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Environmental Screening Study

for the proposed Square Kilometre Array
(SKA) fibre optic cable from
Beaufort West to Carnarvon



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SUMMARY

This Environmental Screening Study (ESS) reviews available geographic information and legislative requirements to determine the need for the proposed Square Kilometre Array (SKA) fibre optic cable between Beaufort West and Carnarvon to:

- obtain an Environmental Authorisation in terms of the National Environmental Management Act (No. 107 of 1998) Environmental Impact Assessment Regulations (2014, as amended in 2017), or obtain exclusion from Environmental Authorisation as part of the SKA Phase 1 environmental management instrument (Government Gazette 42323, Notice 436;)
- obtain a Water Use License in terms of the National Water Act (No. 36 of 1998); and
- conduct a Heritage Impact Assessment and obtain approval from the South African Heritage Resources Agency in terms of the National Heritage Act (No. 25 of 1999).

The baseline environmental description (§3) provides an overview of the ecosystems, species and heritage features that could potentially be impacted by the proposed development. Notably, the proposed route will traverse several Critical Biodiversity Areas and will have to make twenty-one river crossings. Some of these riverine / riparian ecosystems are the habitat of “Critically Endangered” Riverine rabbits. These findings are consistent with the “Screening Tool Report” generated for the proposed fibre optic cable route (Appendix A).

The results of legislative screening (§4) indicate that:

- The SKA Phase 1 Integrated Environmental Management Plan and Exclusion from Environmental Authorisation does not apply since the proposed fibre optic cable is not situated within the SKA Phase 1 geographical area;
- A **Basic Assessment** procedure is required to obtain Environmental Authorisation for the proposed fibre optic route. This requirement is triggered by Listing Notice 3, Activity 12 of the Environmental Impact Assessment Regulations¹;
- A Water Use License Application is required to obtain a **Water Use License** for river crossings. This requirement is triggered by Section 21(c) and (i) of the National Water Act²; and
- A **Heritage Impact Assessment** is required for comment and / or approval by the South African Heritage Resources Agency). This requirement is triggered in terms of Section 38(1)(a) of the National Heritage Act³, and can be conducted as part of the Basic Assessment.

These outcomes have been confirmed with the relevant Authorities.

Finally, this report concludes with a recommended way forward to obtaining the required Environmental Authorisation, Water Use License and Heritage Approval (§5).

¹ “The clearance of an area of 300 square metres or more of indigenous vegetation...within critical biodiversity areas identified in bioregional plans”.

² “Impeding or diverting the flow of water in a watercourse; Altering the bed, banks, course or characteristics of a watercourse”.

³ “The construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length”

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Abbreviations and acronyms

| | |
|---------|---|
| AVN | African Very Long Baseline Interferometry |
| BA | Basic Assessment |
| CBA | Critical Biodiversity Area |
| CR | Critically Endangered (ecosystem / species threat status) |
| DEA&DP | Department of Environmental Affairs and Development Planning (Western Cape) |
| DEFF | Department of Environment, Forestry and Fisheries |
| DENC | Department of Nature Conservation (Northern Cape) |
| DWDM | Dense Wavelength Division Multiplexing |
| E | Ephemeral (river) |
| EA | Environmental Authorisation |
| EIA | Environmental Impact Assessment |
| EMPr | Environmental Management Programme |
| EN | Endangered (ecosystem / species threat status) |
| ESA | Ecological Support Area |
| ESS | Environmental Screening Study |
| FEPA | Freshwater Ecosystem Priority Area |
| GA | General Authorisation |
| GG | Government Gazette |
| GIS | Geographic Information System |
| HartRAO | Hartebeesthoek Radio Astronomy Observatory |
| HDD | Horizontal Directional Drilling |
| HIA | Heritage Impact Assessment |
| IEMP | Integrated Environmental Management Plan |
| LC | Least Concern (ecosystem / species threat status) |
| LN | Listing Notice |
| LT | Least Threatened (ecosystem / species threat status) |
| NC | Northern Cape |
| NEMA | National Environmental Management Act (No. 107 of 1998) |
| NHA | National Heritage Act (No. 25 of 1999) |
| NRF | National Research Foundation |
| NWA | National Water Act (No. 36 of 1998) |
| ONA | Other Natural Area |
| P | Perennial (river) |
| PA | Protected Area |
| PoP | Point of Presence |
| SAHRA | South African Heritage Resources Agency |
| SARAO | South African Radio Astronomy Observatory |
| SKA | Square Kilometre Array |
| VU | Vulnerable (ecosystem / species threat status) |
| WC | Western Cape |
| WUL | Water Use License |
| WULA | Water Use License Application |

1. Introduction

This Environmental Screening Study (ESS) reviews available geographic information and legislative requirements to determine the need for the proposed Square Kilometre Array (SKA) fibre optic cable between Beaufort West and Carnarvon to:

- be granted exclusion from obtaining Environmental Authorisation (EA) under the ambit of the Phase 1 SKA Environmental Management Instrument and Exclusion (Government Gazette (GG) 42323, Notice 436, enacted under the National Environmental Management Act (No. 107 of 1998) (NEMA));
- obtain an EA in terms of the NEMA Environmental Impact Assessment (EIA) Regulations (2014, as amended in 2017);
- obtain a Water Use License (WUL) in terms of the National Water Act (No. 36 of 1998) (NWA); and
- conduct a Heritage Impact Assessment (HIA) and obtain approval from the South African Heritage Resources Agency (SAHRA) in terms of the National Heritage Act (No. 25 of 1999) (NHA).

2. Project description⁴

The South African Radio Astronomy Observatory (SARAO) spearheads South Africa's activities in the SKA Radio Telescope, commonly known as the SKA, in engineering, science and construction. SARAO is a National Facility, managed by the National Research Foundation, which incorporates radio astronomy instruments and programmes such as the MeerKAT and KAT-7 telescopes in the Karoo, the Hartebeesthoek Radio Astronomy Observatory (HartRAO) in Gauteng, the African Very Long Baseline Interferometry (AVN) programme in nine African countries, as well as the associated human capital development and commercialisation endeavours.

Connectivity is required between the SKA core site in the Northern Cape and a data processing facility in Cape Town to transport the science data for the SKA project and its precursor, MeerKAT. Access to dark fibre is required to transport this data due to the expected data throughputs for the SKA project.

SARAO has built an overhead fibre route between Carnarvon and the SKA core site. Additionally, SANReN has procured access to fibre between Beaufort West area and Cape Town. A fibre optic cable connection must, therefore, be built between Carnarvon and Beaufort West.

⁴ CSIR, 2019:6.

Two potential routes for the SKA fibre optic cable were considered (see Section 2.1). The details of the preferred and selected SKA fibre route (Route A) is as follows:

1. The fibre route starts from Beaufort West Transnet building to Loxton where a 3 m x 6 m container for regeneration of signal then to Carnarvon SKA Point of Presence⁵ (PoP) site.
2. The fibre duct and cable will be laid in a 1 m deep and 300 mm wide trench and be buried by backfilling and compacting the trench.
3. The full fibre route will be installed within road reserves and 1 m from the fence of the private land.
4. 155 km will be underground and 25 km will be overhead due to it not being technically or financially feasible to trench on the Molteno Pass section.
5. There are several streams / river and associated wetlands to cross. Rivers will be crossed using directional drilling 2 m below riverbed starting 32 m away from river banks.
6. There is only one river with solid bedrock (the Brak river near Loxton) where directional drilling is not technically or financially feasible. Here the fibre cable will be attached to the existing road bridge.

The proposed SKA fibre optic cable starts in Beaufort West, Western Cape (WC) Province, via Loxton, and terminates in Carnarvon, Northern Cape (NC) Province (Figure 1). The route crosses three local municipalities, namely the Beaufort West Local Municipality (WC), Ubuntu Local Municipality (NC) and the Kareeberg Local Municipality (NC).

Using Geographic Information Systems (GIS) the total construction footprint of the proposed SKA fibre route was calculated (Table 1). The calculated footprints were subsequently also used to identify coinciding conservation planning units (see Section 3.3) and determine spatial thresholds that would trigger the need for an EIA or Basic Assessment (BA) process to acquire EA (see Section 4.2).

⁵ Location where networking equipment may be accessed.

