THE PROPOSED CONSTRUCTION OF A WATER PIPELINE BETWEEN NOENIEPUT AND SWARTKOPSDAM, NORTHERN CAPE PROVINCE

ECOLOGICAL IMPACT ASSESSMENT

July 2020

Prepared for:

bvi ENGINEERING PROCUREMENT MANAGEMENT

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1. DOCUMENT CONTROL

1.1. Quality and revision record

1.1.1. Quality approval

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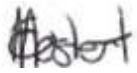
Author:	Environmental Consultant & Ecological Specialist (MSc Botany, SU 2015)	Elana Mostert		1 July 2020
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This report has been prepared in accordance with Enviroworks Quality Management System.

1.1.2. Revision record

Revision Number	Objective	Change	Date
1	Draft Report	N/A	N/A

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5. INTRODUCTION

BVi Consulting Engineers Northern Cape (Pty) Ltd appointed the specialist on behalf of Kalahari-East Water Users Association (The Applicant) to undertake the required Ecological Impact Assessment (Terrestrial Flora Biodiversity) as part of the Environmental Authorisation process for the Noenieput water pipeline construction (hereafter referred to as the proposed project), Northern Cape Province.

The Kalahari-East Water Users Association proposes the construction of a portable water supply pipeline (approximately 25km) in Noenieput. Noenieput is located approximately 160km northwest of Upington within the ZF Mgcawu District Municipality in the Northern Cape Province (Figure 1). It is the centrum of a farming community with sheep and cattle farming as the main source of income (as in BVi Consulting Engineers, 2019).

5.1. Receiving environment

5.1.1. Geology

Geologically the Kalahari is a structural basin. When about 200 million years ago Southern Africa was still flat, it was covered by a shallow sea, as evidenced by the sea shells still to be found everywhere in the arid interior. Upheavals came and massive volcanic surges created the mountains along the coasts, creating a huge dent in the earth's crust that was to become the Kalahari. Gradually this enormous basin was filled through erosion of the surrounding rocks and although it is not known where the red sand originated from, enough rain must have fallen to wash down the colloidal deposits. Later prevailing winds formed the parallel dunes stretching in a north-westerly direction (as in BVi Consulting Engineers, 2019).

5.1.2. Climate and Climate Change

The dry season in the Kalahari is between April and September. Rainfall usually starts late in January, and stops towards the end of April. The average rainfall in the project target area is 120 to 150mm per. Maximum midsummer temperatures are between 35 degrees Celsius and 42 degrees with normal temperatures averaging between 30 and 35 degrees. During winter, daytime temperature is about 27 degrees Celsius, dropping to 0 degrees at night. It occasionally drops below freezing point to -6 degrees. Evaporation of 2900 millimeters per year in the area is the highest in South Africa. Rainfall over the last 20 years was very inconsistent which impacted grazing conditions and subsequently stock production negatively (as in BVi Consulting Engineers, 2019).

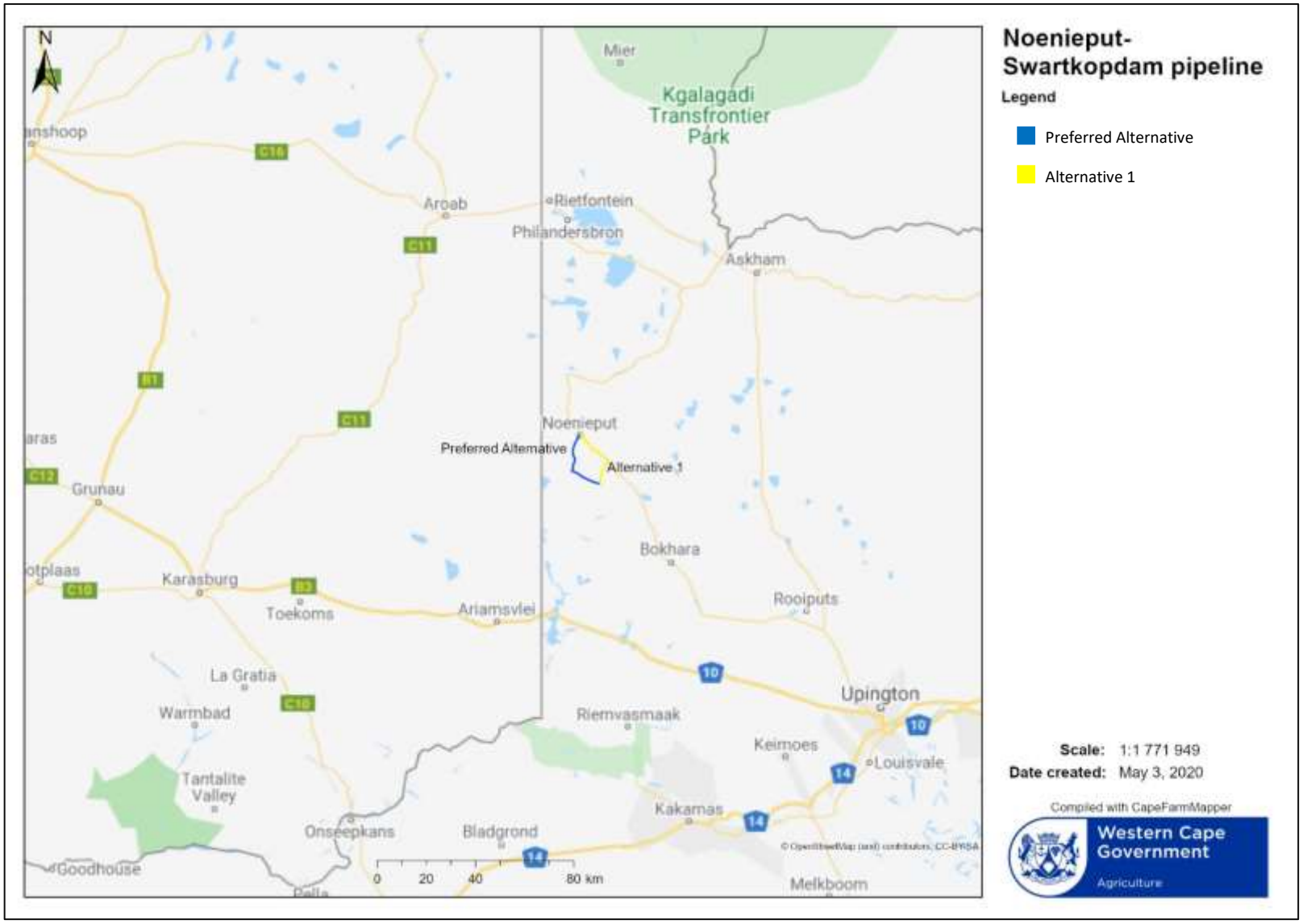


Figure 1 Locality map of the propose Noenieput - Swartkopsdam water pipeline

5.1.3. Geo-hydrology

The ground water quality in the region is poor as can be seen on the South African ground water quality map (Figure 2) below; the pink and red color represents the poorest water quality. Conductivity, which is an indication of the quality of the groundwater, ranges in the project target area between 150 mS/m - >520 mS/m (Department of Water & Sanitation, 2012). SANS 241-2001 states that a conductivity of 150ms/m is still acceptable but 370ms/m is the maximum allowable conductivity suitable for drinking water. The map below shows that only a small area has water suitable for human consumption.

Borehole yield ranges between 0.1 to 0.5 l/s - 0.5 to 2.0 l/s 40 with a fractured aquifer type (Department of Water and Sanitation, n.d.; see Figure 3). This data shows that poor quality as well as the availability of the water is a major concern in the project area. Noenieput and Swartkopsdam are totally dependent on groundwater for water supply, which is unsuitable in terms of quality and quantity. The boreholes cannot meet the summer peak demand and the quality of the water is detrimental to the health of the communities.

5.2. Need and desirability

Water service delivery in the Kalahari area has been severely impacted by the drought situation over the past years. With the extension of the Kalahari-East Water Supply Scheme to Mier in 2017, the water supply problems for all the towns in the area were addressed, except for the three towns of Welkom, Noenieput and Swartkopsdam. These towns still depend solely on groundwater supply from boreholes in the vicinity. The water from 75% of these boreholes have an Electrical Conductivity (EC) of more than 200 mS/m and is thus not suitable for long term human consumption. The towns are also surrounded by commercial and small famers which face the same challenge in terms of sustainable water availability for farming purposes (as in BVi Consulting Engineers, 2019).

In 2018 the Dawid Kruiper Municipality joined forces with the Kalahari-East Water Users Association to co-fund a project to provide potable water from the Kalahari-East from the Mier Pipeline to Noenieput. The project will also give access to sustainable water supply for all the commercial and small farms along the proposed pipeline route. In addition, the design of the proposed pipeline caters for future extension to supply potable water to Swartkopsdam and farms further south of Noenieput (BVi Consulting Engineers, 2019).

Water is essential for all animals. It is important for both animal welfare and business profitability that sheep and cattle have an adequate supply of good quality water. Amount and quality of water required vary between species of livestock, between classes of stock within the species, and in response to the environment in which the stock are kept. The main factor which determines the suitability of water for stock is the concentration of dissolved salts in the water. Dissolved salts in water are expressed in parts per million (ppm) or in terms of the electrical conductivity of the water, measured in milliSiemens per metre (mS/m) (BVi Consulting Engineers, 2019).

It is difficult to determine exactly what the effect of the water quality on the production of stock in the project target area is. This is due to the fact that the figures are not presented on the same scale and that the effects are not exactly quantified (BVi Consulting Engineers, 2019).

The respondents of a survey indicated in a questionnaire that under the current circumstances 15% of sheep and 10% of cattle will die before being ready for the market. Respondents feel that this rate can be brought down with 5% to the optimum of 10% and 5% respectively if the water situation is improved. Furthermore, the respondents feel that they produce 30% less lamb and 20% less cattle due to lower reproduction as a result of the current water situation. They also think that they can improve the quality of meat with 60% through water with better quality and a more reliable water supply (BVi Consulting Engineers, 2019).

The current lack of availability of water and poor quality of groundwater on which the project area depends on, have the following restrictions in development (in addition to the livestock production mentioned above) (from BVi Consulting Engineers, 2019):

- Lack of sustainable water provision restrict further township development. There are currently 100 stands in Noenieput for which the township establishment cannot be concluded due to insufficient water availability.
- Both commercial and small-scale farmers will not be able to survive another summer season without adequate and sustainable water resources. The past droughts and inadequate rainfall had a detrimental effect on grazing resources and stock loss will be inevitable.
- Access to basic services such as water and sanitation is a constitutional right. The dignity and social welfare of the communities are being violated.

5.3. Project description

The connection point (start point) will be at Noenieput where the water supply pipeline- that is currently under construction- terminates. The water will flow from the connection point at Noenieput to Swartkopsdam (end point). Connection points will be provided for small and commercial farmers along the pipeline route. The pipeline material is UPVC of various pipe classes and diameters (110-160mm). The pipeline shall be installed in a trench with at least 600mm cover above the pipe. At the river crossings the pipe cover will be 1.2 meters. The pipeline design will take into account the approximate usage per month that anticipates 0.9l/s at peak summer demand (BVi Consulting Engineers, 2019).

The same construction and rehabilitation methods applied during construction of the Kalahari-East to Mier Pipeline project will be utilized for this project (BVi Consulting Engineers, 2019):

- The pipeline was designed using the same standards as applicable to the original Kalahari East Water Supply System project (completed in 1995) and the Extension to Mier pipeline project (completed in 2015).
- Air valves will be installed at every high point and specifications on metered off take.

