Proposed Development of the KTE Water Pipeline and Associated Infrastructure and the Expansion of the Existing Kenhardt Pipeline Infrastructure from the Orange River to the Farm Uitkyk, No.889 within the Kai! Garib and Hantam Municipalities, Northern Cape

Animal Species (Birds and Mammals) Theme
Impact Assessment Report

Compiled for

EnviroAfrica

KTE.energy
Green Hydrogen Driven. Future Given.

By

Cossypha
Ecological

December 2024

REPORT PRODUCTION

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Refer to **Appendix C** for an abridged CV of the specialist.

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SPECIALIST DECLARATION OF INDEPENDENCE

I, **Robyn Phillips**, in my capacity as a specialist consultant, hereby declare that I –

- Act as an independent consultant;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998);
- Do not have and will not have vested interest in the proposed activity proceeding;
- Have no, and will not engage in, conflicting interests in the undertaking of the activity;
- Undertake to disclose, to the Competent Authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Will provide the Competent Authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not;
- As a registered member of the South African Council for Natural Scientific Professions, will undertake my profession in accordance with the Code of Conduct of the Council, as well as any other societies to which I am a member;
- Based on information provided to me by the project proponent and in addition to information obtained during the course of this study, have presented the results and conclusion within the associated document to the best of my professional ability;
- Reserve the right to modify aspects pertaining to the present investigation should additional information become available through ongoing research and/or further work in this field; and
- Undertake to have my work peer reviewed on a regular basis by a competent specialist in the field of study for which I am registered.

_____ _____

Robyn Phillips *Pr.Sci.Nat.*
Terrestrial Ecologist
SACNASP Reg. No. 400401/12

Date

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ABBREVIATIONS

CBA	Critical Biodiversity Area
CR	Critically Endangered
CSP	Concentrated Solar Power
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
En	Endemic
EN	Endangered
ESA	Ecological Support Area
GIS	Geographic Information System
GN	General Notice
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
LC	Least Concern
NEMA	National Environmental Management Act, Act 107 of 1998
NEMBA	National Environmental Management: Biodiversity Act, Act 10 of 2004
NFEPA	National Freshwater Ecosystem Priority Area
NPAES	National Protected Areas Expansion Strategy
NT	Near Threatened
NWA	National Water Act, Act 36 of 1998
PA	Protected Area
PV	Photovoltaic
QDGC	Quarter Degree Grid Cell
SABAP	South African Bird Atlas Project
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SSV	Site Sensitivity Verification
VU	Vulnerable
WULA	Water Use Licence Application

1. INTRODUCTION

Kotulo Tsatsi Energy (Pty) Ltd (KTE) are applying for an Environmental Authorisation (EA) and a water use licence to construct a bulk water provision pipeline from the Orange River to a Hydrogen production facility situated roughly halfway between Kenhardt and Brandvlei in the Northern Cape. EnviroAfrica NC has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the EA process for the proposed development of the KTE Water Pipeline and associated infrastructure and the expansion of the existing Kenhardt pipeline infrastructure from the Orange River to the Farm Uitkyk, No.889 according to the National Environmental Management Act 107 of 1998 (NEMA), and the Environmental Impact Assessment (EIA) Regulations, 2014 (GN R982, as amended by GN R326). A Water Use Licence Application (WULA) is also required in terms of the Regulations promulgated in terms of Section 26 (1) (k) of the National Water Act, Act 36 of 1998 (NWA), as amended on 19 May 2023. Cossypha Ecological was appointed to conduct an Animal Species Assessment, focussing on birds and mammals, to inform the process.

1.1 PROJECT DESCRIPTION

KTE proposes to abstract water from the Orange River on Portion 103 of Farm Neilers Drift No 34 near Keimoes. The surface water to be abstracted (10 950 000 m^3/a) by pumps from the Orange River will be conveyed via a 3.1 km long 800 mm via raw water rising main to Lennertsville village. At Lennertsville, a new 30 megalitre/day conventional water treatment facility (flocculation, sedimentation, filtration, disinfection) will be constructed as well as a new 10 megalitre storage reservoir. Here the raw water will undergo initial treatment to drinking water standards. A booster pump station will then pump the potable water through a 750 mm rising main along the R27 to a high point located approximately 28.9 km to the south to a new 3 megalitre storage reservoir. From this reservoir, water will be piped under gravity through an 800 mm gravity main located within the R27 road reserve over 63.4 km to a point approximately 20 km southwest of Kenhardt to a second storage reservoir of 3 megalitres capacity.

Approximately 70 km southwest of Kenhardt, the pipeline will turn north-west onto the Soafskolk Road (DR2985) gravel road until it reaches the fork at the Farm Steyns Vley, and then follows the DR2981 gravel road in a south-westerly direction. A second booster pump station will then pump water to an off take for a storage reservoir of 10 megalitres through a 750 mm rising main for approximately 58.9 km. This reservoir will serve to provide water to the various Renewable Energy Power Generation facilities located on the surrounding properties. The Renewable Energy Power Generation will consist of a hybrid mix of solar Photovoltaic (PV) plants, Concentrated Solar Power (CSP) plants, and wind turbines with an eventual generation capacity of 6 gigawatts. The 750 mm rising main will then transfer water to the final storage reservoir located approximately 58.1 km further on the Farm Uitkyk 5/889, which will have a capacity of 30 megalitres storage. This reservoir will serve to supply water to the Hydrogen Production Facility Treatment Plant, where Green Hydrogen will then be produced using Electrolysers, where an electric current is passed through the water, which splits the water molecule into hydrogen and oxygen gas. The hydrogen is earmarked for export from the Northern Cape via Saldana Bay using the Saldana Railway Line to Europe in the form of Ammonia (NH_3), which is easier to handle. The oxygen will be stored and sold for either industrial or medical purposes as a byproduct of the process.

From the two primary Storage Reservoirs located on the Farm Steyns Vley and the Farm Uitkyk, water will be distributed by smaller internal pump stations and pipelines to smaller 500 kilolitre capacity service reservoirs located in proximity to the various Renewable Energy Power Generation Facilities. This water will be used as service water for cleaning PV panels, drinking water for staff, and feedwater for steam generation at the CSP plants. The secondary treatment processes such as reverse osmosis and eletrodeionization are expected to generate approximately 10 279 m^3/day of brine waste consisting of the concentrated salts and minerals removed from the surface water. These by-products will be discharged into 20 large evaporation ponds located on the

Farm Uitkyk 5/889 and will have a total evaporation area of approximately 80 ha. Domestic wastewater deriving from office blocks, canteens, and toilets will also be collected in on-site conservancy tanks and abstracted by vacuum pumps into a fleet of wastewater tanker trucks. The trucks will transport the domestic wastewater to the inlet of the evaporation ponds, where it will be blended and homogenized with the brine waste and allowed to evaporate by natural process.

1.1.1 ALTERNATIVE

An alternative route for 750 mm rising main is proposed from the 10 megalitre storage reservoir at the Farm Steyns Vley to the final 30 megalitre storage reservoir located approximately 58.1 km to the south-west on the Farm Uitkyk 5/889. This route follows the preferred route along the DR2981 gravel road in a south-westerly direction for approximately 26 km before it deviates and turns in a westerly direction along a fence line for ~16 km. It then continues in a south-westerly direction for ~9.6 km until turning south for ~2.8 km to the final reservoir site.

1.2 THE STUDY AREA

1.2.1 LOCATION

The proposed 221 km bulk water pipeline occurs within the road reserve of the R27 from the abstraction point on the Orange River to the intersection of the Soafskolk Road (DR2985) gravel road (located approximately 70 km southwest of the town of Kenhardt) until it reaches the fork at the Farm Steyns Vley, and then follows the DR2981 gravel road in a south-westerly direction. From Karee Bosch Kolk, the pipeline follows minor road OG50 up to its intersection with the Sishen-Saldanha railway line and passes through an existing stormwater culvert below the railway line. The pipeline then follows the railway's service road reserve to Portion 1 of the Farm Uitkyk No.889, where the last storage reservoir is located. All these roads are administrated by the Northern Cape Department of Roads and Public Works. The majority of the pipeline route is located within the Kai !Garib Local Municipality, in the ZF Mgcawu District of the Northern Cape, while the remainder is located within the Hantam Local Municipality, in the Namakwa District of the Northern Cape (**Figure 1**). The pipeline route travels through numerous Quarter Degree Grid Cells (QDGC) 2920DC, 3020BA, 3020BC, and 3020AD. The region is generally flat and ranges in altitude from around 875 m above mean sea level (a.m.s.l) to approximately 940 m a.m.s.l over the 221 km route.

1.2.2 CLIMATE

The region is arid with most rain falling in late summer and autumn. Rainfall is unreliable and droughts are unpredictable and sometimes prolonged (Mucina and Rutherford, 2006). The region around Keimoes on the Orange River in the north usually receives around 84 mm of rain per year, with the highest rainfall occurring in March (~27 mm) and the lowest in June (0 mm), while the region around Kenhardt slightly south usually receives around 70 mm of rain per year, with the highest rainfall occurring in March (~23 mm) and the lowest in June (0 mm). The climate becomes drier further south with the region around Brandvlei usually receiving around 54 mm of rain per year, with the highest rainfall occurring in March (~17 mm) and the lowest in August (0 mm) (saexplorer, 2024). Summers are hot and winters are cold, with warmer temperatures on average experienced in the northern regions. The monthly distribution of average daily maximum temperatures for Keimoes and Kenhardt range from 19.8°C in July to 33°C in January and range from 17.1°C in July to 32°C in January for Brandvlei further south. The region is the coldest during July with the minimum dropping close to 0°C on average during the night (saexplorer, 2024). Temperature extremes can range from -5°C in winter to 43°C in summer. Frost is frequent in winter, and dust devils and small whirlwinds are frequent in summer (Mucina and Rutherford, 2006). The growing season of the region is very short, with rains peaking in March and the onset of frost starting as early as May in some areas (Mucina and Rutherford, 2006).

