. shielding the observers from the facility). As this is not a consistent occurrence, however, VAC will not be taken into account for any of the homesteads or settlements, thus assuming a worst case scenario in the impact assessment.

Figure 10: *Low shrubland* and grassland within the study area – low VAC.

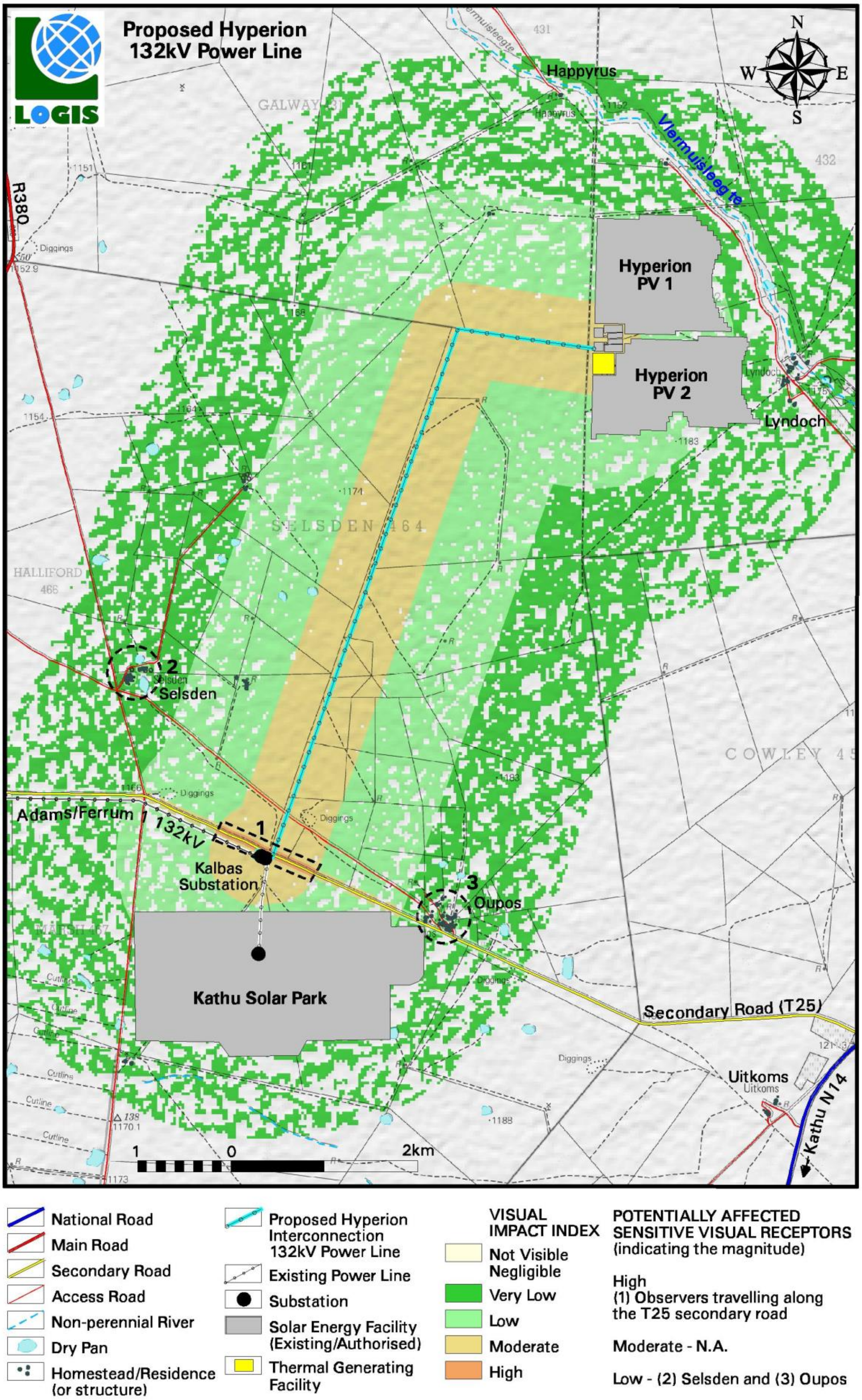
6.5. Visual impact index

The combined results of the visual exposure, viewer incidence/perception and visual distance of the proposed grid connection infrastructure culminate in a visual impact index. Here the weighted impact and the likely areas of impact have been indicated as a visual impact index. Values have been assigned for each potential visual impact per data category and merged in order to calculate the visual impact index.