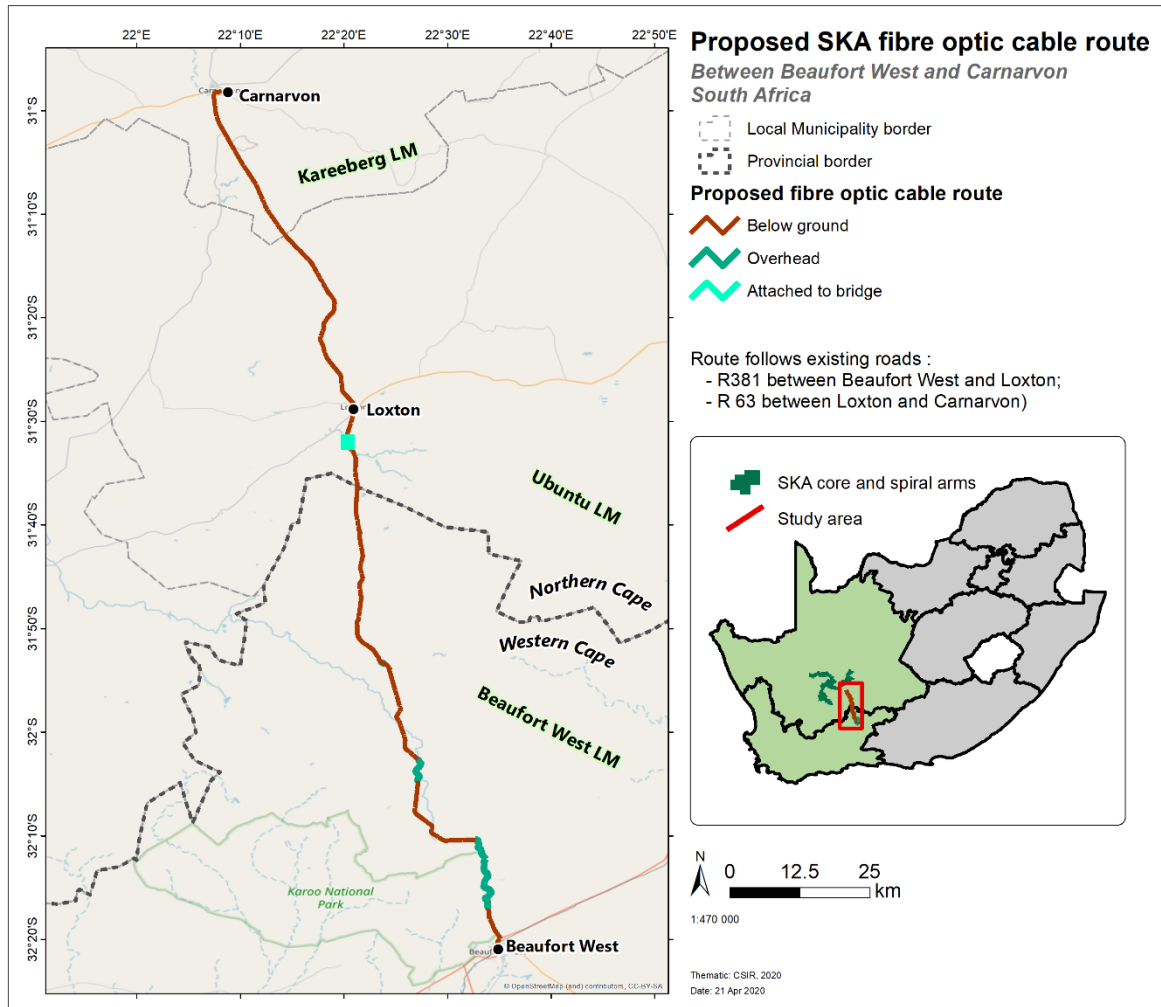


Figure 1: The proposed SKA fibre optic cable route starts in Beaufort West, follows the existing R 381 and R 63 roads via Loxton to Carnarvon.

Table 1: Construction footprints of the proposed SKA fibre optic cable from Beaufort West to Carnarvon.

| Fibre optic route section type | Length (m) | Length (km) | Footprint (m ²) [length x 0.3 m] |
|--------------------------------|-------------------|---------------|---|
| Beaufort West to Loxton | | | |
| Trench | 92 005.69 | 92.01 | 27 601.71 |
| Overhead | 20 621.15 | 20.62 | 6 186.34 |
| Fence line | 2 760.82 | 2.76 | 828.25 |
| Concrete encasement | 947.13 | 0.95 | 284.14 |
| HDD | 818.84 | 0.82 | 245.65 |
| Attached to bridge | 57.54 | 0.06 | 17.26 |
| Loxton to Carnarvon | | | |
| Trench | 65 057.94 | 65.06 | 19 517.38 |
| Concrete encasement | 1 373.22 | 1.37 | 411.97 |
| HDD | 347.51 | 0.35 | 104.25 |
| Existing sleeve | 8.65 | 0.01 | 2.59 |
| Total | 183 998.49 | 184.00 | 55 199.55 |

HDD: Horizontal Directional Drilling

2.1 Consideration of alternatives

Two alternative routes for the proposed fibre optic cable routes for the Beaufort West-to-Carnarvon section to complete the SKA-Cape Town connection were considered (Table 2; Figure 2).

Table 2: Summary of the specifications for the two alternative fibre optic cable routes.

| Specification | Fibre optic cable route alternatives | |
|--|---|--|
| | Option A (Beaufort West – Loxton – Carnarvon)* | Option B (Beaufort West – Leeu Gamka – Fraserburg – Loxton – Carnarvon) |
| Length | 184 km | 354 km |
| Total footprint [length x 0.3 m] | 10.9 ha | 19.3 ha |
| River crossings (SANBI, 2018) | 21 | 37 |
| Total footprint in Critical Biodiversity Areas (CapeNature, 2017; DENC, 2016) [CBA1 & CBA2] | 57 617 m ² | 83 783 m ² |
| CBA: Critical Biodiversity Area | | |

* Preferred from an environmental, engineering and technical perspective.

Option A (Beaufort West – Loxton – Carnarvon) is the most direct and shortest route between the Beaufort West area and Carnarvon and is therefore preferred from an environmental, engineering and technical perspective. Option A is considerably shorter than Option B (-170 km) and is therefore the preferred option by SARAo. Having a shorter link between end points leads to potentially higher transfer speeds per wavelength on the Dense Wavelength Division Multiplexing (DWDM) system⁶ and lower latency. The rate and volume of data that will be transferred from the SKA via the fibre optic cable require high transfer speed and low latency. This is partly achieved through establishing a shortest and most direct route for the fibre optic cable. The shorter length of Option A also results in lower engineering and environmental costs as it has fewer river crossings and a smaller cumulative construction footprint (including in Critical Biodiversity Areas). The longer Option B route would also require the establishment

⁶ Technology that combines data signals from different sources so they can share a single optical fiber pair while maintaining complete separation of the data streams.

of an additional repeater station⁷, which would require the establishment of another facility (site, container, etc.), extra equipment, electricity supply, cooling system and security. Furthermore, Option B would also require SANReN to redesign the DWDM system that has already been deployed by adding a new add-drop site in Leeu Gamka.

Route Option A (Beaufort West – Loxton – Carnarvon) is thus taken forward and further considered in this ESS and any other future subsequent environmental assessment required.