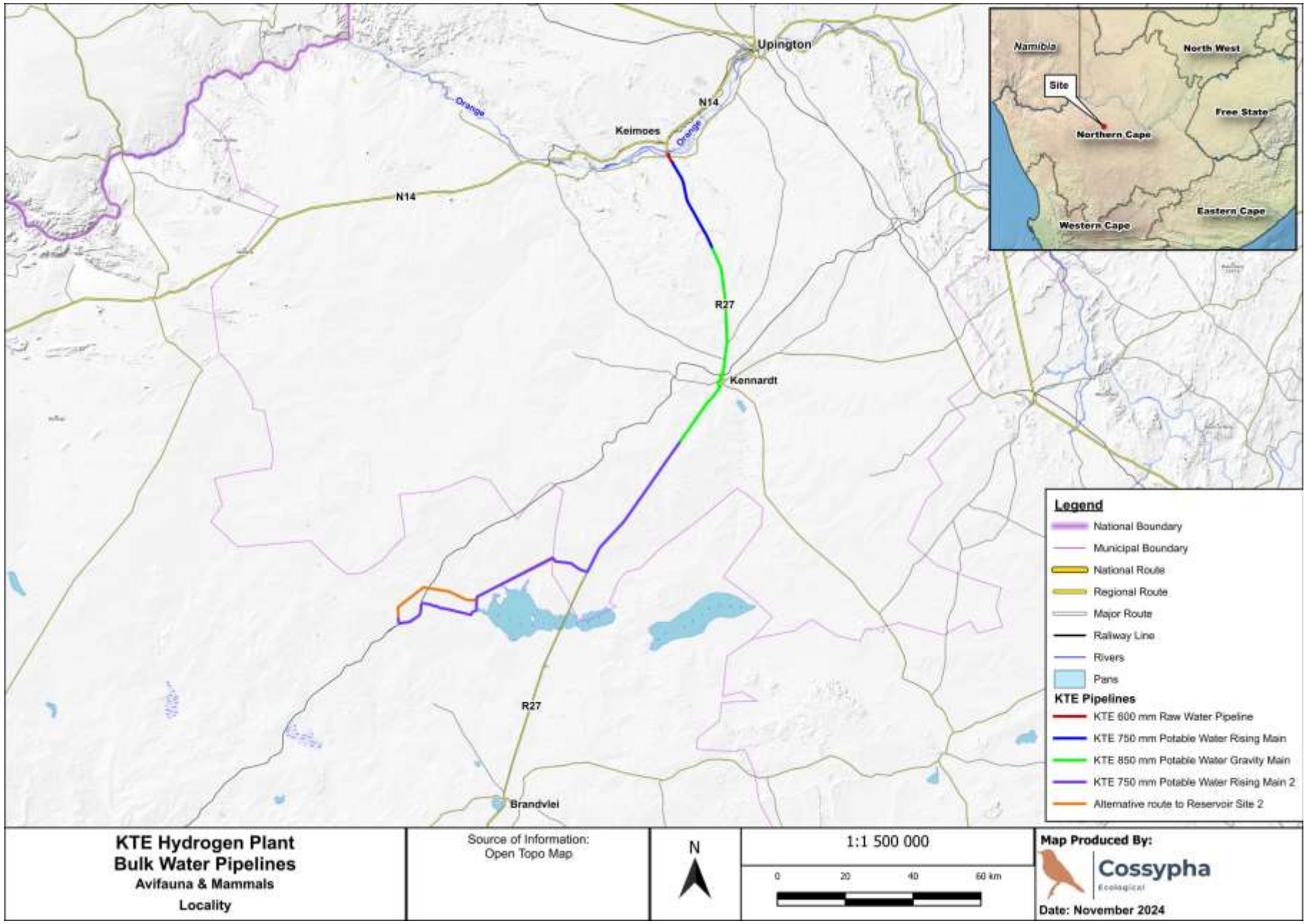
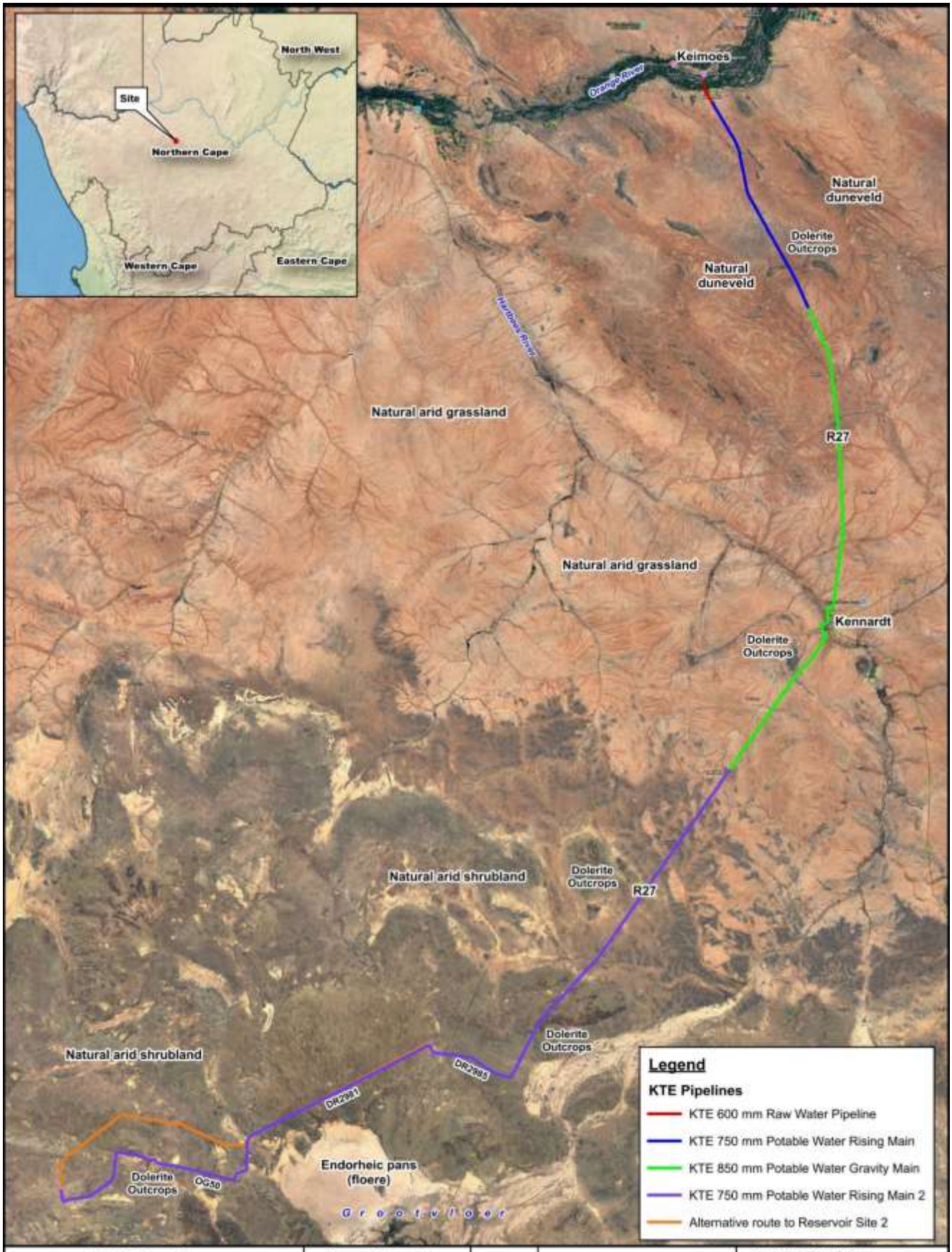


Figure 1: Location of the study area

1.2.3 TOPOGRAPHY AND SURROUNDING LAND USES

The study area is located within the vast rural landscape of the arid Nama Karro comprising natural shrubland, grassland, and duneveld, with little to no human settlement, except in small towns situated periodically along the major routes. The dry open shrublands and grasslands are interspersed with small dolerite outcrops, and non-perennial watercourses form a network that drain into a few large endorheic (closed, dry basin) pans known as floere. The dominant land use of the area is sheep farming. The pipeline route lies within the road reserve of the R27 regional highway, as well as the Soafskolk Road (DR2985), DR2981, and OG50 gravel roads, and then follows the Sishen-Saldanha railway's service road to where the final storage reservoir is located (Figure 2).


North West
Site
Northern Cape
Western Cape
Eastern Cape
Keimoes
Orange River
Natural duneveld
Dolerite Outcrops
Natural duneveld
Hartbees River
Natural arid grassland
R27
Natural arid grassland
Kennardt
Dolerite Outcrops
Natural arid shrubland
Dolerite Outcrops
R27
Dolerite Outcrops
Natural arid shrubland
DR2985
DR2981
Endorheic pans (floere)
Dolerite Outcrops
OG50
Groot vloer
Legend
KTE Pipelines
KTE 600 mm Raw Water Pipeline
KTE 750 mm Potable Water Rising Main
KTE 850 mm Potable Water Gravity Main
KTE 750 mm Potable Water Rising Main 2
Alternative route to Reservoir Site 2
KTE Pipelines
Avifaunal Assessment
Aerial Context
Source of Information:
Aerial Imagery:
Google Earth (2023)
N
1:650 000
0
10
20 km
Map Produced By:
Cossypha
Date: November 2024

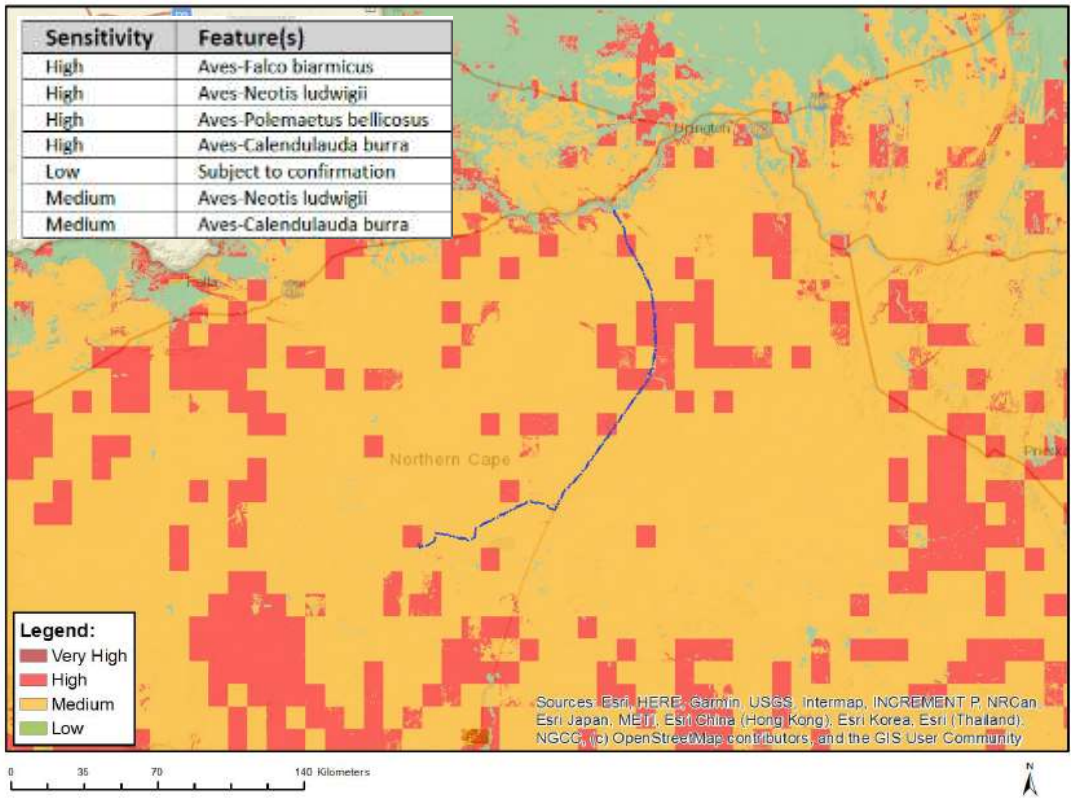
2. REPORTING REQUIREMENTS

2.1 SCREENING TOOL

A Screening Report for proposed site environmental sensitivity, as required by the EIA Regulations of 2014 (as amended in 2017) for Applications for Environmental Authorisation (EA) in terms of NEMA 1998 (Act No. 107 of 1998) was generated for the Brandvlei bulk water pipeline using the National Web-Based Environmental Screening Tool on the 12th of June 2024. The report identified the majority of the study area as having **Medium** sensitivity, with a few sections as **High** sensitivity for the Animal Species theme, due the potential occurrence of the following bird species of conservation concern (SCC):

- High: Aves: Lanner Falcon *Falco biarmicus* (VU)
- High: Aves: Ludwig's Bustard *Neotis ludwigii* (EN)
- High: Aves: Martial Eagle Bustard *Polemaetus bellicosus* (EN)
- High: Aves: Red Lark Calendulauda burra (VU)
- Medium: Aves: Ludwig's Bustard *Neotis ludwigii* (EN)
- Medium: Aves: Red Lark Calendulauda burra (VU)