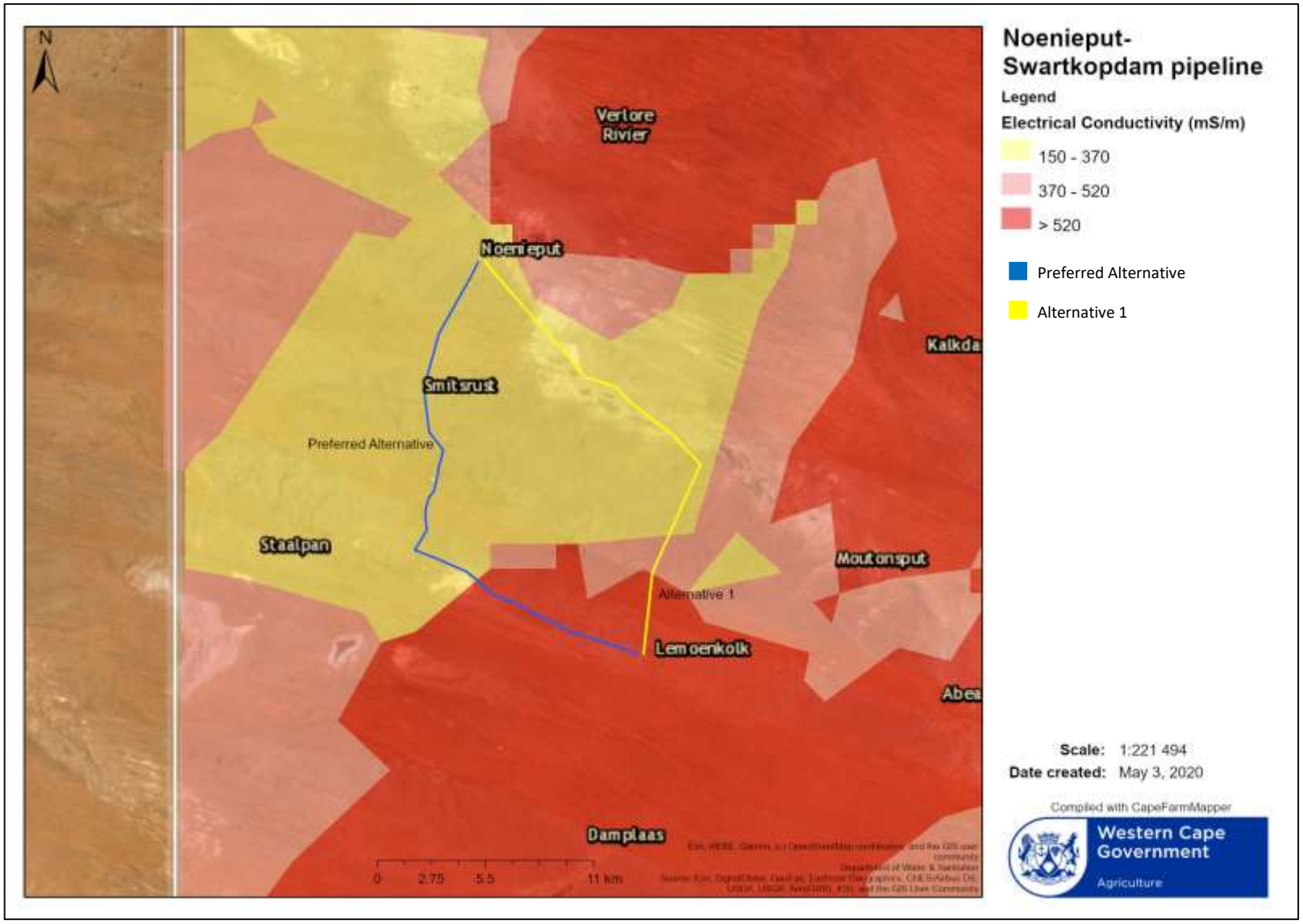


Figure 2 Map of the groundwater quality of the proposed Noenieput-Swartkopsdam pipeline

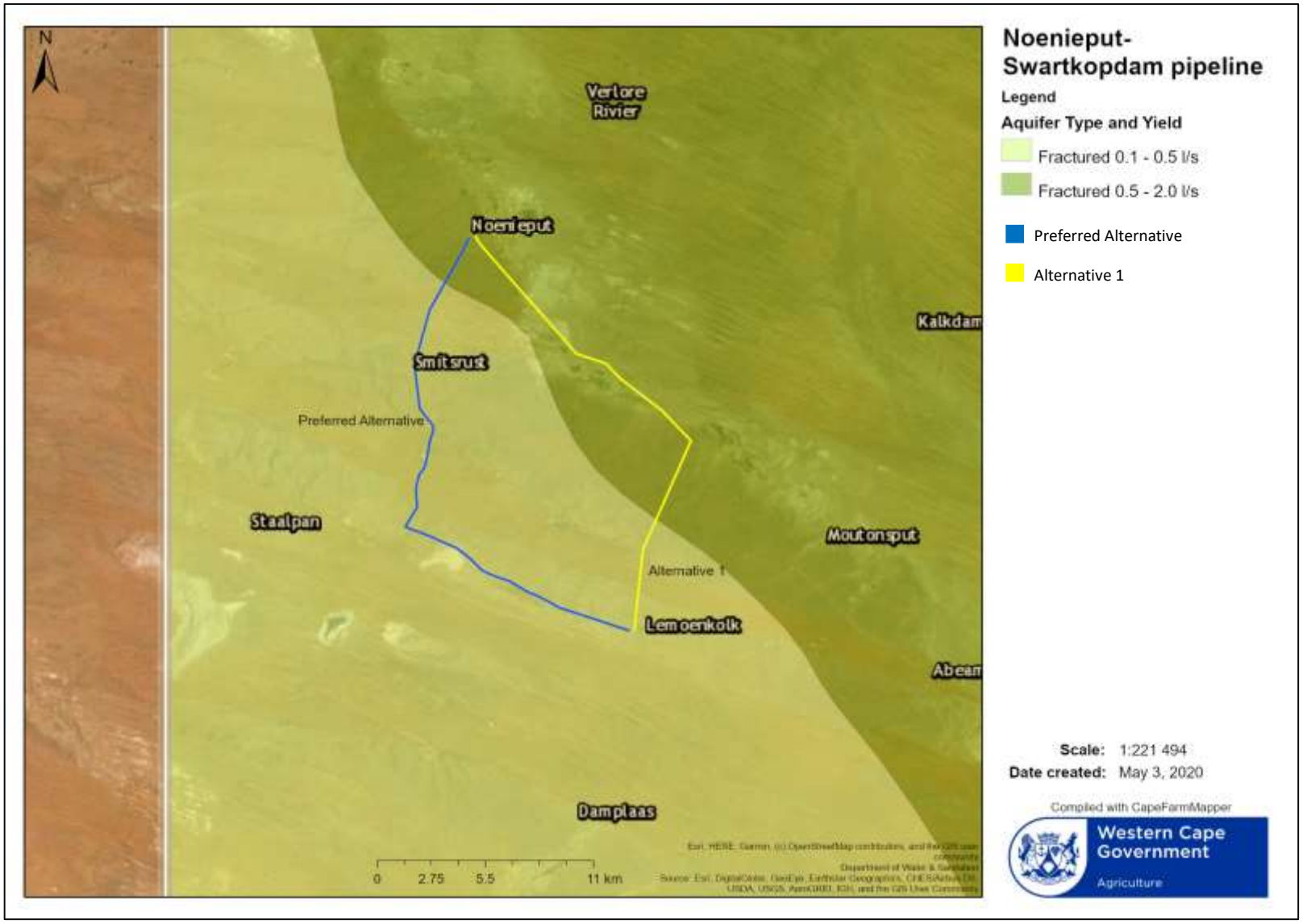


Figure 3 Map of the aquifer type and yield of the proposed Noenieput-Swartkopsdam pipeline

- "Swarthaak" branches will be used to protect the pipeline over the crest of the dunes against wind erosion. This will also help a lot for the re-growth of natural vegetation.
- Soil from the trench excavation will be used for bedding and blanket material.

5.3.1. Alternatives

Two route alternatives were proposed for the water pipeline: the Preferred Alternative and Alternative 1 (Figure 1). The Preferred Alternative is mostly within the road reserve of the route connecting Swartkopsdam and Noenieput via Smitsrust. Alternative 1 follows the road connecting Noenieput to the R360 for roughly 14km before it cuts across private property towards Swartkopsdam.

6. BACKGROUND

6.1. Objective

Various environmental legislation in South Africa makes provision for the protection of our natural resources and the functionality of ecological systems in order to ensure sustainability. Such acts include the National Environmental Management: Biodiversity Act (Act 10 of 2004), National Forests Act (Act 84 of 1998), Conservation of Agricultural Resources Act (Act 43 of 1983), National Water Act (Act 36 of 1998) and framework legislation such as the National Environmental Management Act (Act 10 of 2004).

The various components of ecological systems are all interrelated and it is therefore important that specialist studies of all such components be conducted prior to the commencement of any proposed project development. Only once the potential impacts and outcomes of proposed developments on the ecological systems of an area are understood, can informed decisions be made regarding the viability of projects to address and achieve the environmental and socio-economic needs of an area.

The development of the new infrastructure, could have potential impacts on the vegetation and surrounding environment. Vegetation will be displaced since the new development footprint will transform much of the surface area in order to install the pipeline. In order to evaluate the level of acceptability of the impact on the natural environment an Ecological Impact study was conducted. This was required in order to determine the potential presence of ecologically significant species, habitats or sensitive ecosystems within the proposed project footprint. Proposed mitigation and management measures must also be recommended in order to attempt to reduce/alleviate the identified potential impacts. This report constitutes the Ecological Impact Assessment.

The Ecological Impact Assessment included a vegetation and habitat survey in order to accomplish the following:

- Identify and list significant species encountered on the proposed project footprint and direct surrounds and list any protected and/or Red Data Listed species;

- Determine and discuss the condition and extent of degradation and/or transformation of the vegetation on the proposed project footprint;
- Determine and discuss the ecological sensitivity and significance of the proposed project area;
- Identify, evaluate and rate the potential impacts of the proposed project on the natural environment; and,
- Provide recommendations on mitigation and management measures in order to attempt to reduce/alleviate these identified potential impacts.

7. METHODOLOGY

7.1. Vegetation

- Vegetation types and their conservation status were extracted from the South African National Vegetation Map (Mucina and Rutherford, 2006) and the National List of Ecosystems that are Threatened and in Need of Protection (GN 1002 of 9 December 2012).
- A brief discussion on the vegetation type in which the study area is situated, using available literature, in order to place the study in context.
- A broad-scale map was generated of the vegetation and habitat sensitivity of the site using available GIS data.
- A list of endemic taxon species know to occur in the area was investigated prior to the site visit (Mucina and Rutherford, 2006). Species and their Red Data Listing, occurring in the Quarter Degree Square (QDS) (3318AA) were obtained from the following data bases: and MushroomMAP, OrchidMAP and TreeMAP & Botanical Database of South Africa (SANBI, 2016).
- List of plant species recorded during the survey. Plants were identified from photographs of specimens taken on site.
- The conservation status of the species in the list was also extracted from the database (SANBI, 2016) and is based on the Threatened Species Programme, Red List of South African Plants version 2017.1.

7.2. Date and season of site visit

A site visit took place on the 24 March 2020 to assess the Preferred Alternative. A walkthrough was done, assessing environmental conditions and pictures were taken of the environment and plant species. The site visits took place in late summer at the end of the rainy season, when most species were in flower. The weather conditions were accommodating, where clear visibility facilitated the inspection of the facility and surrounding vegetation.

The entire pipeline footprint could not be surveyed during the site visit. Instead, 100m transects were sampled every 2 km, and opportunistic observations were made at watercourses. This is thought to give a relatively good representative sample of the vegetation type and species that occurs within the proposed route footprint.

7.3. Impacts and ratings methodology

Potential impacts of the proposed project on the surrounding natural environment were identified, evaluated and rated as per the methodology described below:

The **Present Ecological State (PES)** of the proposed project area was assessed and rated as per Table 1 below.