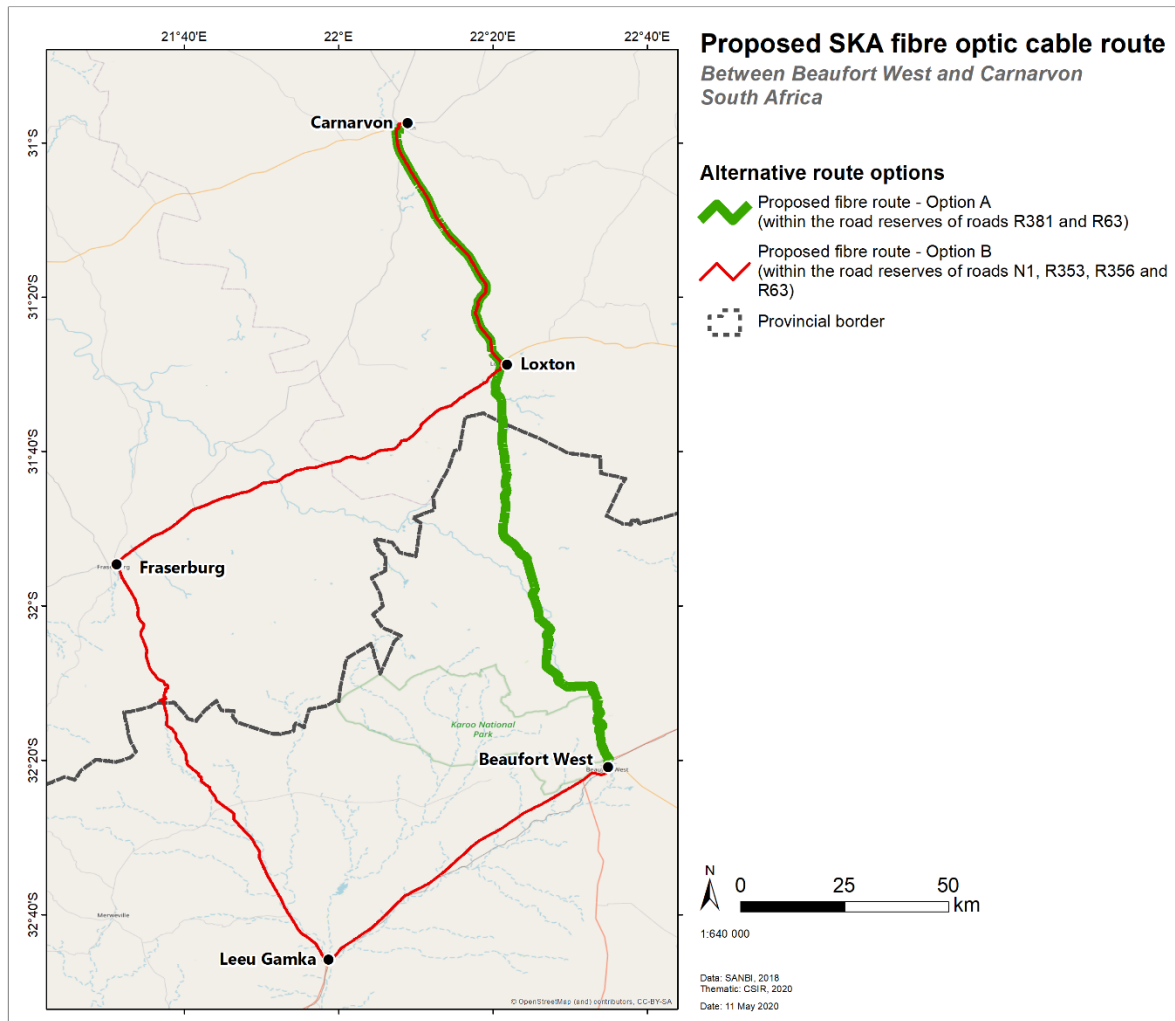


Figure 2: Two alternative routes for the proposed fibre optic cable between the Beaufort West area and Carnarvon were considered.

⁷ System used to regenerate and extend the reach of a DWDM system and correct any signal distortion.

3. Baseline environmental description

3.1 Terrestrial ecology

Flora

The proposed SKA fibre optic cable route spans several vegetation types in the Nama Karoo biome, the most prominent of which is the Eastern Upper Karoo. Azonal vegetation – Southern Karoo Riviere – is present in the vicinity of Beaufort West (Table 3, Figure 3). The ecosystem threat status of these vegetation types are listed as “Least Concern” (LC) (SANBI, 2018). Two sensitive plant species may be present along the proposed route, one of which is the Tree Rice-bush (*Cliffortia arborea*) (“Vulnerable” (VU)) (Whitehouse & Raimondo, 2007), the other is only identified as “Sensitive species 704” (see Appendix A, pg. 21).

Table 3: Vegetation types traversed by the proposed SKA fibre optic cable.

| Vegetation type | Biome | Bioregion | Ecosystem threat status | Protection level |
|---|-------------------|--------------------------|-------------------------|------------------|
| Southern Karoo Riviere | Azonal Vegetation | Inland Saline Vegetation | LC | PP |
| Gamka Karoo | Nama-Karoo | Lower Karoo Bioregion | LC | PP |
| Eastern Upper Karoo | | Upper Karoo Bioregion | LC | PP |
| Northern Upper Karoo | | | LC | NP |
| Upper Karoo Hardeveld | | | LC | PP |
| Western Upper Karoo | | | LC | NP |
| <i>LC: Least Concern; PP: Poorly Protected; NP: Not Protected</i> | | | | |

Fauna

The “Critically Endangered” (CR) Riverine rabbit (*Bunolagus monticularis*) occurs within the region (Collins et al., 2019; Appendix A, pg. 16). The habitat of Riverine rabbit, as the name suggests, is typically riparian scrub. As such, care must be taken where the fibre optic cable crosses rivers to identify and minimise impacts to potential burrows, and limit construction in these areas during the breeding season (August to May (Duthie, 1989)). Southern Mountain Reedbuck (*Redunca fulvorufula fulvorufula*), listed as “Endangered” (EN) (Child et al., 2016) can also be found within the region where the fibre optic cable is proposed (Appendix A, pg. 16).

The Karoo dwarf tortoise (*Chersobius boulengeri*) (EN) is an endemic reptile which occurs within the region (Hofmeyer et al., 2018; Appendix A, pg. 16). This species, along with the other described in this section, would be at risk to falling into and getting stuck in open trenches during the construction phase of establishing the fibre optic cable.

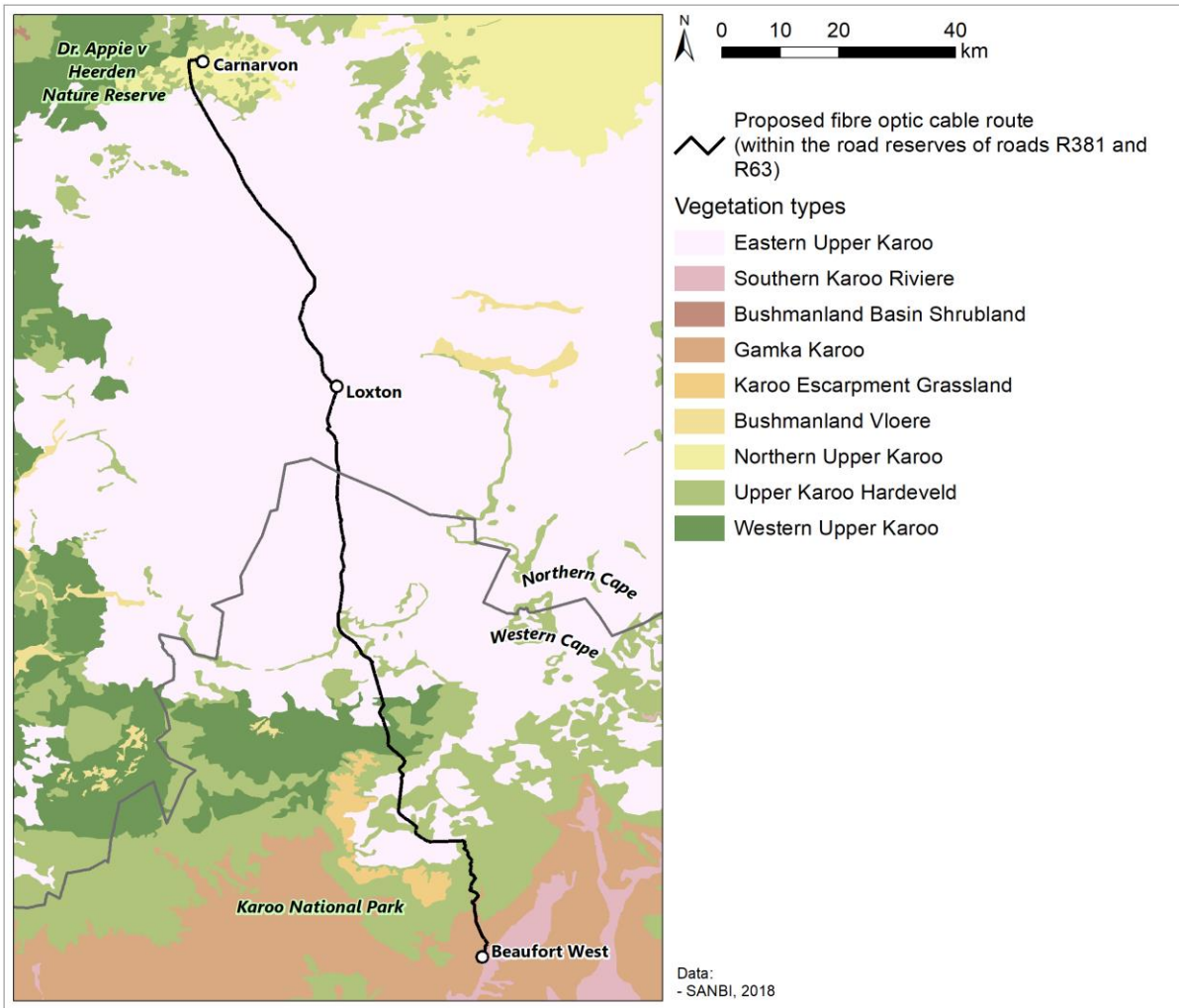


Figure 3: Vegetation types traversed by the proposed SKA fibre optic cable is mainly within the Nama Karoo biome.

Avifauna

Black harrier (*Circus maurus*) (EN) (Birdlife International, 2017) and Verraux's eagle (*Aquila verreauxii*) (LC) (Birdlife International, 2016) are known to be present within the region that the fibre optic cable is proposed (see Appendix A, pg.16). Sections of the proposed cabling, buried at a depth of 1 m, do not pose any risk to birds. Overhead sections of the cabling across the Molteno pass, at a height of 7.5 m, may be frequented by larger birds as perches, but doesn't pose an electrocution risk.

3.2 Aquatic ecology

Water Management Areas and catchments

The proposed fibre optic cable is situated in seven quaternary catchments in the Gourits and Lower Orange Water Management Areas (Figure 4).