MAP OF RELATIVE ANIMAL SPECIES THEME SENSITIVITY



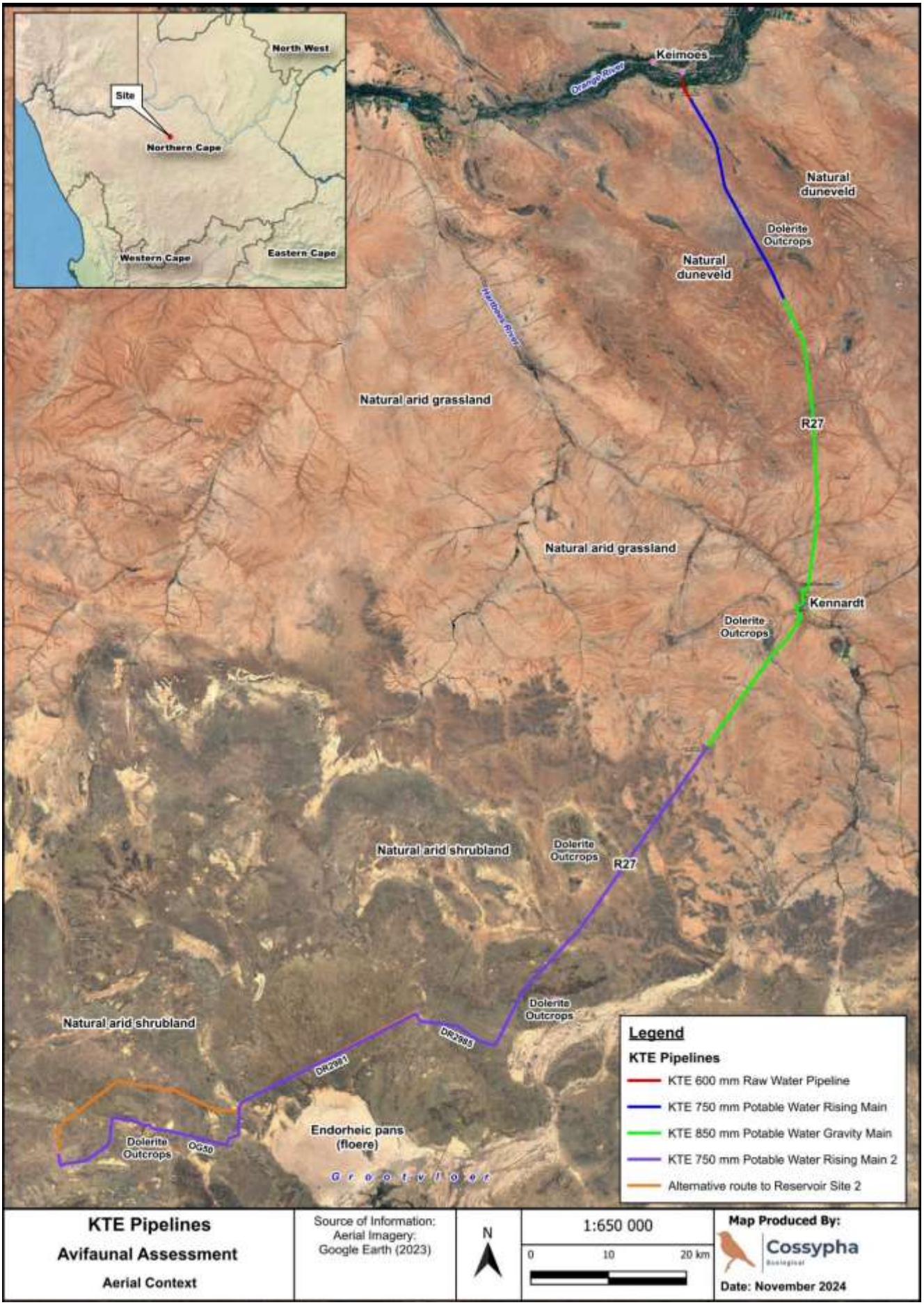


Figure 2: Aerial context of the study area

Therefore, an animal species assessment (focussing on birds) is required for the project, which must be compiled in accordance with the requirements of the *Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes when Applying for EA* (GN R320 of 2020) and comply with the following gazetted protocol. This protocol replaces the requirements of Appendix 6 of the EIA Regulations, 2014 (as amended) in terms of NEMA:

- *Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species* (GN 1150 of 30 October 2020) as amended 28 July 2023.

The following report therefore comprises an investigation of the birds and mammals present in the study area, including an assessment of the ecological sensitivities and possible impacts associated with the proposed project on the ecology pertaining to birds and mammals in the area.

2.2 SITE SENSITIVITY VERIFICATION

According to the above-mentioned protocol, the current use of the land and the potential environmental sensitivity identified by the screening tool, of the site under consideration, must be confirmed by undertaking a site sensitivity verification prior to commencing with the specialist assessment. This will confirm the actual use of the land on the ground versus that which has been identified by the screening tool and the validity of the sensitivity rating assigned by the screening tool. This will confirm whether a full Specialist Assessment Report (applicable for **Very High** and **High** sensitivity sites) or a Compliance Statement (applicable for **Low** sensitivity sites) is required.

In the case of species assessments, because **Medium** sensitivity data represents suspected habitat for SCC based on occurrence records for these species collected prior to 2002 or is based on habitat suitability modelling, the presence or likely presence of the SCC identified by the screening tool must be investigated through a site inspection. Where SCC are found on the site or have been confirmed to be likely present by the specialist, an **Animal Species Specialist Assessment** must be compiled in accordance with the requirements specified for **Very High** and **High** sensitivity in the protocol. Where no SCC are found on the site or the presence is confirmed to be unlikely during the site inspection, an **Animal Species Compliance Statement** must be submitted.

For the project in question, the site inspection and field surveys were combined into one site visit and took place from the 9th to the 13th of September 2024 where the footprint of the proposed pipeline was inspected by vehicle and on foot at various points. The season was early spring and was deemed an appropriate time of year for the field survey. The site inspection revealed that the assessment area is generally in a disturbed state with the majority of the preferred route situated within the road reserve of the R27 regional highway, various district gravel roads, and the Sishen-Saldanha railway line servitude. The pipeline route does come in proximity to sensitive landscape features such as drainage lines, rocky outcrops, the Orange River at the abstraction point, and the Hartbees River near Kenhardt. The route crosses numerous non-perennial drainage lines that lie perpendicular to the roadway, however no diverting, impeding, or alteration actions (in terms of Section 21 (c) and (i) of the NWA) are proposed as the pipeline will be laid deeper where drainage lines are crossed, and will have no effect on existing drainage infrastructure such as existing culverts mostly within the road servitude. The pipeline route is proposed to cross the floodplain of the Hartbees River just west of Kenhardt, which is an ecologically sensitive area and will require mitigation to avoid and minimise impacts.

The preferred route also lies in proximity to a few rocky outcrops at various points along the route, however such areas are not likely to be affected by construction activities. The alternative route for the 750 mm pipe to the final storage reservoir is however routed through arid shrubland and a few rocky outcrops that are considered ecologically sensitive and will require mitigation to avoid and minimise impacts.

While a few bird SCC were recorded in the study area during the field surveys, it is unlikely that any of the species would utilise the areas affected by the preferred pipeline route. The site sensitivity for terrestrial fauna (birds and mammals) can therefore drop to **Low** for the majority of the preferred route where it lies within the road reserve and follows district gravel roads, and the sensitive habitats such as the Hartbees River floodplain, and rocky outcrops being **High** (see further discussion in **Section 7**).

The following Report therefore comprises an investigation of the birds and mammals in the study area with a combination of a Compliance Statement (for the preferred route where it lies within the road reserve and follows district gravel roads) and an Impact Assessment (for sections affecting highly sensitive habitats), in accordance with the above-mentioned protocol and written following the Species Environmental Assessment Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols (SANBI, 2020).

2.3 TERMS OF REFERENCE

The terms of reference for the animal species assessment were to:

- Undertake a desktop assessment and field survey of the site to inform the assessment.
- Complete a habitat assessment to determine the likelihood of bird and mammal SCC occurring within the study area.
- Verify the site sensitivities for terrestrial faunal species.
- If any SCC are recorded, include evidence if possible, such as location and map points of where species are identified denoting them as high sensitivity areas within the site/s.
- Photographic record of the site characteristics, including potential habitats and/or sensitive areas.
- Compilation of a Terrestrial Animal Species Assessment or Compliance Statement following the Species Environmental Assessment Guidelines (SANBI, 2020), including a description of the baseline terrestrial ecology of the area; and
- Recommend impact management actions or any monitoring requirements for inclusion in the EMPr.

3. METHODOLOGY

The study was based on desktop assessment as well as field surveys. The methodology broadly entailed the following.

3.1 DESKTOP ASSESSMENT

The desktop assessment entailed the following:

- Available recent and historical satellite and aerial imagery using Google Earth and the Chief Directorate National Geospatial Information (CDNGI) Geospatial Portal was reviewed to differentiate areas with natural vegetation versus modified and transformed areas of the study area.
- Review of all relevant literature including distribution data of birds and mammals, and vegetation/habitat types expected to occur in the study area, as well as the conservation status of the vegetation types and faunal species.
- Review available information layers within the Geographic Information System (GIS) e.g. regional vegetation types, relevant provincial spatial conservation or biodiversity plan, Important Bird Areas (IBAs), Protected Areas Database etc.

- Mammal species likely to occur in the region of the study area was informed using the electronic database MammalMap (2024) provided by the ADU's Virtual Museum and information regarding species distribution and habitat was obtained from reputable field guides and literature pertaining to mammal distribution such as Skinner and Chimimba (2005) and Stuart and Stuart (2015). Conservation status follows the Red List of Mammals of South Africa, Lesotho and Swaziland (Child *et al.*, 2016).
- A comprehensive list of bird species potentially occurring in the area was compiled using electronic databases within Roberts VII Multimedia Birds of Southern Africa (SA Birding, 2011) where distribution maps have been interpreted and updated from the Atlas of Southern African Birds (Harrison *et al.*, 1997). The search was confined to the QDGC in which the study area falls (i.e. atlas area of 15' × 15' – roughly 24 × 27 km) to get a comprehensive list of species for the region. The data was supplemented with current Southern African Bird Atlas Project 2 (SABAP2, 2024) data, which is recorded per pentad (a 5' x 5' coordinate spatial grid reference – one QDGC comprises of nine pentads). Bird SCC that potentially occur in the study area were noted and their habitat requirements determined by consulting the relevant literature. Bird names follow the International Ornithological Congress (IOC) World Bird List (v13.2) (Gill *et al.*, 2023) while conservation status follows the latest Red Data Book of Birds (Taylor *et al.*, 2015), which is updated yearly by BirdLife South Africa in their Checklist of Birds.
- Other online databases such as Co-ordinated Wetland Counts (CWAC), Co-ordinated Avifaunal Road Counts (CAR), Birds in Reserves Project (BIRP), Global Biodiversity Information Facility (GBIF), and iNaturalist were searched for avifaunal SCC potentially occurring in the area.
- The conservation status of species is reported on a national level and global level, based on the International Union for Conservation of Nature (IUCN) Red List Categories and Criteria (**Figure 3**).

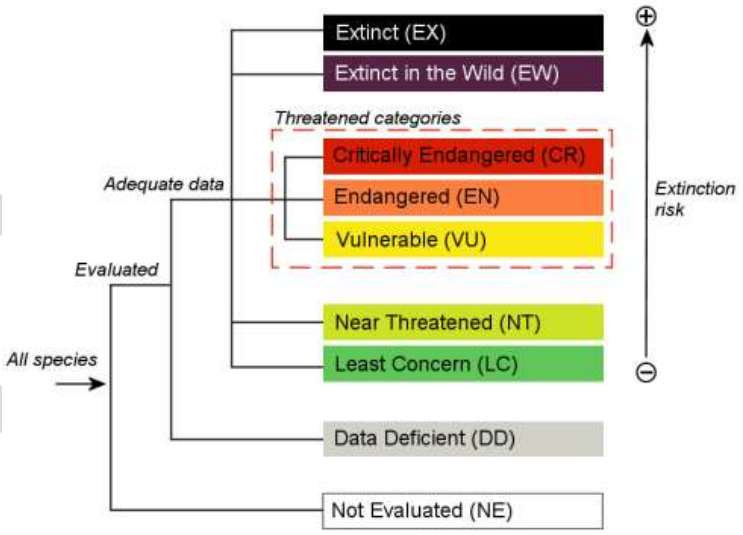


Figure 3: IUCN Red List Categories (www.iucnredlist.org)

3.2 FIELD ASSESSMENT

The field investigation was undertaken from the 9th to the 13th of September 2024 when terrestrial faunal elements within the study area were assessed, with a focus on birds. Daytime surveys were conducted by vehicle and on foot at various points by driving the length of the route within the assessment area. Changes in land cover, habitat, and vegetation were observed, and any fauna or evidence of fauna present on site noted. Photographs were taken at various points to illustrate the condition of vegetation, habitat, and representative areas of the route, and are described in the results section below. Coverage of the study area was deemed to be sufficient. Note that no sampling was conducted in the vegetation outside of the road reserve.

During the field survey the following aspects pertaining to terrestrial fauna were assessed:

- Current land use of the site and immediate surrounds.
- Current ecological state of habitats on site.
- Presence of terrestrial faunal SCC, protected species, or suitable habitat for such species on site; and
- Significant landscape features, ecological corridors, and landscape connectivity.

3.3 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations pertain to the current study:

- To obtain a comprehensive understanding of the dynamics of the biota on site, including SCC, studies should include sampling through the different seasons of the year, over several years, and extensive sampling of the area. Such long-term research is not feasible for non-academic studies of this nature, and the survey was conducted during one field visit during the early spring season. It is not considered necessary to perform an additional survey.
- It is assumed that all third-party information used (e.g. GIS data and satellite imagery) was correct at the time of generating this report.
- Vegetation habitat boundaries usually consist of subtle transitional zones or ecotones, which cannot be captured as distinct lines. Boundaries of habitat types are therefore approximately defined.
- Habitat types were defined and mapped in the context of use by birds and mammals and not in terms of botanical species associations. Similarly, the habitat associated with rivers and wetlands described in this report are defined in terms of broad habitat use by fauna and do not denote the boundaries of wetlands and watercourses.
- No sampling was conducted in the adjacent indigenous vegetation outside of the road reserve.
- Potential impacts of the proposed project were evaluated based on the layout provided at the time of writing, and where necessary, recommendations for the most appropriate mitigation measures have been provided.
- Findings, recommendations, and conclusions provided in this report are based on the author's best scientific and professional knowledge as well as information available at the time of compilation.

