

**Basic Assessment Report:** Upgrading & Development of an Access Road from the N10/’Burgerville’ District Road (2448) Turn-Off into the Farm Riet Fountain No. 39C and to the Switching Station and Main Transmission Substation on Sun Central Cluster 1 (300 MW) Solar PV Facility between De Aar & Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province, South Africa (2023).

**Environmental attributes associated with the alternatives**

3(1) A basic assessment report... must include –

(h) a full description of the process followed to reach the proposed preferred alternative within the site, including –

(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;

Appendix 1 (Basic assessment process) of the EIA Regulations, 2014 as amended

The level of sensitivity (or sensitivity rankings) for the environmental attributes associated with the alternatives (**Table 1**) was assessed using *inter alia* the results from the Screening Reports generated by the Department’s National web-based environmental screening tool and referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended.

**Table 1.** Sensitivity of the environmental attributes associated with the alternative routes and no-go option.

Aspect→ Alternative↓	geographical	physical	biological	social	economic	Heritage and cultural
Alternative Route No. 1 (preferred)	Low	Very High	High	Low	Low	High
Alternative Route No. 2	Medium	Very High	High	Medium	Medium	High
No-go option	Low	Very High	High	Low	Low	High

<b>Legend</b>	<b>Very High</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>
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Three Screening Assessments were undertaken for Alternative Route No. 1 (preferred):

- (1) A Screening Report generated on 10/10/2022 @ 15:37:32 for “Any activities within or close to a **watercourse**”
- (2) A Screening Report generated on 22/09/2022 @ 16:53:44 for “Infrastructure; Transport Services; Roads; **Private**”
- (3) A Screening Report generated on 13/10/2022 @ 14:24:53 for “Infrastructure; Transport Services; Roads; **Public**”

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One Screening Assessment was undertaken for Alternative Route No. 2:

(1) A Screening Report generated on 02/12/2022 @ 09:40:41 for “Infrastructure; Transport Services; Roads; **Public**”

The results of the screening tool were confirmed (or disputed) by means of a Site Sensitivity Verification undertaken on the 23<sup>rd</sup> and 24<sup>th</sup> November 2022 according to the requirements in terms of GN 320 of 20<sup>th</sup> March 2020.

### **References (Source of information) used to designate levels of sensitivity in Table 1**

#### **Geographical aspect:**

##### *Strategic Areas*

- Alternative Route No. 1 (preferred) is located within a Strategic Transmission Corridor, whereas only the northernmost section of Alternative Route No. 2 is in the same Central corridor (GN No. 113 in GG No. 41445 of 16 February 2018, as well GN No. 383, GG No. 44504 of 29 April 2021).
  - In terms of GN No. 113 dated 16 February 2018 (Gazette, 2018), “Applications for an environmental authorisation for large scale electricity transmission and distribution facilities, where such facilities trigger Listed Activity No. 9 of the Environmental Impact Assessment Regulations Listing Notice 2 of 2014 and any other listed and specified activities necessary for the realisation of such facilities, and where the greater part of the proposed facility is to occur in one or more such Strategic Transmission Corridors, must follow the basic assessment procedure contemplated in Regulation 19 and 20 of the Environmental Impact Assessment Regulations, 2014 in order to obtain environmental authorisation, as required in terms of the Act.” – **The proposed development which is the subject of this application does fall within the “Central Corridor” but does not trigger LA 9 of LN2.**
- Both Alternative Routes are not located within a Renewable Energy Development Zone (REDZ).
  - Renewable Energy Zones together with the procedures to be followed when applying for environmental authorisation for a large-scale wind and solar facility within these areas were published under GN No. 114, GG No. 41445 of 16 February 2018, as well as GN No. 786 of 17 July 2020.
  - In terms of GN No. 145 dated 26 February 2021, “The scope of this notice applies to ...an application for environmental authorisation when triggering the following activities related to the development of electricity transmission and distribution infrastructure (Activity 11 of Listing Notice 1 and Activity 9 of Listing Notice 2) where the greater part of the activity is undertaken within a Renewable Energy Development Zone...” – **The proposed development which is the subject of this application does not trigger the applicable listed activities.**

##### Radio Frequency

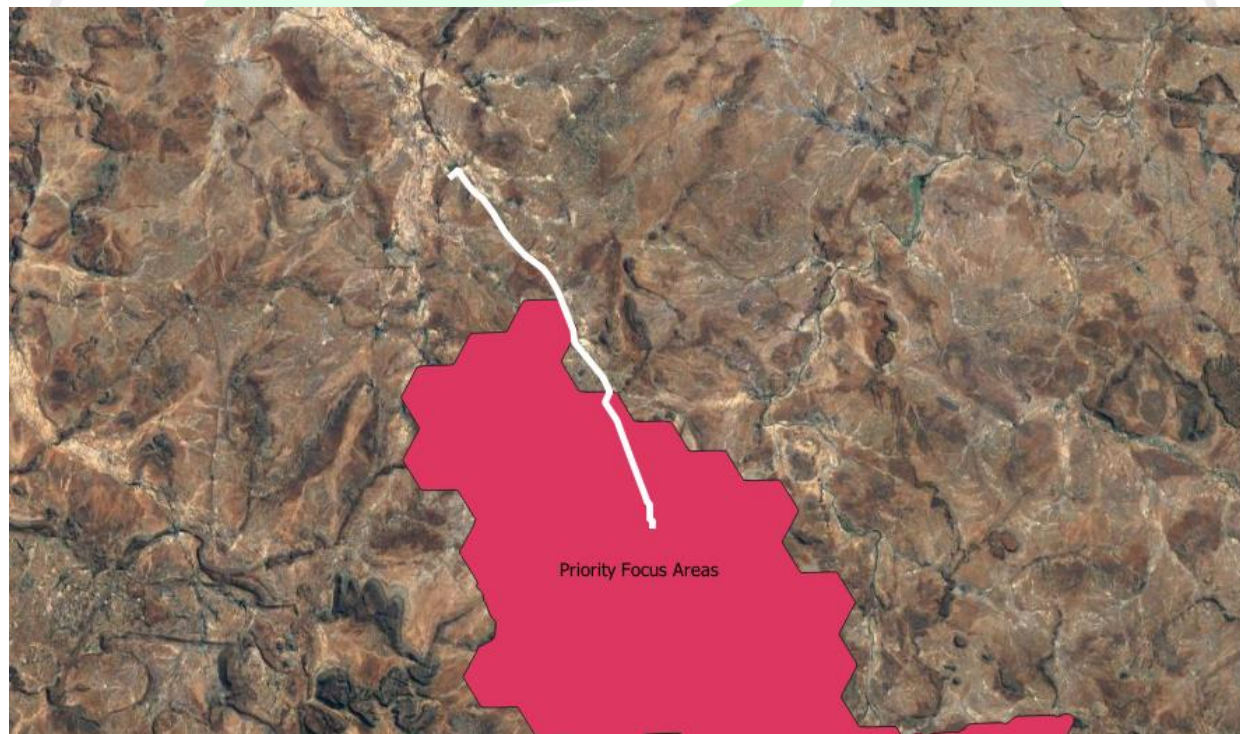
- The Radio Frequency Interference (RFI) was not identified as a theme in the Screening Reports as a gravel road will not result in any interference.

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- The Northern Cape Province is declared an **Astronomy Advantage Area (AAA)** under the Astronomy Geographic Advantage (AGA) Act, 2007, but the site doesn’t fall within the Karoo Central Astronomy Advantage Area (KCAAA). Central Astronomy Advantage Areas are areas where the Minister restricts radio spectrum use that has detrimental use on astronomy. The radio frequency spectrum from 100 MHz to 25.5 GHz is restricted for astronomy purpose.

*Protected Areas*

- A part of Alternative Route No. 2 is within a National Protected Area Expansion Strategy Focus Area according to the National Protected Area Expansion Strategy Focus Areas (2018) (**Figure 1**).
- Study area is not within a protected area or within 5 km of a protected area (**Figure 2 and 3**), the core area or within 5 km of the core area of a Biosphere Reserve according to the PAR, and within a sensitive area in terms of an EMF as there is no EMF. There is no Bioregional Plan either.