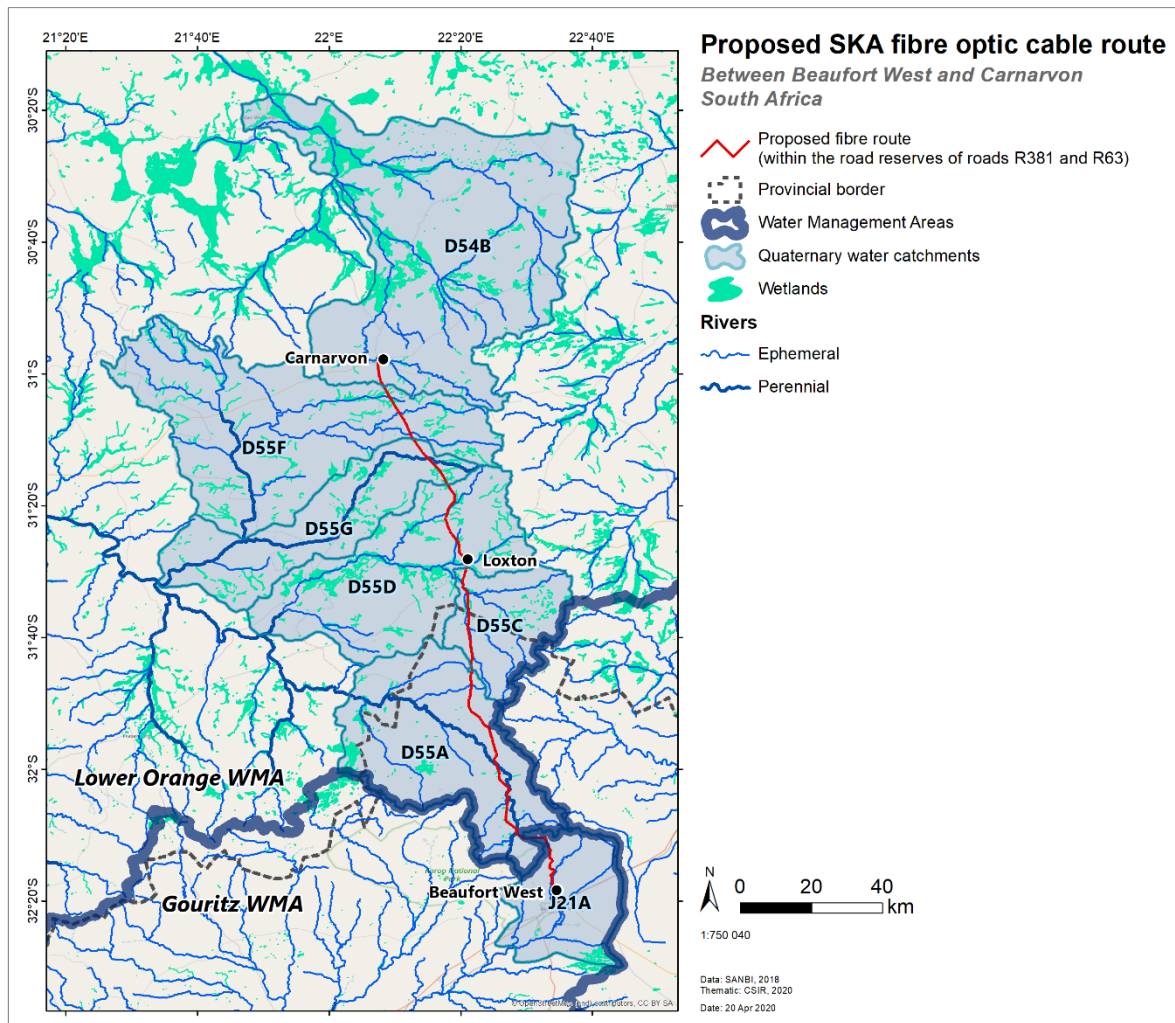


Figure 4: Water management areas and quaternary catchments traversed by the proposed SKA fibre optic cable.

Aquatic ecosystems (rivers and wetlands)

The proposed route makes 21 crossings over 16 different rivers (see Table 4) and several wetlands (mostly associated with the rivers) in the region (Figure 5). The majority of rivers in the Karoo region is ephemeral, with Gansvlei and Sak being the only perennial rivers. Some sections of the rivers are characterised as being Endangered (EN) (SANBI, 2018) (refer to Figure 6).

Table 4: Rivers that will have to be crossed by the proposed SKA fibre optic cable.

| Fibre optic route section type | Rivers (SANBI, 2018) | | | Location | |
|--|----------------------|------|-------------------------|-------------------|-------------------|
| | Name | Flow | Ecosystem threat status | Latitude | Longitude |
| Beaufort West to Loxton Section | | | | | |
| HDD | Gamka | E | LT | 32° 21' 1.487" S | 22° 34' 48.714" E |
| HDD | Slangfontein | E | LT | 31° 38' 30.572" S | 22° 21' 8.788" E |
| HDD | Slangfontein | E | EN | 31° 33' 23.048" S | 22° 21' 3.411" E |
| Overhead | Gamka | E | LT | 32° 17' 0.397" S | 22° 33' 54.534" E |
| Overhead | Sak | P | LT | 32° 4' 15.212" S | 22° 27' 14.772" E |
| Overhead | Sak | P | EN | 32° 3' 4.805" S | 22° 27' 25.553" E |
| Attached to bridge | Brak | E | EN | 31° 32' 11.737" S | 22° 20' 22.433" E |
| Trench | Sak | P | LT | 32° 9' 42.927" S | 22° 28' 27.878" E |
| Trench | Sak | P | EN | 31° 59' 8.794" S | 22° 25' 23.540" E |
| Trench | Unnamed 1 | E | LT | 31° 38' 58.918" S | 22° 21' 11.368" E |
| Trench | Unnamed 2 | E | LT | 31° 28' 57.735" S | 22° 21' 3.598" E |
| Trench | Unnamed 3 | E | LT | 31° 40' 35.321" S | 22° 21' 28.617" E |
| Trench | Unnamed 4 | E | LT | 31° 41' 7.198" S | 22° 21' 29.143" E |
| Trench | Unnamed 5 | E | LT | 31° 47' 7.354" S | 22° 21' 39.110" E |
| Loxton to Carnarvon Section | | | | | |
| Concrete encasement | Unnamed 6 | E | LT | 31° 25' 12.441" S | 22° 19' 24.296" E |
| HDD | Alarmleegte | E | EN | 31° 5' 49.087" S | 22° 10' 38.113" E |
| HDD | Soutpoort | E | EN | 31° 20' 55.530" S | 22° 18' 3.110" E |
| Trench | Brak | E | EN | 31° 9' 5.903" S | 22° 12' 21.755" E |
| Trench | Gansvlei | P | EN | 31° 12' 46.116" S | 22° 15' 0.825" E |
| Trench | Reitzvilleleegte | E | LT | 31° 3' 35.736" S | 22° 9' 17.793" E |
| Trench | Unnamed 7 | E | LT | 31° 25' 12.441" S | 22° 19' 24.296" E |

E: Ephemeral; P: Perennial; EN: Endangered; LT: Least Threatened

[Note: the potential crossing methodology of some of the fibre optic cable route sections, based on spatial data, are indicated as "trench". This could be attributed to spatial inaccuracies. The presence of rivers / river crossings and confirmation of appropriate crossing methodologies will be determined at the EIA phase.]