An area with short distance visual exposure to the proposed grid connection infrastructure, a high viewer incidence and a potentially negative perception would therefore have a higher value (greater impact) on the index. This helps in focussing the attention to the critical areas of potential impact and determining the potential **magnitude** of the visual impact.

The likely area of higher visual impact is indicated on **Map 5** where the power line will traverse the secondary road (T25) near the Kalbas Substation. There are no homesteads within a 500m radius of the power line structures, negating additional potentially high visual impacts. The Oupos and Selsden homesteads, each located beyond 1.5km from the power line structures, are expected to experience visual impacts of low magnitude.

It also appears, when referencing the South African Renewable Energy EIA Application Database (REEA_OR_2020_Q2) that the two homesteads are located on the farms **originally submitted** for the Hyperion PV projects application. It is assumed that the residents are supportive of SEF developments within the region and will likely be supportive of the grid connection infrastructure.



Map 5: Visual impact index and potentially affected sensitive visual receptors.

6.6. Visual impact assessment: impact rating methodology

The previous section of the report identified specific areas where likely visual impacts would occur. This section will attempt to quantify these potential visual impacts in their respective geographical locations and in terms of the identified issues (see **Section 3:** SCOPE OF WORK) related to the visual impact.

The methodology for the assessment of potential visual impacts states the **nature** of the potential visual impact (e.g. the visual impact on users of major roads in the vicinity of the proposed power line alignment) and includes a table quantifying the potential visual impact according to the following criteria:

- **Extent** - site only (very low = 1), local (low = 2), regional (medium = 3), national (high = 4) or international (very high = 5)[3].
- **Duration** - very short (0-1 yrs. = 1), short (2-5 yrs. = 2), medium (5-15 yrs. = 3), long (>15 yrs. = 4), and permanent (= 5).
- **Magnitude** - None (= 0), minor (= 2), low (= 4), medium/moderate (= 6), high (= 8) and very high (= 10)[4].
- **Probability** – very improbable (= 1), improbable (= 2), probable (= 3), highly probable (= 4) and definite (= 5).
- **Status** (positive, negative or neutral).
- **Reversibility** - reversible (= 1), recoverable (= 3) and irreversible (= 5).
- **Significance** - low, medium or high.

The **significance** of the potential visual impact is equal to the **consequence** multiplied by the **probability** of the impact occurring, where the consequence is determined by the sum of the individual scores for magnitude, duration and extent (i.e. **significance = consequence (magnitude + duration + extent) x probability**).

The significance weighting for each potential visual impact (as calculated above) is as follows:

- <30 points: Low (where the impact would not have a direct influence on the decision to develop in the area)
- 31-60 points: Medium/moderate (where the impact could influence the decision to develop in the area)
- >60: High (where the impact must have an influence on the decision to develop in the area)

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[3] Local = within 0.5km of the power line. Regional = between 0.5 - 3km from the power line.

[4] This value is read from the visual impact index. Where more than one value is applicable, the higher of these will be used as a worst case scenario.

6.7. Visual impact assessment

The primary visual impacts of the proposed grid connection infrastructure for the Hyperion Hybrid Facility are assessed as follows:

6.7.1. Construction impacts

Potential visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.

During construction, there may be an increase in heavy vehicles utilising the roads to the power line that may cause, at the very least, a visual nuisance to other road users and landowners in the area.

Construction activities may potentially result in a **low** (significance rating = 20) temporary visual impact both before and after (significance rating = 16) mitigation.

Table 2: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.