- The Present Ecological State (PES) refers to the current state or condition of an area in terms of all its characteristics and reflects the change to the area from its reference condition. The value gives an indication of the alterations that have occurred in the ecosystem.

Table 1 Criteria for PES calculations.

Ecological Category	Score	Description
A	> 90-100%	**Unmodified**, natural.
B	> 80-90%	**Largely natural** with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.
C	> 60-80%	**Moderately modified**. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.
D	> 40-60%	**Largely modified**. A large loss of natural habitat, biota and basic ecosystem functions has occurred.
E	> 20-40%	**Seriously modified**. The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	0-20%	**Critically/Extremely modified**. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.

The **Ecological Importance and Sensitivity (EIS)** of the proposed project area was assessed and rated as per Table 2 below.

- The Ecological Importance and Sensitivity (EIS) of an area is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales, and both abiotic and biotic components of the system are taken into consideration. Sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred.

Table 2 Criteria for EIS calculations.

EIS Categories	Score	Description
Low/Marginal	**D**	Not ecologically important and sensitive at any scale. Biodiversity ubiquitous and not sensitive to flow and habitat modifications.
Moderate	**C**	Ecologically important and sensitive on provincial/local scale. Biodiversity not usually sensitive to flow and habitat modifications.
High	**B**	Ecologically important and sensitive. Biodiversity may be sensitive to flow and habitat modifications.
Very High	**A**	Ecologically important and sensitive. On national even international level. Biodiversity usually very sensitive to flow and habitat modifications.

The tables below indicate and explain the methodology and criteria used for the evaluation of the **Environmental Risk Ratings** as well as the calculation of the final **Environmental Significance Ratings** of the identified potential ecological impacts.

Each potential environmental impact is scored for each of the **Evaluation Components** as per the Table 3 below.

Table 3 Scale utilised for the evaluation of the Environmental Risk Ratings.

Evaluation Component	Rating Scale and Description/criteria
MAGNITUDE of NEGATIVE IMPACT (at the indicated spatial scale)	**10 - Very high**: Bio-physical and/or social functions and/or processes might be *severely* altered. **8 - High**: Bio-physical and/or social functions and/or processes might be *considerably* altered. **6 - Medium**: Bio-physical and/or social functions and/or processes might be *notably* altered. **4 - Low** : Bio-physical and/or social functions and/or processes might be *slightly* altered. **2 - Very Low**: Bio-physical and/or social functions and/or processes might be *negligibly* altered. **0 - Zero**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
MAGNITUDE of POSITIVE IMPACT (at the indicated spatial scale)	**10 - Very high (positive)**: Bio-physical and/or social functions and/or processes might be *substantially* enhanced. **8 - High (positive)**: Bio-physical and/or social functions and/or processes might be *considerably* enhanced. **6 - Medium (positive)**: Bio-physical and/or social functions and/or processes might be *notably* enhanced. **4 - Low (positive)**: Bio-physical and/or social functions and/or processes might be *slightly* enhanced. **2 - Very Low (positive)**: Bio-physical and/or social functions and/or processes might be *negligibly* enhanced. **0 - Zero (positive)**: Bio-physical and/or social functions and/or processes will remain *unaltered.*
DURATION	**5 - Permanent** **4 - Long term**: Impact ceases after operational phase/life of the activity > 60 years. **3 - Medium term**: Impact might occur during the operational phase/life of the activity – 60 years. **2 - Short term**: Impact might occur during the construction phase - < 3 years. **1 - Immediate**
EXTENT (or spatial scale/influence of impact)	**5 - International**: Beyond National boundaries. **4 - National**: Beyond Provincial boundaries and within National boundaries. **3 - Regional**: Beyond 5 km of the proposed development and within Provincial boundaries. **2 - Local**: Within 5 km of the proposed development. **1 - Site-specific**: On site or within 100 m of the site boundary. **0 -** None
IRREPLACEABLE loss of resources	**5 – Definite** loss of irreplaceable resources. **4 – High** potential for loss of irreplaceable resources. **3 – Moderate** potential for loss of irreplaceable resources. **2 – Low** potential for loss of irreplaceable resources. **1 – Very low** potential for loss of irreplaceable resources. **0 - None**
REVERSIBILITY of impact	**5 –** Impact **cannot** be reversed. **4 – Low** potential that impact might be reversed. **3 – Moderate** potential that impact might be reversed. **2 – High** potential that impact might be reversed. **1 –** Impact **will be** reversible. **0 –** No impact.
PROBABILITY (of occurrence)	**5 - Definite**: >95% chance of the potential impact occurring. **4 - High probability**: 75% - 95% chance of the potential impact occurring. **3 - Medium probability**: 25% - 75% chance of the potential impact occurring **2 - Low probability**: 5% - 25% chance of the potential impact occurring. **1 - Improbable**: <5% chance of the potential impact occurring.
CUMULATIVE impacts	**High**: The activity is one of several similar past, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern. **Medium**: The activity is one of a few similar past, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern. **Low**: The activity is localised and might have a negligible cumulative impact. **None**: No cumulative impact on the environment.

Once the **Environmental Risk Ratings** have been evaluated for each potential ecological impact, the **Significance Score** of each potential ecological impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**

The maximum **Significance Score** value is 150.

The **Significance Score** is then used to rate the **Environmental Significance** of each potential ecological impact as per Table 4 below. The **Environmental Significance** rating process is completed for all identified potential ecological impacts both before and after implementation of the recommended mitigation measures.

Table 4 Scale used for the evaluation of the Environmental Significance Ratings.

Significance Score	Environmental Significance	Description/criteria
125 – 150	**Very high (VH)**	An impact of very high significance will mean that the project cannot proceed, and that impacts are irreversible, regardless of available mitigation options.
100 – 124	**High (H)**	An impact of high significance which could influence a decision about whether or not to proceed with the proposed project, regardless of available mitigation options.
75 – 99	**Medium-high (MH)**	If left unmanaged, an impact of medium-high significance could influence a decision about whether or not to proceed with a proposed project. Mitigation options should be relooked.
40 – 74	**Medium (M)**	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with a proposed project.
<40	**Low (L)**	An impact of low is likely to contribute to positive decisions about whether or not to proceed with the project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation.
+	**Positive impact (+)**	A positive impact is likely to result in a positive consequence/effect, and is likely to contribute to positive decisions about whether or not to proceed with the project.

7.4. Comparing Alternatives

The two alternatives were compared via a desktop study. The results of the desktop study were used to exclude one of the alternatives from further assessment and only the resulting Preferred Alternative was investigated during the site visit.

8. ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

A part of the assessment depends on the desktop study to determine what species of conservation concern are known to occur in the area and which are most likely to occur in the proposed site. This is thought to be an acceptable method.

The processes of investigation which have led to the production of this report, harbours several assumptions, which include the following:

- All information provided by the applicant and engineering design team to the environmental specialist was correct and valid at the time that it was provided;
- The proposed project footprint as provided by the engineering design team is correct and will not be significantly deviated from;

- Strategic level investigations undertaken by the applicant prior to the commencement of the EIA process, determined that the development site represents a potentially suitable and technically acceptable location;
- The public will receive a fair and reoccurring opportunity to participate and comment during the EIA process, through the provision of adequate public participation timeframes stipulated in the Regulations;
- The need and desirability of the project is based on strategic national, provincial and local plans and policies which reflect the interests of both statutory and public viewpoints;
- The EIA process is a project-level framework and the specialists are limited to assessing the anticipated environmental impacts associated with the construction and operational phases of the proposed project;
- Strategic level decision making is conducted through cooperative governance principles with the consideration of sustainable and responsible development principles underpinning all decision making.
- Given that an EIA involves prediction, uncertainty forms an integral part of the process. Two types of uncertainty are associated with the BA process, namely process-related and prediction-related.
    - Uncertainty of prediction is critical at the data collection phase as final certainty will only be obtained upon implementation of the proposed development. Adequate research, experience and expertise may minimise this uncertainty;
    - Uncertainty of values depicts the approach assumed during the BA process, while final certainty will be determined at the time of decision making. Enhanced communication and widespread/comprehensive coordination can lower uncertainty;
- Uncertainty of related decision relates to the interpretation and decision making aspect of the EIA process, which shall be appeased once monitoring of the project phases is undertaken;
- The significance/importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the interpretation of results and limit the occurrence and scale of uncertainty;
- The initial study was undertaken as a desktop assessment and as such, the information gathered must be considered with caution, as inaccuracies and data capturing errors are often present within these databases;
- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the relevant areas will need to be surveyed and pegged according to surveying principles;
- The impact assessment was applied on the basis that the stipulated mitigation measures in all specialist recommendations will be implemented as recommended and therefore the results presented demonstrate the impact significance of perceived impacts on the receiving environment post-mitigation.
- Significant reliance on visual eco-morphological observations, was made in order to derive an understanding of the state of the habitat within the subject site. This state may change under a different meteorological regime.

- Investigations were confined to the road and road reserve. In some instances not all watercourses or areas > 4m from the road edge could be investigated due to farm fencing restricting access.
- Due to the extent of the linear development, the entire footprint could not be surveyed during the site visit. Instead, a representative sample of the pipeline was surveyed.

Gaps in knowledge can be attributed to:

The ecological study process is being undertaken prior to the availing of certain information which would be derived from the final project design and layout.

The specialist is an independent specialist consultant and as such, all processes and attributes of the specialist investigations are addressed in a fair and unbiased/objective manner. It is believed that through the running of a transparent and participatory process, risks associated with assumptions, uncertainties and gaps in knowledge can be and have been acceptably reduced.

9. RESULTS

9.1. Desktop comparison of alternatives

The desktop analysis used two maps and three datasets to compare alternative routes: the Northern Cape Critical Biodiversity Areas (CBA; Holness and Oosthuysen, 2016) and the National Rivers- and Wetland Maps from the 2018 National Biodiversity Assessment (Van Deventer et al., 2020, 2019). From the maps below (Figure 4 & 5), the following general observations can be made:

- The Preferred Alternative closely follows a dirt road (not clear on the map scale), whereas Alternative 1 only follows a surfaced road for a section, then crosses over private land from the road to Swartkopsdam.
- The Preferred Alternative crosses over a landscape classified as 'Other Natural Areas' (ONA) only, whereas Alternative 1 goes through a large portion classified as 'Ecological Support Areas (ESA). The ESA area of Alternative 1 corresponds to the corridor surrounding the Molopo River.
- Alternative 1 crosses through a large depression wetland.

From a general environmental and ecological perspective it is highly undesirable to choose a route that will go through a relatively large distance of 'natural' area, were no existing linear access routes are easily available. Disturbing areas within the CBA network (CBA1, CBA2 an ESA) is not preferred when areas not part of the network or classified as ONA is rather available. From the desktop assessment it is concluded that Alternative 1 is not a feasible option and this conclusion is further supported by the fact that the Preferred Alternative does not cross any ESAs or National Wetlands, in contrast to Alternative 1.

The Preferred Alternative was thus further investigated in the field.

