

HERITAGE IMPACT ASSESSMENT

In terms of Section 38(8) of the NHRA for the

Proposed Square Kilometre Array (SKA) fibre optic cable between Beaufort West and Carnarvon, Northern and Western Cape

Final Report

HWC Ref: 20100206

SAHRIS Case ID: 15577

Prepared by CTS Heritage



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For

CSIR

October 2020

Finalised August 2021



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EXECUTIVE SUMMARY

1. Site Name:

Square Kilometer Array (SKA) fibre optic line between Beaufort West (Western Cape) and Carnarvon (Northern Cape)

2. Location:

Predominantly following the road reserves of roads R381 and R63, and 1 m from the fence of the private land between Beaufort West in the Western Cape and Carnarvon in the Northern Cape. Some areas characterised complex / difficult terrain will be traversed by overhead fibre optic lines which may be located outside the road reserve.

3. Locality Plan:

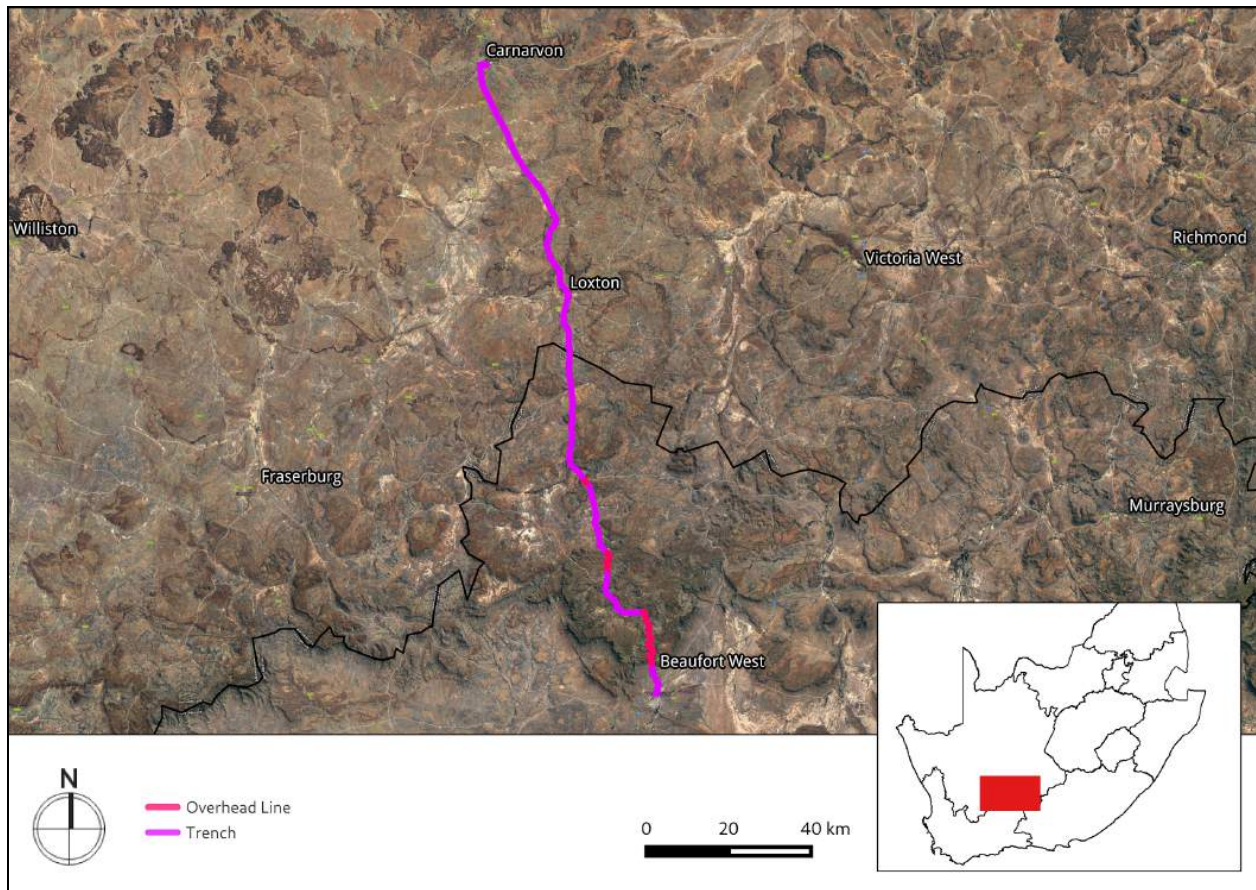


Figure 1: Location of the proposed fibre optic cable development area

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4. Description of Proposed Development:

The South African Radio Astronomy Observatory (SARAO) spearheads South Africa's activities in the SKA Radio Telescope through engineering, science and construction. 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, the South African National Research Network (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.

5. Heritage Resources Identified:

Observations noted during the field assessments for archaeology and palaeontology

Site No.	Site Name	Description	Co-ordinates		Grading	Province	Mitigation
BTC01	SKA Fibre_01	Bridge (dated: 1970)	-32.28339	22.56525	NA	Western Cape	None Required
BTC02	SKA Fibre_02	Anniversary Monument/Dedication (dated: 3 August 2014)	-32.25241	22.56853	NA	Western Cape	Not to be disturbed - 10m buffer recommended
BTC03	SKA Fibre_03	Possible MSA chert artefact	-32.17230	22.48989	NCW	Western Cape	None Required
BTC04	SKA Fibre_04	Loxton Leiwater System	-31.47537	22.34922	IIIC	Northern Cape	No impact anticipated
BTC05	SKA Fibre_05	Loxton Leiwater System	-31.47604	22.35136	IIIC	Northern Cape	No impact anticipated
BTC06	SKA Fibre_06	Loxton Leiwater System	-31.47761	22.35630	IIIC	Northern Cape	No impact anticipated
BTC07	SKA Fibre_07	Bridge (dated: 1958)	-31.34858	22.30103	IIIC	Northern Cape	No impact anticipated
BTC08	SKA Fibre_08	Sandstone outcrop	-31.22497	22.26206	NA	Northern Cape	None Required
BTC09	SKA Fibre_09	Trace fossils from the Abrahamskraal Formation located On top of road cutting on the western side of the road.	-32.3043	22.5698	IIIC	Western Cape	None Required
BTC10	SKA Fibre_10	Mudflakes in sandstone "mud flake conglomerate" from the Abrahamskraal Formation. Not <i>in situ</i> .	-32.2906	22.5666	NCW	Western Cape	None Required

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6. Anticipated Impacts on Heritage Resources:

The proposed development will not have a negative impact on the heritage resources situated within the footprint of the proposed fibre optic line between Beaufort West and Carnarvon. The lithic material identified is of low significance, and even though the resources may be destroyed during the construction, the impact is inconsequential.

The heritage resources identified are largely located some distance from the proposed line (BTC02, BTC04, BTC05, BTC06, SAHRIS Site ID 32495) and will not be impacted by the proposed development or are not conservation-worthy (BTC01, BTC03 and BTC07). Due to the fact that some cultural remains along the roadside are likely covered in gravel from road grading/construction, the possibility exists that some artefacts may only be uncovered during the digging of the trenches for the proposed fiber line.

The proposed installation of the SKA fibre line may proceed. It is unlikely that this construction will have a great effect on significant palaeontological heritage. Although the area has a rich occurrence of multiple fossil assemblages, fossil finds are often isolated as individuals. Only one site was identified to contain some trace fossils (BTC09). This trace fossil has contextual significance only and no further mitigation measures are recommended.

The trench for the SKA fibre line will run along highly disturbed and fractured roadside material. This decreases the chance of finding fossils dramatically. As such, the overall sensitivity of the proposed fibre optic route to impacts to heritage resources is MEDIUM TO LOW, and LOW with mitigation.

7. Recommendations:

There is no objection to the proposed development on heritage grounds and the following is recommended:

- No mitigation is required prior to construction operations commencing.
- During the construction phase all excavations must be monitored for fossil remains by the responsible Environmental Control Officer (ECO) using the HWC Chance Fossil Finds Procedure. Should substantial fossil remains such as vertebrate bones and teeth, petrified wood, plant-rich fossil lenses or dense fossil burrow assemblages be exposed during construction, the responsible ECO should safeguard these, preferably in situ, and alert the South African Heritage Resources Authority (SAHRA) in the Northern Cape and HWC in the Western Cape so that appropriate action can be taken by a professional palaeontologist,



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- Should any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources be found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) in the Northern Cape and HWC (Colette Scheermeyer 021 483 5959) in the Western Cape must be alerted.
- If unmarked human burials are uncovered in the Northern Cape, the SAHRA Burial Grounds and Graves (BGG) Unit (Mimi Seetelo 012 320 8490), and in the Western Cape, HWC (Colette Scheermeyer 021 483 5959) must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist must be contracted as soon as possible to inspect the findings. A Phase 2 rescue excavation operation may be required subject to permits issued by SAHRA and/or HWC
- The above recommendations must be included in the Environmental Management Programme (EMPr) for the project

8. Author/s and Date:

Jenna Lavin

October 2020

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NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA) AND ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS, 2014 (AS AMENDED) - REQUIREMENTS FOR SPECIALIST REPORTS (APPENDIX 6)

Regulation GNR 326 of 4 December 2014, as amended 7 April 2017, Appendix 6	Section of Report
1. (1) A specialist report prepared in terms of these Regulations must contain- 1. details of- 1. the specialist who prepared the report; and 2. the expertise of that specialist to compile a specialist report including a curriculum vitae;	Page 7 Appendix 4
2. a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix 5
3. an indication of the scope of, and the purpose for which, the report was prepared;	Section 2.1
(cA) an indication of the quality and age of base data used for the specialist report;	Section 2.4
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 3 Section 5.1 and 5.2
4. the date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 2.2
5. a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 2.2
6. 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;	Section 4.1 and 5.4
7. an identification of any areas to be avoided, including buffers;	Section 5.1
8. 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;	Section 4.3
9. a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 2.3



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10. a description of the findings and potential implications of such findings on the impact of the proposed activity, (including identified alternatives on the environment) or activities;	Section 5.1 and 5.2
11. any mitigation measures for inclusion in the EMPr;	Section 8
12. any conditions for inclusion in the environmental authorisation;	Section 8
13. any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 8
14. a reasoned opinion- <ol style="list-style-type: none"> 1. (as to) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and 2. 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 9
15. a description of any consultation process that was undertaken during the course of preparing the specialist report;	Section 6
16. a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Appendix 8
17. any other information requested by the competent authority.	Included throughout report
2) Where a government notice <i>gazetted</i> 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.	Section 38(3) of the NHRA instructs the minimum requirements for an HIA. In addition, HWC has Guidelines for HIAs and SAHRA has Minimum Standards for AIAs and PIAs - all of which are complied with
General requirements for undertaking an initial site sensitivity verification where no specific assessment protocol has been identified (GN 320, 20 March 2020)	Section of Report
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	Section 3.2



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<p>based environmental screening tool (screening tool), where determined, must be confirmed by undertaking a site sensitivity verification.</p> <p>(1.1) The site sensitivity verification must be undertaken by an environmental assessment practitioner or a specialist.</p>	Appendix 4 and page 8
<p>(1.2) The site sensitivity verification must be undertaken through the use of:</p> <p>a) a desktop analysis, using satellite imagery;</p> <p>b) a preliminary on -site inspection; and</p> <p>c) any other available and relevant information</p>	Section 3.1 Section 4.1 Section 4.2
<p>(1.3) The outcome of the site sensitivity verification must be recorded in the form of a report that-</p> <p>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</p> <p>b) contains a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity; and</p> <p>c) is submitted together with the relevant assessment report prepared in accordance with the requirements of the Environmental Impact Assessment Regulations¹ (EIA Regulations).</p>	Section 4.2 Section 5

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Details of Specialist who prepared the HIA

This specialist assessment has been undertaken by **Jenna Lavin** of CTS Heritage. Jenna Lavin is registered with the Association of Professional Heritage Practitioners and with the Association of Southern African Professional Archaeologists. A curriculum vitae is included in Appendix A of this specialist assessment.

In addition, a signed specialist statement of independence is included in Appendix B of this specialist assessment.

Jenna Lavin, an archaeologist with an MSc in Archaeology and Palaeoenvironments, and currently completing an MPhil in Conservation Management, heads up the heritage division of the organisation, and has a wealth of experience in the heritage management sector. Jenna's previous position as the Assistant Director for Policy, Research and Planning at Heritage Western Cape has provided her with an in-depth understanding of national and international heritage legislation. Her 8 years of experience at various heritage authorities in South Africa means that she has dealt extensively with permitting, policy formulation, compliance and heritage management at national and provincial level and has also been heavily involved in rolling out training on SAHRIS to the Provincial Heritage Resources Authorities and local authorities.

