VISUAL IMPACT

SPECIALIST ASSESSMENT

BASIC ASSESSMENT FOR THE PROPOSED SQUARE KILOMETRE ARRAY (SKA) FIBRE OPTIC CABLE BETWEEN BEAUFORT WEST AND CARNARVON

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Version: v1 Final

12 November 2021

Executive Summary

The proposed underground fibre optic cable would have little or no visual implications, and therefore only the above-ground sections of the route were assessed. The proposed route of the cable generally follows the R381 through the Molteno Pass and a number of smaller passes and *poorts*. These sections of the route have scenic value, and it is mainly users of the R381 that would potentially be affected by the proposed cable. Farmsteads in the area are too far away to be significantly affected.

Because the poles for the cables are relatively low, (7,5 and 9,0m), compared to the existing 22kV Eskom powerline (about 12,0m), visibility of the proposed cable infrastructure is not expected to be generally significant, although where poles are located on the skyline, visibility would become more significant and the scenic quality of the area could be affected.

Where the cable infrastructure is located immediately adjacent to the R381 road, the visual impact on users of the road, and on the rural or wilderness experience of the area, would become significant. In addition, where the cable route creates a different corridor to that of the existing 22kV powerline, further fragmentation of the scenic landscape can be expected.

Recommended mitigations include the following:

- avoiding visually exposed ridgelines and locating the SKA cable in the lower lying areas or valleys, where feasible;
- observing a visual buffer along the R381 and minimising crossing of the road by the cable as far as possible;
- combining the SKA cable and Eskom powerline corridors where possible, except where the existing powerline follows a visually intrusive route;
- placing the cable in a trench in those sections where the potential exists.

Provided these mitigations are implemented, the visual impact significance of the proposed SKA cable could be reduced from moderate to low during its operational lifespan. As the visual landscape could be restored after decommissioning, the visual significance would reduce further to very low post mitigation.

The potential cumulative visual impact for the proposed SKA cable, in combination with the existing Eskom powerline and telephone line would be moderate, but could be reduced to low if the above mitigations are implemented.

A summary of the overall visual impact significance (post mitigation) is given below:

Phase	**Overall Impact Significance**
Construction	Very low
Operational	Low
Decommissioning	Very low
Nature of Impact	**Overall Impact Significance**
Cumulative - Construction	Very low
Cumulative - Operational	Low
Cumulative - Decommissioning	Very low

No fatal flaws in visual terms are expected as a result of the proposed cable infrastructure. The Molteno Pass has both scenic and heritage significance, and it is important therefore that the recommended mitigations form part of the conditions of approval. Provided a heritage permit is issued, the application could be authorised from a visual perspective.

Contents

Executive Summary 1
1. Introduction 5
2. Approach and Methodology 5
3. Description of Project Aspects relevant to Visual and Scenic Resources 7
4. Baseline Environmental Description 7
5. Environmental Sensitivity 9
6. Issues, Risks and Impacts 11
7. Impact Assessment 12
8. Legislative and Permit Requirements 14
9. Environmental Management Programme Inputs 14
10. Final Specialist Statement and Authorisation Recommendation 15
11. References 16
Appendix A - Specialist Expertise 17
Appendix B - Specialist Statement of Independence 18
Appendix C: Site Sensitivity Verification 19
Appendix D: Impact Assessment Methodology 20
Appendix E: Compliance with the Appendix 6 of the 2014 EIA Regulations (as amended) 23

Maps

Map 1: SKA Fibre Overhead Lines: Carnarvon to Beaufort West
Map 2: SKA Fibre Overhead Lines
Map 3: SKA Fibre Overhead Lines: North Section
Map 4: SKA Fibre Overhead Lines: Mid Section
Map 5: SKA Fibre Overhead Lines: Molteno Pass North Section
Map 6: SKA Fibre Overhead Lines: Molteno Pass South Section
Map 7: SKA Fibre Overhead Lines: North Section Viewshed
Map 8: SKA Fibre Overhead Lines: Mid Section Viewshed
Map 9: SKA Fibre Overhead Lines: Molteno Pass North Section Viewshed
Map 10: SKA Fibre Overhead Lines: Molteno Pass South Section Viewshed
Map 11: SKA Fibre Overhead Lines: North Section Visual Sensitivity
Map 12: SKA Fibre Overhead Lines: Mid Section Visual Sensitivity
Map 13: SKA Fibre Overhead Lines: Molteno Pass North Section Visual Sensitivity
Map 14: SKA Fibre Overhead Lines: Molteno Pass South Section Visual Sensitivity
Figures 1 and 2: Photomontages

List of Abbreviations

BA	Basic Assessment
DEFF	Department of Environment, Forestry and Fisheries
EA	Environmental Assessment
EAP	Environmental Assessment Practitioner
EMPr	Environmental Management Programme
SKA	Square Kilometre Array
VIA	Visual Impact Assessment

This report serves as the Visual Specialist Assessment that was prepared as part of the Basic Assessment (BA) for the proposed installation of a fibre optic cable between Beaufort West and Carnarvon to complete a connection between the Square Kilometre Array (SKA) radio telescope to a data processing facility in Cape Town.

1. Introduction

1.1. Scope, Purpose and Objectives of this Specialist Report

The intention of the visual assessment study is to assist in identifying the most suitable route for the proposed fibre optic cable, with the focus on the three above ground sections of the route, namely the Molteno Pass Section, the Mid Section and the North Section, as indicated on Maps 1 and 2. The position taken is that it is only these above-ground sections that have potential visual implications.

Given the minimal visual effect of 7,5m poles along the route, the visual specialists determined that only a 'Level 2' visual assessment was required, which involves the following (0berholzer, 2005):

Site visit and identification of visual issues;
Description of the proposed project and the receiving environment;
Establishment of view catchment area and receptors;
Indication of potential visual impacts, and recommended mitigation measures.

1.2. Details of Specialists

This specialist assessment has been undertaken by:

Quinton Lawson, Architect, SACAP reg. no. 3686, and
Bernard Oberholzer, Landscape Architect, SACLAP reg. no. 87018.

Both specialists have more than 20 years of experience in visual assessments.
A curriculum vitae is included in Appendix A of this specialist assessment.
A signed specialist statement of independence is included in Appendix B.

1.3. Terms of Reference

The Terms of Reference for the visual specialist study include the following:

- A description of the regional and local features,
- A field survey to determine visually sensitive areas and receptors,
- Visual sensitivity mapping,
- Assessment of potential visual impacts on the landscape, and their significance,
- Identification of relevant legislation and legal requirements; and
- Recommendation of possible visual mitigation measures.

2. Approach and Methodology

The methodology involved a number of standard procedures as described below:

- A baseline survey of existing scenic resources and visual characteristics of the study area, including desktop work and field observations.
- A photographic survey of the proposed route of the fibre optic cable.
- Mapping of view corridors, important viewpoints and receptors.
- Mapping of distance radii from the proposed cable route to determine potential visibility.
- Mapping of viewsheds of the proposed overhead cable route to determine zones of visual influence.
- Construction of photomontages panoramic photographs taken in the field, plus digital terrain modelling and 3D modeling of the proposed cable route.

- Consideration of land uses, topographic features, vegetation cover and general intactness of the landscape.
- Determination of potential impacts based on the criteria and methodology provided by the EAP (Appendix D).

Field work was previously was carried out by the specialists in 2020 and additional photographs were taken by the CSIR on 17 November 2020. The season was not a consideration, nor had any effect on carrying out a visual assessment. Clear visibility was required for the photographic survey.

2.1. Information Sources

Base data used in the visual assessment is listed in Table 1 below. Although some of the information has not been updated for a few years, the quality of the data was considered adequate for the purpose of this assessment.

Table 1: Information Sources

Data / Information	Source	Date	Type	Description
Project description data and photos	CSIR	Feb. 2021		Construction method statement
1:50000 Topographic, 1:250000 Topo-Cadastral series maps and datasets	Chief Directorate: National Geospatial Information		Spatial	Topographic information
1 arcSEC 30m DEM Data	Shuttle Radar Topography Mission (SRTM)	2014	Spatial	Digital elevation model
Satellite Imagery	Google Earth	2021	Spatial	Aerial photography
Geographic information	Google Maps and Open Street Map (OSM)	2020	Spatial	Geographic information
South Africa Protected Areas Database (SAPAD)	DEFF	2020 Q3	Spatial	Location of protected areas
National Freshwater Ecosystem Priority Areas (NFEPA)	SANBI	2015	Spatial	River and Wetland Datasets
Electricity Grid Infrastructure (EGI)	ESKOM	2018	Spatial	Infrastructure dataset

2.2. Assumptions, Knowledge Gaps and Limitations

Based on the information provided, only a generalised routing of the overhead optic fibre cable is available. In a project of this nature, where the pylons are fairly small (7,5 and 9,0m), but the route is fairly long in a visually sensitive mountain pass environment, then micro-siting of the overhead cable will become important.

Secondly, the criteria for the proposed route alignment of the overhead cable are not known, including the numerous road crossings, and therefore it is difficult to know if recommended mitigations are feasible.

The only other cable infrastructure in the study corridor is the 22kV Eskom overhead powerline and a separate telephone line which would need to be considered in the cumulative visual impact assessment.

2.3. Consultation Processes Undertaken

No consultation has taken place for this visual assessment to date and it is anticipated that any visual issues will be identified in the Public Participation Process, and that these will be addressed in the final BAR.

3. Description of Project Aspects relevant to Visual and Scenic Resources

The proposed fibre optic cable installation will start in Beaufort West and terminate at the existing Carnarvon SKA internet PoP site, via Loxton where a 3m x 6m container for regeneration of signal will be established. The total length of the cable is about 185 km. (CSIR et al, 2020).

The underground cable would generally be installed in trenches at least 1 m from the fence of adjacent private land within the road reserves, mainly being the road reserve of the R381 Route.

Some sections, i.e. the North Section, the Mid Section and the Molteno Pass Section would be unfeasible to trench because of the rugged topography and substrate, and therefore the cabling would be installed overhead on poles in these sections. The distances for the 3 separate overhead sections are as follows:

North Section (Donkerhoek Poort): 750m
Mid Section (Sakrivier Poort and Pass: 4,73km
South Section (Molteno Pass and Ouberg): 15,14km

Wooden poles with a total length of 9m would be buried 1.5m deep, resulting in a total above-ground height of about 7.5m. At the start and end of the overhead sections, 9m high hollow concrete poles would be used. (See Maps 3 to 6). As a comparison, the existing 22kV Eskom powerline poles are about 12m in height.

A combination of two techniques would be used to dig holes for the poles:

a) A drill mounted on the back of a truck for those areas that are accessible; and
b) A hand-held drill in areas which are inaccessible to the drill-mounted truck.

Example of the existing 22kV Eskom powerline and adjacent telephone line

4. Visual Baseline Description of the Study Area

A brief description of the landscape and scenic features of the grid corridor are given below, and in the accompanying photographs.

Landscape setting

The proposed SKA cable would follow the R381, the most significant, and visually sensitive part of the route being the 15 km long Molteno Pass Section - a mix of tar and gravel that ascends 647m to the plateau at 1574m.

Molteno Pass was laid out by Thomas Bain and completed in 1881, and was named after the first Prime Minister of the Cape, Sir JC Molteno. The pass therefore has both scenic and historical significance.

The Karoo National Park, north of Beaufort West, lies adjacent to the Molteno Pass, adding to the visual and scenic significance of the area.

The Mid Section and North Section are considerably shorter and include a number of smaller passes and *poorts* through which the proposed overhead cable would pass.

