

Basic Assessment Report

Basic Assessment for the proposed Square Kilometre Array (SKA) fibre optic cable between Beaufort West and Carnarvon

SUMMARY

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Applicant:
South African National Research Network

Prepared by:
CSIR Environmental Management Services

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Square Kilometre Array fibre optic cable between Beaufort West and Carnarvon.
Part A: Basic Assessment Report

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Applicant:	South African National Research Network (SANReN)
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Summary

Introduction

The Square Kilometre Array (SKA) will be the largest radio telescope ever built and will produce science that changes our understanding of the universe. The telescope is being constructed in Australia and in the Northern Cape province of South Africa.

A high-speed fibre optic internet connection is required between the SKA core site in the Northern Cape and an existing facility in Cape Town where the data is processed. Fibre optic infrastructure already exists between the SKA

core site and Carnarvon, and between Beaufort West and the existing data processing facility in Cape Town. To complete the SKA-Cape Town connection, a new fibre optic cable needs to be installed between Beaufort West and Carnarvon. The proposed route for the new fibre optic cable follows the R381 and R63 roads for a length of approximately 183 km in the Karoo Biome, from Beaufort West, via Loxton, to Carnarvon, and spans the Western Cape and Northern Cape Provinces (Figure i).

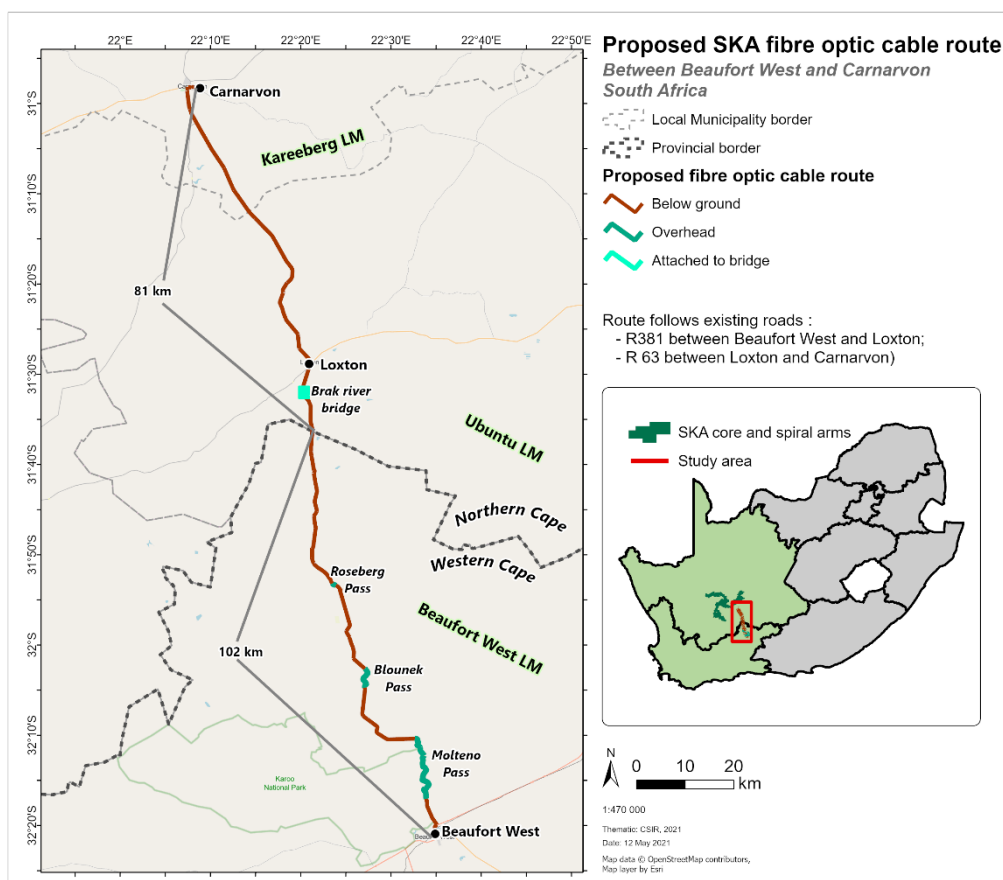
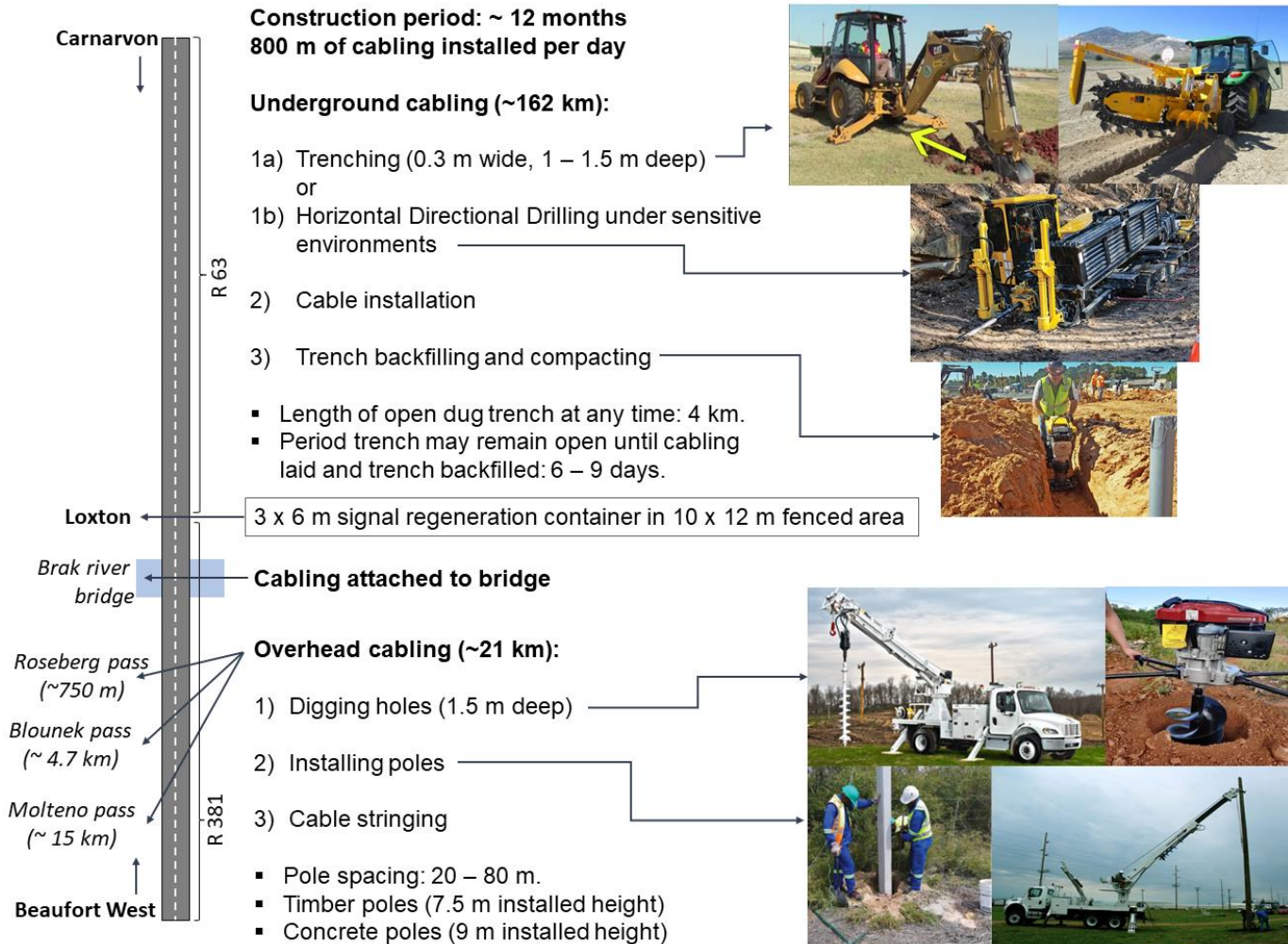


Figure i: The proposed SKA fibre optic cable route starts in Beaufort West, follows the existing R381 and R63 roads via Loxton and terminates in Carnarvon.

The South African National Research Network (SANReN) has been tasked by the South African Radio Astronomy Observatory (SARAO), who spearheads South Africa's activities in the SKA Radio Telescope, to facilitate the installation of the new fibre optic cable between Beaufort West and Carnarvon. The proposed Fibre Optic Project is a critical part of realising the global SKA mega-science project. The SKA will be an advanced radio

telescope linked to research infrastructure and high-speed Information and Communications Technology (ICT) capacity, and provides an opportunity for South Africa to contribute towards global science projects. Additionally, the SKA is a Strategic Integrated Project (SIP 16: SKA & MeerKAT) prioritised in the National Development Plan (NDP).