Jenna is on the Executive Committee of the Association of Professional Heritage Practitioners (APHP), and is also an active member of the International Committee on Monuments and Sites (ICOMOS) as well as the International Committee on Archaeological Heritage Management (ICAHM). In addition, Jenna has been a member of the Association of Southern African Professional Archaeologists (ASAPA) since 2009. Recently, Jenna has been responsible for conducting training in how to write Wikipedia articles for the Africa Centre's WikiAfrica project.

Since 2016, Jenna has drafted over 50 Heritage Impact Assessments throughout South Africa.

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1. INTRODUCTION

1.1 Background Information on Project

The South African Radio Astronomy Observatory (SARAO) spearheads South Africa's activities in the Square Kilometer Array (SKA) Radio Telescope through 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, the South African National Research Network (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.

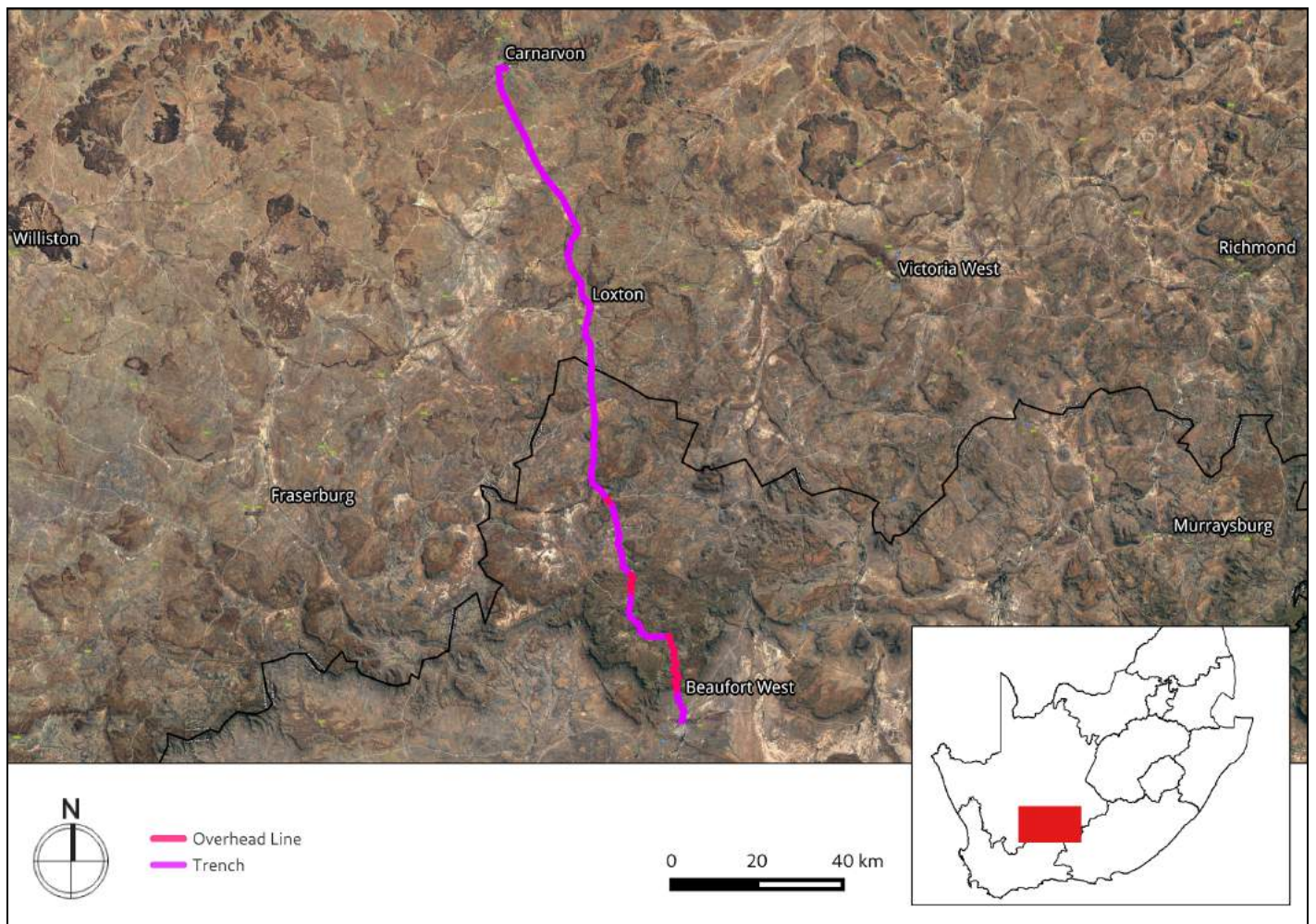
The details of the preferred and selected SKA fibre route (Route A) is as follows:

1. The fibre route starts from Beaufort West Transnet building, to a 3 m x 6 m signal repeater station at Loxton, and then on to the Carnarvon SKA Point of Presence (PoP) site (location where networking equipment may be accessed).
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 predominantly be installed within the road reserves of roads R381 and R63, 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. Here the proposed routing may deviate from the road reserve. The total pole length is 9 m, buried 1.5 m deep, with a resultant above-ground height of 7.5 m
5. There are several streams / rivers and associated wetlands to cross. Rivers will be crossed using directional drilling 2 m below the 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.



1.2 Description of Property and Affected Environment

The area proposed for development is located within a dry rural landscape. The topography of the Karoo region is mainly determined by the geology. The areas that were surveyed directly adjacent to the road (R381) were relatively flat. The land use in the study area is characterised by agriculture which is dominantly sheep and game farming. The soil surface in the surveyed area is very stony, consisting of thick dolerite or sandstone deposits with large boulders. The vegetation is typical of the Karoo Biome and includes knee high shrubs, grasses and Acacias.



Map 1a: The proposed development area for the SKA fibre optic cable connection between Beaufort West (Western Cape) and Carnarvon (Northern Cape)



2. APPROACH AND METHODOLOGY

2.1 Scope, Purpose and Objectives of this Specialist Report

The purpose of this Heritage Impact Assessment (HIA) is to satisfy the requirements of section 38(8), and therefore section 38(3) of the National Heritage Resources Act (Act 25 of 1999) and in so doing, identify and assess the significance of all heritage resources that may be impacted by the proposed development. As such, the area to be directly and indirectly impacted by the proposed development has been assessed herein. A NID was submitted to HWC in October 2020. In HWC's NID Response dated 27 October 2020, HWC required that an HIA be submitted that satisfies the requirements of section 38(3) and assesses impacts to archaeological and palaeontological heritage.

2.2 Summary of steps followed

- A Desktop Study was conducted of relevant reports previously written (please see the reference list for the age and nature of the reports used)
- Two archaeologists conducted an assessment of archaeological resources likely to be disturbed by the proposed development. The archaeologist conducted his site visit from 28 to 29 September 2020.
- A palaeontologist conducted an assessment of palaeontological resources likely to be disturbed by the proposed development. The palaeontologist conducted his site visit from 28 to 29 September 2020.
- The identified resources were assessed to evaluate their heritage significance
- An assessment of the potential impacts to heritage resources were conducted (see Appendix 6: Impact Assessment Methodology).
- Alternatives and mitigation options were discussed with the Environmental Assessment Practitioner

2.3 Assumptions and uncertainties

- The *significance* of the sites and artefacts is determined by means of their historical, social, aesthetic, technological and scientific value in relation to their uniqueness, condition of preservation and research potential. It must be kept in mind that the various aspects are not mutually exclusive, and that the evaluation of any site is done with reference to any number of these.
- It should be noted that archaeological and palaeontological deposits often occur below ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be



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halted, and it would be required that the heritage consultants are notified for an investigation and evaluation of the find(s) to take place.

However, despite this, sufficient time and expertise was allocated to provide an accurate assessment of the heritage sensitivity of the area.

2.4 Information Sources

List of main articles, maps, databases (spatial and non-spatial) and other literature on which this assessment is based.

Table 1: Information Sources

Data/Information	Source	Date	Type	Description
Previous heritage assessments	SAHRIS	28/08/2020	Spatial	Spatial delineation of HIAs completed in South Africa, updated daily
Known heritage resources	SAHRIS	28/08/2020	Spatial	Spatial delineation of known heritage resources in South Africa, updated daily
Palaeontological sensitivity	SAHRIS	28/08/2020	Reports and Spatial	Spatial delineation of areas sensitive for impacts to palaeontology (2013)
Geology	Council of GeoScience	Various	Spatial	CGS 3222 Beaufort West Map CGS 3122 Victoria West Map CGS 3022 Britstown Map

2.5 Constraints & Limitations

A portion of the area proposed for development was inaccessible as it was located along steep hillslopes. There were also a few narrow stretches of road where it was not possible to safely park and walk. As such, the field assessment focussed on areas that were accessible along the road.

The experience of the heritage practitioner, and observations made during the study, allow us to predict with some accuracy the archaeological sensitivity of the receiving environment.

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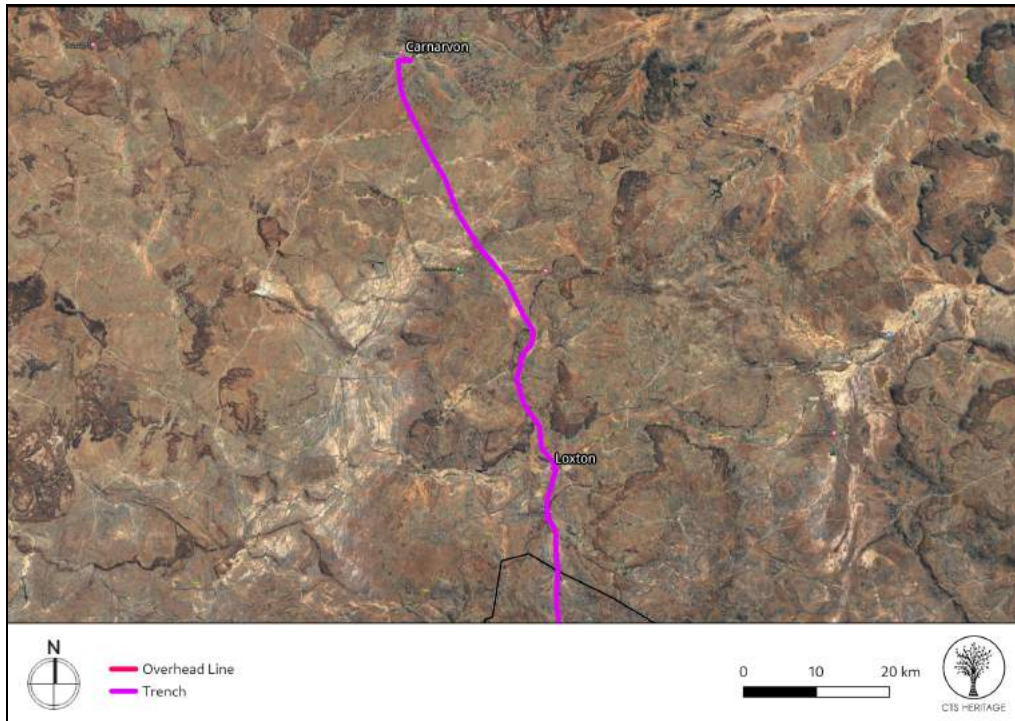


Figure 1.2: Area proposed for development including the proposed layout

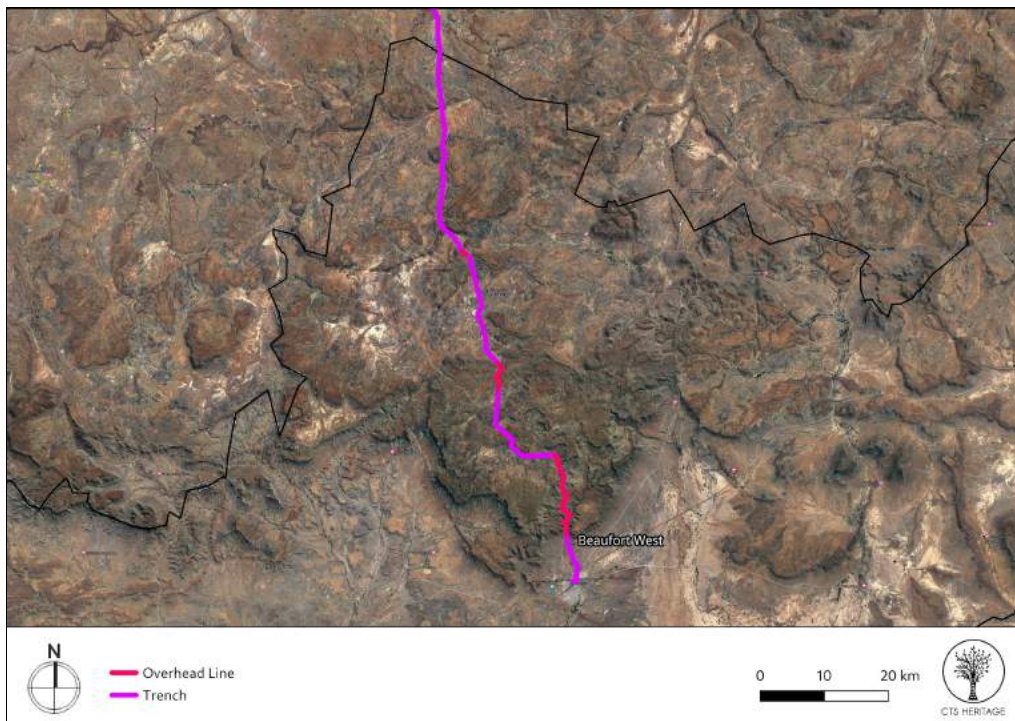


Figure 1.3: Area proposed for development including the proposed layout



2.6 Project Aspects relevant to heritage

This application is for the proposed installation of a fibre optic line from Carnarvon to Loxton in the Northern Cape, and from Loxton to Beaufort West in the Western Cape in order to connect the SKA to the internet for the purposes of sending and receiving data. The proposed fibre optic line will be allocated within the existing road reserve for the majority of the route and will supplement existing overhead lines where trenching is not possible. Based on the known heritage sensitivity of the area, the proposed trenching may negatively impact on significant archaeological and palaeontological heritage and as such, it is recommended that an HIA is required in order to assess the nature of these impacts and proposed methods for mitigating this impact.