Existing visual intrusions

Existing intrusions along the route of the proposed SKA overhead cable include the R381 Road, which required a number of cut and fill embankments in the steeper sections. The only other significant visual intrusion is that of the 22kV Eskom powerline and a smaller telephone line which thread their way through the passes and *poorts*, sometimes crossing small ridges on the skyline, but generally following the R381 in the flatter areas. Little effort was made to avoid visual intrusion on scenic resources in the routing of the powerline.

The 22kV Eskom powerline crosses the R381 Route twice over a short distance in the scenic Sakrivier poort.

Geology and landforms

The landscape in this part of the Great Karoo has been eroded over time, the once deeply buried Beaufort Group mudstones and sandstones and the dolerite intrusions having been exposed to form the present-day Karoo landscape.

The Nuweveld escarpment is characterised by horizontal sills of erosion-resistant dolerite forming steep cliffs, boulder-strewn slopes, and flat-topped *koppies,* as well as the Nuweveld mountain range, that constitute the scenic resources along the proposed SKA cable route.

The plateau areas consist of more even topography with easily weathered mudstone, and occasional narrow ledges of harder sandstone.

Vegetation cover

The vegetation of the Upper Karoo Bioregion is a response to the geology and relatively low rainfall, which occurs mainly in summer. Snow is sometimes experienced in winter on the Nuweveld Mountains.

The Eastern Upper Karoo vegetation type covers a vast area on the plateau above the escarpment, and consists largely of dwarf shrubland, along with grasses and succulent shrubs in places. (Mucina and Rutherford, 2006).

The Upper Karoo Hardeveld vegetation type covers smaller areas, occurring on the dolerite crests and steep slopes, often among large boulders. It consists of a grassy dwarf Karoo shrubland.

The sparse, stunted vegetation of the area provides little in the way of visual screening. However the farmsteads tend to be surrounded by gums, pines and/or poplars, which would mitigate potential visual effects of the SKA overhead cable.

Land use

There are a number of farmsteads along the route, as well as tourist facilities, such as Ko-Ka Tsara Bush Camp in the Molteno Pass area. The farms in the area have mainly merino sheep, as well as dorper sheep and game.

The Karoo National Park adjoins the southern section of the proposed grid route in the vicinity of the Molteno Pass. Much of the proposed SKA cable would lie within the 'Viewshed Protection Area' of the National Park, (see Map 1).

Sense of place

The Molteno Pass, completed in 1881 by the renowned pass builder, Thomas Bain, is one of South Africa's first mountain passes, and forms an important gateway to the plateau and Great Karoo to the north.

The flat-topped dolerite hills and Nuweveld mountains, forming the escarpment, are characteristic features of the Great Karoo in an otherwise fairly featureless, parched landscape, an area noted mainly for its empty, uncluttered landscapes.

Isolated farmsteads form green oases in the semi-arid landscape, sheltered from the heat by poplars and other exotic trees.

Picturesque R381 Route winding between dolerite formations. Pylons on the far skyline.

5. Environmental Sensitivity

5.1 Sensitivities identified by the National Web-Based Environmental Screening Tool

As no specific assessment protocol has been prescribed, the required level of assessment is based on Appendix 6 of the Environmental Impact Assessment Regulations promulgated under sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), where a specialist assessment is required.

No visual or landscape sensitivity mapping is available on the web-based environmental screening tool. Given the specific nature of the proposed fibre optic cable, more detailed viewshed mapping (Maps 7 to 10), and visual sensitivity mapping (Maps 11 to 14), were considered necessary, and included in this assessment.

5.2 Visual Sensitivity Analysis and Verification

Sensitive Scenic Features and Receptors

Sensitive topographic features include the Nuweveld Mountains, which form part of the escarpment, a major scenic feature of this part of the Karoo.

The Gamka River, flowing through the Nuweveld Mountain, adjacent to the Molteno Pass (R381 Route), is the main water feature, forming scenic gorges in places. The Sak River, which also rises in the Nuweveld Mountains, flows north, and is crossed by the R381 Route and proposed SKA cable in places.

The Karoo National Park, adjacent to the R381 Route, which includes a 'Viewshed Protection Area', has wilderness and scenic value in addition to its biological conservation role, serving as an important visitor / tourist destination. Visual significance is increased by its protection status.

Private nature reserves and guest farms in the area, which include the Ko-Ka Tsara Bush Camp, are important for the local tourism economy, and tend to be sensitive to loss or degradation of scenic quality. These are some distance from the proposed SKA cable, and would not be affected.

Farmsteads bordering on the proposed SKA cable are also generally some distance from the proposed cable route. In addition, the farmsteads are mostly screened by trees. (See Table 1).

The R381 Route, particularly the Molteno Pass, and a number of smaller passes and *poorts*, have high scenic value in places and are therefore visually sensitive for users of the Route. (See Table 1).

Cultural and heritage sites form part of the heritage study, but could have visual implications.

Visual Sensitivity Buffers

Areas to be avoided (including buffers) have been identified, including areas not suitable for construction or operation of the proposed project.

A four-tier sensitivity table and map of the study area, which indicate very high, high, medium and low sensitivities as well as recommended buffers, are given below. The proposed SKA cable facility has been superimposed on the visual sensitivity maps, (see Table 3 and attached Maps 11 to 14).

The recommended buffers are based on those used previously for powerlines, but which have been adapted for the smaller 7,5 and 9,0m SKA overhead fibre optic cable.

Table 2: Distances between receptors and the proposed fibre optic cable

Receptor	Location	Coordinates		Distance to SKA Fibre OHL	Visibility
R1	Rosedene Farmstead	32.03214S	22.44057E	1 653m	Marginal visibility
R2	Renosterfontein farmstead	32.16946S	22.54122E	496m	Marginal visibility
R3	Farm B101A	32.18819S	22.55154E	110m	High visibility
R4	KNP Staff Quarters	32.20367S	22.56129E	38m	High visibility
R5	Ko-KaTsara Bush Camp	32.25510S	22.57424E	448m	Marginal visibility

High visibility: Prominent feature within the observer's viewframe 0 - 100m
Moderate visibility: Noticeable feature as part of the wider landscape 100 – 250m
Marginal visibility: Partially noticeable as a minor element in the landscape 250m – 1km

Table 3: Visual Sensitivity Mapping Categories for the SKA Fibre Optic Overhead Cable

Scenic Resources	No-go areas	High visual sensitivity	Medium visual sensitivity	Low visual sensitivity
Topographic features, ridges, peaks, scarps	Feature	within 50m	100m	-
Geological features / outcrops	Feature	within 25m	50m	-
Steep slopes	-	Slopes > 1:4	Slopes > 1:10	-
Scenic water features (rivers, large dams)	within 50m	within 100m	150m	-
Protected Landscapes / Sensitive Receptors				
National Parks (Karoo NP)	Feature	100m	150m	-
Nature Reserves	Feature	within 100m	within 150m	-
Guest farms	Feature	within 100m	within 150m	-
Farmsteads	within 50m	within 100m	within 150m	-
Scenic poorts / passes R381[1]	-	within 50m	within 100m	-
Arterial route R381[1]	-	within 25m	within 50m	-
Main district road[1]	-	within 25m	within 50m	-

[1] Except where road crossings are required.

5.3 Sensitivity Analysis Summary Statement

There are no relevant themes on the Screening tool for an overhead fibre optic cable, nor for visual or landscape sensitivity. The powerline theme is the closest in physical type, but is for a significantly larger scale infrastructure. The project scale visual and scenic resource mapping by the visual specialists was therefore used for the purpose of this study.

6. Issues, Risks and Impacts

The potential visual impacts include the following:

Construction Phase

- Visual effect of spoil heaps from underground cable trenches in the R381 road reserve.
- Potential dust and noise caused by excavation works.

Operational Phase

- Visual intrusion of overhead cables in the landscape, particularly when visible on the skyline, and on the scenic Molteno Pass and other smaller passes and *poorts.*
- Visual clutter of poles where cable is routed close to the R381 Road.

Decommissioning Phase

- Potential visual effect of abandoned poles and cables, if not removed after decommissioning.

Cumulative Impacts

- Potential cumulative visual impact of an additional cable corridor, when seen together with the existing 22kV powerline, particularly where these occur on the opposite sides of the R381 Route.

The visual effects of the proposed SKA cable can be seen in Figures 1 and 2, the cable becoming prominent on the skyline where it crosses ridgelines.

6.1 Summary of Issues identified during the Public Consultation Phase

No comments regarding visual issues been received to date from the public participation process.

7. Impact Assessment

7.1 Potential Impacts during the Construction Phase

IMPACT 1:
Where the proposed cable is located underground, or where holes are excavated for poles, there could be potential visual impacts relating to spoil heaps from trenches, mainly along the R381 road reserve. There would also be potential dust and noise caused by excavation works. These impacts would however only affect users of the R381, be fairly localised and of very short term duration.

Table 3: Impact Summary - Construction Phase

Impact 1	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
CONSTRUCTION PHASE						
	Status	*Negative*	*Very low risk*	*Adherence to construction method statement and EMPr.*	*Very low risk*	*High*
	Spatial Extent	*Site specific*				
	Duration	*Short term*				
	Consequence	*Slight*				
	Probability	*Likely*				
	Reversibility	*High*				
	Irreplaceability	*Low*				

7.2 Potential Impacts during the Operational Phase

IMPACT 1:
There would be potential visual intrusion of overhead cables in the scenic landscape, particularly when visible on the skyline, and on the scenic Molteno Pass as well as other smaller passes and *poorts.* In addition, there would be potential visual clutter of poles where the cable is routed close to the R381 Road.

Table 4: Impact Summary - Operational Phase

Impact 1	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
OPERATIONAL PHASE						
	Status	*Negative*	*Moderate risk*	*Locate poles in low-lying areas or valleys and avoid ridgelines where possible. Locate poles in same corridor as existing powerline where possible. Implement 50m buffer from R381 where possible. Place cable in underground trench where feasible.*	*Low risk*	*High*
	Spatial Extent	*Local*				
	Duration	*Long term*				
	Consequence	*Substantial*				
	Probability	*Likely*				
	Reversibility	*High*				
	Irreplaceability	*Low*				

7.3

7.4 Potential Impacts during the Decommissioning Phase

IMPACT 1:
There could be on-going potential visual impact of abandoned poles and cables, if these are not removed after decommissioning. However, mitigation is feasible if the infrastructure is removed and the site rehabilitated, in which case scenic resources would be restored.

Table 5: Impact Summary - Decommissioning Phase

Impact 1	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
DECOMMISSIONING PHASE						
	Status	*Negative*	*Moderate risk*	*Poles and cables to be removed after decommissioning. Affected area to be rehabilitated as per vegetation specialist specifications.*	*Very low risk*	*High*
	Spatial Extent	*Local*				
	Duration	*Long term*				
	Consequence	*Substantial*				
	Probability	*Likely*				
	Reversibility	*High*				
	Irreplaceability	*Low*				

7.5 Cumulative Impacts

IMPACT 1:
There would be potential cumulative visual impacts resulting from of an additional cable corridor, when seen together with the existing 22kV powerline and telephone line, particularly where these create a new corridor, such as when they are on opposite sides of the R381 Route.