Project description



The proposed fibre optic cable installation will start in Beaufort West at the Transnet building (corner of 2nd Avenue and Kerk Street), via Loxton where a 3 m x 6 m container for regeneration of signal will be established in a 10 x 12 m fenced area, to Carnarvon where the cabling will terminate at the existing SKA internet Point of Presence site (just off Stasieweg Street). The total length of the proposed cable route is approximately 183 km.

The cabling will predominantly be installed underground, using a combination of trenching and Horizontal Directional Drilling (HDD). Where trenching is technically unfeasible the cable will be installed overhead on poles. At one river crossing – the Brak river south of Loxton – the cabling will be attached to the bridge (Figure ii). The majority of activities related to the proposed Fibre Optic Project will take place in the construction phase.

Figure ii: Schematic summary of the main activities to install the fibre optic cable between Beaufort West and Carnarvon.

The spatial extent of the proposed Fibre Optic Project, for which EA is being sought, is defined as follows:

- Underground sections: a 30 m corridor around the centre line of the roads (i.e. the road reserve) where the cabling will be installed underground.
- Overhead sections, outside of the road reserve: a 30 m corridor around the engineering Low Level Design (LLD) (latest

technically feasible engineering design at the time of writing this report).

It is proposed that the EA (if granted) applies to the entirety of the corridor. Within this corridor, the fine-scale routing of the fibre optic cable may be adjusted as required to avoid or compensate for any technical difficulties or environmental sensitivities identified in the field during construction.

Need for Environmental Authorisation

In terms of the National Environmental Management Act (NEMA) Environmental Impact Assessment (EIA) Regulations (2014, as amended, 2017), Environmental Authorisation (EA) is required for the proposed fibre optic cable installation through the undertaking of a Basic Assessment (BA) process. This requirement is triggered by the NEMA Listed Activities presented in Table i. Since the proposed fibre optic cable route traverses both the Western Cape and Northern Cape Provinces, the National Department of

Forestry, Fisheries and the Environment (DFFE)¹ has been identified as the Competent Authority in terms of Section 24C of the NEMA. The CSIR Environmental Management Services (EMS) group has been appointed to undertake the required BA Process and will serve as the Environmental Assessment Practitioner (EAP). Additionally, an external independent reviewer, SLR Consulting South Africa, has been appointed as the independent peer-review EAP.

Table i: Listed Activities (NEMA EIA Regulations, 2014, as amended) applicable to the proposed SKA fibre optic cable project and which require an Environmental Authorisation.

Listed Activity	Relevant project aspect
<p>Listing Notice 1 (GN R327), Activity 19</p> <p><i>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse</i></p>	<p>The proposed approach is to avoid sensitive areas, particularly watercourses, via HDD 2 m below the riverbed starting 32 m from the riverbanks. In some areas, dry watercourses may be trenched and backfilled, in accordance with measures identified and included in the Environmental Management Programme (EMPr).</p>
<p>Listing Notice 3 (GN R324), Activity 12</p> <p><i>The clearance of an area of 300 square metres or more of indigenous vegetation:</i></p> <p>(a) Northern Cape,</p> <p>(ii) within critical biodiversity areas identified in bioregional plans.</p> <p>(i) Western Cape,</p> <p>(ii) within critical biodiversity areas identified in bioregional plans.</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.</p> <p>(v) On land designated for protection or conservation purposes in an Environmental Management Framework adopted in the prescribed manner, or a Spatial</p>	<p>CBAs: Although the development is predominantly proposed within the road reserves of the R381 and R63, the total cumulative approximate construction footprint of the proposed fibre optic cable, within Critical Biodiversity Areas (CBAs) in the Northern Cape (37 803 m²) and Western Cape (19 814 m²) Provinces, exceeds the 300 m² clearance threshold.</p> <p>Land zoned as conservation or designated for conservation purposes: The Beaufort West SDF (2013, adopted 2017 for 2017-22) (BMLM, 2013; 2018) recognises the Karoo National Park, as well as the Sakriver, Brakriver, Kromriver and Wagenaarskraal conservancies between Beaufort West and Loxton (in the Northern Cape and Western Cape provinces). Within the Karoo National Park, the proposed fibre optic cable will be installed overhead on timber and concrete poles for a total</p>

¹ Previously Department of Environment, Forestry and Fisheries (DEFF) and Department of Environmental Affairs (DEA).