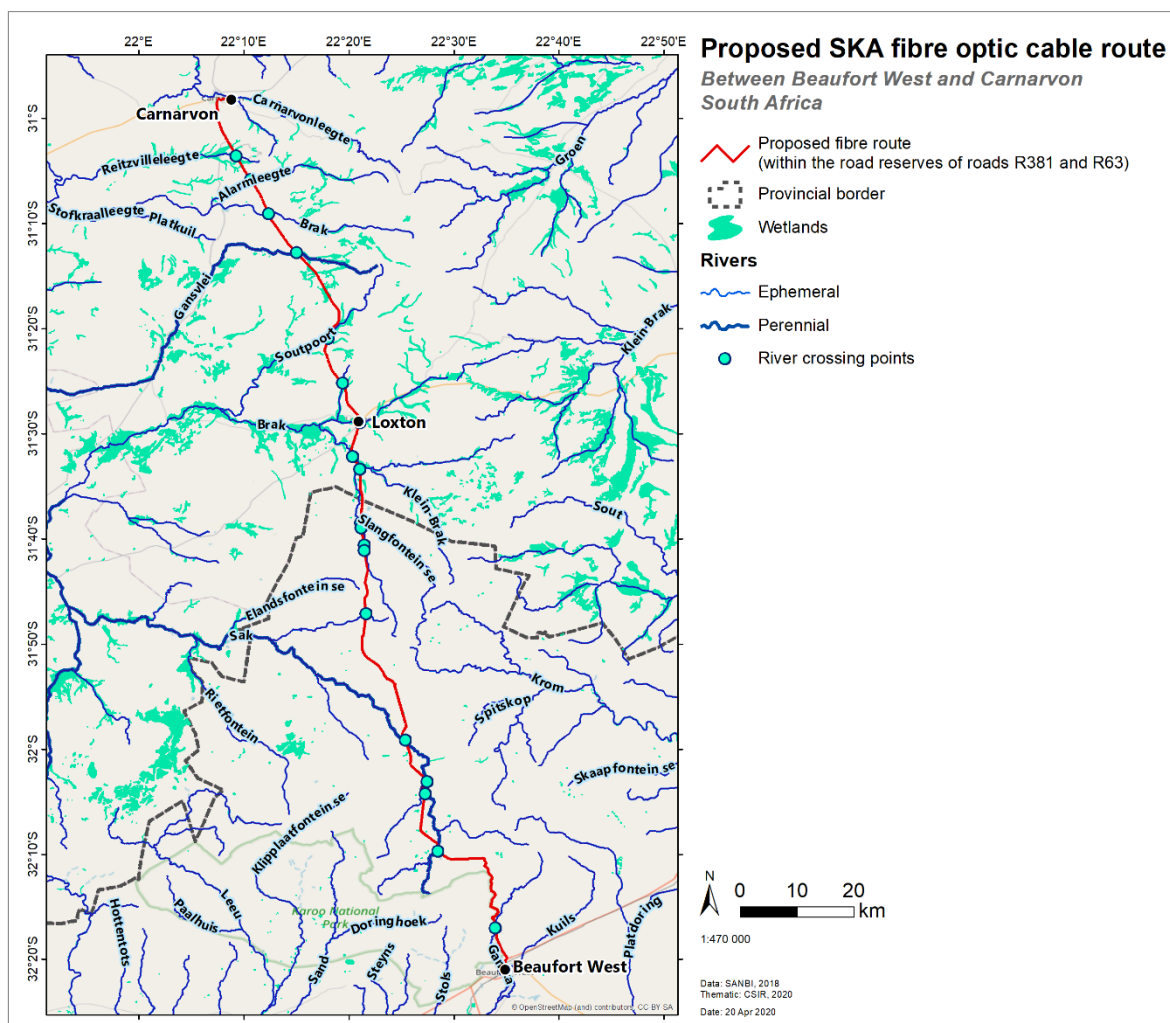


Figure 5: Rivers and wetlands in the project area proposed for the SKA fibre optic cable route from Beaufort West to Carnarvon.

[Note: smaller wetlands may not be visible at the scale of this map]

In addition to some of the rivers in the proposed project area being listed as EN, several water catchments are classified as Freshwater Ecosystem Priority Areas (FEPAs) – strategic priority areas for conserving freshwater ecosystems and supporting sustainable use of water resources – and Upstream Management Areas (Driver et al., 2011) (Figure 6).

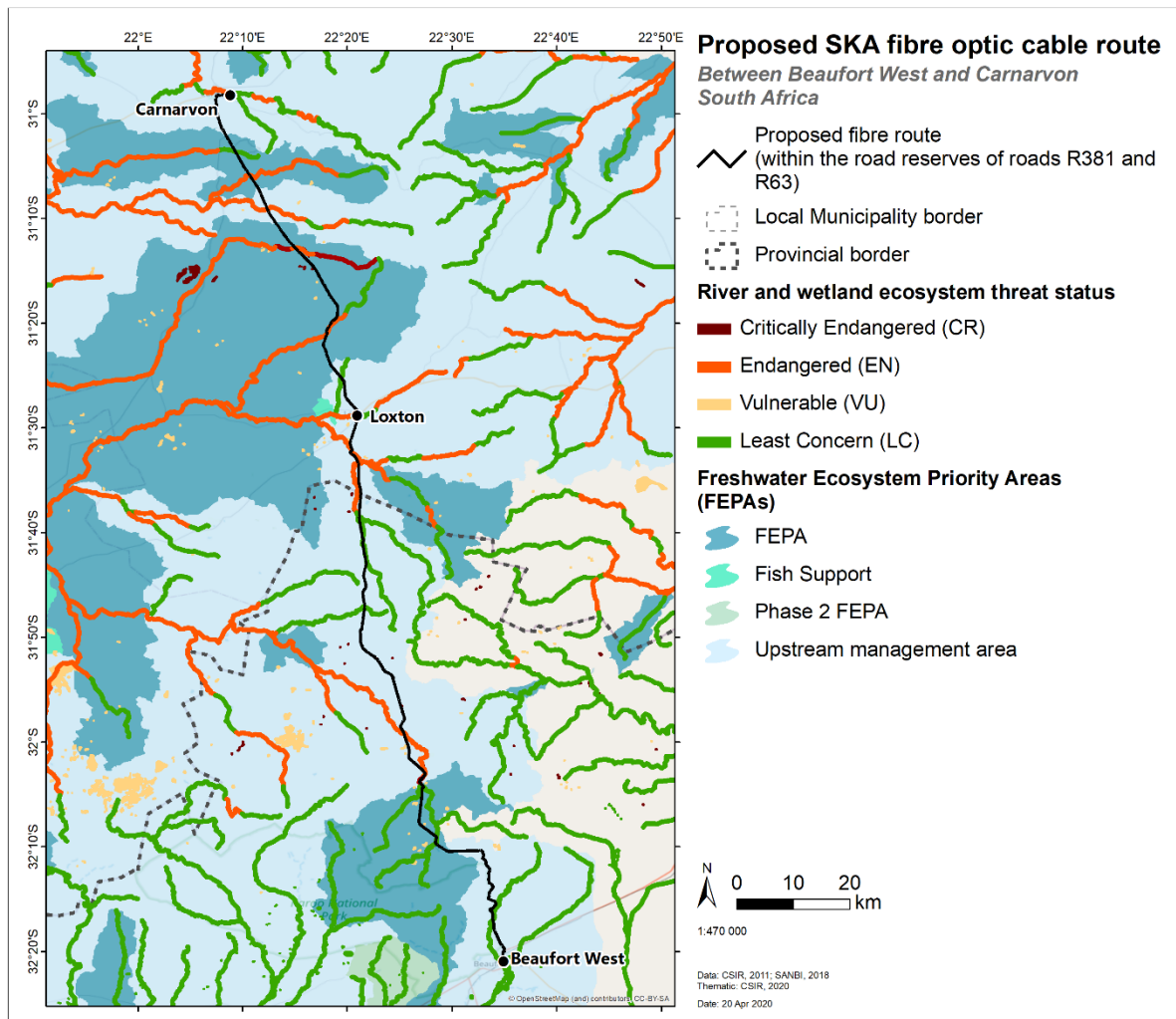


Figure 6: River ecosystem threat and freshwater priority areas in the project area proposed for the SKA fibre optic cable route from Beaufort West to Carnarvon.

[Note: smaller wetlands may not be visible at the scale of this map]

3.3 Conservation planning

Provincial biodiversity spatial plans or conservation plans is a tool for determining biodiversity priority areas and land use guidance for development planning, environmental assessment and regulation, and natural resource management (CapeNature, 2017). Although proposed within the road reserves of the R381 and R63, the proposed SKA fibre optic route traverses through the Karoo National Park and crosses multiple Critical Diversity Areas (CBAs) and Ecological Support Areas (ESAs) within the Western and Northern Cape Provinces (Figure 7).

The cumulative construction phase footprint (length x 0.3 m) within each of the different conservation planning units were calculated using GIS tools (Table 5). The results indicate an exceedance of the threshold stipulated in Listing Notice 3 Activity 12, entailing the need for an EA – see Table 7 in Section 4.2.