Table 6: Impact Summary - Cumulative Impacts

Impact 1	*Impact Criteria*		*Significance and Ranking (Pre-Mitigation)*	*Potential mitigation measures*	*Significance and Ranking (Post-Mitigation)*	*Confidence Level*
CONSTRUCTION PHASE						
	Status	*Negative*	*Very low risk*	*Adherence to construction method statement and EMPr.*	*Very low risk*	*High*
	Spatial Extent	*Site specific*				
	Duration	*Short term*				
	Consequence	*Slight*				
	Probability	*Likely*				
	Reversibility	*High*				
	Irreplaceability	*Low*				
OPERATIONAL PHASE						
	Status	*Negative*	*Moderate risk*	*SKA cables to share corridors of existing powerline and telephone line where possible, and avoid ridgelines / skylines.*	*Low risk*	*High*
	Spatial Extent	*Local*				
	Duration	*Long term*				
	Consequence	*Substantial*				
	Probability	*Likely*				
	Reversibility	*High*				
	Irreplaceability	*Low*				
DECOMMISSIONING PHASE						
	Status	*Negative*	*Moderate risk*	*Poles and cables to be removed after decommissioning. Affected area to be rehabilitated as per vegetation specialist specifications.*	*Very low risk*	*High*
	Spatial Extent	*Local*				
	Duration	*Long term*				
	Consequence	*Substantial*				
	Probability	*Likely*				
	Reversibility	*High*				
	Irreplaceability	*Low*				

7.6 Impact Assessment Summary

Table 7: Overall Impact Significance (Post Mitigation)

Phase	**Overall Impact Significance**
Construction	Very low
Operational	Low
Decommissioning	Very low
Nature of Impact	**Overall Impact Significance**
Cumulative - Construction	Very low
Cumulative - Operational	Low
Cumulative - Decommissioning	Very low

Alternatives

An alternative route for the SKA cable was considered at the early screening stage, but was screened out and only the preferred route, based on environmental, engineering and technical aspects, was taken forward to the Basic Assessment Stage.

No-go Alternative

In the no-go alternative, there would be opportunity for a SKA fibre optic cable along the proposed route and therefore no additional visual intrusion on the rural landscape and scenic resources. The visual significance would therefore be neutral, with neither impacts nor benefits occurring.

Findings

Given the fairly small footprint of the proposed underground and overhead fibre optic cable, the limited viewshed and the localised visual effects in a remote area, the visual impact significance was found to be **low risk** during operation (post mitigation), and **very low risk** after mitigation in the long term if the cable infrastructure is decommissioned.

The potential cumulative visual impacts, when combined with the existing 22kV Eskom powerline and the telephone line could result in additional visual clutter in the landscape. It would therefore be important for the proposed fibre optic cable to share the same corridor with the powerline and telephone lines, where possible, (except where these are in visually intrusive areas), to avoid a proliferation of corridors.

8. Legislative and Permit Requirements

The National Environmental Management Act (Act No. 107 of 1998). (NEMA) and the (NEMA EIA Regulations (2014, as amended) apply as the proposed cable infrastructure a listed activity, a Basic Assessment (BA) being required. The need for a visual assessment has been identified.

The National Heritage Resources Act (Act No. 25 of 1999) (NHRA), and associated provincial regulations, provide legislative protection for natural, cultural and scenic resources, as well as for heritage sites within the study area. This report deals with visual considerations, including scenic resources, which form part of the National Estate. The Visual Assessment would therefore form part of the Heritage Assessment in terms of obtaining the relevant permits.

Other than the above legislation, there are no specific policies or guidelines for visual and scenic resources for the Western Cape and Northern Cape. The Guideline for Involving Visual and Aesthetic Specialists in EIA Processes, by the Provincial Government of the Western Cape, was used as a general guide.

9. Environmental Management Programme Inputs

Planning and Design Phase

Ensure that the visual sensitivity mapping is used to inform the routing of the overhead cable routing, as well as the siting of any construction camps and material stockpiles, which should be located in visually unobtrusive positions in the landscape, away from public roads.

Construction Phase Monitoring:

Implement dust suppression and litter control measures, as well as rehabilitation of excavations to minimise their visual effect on the surroundings. Ensure regular reporting to an environmental management team by the ECO during the construction phase.

Operation Phase Monitoring:

No particular monitoring is required during the operational phase..

Decommissioning Phase Monitoring:

Ensure that procedures for the removal of poles and cables during the decommissioning phase are implemented, including recycling of materials and rehabilitation of the site to a visually acceptable standard as prescribed in a rehabilitation plan, and signed off by the delegated authority.

10. Final Specialist Statement and Authorisation Recommendation

10.1 Statement and Reasoned Opinion

As the underground fibre optic cable would have little or no visual implications, only the above-ground sections of the route were assessed. The route of the cable generally follows the R381 through the Molteno Pass and a number of smaller passes and *poorts*. These sections of the route have scenic value, and it is mainly users of the R381 Route that would potentially be affected by the proposed cable. Farmsteads in the area are too far away to be significantly affected.

Because the poles for the cables are relatively low, (7,5 and 9,0m), compared to the existing 22kV Eskom powerline (about 12,0m), visibility of the proposed cable infrastructure is not expected to be generally significant, except where it is in the road reserve. However, if the poles are located on ridgelines, where they break the skyline, visibility would become more significant and the scenic quality of the area affected. For this reason, the cable route should ideally follow the lower lying areas or valleys, i.e. the lower side of the road.

In addition, if the poles are located immediately adjacent to the R381 road, as presently proposed, the visual impact on users of the road, and on the rural or wilderness experience of the area, would become compromised. For this reason, a visual buffer along the R381 has been recommended. Crossing of the road by the cable should also be minimised as far as possible.

Where the cable route creates a different corridor to that of the existing 22kV powerline, as often occurs in the current proposal, further fragmentation of the scenic landscape can be expected. One of the visual mitigations therefore is to combine the corridors as far as possible, except where the existing powerline follows a visually intrusive route.

A further mitigation would be to place the cable in a trench in the road reserve for those sections where the topography is more even and the potential exists, such as between the 6 and 8km mark, and the 11 and 12 km mark (Maps 5 and 6).

Provided these mitigations are implemented, where environmentally acceptable and technically feasible, the visual impact significance of the proposed SKA cable could be reduced from moderate to low during its operational lifespan.

As the visual landscape could be restored after decommissioning, the visual significance would reduce further to very low post mitigation.

The potential cumulative visual impact for the proposed SKA cable, in combination with the existing Eskom powerline and telephone line would be moderate, but could reduce to low if the above mitigations are implemented.

10.2 EA Condition Recommendations

No fatal flaws from a visual perspective are expected as a result of the proposed cable infrastructure. However, the Molteno Pass, which ascends the great escarpment, has both scenic and heritage significance, and it is important that the recommended mitigations form part of the conditions of approval. Provided adjustments are made to the cable routing, and a heritage permit is issued, the application could be authorised from a visual perspective.

11. References

CSIR. May 2020. Environmental Screening Study for Prposed Square Kilometre Array Fibre Optic cable from Beaufort West to Carnarvon.

CSIR. Nov. 2020. Square Kilometre Array (SKA) fibre optic cable between Beaufort West and Carnarvon: Construction Method Statement.

Mucina, L. and Rutherford, M.C. (eds) 2006.The Vegetation of South Africa, Lesotho and Swaziland. *Strelizia* 19. SANBI, Pretoria.

Oberholzer, B. 2005. Guideline for Involving Visual and Aesthetic Specialists in EIA Processes: Edition 1 CSIR Report No. ENV-S-C 2005 053 F. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning.

Appendix A - Specialist Expertise

Quinton Lawson Architect (qarc)

Qualifications:
Bachelor of Architecture (Univ. of Natal 1977)

Professional registration/membership:
Professional member of the SA Council for the Architectural Profession (SACAP), reg. no. 3686.
Member of the Cape Institute for Architects and SA Institute of Architects.
B-BBEE Status: Level 4.

Quinton has practiced as a professional architect since 1978, specialising in architectural and urban design, environmental design and computer visualisation.

He was one of the founding partners of Meirelles Lawson Architects formed in 1988, initially specialising in economic and sustainable housing. He was a senior partner at MLB Architecture and Urban Design, with specialist expertise in visual modelling and design solutions.

In the past he has been a visiting lecturer at UCT teaching a post-graduate course on Computer Techniques in Landscape Architecture, including visualisation and visual assessment techniques.

Together with BOLA, Quinton has been involved in numerous visual impact assessments over a number of years, and previously served on the Impact Assessment Review Committee of Heritage Western Cape.

Bernard Oberholzer Landscape Architect + Environmental Planner (BOLA)

Qualifications:
Bachelor of Architecture (UCT 1970), Master of Landscape Architecture (U. of Pennsylvania 1975)

Professional registration/membership:
Professional member of the SA Council for the Landscape Architectural Profession (SACLAP), reg. no. 87018.
Fellow of the Institute of Landscape Architects of South Africa.
B-BBEE Status: Level 4.

Bernard has 40 years of experience as a professional landscape architect, specialising in, environmental planning, coastal planning, urban landscape design and visual assessments.

He is currently an independent consultant, and was for 7 years the Convenor of the Master of Landscape Architecture Programme at UCT.

He has presented papers on *Visual and Aesthetic Assessment Techniques*, and provides specialist services as a reviewer of visual impact studies prepared by other firms.

He is the author of *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes,* prepared with the CSIR for the Dept. of Environmental and Development Planning, Provincial Government of the Western Cape, 2005.

Bernard has been involved in numerous land use suitability studies and visual assessments for a wide range of projects, and serves as a member of the Stanford Heritage Committee.

Bernard and Quinton were joint authors of the visual specialist chapters for the National Wind and Solar SEA and National Electricity Grid Infrastructure SEA, with the CSIR, for the Department of Environmental Affairs.

Appendix B - Specialist Statement of Independence

We, Quinton Lawson and Bernard Oberholzer, declare that we –

- act as the independent specialist in this application;
- will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- declare that there are no circumstances that may compromise my objectivity in performing such work;
- have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- will comply with the Act, Regulations and all other applicable legislation;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist: _____

Name of Company: qarc and bola

Date: 12 November 2021

Appendix C: Site Sensitivity Verification

Prior to commencing with the specialist assessment in accordance with Appendix 6 of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations of 2014, a site sensitivity verification was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area as identified by the National Web-Based Environmental Screening Tool (Screening Tool).

The details of the site sensitivity verification are noted below:

Date of Site Visit	17 November 2020
Specialist Name	Quinton Lawson and Bernard Oberholzer
Professional Registration Number	SACAP 3686, SACLAP 87018
Specialist Affiliation / Company	qarc and bola

The site sensitivity verification was undertaken using the following means:

(a) desk top analysis, using satellite imagery;
(b) preliminary on-site inspection; and
(c) a range of other available / relevant information included in Section 2.1 of this Report.

A screening report was generated by the CSIR (15/4/2020) using the DEFF screening tool. No information or maps for visual or landscape themes were available on the website or in the report for the area under investigation.

Fine-scale visual sensitivity mapping at the project scale is included in this Visual Impact Assessment, including viewshed mapping. This mapping provides the detail that is required, given the nature of the project.