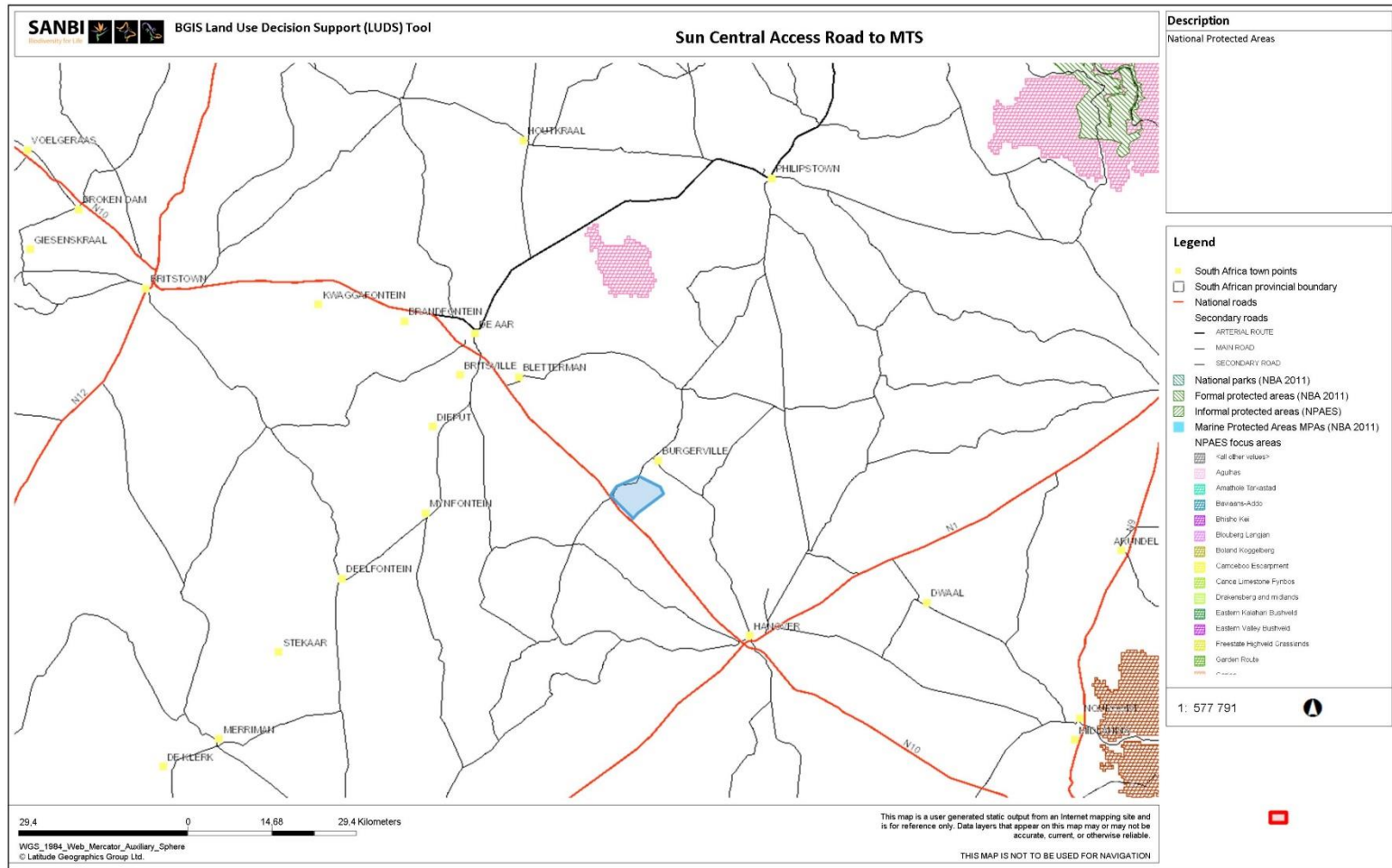


**Figure 1.** The southern section of Alternative Route No. 2 intersects the NPAES (2018) (coloured).

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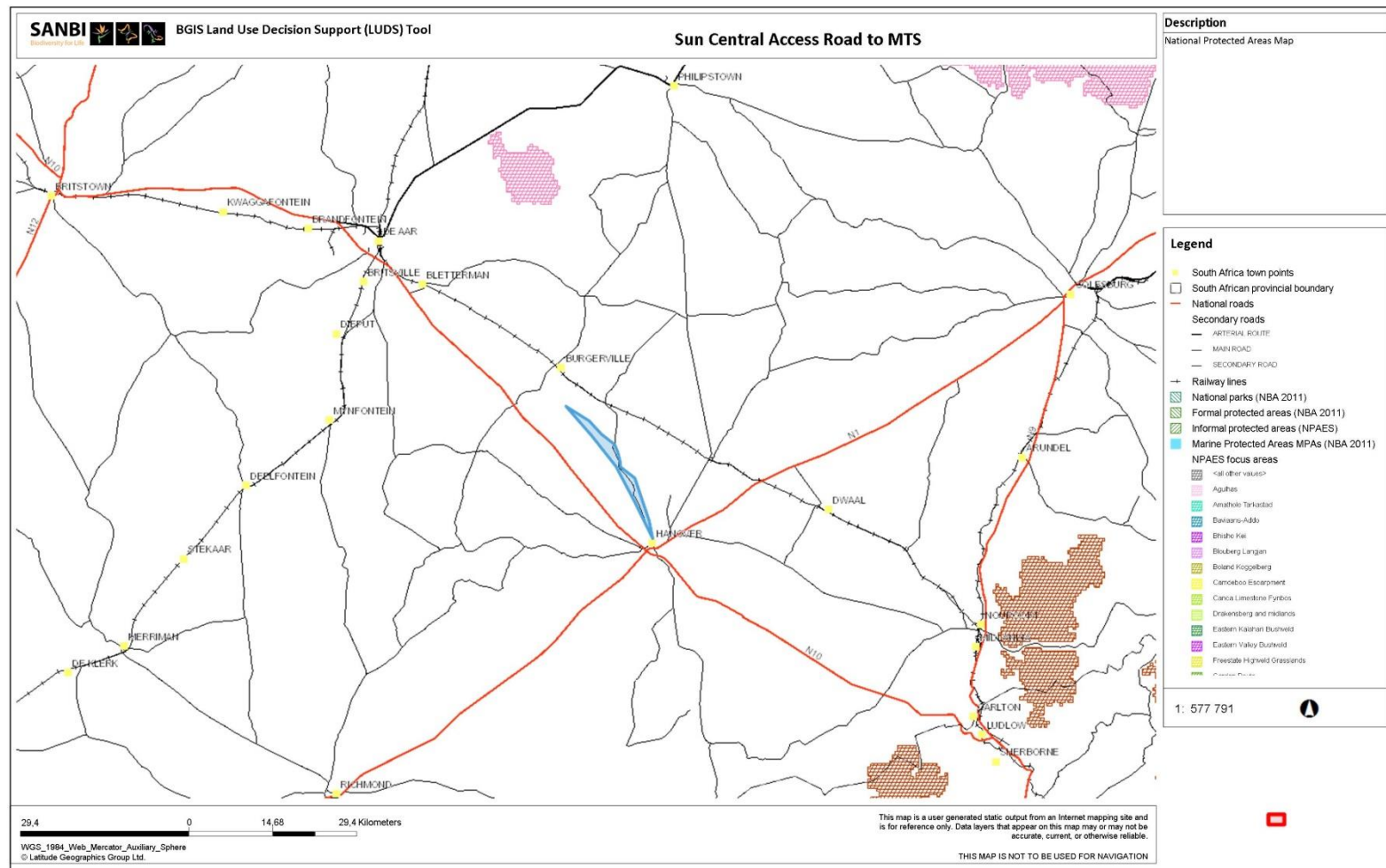
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**Figure 2.** Alternative Route No. 1 (preferred) relative to National Protected Areas (bgisviewer.sanbi.org, n.d.).

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**Figure 3.** Alternative Route No. 2 (preferred) relative to National Protected Areas (bgisviewer.sanbi.org, n.d.).

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## Physical aspect:

### *Atmosphere*

- The study area is not within an Air Quality Priority Area. According to the Emathanjeni Local Municipality Final Integrated Development Plan 2021 – 2022, the air quality within this municipality is in good condition compared to the other urban areas, but dust pollution does occur in the Karoo to some extent due to low variable rainfall and sparse vegetation.

### *Climate*

- The Karoo is a dry plateau, experiencing periodic droughts which negatively affects the surrounding farming areas (Emathanjeni Local Municipality Final Integrated Development Plan 2021/2022)
- The area falls within a summer rainfall area, receiving more rainfall in the high-sun half of the year (October through March).
- The average rainfall is in the order of 320 mm/yr.
- The MAE (2 000 to 2 150 mm/yr) far exceeds the MAP for the site, which implies greater evaporative losses when compared to incident rainfall. Due to evaporation being about 85% more than local rainfall, non-perennial streams and rivers will only have water when there are flooding events (e.g., 1:2, 1:5, 1:50 and 1:100-year flood events). Runoff from natural (unmodified) catchments in Catchment D62D is 3.1 mm/yr, which is approximately 0.9% of the MAP and amounts to approximately 7.4 Mm<sup>3</sup>/yr over the surface of the quaternary catchment (“Hydrological Assessment for additional listed activities and water uses relating to the development of the Sun Central Cluster 1 300 MW Solar PV facility (previously known as Phase 1) in the Northern Cape”, Version – Final 1, prepared by Hendrik Botha and dated 09 January 2023 (GCS Ref – 22 - 1054)).
- Average monthly rainfall peaks from October to May, whereas average monthly run-off peaks from December to April (Hydrology Assessment, 2023).

### *Geology*

- According to the 1:1 000 000 series geology map for the area (ESRI Geology Map Series, 2022), the geology of the study area is underlain by flat-lying sedimentary rocks of the Karoo Supergroup, which have been intruded by innumerable sills and dykes of dolerite (Hydrology Assessment, GCS, 2022).
- The geology of the area comprises shales of the Volksrust Formation and to a lesser extent the Prince Albert formation which are both of the Ecca group (Mucina & Rutherford, 2006). The land is also covered by superficial deposits which include calcretes of the Kalahari Group (Mucina & Rutherford, 2006).
- In the Besemkaree koppies Shrubland, there is dolerite koppies and sills embedded within Karoo Supergroup sediments (Mucina & Rutherford, 2006). The dolerite dykes and sills are igneous intrusions that were a result of extensive volcanic activity which accompanied the break-up of Gondwana in the Jurassic (Mucina & Rutherford, 2006). There is also soils with pedocutanic horizon (bgisviewer.sanbi.org, 2016)
- The study area also has red soils with high base status (bgisviewer.sanbi.org, 2016).

### *Wetlands*

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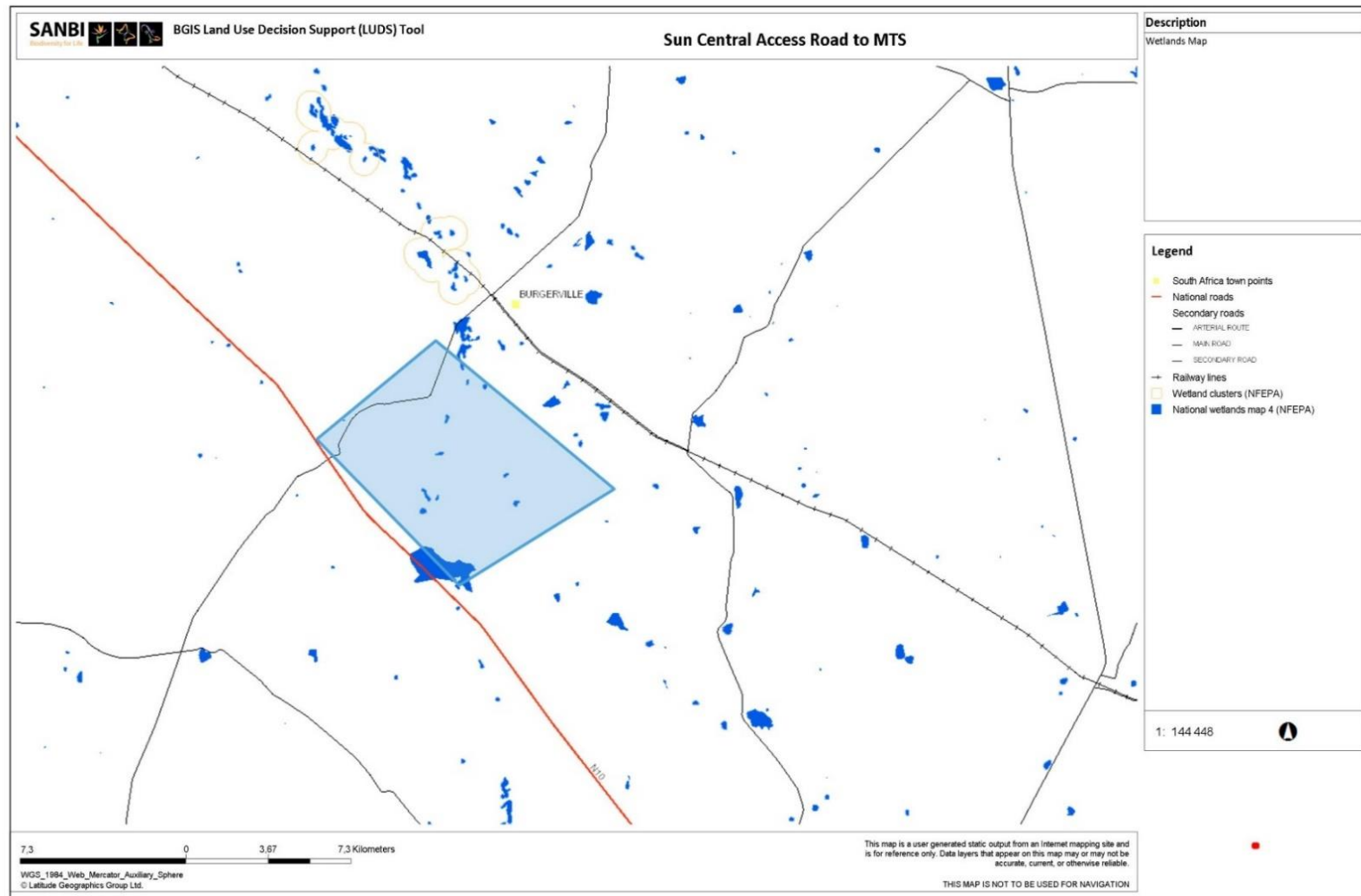
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- The study area is not within an area identified in terms of an international convention, such as a RAMSAR site.
- The project area contains National Freshwater Ecosystem Priority Areas (NFEPA) “Wetlands and Estuaries” and “Rivers” (Screening Reports), including the floodplain areas of the Brak River and its tributaries (non-perennial drainage streams).
- Based on the BGIS Map Viewer of SANBI under the National Wetland Freshwater Ecosystem Priority Areas (NFEPA) layer (Van Deventer, 2018), the general area constitutes natural and artificial wetlands, specifically channelled valley-bottom wetlands (bgisviewer.sanbi.org, n.d.) (**Figure 4 and 5**).
- Both Alternative Routes will infringe on these ecologically sensitive zones.