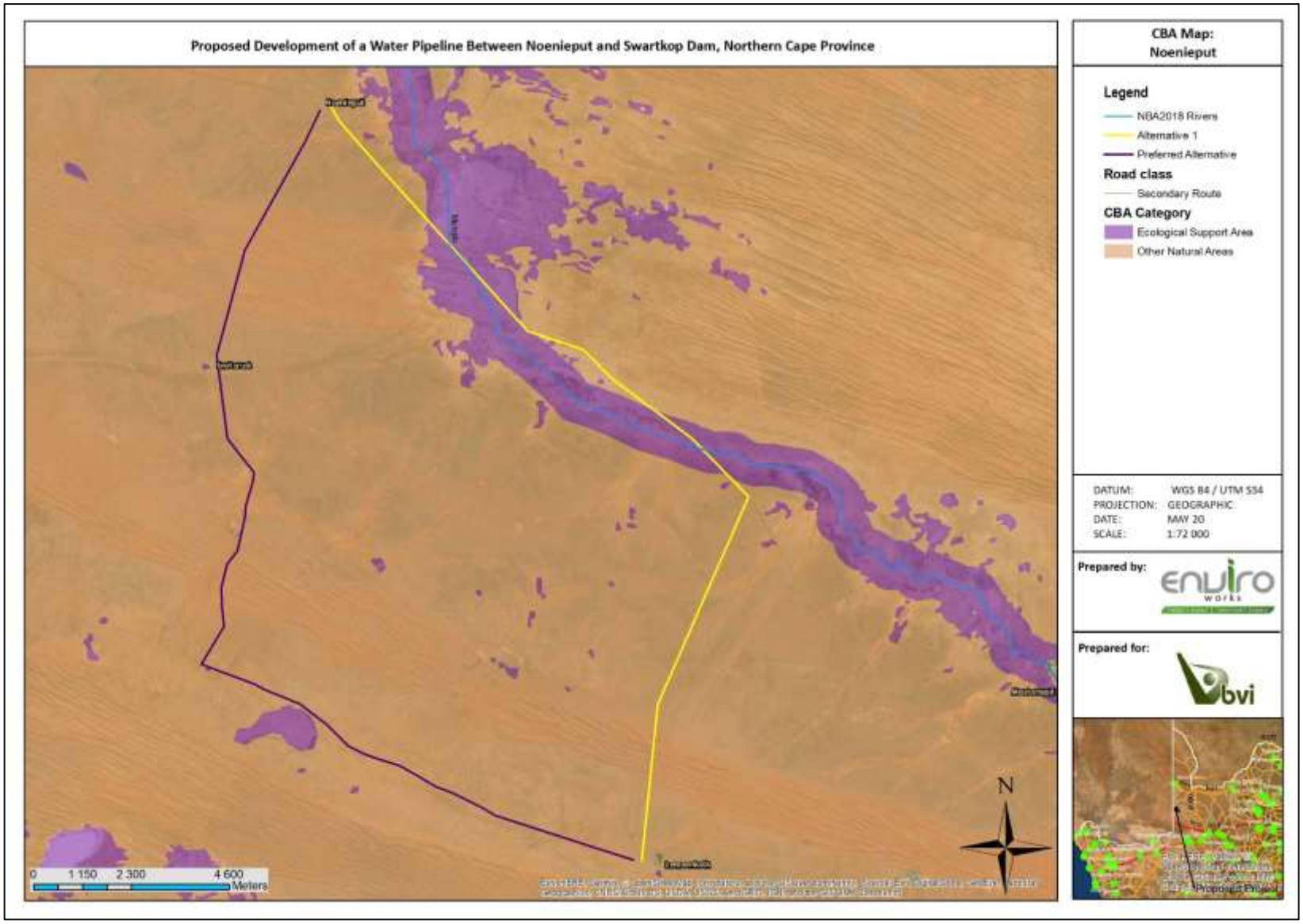


Figure 4 CBA map of the proposed pipeline alternatives

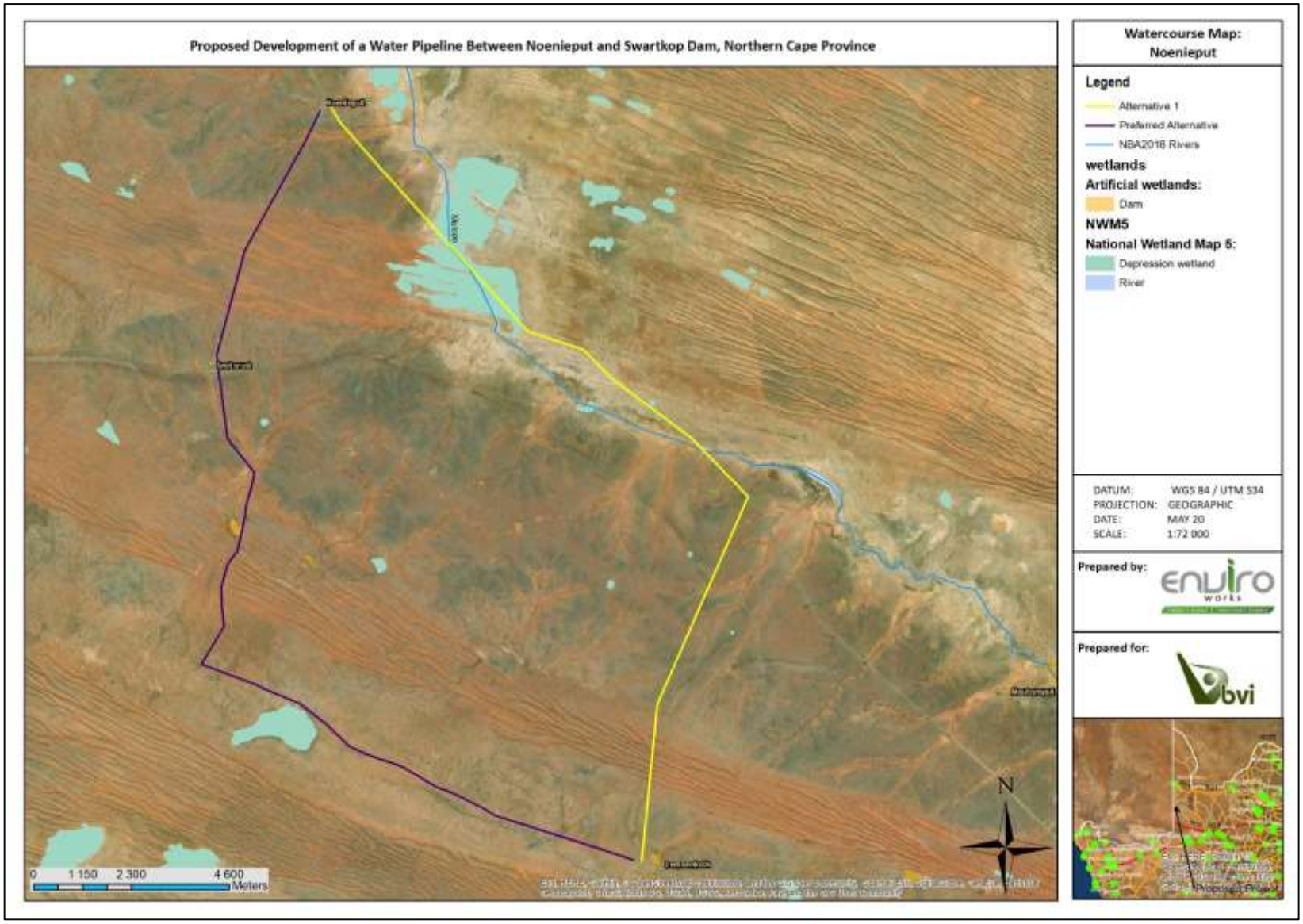


Figure 5 Watercourse map of the proposed pipeline alternatives

It should be noted that a separate Freshwater Impact Assessment (Mostert, 201) has been done and that watercourse delineation, watercourse status and condition, and impacts on watercourses are discussed in detail in the separate report. These aspects will thus not be discussed and repeated here.

9.2. National Environmental Screening Tool

The National Web based Environmental Screening Tool (https://screening.environment.gov.za/screeningtool/) is a geographically based web-enabled application which allows a proponent intending to submit an application for environmental authorisation in terms of the Environmental Impact Assessment (EIA) Regulations 2014, as amended to screen their proposed site for any environmental sensitivity.

The Screening Tool also provides site specific EIA process and review information, for example, the Screening Tool may identify if an industrial development zone, minimum information requirement, Environmental Management Framework or bio-regional plan applies to a specific area.

Further to this, the Screening Tool identifies related exclusions and/ or specific requirements including specialist studies applicable to the proposed site and/or development, based on the national sector classification and the environmental sensitivity of the site.

Finally, the Screening Tool allows for the generating of a Screening Report referred to in Regulation 16(1)(v) of the Environmental Impact Assessment Regulations 2014, as amended whereby a Screening Report is required to accompany any application for Environmental Authorisation and as such the tool has been developed in a manner that is user friendly and no specific software or specialised GIS skills are required to operate this system.

Further to this, PROCEDURES FOR THE ASSESSMENT AND MINIMUM CRITERIA FOR REPORTING ON IDENTIFIED ENVIRONMENTAL THEMES IN TERMS OF SECTIONS 24(5)(a) AND (h) AND 44 OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998, WHEN APPLYING FOR ENVIRONMENTAL AUTHORISATION have been gazetted (GN. R 320 of 20 March 2020). In terms of sections 24(5)(a), (h) and 44 of the National Environmental Management Act, 1998, these procedures prescribe general requirements for undertaking site sensitivity verification and for protocols for the assessment and minimum report content requirements of environmental impacts for environmental themes for activities requiring environmental authorisation, as contained in the Schedule therein. When the requirements of a protocol apply, the requirements of Appendix 6 of the Environmental Impact Assessment Regulations, as amended, (EIA Regulations), promulgated under sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), are replaced by these requirements.

According to the report generated by the National Screening Tool the following two themes and their protocols will be applicable this study:

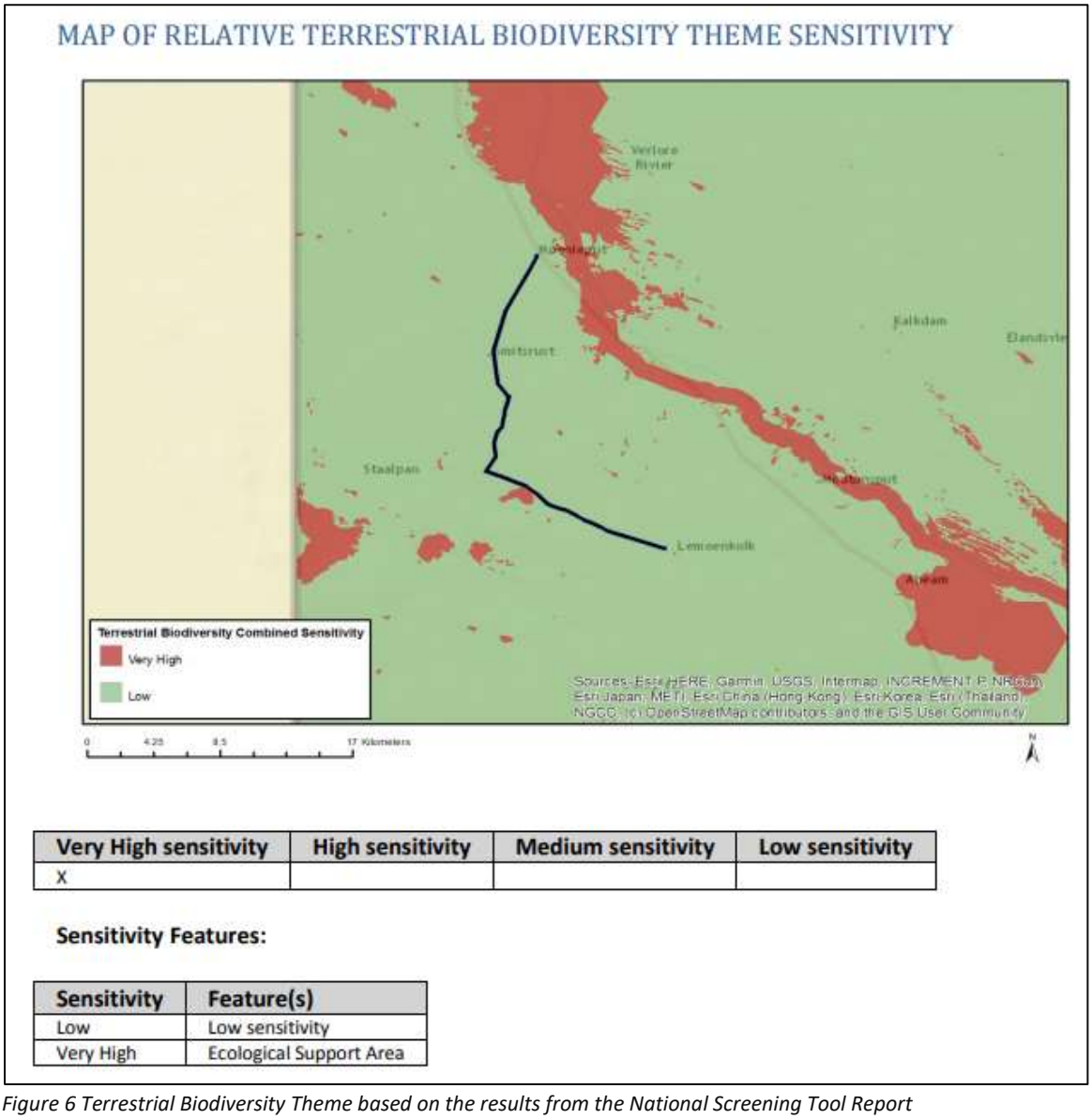
- *Terrestrial Biodiversity Theme*

  3(a) - PROTOCOL FOR THE SPECIALIST ASSESSMENT AND MINIMUM REPORTING CONTENT REQUIREMENTS FOR ENVIRONMENTAL IMPACTS ON TERRESTRIAL BIODIVERSITY

- *Plant Species Theme*

PART A: GENERAL REQUIREMENTS FOR UNDERTAKING AN INITIAL SITE SENSITIVITY VERIFICATION WHERE NO SPECIFIC ASSESSMENT PROTOCOL HAS BEEN IDENTIFIED.