Nature of Impact: Visual impact of construction activities on sensitive visual receptors in close proximity to the proposed grid connection infrastructure.		
	Without mitigation	***With mitigation***
Extent	Local **(2)**	Local **(2)**
Duration	Short term **(2)**	Short term **(2)**
Magnitude	Moderate **(6)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(20)**	Low **(16)**
Status (positive or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	

Mitigation: Planning: ➢ Retain and maintain natural vegetation immediately adjacent to the development footprint/servitude. Construction: ➢ Ensure that vegetation is not unnecessarily removed during the construction phase. ➢ Plan the placement of lay-down areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible. ➢ Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads. ➢ Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed of regularly at licensed waste facilities. ➢ Reduce and control construction dust using approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent). ➢ Restrict construction activities to daylight hours whenever possible in order to reduce lighting impacts. ➢ Rehabilitate all disturbed areas immediately after the completion of construction works.
Residual impacts: None, provided rehabilitation works are carried out as specified.

6.7.2. Potential visual impact on sensitive visual receptors located within a 0.5km radius of the grid connection infrastructure during the operation phase

The power line is expected to have a **low** visual impact (significance rating = 20) on observers within a 0.5km radius of the power line structures. This is due to the limited number of potentially sensitive visual receptors brought about by the remote location of the infrastructure. The area of potential visual impact (i.e. where the power line crosses the secondary road near the Kalbas Substation) will also likely be overshadowed by the much larger Kathu Solar Park infrastructure.

No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice. The table below illustrates this impact assessment.

Table 3: Visual impact on sensitive visual receptors in close proximity to the 132kV overhead power line.

Nature of Impact: Visual impact on observers travelling along the roads and residents at homesteads in close proximity to the power line structures		
	Without mitigation	***With mitigation***
Extent	Local **(2)**	Local **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(20)**	Low **(20)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be	No	

mitigated?	

Mitigation / Management: Planning: ➢ Retain/re-establish and maintain natural vegetation immediately adjacent to the power line servitude. Operations: ➢ Maintain the general appearance of the infrastructure. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.
Residual impacts: The visual impact will be removed after decommissioning, provided the power line infrastructure is removed. Failing this, the visual impact will remain.

6.7.3. Potential visual impact on sensitive visual receptors within the region (0.5 – 3km radius) during the operation of the grid infrastructure

The 132kV power line will have a **low** visual impact (significance rating = 22) on observers traveling along the roads and residents of homesteads within a 0.5 - 3km radius of the grid connection infrastructure.

No mitigation of this impact is possible (i.e. the structures will be visible regardless), but general mitigation and management measures are recommended as best practice. The table below illustrates this impact assessment.

Table 4: Visual impact of the proposed grid connection infrastructure within the region.

Nature of Impact: Visual impact on observers travelling along the roads and residents at homesteads within a 0.5 – 3km radius of the grid connection infrastructure.		
	Without mitigation	***With mitigation***
Extent	Regional **(3)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(22)**	Low **(22)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No	
Mitigation / Management: Planning: ➢ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: ➢ Maintain the general appearance of the servitude as a whole. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		

Residual impacts: The visual impact will be removed after decommissioning, provided that the grid connection infrastructure is removed. Failing this, the visual impact will remain.

6.8. Visual impact assessment: secondary impacts

The potential visual impact of the proposed grid connection infrastructure on the sense of place of the region.

Sense of place refers to a unique experience of an environment by a user, based on his or her cognitive experience of the place. Visual criteria, specifically the visual character of an area (informed by a combination of aspects such as topography, level of development, vegetation, noteworthy features, cultural / historical features, etc.), plays a significant role.

An impact on the sense of place is one that alters the visual landscape to such an extent that the user experiences the environment differently, and more specifically, in a less appealing or less positive light.

The greater environment has a rural, undeveloped character and a natural appearance. These generally undeveloped landscapes are considered to have a high visual quality.

The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance. This is due to the relatively low viewer incidence within close proximity to the power line and the presence of the existing electricity infrastructure.

Table 5: The potential impact on the sense of place of the region.