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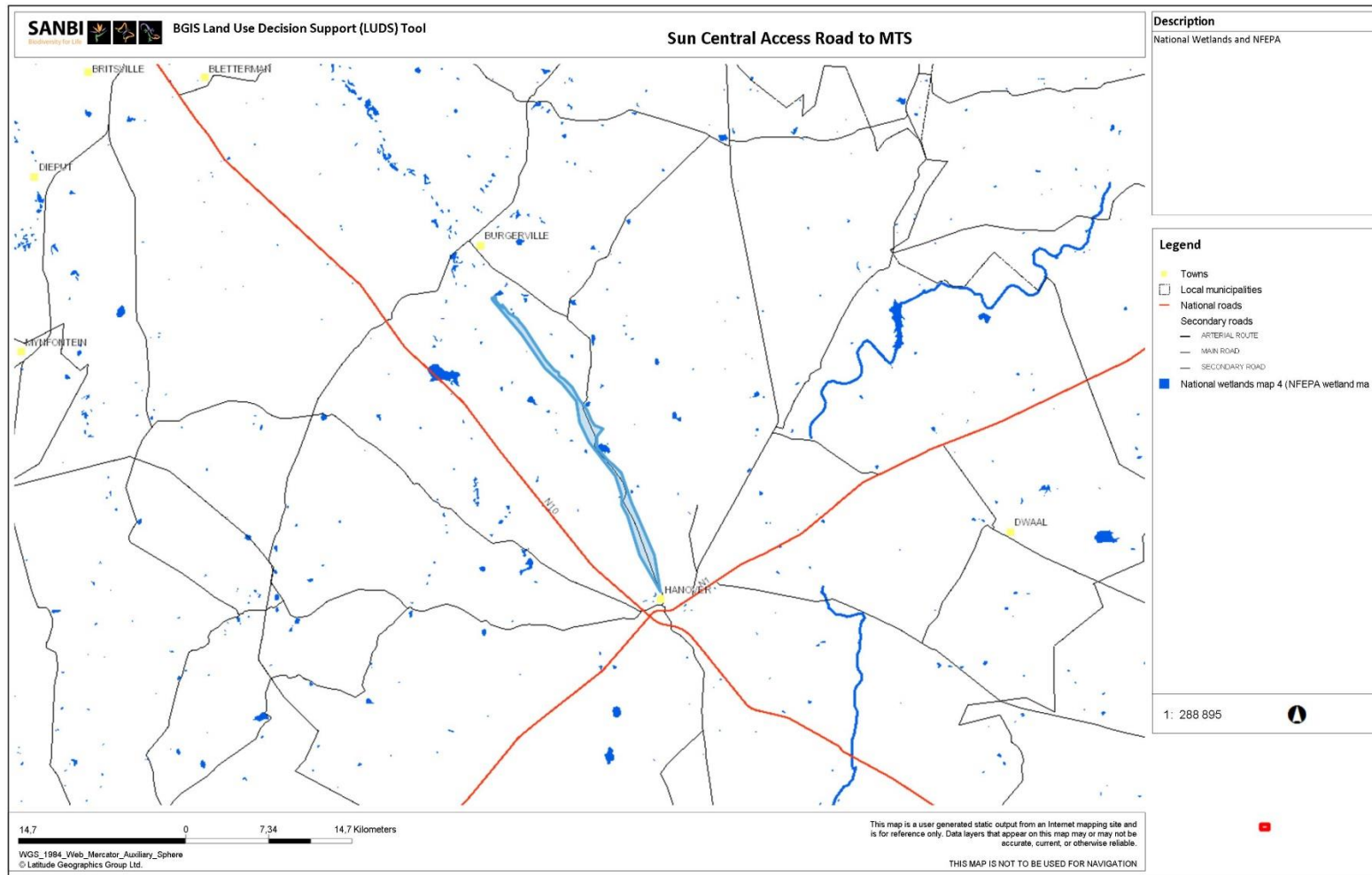


**Figure 4.** NFEPA Wetlands within proximity to Alternative Route No. 1 (preferred).

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**Figure 5.** NFEPA Wetlands within proximity to Alternative Route No. 2.

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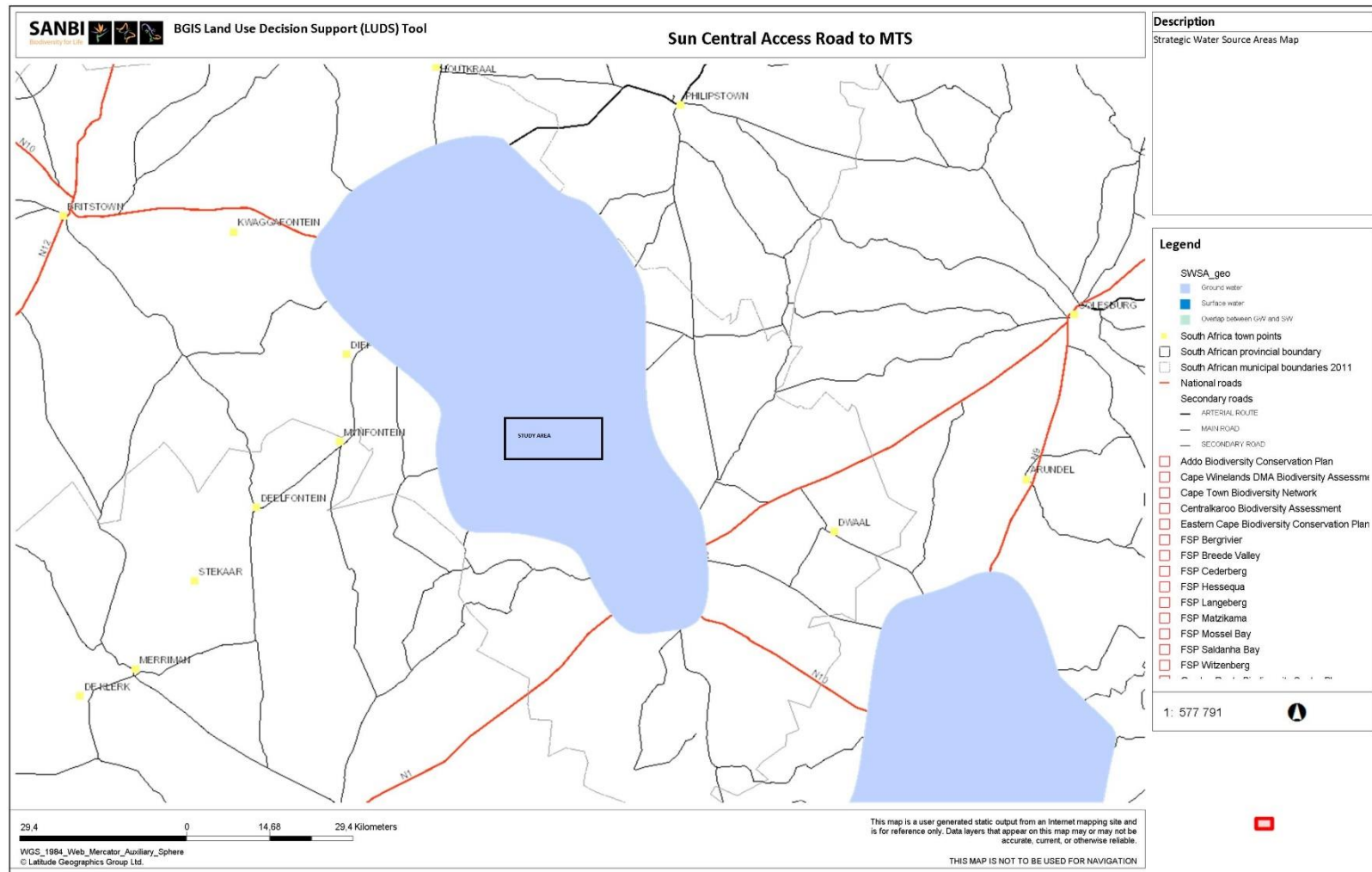
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### *Surface Water (Hydrology)*

- Both Alternative Routes are located within a Strategic Water Source Area (**Figure 6**).  
Alternative Route No. 1 (preferred)
- The project falls within quaternary catchment D62D of the Orange Water Management Area (WMA) (DWS, 2016). The topography of the study area is generally flat with elevations on the site typically ranging from 1310 to 1370 metres above mean sea level (mamsl) (Hydrology Assessment, 2023).
- Eight (8) hydrological response units (HRUs) describe the natural drainage for the study area (Hydrology Assessment, 2023).
- The HRUs delineated correspond well to known non-perennial rivers and drainage lines associated with the project area. Drainage in the HRUs is towards the northwest in the form of a multitude of non-perennial drainage lines, which drains towards the non-perennial Brak River, of which the proposed consolidated access road to MTS will cross. The Brak River and a tributary thereof (bounding the Sun Central 1 development) are the only recognised water courses in the area (Hydrology Assessment, 2023).
- Topography data and Google imagery were used to delineate several ephemeral drainage lines, which contribute to the overall drainage of the Brak River. It was observed that there are potentially two (2) ephemeral drainage line crossings, associated with the proposed road: the district road crosses the non-perennial Brak River and an ephemeral stream (Hydrology Assessment, 2023).
- A flood line assessment was undertaken to evaluate potential flooding risks associated with the non-perennial drainage lines in the study area. The results indicated that the area is prone to exhibiting ponded flood occurrence zones, in the absence of clearly defined drainage channels or streams. This is due to the micro-catchment style drainage associated with the project area. The absence of clearly defined drainage channels or flow paths was confirmed in the field. Instead, sheet flow from micro-sub catchments towards lower topographical areas or isolated depressions form temporarily flooded areas. Irregular occurrences of ponded water were visible across the project area, even in areas with no defined drainage lines or stream channels (Hydrology Assessment, 2023).
- The flood lines suggest a low flooding risk associated with the project area, as no clearly defined drainage lines occur. Micro-sub catchment sheet flow towards lower laying areas within the non-perennial river flood plains is likely to dominate flood propagation, and isolated flooded areas are predicted to occur. As such, no clearly defined exclusion zones/protection buffer areas could be mapped.

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**Figure 6.** Strategic Water Source Areas (bgisviewer.sanbi.org, 2017).

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### *Groundwater (Geohydrology)*

- De Aar is dependent on groundwater for agriculture and drinking water (District Municipality’s Climate Change Response Plan).
- The project area overlies a moderate to high yielding aquifer (median yields of 0,5 to 2 l/sec), on average 6,9 m below ground level, and generally in bedding planes in shale or interbedded sandstone of the Beaufort Group and jointed and fractured contact zones between sedimentary rocks and dolerite dykes (Hydrology Assessment, 2023).
- Borehole No. 13 (in sub-catchment HRU4) and Solar Borehole No. 5 (in sub-catchment HRU5) have been identified for water use during the construction and operation of Cluster 1.
- Borehole 13 (-30.859654; 24.317973) is 1321 mamsl, the collar is 0.56 m. The water level is 3.725 mbcl and the pump is installed at 24 mbgl (the depth of the hole is 28 m) so the available drawdown is 20.275 m (Geohydrological Assessment, 2022).
- Solar Borehole 5 (-30.88434; 24.31464) is 1335 mamsl, the collar is 0 m. The water level is 10.23 mbcl and the pump is installed at 18 mbgl (the depth of the hole is 18 m) so the available drawdown is 7.77 m (Geohydrological Assessment, 2022).
- According to the DWAF 1996 Target Water Quality Range (TWQR) for potable use, the groundwater from BH13 is suitable for domestic use, having a pH of 6.9. Only the EC of 75.5 mS/m and dissolved Calcium of 89 mg Ca/l exceed the DWAF TWQR (0 – 70 mS/m and 0 – 32 mg Ca/l, respectively) (Geohydrological Assessment, 2022).
- Similarly, the groundwater abstracted from Solar Borehole No. 5 is suitable for domestic use with a pH of 6.7. Four water quality parameters exceeded the DWAF TWQR, specifically EC (82.7 mS/m > 70 mS/m DWAF TWQR), TDS (466 mg/l > 450 mg/l DWAF TWQR), Dissolved Ca (94 mg Ca/l > 32 mg Ca/l DWAF TWQR) and Dissolved Mg (37 mg Ca/l > 30 mg Ca/l DWAF TWQR) (Geohydrological Assessment, 2022).
- The sustainable yield of Borehole No. 13 in sub-catchment/HRU 4 is 6.64 l/sec (for 8hrs per 24hr day of pumping only), which is equivalent to 191.23 m3/day or 5 736.96 m3/month (Geohydrological Assessment, 2022).
- The sustainable yield of Solar Borehole No. 5 in sub-catchment/HRU 5 is 0.23 l/sec (for 8hrs per 24hr day of pumping only), which is equivalent to 6.62 m3/day or 198.72 m3/month (Geohydrological Assessment, 2022).
- The sustainable abstraction yield from both boreholes for Cluster 1 is therefore 197 m<sup>3</sup> (Geohydrological Assessment, 2022).
- Water scarcity in the arid Pixley Ka Seme District Municipality is expected to be exacerbated by climate change, specifically drought. Most of the province receives minimal summer rainfall ranging from 50 mm to 400 mm depending on the location. Under a low climate change mitigation scenario (Climate Change Adaptation Response Strategy for the Northern Cape, 2016), model simulations indicated an average temperature increase by 2.3 °C, an increase of 16.1 in the total number of heat waves experienced and a decrease in rainfall to 17 mm - 74.3 mm annually.
- The projected rainfall for the area because of climate change is estimated to decrease by as much as 150 mm, reducing the total rainfall to about 170 mm/yr by 2050. It should be noted that the projected changes in the annual average number of extreme rainfall days or events throughout the district over the period 2021-2050 (under the RCP 8.5 scenario) is expected to decrease or increase. It is anticipated that under the scenarios put forth, the groundwater



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resources in the project area may become completely replenished in the event of 1:50 and 1:100-year storm events that occur in the project area (Hydrology Assessment, 2023).