9.2.1. Terrestrial Biodiversity Theme Results



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Ecological Support Area

Figure 6 Terrestrial Biodiversity Theme based on the results from the National Screening Tool Report

Based on the initial Site Sensitivity Verification undertaken by the specialist on 24 March 2020, the environmental sensitivity and land use was confirmed to correspond to those identified by the screening tool (Figure 4). The protocols further specifies the content of the assessment and minimum report content requirements on terrestrial biodiversity. The requirements are listed in the table below. The relevant section of this report is linked to each of the protocol's minimum requirements.

It should be noted that if any part of the proposed development footprint falls within an area of "very high" sensitivity, the assessment and reporting requirements prescribed for the "very high" sensitivity apply to the

entire footprint, excluding linear activities for which impacts on terrestrial biodiversity are temporary and it is in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures, can be returned to the current state within two years of the completion of the construction phase, in which case a compliance statement applies. Development footprint in the context of this protocol means the area on which the proposed development will take place and includes any are that will be disturbed.

In this case, where disturbance by the linear pipeline installation is temporary, and it is indeed the opinion of the terrestrial biodiversity specialist that based on the mitigation and remedial measures, it can be returned to the current state within two years of the completion of the construction phase. Thus a compliance statement applies and will be sufficient for the terrestrial biodiversity investigation.

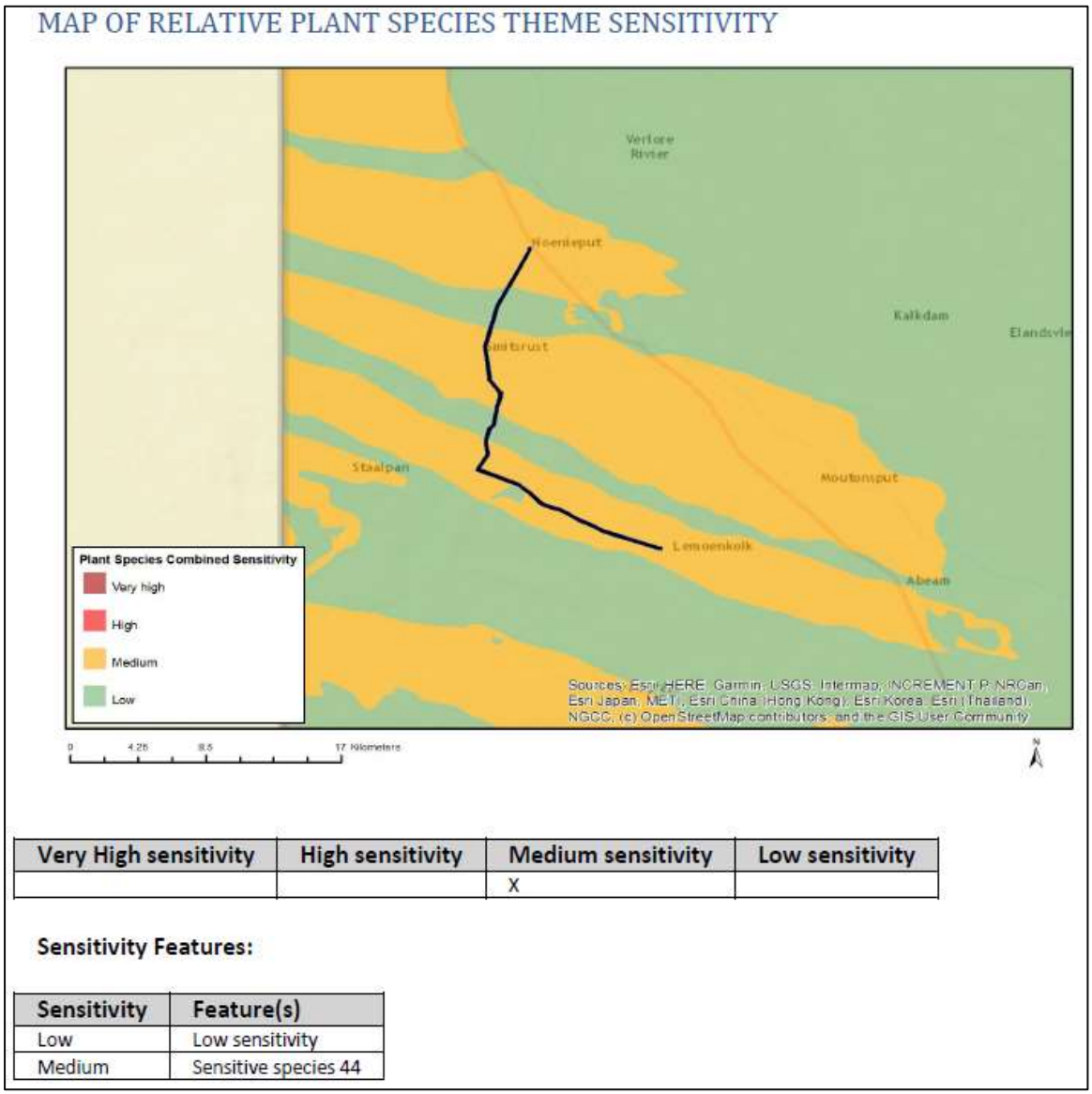
The areas classified as having Very high terrestrial biodiversity sensitivity correspond to ESA's of the CBA Map in Figure 4.

Table 5 Content cross-reference checklist for specialist assessment and minimum report content requirements for Terrestrial Biodiversity Compliance Statement as per GN R 320, with corresponding section names in the report.

Requirement	Section of this report
4.1. The compliance statement must be prepared by a specialist registered with the SACNASP and having expertise in the field of ecological sciences.	Quality and revision record
4.2. The compliance statement must:	-
4.2.1. be applicable to the preferred site and proposed development footprint;	Project description
4.2.2. confirm that the site is of "low" sensitivity for terrestrial biodiversity; and	Terrestrial Biodiversity Theme Results
4.2.3. indicate whether or not the proposed development will have any impact on the biodiversity feature.	Overall ecological impact assessment
4.3. The compliance statement must contain, as a minimum, the following information:	-
4.3.1. the contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Details of the Specialist; Quality and revision record
4.3.2. a signed statement of independence by the specialist;	Declaration of Independence
4.3.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Methodology
4.3.4. a baseline profile description of biodiversity and ecosystems of the site;	Receiving Environment; Results
4.3.5. the methodology used to verify the sensitivities of the terrestrial biodiversity features on the site, including equipment and modelling used, where relevant;	Methodology; Results
4.3.6. in the case of a linear activity, confirmation from the terrestrial biodiversity specialist that, in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase;	Overall ecological impact assessment
4.3.7. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr;	Recommendation and Conclusion; Description of Potential Ecological Impacts and their Recommended Mitigation Measures
4.3.8. a description of the assumptions made and any uncertainties or gaps in knowledge or data; and	Assumptions, uncertainties and gaps in knowledge
4.3.9. any conditions to which this statement is subjected.	Conclusion and Conditions

Requirement	Section of this report
4.4. A signed copy of the compliance statement must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	Declaration of Independence signed and this report will be appended to the Basic Assessment Report

9.2.2. Plant Species Theme Results



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
		X	

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Medium	Sensitive species 44

Figure 7 Plant Species Theme based on the results from the National Screening Tool Report

No specific assessment protocol for the plant species theme has been prescribed the required level of assessment must be based on the findings of the Initial Site Sensitivity Verification and must comply with Appendix 6 of the Environmental Impact Assessment Regulations promulgated under sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (The Act), where a specialist assessment is required. The minimum content requirements according to this theme are listed in the table below.

Table 6 As stated per Government Notice (GN) Regulation 326 of 7 April 2017, Appendix 6, a Specialist Report should contain the information listed in the table, with corresponding section names.

Requirement	Section
(a) details of— (i) the specialist who prepared the report; and (ii) (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae	Details of the Specialist
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority	Declaration of Independence
(c) an indication of the scope of, and the purpose for which, the report was prepared	Objective
(cA) an indication of the quality and age of base data used for the specialist report	Methodology
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) & Risk Ratings of Potential Impacts
(d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Date and Season of Site Visit
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Methodology
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives	Results
(g) an identification of any areas to be avoided, including buffers	Description of Potential Ecological Impacts and their Recommended Mitigation Measures
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	Results
(i) a description of any assumptions made and any uncertainties or gaps in knowledge	Assumptions, Uncertainties and Gaps in Knowledge
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Description of Potential Ecological Impacts and their Recommended Mitigation Measures
(k) any mitigation measures for inclusion in the EMPr	Description of Potential Ecological Impacts and their Recommended Mitigation Measures
(l) any conditions for inclusion in the environmental authorisation	Conclusion and conditions
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation	Recommendation and Conclusion; Description of Potential Ecological Impacts and their Recommended Mitigation Measures
(n) a reasoned opinion— (i) whether the proposed activity, activities or portions thereof should be authorised (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Conclusion and conditions
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report	Methodology
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A

Requirement	Section
(q) any other information requested by the competent authority	None up to date

The screening tool report does not list the specific species that could occur in the identified Medium sensitive areas. According to the Metadata for the plant species theme (Verburgt et al., 2020):

"Medium sensitivity is based on modelled distribution ranges, and indicates areas where suitable habitat for a species is present, but its presence at the site needs to be confirmed by field surveys. Distribution models are expert-driven suitable habitat models, and is derived by combining areas of suitable vegetation types and altitudes within the known ranges of species. Distribution maps are based on best available data for plant species, many of which are poorly known, and therefore the ability to generate accurate maps is constrained. This third level of sensitivity is a critically important consideration in a country with very high levels of biodiversity where most areas have not recently or never been thoroughly surveyed. Care was taken to limit predicted areas to no more than 10 km outside the known range of a species, so as to avoid excessive survey requirements. There are large parts of South Africa where no plant species of conservation concern are expected to occur, and these areas are designated in the Low sensitivity category."

During the site verification, the pipeline route was served and all species encountered were recorded in order to detect any species of conservation concern (SCC)[1]. During the site visit, the vegetation along the route was found to be relatively homogenous, with the vegetation types having many species in common. No species of conservation concern were encountered during the field survey.