Nature of Impact: The potential impact of the development of the proposed grid connection infrastructure on the sense of place of the region.		
	Without mitigation	***With mitigation***
Extent	Regional **(3)**	Regional **(3)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Low **(4)**
Probability	Improbable **(2)**	Improbable **(2)**
Significance	Low **(22)**	Low **(22)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	
Generic best practise mitigation/management measures: Planning: ➢ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: ➢ Maintain the general appearance of the servitude as a whole. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		

Residual impacts: The visual impact will be removed after decommissioning, provided the grid connection infrastructure is removed. Failing this, the visual impact will remain.

The potential cumulative visual impact of the proposed grid connection infrastructure on the visual quality of the landscape.

The construction of the grid connection infrastructure for the Hyperion Hybrid Facility may increase the cumulative visual impact of industrial type infrastructure within the region.

The anticipated cumulative visual impact of the proposed power lines is expected to be of **moderate** significance, which is considered to be acceptable from a visual perspective. This is once again due to the relatively low viewer incidence within close proximity to the proposed alignments and the presence of the existing electricity infrastructure.

Table 6: The potential cumulative visual impact on the visual quality of the landscape.

Nature of Impact: The potential cumulative visual impact of the grid infrastructure on the visual quality of the landscape.		
	Overall impact of the proposed project considered in isolation (with mitigation)	***Cumulative impact of the project and other projects within the area (with mitigation)***
Extent	Local **(2)**	Local **(2)**
Duration	Long term **(4)**	Long term **(4)**
Magnitude	Low **(4)**	Moderate **(6)**
Probability	Improbable **(2)**	Probable **(3)**
Significance	Low **(20)**	Moderate **(36)**
Status (positive, neutral or negative)	Negative	Negative
Reversibility	Reversible **(1)**	Reversible **(1)**
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	No, only best practise measures can be implemented	
Generic best practise mitigation/management measures: Planning: ➢ Retain/re-establish and maintain natural vegetation immediately adjacent to the development footprint/servitude. Operations: ➢ Maintain the general appearance of the servitude as a whole. Decommissioning: ➢ Remove infrastructure not required for the post-decommissioning use. ➢ Rehabilitate all affected areas. Consult an ecologist regarding rehabilitation specifications.		
Residual impacts: The visual impact will be removed after decommissioning, provided the grid infrastructure is removed. Failing this, the visual impact will remain.		

6.9. The potential to mitigate visual impacts

The primary visual impact, namely the appearance of the proposed grid connection infrastructure is not possible to mitigate. The functional design of the structures cannot be changed in order to reduce visual impacts.

Secondary impacts anticipated as a result of the proposed grid connection infrastructure (i.e. visual character and sense of place) are also not possible to mitigate.

The following mitigation is, however possible:

- Retain/re-establish and maintain natural vegetation in all areas immediately adjacent to the development footprint/servitude. This measure will help to soften the appearance of the grid connection infrastructure within its context.

- Mitigation of visual impacts associated with the construction phase, albeit temporary, would entail proper planning, management and rehabilitation of the construction site. Recommended mitigation measures include the following:

    - Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
    - Plan the placement of laydown areas and any potential temporary construction camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.
    - Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads.
    - Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
    - Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
    - Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
    - Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist must be consulted to assist or give input into rehabilitation specifications.

- During operation, the maintenance of the grid connection infrastructure will ensure that the infrastructure does not degrade, therefore aggravating visual impact.

- Roads must be maintained to forego erosion and to suppress dust, and rehabilitated areas must be monitored for rehabilitation failure. Remedial actions must be implemented as a when required.

- Once the grid connection infrastructure has exhausted its life span, all associated infrastructure not required for the post rehabilitation use of the site/servitude should be removed and all disturbed areas appropriately rehabilitated. An ecologist should be consulted to give input into rehabilitation specifications.

- All rehabilitated areas should be monitored for at least a year following decommissioning, and remedial actions implemented as and when required.

Good practice requires that the mitigation of both primary and secondary visual impacts, as listed above, be implemented and maintained on an ongoing basis.

7. CONCLUSION AND RECOMMENDATIONS

The construction and operation of the proposed grid connection infrastructure for the Hyperion Hybrid Facility, may have a visual impact on the study area, especially within (but not restricted to) a 0.5km radius of the power line. The visual impact will differ amongst places, depending on the distance from the power line.