3. HISTORY AND EVOLUTION OF THE SITE AND CONTEXT

3.1 Baseline Heritage Assessment

Carnarvon was established in 1853 on a route between Cape Town and Botswana that was followed by early explorers and traders. It was originally established as a mission station of the Rhenish Missionary Society and named Harmsfontein. Loxton's first church building and schoolhouse was built in 1900. Tree-lined streets and flood irrigation channels that run alongside the town's main roads were completed in the same year. The town became a municipality in 1905 as it developed to serve the region's sheep-farming community. The church that stands in the town's centre was constructed in 1924. Beaufort West was the first town to be established in the central Karoo. The town was founded in 1818 and became the first municipality in South Africa on 3 February 1837 and had the country's first town hall. When the railroad reached the town in 1880 it became a marshalling yard and locomotive depot and today it is the largest town in the Karoo. All of these towns have significant historic town centres with a unique sense of place. It is not anticipated that the proposed trenching for the SKA Fibre Line will negatively impact on any historic fabric or on this unique sense of place. However, care must be taken to ensure that historic features such as leiwater systems are not negatively impacted by the proposed trenches.

According to Tusenius (2012, SAHRIS NID 503050), "with the notable exception of the research done by Sampson in the Seacow Valley (1985), the rich archaeological heritage of the Karoo has not been systematically studied... Sites and scatters of Early, Middle and Late Stone Age (ESA, MSA and LSA) material have been recorded, as well as pastoralist occurrences, historical sites, rock paintings and engravings." According to a concise summary of the heritage of the area provided by Rossouw (2019, SAHRIS NID 521555), Rock engravings located to the southeast of Loxton, suggest the possibility that a giant long-horned buffalo (*Syncerus antiquus*), which became extinct more than 10 000 years ago, previously occurred in the area. Furthermore, "multiple rock engraving sites have been recorded in the region and are mainly attributed to San hunter-gatherers who inhabited the area and had



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done so for thousands of years while the pastoralist Khoekhoe had been present in the Karoo for at least 2 000 years. The historical footprint is largely represented by the vernacular architecture of the well-known corbelled houses in the region, which is related to 19th century trekboers who occupied these buildings, and whose cultural history dates back to their 18th century movement onto the VOC (“Verenigde Oostindische Compagnie” / United East India Company) Cape frontier that resulted in ongoing interaction with indigenous people in the Karoo.” As the proposed development is anticipated to be restricted to existing road reserve, it is not anticipated that the proposed development will have a negative impact on significant archaeological heritage. However, it is well established that ESA, MSA and LSA archaeological occurrences are prevalent throughout the broader Karoo landscape and these resources may be impacted by the proposed development.

Palaeontology

Based on the SAHRIS Palaeosensitivity Map (Figure 4a and 4b), most of the area proposed for development is underlain by sediments that have very high palaeontological sensitivity. According to geology maps from the Council for Geoscience (CGS), these sediments include the Poortjie Member and Hoedemaker Member of the Teekloof Formation, and the Abrahamskraal Formation of the Beaufort Group. According to Rossouw (2019, SAHRIS NID 521555), the study area is located within “early Permian Abrahamskraal Formation rocks of the Adelaide Subgroup (Karoo Supergroup) that is capped by severely degraded, superficial sheet wash and channel related (Quaternary) deposits bounded by Jurassic age dolerite intrusions to the north. The Loxton area lies within the outcrop area of the Tapinocephalus Assemblage Zone (AZ) which spans the middle part of the Abrahamskraal Formation. Vertebrate fossils of the Tapinocephalus AZ are not as common as in succeeding biozones and are usually found as individual specimens in the mudrock sequences in association with, and often enveloped by, brown-weathering calcareous nodular material. This faunal assemblage is mainly represented by small dicynodonts, large dinocephalians, pareiasaurs and pristerognathid therocephalians.” It is therefore likely that any excavation conducted within this palaeontologically sensitive area is likely to negatively impact on significant palaeontological heritage.

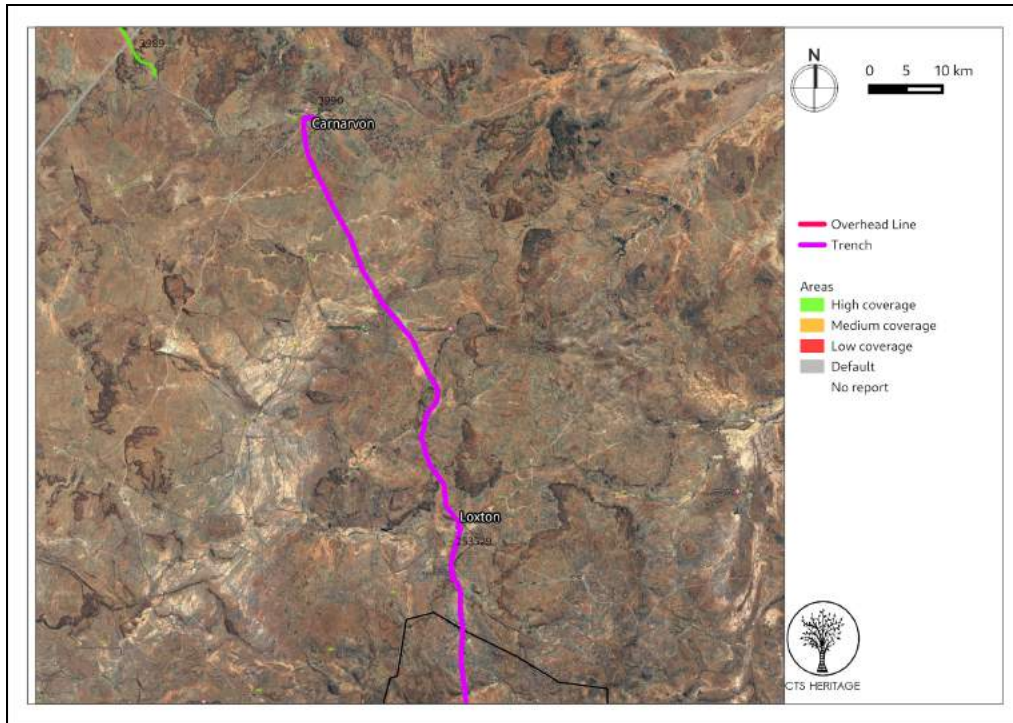
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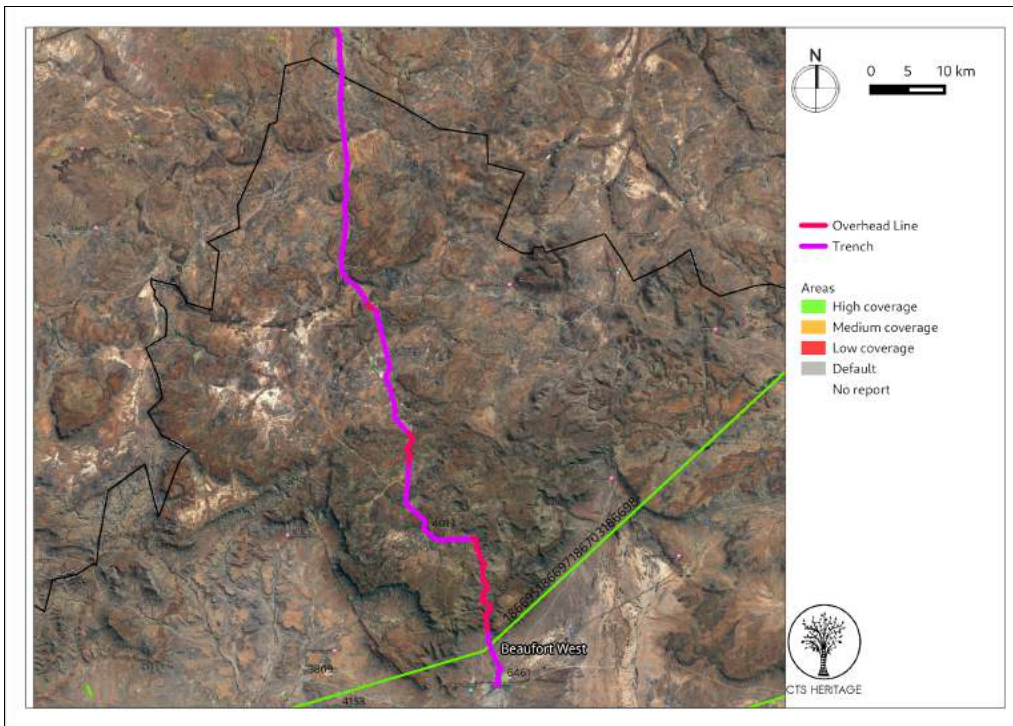
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Map 2.1: Spatial distribution of heritage assessments conducted in proximity to the proposed development in the Northern Cape

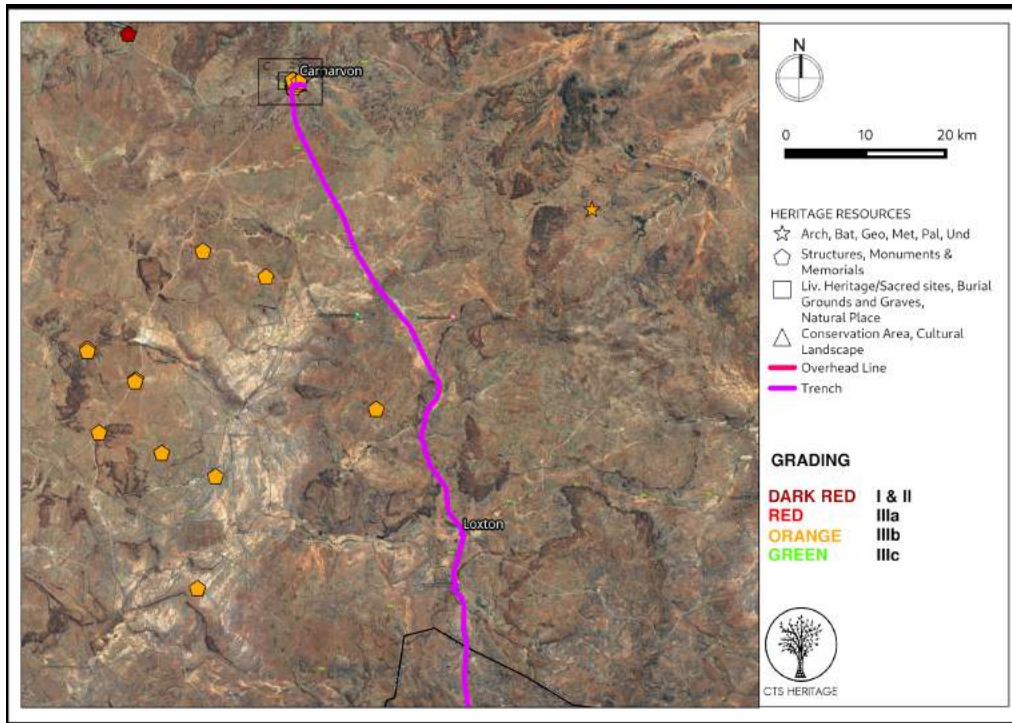


Map 2.2: Spatial distribution of heritage assessments conducted in proximity to the proposed development in the Western Cape