4. DESKTOP ASSESSMENT RESULTS

4.1 REGIONAL BIODIVERSITY SETTING

4.1.1 NATIONAL VEGETATION TYPES AND ECOSYSTEMS

The study area is located within the Bushmanland Bioregion, which forms part of the Nama Karoo Biome (Rutherford and Westfall, 1994). The northern ~half of the route (including the 600 mm Raw Water Pipeline, the 750 mm Potable Water Rising Main, and the 850 mm Potable Water Gravity Main) falls mostly within the original extent of the **Bushmanland Arid Grassland** vegetation type, with short sections crossing **Gordonia Duneveld** and **Lower Gariep Broken Veld**. The abstraction point on the Orange River occurs within the **Lower Gariep Alluvial Vegetation**, which is an azonal vegetation type falling within the Alluvial Vegetation Bioregion (Mucina and Rutherford, 2006; SANBI, 2018) (**Figure 4**).

The southern ~half of the route (including the 750 mm Potable Water Rising Main 2, and the alternative route to the final reservoir site) falls mostly within the original extent of the **Bushmanland Basin Shrubland** vegetation

type, with short sections crossing **Lower Gariep Broken Veld**, and **Bushmanland Vloere**, which is an azonal vegetation type falling within the Inland Saline Vegetation Bioregion (Mucina and Rutherford, 2006; SANBI, 2018) (**Figure 4**).

The **Bushmanland Arid Grassland** vegetation type is wide ranging and occurs on extensive, slightly sloping plains that are typically sparsely vegetated and dominated by white grasses (*Stipagrostis* species) giving the vegetation the character of a semidesert steppe. Low shrubs of *Salsola* sp. occur in places, and in years of abundant rainfall, annual herbs can be abundant (Mucina and Rutherford, 2006; SANBI, 2018). Occasional units of Lower Gariep Broken Veld, Kalahari Karroid Shrubland, and Gordonia Duneveld are interspersed within Bushmanland Arid Grassland.

Gordonia Duneveld comprises parallel dunes about 3-8 m above the plains and supports open shrubland with ridges of grassland dominated by *Stipagrostis amabilis* on the dune crests and *Vachellia haematoxylon* on the dune slopes, with *Senegalia mellifera* on lower slopes, and *Rhigozum trichotomum* in the interdune straiten (Mucina and Rutherford, 2006; SANBI, 2018).

Lower Gariep Broken Veld occurs on hills and low mountains and is characterised as slightly irregular plains with some rugged terrain with sparse vegetation dominated by shrubs and dwarf shrubs, with annuals conspicuous, especially in spring, and perennial grasses and herbs. Groups of widely scattered low trees such as *Aloe dichotoma* var. *dichotoma* and *Senegalia mellifera* subsp. *detinens* (Mucina and Rutherford, 2006; SANBI, 2018).

Lower Gariep Alluvial Vegetation occurs on the broad alluvium (floodplains and islands) of the Orange (Gariep) River. It comprises flat alluvial terraces and riverine islands supporting a complex of riparian thickets (dominated by *Ziziphus mucronata*, *Euclea pseudebenus*, and *Tamarix usneoides*), reed beds with *Phragmites australis* as well as flooded grasslands and herblands populating sand banks and terraces within and along the river (Mucina and Rutherford, 2006; SANBI, 2018).

The **Bushmanland Basin Shrubland** vegetation type is typically a dwarf shrubland dominated by a mixture of low, sturdy, and spiny shrubs with occasional succulents, and grasses (mainly *Stipagrostis* species) (Mucina and Rutherford, 2006). The **Bushmanland Vloere** are salt pans of the central Bushmanland Basin and the broad riverbeds of the intermittent Sak River. They are characteristically flat and even, with the centre of a pan (or the river drainage channel itself) usually devoid of vegetation. The rest is covered by loosely scattered scrub dominated by *Rhigozum trichotomum* and various species of *Salsola* and *Lycium*, with a mixture of non-succulent dwarf shrubs. In places loose thickets of woody species such as *Parkinsonia africana*, *Lebeckia linearifolia*, and *Vachellia karroo* can be found (Mucina and Rutherford, 2006).

According to the recently gazetted list of threatened ecosystems (DFFE, 2022), all these vegetation types are currently listed as **Least Concern** as the ecosystems have experienced low rates of natural habitat loss and biotic disruptions, placing the ecosystems at low risk of collapse (SANBI, 2021).

4.1.2 CRITICAL BIODIVERSITY AREAS OF THE NORTHERN CAPE

The identification of Critical Biodiversity Areas (CBAs) for the Northern Cape (Holness and Oosthuysen, 2016) was undertaken using a Systematic Conservation Planning approach (Margules and Pressey, 2000; Ardron *et al*., 2010). Opportunities and constraints for effective conservation were collated using available data on the condition of both terrestrial and inland aquatic biodiversity features (incorporating both pattern and process), and current Protected Areas and Conservation Areas (Holness and Oosthuysen, 2016). The categories included in the Northern Cape CBA Map are Protected Area (PA), Critical Biodiversity Area One (CBA 1), Critical Biodiversity Area Two (CBA 2), Ecological Support Area (ESA), and Other Natural Area (ONA). ONAs are identified as natural

and/or near natural environmental areas (i.e. not 100% modified) but not identified as an optimal area for the conservation of biodiversity.

At a desk-top level, the majority of the proposed pipeline is routed through areas classified as ONA, with a few short sections crossing areas classified as CBA 1, CBA 2, and ESA. The ONA generally comprises the primary vegetation of the region (arid grassland and shrubland). The areas classified as CBA 1 appear to be associated with rivers such as the Orange River and Hartbees River near Kenhardt, drainage lines, the Bushmanland Vloere, and dolerite rocky outcrops (which are usually areas of high biodiversity). The areas classified as CBA 2 appear to be associated with buffers to the Orange River, the Bushmanland Vloere, and non-perennial watercourses such as the Sak River. The areas classified as ESA appear to be associated with certain non-perennial drainage lines and sections of vloere that drain towards the Sak River (**Figure 5**). The majority of the proposed pipeline route falls within the road reserve of the R27, and then generally follows existing gravel roads and tracks, including the railway servitude. These areas are generally disturbed and devoid of vegetation in places and are likely not to be representative of any CBA or ESA.

4.2 NATIONAL PROTECTED AREAS

Protected areas have been used in South Africa for decades as a valuable tool for conserving the nation's natural and cultural heritage. Protected areas are national assets that contribute to environmental integrity, economic development, and social well-being. The National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEMPAA) provides for the proclamation of protected areas to facilitate the conservation of both biological resources (focusing on species-, habitat- and ecosystem-related conservation, and the conservation of specific site values) and cultural values.

According to the South African Protected Areas Database (SAPAD 2024 Quarter 2; DFFE, 2024a) and the South African Conservation Areas Database (SACAD 2024 Quarter 2; DFFE, 2024b), no formally protected areas or IBAs fall within a ~50 km radius of the site. The closest protect area is the Augrabies Falls National Park, which is also an IBA, and occurs approximately 59 km to the north-west of the northern end of the route. The National Protected Area Expansion Strategy (NPAES) has identified Priority Focus Areas associated with the Orange River and the Upper Karoo category within and around the study area (DEA, 2018).

4.3 HISTORICAL LAND USE OF THE STUDY AREA

The proposed pipeline occurs within an expansive, arid, and ancient landscape, which has not changed much over the last century. According to available historical satellite and aerial imagery using Google Earth and the CDNGI Geospatial Portal, the majority of the route is situated along the R27, which has been present since at least 1963 and most likely prior. The surroundings comprise natural, arid shrubland, and natural salt pans.