Appendix D: Impact Assessment Methodology

The impact assessment includes:

- *the nature, significance and consequences of the impact and risk;*
- *the extent and duration of the impact and risk;*
- *the probability of the impact and risk occurring;*
- *the degree to which impacts and risks can be mitigated;*
- *the degree to which the impacts and risks can be reversed; and*
- *the degree to which the impacts and risks can cause loss of irreplaceable resources.*

As per the DEFFT Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the prediction and assessment of impacts and risks. Potential impacts and risks have been rated in terms of the direct, indirect and cumulative:

- *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. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.*
- *Indirect impacts of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place 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. 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 impact assessment methodology includes the following aspects:

- *Nature of impact/risk - The type of effect that a proposed activity will have on the environment.*

- *Status - Whether the impact/risk on the overall environment will be:*
    - *Positive - environment overall will benefit from the impact/risk;*
    - *Negative - environment overall will be adversely affected by the impact/risk; or*
    - *Neutral - environment overall not be affected.*

- *Spatial extent – The size of the area that will be affected by the impact/risk:*
    - *Site specific;*
    - *Local (<10 km from site);*
    - *Regional (<100 km of site);*
    - *National; or*
    - *International (e.g. Greenhouse Gas emissions or migrant birds).*

- *Duration – The timeframe during which the impact/risk will be experienced:*
    - *Very short term (instantaneous);*
    - *Short term (less than 1 year);*
    - *Medium term (1 to 10 years);*
    - *Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or*
    - *Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).*

- *Consequence – The anticipated consequence of the risk/impact:*
    - *Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);*
    - *Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);*
    - *Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);*

- *Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or*
- *Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).*

- *Reversibility of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):*
  - *High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);*
  - *Moderate reversibility of impacts;*
  - *Low reversibility of impacts; or*
  - *Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).*

- *Irreplaceability of Receiving Environment/Resource Loss caused by impacts/risks – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):*
  - *High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment);*
  - *Moderate irreplaceability of resources;*
  - *Low irreplaceability of resources; or*
  - *Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).*

Using the criteria above, the impacts have been further assessed in terms of the following:

- *Probability – The probability of the impact/risk occurring:*
  - *Extremely unlikely (little to no chance of occurring);*
  - *Very unlikely (<30% chance of occurring);*
  - *Unlikely (30-50% chance of occurring)*
  - *Likely (51 – 90% chance of occurring); or*
  - *Very Likely (>90% chance of occurring regardless of prevention measures).*

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure 1).

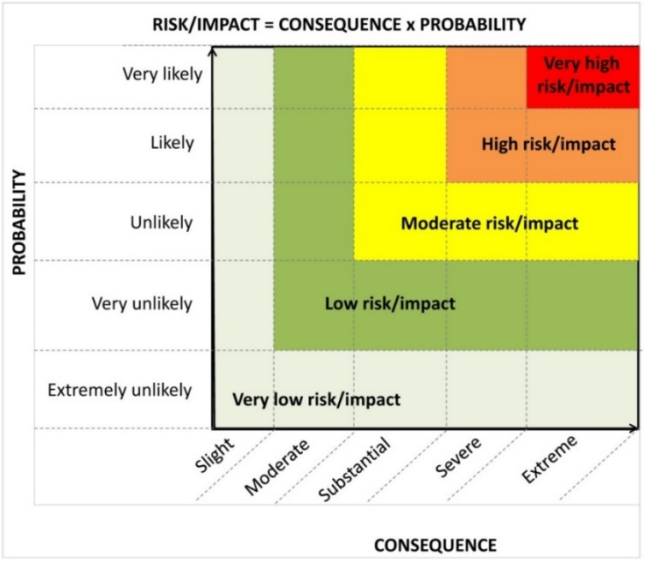


Figure 1. Guide to assessing risk/impact significance as a result of consequence and probability.

- *Significance – Will the impact cause a notable alteration of the environment?*

- *Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);*
- *Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);*
- *Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);*
- *High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and*
- *Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).*

With the implementation of mitigation measures, the residual impacts/risks are ranked as follows in terms of significance:

- *Very low = 5;*
- *Low = 4;*
- *Moderate = 3;*
- *High = 2; and*
- *Very high = 1.*

Confidence – The degree of confidence in predictions based on available information and specialist knowledge:

- *Low;*
- *Medium; or*
- *High.*

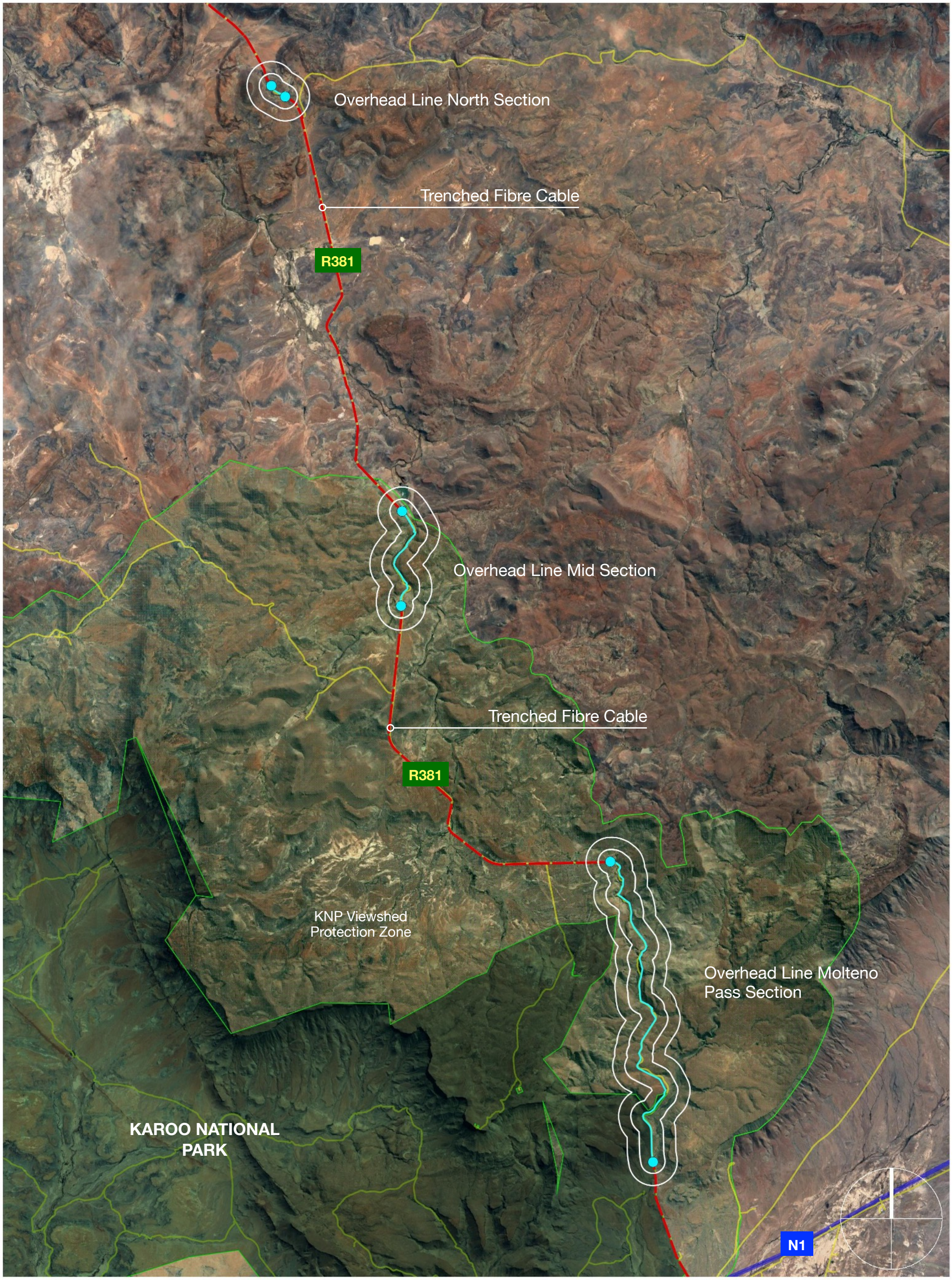
Appendix E: Compliance with the Appendix 6 of the 2014 EIA Regulations (as amended)

Requirements of Appendix 6 (Specialist Reports) of Government Notice R326 (Environmental Impact Assessment (EIA) Regulations of 2014, as amended)	***Section where this has been addressed in the Specialist Report***
1. (1) A specialist report prepared in terms of these Regulations must contain - *a) details of -* *i. the specialist who prepared the report; and* *ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;*	Section 1.2 and Appendix A
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix B
c) an indication of the scope of, and the purpose for which, the report was prepared;	Sections 1.1 and 1.3
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2.1
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 6 and 7
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2
f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Sections 6 and 7
g) an identification of any areas to be avoided, including buffers;	Maps 11 to 14
h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Maps 11 to 14
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.2
j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 10
k) any mitigation measures for inclusion in the EMPr;	Section 7
l) any conditions for inclusion in the environmental authorisation;	Section 10
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 9
n) a reasoned opinion- *i. whether the proposed activity, activities or portions thereof should be authorised;* *(iA) regarding the acceptability of the proposed activity or activities; and* *ii. if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;*	Section 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	Refer to EAP
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Refer to EAP

Requirements of Appendix 6 (Specialist Reports) of Government Notice R326 (Environmental Impact Assessment (EIA) Regulations of 2014, as amended)	***Section where this has been addressed in the Specialist Report***
q) any other information requested by the competent authority.	None
(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	"General requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified (GN 320, 20 March 2020)" applies – see below.
General requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified (GN 320, 20 March 2020)	**Section 5 and Appendix C**
1. Site sensitivity verification and minimum report content requirements *Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration identified by the national web based environmental screening tool (screening tool), where determined, must be confirmed by undertaking a site sensitivity verification.* *(1.1) The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.*	Appendix C
(1.2) The site sensitivity verification must be undertaken through the use of: *a) a desk top analysis, using satellite imagery;* *b) a preliminary on -site inspection; and* *c) any other available and relevant information*	Appendix C
(1.3) The outcome of the site sensitivity verification must be recorded in the form of a report that- *a) confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status* *b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and* *c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations1 (EIA Regulations).*	Appendix C