Overall, the significance of the visual impacts is expected to range from **moderate** to **low** as a result of the generally undeveloped character of the landscape. No visual impacts of a high significance are expected to occur.

A number of mitigation measures have been proposed (**Section 6.9.**). Regardless of whether or not mitigation measures will reduce the significance of the anticipated visual impacts, they are considered to be good practice and should all be implemented and maintained throughout the construction, operation and decommissioning phases of the proposed grid connection infrastructure.

If mitigation is implemented as recommended, it is concluded that the significance of most of the anticipated visual impacts will remain at or be managed to acceptable levels. As such, the grid connection infrastructure for the Hyperion Hybrid Facility is considered to be acceptable from a visual impact perspective.

8. IMPACT STATEMENT

The findings of the Visual Impact Assessment undertaken for the proposed grid connection infrastructure for the Hyperion Hybrid Facility indicates that the visual environment surrounding the power line, especially within a 0.5km radius, may be visually impacted upon for the anticipated operational lifespan of the 132kV power line.

This impact is applicable to the proposed grid connection infrastructure and to the potential cumulative visual impact of the power line in association with existing electricity distribution and generation infrastructure within the region.

The following is a summary of impacts remaining, assuming mitigation as recommended is exercised:

- During the construction, there may be an increase in heavy vehicles utilising the roads to the power line that may cause, at the very least, a visual nuisance to other road users and landowners in the area. Construction activities may potentially result in a **low** temporary visual impact after mitigation.

- The grid connection infrastructure is expected to have a **low** visual impact on observers traveling along the roads and residents of homesteads within a 0.5km radius of the structures.

- The grid connection infrastructure is expected to have a **low** visual impact on observers traveling along the roads and residents of homesteads within a 0.5 - 3km radius of the structures.

- The anticipated visual impact of the proposed grid connection infrastructure on the regional visual quality, and by implication, on the sense of place, is difficult to quantify, but is generally expected to be of **low** significance. This is due to the relatively low viewer incidence within close proximity to the proposed grid connection infrastructure.

- The anticipated cumulative visual impact of the proposed grid connection infrastructure is expected to be of **moderate** significance, which is considered to be acceptable from a visual perspective. This is once again due to the relatively low viewer incidence within close proximity to the power line and the presence of the existing electricity infrastructure.

The anticipated visual impacts listed above (i.e. post mitigation impacts) range from **moderate** to **low** significance. No visual impacts of a high significance are expected to occur. Anticipated visual impacts on sensitive visual receptors in close proximity to the power line are not considered to be fatal flaws for the proposed project.

Considering all factors, it is recommended that the development of the grid connection infrastructure as proposed be supported; subject to the implementation of the recommended mitigation measures (**Section 6.9.**) and management programme (**Section 9.**).

Where sensitive visual receptors are likely to be affected (i.e. residents of homesteads and settlements in close proximity), it is recommended that the developer enter into negotiations regarding the potential screening of visual impacts at the receptor site. This may entail the planting of vegetation, trees or the construction of screens. Ultimately, visual screening is most effective when placed at the receptor itself.

9. MANAGEMENT PROGRAMME

The following management plan tables aim to summarise the key findings of the visual impact report and suggest possible management actions in order to mitigate the potential visual impacts.

Table 7: Management Programme: Planning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the planning of the proposed grid connection infrastructure.		
Project component/s	The Hyperion Hybrid Facility 132kV power line.	
Potential Impact	Primary visual impact due to the presence of the grid connection infrastructure in the landscape.	
Activity/risk source	The viewing of the grid connection infrastructure by observers near the infrastructure as well as within the region.	
Mitigation: Target/Objective	Optimal planning of infrastructure so as to minimise visual impact.	
Mitigation: Action/control	Responsibility	Timeframe
Implement an environmentally responsive planning approach for the development of roads and infrastructure to limit cut and fill	Project proponent / design consultant	Planning phase.

requirements. Plan with due cognisance of the topography.		
Consolidate infrastructure and make use of already disturbed sites rather than natural areas.	Project proponent / design consultant	Planning phase.
Performance Indicator	No access roads and other associated infrastructure are visible from surrounding areas.	
Monitoring	Not applicable.	