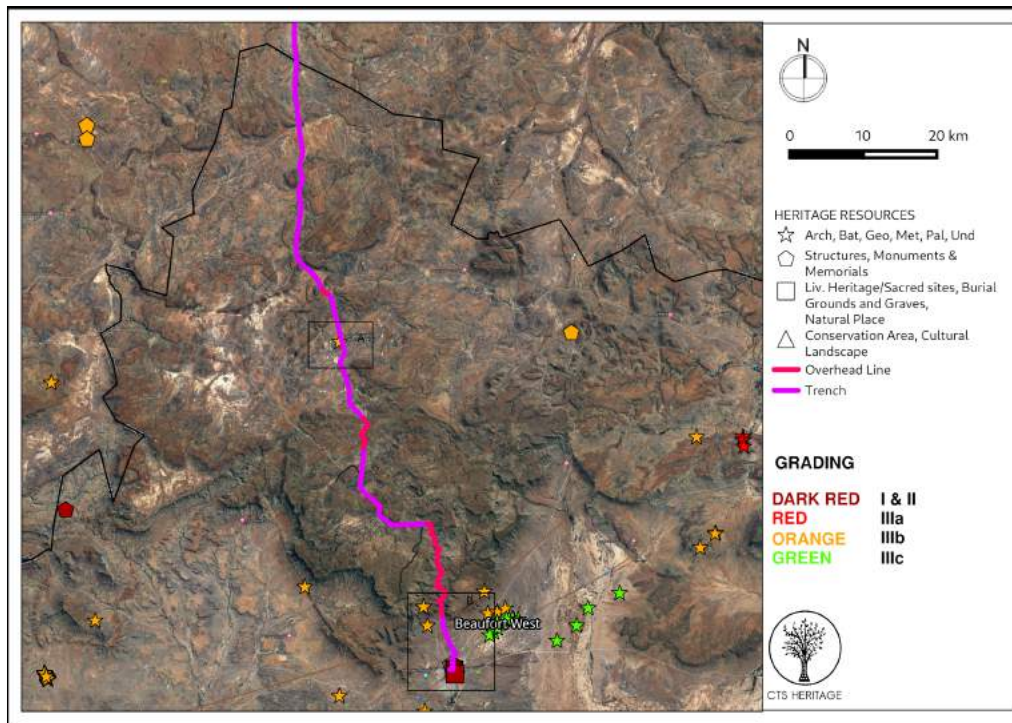
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Map 2.3: Spatial distribution of heritage resources known in proximity to the proposed development (see Appendices for insets)



Map 2.4: Spatial distribution of heritage resources known in proximity to the proposed development (see Appendices for insets)

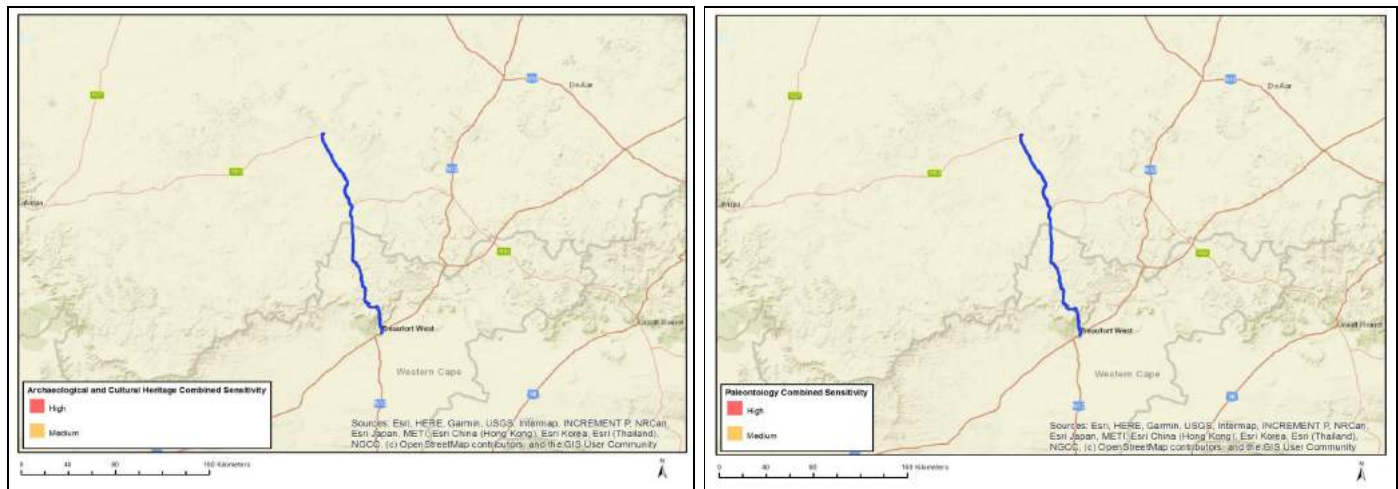


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3.2 Sensitivities identified by the National Web-Based Environmental Screening Tool

According to the Environmental Screening Study completed by the CSIR (2020:17), “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 3.1 and 3.2), which entails the requirement for a desktop palaeontology assessment and field investigation if necessary. One palaeontology find exists within proximity of road R381 between Beaufort West and Loxton (SAHRA, 2018).” Furthermore, the DEFF Screening Tool indicates that the area proposed for development has high - medium sensitivity for impacts to archaeological and cultural heritage, as well as palaeontological heritage. These sensitivities are verified and impacts are assessed in this report (see Appendix 6).

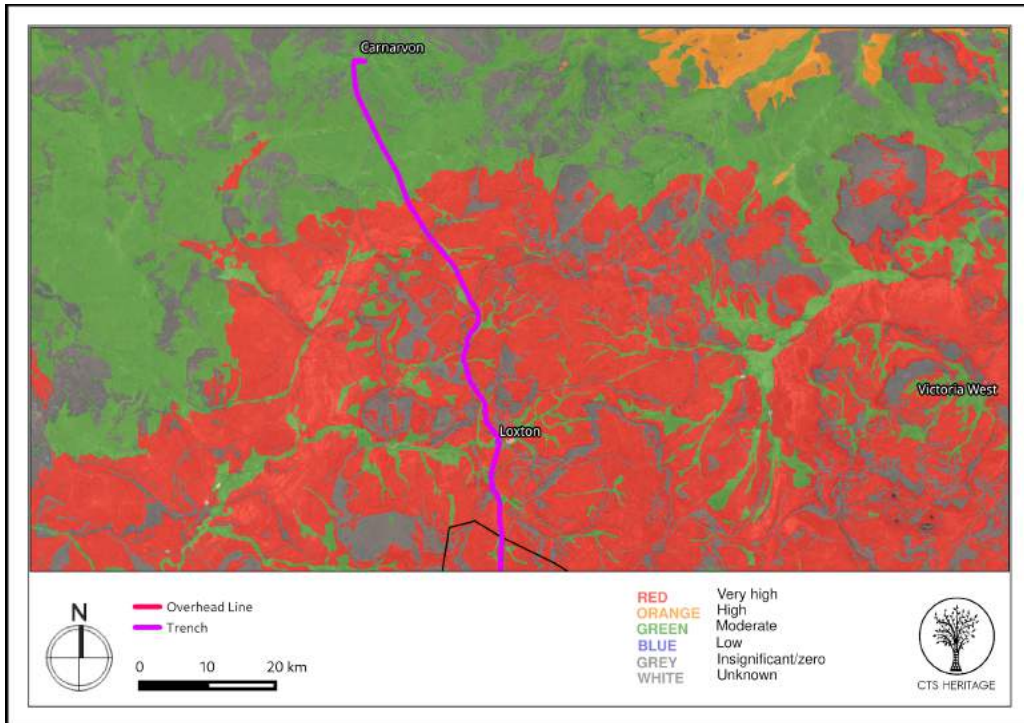
The sensitivity of the proposed development area with regard to likely impacts to significant heritage resources is LOW, mainly due to the nature of the project site, which is predominantly within areas previously disturbed by road construction (road reserve). Recorded heritage features have been graded in terms of their levels of cultural significance as per section 3 of the NHRA, and the guideline titled “Grading: Purpose and Management Implications” (2016). More detail regarding the cultural significance and related sensitivity of the heritage resources identified within the development area is included below in sections 4 and 5.



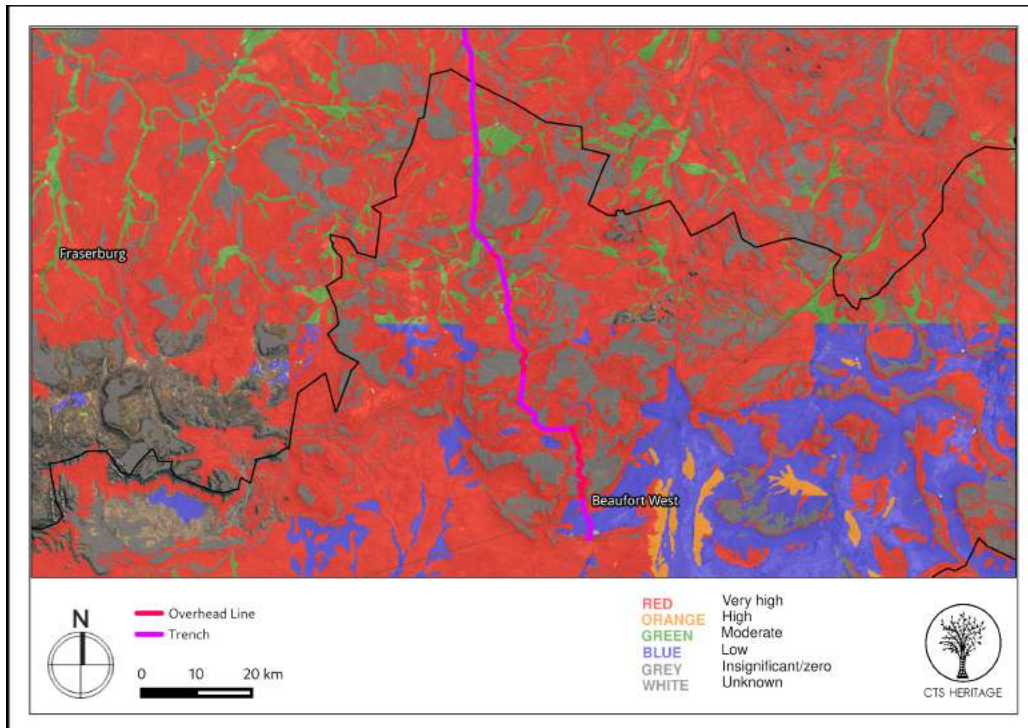
Map 2.5 and 2.6: Screening Tool sensitivity Maps for Archaeology and Cultural Heritage, and Palaeontology (due to the extent of the linear study area the sensitivities cannot be observed at the scale of the automatically generate Screening Tool maps)



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Map 3.1: Palaeontological sensitivity of the proposed development area in the Northern Cape



Map 3.2: Palaeontological sensitivity of the proposed development area in the Western Cape

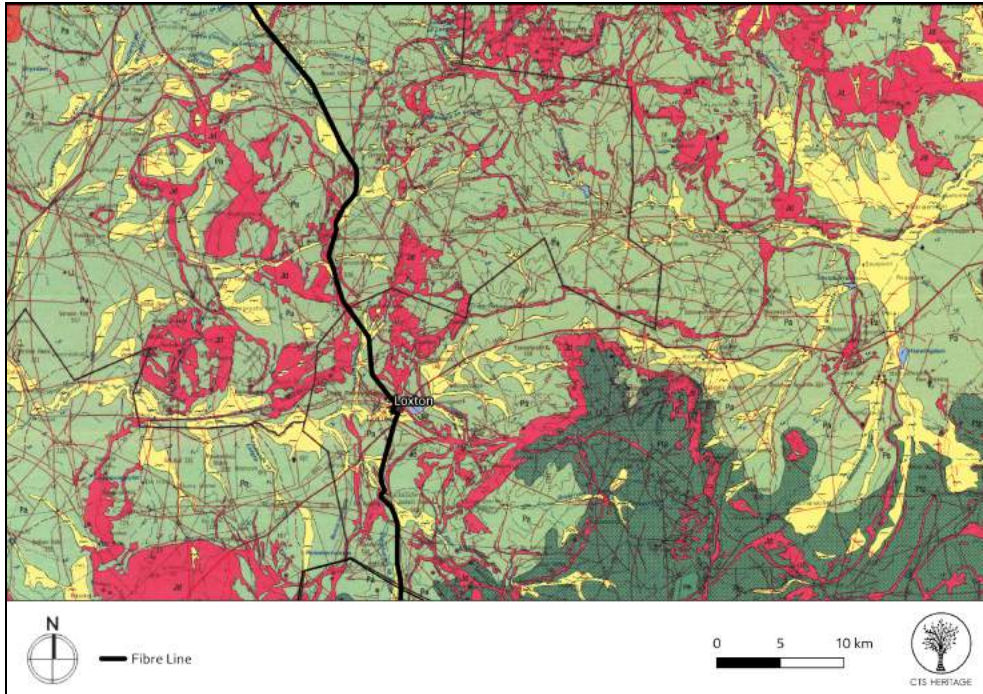


Figure 4.3: Extract from the CGS 3122 Victoria West Map indicating that the development area is underlain by Pa: Abramskraal Formation of the Beaufort Group, Pc: Carnavon Formation of the Eccca Group, Quaternary Sands and Jd: Jurassic Dolerite