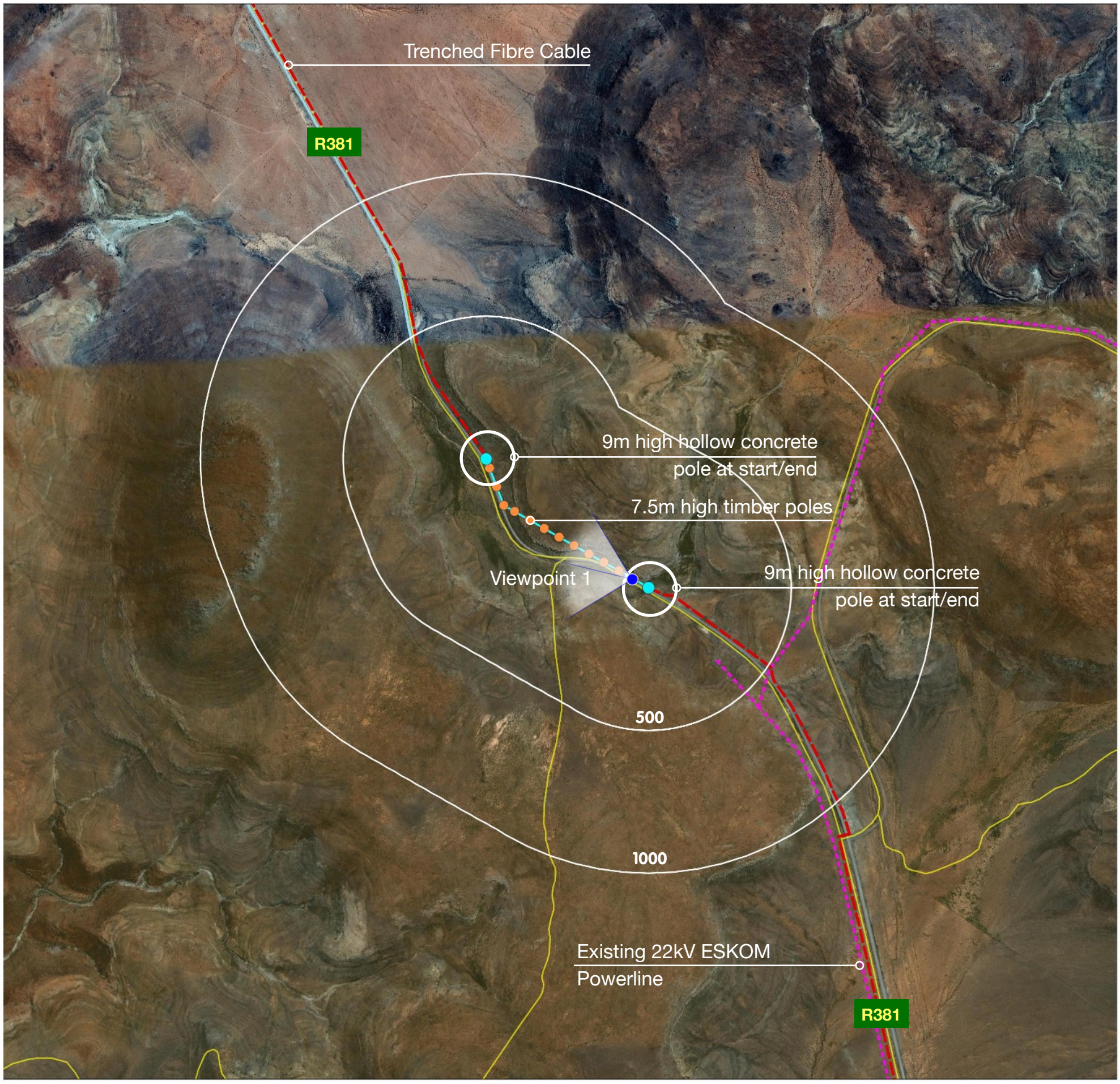
Base map : Google Earth 2021

map 1 : SKA Fibre Overhead Lines • Carnarvon to Beaufort West



Base map : Google Earth 2021

map 2 : SKA Fibre Overhead Lines

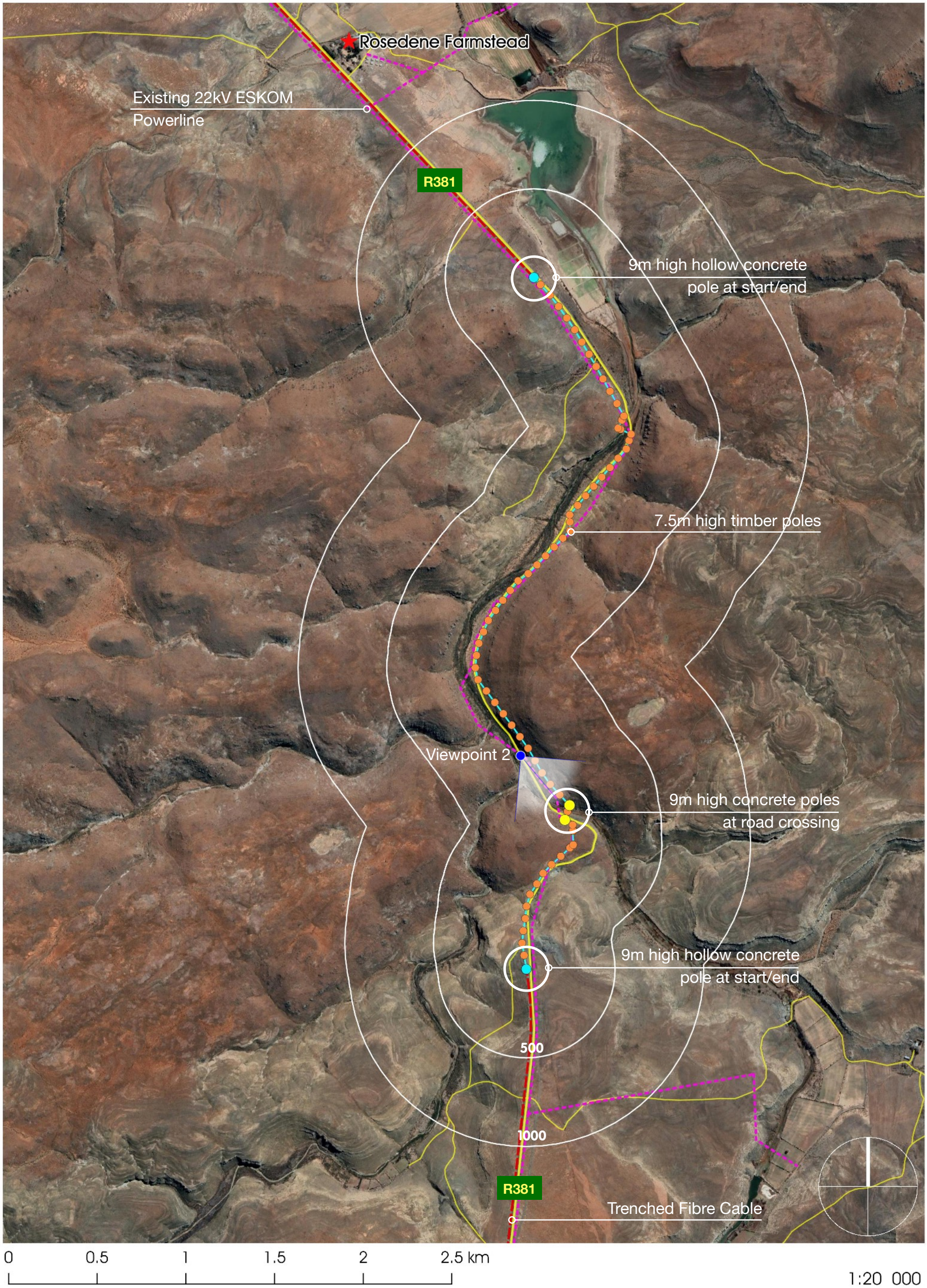


0 0.5 1 1.5 2 2.5 km

1:15 000

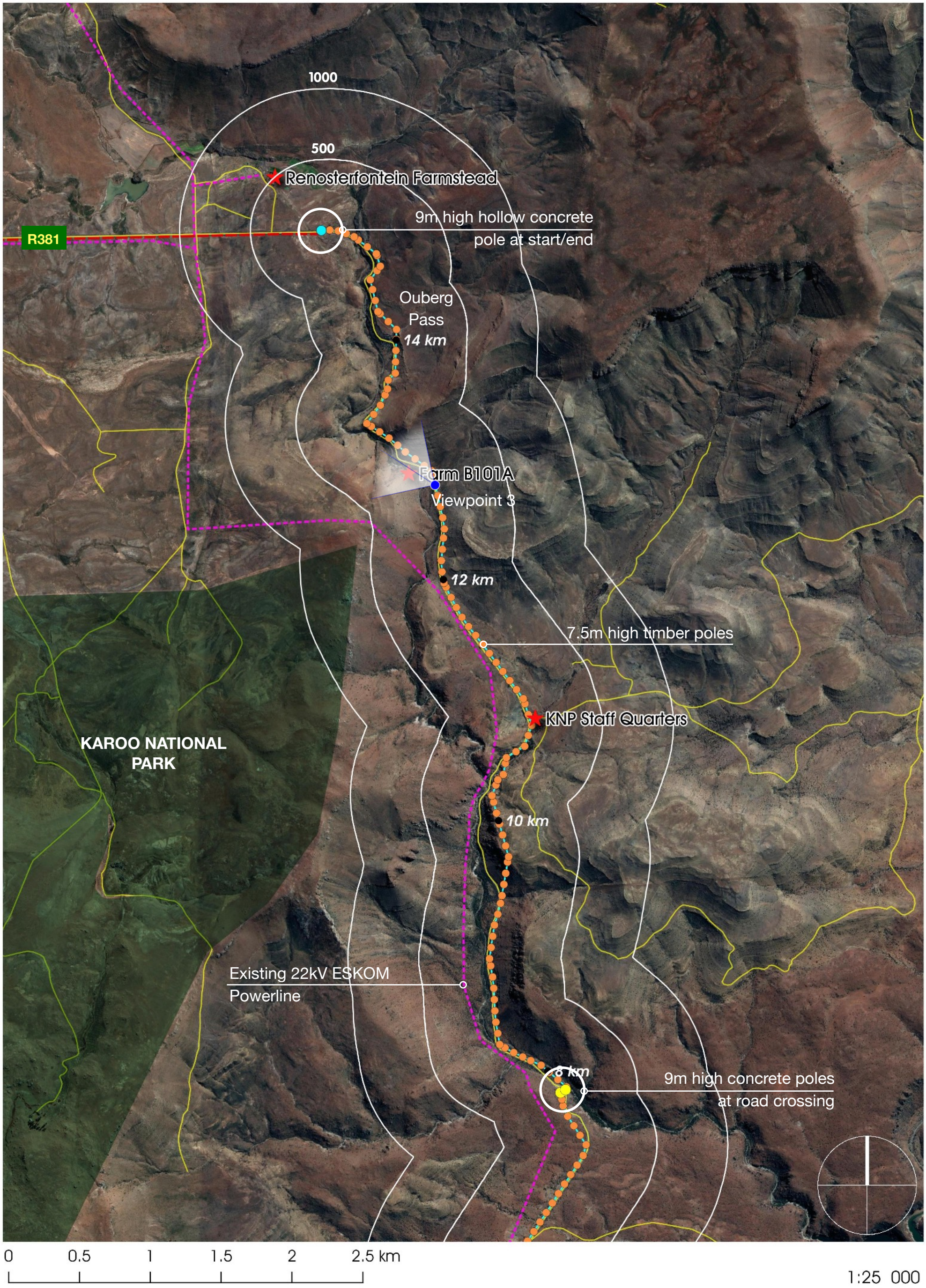
Base map : Google Earth 2021

map 3 : SKA Fibre OHL : North Section