Table 8: Management Programme: Construction.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the construction of the proposed grid connection infrastructure.		
Project component/s	Construction activities associated with the development of the 132kV power line.	
Potential Impact	Visual impact of general construction activities, and the potential scarring of the landscape due to vegetation clearing.	
Activity/risk source	The viewing of general construction activities by observers near the development areas.	
Mitigation: Target/Objective	Minimal visual intrusion by construction activities and intact vegetation cover outside of immediate works areas.	
Mitigation: Action/control	Responsibility	Timeframe
Ensure that vegetation is not unnecessarily cleared or removed during the construction period.	Project proponent / contractor	Early in the construction phase.
Plan the placement of laydown areas and temporary construction equipment camps in order to minimise vegetation clearing (i.e. in already disturbed areas) wherever possible.	Project proponent / contractor	Early in and throughout the construction phase.
Restrict the activities and movement of construction workers and vehicles to the immediate construction area and existing access roads.	Project proponent / contractor	Throughout the construction phase.
Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.	Project proponent / contractor	Throughout the construction phase.
Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).	Project proponent / contractor	Throughout the construction phase.
Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.	Project proponent / contractor	Throughout the construction phase.
Rehabilitate all disturbed areas, construction areas, servitudes etc. immediately after the completion of construction works. If necessary, consult an ecologist to give input into rehabilitation specifications.	Project proponent / contractor	Throughout and at the end of the construction phase.
Performance Indicator	Vegetation cover within the servitudes and in the vicinity of the grid connection infrastructure is intact with no evidence of degradation or erosion.	
Monitoring	Monitoring of vegetation clearing during construction. Monitoring of rehabilitated areas post construction.	

Table 9: Management Programme: Operation.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the operation of the proposed grid connection infrastructure.		
Project component/s	The Hyperion Hybrid Facility 132kV power line.	
Potential Impact	Visual impact of vegetation rehabilitation failure.	
Activity/risk source	The viewing of the above mentioned by observers near the infrastructure.	
Mitigation: Target/Objective	Well-rehabilitated and maintained servitudes.	
Mitigation: Action/control	Responsibility	Timeframe
Maintain roads to forego erosion and to suppress dust.	Project proponent / operator	Throughout the operation phase.
Monitor rehabilitated areas, and implement remedial action as and when required.	Project proponent / operator	Throughout the operation phase.
Performance Indicator	Intact vegetation within servitudes and in the vicinity of the infrastructure.	
Monitoring	Monitoring of rehabilitated areas.	

Table 10: Management Programme: Decommissioning.

OBJECTIVE: The mitigation and possible negation of visual impacts associated with the decommissioning of the proposed grid connection infrastructure.		
Project component/s	The Hyperion Hybrid Facility 132kV power line.	
Potential Impact	Visual impact of residual visual scarring and vegetation rehabilitation failure.	
Activity/risk source	The viewing of the residual scarring and vegetation rehabilitation failure by observers along or near the areas where the grid connection infrastructure was constructed.	
Mitigation: Target/Objective	Rehabilitated vegetation in all disturbed areas.	
Mitigation: Action/control	Responsibility	Timeframe
Remove infrastructure not required for the post-decommissioning use of the site/servitude.	Project proponent / operator	During the decommissioning phase.
Rehabilitate access roads and servitudes not required for the post-decommissioning use of the sites. If necessary, consult an ecologist to give input into rehabilitation specifications.	Project proponent / operator	During the decommissioning phase.
Monitor rehabilitated areas quarterly for at least a year following decommissioning, and implement remedial action as and when required.	Project proponent / operator	Post decommissioning.
Performance Indicator	Intact vegetation along and in the vicinity of the servitude.	
Monitoring	If rehabilitation is successful then no further monitoring is required.	

10. REFERENCES/DATA SOURCES

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