9.3. Vegetation type

The proposed alternatives traverses two vegetation types, namely Kalahari Karroid Shrubland, alternating with Gordonia Duneveld (Figure 8). The distribution of the two vegetation types correspond with the Plant Species Theme in Figure 7. Thus the Kalahari Karroid Shrubland is classified as having a medium plant sensitivity and Gordonia Duneveld has a low plant sensitivity.

The Kalahari Karroid Shrubland vegetation type is distributed within the Northern Cape Province. It typically forms belts alternating with belts of Gordonia Duneveld on plains northwest of Upington through Lutzputs and Noenieput to the Rietfontein/Mier area in the north. Other patches occur around Kakamas and north of Groblershoop. The unit is also found in the neighbouring Namibia. Altitude varies mostly from 700–1 100 m. The unit is characterised by low karroid shrubland on flat, gravel plains. Karoo-related elements (shrubs) meet here with northern floristic elements, indicating a transition to the Kalahari region and sandy soils. The vegetation type is classified as Least Threatened. Very little of the unit is statutorily conserved in Augrabies Falls National Park. Although only a small area has been transformed many of the belts of this type were preferred routes for early roads, thus promoting the introduction of alien plants (about a quarter of the unit has scattered *Prosopis* species). Erosion potential is very low for this unit (Mucina et al., 2006).

[1] Species of conservation concern (SCC) – species that are threatened with extinction (i.e. IUCN listed as CR, EN or VU), or nationally assessed as rare and/ or range-restricted.

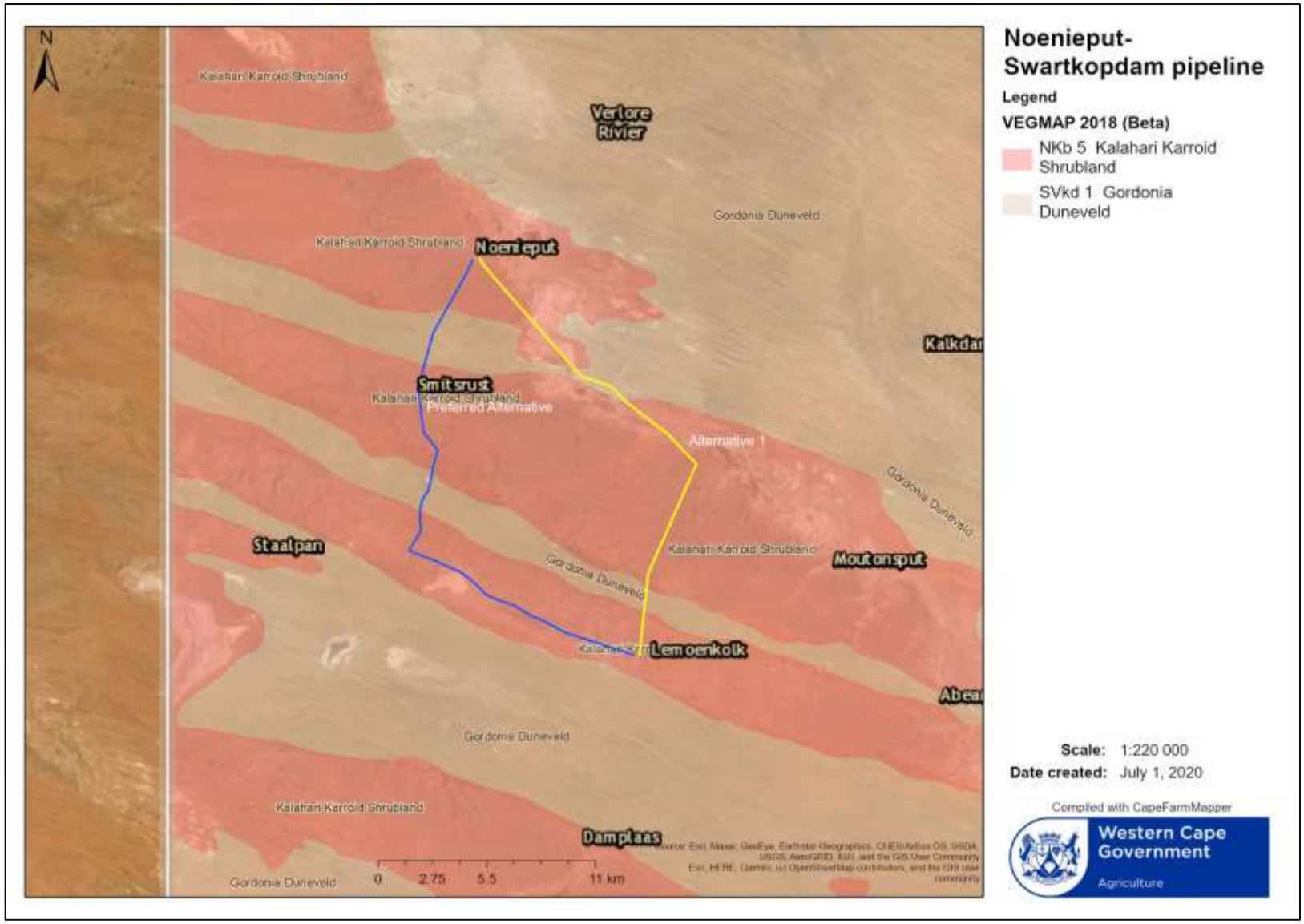


Figure 8 Vegetation map of the proposed pipeline alternatives

Gordonia Duneveld is also distributed within the Northern Cape Province and in areas with dunes comprising the largest part of the South African side of the Kgalagadi Transfrontier Park. South of the Molopo River border with Botswana (west of Van Zylsrus) the unit interleaves Kalahari Karroid Shrubland in the west (south of Rietfontein to the Orange River area) and in the south (around Upington and north of Groblershoop). It also occurs as a number of loose dune cordons south of the Orange River near Keimoes and between Upington and Putsonderwater. The eastern boundary is found at the longitude of Pearson's Hunt, but with outliers near Niekerkshoop in the southeast and Floradora in the northeast. Altitude ranges between 800–1 200 m. The landscape features consist of parallel dunes about 3–8 m above the plains. Open shrubland characterise the vegetation with ridges of grassland dominated by *Stipagrostis amabilis* on the dune crests and *Vachellia haematoxylon* on the dune slopes, also with *Senegalia mellifera* on lower slopes and *Rhigozum trichotomum* in the interdune straiten. The vegetation type is classified as Least Threatened. Some 14% is statutorily conserved in the Kgalagadi Transfrontier Park. Very little of the unit is transformed. Generally the unit has low erosion potential, but some areas have spectacular destabilisation of normally vegetated dunes (through local overstocking) favoured by photographers (Rutherford et al., 2006).

9.4. Preferred Alternative

The proposed pipeline originates in the town of Noenieput and closely follows the dirt road connecting the towns of Noenieput and Swartkopdam (where the pipeline end). The sections of the footprint within each of the towns consist of transformed areas but the rest of the pipeline is within a largely natural landscape. The pipeline is confined to the road reserved in most cases or stays within a very close distance of the road. The surrounding landscape consist of farms, where the predominant use is livestock production. The route traverses a few drainage lines, one pan and there are pans situated on either sides of the pipeline footprint as per the Freshwater Impact Assessment (Mostert, 2020).

The vegetation surveyed along the footprint was homogenous, with very little significant differences in species composition. The vegetation structure had subtle differences, ranging between riparian area, shrubland, gravel plains that were sparsely vegetated, open pans and duneveld. The plant species sampled during the survey are listed in the table below. No species of conservation concern were encountered during the survey. Pictures from the site visit can be viewed in Appendix A.

Two alien invasive cactus species occur in the footprint that were planted in Swartkopdam. Other listed alien invasive species encountered include White-flowered Mexican Poppy and Velvet Mesquite. A plant removal permit will need to be applied for, for the Schedule 2 & 3 species listed below according to Ssection 51 of the Northern Cape Nature Conservation Act No. 9 of 2009:

"1) No person may, without a permit, pick an indigenous plant [Picking, receipt, possession, acquisition or handling of indigenous plants] —

(a) On a public road;

(b) on land next to a public road within a distance of 100 meters measured from the centre of the road; or

(c) within an area bordering a natural water course, whether wet or dry, up to and within a distance of 100 metres from the middle of a river on either side of the natural water course."

Table 7 Species list of plants that were encountered during the survey at the Preferred Alternative.

Species	Common Name	Family	Origin	Conservation Status (Redlist)	Schedule as per the Northern Cape Nature Conservation Act No. 9 of 2009
Bulb sp. 1 - Liliopsida	-	-	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Bulb sp. 2 - Asparagales	Agaves, Orchids, Irises, and Allies	-	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Dicot 1 - Magnoliopsida	-	-	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Dicot 2 - Magnoliopsida	-	-	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Blepharis sp.	N/A	ACANTHACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Aizoon schellenbergii	Basterskaapvygie	AIZOACEAE	Not endemic to South Africa	Least Concern	Schedule 2 PROTECTED SPECIES
Tetragonia schenckii	N/A	AIZOACEAE	-	-	Schedule 2 PROTECTED SPECIES
Caroxylon rabieanum	Bushmanland Saltwort	AMARANTHACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Albuca sp. 1	Slimelillies	ASPARAGACEA	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Albuca stapffii	N/A	ASPARAGACEA	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Asparagus retrofractus	Zigzag Asparagus	ASPARAGACEA	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Asparagus pearsonii	N/A	ASPARAGACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Asparagus rubicundus	Redstem Asparagus	ASPARAGACEAE	South African endemic	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Chlorophytum sp.	Lilies	ASPARAGACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Dipcadi bakerianum	Small Mad Daintybells	ASPARAGACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Dipcadi sp.	Dainty bells	ASPARAGACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Ledebouria sp.	N/A	ASPARAGACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Arctotis leiocarpa	Karoo Daisy	ASTERACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Eriocephalus sp.	Kapok Bushes	ASTERACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Kleinia longiflora	Sjambokbos	ASTERACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Rhigozum trichotomum	Three-thorn Rhigozum	BIGNONIACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES

Cylindropuntia fulgida var. mamillata	Boxing-glove cactus	CACTACEAE	Alien Invasive (Category 1b)	N/A	-
Cylindropuntia imbricata ssp. imbricata	Imbricate cactus	CACTACEAE	Alien Invasive (Category 1b)	N/A	-
Boscia foetida ssp. foetida	Stink Shepherds-tree	CAPPARACEAE	Not endemic to South Africa	Least Concern	Schedule 2 PROTECTED SPECIES
Citrullus amarus	Makataan	CUCURBITACEAE	-	-	-
Citrullus rehmii	Namib Melon	CUCURBITACEAE	-	-	-
Cucumis sp.	Melons & Cucumbers	CUCURBITACEAE	-	-	-
Euphorbia inaequilatera	Smooth Creeping Milkweed	EUPHORBIACEAE	Not endemic to South Africa	Least Concern	Schedule 2 PROTECTED SPECIES
Calobota linearifolia	Blue Pea	FABACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Indigastrum niveum	Seeroogbossie	FABACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Lotononis sp.	Lotononises	FABACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Parkinsonia africana	Greenhair Tree	FABACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Prosopis velutina	Velvet Mesquite	FABACEAE	Alien Invasive (Category 3 in Northern Cape)	N/A	-
Ptycholobium biflorum ssp. biflorum	N/A	FABACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Senegalia mellifera ssp. detinens	Black Thorn	FABACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Gisekia africana	N/A	GISEKIACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Hypertelis cerviana	Threadstem Carpetweed	MOLLUGINACEAE	Not endemic to South Africa	Least Concern	
Limeum aethiopicum	Pest Lizardfoot	MOLLUGINACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Limeum arenicolum	Sandy Lizardfoot	MOLLUGINACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Boerhavia diffusa	Wineflower	NYCTAGINACEAE	Naturalized exotic	N/A	-
Phaeoptilum spinosum	Brittle Thorn	NYCTAGINACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES