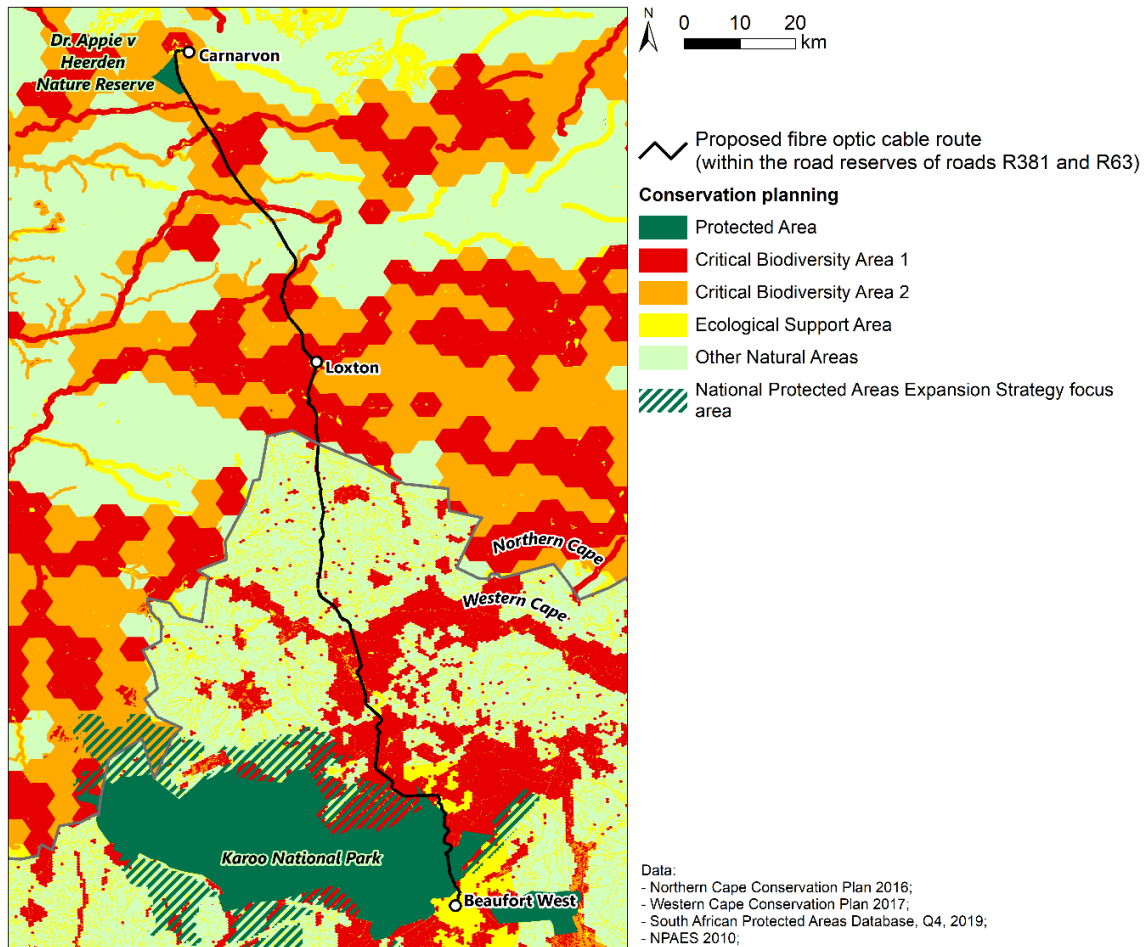


Figure 7: Protected areas and conservation planning in the project area proposed for the SKA fibre optic cable route from Beaufort West to Carnarvon.

Table 5: Construction footprints of the proposed SKA fibre optic cable within Conservation Planning Units.

| Conservation Planning Category | Footprint (m ²) |
|--|-----------------------------|
| Western Cape (CapeNature, 2017) | |
| CBA1 | 19 703.87* |
| CBA2 | 110.29 |
| ESA1 | 5 110.23 |
| ESA2 | 2 475.61 |
| ONA | 15 310.64 |
| PA | 6 983.24 |
| Northern Cape (DENC, 2016) | |
| CBA1 | 24 844.94* |
| CBA2 | 12 958.06 |
| ESA | 197.58 |
| ONA | 5 436.86 |
| PA | 2 573.38 |
| CBA: Critical Biodiversity Area; ESA: Ecological Support Area; ONA: Other Natural Area; PA: Protected Area | |

* The construction footprints exceed the threshold stipulated in Listing Notice 3 Activity 12, entailing the need for an EA – refer to Table 7 in Section 4.2.

3.4 Heritage and palaeontology

Recorded heritage features in the proposed project area are mainly buildings, cemeteries and trees concentrated within the towns of Beaufort West and Carnarvon (SAHRA, 2018).

The regional palaeontological (fossil) sensitivity of the project area proposed for the SKA fibre optic cable route is predominantly Very High (Figure 8), which entails the requirement for a desktop palaeontology assessment and field investigation if necessary (Table 6). One palaeontology find exists within proximity of road R381 between Beaufort West and Loxton (SAHRA, 2018).

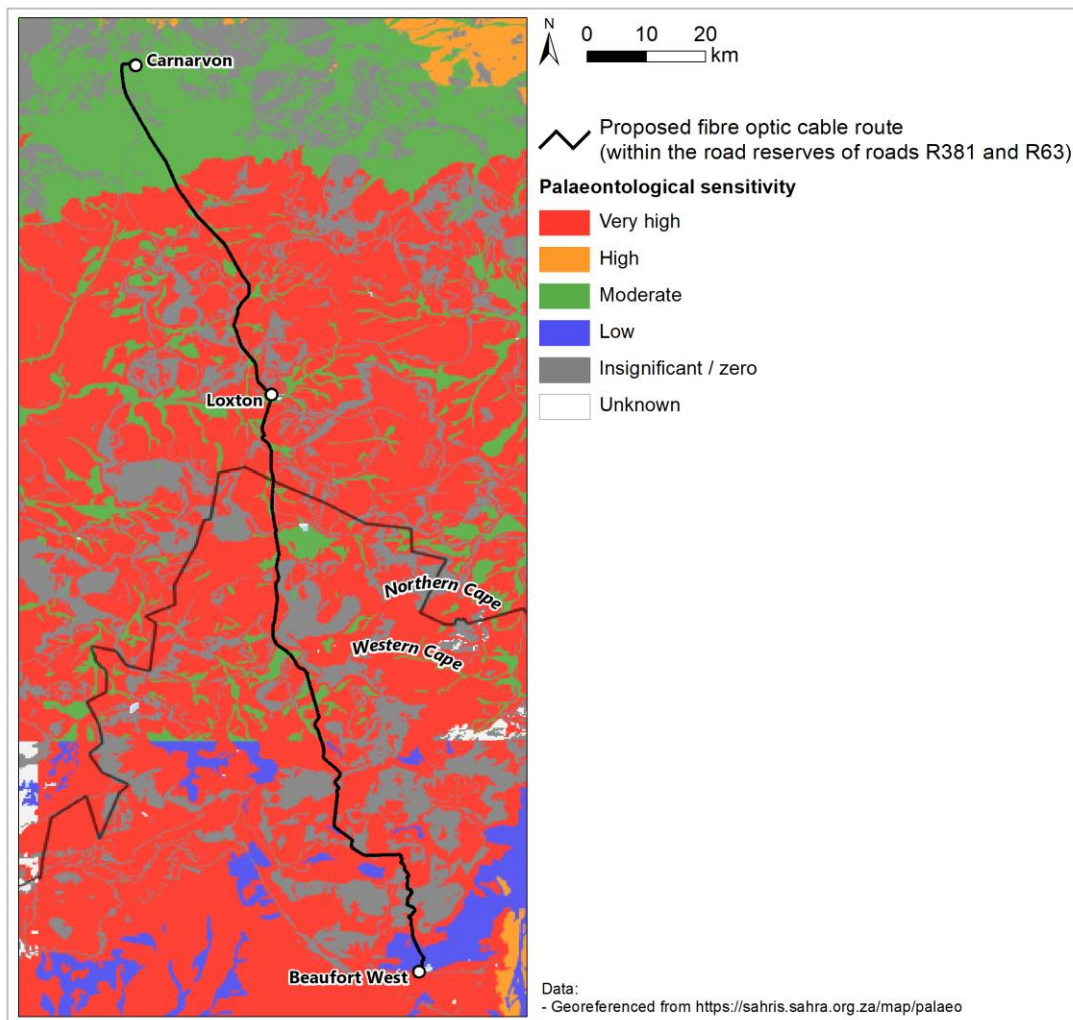


Figure 8: Palaeontological sensitivity of the proposed project area (SAHRA, 2020).

Table 6: Recommended investigation required for each palaeontology sensitivity class (SAHRA, 2020).

| Palaeontology sensitivity class | Required action |
|--|---|
| High | Desktop study is required and based on the outcome of the desktop study, a field assessment is likely. |
| Moderate | Desktop study is required. |
| Low | No palaeontological studies are required however a protocol for finds is required. |
| Insignificant / zero | No palaeontological studies are required. |
| Unknown | These areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map. |

3.5 Agriculture

The proposed SKA fibre optic cable will be constructed within the road reserve – i.e. between the road surface and the fence line of any adjacent property – where no agriculture is practiced or likely to be practiced in the future. As such, the proposed fibre optic cable poses negligible risk to agricultural resources. However, aspects such as the control of erosion and invasive alien plants, which could have secondary consequences for agricultural resources, will have to be implemented and monitored during all project phases (construction, operations/maintenance, decommissioning).

4. Legislative screening

This section considers the relevant legislation that outlines:

- The applicability of the Phase 1 SKA Environmental Management Instrument and Exclusion (GG 42323: 436) (Section 4.1);

and / or the need for:

- Environmental Authorisation in terms of the NEMA (107/1998) EIA Regulations 2014, as amended in 2017 (Section 4.2; Table 7); and
- Water Use License in terms of the NWA (36/1998) (Section 4.3); and
- HIA and / or approval in terms of the NHA (25/1999) (Section 4.4).