Listed Activity		Relevant project aspect
	<i>Development Framework adopted by the MEC or Minister.</i>	distance of approximately 4.7 km. The 'clearance' of vegetation for the holes within which the poles are planted, will be approximately 80 m ² , cumulatively. Within the Sakriver, Brakriver, Kromriver and Wagenaarskraal conservancies the fibre optic cable will be installed in the road reserve of the R381 road for a distance of approximately 62 km, which would result in cumulative clearance of vegetation in the road reserve of 18 600 m ² .

Need for water use authorisation

The fibre optic cable route entails multiple watercourse (rivers and associated wetlands) crossings in the Lower Orange Water Management (WMA) (156 km) and Gouritz WMA (27 km)². The watercourse crossings qualify as non-consumptive water uses in terms of Section 21 of the National Water Act (NWA) and necessitate the need for a Water Use

License (WUL) (Table ii). The watercourse crossings have been found to pose a low risk to the watercourses and thus qualifies for a water use General Authorisation (GA). This approach has been accepted by the Competent Authority – Regional Department Water and Sanitation (DWS) of the Lower Orange WMA² and GA has been issued.

Table ii: Water Uses (Section 21 of the NWA) applicable to the proposed SKA fibre optic cable project and which require a water use GA.

Water use		Relevant project aspect
Section 21 (c)	<i>Impeding or diverting the flow of water in a watercourse.</i>	The proposed approach is to avoid sensitive areas, particularly watercourses, via HDD 2 m below the riverbed starting 32 m from the riverbanks. In some areas, dry watercourses may be trenched and backfilled, thus constituting Section 21 (c) and (i) water uses.
Section 21 (i)	<i>Altering the bed, banks, course or characteristics of a watercourse.</i>	

SANParks approval

Part of the fibre optic cabling is proposed within the eastern section of the Karoo National Park next to the R381 road, specifically to traverse the difficult terrain associated with the Molteno Pass. In terms of the National Environmental Management: Protected Areas Act (NEM:PAA), prior written approval of the Park management

authority is required for any development, construction or farming in a national park, nature reserve or world heritage site. South African National Parks (SANParks) and the Karoo National Park management have approved the proposed Fibre Optic Protect in line with the NEM:PAA requirements.

Basic Assessment Process

A BA process in terms of the NEMA EIA Regulations, 2014, as amended, entails a detailed description of the project and an assessment of the potential impacts that the project may have on the environment. Furthermore, it also includes the development of an Environmental Management Programme

(EMPr) which outlines the environmental management practices that need to be implemented to avoid and minimise any potential damage to the environment, and to enhance any potential positive impacts that may arise for the proposed project. An Application for an EA is being lodged with the

² Since the majority of the proposed Fibre Optic Project is located within the Lower Orange Water Management (WMA) Area, the Regional Department Water and

Sanitation (DWS) of the Lower Orange WMA will act as Competent Authority for the entire water use General Authorisation (GA) application.

Competent Authority. The draft BA Report (BAR) was released to Interested and Affected Parties (I&APs), Stakeholders and Departments (including the Competent Authority) for a 30-day comment period as part of a Public Participation Process (PPP)

between 30 Aug – 30 Sept 2021. Thereafter, the final BAR was compiled taking relevant comments received into account, and was submitted to the Competent Authority (DFFE), who then decides on whether the EA may be issued for the proposed project.

Specialist assessments undertaken

The following specialist assessments were undertaken as part of the SKA fibre optic cable BA:

- 1) Terrestrial Ecology, Biodiversity and Species.
- 2) Aquatic Ecology, Biodiversity and Species, including a Risk Assessment in terms of the NWA to determine whether a water use GA applies.
- 3) Visual and Aesthetic Resources for the proposed overhead cabling sections (Molteno, Blounek and Rosenberg passes).
- 4) Heritage, Archaeology and Palaeontology (Heritage Impact Assessment (HIA)) as required in terms of Section 38(8) of the National Heritage Resources Act (NHRA).

Environmental sensitivity

Even though the fibre optic cable is predominantly proposed within the road reserves of the R381 and R63 roads, several sensitive environmental features were identified (Table iii).

Table iii: Summary of the main sensitive environmental features within the SKA fibre optic study area.