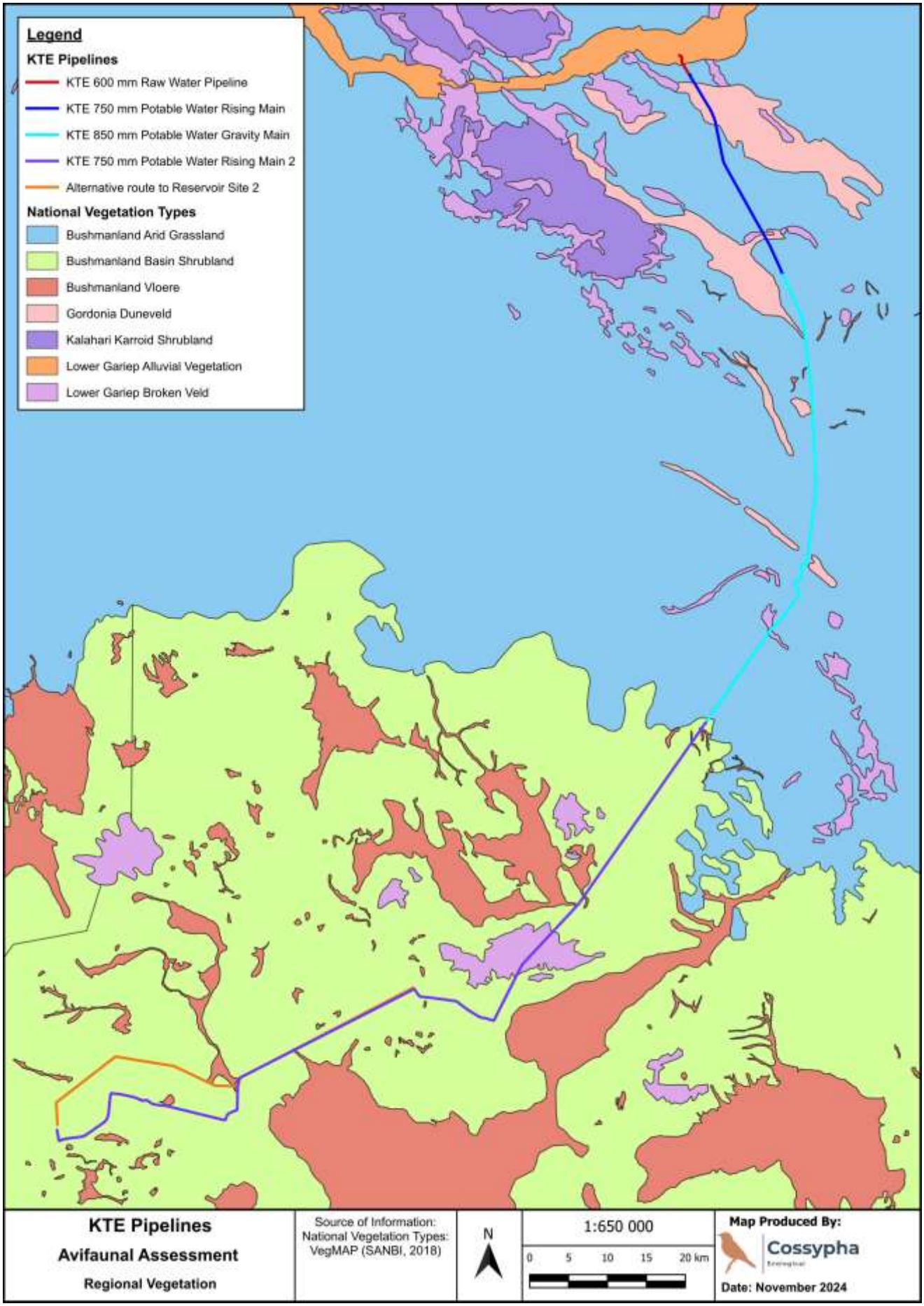


Figure 4: The study area in relation to national vegetation types

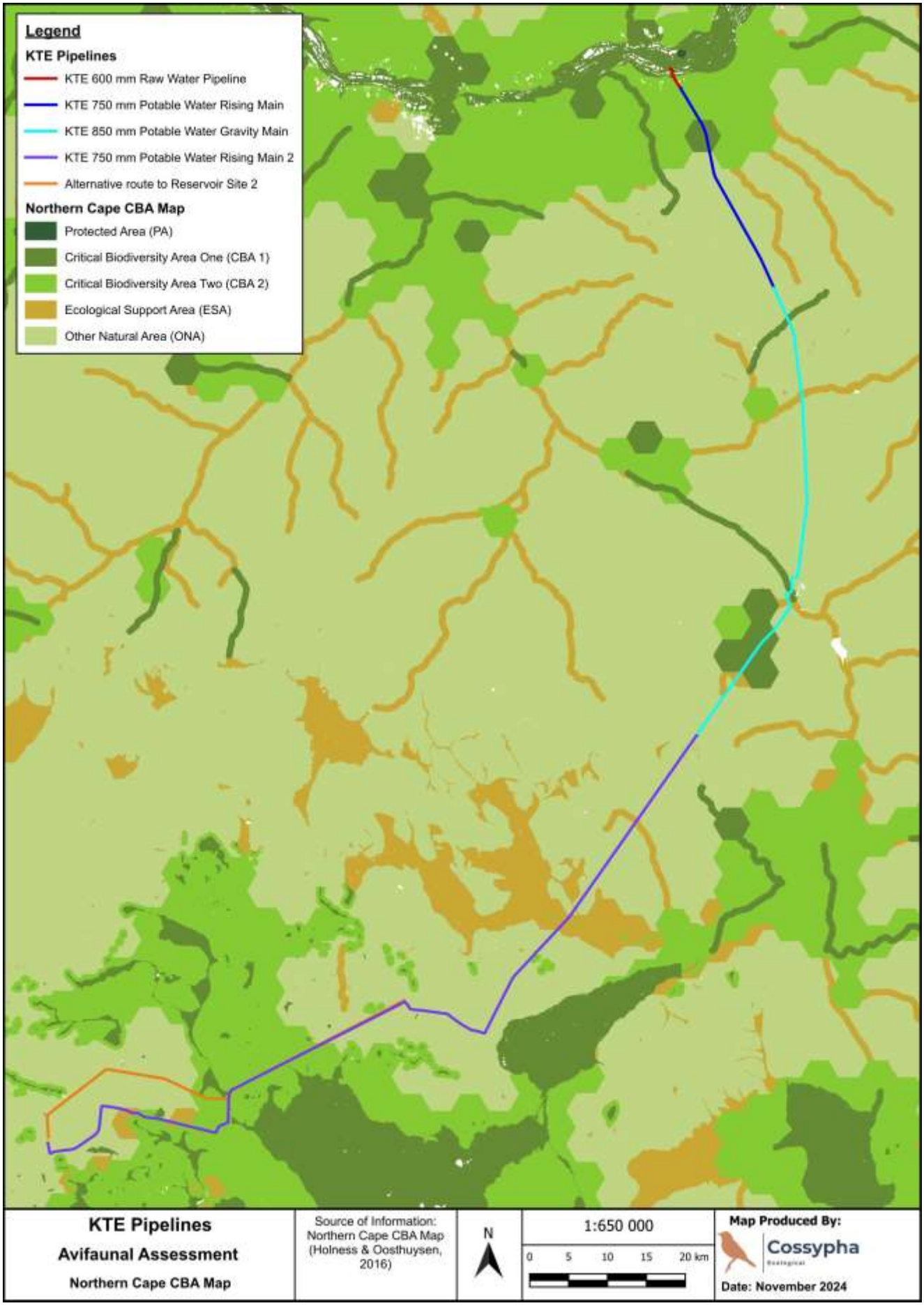


Figure 5: The study area in relation to the Northern Cape CBAs

4.4 SPECIES DISTRIBUTION

4.4.1 AVIFAUNA

The region has relatively low avifaunal diversity, typical of the arid western regions of the country, with around 225 bird species potentially occurring within QDGCs through which the route moves, according to the distribution maps in Roberts VII Multimedia Birds of Southern Africa (SA Birding, 2011). The Southern African Bird Atlas Project (SABAP2) has been collecting data since 2007 and includes data from the previous SABAP1 (1987-1991). SABAP2 aims to map the distribution and relative abundance of birds in southern Africa. SABAP2 data is recorded per pentad (a 5' x 5' coordinate spatial grid reference and a subset of the QDGC, i.e. one QDGC comprises of nine pentads. 5' x 5' = roughly 8 x 9 km) and therefore represents a more focussed search. The route crosses 22 pentads that have data available. According to this data, 200 bird species have been recorded within the pentads combined. This includes 11 SCC and 13 species that are endemic to southern Africa (Error! Not a valid bookmark self-reference.).

Table 1: Red listed and endemic species recorded in the SABAP2 pentads in which the route falls

Common Name	Taxonomic Name	Red List Status (National, Global)	Endemism	Residence
White-backed Vulture	*Gyps africanus*	CR, CR		Resident
Lappet-faced Vulture	*Torgos tracheliotos*	EN, EN		Resident
Martial Eagle	*Polemaetus bellicosus*	EN, EN		Resident
Tawny Eagle	*Aquila rapax*	EN, VU		Resident
Red Lark	*Calendulauda burra*	VU, VU	E	Resident
Kori Bustard	*Ardeotis kori*	NT, NT		Resident
Burchell's Courser	*Cursorius rufus*	VU, LC		Resident
Verreaux's Eagle	*Aquila verreauxii*	VU, LC		Resident
Lanner Falcon	*Falco biarmicus*	VU, LC		Resident
Karoo Korhaan	*Eupodotis vigorsii*	NT, LC		Resident
Curlew Sandpiper	*Calidris ferruginea*	LC, NT		NBM
Jackal Buzzard	*Buteo rufofuscus*	LC, LC	NE	Resident
Karoo Thrush	*Turdus smithi*	LC, LC	NE	Resident
Fiscal Flycatcher	*Melaenornis silens*	LC, LC	NE	Resident
Sickle-winged Chat	*Emarginata sinuata*	LC, LC	NE	Resident
Grey Tit	*Melaniparus afer*	LC, LC	NE	Resident
Karoo Prinia	*Prinia maculosa*	LC, LC	NE	Resident
Namaqua Warbler	*Phragmacia substriata*	LC, LC	NE	Resident
Fairy Flycatcher	*Stenostira scita*	LC, LC	NE	NBM
Black-eared Sparrow-Lark	*Eremopterix australis*	LC, LC	NE	Resident
Large-billed Lark	*Galerida magnirostris*	LC, LC	NE	Resident
Southern Double-collared Sunbird	*Cinnyris chalybeus*	LC, LC	NE	Resident
Black-headed Canary	*Serinus alario*	LC, LC	NE	Resident

CR = Critically Endangered; EN = Endangered; VU = Vulnerable; NT = Near Threatened; LC = Least Concern

E = endemic; NE = near endemic (70% or more of population in RSA)

NBM = non-breeding migrant

According to citizen science online databases such as iNaturalist and GBIF, bird SCC that have been recorded in the vicinity of the Brandvlei pipeline route include Red Lark (mostly around the town of Brandvlei), Martial Eagle, Black Harrier, Lanner Falcon, and Karoo Korhaan. These were mostly recorded in the surrounding natural vegetation, and not within the road reserve of the R27.

4.4.2 MAMMALS

Mammals are less well documented that birds. According to available online database MammalMap and other relevant literature, approximately 52 indigenous mammal species are known to occur in the broad region of the study area. Of these, one species is currently of conservation concern, Black-footed Cat *Felis nigripes* (VU).

5. FIELD SURVEY RESULTS

5.1 LANDSCAPE FEATURES AND HABITATS WITHIN THE STUDY AREA

The assessment area incorporates the broad road reserve on the western side of the R27 (until the intersection with the Soafskolk Road), which is mostly comprised of the disturbed roadside with a sparse grassy cover and pockets of scrubby vegetation growing mostly against the fence line. The road reserve generally had little vegetation and is likely cut or cleared from time to time. Vegetation comprised mainly grasses (*Stipagrostis* spp.) and indigenous shrubs such as *Rhigozum trichotomum* (driedoring), *Lycium cinereum* (kriedoring), and *Phaeoptilum spinosum* (brosdoring) (PB Consult, 2024). Habitat for birds and other animals is limited within the road reserve and is rather provided by the surrounding expanse of natural vegetation.

Photo 1: Broad road reserve on the western side of the R27 with sparse vegetation in the northern section of the route

The R27 crosses numerous drainage lines where the road reserve usually narrows with a culvert and has a mix of indigenous and alien woody vegetation including *Vachellia karoo* and *Prosopis* sp. occurring along the fence line. While drainage lines provide important habitat for birds and other fauna, such habitat is limited within the road reserve. In addition, the pipeline is proposed to be buried beneath the drainage areas and will not affect the existing drainage infrastructure such as existing culverts.

At Kenhardt, the proposed pipeline deviates from the R27 around to west of the town where the proposed route passes through the floodplain of the Hartbees River, crosses the river channel, and is then routed along a gravel road to rejoin the R27 just to the south of the town. The floodplain is comprised of deep alluvial sandy soils and scattered woody species such as *Vachellia karoo*, *Ziziphus mucronata*, and *Tamarix usneoides*, as well as alien *Prosopis* sp. The river and associated floodplain provide important habitat for burrowing animals and birds, and

likely provides an important corridor for movement for biodiversity through the landscape. If possible, the route should avoid this sensitive habitat as far as possible and is discussed further in the impact assessment section.

Photo 2: An example of a drainage line crossing with a culvert along the R27. Vegetation comprising woody species such as *Vachellia karoo* and the alien *Prosopis* sp. occurring just outside the road reserve

Photo 3: The Hartbees River floodplain to the west of Kenhardt

Photo 4: Deep alluvial sands of the Hartbees River floodplain, where sand mining has taken place

Other notable landscape features along the R27 include small dolerite outcrops that occur occasionally along the route. These generally occur outside of the road reserve, or the road reserve narrows where rocky areas are close by. Rocky outcrops provide habitat heterogeneity to the landscape and are often areas of higher biodiversity.

Photo 5: The occasional rocky outcrop along the R27

Photo 6: Large rocky outcrop with a narrow road reserve in the northern section of the route on the R27

The assessment area continues along the Soafskolk Road, which is a relatively wide gravel road with a wide road reserve. The vegetation / habitat along the road was found to be disturbed and sparse or patchy. The vegetation was generally dominated by white grasses (*Stipagrostis* spp.) and indigenous hardy (often spiny) shrubs such as *Rhigozum trichotomum* (driedoring), *Lycium cinereum* (kriedoring), and *Phaeoptilum spinosum* (brosdoring) shrubs scattered within the landscape (PB Consult, 2024).

Photo 7: Vegetation along the Soafskolk Road comprising mostly white grasses and shrubs such as *Rhigozum trichotomum*

The Soafskolk Road also crosses a few non-perennial drainage lines where the road reserve narrows. The riparian habitat comprised thicker vegetation with more woody species and trees such as *Vachellia karoo* and *Ziziphus mucronata* as well as alien *Prosopis* sp.

Photo 8: Woody vegetation along a non-perennial drainage line along the Soafskolk Road

Photo 9: Drainage area infested by *Prosopis* sp. along the DR2981 gravel road

The pipeline route continues to follow existing gravel roads or tracks, and passes habitat features such as pans and dams. These provide important habitat for fauna and should be avoided by the construction activities.

Photo 10: Small dam (top) and pan (bottom) next to the DR2981 gravel road

Other important habitat for fauna is provided by dolerite outcrops, which occur occasionally along the DR2981 gravel road, particularly in the vicinity of the small dam pictured above. These occur outside of the road reserve and should not be affected by the construction activities.

Photo 11: Dolerite outcrops along the DR2981 gravel road in the vicinity of the small dam

The proposed pipeline route then follows a dirt track and joins the Sishen-Saldanha railway servitude until it reaches the proposed site for the final storage reservoir. The railway servitude has a small road reserve and is generally disturbed with little vegetation.

Photo 12: Disturbed roadside of the Sishen-Saldanha railway servitude

The alternative route for 750 mm rising main to the final storage reservoir follows the preferred route along the DR2981 gravel road before it deviates and turns in a westerly direction and is routed along fence lines and through natural arid shrubland.

Photo 13: Fencelines along which the proposed alternative is routed with natural arid shrubland in the surrounding areas

The proposed alternative route also crosses numerous, relatively undisturbed non-perennial drainage lines and a floodplain that feeds the many floere / slat pans that lie to the east. The alternative then deviates from the fence line and is routed through natural, undisturbed arid shrubland, then close to and over some dolerite outcrops before reaching the proposed site for the final storage reservoir, which is not favourable.