4.1 SKA Environmental Management Instrument and Exclusion

In March 2019, the Minister of Environmental Affairs adopted an environmental management instrument and exclusion for Phase 1 of the SKA from obtaining EA. The environmental management instrument is an Integrated Environmental Management Plan (IEMP) (NRF

SARAO, 2018) which was developed on the basis of an extensive Strategic Environmental Assessment (SEA) process (CSIR, 2016).

The IEMP and EA exclusion applies to:

- development activities related to the SKA, as contemplated in the IEMP, where the National Research Foundation (NRF) is the applicant for EA;
- the geographical area which was assessed in the SEA and contemplated in the IEMP (Figure 9).

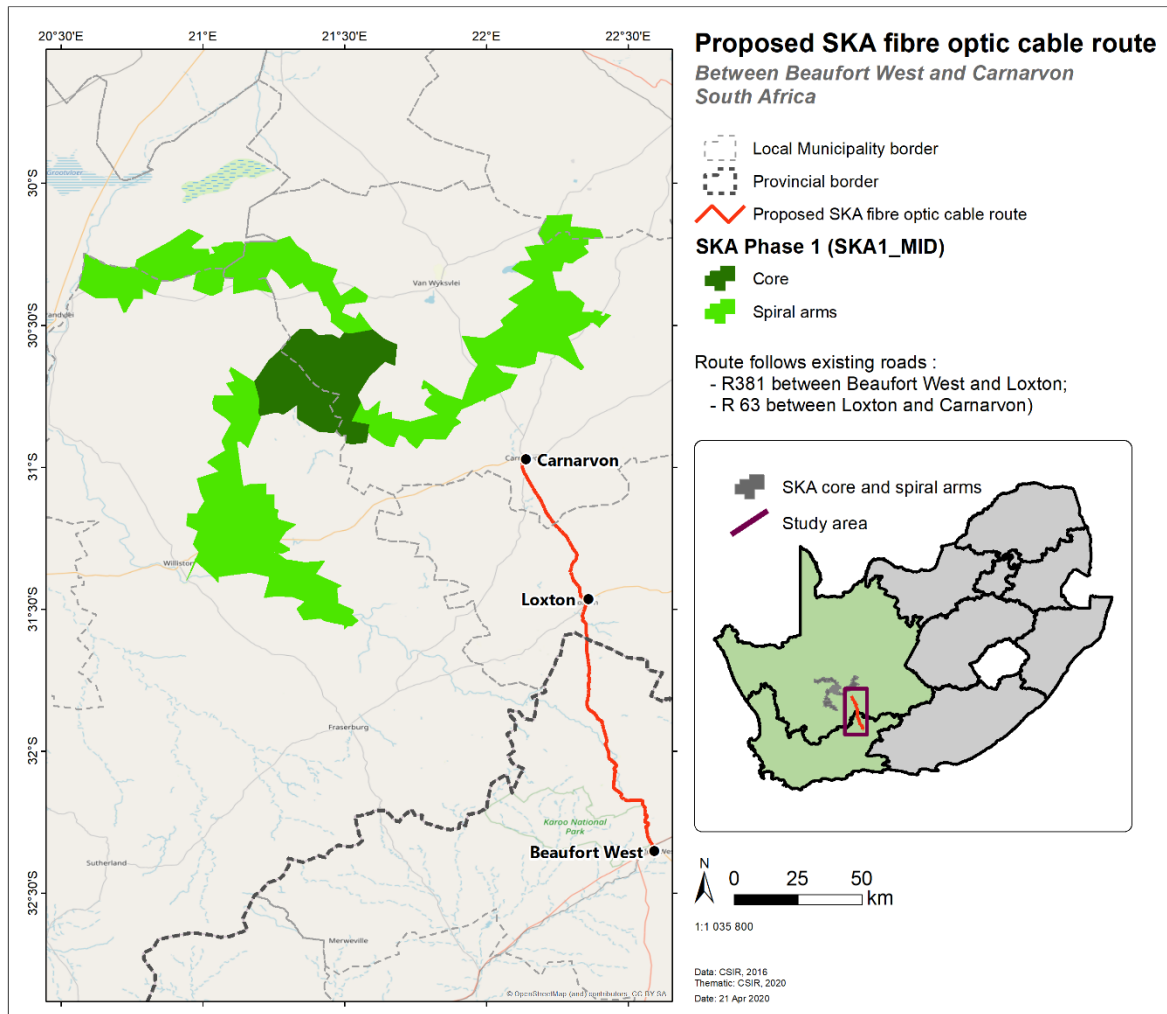


Figure 9: The proposed SKA fibre optic cable between Beaufort West and Carnarvon in relation to the SKA1_MID area to which the IEMP and EA exclusion apply.

Outcome

The proposed SKA fibre optic cable route between Beaufort West and Carnarvon is located outside of the SKA1_MID area to which the IEMP and EA exclusion applies (GG 42323: 436), and is therefore not eligible for exclusion from obtaining EA.

4.2 Environmental Authorisation

- Key to Table 7 -- LN1: Basic Assessment required | LN2: Full Scoping and EIA required | LN3: BA required.
 -- Yellow highlights indicate potentially relevant Listed Activities.
 -- Red box / border indicates triggered Listed Activities.

Table 7: Listed Activities (NEMA EIA Regulations 2014, as amended in 2017) which require an Environmental Authorisation.

| Listed Activity | Comment |
|---|---|
| <p>LN 1 Activity 12</p> <p>The development of—</p> <ul style="list-style-type: none"> (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; <p>where such development occurs—</p> <ul style="list-style-type: none"> (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; — <p>excluding—</p> <ul style="list-style-type: none"> (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; (cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies; (dd) where such development occurs within an urban area; or (ee) where such development occurs within existing roads, or road reserves or railway line reserves; or | <p>Outcome:</p> <p>LN 1 (12) <u>does not apply</u> since the full fibre route will be installed within road reserves and 1 m from the fence of the private land.</p> |

| Listed Activity | Comment |
|--|---|
| <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</p> | |
| <p>LN 1 Activity 27</p> <p>The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—</p> <ul style="list-style-type: none"> (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan. | <p>Outcome:</p> <p>LN 1 (27) <u>does not apply</u> since linear activities are exempted here.</p> |
| <p>LN2 – No applicable activities identified</p> | |
| <p>LN 3 Activity 3</p> <p>The development of masts or towers of any material or type used for telecommunication broadcasting or radio transmission purposes where the mast or tower—</p> <ul style="list-style-type: none"> (a) is to be placed on a site not previously used for this purpose; and (b) will exceed 15 metres in height— <p>but excluding attachments to existing buildings and masts</p> <p>g. Northern Cape</p> <ul style="list-style-type: none"> i. In an estuary; ii. Outside urban areas: <ul style="list-style-type: none"> (aa) A protected area identified in terms of NEMPAA, excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (see Table 7) (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (see Fig 1) | <p>Outcome:</p> <p>LN 3 (3) <u>does not apply</u> since the total pole height is 9 m, buried 1.5 m deep, with a resultant above-ground height of 7.5 m</p> |

| Listed Activity | Comment |
|--|---|
| <p>(ff) Core areas in biosphere reserves;</p> <p>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; <i>(see Table 7)</i>, or</p> <p>(hh) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or</p> <p>iii. Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space; or</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.</p> <p>i. Western Cape</p> <p>i. All areas outside urban areas;</p> <p>ii. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority, or zoned for a conservation purpose, within urban areas; or</p> <p>iii. Areas zoned for use as public open space or equivalent zoning within urban areas.</p> | |
| <p>LN 3 Activity 12</p> <p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>g. Northern Cape</p> <p>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>ii. Within critical biodiversity areas identified in bioregional plans; <i>(see Figure 7)</i></p> <p>iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on even in urban areas; or</p> | <p>Outcome:</p> <p>LN 3 (12) <u>does apply</u> since the total construction footprint of the of the proposed fibre optic cable within CBAs in the Northern Cape (37 803 m²) and Western Cape (19 9814 m²) Provinces exceed the 300 m² clearance threshold.</p> <p>Environmental Assessment procedure required: Basic Assessment.</p> |

| Listed Activity | Comment |
|--|---------|
| <p>iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.</p> <p>i. Western Cape</p> <p>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>ii. Within critical biodiversity areas identified in bioregional plans; (see Figure 7)</p> <p>iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on erven in urban areas;</p> <p>iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning; or</p> <p>v. On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed.</p> | |

Outcome

The proposed SKA fibre optic cable between Beaufort West and Carnarvon triggers Listing Notice 3, Activity 12 of the NEMA EIA Regulations due to the construction phase cumulative footprint in CBAs (refer to Table 5). Resultantly, a BA process will have to be undertaken to obtain EA.

4.3 Water Use License

The following activities require a Water Use Licence (WUL), in terms of Section 21 of the National Water Act:

21.