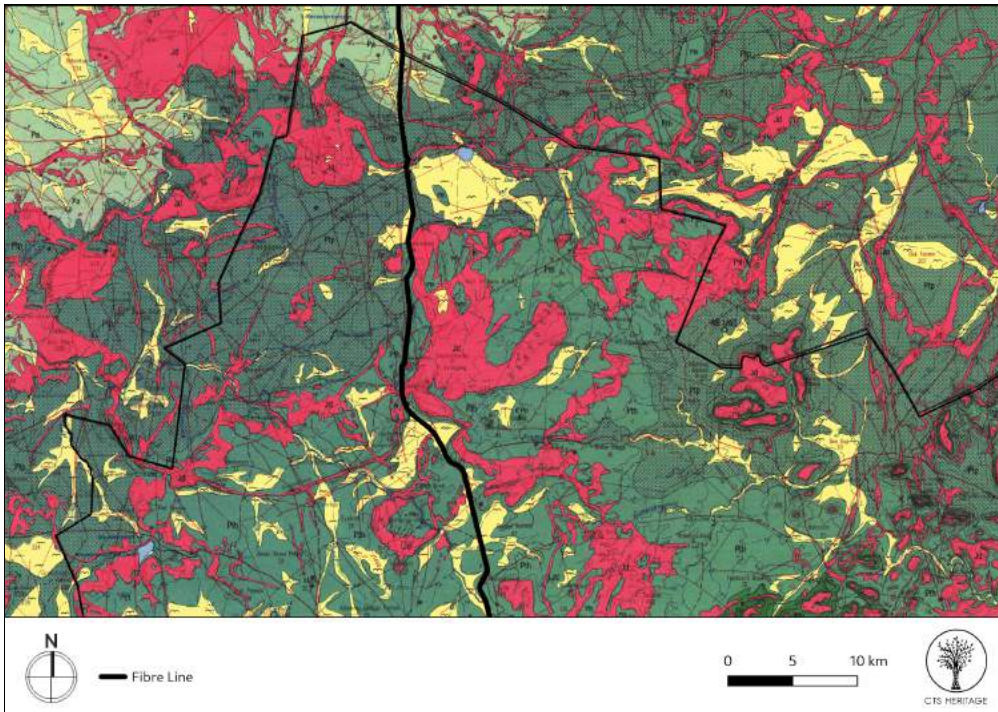


Figure 4.4: Extract from the CGS 3122 Victoria West Map indicating that the development area is underlain by Ptp: Poortjie Member and Pth: Hoedemaker Member of the Teekloof Formation, Pa: Abramskraal Formation of the Beaufort Group, Pc: Carnavon Formation of the Eccca Group, Quaternary Sands and Jd: Jurassic Dolerite



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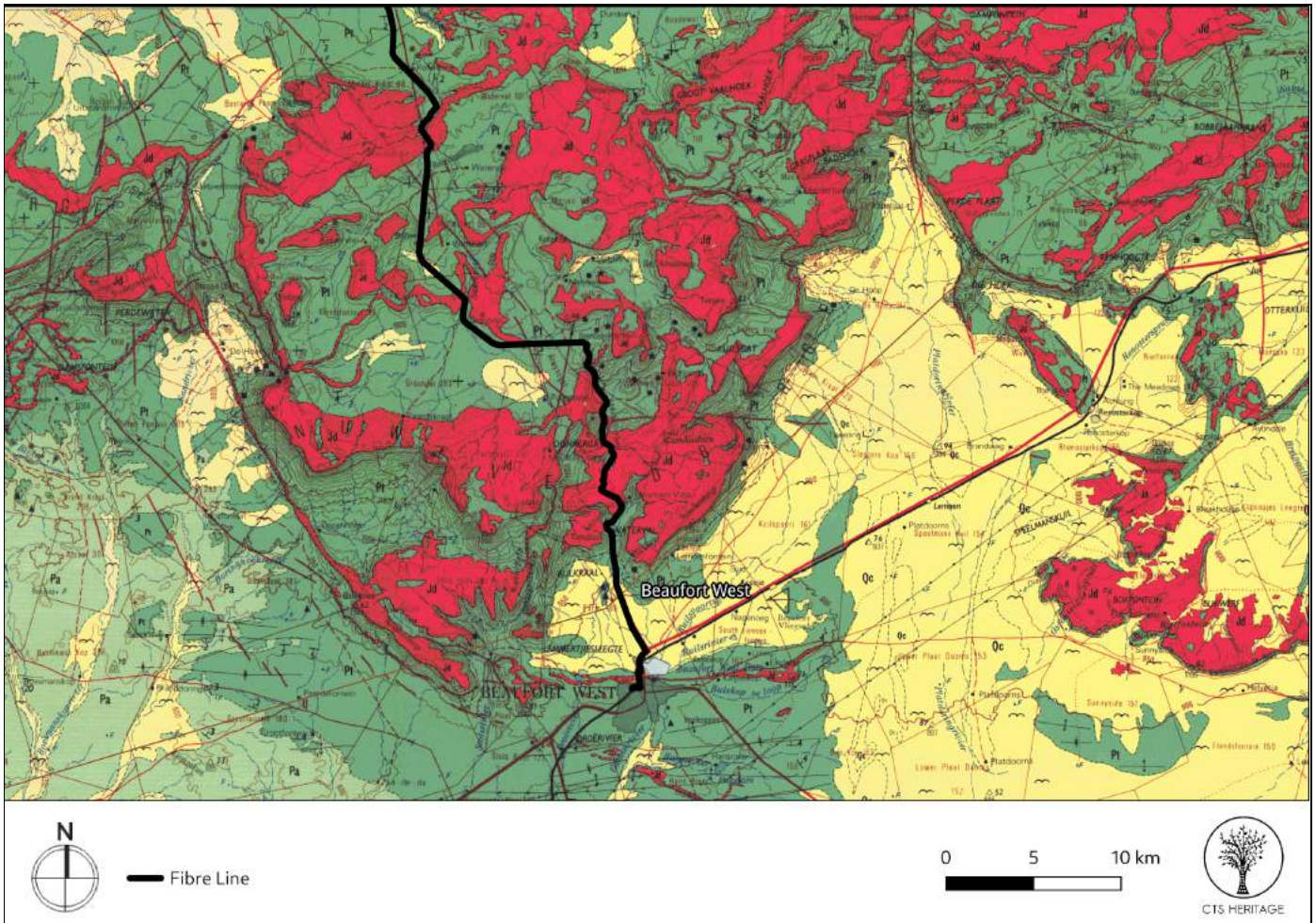


Figure 4.5: Extract from the CGS 3222 Beaufort West Map indicating that the development area is underlain by Ptp: Poortjie Member and Pth: Hoedemaker Member of the Teekloof Formation, Pa: Abramskraal Formation of the Beaufort Group, Pc: Carnavon Formation of the Ecca Group, Quaternary Sands and Jd: Jurassic Dolerite



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Table 2: Explanation of symbols for the geological map and approximate ages

Symbol	Group/Formation	Notes
Pth	Teekloof, Hoedemaker member, Beaufort Group, Adelaide Subgroup	266 – 250 Ma Raindrop imprints, desiccation cracks Tropicostoma Assemblage Zone
Ptp	Teekloof, Poortjie member, Beaufort Group, Adelaide Subgroup	266 – 250 Ma Raindrop imprints, desiccation cracks Pristerognathus Assemblage Zone
Pa	Abrahamskraal, Beaufort Group, Adelaide Subgroup	266 – 250 Ma Bioturbation, Trance fossils ~Tapinocephalus Assemblage Zone
Pc	Water Ford Formation (Previously Carnarvon), Ecca Group	290 – 266 Ma Trace Fossils
Pt	Tierberg Formation, Ecca Group	290 – 266 Ma Trace fossils, fish scales, and sponge spicules
Jd	Jurassic Dolerites	182-183 Ma
Qs	Quaternary Sediment	2.6Ma to present

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4. IDENTIFICATION OF HERITAGE RESOURCES

4.1 Summary of findings of Specialist Reports

Archaeology

Two large bridges (BTC01 and BTC07) were investigated during the field assessment, one of which could be dated to older than 60 years old (BTC07). BTC07 is located at the Soutpoot River near Loxton. No negative impact to this structure is anticipated. BTC01 is located north of Beaufort West at the start of the Molteno Pass - here the proposed fibre optic cable will be installed overhead on wooden poles.

An anniversary monument (dedication) was also identified (BTC02), although it is not yet considered to be historical (dated 2014), this monument does form part of the cultural landscape and falls within the definition of Monuments and Memorials in terms of HWC's Guideline. This monument reads:

“DUISENDE JARE GELEDE HET SALOMO IN SPREUKE 31:10-31 GESKRYF OOR ‘N DEURSAME VROU HIERDIE STEEN IS ‘N EERBETOON AAN SO ‘N DROOM VROU LOUNIE BADENHORST DANKIE VIR ALLES WAT JY VIR MY BETEKEN LIEFDE CHRIS 25STE HUWELIKS HERDENKING 3.8.1994 - 35 JAAR 3 AUG 2004 - 45 JAAR 3 AUG 2014”

Based on the significance criteria included in the HWC Guide, it is likely that this monument is not conservation-worthy. However, it is recommended that this monument not be negatively impacted by the proposed development (as we are hoping that the Badenhorst's make it to 55 years!).

Although it is well established that ESA, MSA and LSA archaeological finds as well as engraved boulders are prevalent throughout the broader Karoo landscape, only one possible MSA artefact (BTC03) was recorded. The proposed fibre line route has been previously degraded (heavily disturbed) by the construction of the existing road between Beaufort West and Carnarvon and as such, this explains the lack of conservation worthy archaeological finds. An additional explanation for the lack of stone tools may relate to the lack of rocky outcrops (suitable raw material sources) within the proposed development area. With regards to rock engravings, although rocky Karoo dolerite outcrops, consisting of large boulders were observed, no boulders with rock engravings were identified.

There are a few farmhouses situated near the road but no historical farmsteads, dwellings, structures or cemeteries were located within close proximity to the proposed fiber line footprint. The Loxton leiwat system (narrow water canals, examples: BTC04, BT05, BTC06), which are used for irrigation, are set up in a grid system



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across the Karoo village. These historical features, which are lined with some trees which are older than 100 years, are significant in terms of their contribution to the historical context of Loxton and are therefore graded IIIc. However these resources were not within the layout of the proposed fiber line and will not be impacted by the proposed development.

As such, despite the findings of the DEFF Screening Tool that the area proposed for development has high - medium sensitivity for impacts to archaeological and cultural heritage, the results of the fieldwork indicate that the area in reality has low sensitivity for impacts to significant archaeological and cultural heritage resources. Refer to Appendix 1 for detailed archaeology description and assessment.

Palaeontology

Most of the area proposed for development is underlain by sediments that have very high palaeontological sensitivity. According to geology maps from the CGS, these sediments include the Poortjie Member and Hoedemaker Member of the Teekloof Formation, and the Abrahamskraal Formation of the Beaufort Group. According to Rossouw (2019, SAHRIS ID 521555), the study area is located within “early Permian Abrahamskraal Formation rocks of the Adelaide Subgroup (Karoo Supergroup) that is capped by severely degraded, superficial sheet wash and channel related (Quaternary) deposits bounded by Jurassic age dolerite intrusions to the north.

The Loxton area lies within the outcrop area of the Tapinocephalus Assemblage Zone (AZ) which spans the middle part of the Abrahamskraal Formation. Vertebrate fossils of the Tapinocephalus AZ are not as common as in succeeding biozones and are usually found as individual specimens in the mudrock sequences in association with, and often enveloped by, brown-weathering calcareous nodular material. This faunal assemblage is mainly represented by small dicynodonts, large dinocephalians, pareiasaurs and pristerognathid theropcephalians. The dinocephalians which consist of Synapsida and Therapsida dominated as one of the tetrapod groups in the Middle Permian. The Tapinocephalus AZ in the Main Karoo Basin holds the most abundant record these dinocephalians. The top of the Abrahamskraal Formation marks the extinction of the dinocephalians. Their disappearance is one of the criterion that marks the beginning of the Pristerognathus AZ. The Pristerognathus AZ correlated with the Poortjie member of the Teekloof Formation. This assemblage zone is followed by the Tropicostoma Assemblage Zone which coronates with the Hoedemaker Member of the Teekloof Formation (Day et al. 2015).