Photo 14: Densely vegetated drainage area along the alternative route

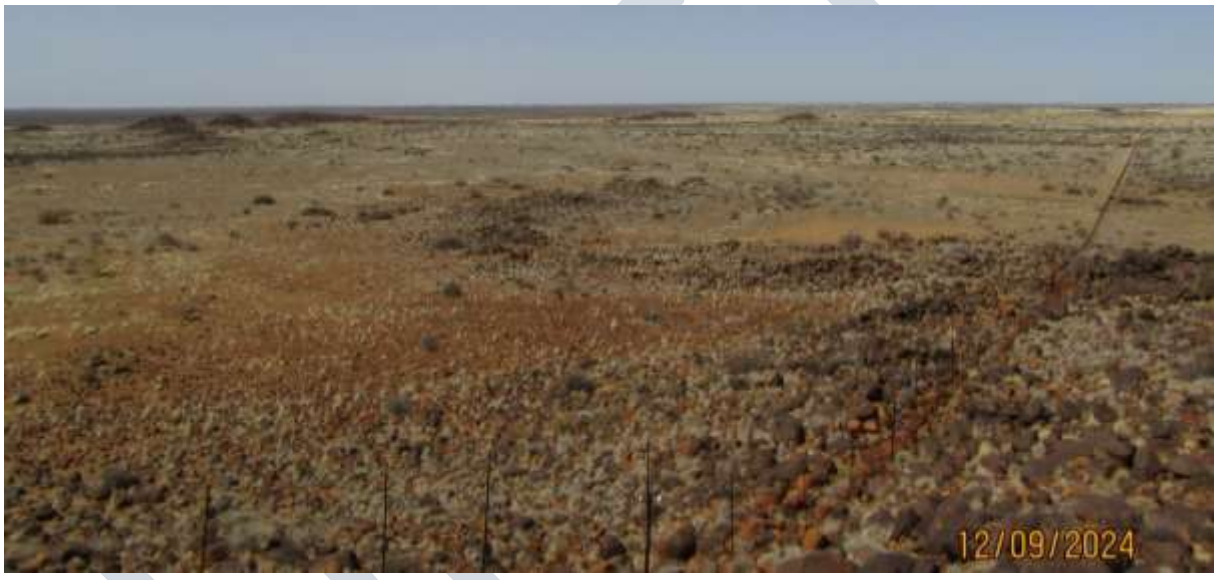


Photo 15: Numerous dolerite outcrops through which the alternative is routed

5.2 SPECIES OCCURRENCE

Faunal activity along the R27 route was very low with only common and generalist birds recorded mainly around the drainage lines and pans, and few mammals such as Rock Hyrax *Procavia capensis* recorded on the rocky outcrops. Slightly more faunal activity was recorded along the district gravel roads, which experience less traffic and human disturbance. Few species were however recorded within the road reserves. Bird and mammal species recorded over the assessment area during the field surveys are listed in **Table 2** along with their national (Taylor *et al*., 2015; BirdLife SA, 2024; Child, 2016) and global (IUCN, 2024) conservation status. Species observed consisted of fauna typically found in arid habitats of the Northern Cape and included three bird SCC.

Table 2: Birds and mammals recorded during the field surveys in the assessment area

Common Name	Scientific Name	Conservation Status	
		National	Global
Birds			
Egyptian Goose	*Alopochen aegyptiaca*	LC	LC
White-backed Mousebird	*Colius colius*	LC	LC
Red-faced Mousebird	*Urocolius indicus*	LC	LC
Little Swift	*Apus affinis*	LC	LC
Ring-necked Dove	*Streptopelia capicola*	LC	LC
Kori Bustard	*Ardeotis kori*	NT	NT
Northern Black Korhaan	*Afrotis afraoides*	LC	LC
Karoo Korhaan	*Eupodotis vigorsii*	NT	LC
Namaqua Sandgrouse	*Pterocles namaqua*	LC	LC
Double-banded Courser	*Rhinoptilus africanus*	LC	LC
Black-winged Kite	*Elanus caeruleus*	LC	LC
Pale Chanting Goshawk	*Melierax canorus*	LC	LC
Greater Kestrel	*Falco rupicoloides*	LC	LC
Lanner Falcon	*Falco biarmicus*	VU	LC
Southern Fiscal	*Lanius collaris*	LC	LC
Pied Crow	*Corvus albus*	LC	LC
Pririt Batis	*Batis pririt*	LC	LC
Karoo Scrub Robin	*Cercotrichas coryphoeus*	LC	LC
Karoo Chat	*Emarginata schlegelii*	LC	LC
Tractrac Chat	*Emarginata tractrac*	LC	LC
Ant-eating Chat	*Myrmecocichla formicivora*	LC	LC
Greater Striped Swallow	*Cecropis cucullata*	LC	LC
African Red-eyed Bulbul	*Pycnonotus nigricans*	LC	LC
Black-chested Prinia	*Prinia flavicans*	LC	LC
Sabota Lark	*Calendulauda sabota*	LC	LC
Karoo Long-billed Lark	*Certhilauda subcoronata*	LC	LC
Spike-heeled Lark	*Chersomanes albofasciata*	LC	LC
Grey-backed Sparrow-Lark	*Eremopterix verticalis*	LC	LC
Sclater's Lark	*Spizocorys sclateri*	LC	LC
Cape Sparrow	*Passer melanurus*	LC	LC
White-browed Sparrow-Weaver	*Plocepasser mahali*	LC	LC
Sociable Weaver	*Philetairus socius*	LC	LC
Southern Masked Weaver	*Ploceus velatus*	LC	LC
Yellow Canary	*Crithagra flaviventris*	LC	LC
White-throated Canary	*Crithagra albogularis*	LC	LC
Lark-like Bunting	*Emberiza impetuani*	LC	LC
Cape Bunting	*Emberiza capensis*	LC	LC

Common Name	Scientific Name	Conservation Status	
		National	Global
Mammals			
Rock Hyrax	*Procavia capensis*	LC	LC
Cape Hare	*Lepus capensis*	LC	LC
Cape Ground Squirrel	*Xerus inauris*	LC	LC
Yellow Mongoose	*Cynictis penicillata*	LC	LC
Steenbok	*Raphicerus campestris*	LC	LC
Springbok	*Antidorcas marsupialis*	LC	LC
Gemsbok	*Oryx gazella*	LC	LC
Springhare	*Pedetes capensis*	LC	LC
Aardvark	*Orycteropus afer*	LC; Pr	LC
Cape Porcupine	*Hystrix africaeaustralis*	LC	LC
Caracal	*Caracal caracal*	LC	LC
Black-backed Jackal	*Canis mesomelas*	LC	LC

VU = Vulnerable; NT = Near Threatened; LC = Least Concern; Pr = Protected

Photo 16: Some bird species recorded in the assessment area (from top left to bottom right): Sociable Weaver *Philetairus socius*; Sabota Lark *Calendulauda sabota*; Namaqua Sandgrouse *Pterocles namaqua*; Double-banded Courser *Rhinoptilus africanus*; Kori Bustard *Ardeotis kori*; and White-backed Mousebird *Colius colius*

Photo 17: Some mammal species recorded in the assessment area (from left to right): Rock Hyrax *Procavia capensis*; Cape Ground Squirrel *Xerus inauris*; and Aardvark *Orycteropus afer* spoor

The DFFE screening tool report identified the majority of the study area as having **Medium** sensitivity, with a few sections as **High** sensitivity for the Animal Species theme, due the potential occurrence of four bird SCC; Lanner Falcon *Falco biarmicus* (VU), Ludwig's Bustard *Neotis ludwigii* (EN), Martial Eagle Bustard *Polemaetus bellicosus*

(EN), and Red Lark Calendulauda burra (VU). One of these species, and two other bird SCC (see **Table 2**) were recorded in the general study area during the field surveys. The Lanner Falcon was observed flying overhead, while the other individuals were recorded in the surrounding natural habitat, and not within the road reserve. The vast expanse of the surrounding arid shrubland and grassland, as well as specialised habitats such as rivers, drainage lines, pans, and rocky outcrops provide the most important habitat for the faunal species found in the region. The vegetation within the road reserves and around the smaller gravel roads is generally disturbed and of low quality that does not provide any permanent habitat for fauna and is unlikely to support any populations of SCC.

There are however sections of the proposed route that will require special mitigation measures to ensure that impacts are avoided and minimised, which is discussed in the next section.

6. IMPACT ASSESSMENT AND MITIGATION

6.1 IMPACTS OF DEVELOPMENTS ON BIODIVERSITY

Any developmental activities in a natural system will impact on the surrounding environment, usually in a negative way. The purpose of this phase of the study was to identify and assess the significance of the impacts caused by the proposed development and to provide a description of the mitigation required to limit the perceived impacts on the natural environment.

The term mitigation covers all the components of the "mitigation hierarchy" (described below) and involves selecting and implementing measures to conserve biodiversity and to protect users of biodiversity as well as other affected stakeholders from potentially detrimental impacts as a result of the development (Guideline for Mainstreaming Biodiversity into Mining: DEA, DMR, SACM, SAMBF, and SANBI, 2013).

Mitigation measures should aim to achieve "no net loss" of biodiversity which is defined by the International Finance Corporation (IFC) as:

"the point at which project-related impacts on biodiversity are balanced by measures taken to avoid and minimise the project's impacts, to undertake on-site restoration and finally to offset significant residual impacts, if any, on an appropriate geographic scale".

Mitigation is a broad term and involves the following steps of the mitigation hierarchy:

1. Avoid or prevent loss to biodiversity and ecosystem services: This is the first option and refers to project location and layout of the project, as well as phasing to avoid impacts on biodiversity. These areas need to be identified early in the development's lifecycle so that impacts can be avoided.
2. Minimise impacts on biodiversity and ecosystem services: The location, layout, technology, and phasing of the project should minimise the impacts on biodiversity. This should be considered even in areas where the environmental constraints are not particularly high, and every effort should be made to minimise these impacts.
3. Rehabilitate concurrently or progressively with the activity and on cessation of the activity: This refers to the rehabilitation of areas where impacts were unavoidable and impacted areas should be returned to a condition ecologically similar to their pre-development natural state. Unfortunately, rehabilitation is a limited process that usually falls short of replicating the diversity of natural systems. Rehabilitation should occur progressively.
4. Offset significant residual negative impacts on biodiversity or ecosystem services: This refers to the compensation for the remaining and unavoidable negative residual impacts on biodiversity.

6.2 ASSESSMENT CRITERIA

For the current assessment, environmental impacts at selected sections of the routes were assessed with mitigation measures and without mitigation measures and the results are presented in the impact tables, which summarise the assessment. Mitigation and management actions are also recommended with the aim of minimising negative impacts. A ranking or scoring system was used to evaluate the significance of each impact where the potential significance is a function of consequence (duration, extent, and irreplaceable resources) and probability. The impact assessment criteria are described in **Table 3** and **Table 4**. Each of these was then ranked using the rating scales listed in **Table 5**.

Table 3: Proposed criteria and rating scales which were used in the assessment of the potential impacts

Criteria	Rating Scales	Notes
Nature	Positive	An evaluation of the effect of the impact related to the proposed development.
	Negative	
Extent	Footprint	The impact only affects the area in which the proposed activity will occur.
	Site	The impact will affect only the development area.
	Local	The impact affects the development area and adjacent properties.
	Regional	The effect of the impact extends beyond municipal boundaries.
	National	The effect of the impact extends beyond more than 2 regional/ provincial boundaries.
	International	The effect of the impact extends beyond country borders.
Duration	Temporary	The duration of the activity associated with the impact will last 0-6 months.
	Short term	The duration of the activity associated with the impact will last 6-18 months.
	Medium term	The duration of the activity associated with the impact will last 18 months-5 years.
	Long term	The duration of the activity associated with the impact will last more than 5 years.
Severity	High negative	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
	Moderate negative	The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
	Low negative	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural, and social functions and processes are minimally affected.
	Low positive	The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural,

Criteria	Rating Scales	Notes
		cultural, and social functions and processes are minimally improved.
	Moderate positive	The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected.
	High positive	The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.
Potential for impact on irreplaceable resources	No	No irreplaceable resources will be impacted.
	Yes	Irreplaceable resources will be impacted.
Consequence	Extremely detrimental	A combination of extent, duration, intensity and the potential for impact on irreplaceable resources.
	Highly detrimental	
	Moderately detrimental	
	Slightly detrimental	
	Negligible	
	Slightly beneficial	
	Moderately beneficial	
	Highly beneficial	
	Extremely beneficial	
Probability (the likelihood of the impact occurring)	Unlikely	It is highly unlikely or less than 50 % likely that an impact will occur.
	Likely	It is between 50 and 75 % certain that the impact will occur.
	Definite	It is more than 75 % certain that the impact will occur, or it is definite that the impact will occur.
Significance	Very high - negative	A function of Consequence and Probability.
	High - negative	
	Moderate - negative	
	Low - negative	
	Very low	
	Low - positive	
	Moderate - positive	
	High - positive	
	Very high - positive	

Table 4: Explanation of assessment criteria

Criteria	Explanation
Nature	This is an evaluation of the type of effect the construction, operation and management of the proposed development would have on the affected environment. Will the impact change in the environment be positive, negative, or neutral?
Extent or Scale	This refers to the spatial scale at which the impact will occur. Extent of the impact is described as **footprint** (affecting only the footprint of the development), **site** (limited to the site) and **regional** (limited to the immediate surroundings and closest towns to the site). Extent or scale refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of small extent, are of very high importance, e.g. impacts on species of very restricted range. To avoid "double counting", specialists have been requested to indicate spatial significance under "intensity" or "impact on irreplaceable resources" but not under "extent" as well.
Duration	The lifespan of the impact is indicated as temporary, short, medium, and long term.
Severity	This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered?
Impact on irreplaceable resources	This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonisation from surrounding areas), through artificial means (e.g. by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.
Consequence	The consequence of the potential impacts is a summation of above criteria, namely the extent, duration, intensity and impact on irreplaceable resources.
Probability of occurrence	The probability of the impact occurring based on professional experience of the specialist with environments of a similar nature to the site and/or with similar projects. It is important to distinguish between probability of the impact occurring and probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact.
Significance	Impact significance is defined to be a combination of the consequence (as described below) and probability of the impact occurring. The relationship between consequence and probability highlights that the risk (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact occurring. In simple terms, if the consequence and probability of an impact is high, then the impact will have a high significance. The significance defines the level to which the impact will influence the proposed development and/or environment. It determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision-making.
Degree of confidence in predictions	Specialists and the EIR team were required to provide an indication of the degree of confidence (low, medium or high) that there is in the predictions made for each impact, based on the available information and their level of knowledge and expertise. Degree of confidence is not taken into account in the determination of consequence or probability.
Mitigation measures	Mitigation measures are designed to reduce the consequence or probability of an impact, or to reduce both consequence and probability. The significance of impacts has been assessed both with mitigation and without mitigation.