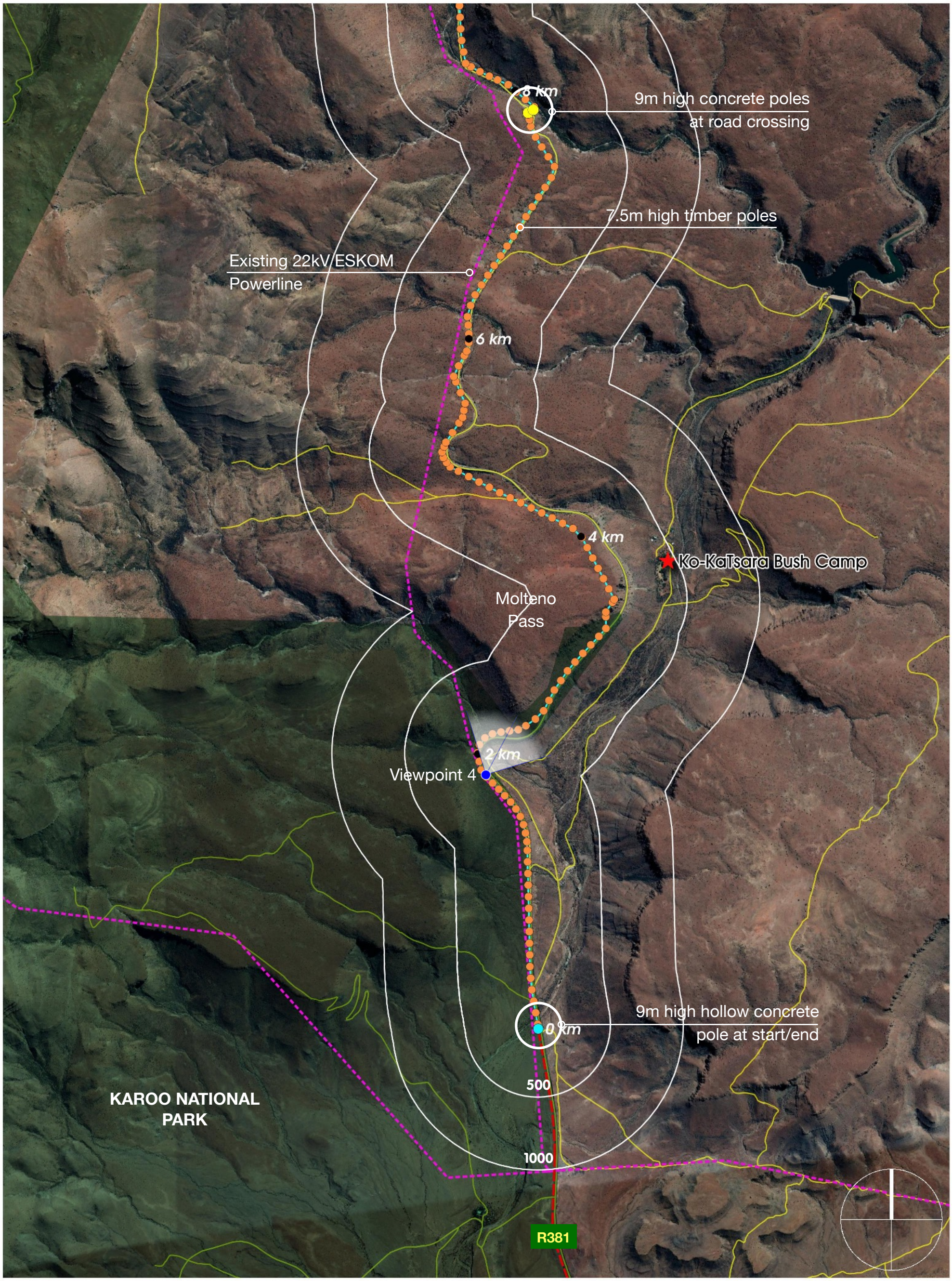
Base map : Google Earth 2021

map 4 : SKA Fibre OHL : MID Section



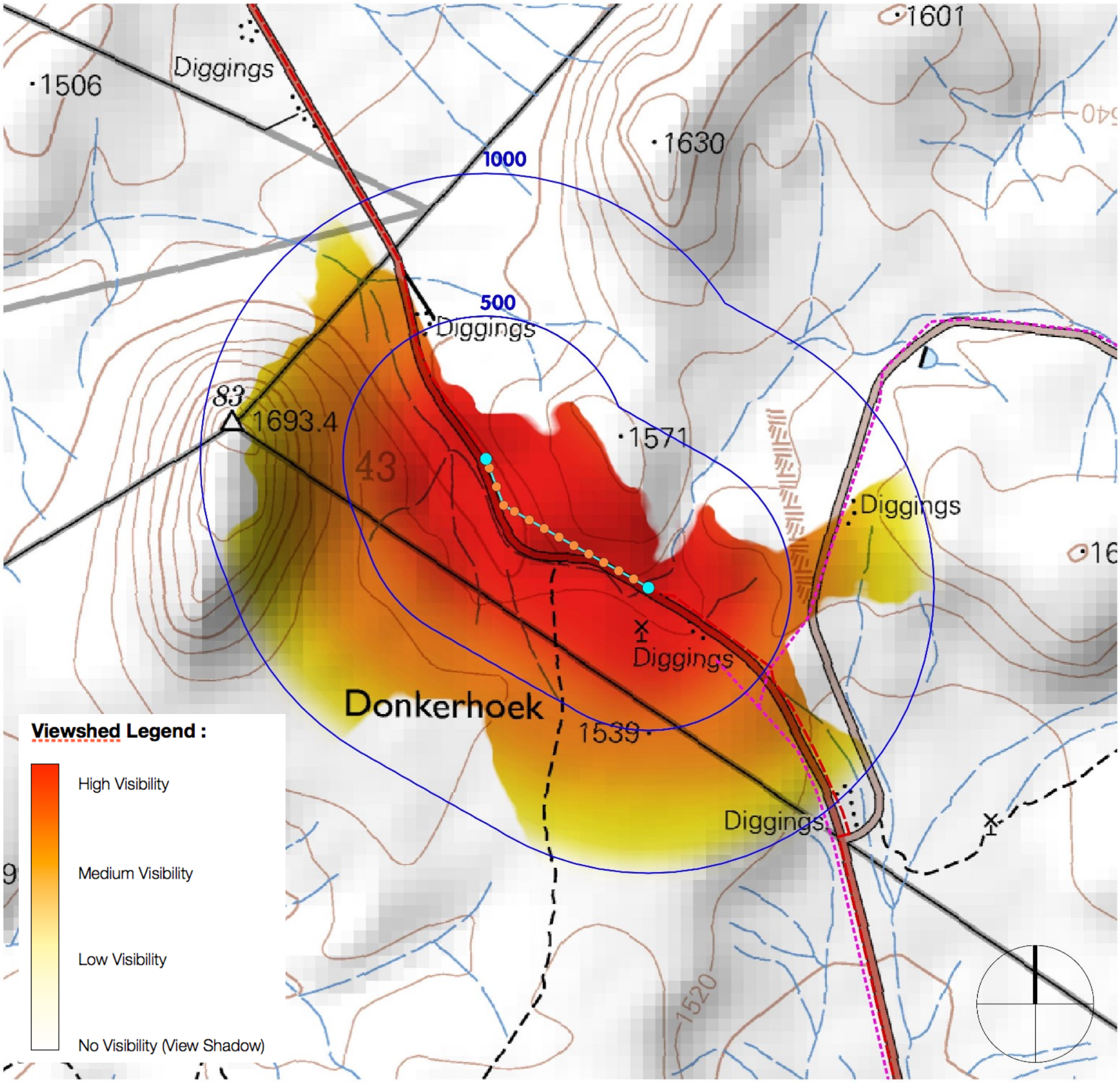
Base map : Google Earth 2021

map 5 : SKA Fibre OHL : Molteno Pass North Section



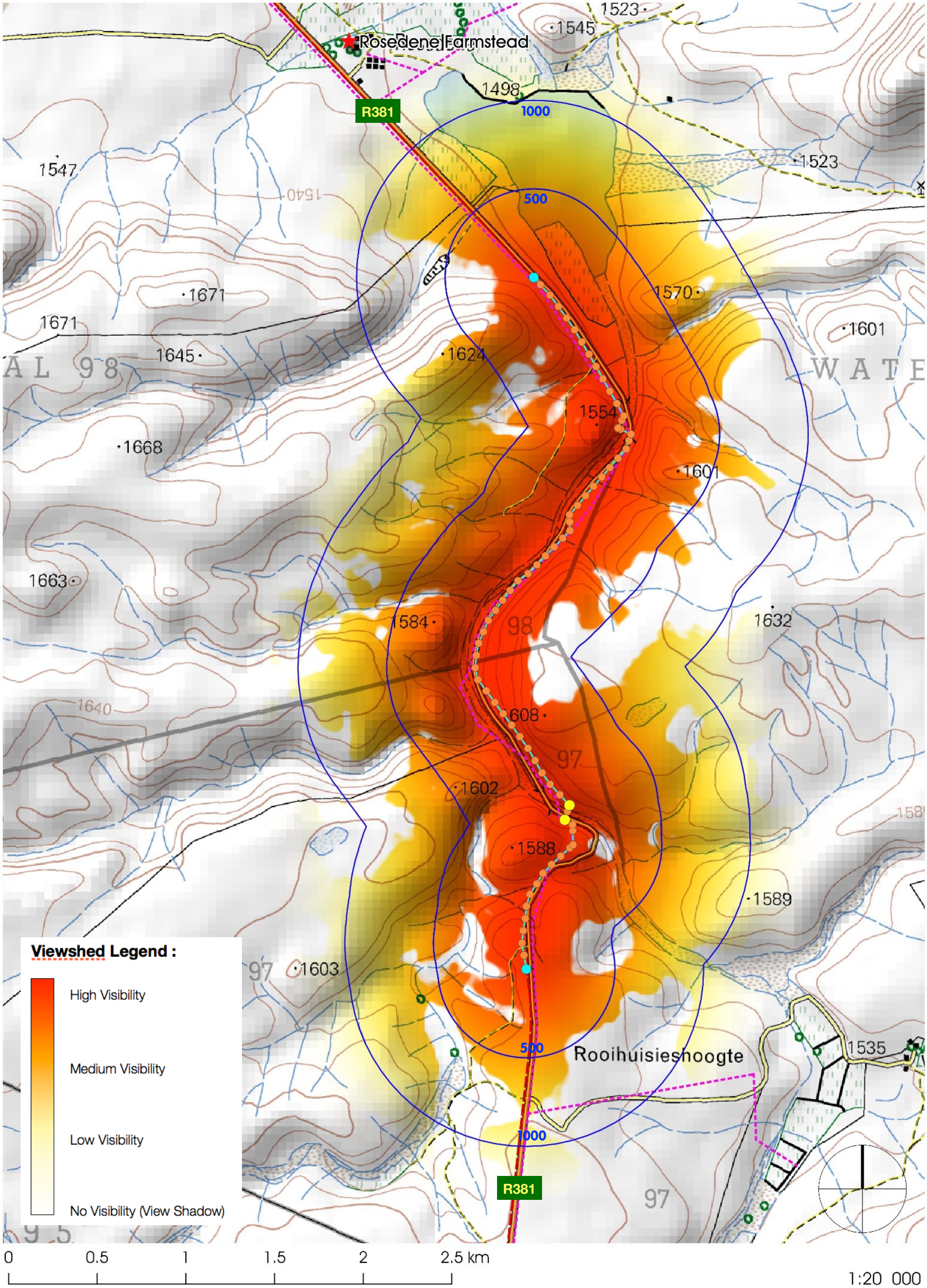
Base map : Google Earth 2021

map 6 : SKA Fibre OHL : Molteno Pass South Section