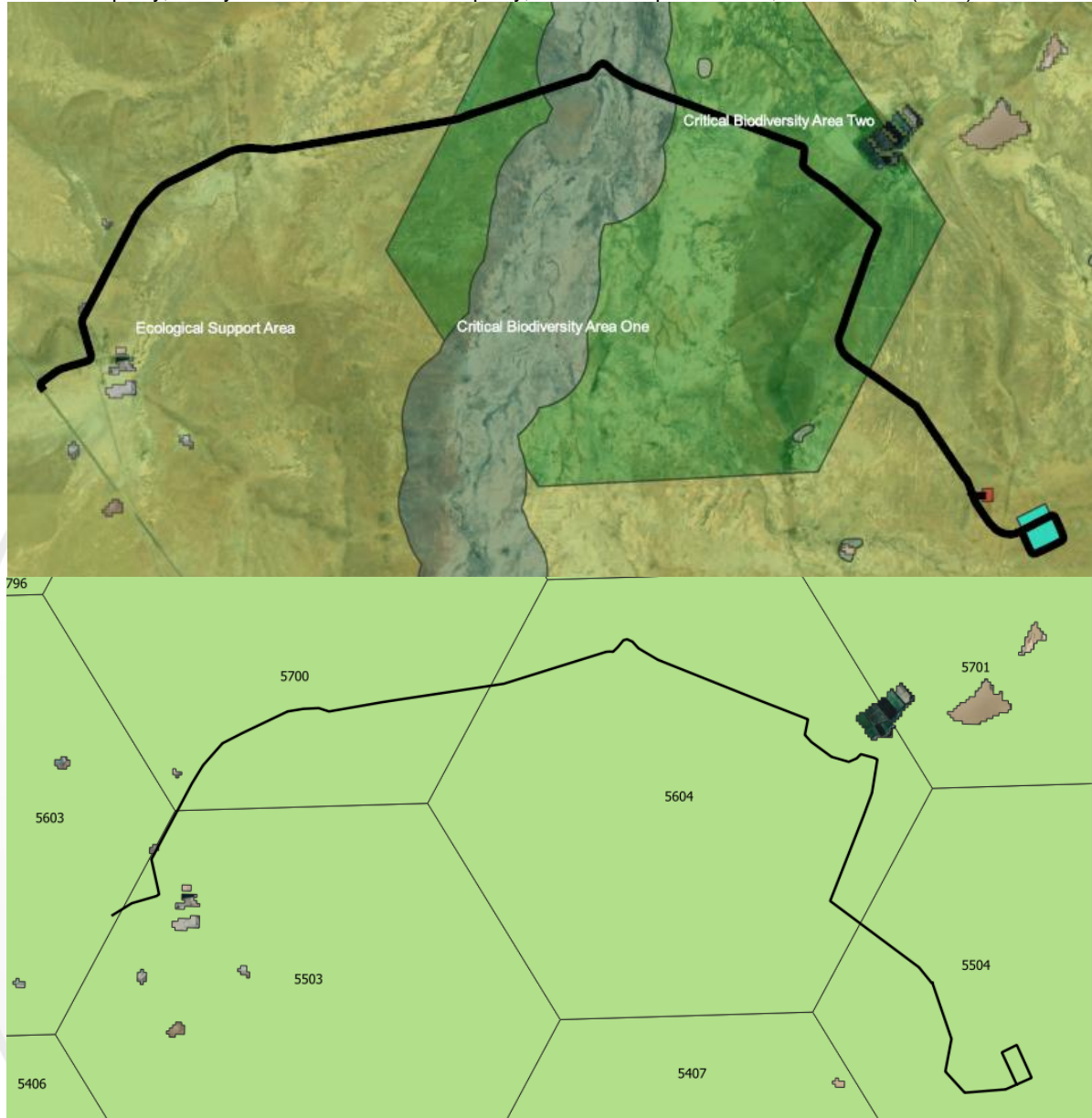
### *Terrestrial Biodiversity*

- The Terrestrial Biodiversity theme for both Alternative Routes is **Very High** because both road alignments intersect a Critical Biodiversity Area 1 (CBA1), a Critical Biodiversity Area 2 (CBA2), an Ecological Support Area (ESA) and NFEPA sub-catchments. Alternative Route No. 2 is further located in a National Protected Area Expansion Strategy (NPAES).
- The Northern Cape CBA Map identifies biodiversity priority areas, called Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) which, together with protected areas, are important for the persistence of a viable representative sample of ecosystems and species, as well as the long-term ecological functioning of the landscape. The Critical Biodiversity Areas of the Northern Cape: Technical Report (2016) by Dr Stephen Holness & Enrico Oosthuysen, has been adopted (pers. comm. Elsabe Swart, DENC). There is no Bioregional Plan for the Pixley Ka Seme District Municipality District (pers. comm. Elsabe Swart, DENC).
- **Why was this area identified as a CBA1, CBA2 and an ESA, ... what ecological processes do we need to take into consideration?**  
For example, ESAs are meant to support the ecological functioning of CBAs through its provision of supporting ecological processes (along ecological process pathways) or even meet biodiversity targets for ecological processes that have not been met in the CBA. So, ESAs and CBAs are inextricably linked. Logically then, the nature and life history strategies of the biodiversity features (- that are the subject of the biodiversity targets, which need to be met in a CBA) will influence the nature of the supporting ecological processes that need to be protected in the ESA. As long as a person doesn't know what ecological processes (and pathways) need to be protected, one cannot assess the impacts of the proposed access road on this ESA and come up with appropriate mitigations, to avoid, minimise, etc., and then determine the residual impact.

#### **Answer**

- So, the study area falls within a CBA1 because the Brak River has been identified as having FEPA River Ecosystem Type status according to the **Freshwater Ecosystem Protected Areas (FEPA) map for the area** (Phase 1 Aquatic Report October 2017) and all FEPA prioritised rivers and wetlands have a minimum category of CBA1. All FEPA prioritised wetland clusters have minimum category of CBA2, and natural non-FEPA wetlands and larger rivers have minimum category of ESA (Avifauna Final EIA Report prepared by Sam Laurence of Enviro-Insight cc, dated October 2022).
- Additional insight is provided by the “reasons” layer (**Northern Cape CBA “reasons” spatial data, SANBI BGIS**) of the Northern Cape CBA Map as it provides a list of biodiversity and ecological features found in each planning unit used in the spatial analysis, and which contribute to the biodiversity target (**Figure 7**).

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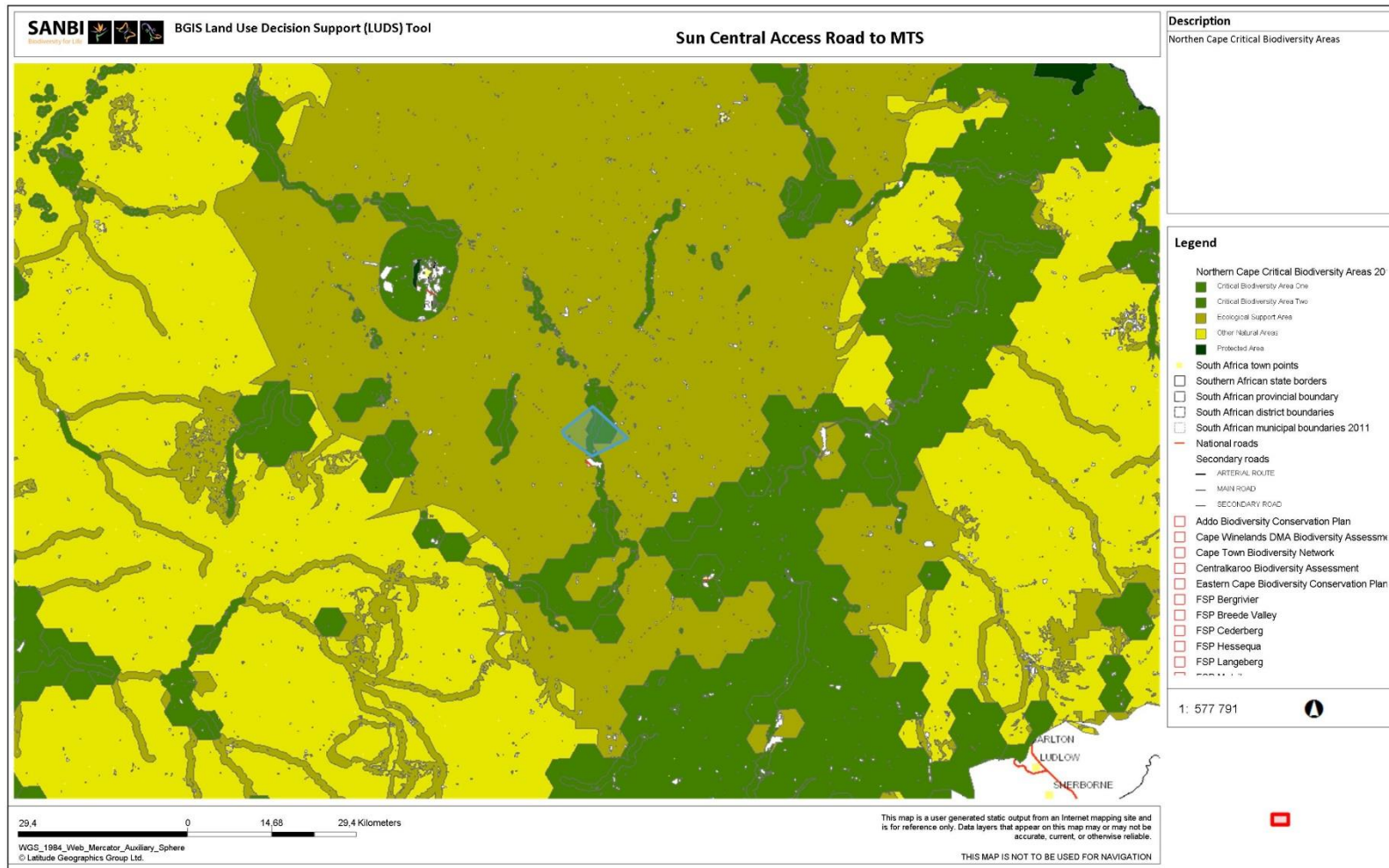
**Figure 7.** The Biodiversity Priority Areas (above) and planning units (below) intersected by the alignment of the preferred Alternative Route No. 1.

The planning units have the following biodiversity and ecological features:

- **UNIT ID 5503** - Besemkaree Koppies Shrubland, Northern Upper Karoo, Conservation Areas, IBA Platberg-Karoo Conservancy, All natural wetlands, All wetland FEPAS, All Rivers, FEPA 500 m, FEPA catchment.
- **UNIT ID 5700** - Northern Upper Karoo, Conservation Areas, and IBA Platberg-Karoo Conservancy.
- **UNIT ID 5604** - Northern Upper Karoo, Conservation Areas, IBA Platberg-Karoo Conservancy, All natural wetlands, All wetland FEPAS, All Rivers, FEPA 500 m, FEPA catchment.
- **UNIT ID 5504** - Northern Upper Karoo, IBA Platberg-Karoo Conservancy, All natural wetlands, All wetland FEPAS, All Rivers, FEPA catchment.