Table 5: Impact assessment criteria and rating scales

Duration		Extent		Irreplaceable Resources		Severity	
1	Temporary	1	Footprint	1	Yes	-3	High-negative
2	Short term	2	Site	0	No	-2	Moderate-negative
3	Medium term	3	Local			-1	Low-negative
4	Long term	4	Regional			1	Low-positive
		5	National			2	Moderate-positive
		6	International			3	High-positive
Consequence = (Duration + Extent + Irreplaceability) x Severity		**Likelihood**		**Significance**		**Confidence**	
-25 to -33	Extremely detrimental	1	Unlikely	-73 to -99	Very high-negative	Low	
-19 to -24	Highly detrimental	2	Likely	-55 to -72	High-negative	Medium	
-13 to -18	Moderately detrimental	3	Definite	-37 to -54	Moderate-negative	High	
-7 to -12	Slightly detrimental			-19 to -36	Low-negative		
0 to -6	Negligible			0 to -18	Very low-negative		
0 to 6	Negligible			0 to 18	Very Low-positive		
7 to 12	Slightly beneficial			19 to 36	Low-positive		
13 to 18	Moderately beneficial			37 to 54	Moderate-positive		
19 to 24	Highly beneficial			55 to 72	High-positive		
25 to 33	Extremely beneficial			73 to 99	Very high-positive		

6.3 ASSESSMENT OF IMPACTS

While most of the proposed pipeline route falls within the disturbed road reserve, or along existing gravel roads and tracks, which are of low sensitivity, certain areas of the route will impact on sensitive habitat. Possible impacts on birds and mammals and their sources associated with selected sections of the proposed pipeline route are provided in **Table 6** for the construction phase, and operational phase maintenance activities.

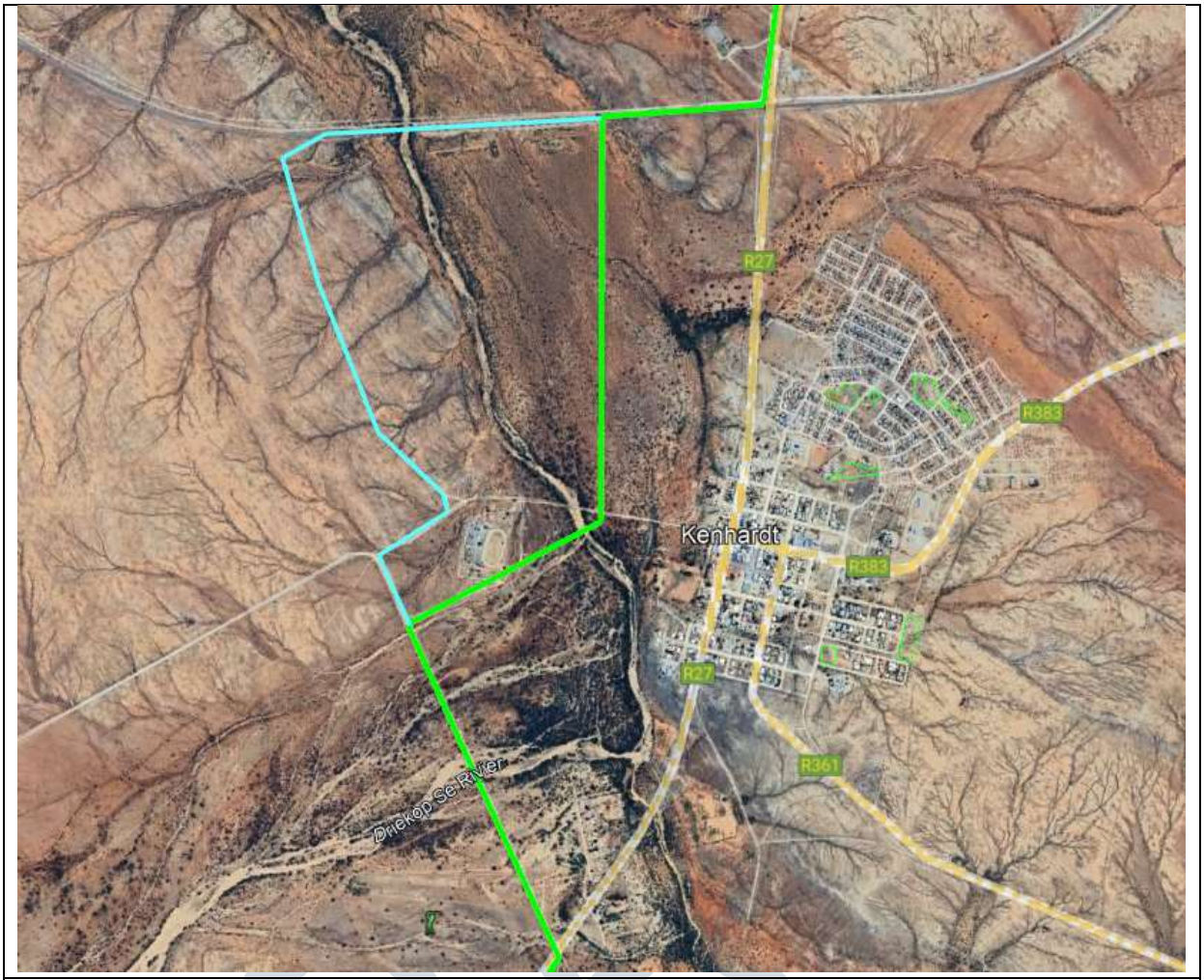
Table 6: Possible impacts arising from the proposed development during construction and operations

Possible Impact	Development Phase and Potential Source of Impact	Area to be Affected
Habitat destruction	**Construction Phase:** • Clearing of natural vegetation and habitat, and trench digging for burying the pipe **Operational Phase:** • Opening the trench for repairs or maintenance	• Floodplain and riparian habitat of the Hartbees River (29°20'21.00"S 21° 8'46.23"E)

Possible Impact	Development Phase and Potential Source of Impact	Area to be Affected
		 • Natural arid shrubland along the alternative route from the deviation from the preferred route (29°54'43.51"S 20°18'35.41"E)  • Non-perennial drainage lines and floodplain / riparian habitat along the alternative route (29°55'46.23"S 20°11'22.79"E) 

Possible Impact	Development Phase and Potential Source of Impact	Area to be Affected
		• Dolerite outcrops along the alternative route (29°56'53.49"S 20° 9'41.62"E) 

IMPACT TABLE				
PROJECT PHASE	*Construction phase*			
DIRECT IMPACT	*Destruction of natural vegetation and faunal habitat*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-16*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way; and valued, important, sensitive, or vulnerable systems or communities are negatively affected*	***Moderately detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-48***	***moderate negative***		
PROPOSED MITIGATION MEASURES				
Crossing the Hartbees River floodplain in a currently undisturbed area should be avoided. If technically feasible, the suggested route change shown below (blue lines) must be considered. This suggested route follows existing tracks that are already disturbed, rather than disturbing the floodplain in new areas				



The alternative route for 750 mm rising main to the final storage reservoir is not preferred from a faunal perspective as it is routed through natural arid shrubland, impacts on undisturbed drainage lines and floodplain habitat, and natural dolerite outcrops. This alternative will therefore impact negatively on natural faunal habitat. This can be avoided by opting for the preferred route in this section

Construction activities should commence during the dry winter months as far as possible to minimise the impacts on breeding fauna

POST-MITIGATION				
DURATION	*4*	*The duration of the activity associated with the impact will last more than 5 years and as such is rated as Long Term*	*-7*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Slightly Detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-21***	***low negative***		
CONFIDENCE LEVEL				
Medium				

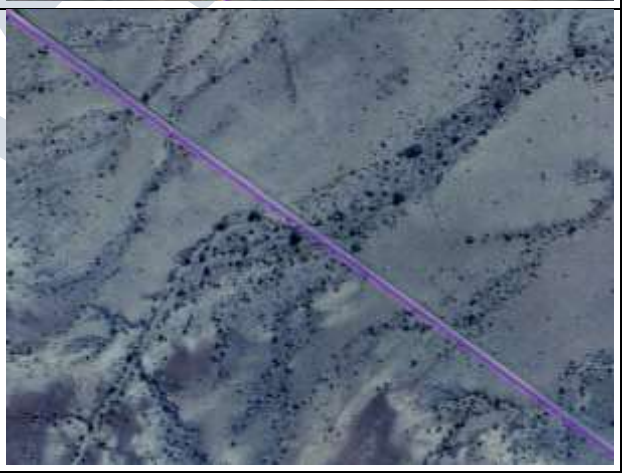
Note that if the suggested route changes and alternatives recommended are not implemented, then the impact will remain at moderate negative.

IMPACT TABLE				
PROJECT PHASE	*Operational Phase*			
DIRECT IMPACT	*Destruction of natural vegetation and faunal habitat*			
DIMENSION	**RATING**	**MOTIVATION**	**CONSEQUENCE**	**LIKELIHOOD**
PRE-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-12*	*3*
EXTENT	*3*	*The extent of the impact is rated as Local as it affects the development area and adjacent properties*		
SEVERITY	*-2*	*The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural, and social functions and processes continue albeit in a modified way; and valued, important, sensitive, or vulnerable systems or communities are negatively affected*	***Slightly detrimental***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-36***	***low negative***		
PROPOSED MITIGATION MEASURES				
If technically feasible, the suggested route change shown above (blue lines) must be considered. This suggested route follows existing tracks that are already disturbed, rather than disturbing the floodplain in new areas. This will help avoid repeating impacts during the operational phase whenever repairs or maintenance is required				
The alternative route for 750 mm rising main to the final storage reservoir is not preferred from a faunal perspective as it is routed through natural arid shrubland, impacts on undisturbed drainage lines and floodplain habitat, and natural dolerite outcrops. This alternative will therefore impact negatively on natural faunal habitat. This can be avoided by opting for the preferred route in this section. This will help avoid repeating impacts during the operational phase whenever repairs or maintenance is required				
POST-MITIGATION				
DURATION	*2*	*The duration of the activity associated with the impact will last 6-18 months and as such is rated as Short term*	*-5*	*3*
EXTENT	*2*	*The extent of the impact is rated as site as it will affect only the development area*		
SEVERITY	*-1*	*The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected*	***Negligible***	***Definite***
IMPACT ON IRREPLACEABLE RESOURCES	*1*	*Irreplaceable resources will be impacted*		
SIGNIFICANCE	***-15***	***very low negative***		
CONFIDENCE LEVEL				
Medium				

6.4 IMPACT MANAGEMENT AND KEY RECOMMENDATIONS

While impacts of the proposed pipeline route will generally be low to negligible, and general best practice and impact management will apply, there are certain sections that require special attention and specific mitigation

to avoid and minimise impacts. In addition to the mitigation measures prescribed above, the following sections of the route are highlighted as they have the potential to impact negatively on natural faunal habitat.