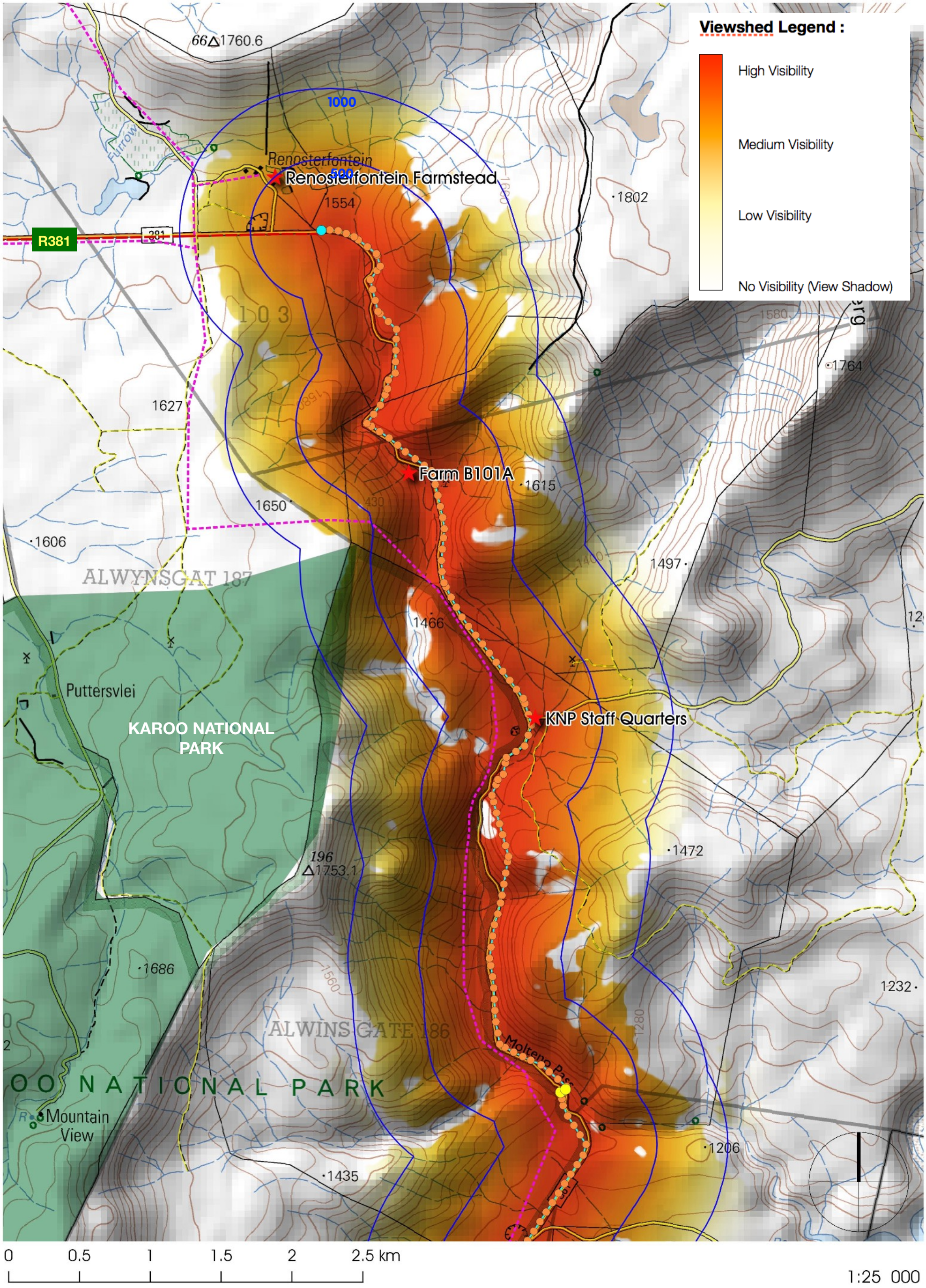
Base map : NGI 1:50K Topographic Series : 3122 CD Dunedin

map 7 : SKA Fibre OHL : North Section Viewshed



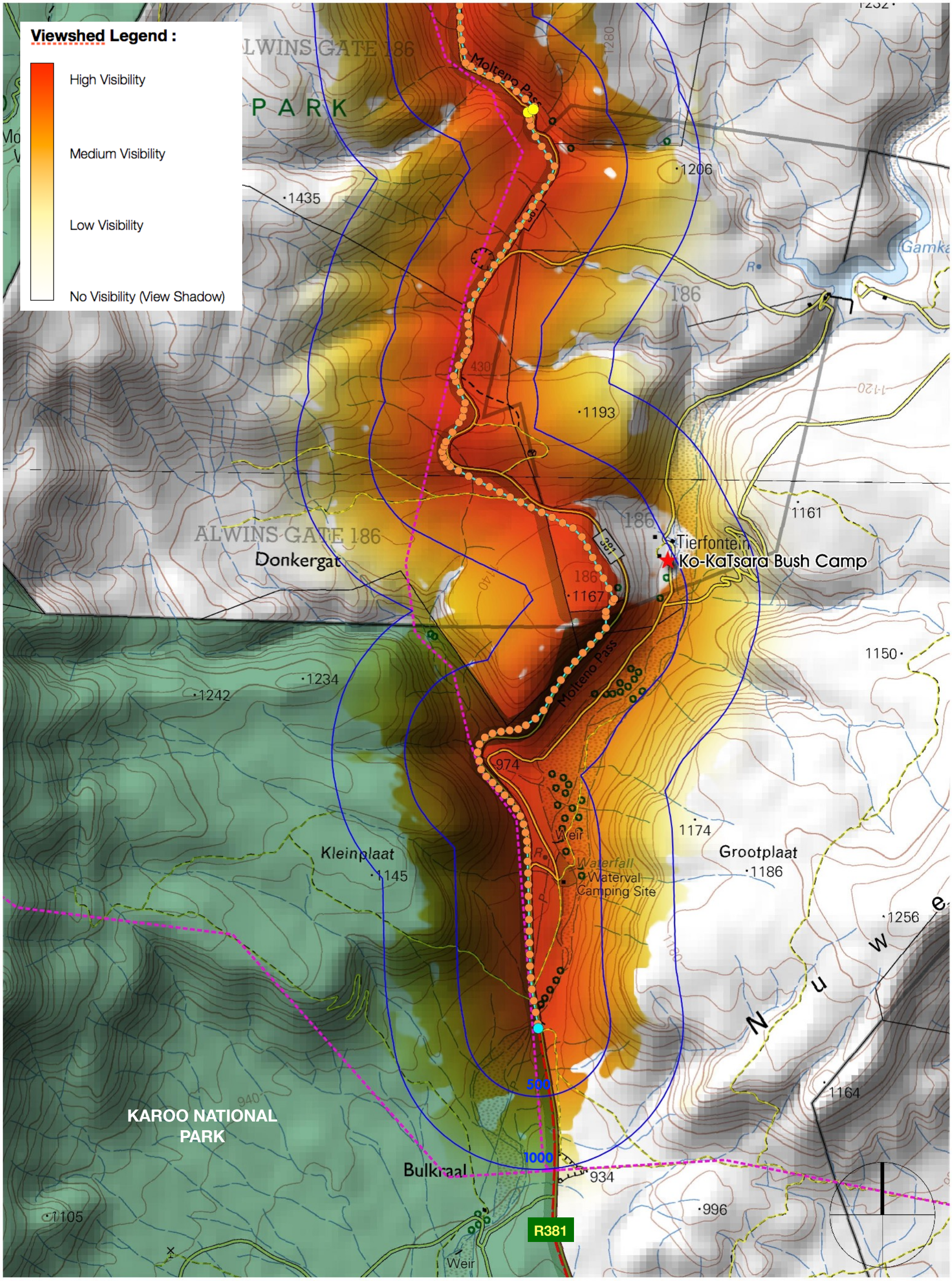
Base map : NGI 1:50K Topographic Series : 3222 AB Rosedene

map 8 : SKA Fibre OHL : Mid Section Viewshed



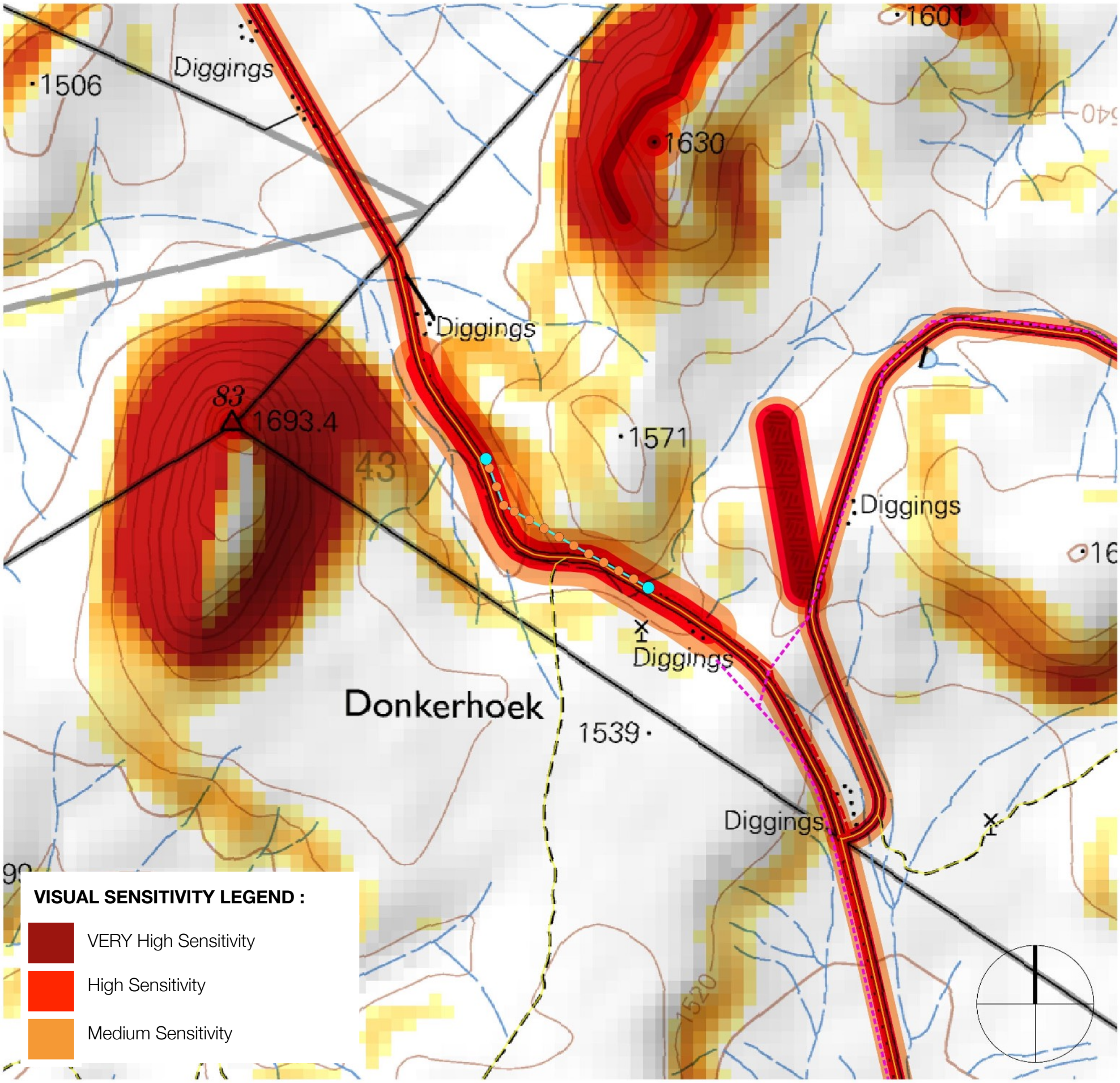
Base map : NGI 1:50K Topographic Series : 3222 BA Kuilspoort