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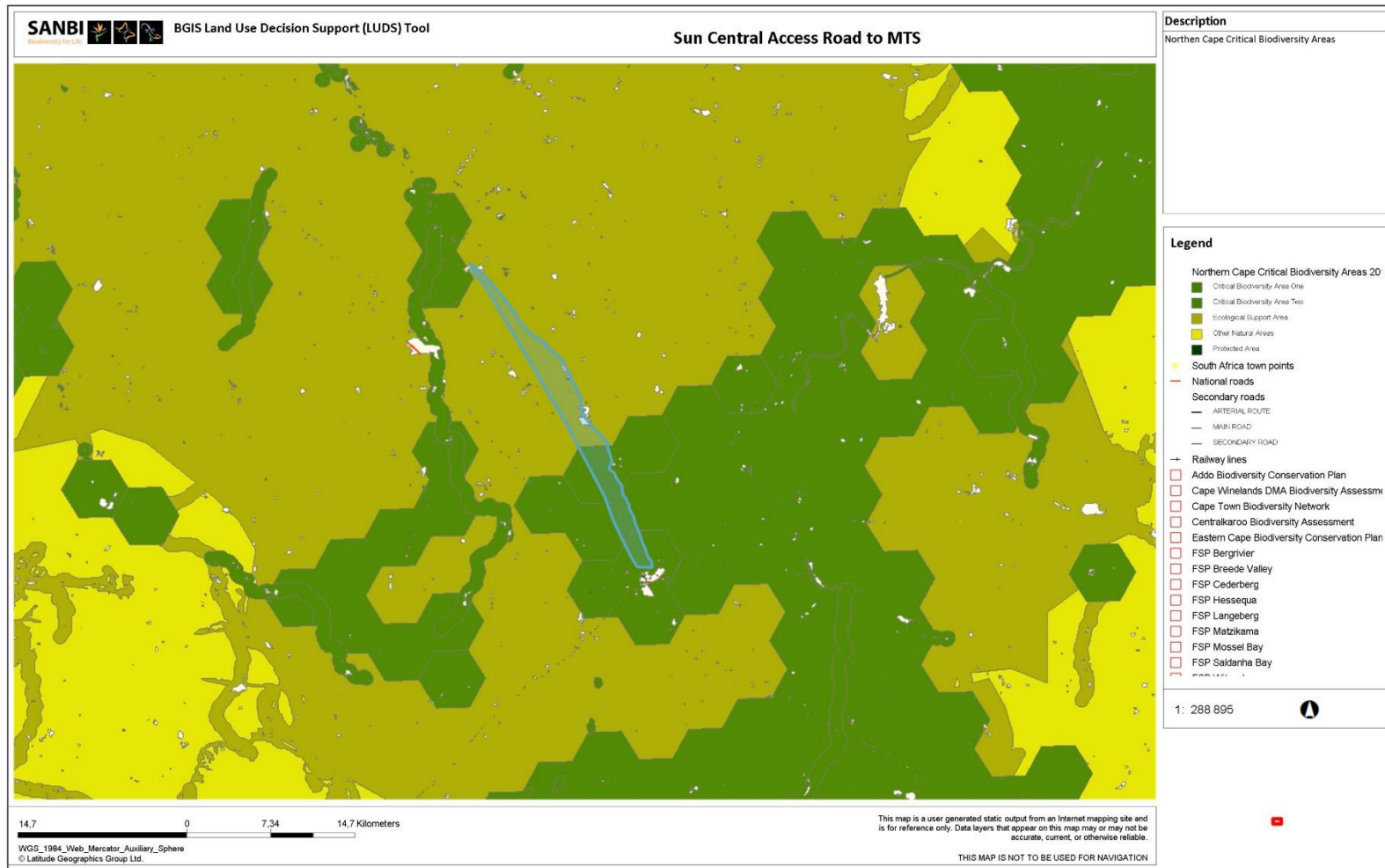


**Figure 8.** Alternative Route No. 1 (preferred) relative to the Northern Cape Critical Biodiversity Areas (CBA1, CBA2 and ESA).

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**Figure 9.** Alternative Route No. 2 relative to the Northern Cape Critical Biodiversity Areas (CBA1, CBA2 and ESA).

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*Aquatic Biodiversity*

- The **Aquatic Biodiversity theme** for both Alternative Routes is **Very High** because the study area is within a Strategic Water Source Area, National Freshwater Ecosystem Priority Area (NFEPA) “Wetlands and Estuaries” and “Rivers” and FEPA quaternary catchments. This was confirmed during the site sensitivity verification.
- The Brak River and a tributary (unnamed FEPA drainage line D62D – 05610 SQ bounding the Sun Central 1 development) are the only recognised water courses impacted by Alternative Route No. 1 (Hydrology Assessment, 2023).

**Brak River:**

**Extent of Drainage Line D62D – 05610 SQ:**

The 9,0 km-long unnamed FEPA drainage line D62D – 05610 SQ is a tributary of the Brak River, located in an Upstream Management Area (UMA). UMAs are adjacent sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPAs, specifically the Brak River. The area surrounding this drainage line is classified as an Ecological Support Area (ESA). The desired management objective for an ESA is to be maintained in a natural, functional state. Limited loss of ecosystems or functionality is acceptable, as long as the present ecological state is not lowered (Aquatic Assessment, 2017).

According to the Land-Use Decision Support Tool (LUDS) the FEPA River ecosystem type of D62D – 05610 is either an “Upper Nama Karoo\_Channelled valleybottom wetland”, “Upper Nama Karoo\_Flat” or an “Upper Nama Upper Nama Karoo\_Unchannelled valleybottom wetland”. However, the field assessment revealed that drainage line D62D – 05610 SQ is discernible only as a slightly shallow depression with no clear associated vegetation and slightly clayey soils. Dwarf karroid scrub and tufted grass are the only vegetation present in this drainage area. It is in a good condition despite some weirs and diversion walls in the catchment (Aquatic Assessment, 2017).

**Table 2.** Applicable biodiversity features or other sensitivity categories with definitions and desired management objectives.

Biodiversity Feature	Description	Desired State and compatible land uses
CBA1 and CBA2 – Technical Guidelines for CBA Maps (2017) (SANBI)	Areas that are irreplaceable or the best option for meeting biodiversity targets relating to ecosystems, species and/or ecological processes.	Maintain in a natural or near natural ecological condition.

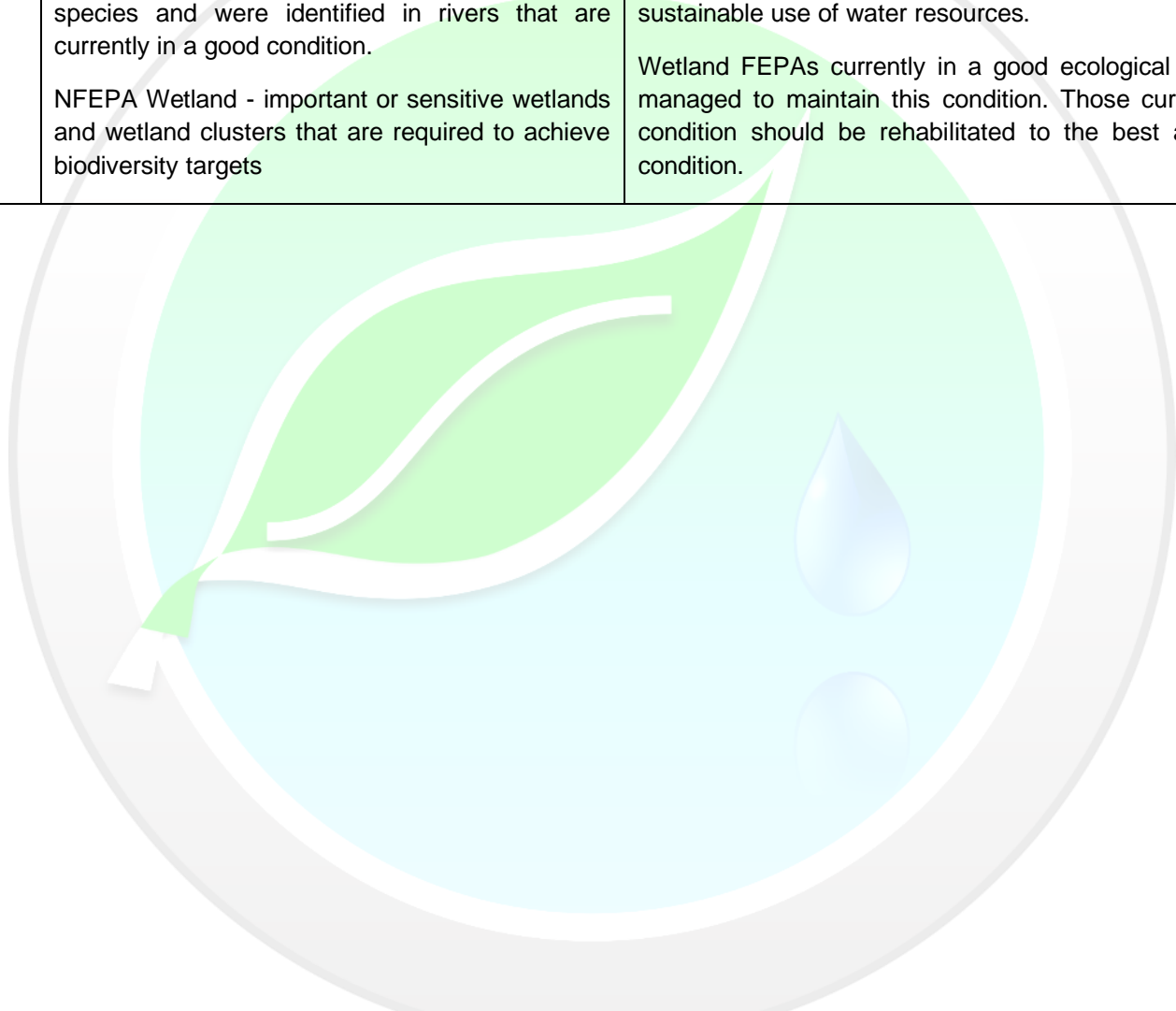
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<p>ESA – Technical Guidelines for CBA Maps (2017) (SANBI)</p>	<p>An ESA is an area that must retain its ecological processes to:</p> <ul style="list-style-type: none"> <li>• meet biodiversity targets for ecological processes that have not been met in CBAs or protected areas.</li> <li>• meet biodiversity targets for representation of ecosystem types or species of special concern when it is not possible to meet them in CBAs.</li> <li>• support ecological functioning of a protected area or CBA (e.g., protected area buffers); or a combination of these).</li> </ul> <p>See <b>Figure 10</b> below.</p>	<p>To be managed to maintain near natural landscapes with minimal loss in ecosystem integrity and functioning.</p> <p>Spatially explicit corridors must be managed to maintain function and structure, especially for aquatic systems.</p> <p>Buffers to be managed to limit transformation with particular emphasis on maintaining ecological process that require large areas.</p> <p>For ESAs currently in good or fair ecological condition: Maintain in at least fair (semi-natural) condition.</p> <p>For ESAs currently in severely modified ecological condition: No further deterioration in ecological condition (e.g., through intensification of land use).</p>
<p>Strategic Water Source Area.</p>	<p>Strategic Water Source Areas (SWSAs) are defined as areas of land that either:</p> <p>(a) supply a disproportionate (e.g., relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or</p> <p>(b) have high groundwater recharge and where the groundwater forms a nationally important resource; or</p> <p>(c) areas that meet both criteria (a) and (b).</p> <p>They include transboundary Water Source Areas that extend into Lesotho and Swaziland.</p>	<p>The protection and restoration of strategic water source areas is of direct benefit to all downstream users. This dependence needs to be considered in decisions relating to these primary headwater catchments.</p> <p>The protection of both water quantity (flows) and quality must be addressed. Any failure to address impacts on water quality or quantity will have impacts on the water security of all those depending on that water downstream.</p> <p>Groundwater is the main or only source of water for numerous towns and settlements across the country so protecting the capture zone, specifically for municipal supply well-fields, the recharge area, and the integrity of the aquifers is important as well.</p>