Argemone ochroleuca	White-flowered Mexican poppy	PAPAVERACEAE	Alien Invasive (Category 1b)	N/A	-
Sesamum capense	Aprilbaadjie	PEDALIACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Cenchrus ciliaris	Blue Buffalo Grass	POACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Chloris virgata	Feather Finger Grass	POACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Enneapogon cenchroides	Agtdaegras	POACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Eragrostis porosa	Blousoetgras	POACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Stipagrostis ciliata var. capensis	Large Bushman Grass	POACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Stipagrostis obtusa	Kortbeenboesmangras	POACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Tragus berteronianus	Small Carrot-Seed Grass	POACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Kohautia ramosissima	N/A	RUBIACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Aptosimum lineare	Bushveld Carpet Flower	SCROPHULARIACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Aptosimum spinescens	Doringviooltjie	SCROPHULARIACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Lycium bosciifolium	Limpopo Honey-thorn	SOLANACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Lycium pumilum	Dwarf Honey-thorn	SOLANACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Tetraena cylindrifolia	N/A	ZYGOPHYLLACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Tetraena simplex	Volstruisdruiwe	ZYGOPHYLLACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Tetraena sp.	N/A	ZYGOPHYLLACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES
Tribulus cristatus	Flanged Devilthorn	ZYGOPHYLLACEAE	Not endemic to South Africa	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES
Tribulus pterophorus	Duiviedoring	ZYGOPHYLLACEAE	Not endemic	Least Concern	Schedule 3 COMMON INDIGENOUS SPECIES

			to South Africa		
Tribulus sp.	N/A	ZYGOPHYLLACEAE	-	-	Schedule 3 COMMON INDIGENOUS SPECIES

9.5. Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)

The proposed pipeline footprint and direct surrounds can be classified as having a PES of B, being **Largely natural** with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged. As the planned footprint in within the road reserve or kept very close to the existing road, there are some habitat modifications due to the fragmentation (or rather division) of the habitat by the linear road, farm fencing and disturbances form vehicles using the road, maintenance activities to the road and fence lines and livestock utilizing the vegetation, watering holes and watercourses.

As no SCC's were encountered during the survey or are expected to occur in the development footprint, the area can be classified as having an EIS of D – Low/marginal and is not ecologically important and sensitive at any scale. Biodiversity is ubiquitous and not sensitive to flow and habitat modifications. The vegetation types are not classified as endangered or vulnerable, and not classified within the CBA network as contributing to ecosystem conservation status nor is it a priority for conservation. The pans, can however be classified as having a moderate EIS and should be considered ecologically important and sensitive on provincial/local scale. Biodiversity is not usually sensitive to flow and habitat modifications.

The rationale behind choosing the Preferred Alternative is to align the pipeline as close as possible to the existing linear infrastructure between Swartkopsdam and Noenieput, namely the dirt road. From a general environmental perspective this limits the disturbance of topsoil and clearing of vegetation close to existing disturbances and also does not fragment any new habitats or ecosystems but is rather situated on the edges of existing disturbances in the landscape. If the aim is to stay within the road reserve and as close as possible to the road, totally avoiding watercourses is not practically feasible and thus recommending buffer distance around watercourses is not practical in this instance. It is however argued that should the pipeline be situated on the opposite side of the road of watercourses or crossing watercourses upstream of larger drainage systems, impacts will be mitigated by the potential disruptive effects of the road and maximizing the distance between the disturbance and watercourses, whilst also minimising the extent of instream and riparian disturbance. This recommendation is further detailed in the Freshwater Impact Assessment (Mostert, 2020). Besides the watercourses, no sensitive plant species or terrestrial biodiversity features are present within the footprint or are anticipated to be impacted by the pipeline installation.

10. OVERALL ECOLOGICAL IMPACT ASSESSMENT

Disturbance during construction phases will temporarily reduce vegetation cover and disturb soil over the footprint area which is likely to increase the amount of erosion and subsequent sedimentation along the drainage line and associated drainage systems. Given the infrequency of rainfall in the area this may fortunately

happen at a relatively slow rate. Wide-scale disturbance to vegetation is likely to exacerbate erosion and may lead to significant invasion by alien vegetation if this issue is not consistently managed by the various land owners and plant management. It is anticipated that the impacts on terrestrial biodiversity and indigenous plant species are temporary and it is in the opinion of the terrestrial biodiversity specialist, based on the mitigation and remedial measures discussed below, that the area can be returned to the current state within two years of the completion of the construction phase.

The following section identifies the potential ecological impacts (both positive and negative) which the proposed project will have on the terrestrial biodiversity and indigenous plant species.

Once the potential impacts are identified, they are assessed by rating their Environmental Risk after which the final Environmental Significance is calculated and rated for each identified ecological impact.

The same Environmental Risk rating process is then followed for each ecological impact to determine the Environmental Significance if the recommended mitigation measures were to be implemented.

The objective of this section is therefore firstly to identify all the potential ecological impacts of the proposed project and secondly to determine the significance of the impacts and how effective the recommended mitigation measures will be able to reduce their significance. The potential ecological impacts which are still rated as highly significant, even after implementation of mitigations, can then be identified in order to specifically focus on implement of effective management strategies for them.

10.1. Description of Potential Ecological Impacts and their Recommended Mitigation Measures

The following section provides descriptions of the potential ecological impacts which the proposed project will have as well as the recommended mitigation measures to be implemented for each impact as identified.

10.1.1. Construction phase

Impacts on sensitive habitats, CBA areas and threatened ecosystems

The vegetation types are classified as Least Threatened and no threatened ecosystems is anticipated to be impacted by the development. Vegetation will be lost during the construction of the development. The impacts on existing indigenous species will likely be low. The relatively narrow nature of the development footprint resulted in the area not being of a high conservation significance for habitat preservation or ecological functionality persistence in support of the surrounding ecosystem or broader vegetation type. It is not anticipated that ESA areas will be directly impacted by the development footprint, although the impacts on watercourses are discussed in the Freshwater Impact Assessment. The drainage lines and pan that the pipeline will cross can be considered sensitive habitats (Mostert, 2020) but the construction is not anticipated to contribute significantly to impacts on these habitats, as many impacts already exist due to the presence of the

road. It is anticipated that implementation of the recommended mitigation measures, together with site rehabilitation will aid the ecosystem to recover functionally to its current state.

Mitigation measures to reduce potential impacts:

- The project construction footprint must be kept as small as practicably possible, and preferably be demarcated before construction starts.
- Movement of vehicles and construction personnel should be restricted to the road and within the development footprint as much as possible to limit trampling of indigenous species and further disturbance to the surrounding vegetation.
- Topsoil should be meticulously handled. Excavated soil and subsoil should be separately stockpiles and protected from erosion and mechanical disturbance. Excavated material should be returned to the area it was taken from, and replaced in the proper order (i.e. fill, sub-soil strata followed by topsoil).
- Topsoil should be protected on the dunes post-construction as per the project description from livestock grazing as far as possible by branches) and discourage vehicular access.

Impacts on Species of Conservation Concern (SCC)

The vegetation that were surveyed did not contain any SCC and it is not anticipated that the footprint will contain any SCC. Even though indigenous species occur within the development footprint, they are of Least Concern. The significance of this potential impact on any relevant plant species is therefore negligible. It is expected that pioneer and indigenous species will colonize the footprint relatively easily should topsoil be properly handled and returned to the footprint, and due to the close proximity to source vegetation adjacent to the footprint.

Mitigation measures to reduce potential impacts:

- No plants may be removed that have not been specifically earmarked as part of the demarcated footprint and/or the construction process.
- A Plant removal permit must be received from the Northern Cape Department of Nature Conservation before Schedule 2 & 3 species are removed.

Alien Invasive Species Establishment

Areas within and around the proposed project footprint could potentially be prone to significant weedy species establishment due to disturbances caused by construction activities. Considering to the locality of the proposed development in natural vegetation, spreading of alien invasive species into surrounding areas would have a negative impact.

Mitigation measures to reduce potential impacts:

- Implement suitable alien invasive species establishment prevention measures during the construction phase such as proper storage, transport and disposal of plant material (especially listed alien invasive

species found in the footprint) and minimizing disturbance to the area surrounding the development footprint.

- If any alien invasive plant species are observed within the construction area it must immediately be removed in the correct and environmentally friendly manner.
- Areas around the proposed project footprint must be adequately rehabilitated to prevent significant alien invasive species establishment.
- It is recommended to use indigenous vegetation (sourced locally) in any landscaping attempts.
- The project footprint and surroundings should be monitored for alien invasive species annually for two years.
- Care should be taken to remove any biological material from equipment and personnel clothing and gear before entering and when leaving the work site to prevent the spread and establishment of alien invasive species.

Waste Management

The construction of the pipeline pose a pollution risk to the environment, should any waste generated be improperly disposed of, such as littering.

Mitigation measures to reduce potential impacts:

- Sufficient waste receptacles should be placed around the facility in order to encourage employees to use them.
- The principle of reduce, re-use and recycle should be followed.
- Employees should be made aware of best-practice environmental practices while on site.

Rehabilitating post-construction

Once the construction is complete a positive impact on the environment is possible if the site is suitably rehabilitated and restored to enable the ecosystem to recover and be put on a trajectory to host a structure, composition and ecological functioning similar to the surrounding vegetation..

Rehabilitation measures include:

- On completion of a section of works, the area must be rehabilitated by suitable, levelling, topsoil dressing, land preparation, alien plant eradication and where ascribed for by the ECO, vegetation establishment;
- Clear and completely remove from site all construction structures and temporary infrastructure;
- All permanent infrastructure must be returned to a useable state;
- Remove all inert waste and rubble, such as excess rock, any structural foundations and remaining aggregates. Only once this material has been removed, the site shall be re-instated and rehabilitated;
- The reinstatement of disturbed areas must follow immediately after the removal of structures and temporary infrastructure;
- Topsoil backfilling must be undertaken when the soil is dry, and not following any recent rainfall events

- The replacement of topsoil should be sought in situ with construction where possible, or as soon as construction in an area has be completed;
- All stockpiled topsoil together with herbaceous vegetation (only if indigenous) should be replaced and redistributed over a disturbed area such as temporary access roads;
- Topsoil must be returned to the same site from where it was stripped;
- When insufficient topsoil remains, soil of a similar quality can be obtained from a nearby area within the construction area which was disturbed;
- Once topsoil has been returned to the ground, stripped vegetation (only if indigenous) should be randomly spread by hand over the area;
- All re-growth of invasive vegetative material will be monitored by the Developer for at least two years after construction;
- All areas under rehabilitation are to be treated as no-go areas using danger tape and steel droppers/fencing and cordoned off, to prevent vehicular, pedestrian and livestock access;
- If re-vegetation is deemed necessary, it should be done by sourcing indigenous plants from local suppliers or the surrounding vegetation, whether it be whole plants, seedlings, cuttings or seeds (with the appropriate permits);
- Control invasive plant species and weeds using approved methods of manual or chemical intervention; and
- The re-establishment of vegetation should be allowed for several rainy seasons (at least two).

10.1.2. Cumulative Impacts

The area surrounding the proposed development is adjacent to natural vegetation, used mostly for agriculture. Due to the linear nature of the footprint size and temporary nature of the impacts of the proposed project, the negative impacts that the project will cumulatively add to habitat preservation or ecological functionality persistence of the broader area will be low. If mitigation measures are implemented and best-practice environmentally friendly construction- and maintenance methods are followed, the development's impacts are expected to be temporary.

10.2. Risk Ratings of Potential Impacts

The following section provides the Environmental Risk as well as the Environmental Significance Ratings for the potential ecological impacts for the proposed project both before and after implementation of the recommended mitigation measures.