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Day et al. (2015) reported new specimens of the rare tapinocephalid dinocephalian *Criocephalosaurus* in the lower Poortjie Member, which extends the *Tapinocephalus* AZ from the Abrahamskraal Formation up into the Teekloof Formation. The area in the road reserve where the fibre line will be laid is highly degraded, with large amounts of external material brought in during road construction. The mudstones in the area are also extremely fractured, decreasing the chance of fossil preservation. Only one site was identified to contain trace fossils during the field work.

As such, despite the findings of the DEFF Screening Tool that the area proposed for development has high - medium sensitivity for impacts to palaeontological heritage, and the very high sensitivity of the geology for impacts to significant palaeontological heritage indicated by the SAHRA Palaeosensitivity map, the results of the fieldwork indicate that the area in reality has low sensitivity for impacts to significant palaeontological heritage resources. Refer to Appendix 2 for detailed palaeontological description and assessment.

4.2 Heritage Resources identified

Table 3: Observations noted during the field assessments for archaeology and palaeontology

Site No.	Site Name	Description	Co-ordinates		Grading	Province	Mitigation
BTC01	SKA Fibre_01	Bridge (dated: 1970)	-32.28339	22.56525	NA	Western Cape	None Required
BTC02	SKA Fibre_02	Anniversary Monument/Dedication (dated: 3 August 2014)	-32.25241	22.56853	NA	Western Cape	Not to be disturbed - 10m buffer recommended
BTC03	SKA Fibre_03	Possible MSA chert artefact	-32.17230	22.48989	NCW	Western Cape	None Required
BTC04	SKA Fibre_04	Loxton Leiwat System	-31.47537	22.34922	IIIC	Northern Cape	No impact anticipated
BTC05	SKA Fibre_05	Loxton Leiwat System	-31.47604	22.35136	IIIC	Northern Cape	No impact anticipated
BTC06	SKA Fibre_06	Loxton Leiwat System	-31.47761	22.35630	IIIC	Northern Cape	No impact anticipated
BTC07	SKA Fibre_07	Bridge (dated: 1958)	-31.34858	22.30103	IIIC	Northern Cape	No impact anticipated
BTC08	SKA Fibre_08	Sandstone outcrop	-31.22497	22.26206	NA	Northern Cape	None Required
BTC09	SKA Fibre_09	Trace fossils from the Abrahamskraal Formation located On top of road cutting on the western side of the road.	-32.3043	22.5698	IIIC	Western Cape	None Required
BTC10	SKA Fibre_10	Mudflakes in sandstone "mud	-32.2906	22.5666	NCW	Western Cape	None Required

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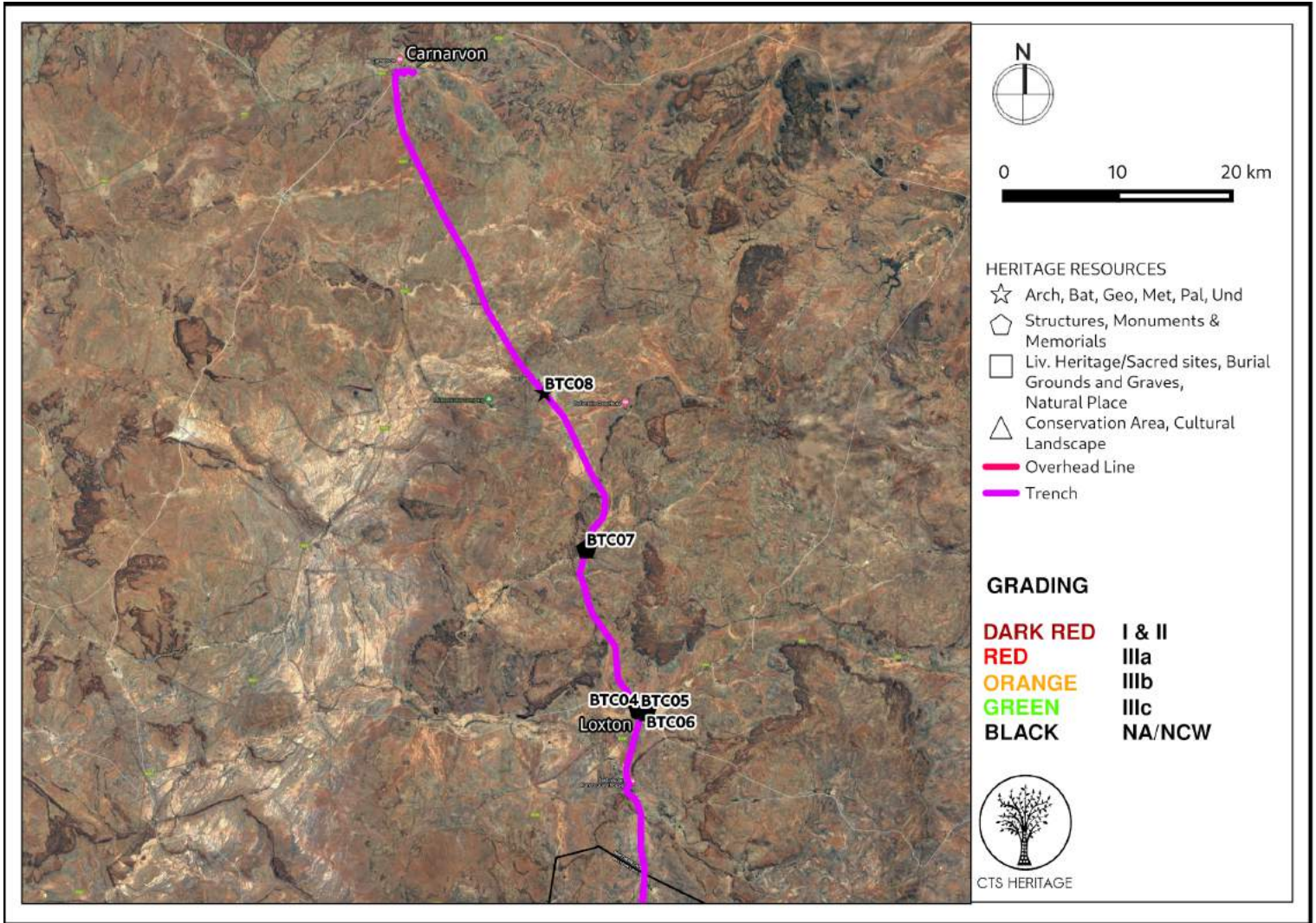
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		flake conglomerate" from the Abrahamskraal Formation. <i>Not in situ.</i>				
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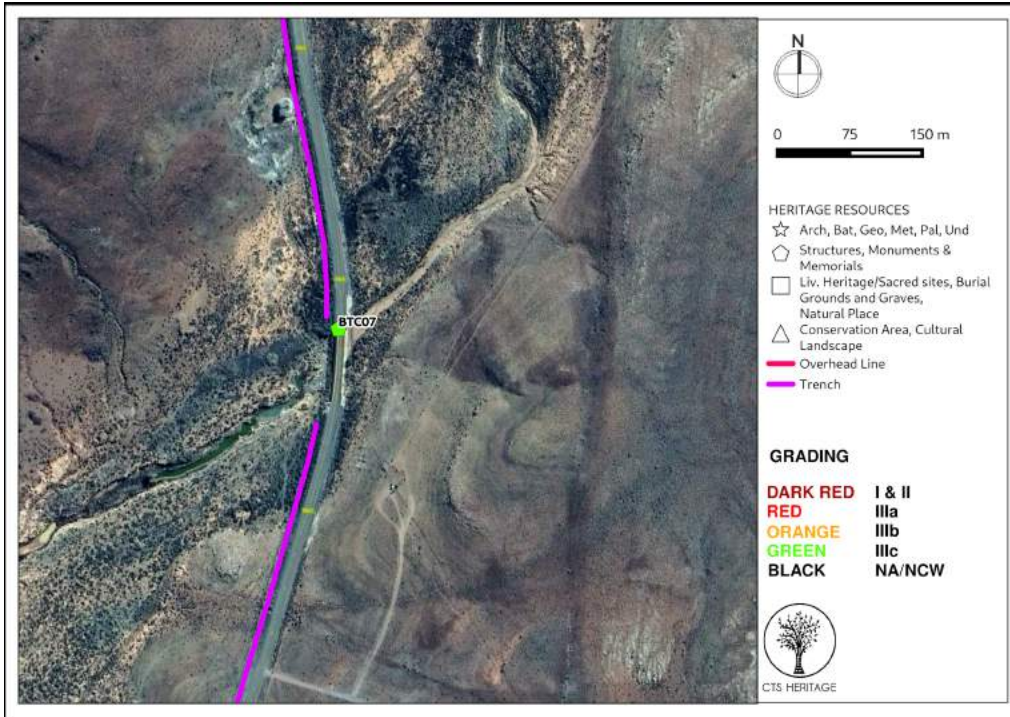
4.3 Mapping and spatialisation of heritage resources



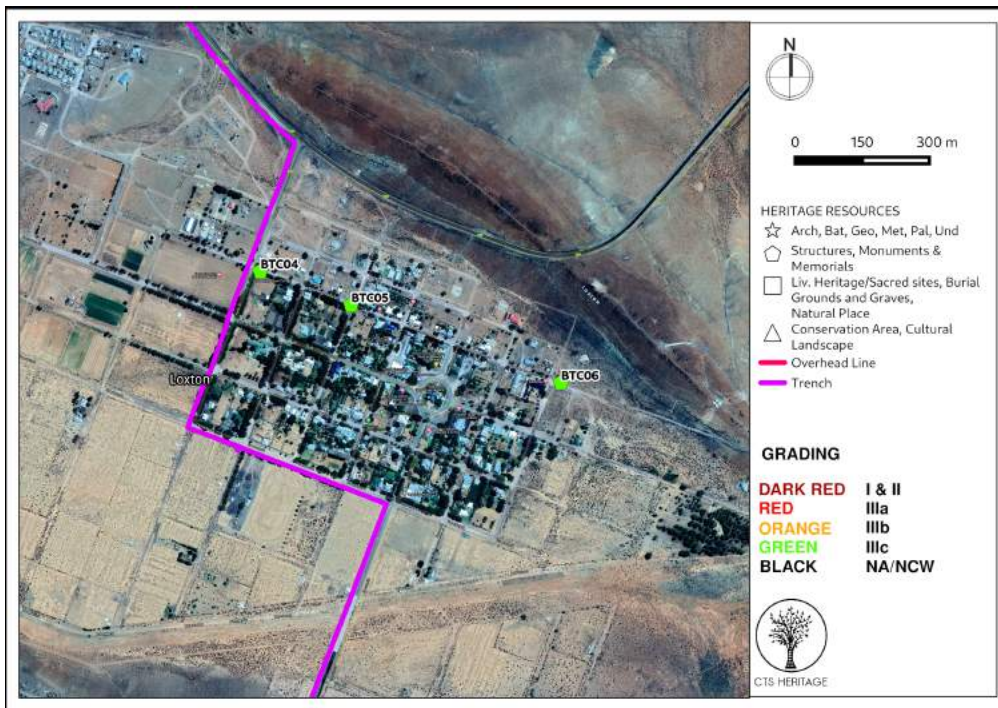
Map 5.1: Heritage resources in the vicinity of the proposed development in the Northern Cape



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Map 5.2: Heritage resources in the vicinity of the proposed fibre line - BTC07 bridge over the Soutpoot river south of Loxton