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<p>NFEPA Rivers and Wetlands</p>	<p>NFEPA River - achieve biodiversity targets for river ecosystems and threatened/near-threatened fish species and were identified in rivers that are currently in a good condition.</p> <p>NFEPA Wetland - important or sensitive wetlands and wetland clusters that are required to achieve biodiversity targets</p>	<p>Their FEPA status indicates that they should remain in a good condition to contribute to national biodiversity goals and support sustainable use of water resources.</p> <p>Wetland FEPAs currently in a good ecological condition should be managed to maintain this condition. Those currently not in a good condition should be rehabilitated to the best attainable ecological condition.</p>
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CBA Map category	Description	Desired state	Examples of compatible land uses
<b>Protected area</b>	Areas that are formally protected in terms of the Protected Areas Act. Each protected area has a management plan.	As per each protected area’s management plan.	• Conservation-related land uses
<b>Critical Biodiversity Area 1 (CBA 1)</b>	Areas that are irreplaceable for meeting biodiversity targets. There are no other options for conserving the ecosystems, species or ecological processes in these areas.	Maintain in natural or near natural ecological condition.	• Open space • Low impact ecotourism or recreation
<b>Critical Biodiversity Area 2 (CBA 2)</b>	Areas that are the best option for meeting biodiversity targets, in the smallest area, while avoiding conflict with other land uses.		
<b>Ecological Support Area 1 (ESA 1)</b>	Areas that support the ecological functioning of protected areas or CBAs, or provide important ecological infrastructure.	Maintain in at least semi-natural ecological condition.	• Low impact ecotourism or recreation • Sustainably managed rangelands • Certain forms of low density housing
<b>Ecological Support Area 2 (ESA 2)</b>		No further intensification of land use.	• Intensive agriculture
<b>Other natural area (ONA)</b>	Natural or semi-natural areas that are not required to meet biodiversity targets or support natural ecological processes.	Best determined through multi-sectoral planning processes.	From a biodiversity perspective, these areas can be used for a range of intensive land uses
<b>No natural remaining (NNR)</b>	Areas in which no natural habitat remains.		

**Figure 10:** CBA Map category descriptions and desired state with associated land uses (Technical Guideline for CBA maps – SANBI, 2017).

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### Biological aspect:

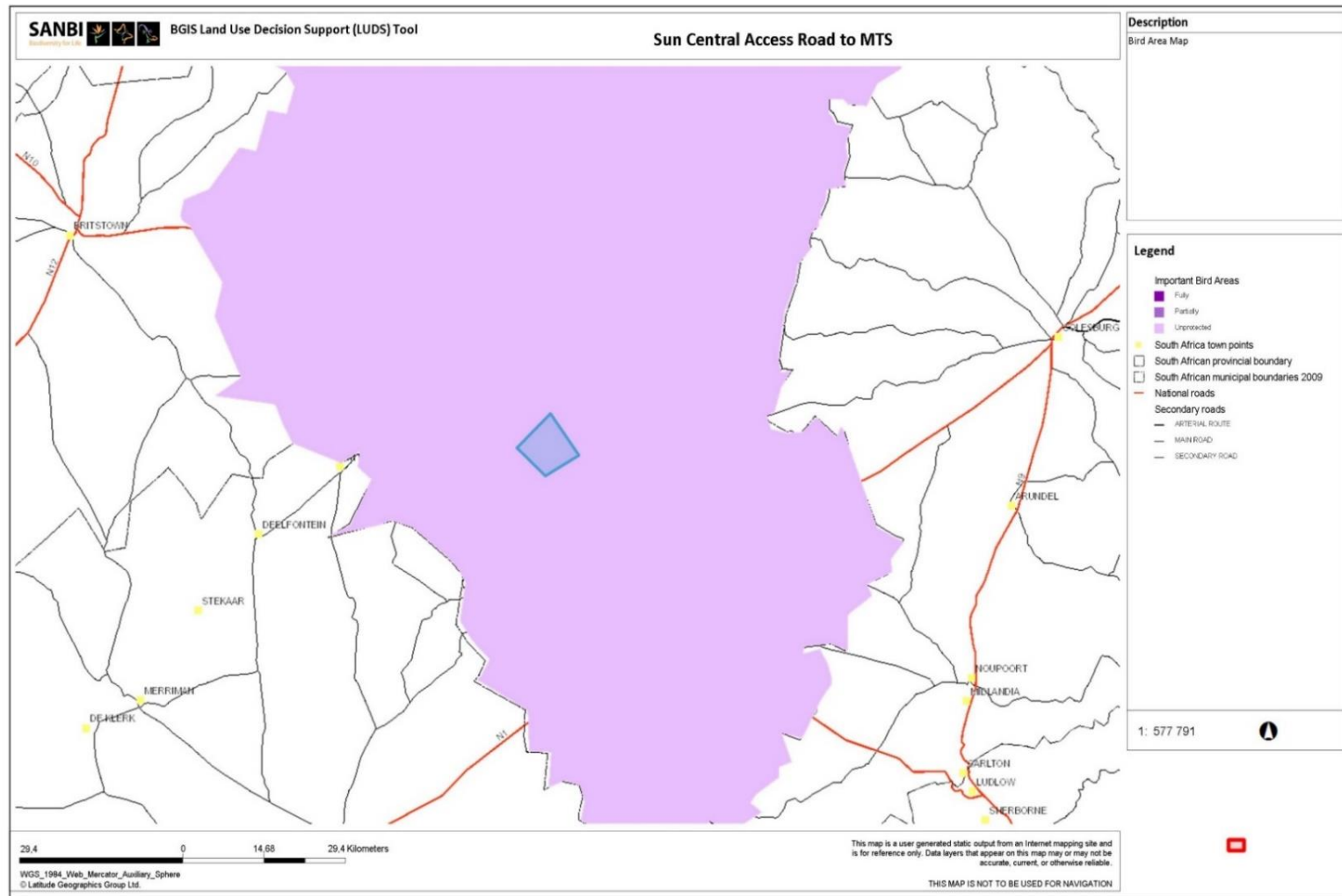
#### *Ecosystem/Vegetation Type*

- Both Alternative Routes fall within the Nama Karoo biome.
- The vegetation types are the Northern Upper Karoo and the Besemkaree Koppies Shrubland (Mucina & Rutherford, 2006).
- The Northern Upper Karoo vegetation type contains shrublands that are dominated by dwarf karoo shrubs and *Acacia mellifera detinens* (Mucina & Rutherford, 2006)
  - The biogeographically important taxa include Herb (western distribution limit): *Convolvulus boedeckerianus*. Tall Shrub (southern limit of distribution): *Gymnosporia szyszylowiczii* subsp. *namibiensis*.
  - The endemic taxa include Succulent Shrubs: *Lithops hookeri*, *Stomatium pluridens*. Low Shrubs: *Atriplex spongiosa*, *Galenia exigua*. Herb: *Manulea deserticola*.
- Besemkaree koppies Shrubland
  - endemic taxa in: Small Tree: *Cussonia* sp. Succulent Shrubs: *Euphorbia crassipes*, *Neohenricia sibbettii*, *N. spiculata*.
- Not a critically endangered or endangered ecosystem in terms of SANBI’s latest NBA (2021). The ecosystem threat status as per the NBA 2021 data provides a holistic view of the vegetation type, the threatened species associated with the ecosystem and the overall land use currently in the area. The National vegetation type is Northern Upper Karoo and is considered Least Concern in the National List of Threatened Ecosystems (NBA, 2021). However, the Ecosystem Protection Level for the Northern Upper Karoo is categorised as Poorly Protected Ecosystem (NBA, 2021). Less than 2,9% of the area is statutorily conserved (protected), compared with the national conservation target of 21%. Although none of this vegetation type is conserved in statutory conservation areas, very little has been cleared for cultivation or irreversibly transformed (99,7% Remaining) through human settlement or infrastructure development. (Visual Assessment).
- Although no alien invasive plant species are said to be within the study area (bgisviewer.sanbi.org, 2012), Mexican Poppy *Argemone mexicana* was observed along the verge of the public district roads during the site sensitivity verification.

#### *Important Bird Area*

- Both Alternative Routes fall within an Important Bird Area (IBA) called Platberg-Karoo Conservancy (unprotected) (bgisviewer.sanbi.org, 2015) (**Figure 11 and 12**)
- The study area occurs in the Platberg-Karoo Conservancy (SA037) Important Bird and Biodiversity Area (IBA). The Platberg-Karoo Conservancy IBA covers c. 1240 000 ha and is in the Northern Cape Province with a protected status of “Unprotected”. A total of 289 bird species have been recorded in the IBA during SABAP2. (*Avifauna Final EIA Report prepared by Enviro-Insight CC (Sam Laurence and A.E. van Wyk) dated October 2022*).

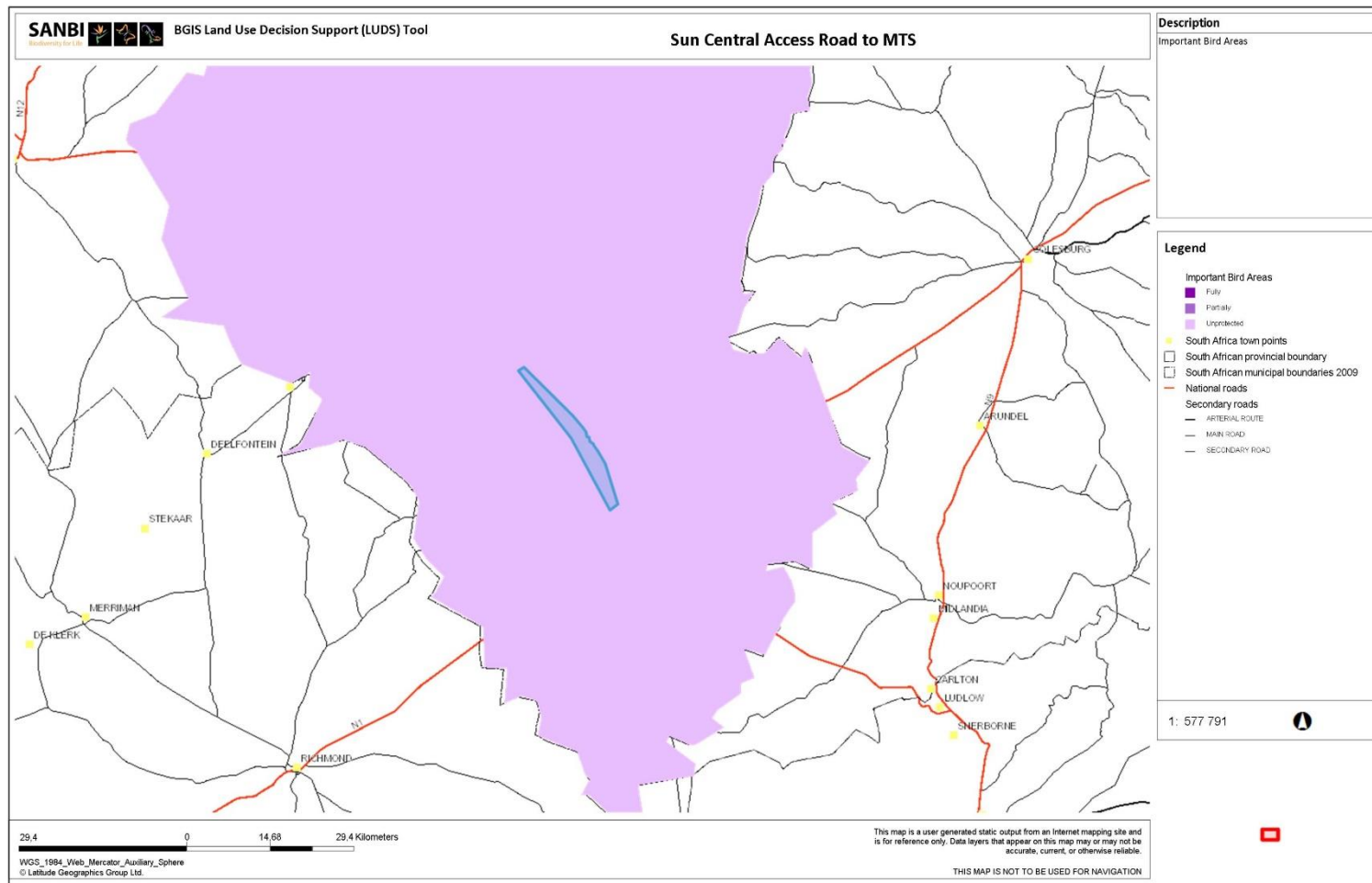
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**Figure 11:** Alternative Route No. 1 (preferred) relative to the Important Bird Area.