map 9 : SKA Fibre OHL : Molteno Pass North Section Viewshed



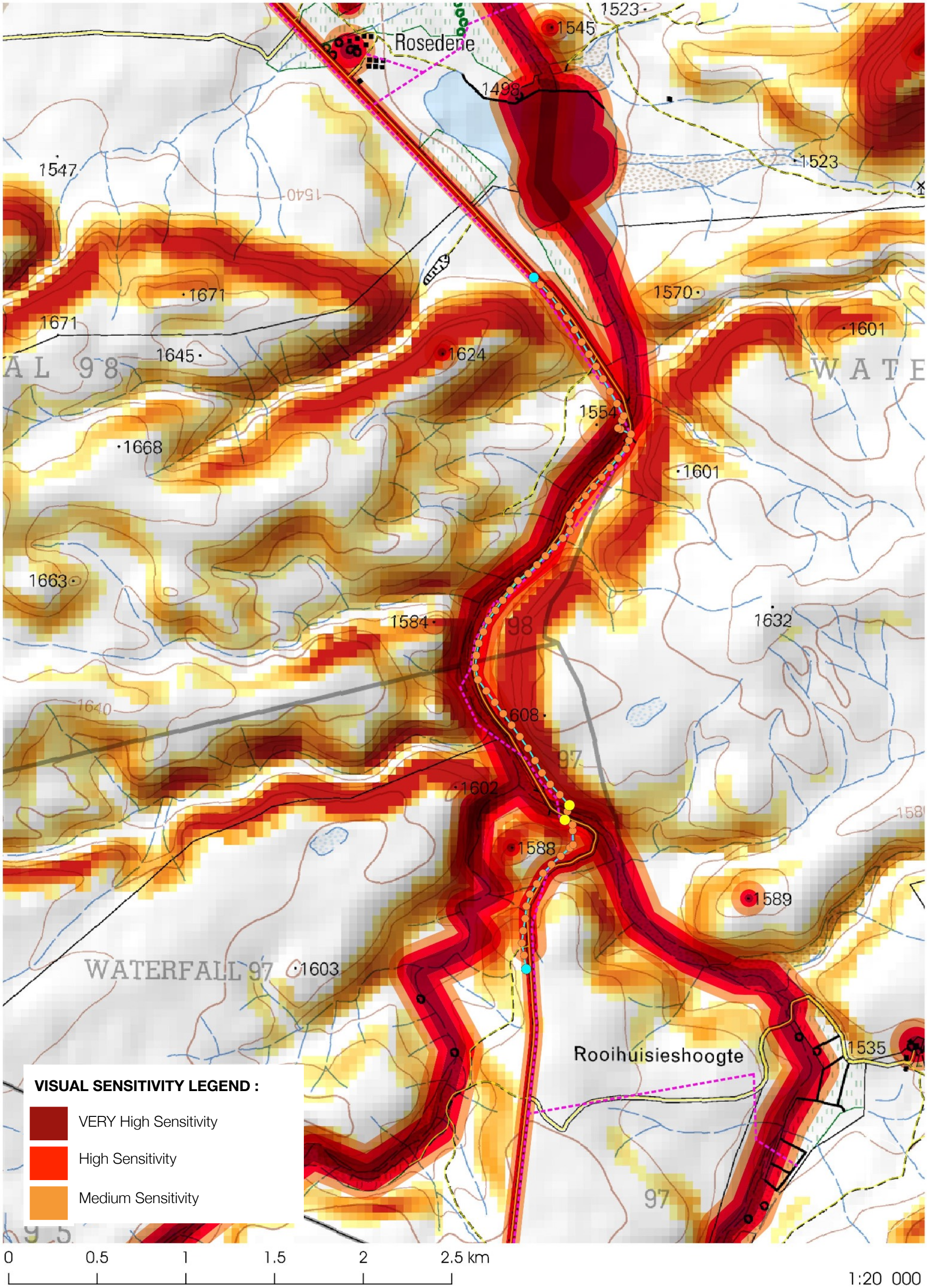
Base map : NGI 1:50K Topographic Series : 3222 BA Kuilspoort, 3222 BC Beaufort West

map 10 : SKA Fibre OHL : Molteno Pass South Section Viewshed



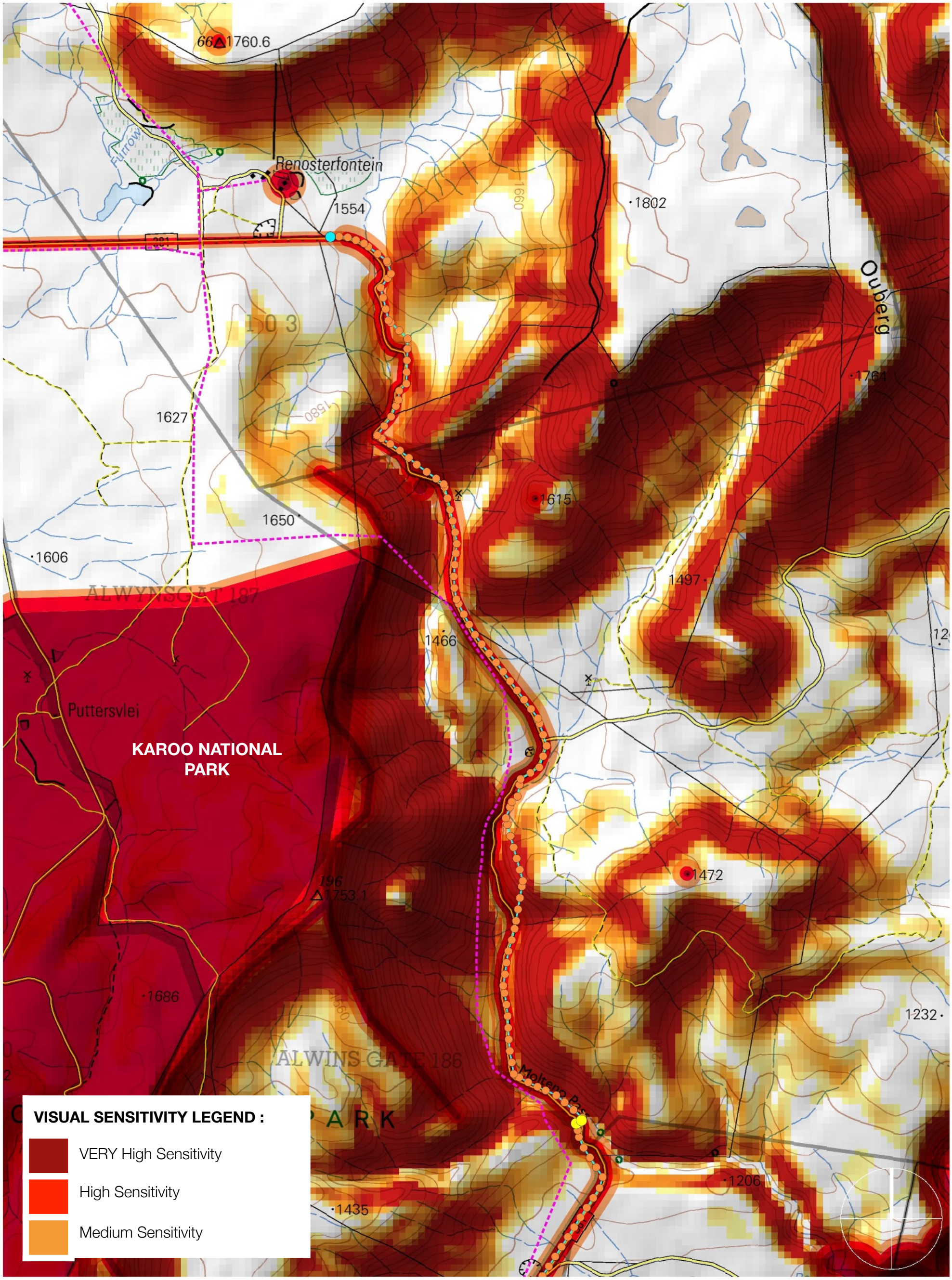
Base map : NGI 1:50K Topographic Series : 3122 CD Dunedin

map 11 : SKA Fibre OHL : North Section Visual Sensitivity



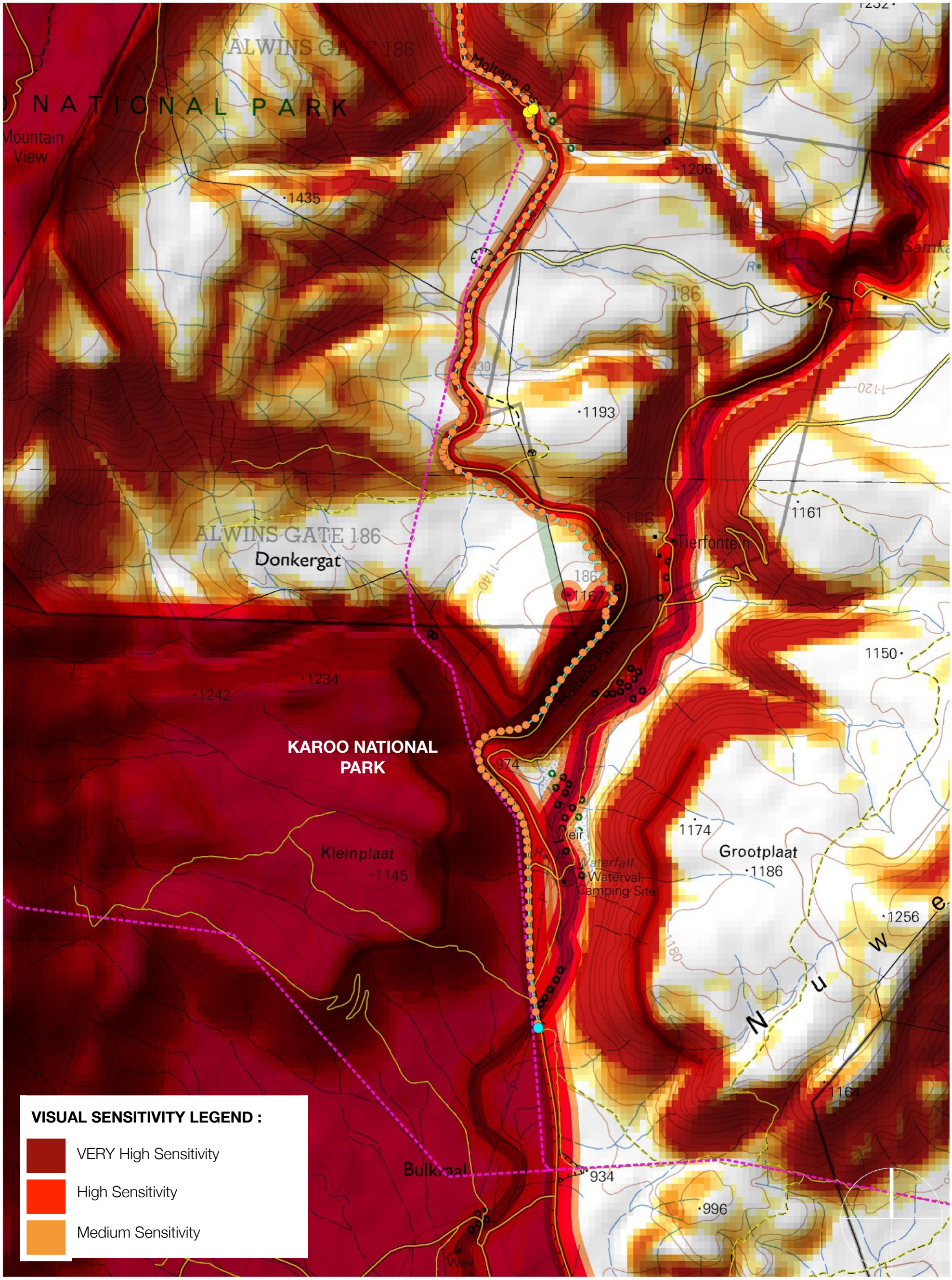
Base map : NGI 1:50K Topographic Series : 3222 AB Rosedene

map 12 : SKA Fibre OHL : Mid Section Visual Sensitivity



Base map : NGI 1:50K Topographic Series : 3222 BA Kuilspoort

map 13 : SKA Fibre OHL : Molteno Pass North Section Visual Sensitivity



Base map : NGI 1:50K Topographic Series : 3222 BA Kuilspoort, 3222 BC Beaufort West

map 14 : SKA Fibre OHL : Molteno Pass South Section Visual Sensitivity

***Viewpoint 1** : looking North-West from Southern entrance to Donkerhoek Poort* *Location 31.88993ºS 22.39773ºE Distance 13m*

***Viewpoint 2** : looking South in Sakrivier Poort* *Location 32.06964ºS 22.45248ºE Distance 30m*

figure 1 : SKA Fibre Overhead Lines • Photomontages

***Viewpoint 3** : looking North-West from start of Ouberg Pass* *Location 32.18873ºS 22.55324ºE Distance 33m*

***Viewpoint 4** : looking North-East in Molteno Pass* *Location 32.26771ºS 22.56081ºE Distance 121m*

figure 2 : SKA Fibre Overhead Lines • Photomontages