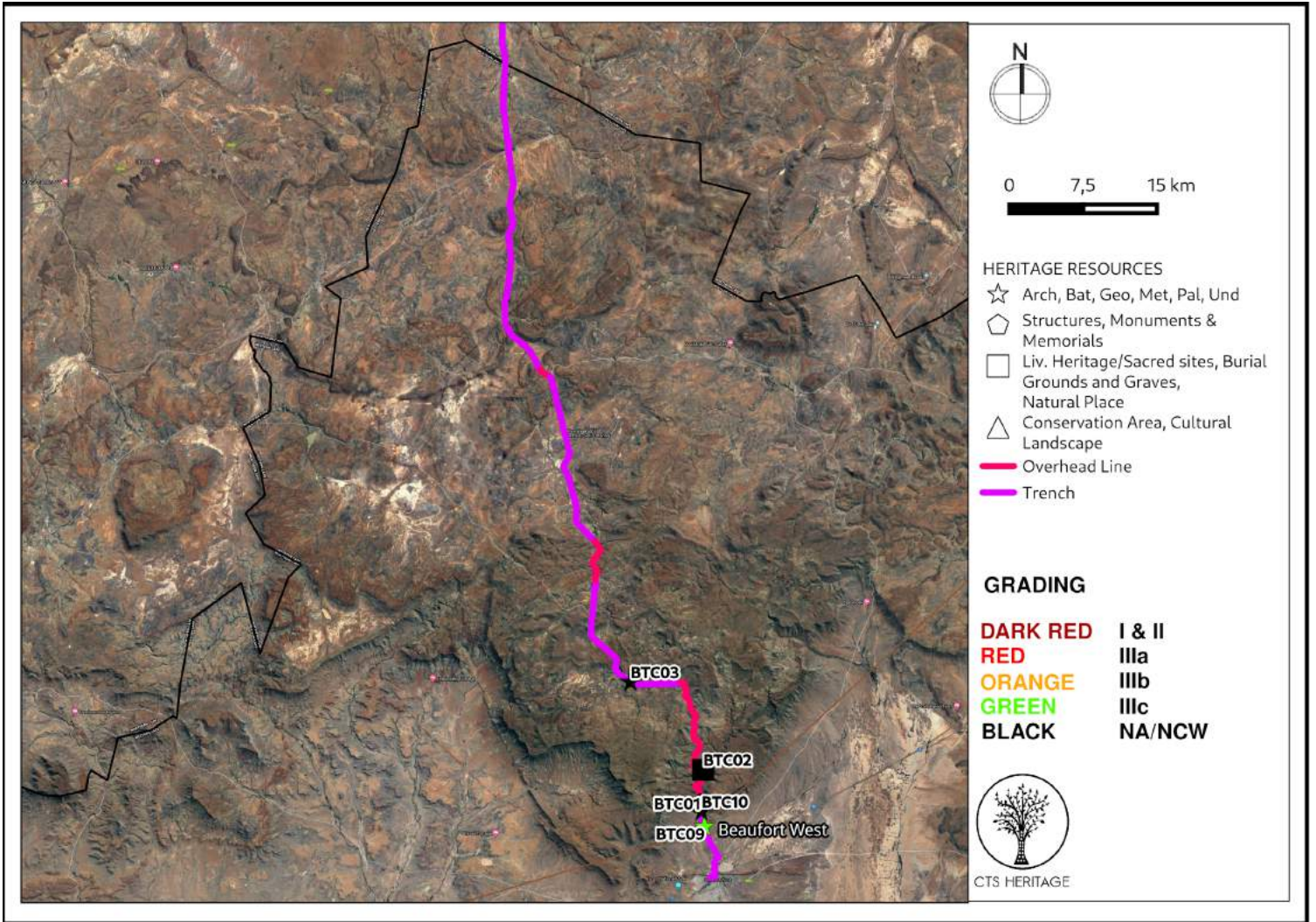
Map 5.3: Heritage resources in the vicinity of the proposed fibre line - BTC04, BTC05 and BTC06 Loxton leiwater

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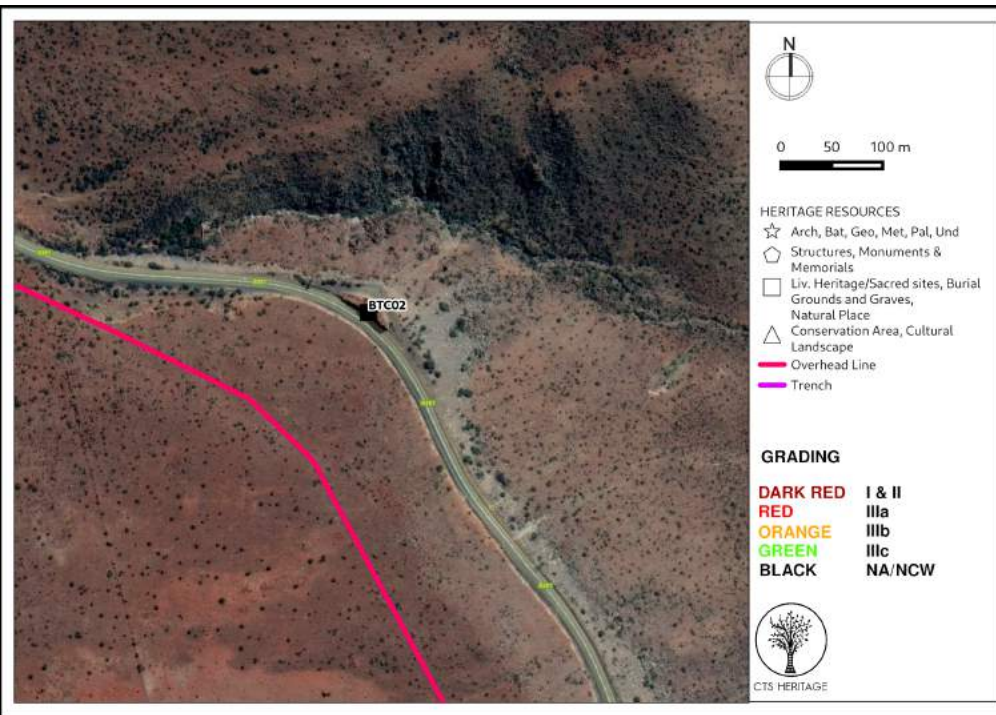
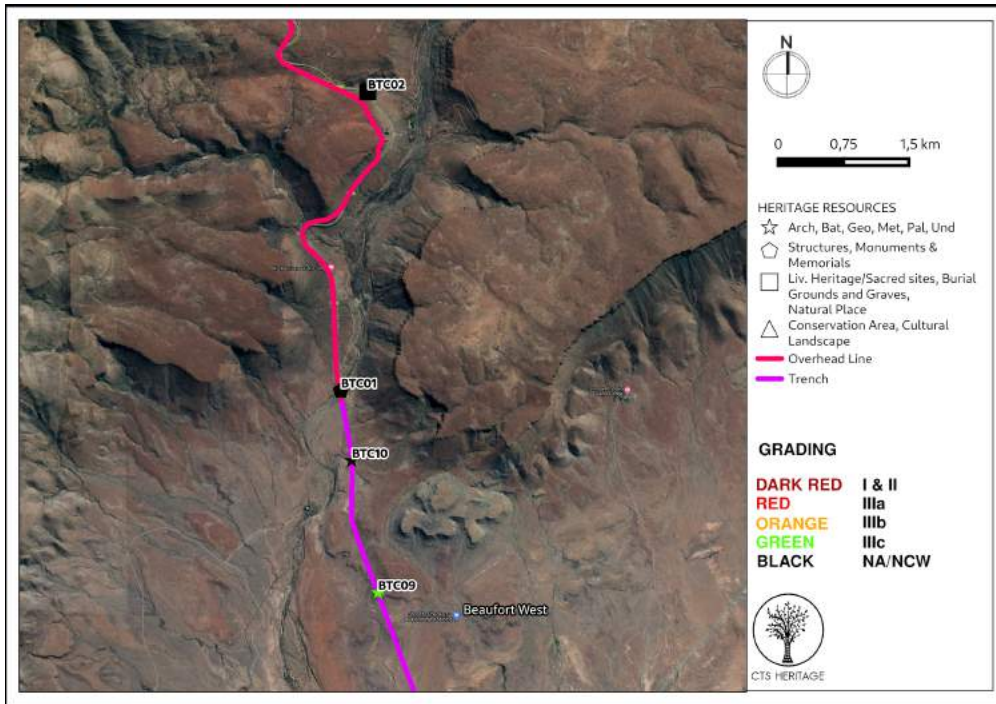
Map 5.4: Heritage resources in the vicinity of the proposed development in the Western Cape

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Map 5.4: Heritage resources in the vicinity of the of the proposed fibre line - BTC09 Trace Fossils

5. ASSESSMENT OF THE IMPACT OF THE DEVELOPMENT

5.1 Assessment of impact to Heritage Resources

Construction Phase

The primary impact to heritage resources is likely to take place during the construction phase with excavation activities associated with trenching and the digging of holes to plant poles. The activities are likely to destroy any heritage resources that are located within the proposed fibre line route. Based on the assessment completed, the area proposed for development has a low archaeological sensitivity. No evidence was found of *in situ* archaeological material, rock engraving sites, or graves along the proposed trench or overhead alignments. Neither were historical buildings or structures older than 60 years observed within the footprint of the proposed



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fibre line, apart from the bridge crossing the Soutpoot River (BTC07, dated 1958) for which no negative impact is anticipated.

Due to the fact that some cultural remains along the roadside are likely covered in gravel from road grading/construction, the possibility exists that some artefacts may only be uncovered during the digging of the trenches or holes for the proposed fiber line.

The area in the road reserve where the fibre line will predominantly be trenched is highly degraded, with large amounts of external material brought in during road construction. The mudstones in the area are also extremely fractured, decreasing the chance of fossil preservation. Only one site was identified to contain trace fossils during the field work. For these reasons it is unlikely that the trenching to lay the fibre line will have a significant effect on the area, provided that the chance fossil find procedure is followed in the possible case of a fossil being found during excavation activities during the construction phase.

Operational Phase

No impacts to heritage resources anticipated.

Decommissioning Phase

No impacts to heritage resources anticipated.

Table 4: Impacts of the proposed fibre optic line to heritage resources

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION PHASE						
Damage to /destruction of significant heritage resources	Status	Negative	Very low risk	During the construction phase excavations should be monitored for fossil remains, archaeological resources and burial sites/graves by the responsible Environmental Control Officer (ECO) by implementing the HWC Chance Fossils Finds Procedure (Appendix 2)	Very low risk	High
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Extreme				
	Probability	Extremely unlikely				

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	Reversibility	Impacts are non-reversible		Should substantial fossil remains such as vertebrate bones and teeth, petrified wood, plant-rich fossil lenses or dense fossil burrow assemblages be exposed during construction, the responsible ECO should safeguard these, preferably in situ, and alert the South African Heritage Resources Authority (SAHRA) in the Northern Cape and/or HWC in the Western Cape so that appropriate action can be taken by a professional palaeontologist or archaeologist as required.		
	Irreplaceability	High irreplaceability				

5.2 Cumulative Impacts

Construction Phase

No impacts anticipated

Operational Phase

Cumulative impacts are only anticipated during the Operational Phase of the development. The proposed fibre line alignment runs predominantly along an existing road between Beaufort West and Carnarvon. For the majority of this route, the proposed fibre line will be buried below ground. For only a portion of the route, the proposed line will run overhead. There is an existing overhead line that runs along much of the route (Figure 6). In general, in terms of impacts to heritage resources, it is preferable to consolidate and concentrate like infrastructure into one location in order to avoid disruption of the integrity of intact wilderness Karoo landscapes. As such, it is not anticipated that the proposed fibre line will have a negative cumulative impact on heritage resources including the cultural landscape as long as the proposed line runs along existing similar infrastructure.

Decommissioning Phase

No impacts anticipated

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Figure 6: Existing overhead line that runs along the existing road

Table 5: Cumulative Impact Table

Impact	Impact Criteria		Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post-Mitigation)	Confidence Level
CONSTRUCTION PHASE						
Cumulative Impact to heritage resources	Status	Negative	Very low risk	No impacts are anticipated and as such, no mitigation is required	Very low risk	High
	Spatial Extent	Site specific				
	Duration	Short term				
	Consequence	Extreme				
	Probability	Extremely unlikely				
	Reversibility	Impacts are non-reversible				
	Irreplaceability	High irreplaceability				



5.3 Sustainable Social and Economic Benefit

In summary, direct socio-economic opportunities are mainly limited to local employment during construction including short term job creation where the main contractor will hire local people to do hand trenching instead of machinery for about 10km on each town (Beaufort West, Loxton and Carnarvon). The distance for hand trenching will be determined close to the start of the project. Spin-off opportunities may include the introduction and expansion of Information and Communications Technology (ICT) services in the region. As part of the bigger SKA project there are opportunities to provide wi-fi services in Carnarvon which will be made possible by this fibre installation project. Discussions in this regard are ongoing.

In addition, as part of the broader SKA project, 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. As such, the anticipated impact to heritage resources does not outweigh the socio-economic benefits associated with the proposed development in terms of the role of South Africa in astronomical research, as well as the associated benefits of fibre connectivity in rural areas.

5.4 Proposed development alternatives

Alternative 1 (Preferred):

This route is assessed in this report. It initiates in Beaufort West and extends north to Loxton and ends in Carnarvon. There is limited impact to heritage resources anticipated for this route alternative and as such, it is the preferred alternative for the development in terms of impacts to heritage resources.

Alternative 2 (Excluded)

This route initiates at Leeu Gamka and extends to Loxton. From Loxton, this alternative route follows the same alignment as Alternative 1, the alternative considered in this report, and ends in Carnarvon. This alternative has been excluded due to its increased length. This increased length of impact also makes this alternative the least preferred in terms of impacts to heritage.