Specialist assessment	Main environmental sensitivity
<ul style="list-style-type: none"> ▪ Terrestrial Ecology, Biodiversity and Species. 	<ul style="list-style-type: none"> ▪ Riverine rabbit habitat; ▪ Rocky areas and outcrops where Species of Conservation Concern (SCC) may occur.
<ul style="list-style-type: none"> ▪ Aquatic Ecology, Biodiversity and Species. 	<ul style="list-style-type: none"> ▪ Valley-bottom wetlands; ▪ Riverine systems, with or without riparian vegetation or that formed part of an alluvial system.
<ul style="list-style-type: none"> ▪ Visual Impact Assessment. 	<ul style="list-style-type: none"> ▪ Topographic and geological features (ridges, peaks, scarps, rocky outcrops); ▪ Scenic water features (rivers, large dams); ▪ National Parks (Karoo National Park); ▪ Scenic passes and poorts (along the R381 road).
<ul style="list-style-type: none"> ▪ Heritage, Archaeology and Palaeontology. 	<ul style="list-style-type: none"> ▪ None (All recorded heritage features (archaeology and palaeontology) non-graded, Not Conservation Worthy and grade IIIC).

Impact assessment

The impacts of the underground fibre optic cable sections are expected to be most pronounced on aspects of terrestrial ecology, aquatic ecology, and heritage features since the cumulative disturbance footprint of the dug trenches in which the cabling is installed will be approximately 11 ha. However, the road reserves are previously disturbed due to road construction and maintenance. Additionally, the dug trenches will be backfilled after the cabling

has been installed, allowing vegetation to re-establish. The significance of impacts associated with the underground cabling is expected to be **Very Low, after mitigation** (Table iv). The key mitigation measures include taking care in areas flagged as potentially sensitive (terrestrial ecology and aquatic ecology), and implementing Alien and Invasive Species management, erosion control, and chance fossil / heritage feature finds protocols.

Table iv: Construction phase impact assessment summary.

Construction phase		Impact significance	
Theme	Impact	Pre-mitigation	Post-mitigation
Terrestrial ecology, biodiversity and species	Clearance of natural vegetation and resultant loss of faunal habitat.	Low	Low
	Loss of threatened, protected and endemic plants / animals.	Low	Low
	Faunal mortalities due to construction, trench digging and increased traffic.	Low	Low
	Increased dust generation and deposition.	Very low	Very low
	Increased human activity and noise levels.	Very low	Very low
	Establishment and spread of alien invasive vegetation.	Low	Very low
	Increased erosion and water runoff.	Low	Very low
Aquatic ecology, biodiversity and species	Clearance of vegetation within wetland crossings.	Low	Very low
	Clearance of vegetation within riverine (with riparian and or alluvial systems) crossings.	Low	Very low
	Loss of aquatic SCCs.	Low	Very low
	Compromised localised surface water quality through spills and leaks from construction vehicles and equipment.	Low	Very low
	Erosion and sedimentation.	Low	Very low
Heritage, archaeology & palaeontology	Damage to or destruction of significant heritage resources.	Very low	Very low
Visual, aesthetic and scenic resources	Visual effect of spoil heaps from underground cable trenches, dust and noise.	Very low	Very low

In some sections, i.e. the Molteno, Blounek and Rosenberg passes, the cabling is proposed **overhead** on timber and concrete poles. The overhead sections will have minimal impact on aspects of terrestrial ecology, aquatic ecology, and heritage features since the physical permanent disturbance footprint is limited to the dug holes (**Very Low, after mitigation**) (Table v). However, the overhead sections will result in

impact to visual, aesthetic and scenic resources. The options to mitigate the visual impacts are constrained by the practical and technical feasibility of installing the cabling in the difficult terrain associated with these sections. As such, the impact of greatest significance for the overhead cabling sections is to visual, aesthetic and scenic resources (**Moderate, after mitigation**) (Table v).

Table v: Operations and maintenance phase impact assessment summary.

Operations and maintenance phase		Impact significance	
Theme	Impact	Pre-mitigation	Post-mitigation
Terrestrial ecology, biodiversity and species	Faunal mortalities.	Low	Very low
	Establishment and spread of alien invasive vegetation.	Low	Very low
Aquatic ecology, biodiversity and species	Creation of hard surfaces, resulting in runoff, erosion and sedimentation.	Low	Very low
Visual, aesthetic and scenic resources	Visual intrusion of overhead cables in the landscape, and visual clutter of poles where cable is routed close to the road.	Moderate	Moderate

In the event that the proposed cabling ever needs to be decommissioned, it should be possible to restore the areas to pre-construction condition, if the overhead cabling is dismantled and removed as per the EMP requirements.