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**Figure 12:** Alternative Route No. 2 relative to the Important Bird Area.

- The IBA trigger species are:

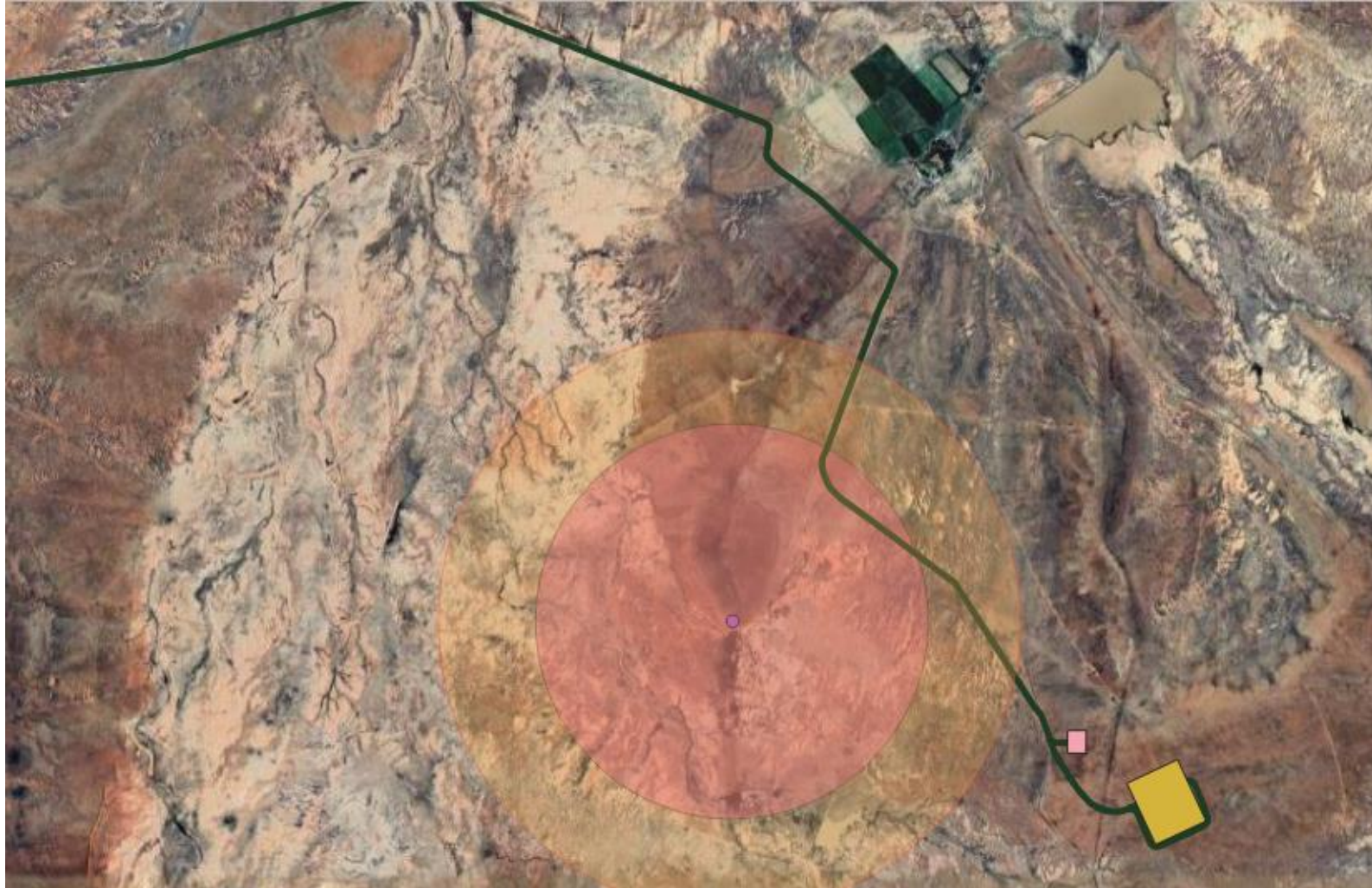
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- Globally threatened species are Blue Crane, Ludwig's Bustard, Kori Bustard, Secretary bird, Martial Eagle, Blue Korhaan, Black Harrier (*Circus maurus*) and Denham's Bustard (*Neotis denhami*). Regionally threatened species are Black Stork, Lanner Falcon (*Falco biarmicus*), Tawny Eagle, Karoo Korhaan and Verreauxs' Eagle.
- Biome-restricted species include Karoo Lark (*alendulauda albescens*), Karoo Long-billed Lark (*Certhilauda subcoronata*), Karoo Chat (*Cercomela schlegelii*), Tractrac Chat (*C. tractrac*), Sickle-winged Chat (*C. sinuata*), Namaqua Warbler (*Phragmacia substriata*), Layard's Tit-Babbler (*Sylvia layardi*), Pale-winged Starling (*Onychognathus nabouroup*) and Black-headed Canary (*Serinus alario*). Congregatory species include Lesser Kestrel and Amur Falcon (BirdLife website; <https://www.birdlife.org.za/iba-directory/platberg-karoo-conservancy> - page last updated Friday 13<sup>th</sup> February 2015)
- Eighty-four (84) bird species were observed within and around the Combined Project Area out of an expected total of 104 species, based on previous surveys, the SABAP Pentad analysis and habitat suitability, based Probability of Occurrences. Seventeen (17) priority species are expected to occur within and surrounding the study area. Thirteen (13) of the seventeen (17) expected priority species were confirmed within the Project Area of Influence (PAOI) (Phases 1 – 3), including some of the IBA trigger species such as **Blue Crane, Ludwig's Bustard, Kori Bustard, Secretary bird, Martial Eagle, Lanner Falcon, Tawny Eagle, Karoo Korhaan and Verreauxs' Eagle** (*Avifauna Final EIA Report prepared by Enviro-Insight CC (Sam Laurence and A.E. van Wyk) dated October 2022*).
- The most significant breeding habitat recorded during the survey were the active Verreaux's Eagle and Tawny Eagle nests (**Figure 13**). The nesting site is at this stage the highest sensitivity found within proximity of the study area (*Avifauna Final EIA Report prepared by Enviro-Insight CC (Sam Laurence and A.E. van Wyk) dated October 2022*).
- Verreaux's Eagles breed with one partner for their entire life, and only replace a partner in the event of death. **Mating takes place all year round and egg-laying season is between April and July.** Verreaux's Eagles produce one to two eggs per clutch. Incubation lasts 38–41 days and is done by the female while the male provides food. In cases where two eggs are laid, the eggs usually hatch about four days apart. The older chick will normally attack and harass the younger chick until it dies. It is for this reason that Verreaux's Eagles rarely raise two chicks despite laying two eggs. The surviving chick leaves the nest after 12 weeks and is forced out of the territory by the parents ([Verreaux's Eagle - SANBI](#) article prepared by Mandisa Kondlo and Thato Moeketsane of Walter Sisulu National Botanical Garden on September 2014).



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**Figure 13.** The portion of the preferred Alternative Route No. 1 that is within the 1 km buffer of the Verreaux Eagle’s nest – orange outer layer is approx. 1.5 km.

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- The **Animal Species theme** for both Alternative Routes is **High** owing to the presence of birds (**Table 3**). This rating is motivated as **Medium** in the site sensitivity verification report as the Avian theme is dealt with separately.

**Table 3.** Biodiversity Features used in rating the sensitivity of the Animal Theme (**High**) for Alternative Routes No. 1 and No. 2.

Sensitivity	Biodiversity Features for Alternative Route No. 1 (preferred)	Biodiversity Features for Alternative Route No. 2
High	<i>Aves-Aquila rapax</i> (Tawny Eagle)	<i>Aves-Aquila rapax</i>
High	<i>Aves-Cursorius rufus</i> (Burchell’s Courser)	<i>Aves-Cursorius rufus</i>
High	<i>Aves-Neotis ludwigii</i> (Ludwig’s Bustard)	<i>Aves-Neotis ludwigii</i>
Low	Subject to confirmation	Subject to confirmation
Medium		<i>Aves-Hydroprogne caspia</i>
Medium	<i>Aves-Aquila rapax</i>	<i>Aves-Aquila rapax</i>
Medium		<i>Aves-Neotis ludwigii</i>

- The **Plant Species theme** for both Alternative Routes is **Low**. This was confirmed during the site sensitivity verification.

**Table 4.** Applicable biodiversity features or other sensitivity categories with definitions and desired management objectives.

Biodiversity Feature	Description	Desired State and compatible land uses
Important Bird Area Platberg-Karoo Conservancy (unprotected)	IBAs are sites of global significance for bird conservation, identified nationally through multi-stakeholder processes using globally standardised, quantitative, and scientifically agreed criteria. Essentially, these are the most important sites for conserving.	IBAs are sites for conservation action and obtaining formal protection. Activities in IBA should be aligned to conservation outcomes of the protected area and should include developments such as low-impact eco-tourism.
<i>Aves-Neotis ludwigii</i> (EN) BirdLife International (2022) Species factsheet: <i>Neotis ludwigii</i> . Downloaded from <a href="http://www.birdlife.org">http://www.birdlife.org</a> on 30/03/2022 ( <a href="http://datazone.birdlife.org/species/factsheet/ludwigs-bustard-neotis-ludwigii">http://datazone.birdlife.org/species/factsheet/ludwigs-bustard-neotis-ludwigii</a> )	Endangered and Vulnerable species in terms of the Conservation of Nature (IUCN) Red List of Threatened Species.  Levels of threat are determined against quantitative threshold-based criteria. South Africa uses the latest version of the IUCN Red List Categories and Criteria, version 3.1. (IUCN,	Building solar arrays (a linked assembly of heliostats) outside known water bird flightpaths.  Constructing new powerlines in such a way that they have minimal impact on birds (e.g., bird-friendly designs, appropriate wire marking devices).