No-Go Alternative

This alternative describes a scenario where no development takes place. Should no development proceed, no impacts to heritage resources will take place.



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6. RESULTS OF PUBLIC CONSULTATION

There are no registered heritage conservation bodies for the area proposed for development (HWC Website checked 28/10/2020). The Beaufort West Municipality will be provided with the opportunity to comment on the Draft HIA for 30 days as per the requirements of HWC. Additional public consultation processes will be undertaken by the EAP during the EIA. No heritage-related comments have been received to-date. Should any heritage-related comments be received during the PPP, this report will be updated to include them. The evidence and outcomes of the heritage commenting process are included in Appendix 7.

7. LEGISLATIVE AND PERMIT REQUIREMENTS

This proposed development triggers sections 38(1) and 38(8) of the National Heritage Resources Act (NHRA, Act 25 of 1999) as this proposed development constitutes a linear development exceeding 300m and this proposed development requires an evaluation of impacts to heritage resources in terms of other legislation (NEMA). This section states that the consenting authority (the Department of Environmental Affairs and Development Planning (DEADP) in the Western Cape and the Department of Environment and Nature Conservation (DENC) in the Northern Cape) must ensure that the assessment completed for impacts to heritage satisfies the requirements of the relevant heritage authority in terms of section 38(3) of the NHRA (HWC in the Western Cape and SAHRA in the Northern Cape), and that the recommendations of the relevant heritage authority must be taken into consideration prior to the granting of consent.

Section 38(3) of the NHRA details the information that MUST be included in a Heritage Impact Assessment (HIA) drafted in terms of section 38 of the NHRA. Furthermore, HWC has published guidelines on their minimum requirements for Heritage Impact Assessments and SAHRA has published Minimum Standards for Archaeological and Palaeontological Impact Assessments. All such guidelines and minimum standards have been complied with in the drafting of this HIA.

In terms of section 38(10) of the NHRA, if the applicant complies with the recommendations and requirements of the relevant heritage authority issued in terms of section 38(8) of the NHRA, then the applicant MUST be exempted from compliance with all other (general) protections included in the NHRA. As such, as long as the requirements of the heritage authority are satisfied, no permit application is required for the destruction of or impact to any heritage resource that has been identified in the HIA.

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Should any heritage resources be newly uncovered during excavation activities (ie. heritage resources that were not identified in the HIA), then as per the recommendations of the HIA, work must cease in that area and the relevant heritage authority must be contacted regarding a way forward. This HIA recommends that the HWC Chance Fossils Finds procedure be implemented in order to direct such actions.

8. ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The following recommendations must be included in the EMPr for this project:

- During the construction phase all excavations must be monitored for fossil remains by the responsible ECO using the HWC Chance Fossil Finds Procedure (Appendix 2). Should substantial fossil remains such as vertebrate bones and teeth, petrified wood, plant-rich fossil lenses or dense fossil burrow assemblages be exposed during construction, the responsible ECO should safeguard these, preferably in situ, and alert SAHRA in the Northern Cape and HWC in the Western Cape so that appropriate action can be taken by a professional palaeontologist,
- Should any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources be found during the proposed development, SAHRA Archaeology, Palaeontology and Meteorites Unit (Natasha Higgitt/Phillip Hine 021 462 5402) in the Northern Cape and HWC (Colette Scheermeyer, 021 483 5959) in the Western Cape must be alerted.
- If unmarked human burials are uncovered in the Northern Cape, the SAHRA Burial Grounds and Graves (BGG) Unit (Mimi Seetelo 012 320 8490), and in the Western Cape, HWC (Colette Scheermeyer, 021 483 5959) must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist must be contracted as soon as possible to inspect the findings. A Phase 2 rescue excavation operation may be required subject to permits issued by SAHRA and/or HWC

9. FINAL SPECIALIST STATEMENT AND AUTHORISATION RECOMMENDATION

9.1 Statement and Reasoned Opinion

The proposed development will not have a negative impact on the heritage resources situated within the footprint of the proposed fibre optic line between Beaufort West and Carnarvon. The lithic material identified is of low significance, and even though the resources may be destroyed during the construction, the impact is inconsequential. The heritage resources identified are largely located some distance from the proposed line (BTC02, BTC04, BTC05, BTC06, SAHRIS Site ID 32495) and will not be impacted by the proposed development or are not conservation-worthy (BTC01, BTC03 and BTC07). Due to the fact that some cultural remains along the

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roadside are likely covered in gravel from road grading/construction, the possibility exists that some artefacts may only be uncovered during the digging of the trenches and holes for the proposed fiber optic line installation.

The proposed installation of the SKA fibre optic line may proceed. It is unlikely that this construction will have a great effect on significant palaeontological heritage. Although the area has a rich occurrence of multiple fossil assemblages, fossil finds are often isolated as individuals. Only one site was identified to contain some trace fossils (BTC09). This trace fossil has contextual significance only and no further mitigation measures are recommended. The trench for the SKA fibre line will predominantly run along highly disturbed and fractured roadside material. This decreases the chance of finding fossils dramatically.

Despite the findings of the DEFF Screening Tool that the area proposed for development has high - medium sensitivity for impacts to archaeological and cultural heritage, and palaeontological heritage, the results of the fieldwork indicate that the overall impacts of the proposed fibre optic cable to heritage resources is MEDIUM TO LOW, and LOW with mitigation.

9.2 EA Condition Recommendations

There is no objection to the proposed development on heritage grounds and the following is recommended:

- No mitigation is required prior to construction operations commencing.
- During the construction phase all excavations must be monitored for fossil remains by the responsible ECO using the HWC Chance Fossil Finds Procedure. Should substantial fossil remains such as vertebrate bones and teeth, petrified wood, plant-rich fossil lenses or dense fossil burrow assemblages be exposed during construction, the responsible ECO should safeguard these, preferably in situ, and alert SAHRA in the Northern Cape and HWC in the Western Cape so that appropriate action can be taken by a professional palaeontologist,
- Should any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources be found during the proposed development, SAHRA APM Unit (Natasha Higgitt/Phillip Hine 021 462 5402) in the Northern Cape and HWC (Colette Scheermeyer, 021 483 5959) in the Western Cape must be alerted.
- If unmarked human burials are uncovered in the Northern Cape, the SAHRA BGG Unit (Mimi Seetelo 012 320 8490), and in the Western Cape, HWC (Colette Scheermeyer, 021 483 5959) must be alerted immediately as per section 36(6) of the NHRA. A professional archaeologist must be

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contracted as soon as possible to inspect the findings. A Phase 2 rescue excavation operation may be required subject to permits issued by SAHRA and/or HWC

- The above recommendations must be included in the Environmental Management Programme (EMPr) for the project

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9. REFERENCES

Heritage Impact Assessments				
Nid	Report Type	Author/s	Date	Title
3989	AIA Phase 1	Cobus Dreyer	19/04/2007	First Phase Archaeological and Cultural Heritage Assessment of the Proposed Borrow Pit Sites Along the P02996 Road Between Carnarvon & the Ska Site, Northern Cape
3990	AIA Phase 1	Cobus Dreyer	17/09/2007	First Phase Archaeological and Cultural Heritage Investigation of the Proposed Upgrading of the Oxidation Pond System at Carnarvon, Northern Cape
4013	AIA Phase 1	Jonathan Kaplan	01/02/2006	Phase 1 Archaeological Impact Assessment Proposed Klavervlei Powerline Karoo National Park
6461	AIA Phase 1	Jonathan Kaplan	01/02/2008	Phase 1 Archaeological Impact Assessment: Proposed Development Remainder of Farm 185 (Now Called Plot 8419) Beaufort West, Western Cape Province
253529	HIA Phase 1	Cobus Dreyer	20/12/2014	First phase archaeological and heritage assessment of the proposed solid waste disposal site at Loxton, Northern Cape
186695	HIA Phase 1	McEdward Murimbika	01/08/2014	Proposed Gamma-Kappa 2nd 765kV Eskom Transmission Powerline and Substations Upgrade Development in Western Cape PHASE 1 HERITAGE IMPACT ASSESSMENT STUDY REPORT
186697	AIA Desktop	Foreman Bandama, Shadreck Chirikure	01/08/2014	An Archaeological Scoping and Assessment report for the proposed Gamma (Victoria West, Northern Cape) - Kappa (Ceres - Western Cape) 765Kv (2) Eskom power transmission line
186698	PIA Desktop	JF Durand	09/06/2013	GAMMA-KAPPA 765kV Transmission Line, Western Cape Province SCOPING REPORT PALAEOLOGY
503050	AIA Phase 1	Madelon Tusenius	01/03/2012	ARCHAEOLOGICAL IMPACT ASSESSMENT OF A PROPOSED BORROW PIT AT RIETKUIL 307, BEAUFORT WEST, CENTRAL KAROO DISTRICT, WESTERN CAPE
521555	Letter of Exemption	Lloyd Rossouw	13/02/2019	Exemption from further Heritage Impact Assessment: Rectification in terms of Section 24G for Residential Development in Loxton, Northern Cape Province.

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Other References:

CSIR. 2020. Environmental Screening Study for the proposed Square Kilometre Array (SKA) fibre optic cable from Beaufort West to Carnarvon. May 2020

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https://www.hwc.org.za/sites/default/files/2016-03/Grading_Implications%20and%20Management_Approved.pdf

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APPENDICES

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APPENDIX 1: Archaeological Assessment



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APPENDIX 2: Palaeontological Assessment



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APPENDIX 3: Heritage Screening Assessment

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APPENDIX 4: Specialist Expertise

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APPENDIX 5: Specialist Statement of Independence

I, _____ Jenna Lavin _____, declare that -

- I act as the independent specialist in this application;
- I 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;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I 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;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I 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
- I 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: __ CTS Heritage _____

Date: __ 18 January 2021 _____



APPENDIX 6: 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	28 and 29 September 2020
Specialist Name	Jenna Lavin, Dewald Wilken, Nikki Mann
Professional Registration Number	ASAPA, APHP, PSSA
Specialist Affiliation / Company	CTS Heritage

Note from the CSIR: The specialist must include the following information in this section of the report:

- Provide a description on how the site sensitivity verification was undertaken using the following means:
 - (a) desktop analysis, using satellite imagery;
See attached Desktop Heritage Screening Assessment (Appendix 3)
 - (b) preliminary on-site inspection; and
See Specialist Archaeology and Palaeontology Reports (Appendix 1 and 2)
 - (c) any other available and relevant information.
- Provide a description of the outcome of the site sensitivity verification in order to:



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(a) confirm or dispute 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 etc.;

Overall site sensitivity is LOW for impacts to archaeology and palaeontology

(b) include a motivation and evidence (e.g. photographs) of either the verified or different use of the land and environmental sensitivity.

See body of HIA

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Appendix 7: Impact Assessment Methodology

Note from the CSIR: The following impact assessment must be used.

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);

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- 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):

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- 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).

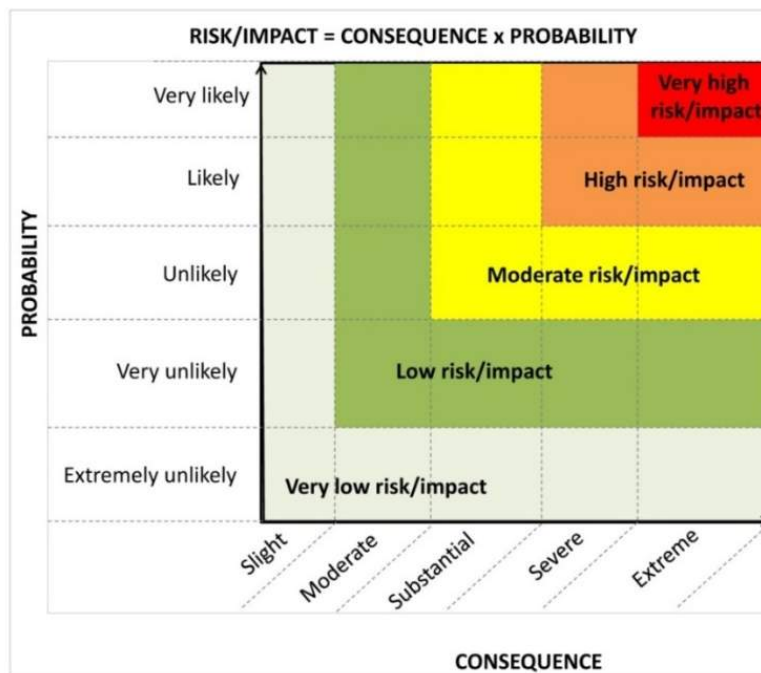


Figure 1. Guide to assessing risk/impact significance as a result of consequence and probability.



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- 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.

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APPENDIX 8: Consultation Process

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