For the purposes of this Act, water use includes—

- a) taking water from a water resource;
- b) storing water;
- c) **impeding or diverting the flow of water in a watercourse;**
- d) engaging in a stream flow reduction activity contemplated in section 36;
- e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- g) disposing of waste in a manner which may detrimentally impact on a water resource;
- h) disposing in any manner of water which contains waste from, or which has been heated in any industrial or power generation process;
- i) **altering the bed, banks, course or characteristics of a watercourse;**
- j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- k) using water for recreational purposes.

Yellow highlights indicate potentially relevant "water uses".

Outcome

The activities associated with the proposed SKA fibre optic cable installation between Beaufort West and Carnarvon are considered section 21(c) and (i) water uses in terms of the NWA and as such will require an application for water use authorisation.

The proposed project will most probably qualify for an application for a General Authorisation (GA) in terms of section 6(2) of GNR 509 of 2016 stating that "All State Owned Companies (SOCs) and other institutions specified in Appendix D2 of the Notice, having lawful access to that property or land, may on that property use water in terms of section 21(c) or (i) of the NWA under each of the relevant SOCs and other institutions"; however, due to the nature of the activities (i.e. river/stream and wetland crossings) the GA in terms of section 3(b) of the Notice may not apply to the use of water in terms of section 21(c) or (i) of the NWA within the regulated area of a watercourse (i.e. 500 m) where the Risk Class is Medium or High as determined by the Risk Matrix. This means a Risk Matrix, as prescribed in Appendix A of the Notice, is to be compiled to ascertain whether the Risk Class is Low and a GA is applicable, or if an application for a Water Use License (WUL) will be required should the Risk Class be confirmed as Medium or High. Depending on the outcome of the Risk matrix, an application for a GA or a WUL will be required to obtain water use authorisation. The Risk Matrix can be undertaken as part of the BA process.

4.4 Heritage Impact Assessment and approval

The NHA under Section 38 states:

38.

(1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as—

- a) the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length;
- b) the construction of a bridge or similar structure exceeding 50 m in length;
- c) any development or other activity which will change the character of a site—
 - (i) exceeding 5 000 m² in extent; or
 - (ii) involving three or more existing erven or subdivisions thereof; or
 - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
 - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority;
- d) the re-zoning of a site exceeding 10 000 m² in extent; or
- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority,

must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

(2) The responsible heritage resources authority must, within 14 days of receipt of a notification in terms of subsection (1)—

- a) if there is reason to believe that heritage resources will be affected by such development, notify the person who intends to undertake the development to submit an impact assessment report. Such report must be compiled at the cost of the person proposing the development, by a person or persons approved by the responsible heritage resources authority with relevant qualifications and experience and professional standing in heritage resources management; or
- b) notify the person concerned that this section does not apply.

Yellow highlights indicate potentially relevant activities requiring HIA / approval.

Outcome

The activities associated with the proposed SKA fibre optic cable between Beaufort West and Carnarvon is categorised as a Section 38(1)(a) development type in terms of the NHA. This requires an HIA (which can be conducted as part of the BA) and comment / approval from the SAHRA.

5. Conclusion and recommendations

5.1 Environmental Authorisation

The cumulative construction footprint of the proposed SKA fibre optic cable in CBA's triggers Listing Notice 3, Activity 12, which stipulates the requirement for a BA process to obtain EA in terms of the NEMA EIA Regulations. Since the proposed cable route spans two provinces, the National Department of Environmental Affairs, Forestry and Fisheries are the Competent Authority for the EA Application.

The following specialist assessments are recommended as part of the BA:

- Heritage (see Section 5.3)
- Palaeontology (desktop)
- Aquatic ecology and hydrology
- Terrestrial ecology (incl. fauna and flora species)

The applicability and relevance of following specialist studies, outlined as requirements in the Screening Tool Report⁸ (Appendix A, pg 13-14), need to be considered and determined:

- Landscape / Visual; and
- Socio-economic.

The BA process (incl. specialist assessments) culminates in the development of an EMPr. Based on the results on the ESS, the EMPr should focus on and address, *inter alia*, the following aspects:

- Management of dug trenches during construction to minimise the entrapment of animals;
- Timing of construction activities to avoid the breeding season of specifically the Riverine Rabbit, which is generally August to May;
- Ensuring that the burrows and / or nests of fauna and avifauna that may be present within the road reserve are not adversely affected during construction;
- Runoff and erosion control; and
- Invasive alien plant control.

⁸ The use of the National Screening Tool (<https://screening.environment.gov.za/>) is mandatory for planning development that require EA, and the Report generated by the Tool must be submitted together with an EA application. The Screening Tool specifies which specialist studies must be undertaken in the EIA, and provides protocols that guide the manner in which the specialist assessments must be undertaken. It is the responsibility of the Environmental Assessment Practitioner undertaking the EIA to confirm identified specialist assessment and to motivate in the assessment report, the reason for not including any of the identified specialist studies.

5.2 Water Use License

Due to the proposed SKA fibre optic cable having to cross rivers and wetlands, an application for water use authorisation is required in terms of section 21(c) and (i) of the NWA. In terms of section 6(2) of GNR 509 of 2016, the project most probably qualifies for GA; but first, a Risk Matrix must be compiled to determine the Risk Class associated with the intended water use activities. This can be conducted as part of the BA process. Should the Risk Class be confirmed as Low, the project will qualify for a GA; but should the Risk Class be confirmed as Medium or High, an application for a Water Use License will be required.

5.3 Heritage Impact Assessment and approval

A HIA (desktop palaeontology study) is required in terms of the NHA. The HIA and consultation with SAHRA for comment / approval must be conducted as part of the BA process.

6. References

- BirdLife International 2016. *Aquila verreauxii*. The IUCN Red List of Threatened Species 2016: e.T22696067A95221980. [<https://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T22696067A95221980.en>]. Downloaded on 16 April 2020.
- BirdLife International 2017. *Circus maurus*. The IUCN Red List of Threatened Species 2017: e.T22695379A118433168. [<https://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T22695379A118433168.en>]. Downloaded on 16 April 2020.
- Cape Nature. 2017. Western Cape Biodiversity Spatial Plan. Spatial data. Available at [<https://bgis.sanbi.org/Projects/Detail/194>].
- Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The 2016 Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa. Available at [https://www.ewt.org.za/wp-content/uploads/2019/02/27.-Mountain-Reedbuck-Redunca-fulvorufula_EN.pdf].
- Collins, K., Bragg, C. & Birss, C. 2019. *Bunolagus monticularis*. The IUCN Red List of Threatened Species 2019: e.T3326A45176532. [<https://dx.doi.org/10.2305/IUCN.UK.2019-1.RLTS.T3326A45176532.en>]. Downloaded on 16 April 2020.
- CSIR (Council for Scientific and Industrial Research). 2016. Strategic Environmental Assessment for the South African mid-frequency array of SKA Phase 1. CSIR Report Number: CSIR/02100/EMS/ER/2016/15240/B. Available at [<https://egis.environment.gov.za/SKAphase1>].
- CSIR. 2019. Technical Requirements -SARAO Underground Fibre Installation Technical Requirements: Beaufort West to Carnarvon (180km) Link. RFP No. 3259/08/02/2019.
- DENC (Department of Nature Conservation). 2016. Northern Cape Critical Biodiversity Areas. Spatial data. Available at [<https://bgis.sanbi.org/Projects/Detail/203>].
- Driver, A., Nel, J.L., Snaddon, K., Murray, K., Roux, D.J., Hill, L., Swartz, E.R., Manuel, J. & Funke, N. 2011. Implementation Manual for Freshwater Ecosystem Priority Areas. WRC Report. Final Draft. June 2011.
- Duthie, A.G. 1989. The ecology of the Riverine rabbit *Bunolagus monticularis*. MSc Thesis. University of Pretoria. Available at [<http://hdl.handle.net/2263/32387>].
- NRF SARAO (National Research Foundation, South African Radio Astronomy Observatory). 2018. Integrated Environmental Management Plan (IEMP) for SKA Phase 1 mid-frequency array (SKA1_MID) in South Africa. Version 2 - prepared by Gaea Enviro (Pty) Ltd. Available at [<https://egis.environment.gov.za/SKAphase1>].
- SAHRA (South African Heritage Resources Agency). 2018. Heritage resources database, All sites, End 2018.
- SAHRA. 2020. PalaeoSensitivity Map. [<https://sahris.sahra.org.za/map/palaeo>]. Accessed on 20 April 2020.
- SANBI (South African National Biodiversity Institute). 2018. National Biodiversity Assessment. Spatial Data. Available at [<https://bgis.sanbi.org/Projects/Detail/221>].
- Whitehouse, C.M. & Raimondo, D. 2007. *Cliffortia arborea* Marloth. National Assessment: Red List of South African Plants version 2017.1. [<http://redlist.sanbi.org/species.php?species=3455-11>]. Accessed on 17 April 2020.

7. Appendix A: DEA Screening Tool Report