Table vi: Decommissioning phase impact assessment summary.

Decommissioning phase		Impact significance	
Theme	Impact	Pre-mitigation	Post-mitigation
Terrestrial ecology, biodiversity and species	Clearance of natural vegetation.	Very low	Very low
	Faunal mortalities.	Low	Very low
	Establishment and spread of alien invasive vegetation.	Very low	Very low
Aquatic ecology, biodiversity and species	Clearance of vegetation within wetland crossings.	Low	Very low
	Clearance of vegetation within riverine (with riparian and or alluvial systems) crossings.	Low	Very low
	Loss of SCCs.	Low	Very low
	Compromised localised surface water quality through spills and leaks.	Low	Very low
	Erosion and sedimentation of watercourses.	Low	Very low
Visual, aesthetic and scenic resources	Visual impact of abandoned poles and overhead cabling.	Moderate	Very low

Cumulative impacts are broadly considered for other proposed developments triggering the same listed activities, and that are leading / may lead to landscape transformation within the study area. The study area, especially in the Gamka Karoo vegetation type around Beaufort West, is vulnerable to vegetation loss due to potential renewable energy, minerals and hydrocarbons exploration and exploitation and urban expansion (**High, after mitigation**) (Table vii). It must be noted that only

approximately 9.5 km (~ 5 %) of the fibre optic cabling is proposed in the Gamka Karoo vegetation type. Furthermore, due to the very limited anticipated change caused by the proposed Fibre Optic Project relative to the footprint of other proposed developments, and it predominantly being proposed within previously disturbed road reserves, its contribution to the cumulative impacts of the greater region is **Very low (after mitigation)** to negligible.

Table vii: Cumulative impact assessment summary.

Cumulative impacts		Impact significance	
Theme	Impact	Pre-mitigation	Post-mitigation
Terrestrial ecology, biodiversity and species	Vegetation loss and habitat destruction due to main developments in the Gamka Karoo* (e.g. renewable energy, minerals and hydrocarbons exploration and exploitation and urban expansion).	Low	Very low
	Loss of SCCs due to all developments in the Gamka Karoo* .	Low	Low
	Compromised integrity of CBAs, Ecological Support Areas (ESAs) and National Protected Areas Expansion Strategy (NPAES) focus areas due to all developments in the Gamka Karoo* .	Low	Low
	Increased erosion and water runoff due to all developments in the Gamka Karoo* .	Low	Low
	Vegetation loss and habitat destruction due to main developments in the Gamka Karoo* (e.g. renewable energy, minerals and hydrocarbons exploration and exploitation and urban expansion).	Low	Very low

Cumulative impacts		Impact significance	
Theme	Impact	Pre-mitigation	Post-mitigation
Aquatic ecology, biodiversity and species	Disturbance to watercourse flow regimes and aquatic habitats.	Low	Very low
Heritage, archaeology & palaeontology	Disturbance to or destruction of heritage resources.	Very low	Very low
Visual, aesthetic and scenic resources	Cumulative visual impacts during the construction phase.	Very low	Very low
	Cumulative visual impacts during the operations and maintenance phase.	Moderate	Moderate
	Cumulative visual impacts during the decommissioning phase.	Moderate	Very low

* Approximately 9.5 km (~ 5 %) of the fibre optic cabling is proposed in the Gamka Karoo vegetation type.

Environmental Impact Statement

Taking into consideration the findings of this BA process, as well as the nature and importance of the proposed Fibre Optic Project, it is the opinion of the EAP that the proposed project is not expected to result in unacceptable negative environmental impacts. Provided that the specified mitigation and management measures are effectively implemented and monitored, and approval in terms of Section 50(5) of the National Environmental Management: Protected Areas Act (No. 57 of 2003) is received by SANParks (Karoo National Park), it is recommended that the project can receive:

1. EA in terms of the EIA Regulations promulgated under the NEMA.
2. GA in terms of the in terms the NWA for non-consumptive water uses.

Document access:

The final BAR and EMPr, including other supporting documentation, can be accessed online at <https://www.csir.co.za/square-kilometre-array-ska-fibre-optic-cable-between-beaufort-west-and-carnarvon>