Possible Impact	Notable areas for specific recommendations	
Habitat destruction	• Narrow road reserve at large rocky outcrop on the R27 (28°56'36.27"S 21° 5'41.17"E)	
	• Narrow road reserve at rocky outcrops on the R27 (29°48'23.31"S 20°46'1.65"E)	
	• Numerous non-perennial drainage lines and riparian habitat along the district gravel roads	

The following recommendations are key to mitigating the impacts of the proposed project from an avifaunal and mammal perspective, and must be included in the Environmental Management Programme (EMPr):

- An experienced, independent Environmental Control Officer (ECO) must be appointed to oversee the construction activities and compliance with the EMPr.
- The natural vegetation and habitat associated with features such as rocky outcrops, drainage lines, and pans must be avoided as far as possible, especially in areas where the road reserve is narrow.

- Rocky outcrops, drainage lines, and the natural vegetation in the surrounding areas must be designated no-go areas for construction camps and crews. Construction camps must be placed within the footprint or within disturbed areas that are already modified as far as possible.
- Crossing the Hartbees River floodplain in a currently undisturbed area should be avoided. If technically feasible, the suggested route change shown in the impact table above (blue lines) must be considered. This suggested route follows existing tracks that are already disturbed, rather than disturbing the floodplain in new areas. This will also help avoid repeating impacts during the operational phase whenever repairs or maintenance is required.
- The alternative route for 750 mm rising main to the final storage reservoir is not preferred from a faunal perspective as it is routed through natural arid shrubland, impacts on undisturbed drainage lines and floodplain habitat, and natural dolerite outcrops. This alternative will therefore impact negatively on natural faunal habitat. This can be avoided by opting for the preferred route in this section. This will also help avoid repeating impacts during the operational phase whenever repairs or maintenance is required
- During construction, no wild animal may under any circumstance be handled, removed, or be interfered with by construction workers. No wild animal may under any circumstance be hunted, snared, captured, injured, or killed. This includes animals perceived to be vermin.
- Alien plant eradication and control must be undertaken throughout the construction phase and the operational phase.

7. SUMMARY AND IMPACT STATEMENT

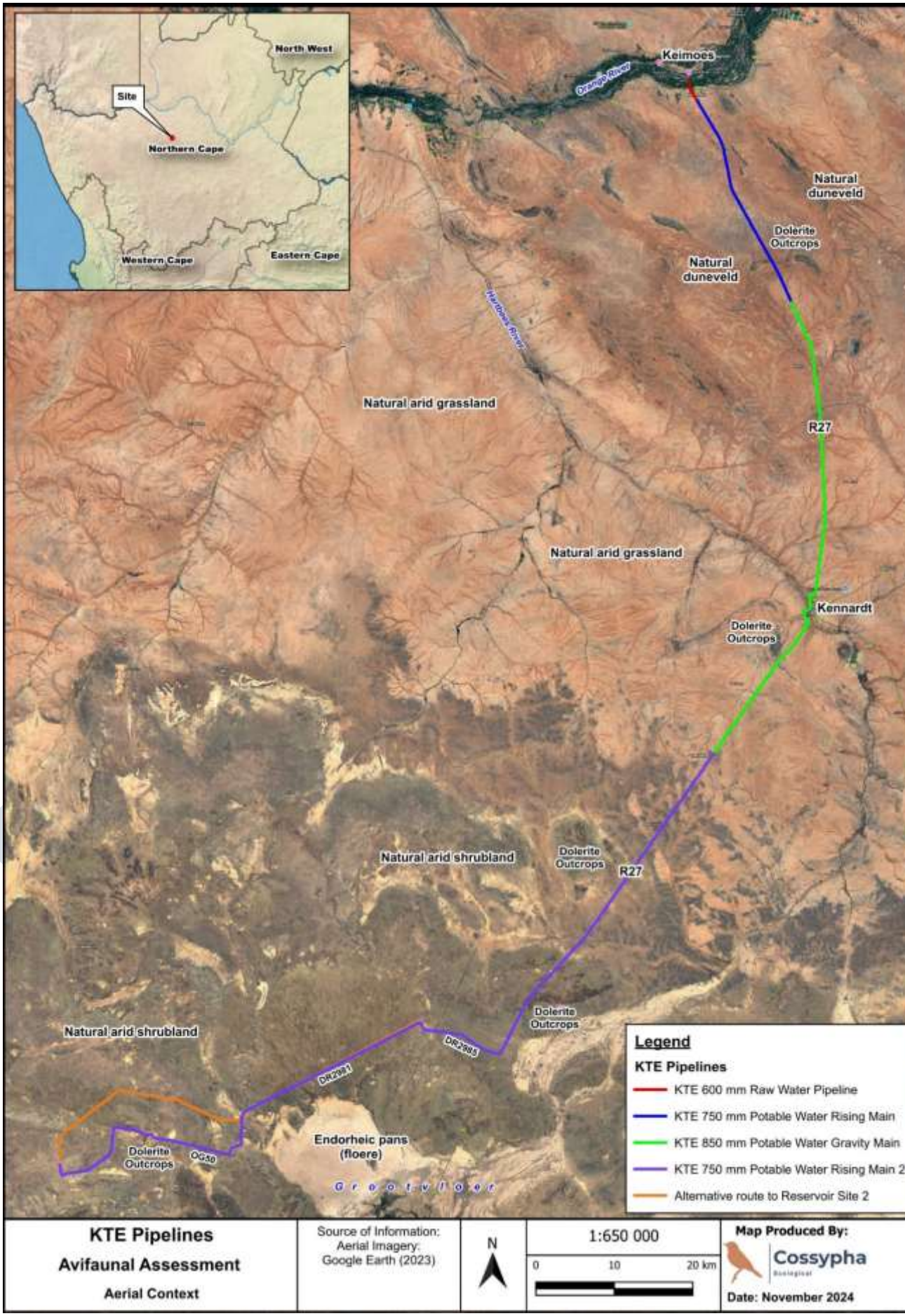
The assessment area incorporates the broad road reserve on the western side of the R27 (until the intersection with the Soafskolk Road), which is mostly comprised of the disturbed roadside with a sparse grassy cover and pockets of scrubby vegetation growing mostly against the fence line. The R27 crosses numerous drainage lines where the road reserve usually narrows with a culvert and has a mix of indigenous and alien woody vegetation. At Kenhardt, the proposed pipeline deviates from the R27 around to west of the town where the proposed route passes through the floodplain of the Hartbees River and crosses the river channel. The floodplain is comprised of deep alluvial sandy soils and scattered woody species. The river and associated floodplain provide important habitat for burrowing animals and birds, and likely provides an important corridor for movement for biodiversity through the landscape. If possible, the route should avoid this sensitive habitat and rather follow existing tracks that are already disturbed. Other notable landscape features include small dolerite outcrops that provide habitat heterogeneity to the landscape and are often areas of higher biodiversity. These generally occur outside of the road reserve, or the road reserve narrows where rocky areas are close by.

Three bird SCC were recorded in the general study area during the field surveys. The Lanner Falcon was observed flying overhead, while the other individuals were recorded in the surrounding natural habitat, and not within the road reserve. The vast expanse of the surrounding arid shrubland and grassland, as well as specialised habitats such as rivers, drainage lines, pans, and rocky outcrops provide the most important habitat for the faunal species found in the region.

The habitat along the route is largely disturbed and exists in a narrow strip that is somewhat fragmented due to the proximity to the roadway. The proposed footprint has limited use by fauna, and it is unlikely that the available habitat would support any individuals or populations of faunal SCC. Such species are more likely to utilise the better-quality habitat that exists in the adjacent natural areas. Overall, the assessment area displays a low sensitivity from a terrestrial faunal perspective.

It is the opinion of the specialist that the impacts on terrestrial fauna will be low to negligible considering the modified and currently disturbed state of the proposed footprint, and that the project may be authorised subject to the recommendations in the EMPr being adhered to.

- This compliance statement is applicable to the study area as described in the EIA documentation and shown in **Figure 1** and


North West
Site
Northern Cape
Western Cape
Eastern Cape
Keimoes
Orange River
Natural duneveld
Dolerite Outcrops
Natural duneveld
Hartbees River
Natural arid grassland
R27
Natural arid grassland
Kennardt
Dolerite Outcrops
Natural arid shrubland
Dolerite Outcrops
R27
Dolerite Outcrops
Natural arid shrubland
DR2981
DR2985
Endorheic pans (floere)
Dolerite Outcrops
OG50
Groot Vloer
Legend
KTE Pipelines
KTE 600 mm Raw Water Pipeline
KTE 750 mm Potable Water Rising Main
KTE 850 mm Potable Water Gravity Main
KTE 750 mm Potable Water Rising Main 2
Alternative route to Reservoir Site 2
KTE Pipelines
Avifaunal Assessment
Aerial Context
Source of Information:
Aerial Imagery:
Google Earth (2023)
N
1:650 000
0
10
20 km
Map Produced By:
Cossypha
Date: November 2024

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- Due to the disturbed nature of the habitat, the study area is confirmed to be of **Low** sensitivity for the Terrestrial Animal Species theme, except in areas specified in this reprt.
- It is likely that the proposed development will not have any impact on terrestrial animal SCC; and
- There are no conditions to which this compliance statement is subjected.

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9. APPENDICES

APPENDIX A: ABRIDGED CV OF THE SPECIALIST

Name and Surname	:	Robyn Phillips
Date of Birth	:	28 08 1975
Company Name	:	Cossypha Ecological
Field of Expertise	:	Terrestrial Ecologist and Avifaunal Specialist
SACNASP Registration	:	*Pr.Sci.Nat.* 400401/12 (Zoological and Ecological Sciences)
Highest Qualification	:	MSc (Zoology) *cum laude*
Years of Experience	:	23
Contact Number	:	084 695 1648
Email	:	robyn@cossypha.co.za

The first half of my professional career was spent working in ecological research at the University of KwaZulu-Natal. Since starting in consulting in 2011, I have been involved in many projects requiring biodiversity surveys and ecological assessments as part of the legislated requirements for the Environmental Impact Assessment (EIA) process. These studies Include field assessment of habitat, species occurrence (especially those of conservation concern), assessment of ecological importance and sensitivity of floral and faunal communities and habitat, as well as assessment of impacts. Tasks also include making recommendations and prescribing mitigation measures after applying the mitigation hierarchy, aimed at minimising impacts.

Following is a selection of similar projects undertaken:

- Terrestrial Biodiversity and Animal Species Themes Impact Assessment Report for the Proposed overhead power line up to 132 kV in capacity from the ABO Otter Solar Energy Facilities to Mercury MTS (CES / ABO) – 2023 to present.
- Avifaunal Impact Assessment Report for the Proposed Installation of the 400 kV Transmission Line to connect the new Mbewu Substation to the existing Invubu Substation near Richards Bay, KwaZulu-Natal (ENVASS / Eskom) – 2023 to 2024.
- Terrestrial Animal Species Compliance Statement for the Proposed Rehabilitation of the Road TR75/1 (N12 Highway) Near Oudtshoorn, Oudtshoorn Local Municipality, Garden Route District Municipality, Western Cape (SES) – 2023.
- Terrestrial Biodiversity and Faunal Assessment for the Proposed Springhaas Solar Cluster Development and Grid Connection near Dealesville, Free State (GIBB Environmental) – 2021 to 2023.
- Fauna and Avifauna Impact Assessment Report for the Proposed Riversdale Anthracite Colliery Ropeway near Vryheid, KwaZulu-Natal (Eco-Pulse / Greenmined) – 2023.
- Terrestrial Animal Species Compliance Statement for the Proposed Road Upgrade of the R46 in Ceres, Western Cape (SRK) – 2022.
- Avifaunal Assessment for the Proposed Development of a Battery Energy Storage System (BESS) and Associated Infrastructure at the Cuprum Substation located at Copperton, near the town of Prieska, Northern Cape Province (AECOM) – 2021.
- Terrestrial Biodiversity Assessment (flora and fauna) for the Proposed KwaZulu-Natal Automotive Supplier Park (ASP) and Township Establishment, including powerline, bulk water pipeline, and sewer line, Illovo South, Durban, KwaZulu-Natal (Dube TradePort Corporation) – 2018 to 2021.
- Terrestrial Biodiversity (fauna and flora) Impact Assessment for the proposed bulk water pipelines for Emfuleni Local Municipality, Vanderbijlpark, Gauteng (Emfuleni Local Municipality) – 2018.
- Avifaunal Assessment for the Westgate and Randfontein Powerlines, Gauteng (Eskom) – 2017.
- Terrestrial Biodiversity (fauna) and Avifaunal Assessment for the Teebus Hydroscheme: Bulhoek Powerline, Eastern Cape (Eskom) – 2016 to 2017
- Terrestrial Biodiversity (fauna) and Avifaunal Assessment for the Ngqeleni Rural Electrification Project, Eastern Cape (Eskom) – 2016.