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	<p>2012a). Protection level of species measures progress towards effective protection of a population persistence target for each species. The indicator consists of two components: (1) The first measures how well represented each species is within the protected area network, based on the number of individuals of a species or area of suitable habitat protected relative to the persistence target set for that species. (2) Component two includes a measure of how well a protected area is mitigating threats to each species and when combined with protected area representation provides an overall (effective) protection level measure for each species.</p>	
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### Social aspect:

- The project area is in Ward 6 of the Emthanjeni Local Municipality that is in the Pixley Ka Seme District Municipality in the Northern Cape province. Emathanjeni municipality is a category B municipality which consist of three towns namely, De Aar, Hanover, and Britstown (PixleyKaseme, 2021). Emathanjeni is known to be the seat of the district with its main town De Aar which was given the name De Aar due to its many water-bearing arteries that occur underground. De Aar represents 3,7% of the total population of the province (PixleyKaseme, 2021).
- Both Alternative Routes are located between the towns of Hanover and De Aar. About 74% of the people in Ward 6 live in urban areas while the remaining 26% (one quarter) live on farms and Emathanjeni local municipality has the highest population (Integrated Development Plan: Pixley Ka Seme District Municipality 2021-2022). There are no areas under traditional leadership in the district and the site is surrounded by commercial farms. (Social Scoping Report prepared by Equispectives Research & Consulting Services dated April 2022)
- At a local municipal level, the number of households increased (between 2011 and 2016) along with population density (per km<sup>2</sup>), but the average household size has decreased (more households but with fewer members) possibly due to children leaving home and starting families of their own. Almost half the population in Ward 6 and the local municipality is 24 years or younger. Such a young population places a lot of pressure on resources and infrastructure of the area, and a great demand for future infrastructure as well as the creation of livelihoods can be expected. (Social Scoping Report prepared by Equispectives Research & Consulting Services dated April 2022).
- The intensity of poverty and the poverty headcount is used to calculate the SAMPI score. A higher score indicates a very poor community that is deprived on many indicators. Despite a slight decrease in poverty intensity (average proportion of indicators in which poor households are deprived), the increased poverty headcount (the proportion of households that can be defined as multidimensionally poor) at a local municipal level, has effectively doubled the SAMPI score from 0,01 in 2011 to 0,02 in 2016. This means that more households are deprived on several dimensions that mostly relate to access to basic services. Education levels are low (About two fifths (17,8%) of the people in Ward 6 aged 20 years or older have no schooling or only some primary education). In Ward 6, 45,3% of people aged between 15 – 65 years are employed, with about half of those people in the formal sector. Ward 6 has the lowest proportion of people (6,7%) with no annual household income. There are very few employment opportunities. (Social Scoping Report prepared by Equispectives Research & Consulting Services dated April 2022)

The South African Multidimensional Poverty Index (SAMPI) (Statistics South Africa, 2014) assess poverty on the dimensions of health, education, standard of living and economic activity using the indicators child mortality, years of schooling, school attendance, fuel for heating, lighting, and cooking, water access, sanitation, dwelling type, asset ownership and unemployment. (Social Scoping Report prepared by Equispectives Research & Consulting Services dated April 2022)

- Both Alternative Routes would require approval from National (SANRAL) and District Road authorities, as well as impact road users such as farmers and local residents. However, (1) a section of Alternative Route No. 2 would require special permission from adjoining farmers and wayleaves would have to be obtained, and (2) the district road 2451, which forms part of Alternative Route No. 2 cannot be accessed directly off the N10 national. Several possibilities



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were sought, but without intensely modifying sections of the road network within Hanover town itself, it is not possible to access the district road 2451 (SolarAfrica Sun Central – Access Road Study Rev 0.1 (Document Reference: SAE-PD-DA-Access Road Study 0.1 FS).

#### *Visual*

- Much of the road is existing, and those sections of new road (for both Alternative Routes) will be built according to the same gravel road specifications, ensuring it forms part of the existing rural Karoo landscape.

#### *Civil*

##### Alternative Route No. 1 (preferred)

- The Civil Aviation theme for the preferred Alternative Route is **Low** because there are no major or other types of civil aviation aerodromes within 15 km of the study area.

##### Alternative Route No. 2

- The Civil Aviation theme for Alternative Route No. 2 is **High** because the beginning of the access road (in Hanover) is within 8 km of a civil aviation aerodrome. According to the Emathanjeni Local Municipality Final Integrated Development Plan 2021/2022, De Aar town has 2 airfields, one is mostly used by the municipality and the other airfield is 12 km away from the central business district and is used by the defence force. The airfields in Britstown and Hanover have dirt runways and are not used (Emathanjeni, 2021).

#### *Defence*

- The Defence theme for both Alternative Routes is **Low** because the Department of Defence Ammunition sub-Depot De Aar, is more than 30 km away from the study area.

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### **Economic aspect:**

- The **Agriculture theme** for both Alternative Routes is **Medium**. This was confirmed during the site sensitivity verification.
- Agriculture (mostly ‘Karoo’ mutton, sheep, and wool, with some hunting of small game) forms the backbone of the economy of the Emthanjeni Local Municipality and accounts for the largest labour/employment contributor to date. (Social Scoping Report prepared by Equispectives Research & Consulting Services dated April 2022).
- The town of De Aar in the municipality has one big abattoir which is solely for sheep with a capacity of 1000 carcasses per day to supply meat (Emathanjeni, 2021).
- Surrounding farms in Hanover are mainly Merino Sheep farms with a variety of the country’s best breeders (Emathanjeni, 2021). Wool from Hanover town is exported to Port Elizabeth.
- According to the IDP, De Aar has an important weather station that can be toured by visitors, and it also has the second most important railway junction in the country.
- The Final Development Plan 2021/2022 also indicated the following economic activities that are in the municipality:
  - Service sector: Government institutions, NGOs, CBOs, and NPOs
  - Manufacturing: Rocla, Green Akker, abattoir for meat, stone crushers, and renewable energy generation
  - Agriculture: Game farming, sheep, goat, pig, and cattle farming
  - Transport: Rail infrastructure and road infrastructure
  - Tourism
- Alternative Route No. 2 is in a worse state of disrepair, requiring more significant repair and rebuilding (25.7 km) compared with the preferred Alternative Route No. 1 (14.1 km) (SolarAfrica Sun Central – Access Road Study Rev 0.1 (Document Reference: SAE-PD-DA-Access Road Study 0.1 FS)).

**Basic Assessment Report:** Upgrading & Development of an Access Road from the N10/'Burgerville' District Road (2448) Turn-Off into the Farm Riet Fountain No. 39C and to the Switching Station and Main Transmission Substation on Sun Central Cluster 1 (300 MW) Solar PV Facility between De Aar & Hanover, Emthanjeni Local Municipality, Pixley Ka Seme District Municipality, Northern Cape Province, South Africa (2023).

### Heritage and cultural aspect:

#### Archaeology

- The Archaeological and Cultural Heritage theme for Alternative Route No. 1 (preferred) is **Low**. However, this sensitivity rating is disputed in the Site Sensitivity Verification Report as being **High**.

Previous archaeological and heritage assessments (2017 & 2021) for Phase 1 (now referred to as Sun Central Cluster 1) recorded a fairly large number of cultural heritage (archaeological & historical) resources of varying extent and significance in the area. These include scatters of open-air surface Stone Age sites, rock engravings, later agro-pastoralist stone-walled sites, as well as historical Anglo-Boer War (1890-1902) sites. These findings are clear evidence of the intrinsic heritage value of the area, but none of the cultural heritage resources identified and recorded during these assessments were Grade I or II sites (National or Provincial Heritage Sites). Nonetheless, some of the sites recorded in 2017 and 2021 are located in relative close proximity to, but outside the access road servitude and pipeline corridors (*A Heritage Scoping Report Impact Assessment prepared by APelser Archaeological Consulting cc (APAC) dated February 2023*).

- The Archaeological and Cultural Heritage theme for Alternative Route No. 2 is **High** because the beginning of the access road (in Hanover) is within 2 km of a Grade II Heritage site, and within 150 m of a Grade IIIa Heritage site.
- The study area is not within a World Heritage Site or within 10 km of a World Heritage Site according to the PAR.

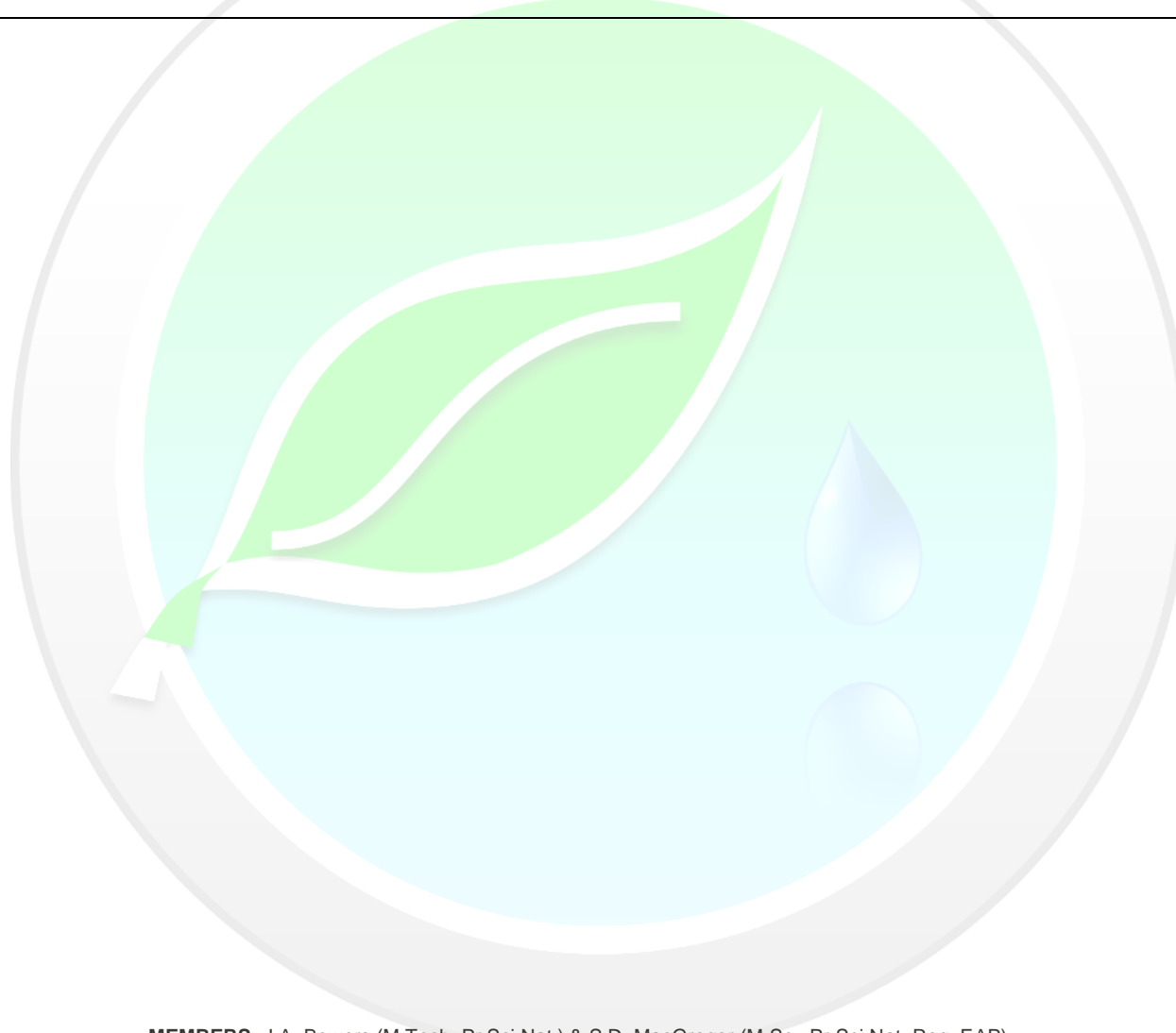
#### Palaeontology

- The Palaeontology theme for both Alternative Routes is **Very High**. However, this is motivated as **Low** in the Site Sensitivity Verification Report.

The palaeosensitivity of the project area has been provisionally rated as Very High by the DFFE Screening Tool. However, based on four successive palaeontological site visits to the broader Soventix solar project area - including, most recently, to the previously unassessed Phase 3 project areas – this sensitivity rating is *contested* in this report. No High Sensitivity fossil sites are recorded within any of the Soventix Phase 1 to Phase 3 solar project areas (including all associated infrastructure such as grid connections, substations, access roads *etc*). This is probably largely due to rarity of well-preserved fossil remains within the bedrocks concerned, the generally very poor levels of bedrock exposure (especially in flat-lying regions) as well as extensive baking of the sedimentary bedrocks by dolerite intrusions in the region. It is concluded that, in practice, all these sites – including the proposed additional infrastructure covered by the current Basic Assessment (access road, and water pipeline, *etc.*) - are of LOW Palaeosensitivity (Palaeontological

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Heritage Comment, Access Road Basic Assessment and Transmission Line Part 2 Amendment for the Sun Central Cluster 1 between De Aar & Hanover, Pixley Ka Seme District Municipality, Northern Cape Province, prepared by John E. Almond (PhD) of Natura Viva cc, and dated January 2023.).



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