Potential environ-mental impact/ Nature of impact	Project alternative	Environmental significance																	
		Before mitigation									After mitigation								
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significances	Cumulative	Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significance	Cumulative
Impact	Location	Construction phase																	
Impacts on sensitive habitats, CBA areas and threatened ecosystems	Preferred Alternative	4	3	2	2	3	3	**42**	Medium	Low	2	2	1	2	1	2	**18**	Low	Low
Impacts on Species of Conservation Concern (SCC)	Preferred Alternative	2	3	2	2	3	2	**24**	Low	Low	0	2	1	2	2	1	**7**	Low	Low
Alien Invasive Species Establishment	Preferred Alternative	4	4	2	1	2	4	**52**	Medium	Low	2	2	0	1	0	2	**10**	Low	Low

Potential environ-mental impact/ Nature of impact	Project alternative	Environmental significance																	
		Before mitigation									After mitigation								
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significances	Cumulative	Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significance	Cumulative
Impact	Location	Construction phase																	
Waste Management	Preferred Alternative	4	3	2	1	2	4	**48**	Medium	Low	0	2	1	0	1	2	**8**	Low	Low

Potential environ-mental impact/ Nature of impact	Project alternative	Environmental significance																	
		Before mitigation									After mitigation								
		Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significances	Cumulative	Magnitude	Duration	Extent	Irreplaceability	Reversibility	Probability	Total (SP)	Significance	Cumulative
Impact	Location	Construction phase																	
Positive Impact of Rehabilitating Development Footprint	Preferred Alternative	2	2	0	1	1	3	**18(+)**	Low	Low	4	3	1	0	2	4	**40 (+)**	Medium	Low

11. Conclusion

Although the proposed development will temporary remove and impact existing indigenous vegetation and terrestrial biodiversity on the project footprint area, the lack of species of conservation concern (SCC) has resulted in overall moderate EIS and PES scores. The proposed development areas are therefore not of high conservational significance for habitat preservation or ecological functionality persistence in support of the surrounding ecosystem or broader vegetation type.

The Preferred Alternative is recommended considering available information. It is the opinion of the specialist, that based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years or less of completion of the construction phase.

The pipeline infrastructure proposed have been well planned in terms of considering environmentally sensitive areas in the planning and layout phase. The layout can be further refined using the suggested mitigation measures in this report. While impacts to watercourses within and adjacent to the footprint are inevitable, the majority of these are considered negligible in their mitigated state. Provided the site is well managed during the construction and operational phase, following suggested mitigation measures, the development is considered as a positive contribution to the water provisioning service within the area.

The proposed project is recommended to continue only if all recommended mitigation measures as per this report are adequately implemented and managed during all project phases. All necessary authorisations and permits must also be obtained prior to any commencement.

11.1. Conditions

- All mitigation measures should be strictly adhered to as recommended in this report, the project's Environmental Management Plan and the other project specialist studies.
- No flora should be harmed moved, damaged or killed outside of the development footprint.
- Monitoring of the continued spread of alien invasive plants should be conducted as part of the different project phases.

12. REFERENCES

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RUTHERFORD, M., MUCINA, L., BREDENKAMP, G., SMIT, J., SCOTT-SHAW, C., HOARE, D., GOODMAN, S., BEZUIDENHOUT, H., SCOTT, L., ELLIS, F., 2006. SAVANNA BIOME.

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VAN DEVENTER, H., VAN NIEKERK, L., HARRIS, L., SMITH-ADAO, L., FODEN, W., MIDGLEY, G., 2019. NATIONAL BIODIVERSITY ASSESSMENT 2018: THE STATUS OF SOUTH AFRICA'S ECOSYSTEMS AND BIODIVERSITY. SYNTHESIS REPORT. SYNTHESIS REPORT. SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE, AN ENTITY OF THE DEPARTMENT OF ENVIRONMENT, FORESTRY AND FISHERIES, PRETORIA.

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APPENDIX A

Figure 9 View of pipeline footprint, in Swartkopdam (km 0 of survey transect)

Figure 10 View of footprint, riparian vegetation at the watercourse crossing (2 km from Swartkopdam)

Figure 11 View to the road from the proposed footprint (4 km from Swartkopdam)

Figure 12 Sparsely vegetated footprint (6 km from Swartkopdam)

Figure 13 Low diversity of species and growth forms within the footprint (8 km from Swartkopdam)

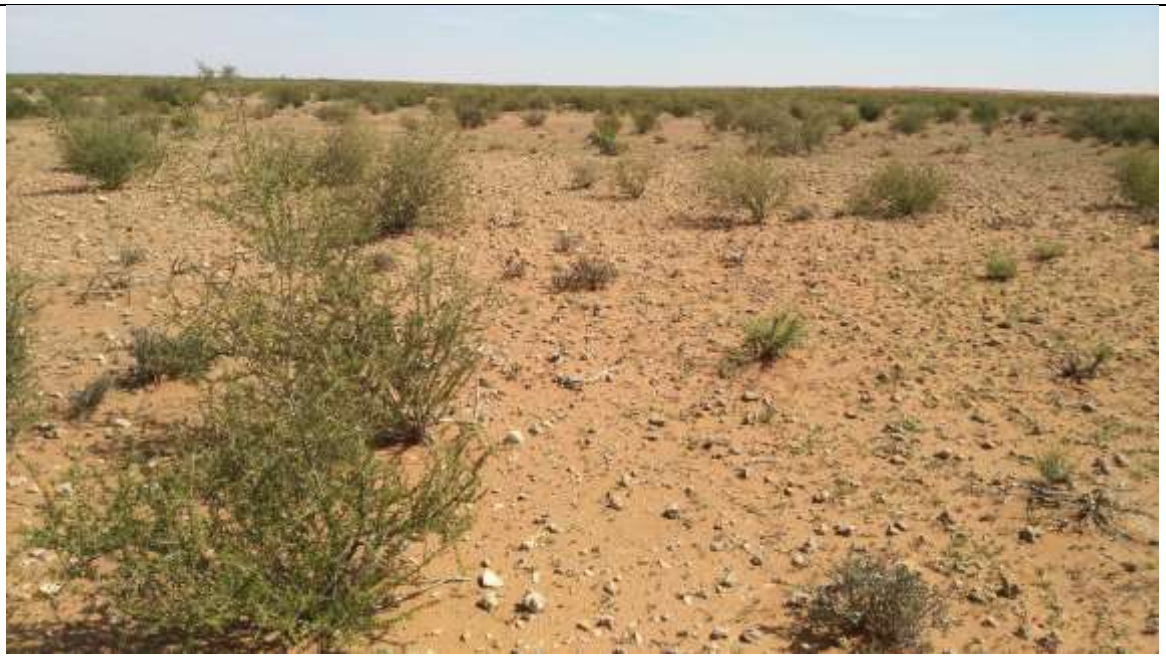


Figure 14 View of the proposed footprint, 10 km from Swartkopdam

Figure 15 Low growth forms dominating in the proposed footprint, 12 km from Swartkopdam

Figure 16 Diverse growth forms at 14 km from Swartkopdam, with a view of the proposed footprint.

Figure 17 Sparsely vegetated footprint, next to a drainage line at 16 km from Swartkopdam

Figure 18 Short vegetation at 18 km from Swartkopdam

Figure 19 Shrub dominated vegetation, 20 km from Swartkopdam

Figure 20 Grass dominated road reserve, proposed footprint of pipeline at 22 km from Swartkopdam

Figure 21 Footprint in the road reserve (24 km from Swartkopdam)

Figure 22 Noenieput, where the pipeline starts (end of survey)

APPENDIX B

B.1. Details of the Specialist

Name:	Elana
Surname:	Mostert
Highest qualification:	MSc Botany (SU)
IAIAsa registered:	No. 5631
South African Association of Botanists	No. 649
Postal address:	Enviroworks Suite 1064 Private Bag x2 Century City 7446
Physical address:	Block B2 Edison Square, Ground floor c/o Century Avenue and Edison Way Century City 7441
Cell phone:	076 838 3058
E-mail:	elana@enviroworks.co.za

RELEVANT QUALIFICATIONS

- MSc Botany (SU): Specialising in Invasion Biology & Fynbos Restoration
- BSc Hons Plant Sciences- Ecology (UP)
- BSc Environmental Sciences (UP)
- Section 21 (c) and (i) Training: Roodeplaat (November 2017)
- SASS5 Aquatic Biomonitoring Training (November 2018)

WORK EXPERIENCE

- March 2016 - May 2017: Field assistant, Plant Ecologist at Department of Environmental Affairs (Oceans & Coasts)
- June 2017 - current: Environmental Consultant & Ecological Specialist at Enviroworks
- January 2019 – current: Office manager for Enviroworks, Cape Town

Published popular Science article:

- Mostert, E., Gaertner, M., Hall, S., Mukundamago, M., Holmes, P. 2015. *Solving the puzzle of restoring the missing fynbos*. Quest, Volume 11, Number 3.

Publication accepted for journal publication:

- Mostert, E., *et al*., Impacts of invasive alien trees on threatened lowland vegetation types in the Cape Floristic Region, South Africa, South African Journal of Botany 108 (2017) 209–222.
- Mostert E., et al, A multi-criterion approach for prioritizing areas in urban ecosystems for active restoration following invasive plant control, Environmental Management, (In production), 1-20, **DOI** 10.1007/s00267-018-1103-9

FRESHWATER ECOLOGICAL ASSESSMENTS

- Wetland delineation and DWS Section 21 (c) & (i) Water Use Risk Matrix for the proposed development of 100 erven on Erf 210 in Sutherland, Karoo Hoogland Local Municipality, Northern Cape, COGHSTA.
- Wetland delineation and DWS Section 21 (c) & (i) Water Use Risk Matrix for the proposed Zachtevlei Dam And Bulk Conveyance Infrastructure, Lady Grey, Eastern Cape, Indwe Environmental Consulting for Joe Gqabi District Municipality.
- DWS Section 21 (c) & (i) Water Use Risk Matrix for the proposed development of Erf 3976 for a mixed use development in Hartswater, Phokwane Municipality, Northern Cape, Makespace Architects.
- DWS Section 21 (c) & (i) Water Use Risk matrix for the proposed construction of a cellular telecommunications base station and associated infrastructure in Roodekrans, Gauteng, Coast to Coast Towers (Pty) Ltd.
- Wetland delineation for the proposed development of the Sarah Baartman Agricultural Hub, Eastern Cape, FemPlan.
- Wetland delineation for the proposed development of the Alfred Nzo Agricultural Hub, Eastern Cape, FemPlan.
- Wetland delineation for the proposed development of the OR Tambo Agricultural Hub, Eastern Cape, FemPlan.
- DWS Section 21 (c) & (i) Water Use Risk Matrix for the proposed expansion of a granite mine in Biesjesfontein, Springbok, Northern Cape, Greenmined.
- DWS Section 21 (c) & (i) Water Use Risk Matrix for the proposed development of new sports grounds at Waterstone College, Olifantsvlei, Gauteng, CURRO.
- Wetland delineation and DWS Section 21 (c) & (i) Water Use Risk Matrix for the 24G Application for the unlawful clearing of indigenous vegetation and construction of chicken lay houses, Molote City, North West Province, Baramakama Poultry (Pty) Ltd.
- Freshwater specialist study for the extension of a canal by 10 metres at km0.1 along Minor Road 6924, Western Cape Province, Garden Route District Municipality.
- Wetland delineation and DWS Section 21 (c) & (i) Water Use Risk Matrix for the 24G Application for the unlawful construction of a poultry farm, Belgie, Thaba 'Nchu, Free State, Country Bird Holdings.
- Freshwater Study and DWS Section 21 (c) & (i) Water Use Risk Matrix for the the periodic maintenance of TR1/2, TR1/3, TR44/1, TR88/1, MR401, MR402 and DR1834, near Uniondale, Western Cape Province, Western Cape Department of Transport and Public Works.
- DWS Section 21 (c) & (i) Water Use Risk Matrix for the rehabilitation of Divisional Road 1688 from Calitzdorp (KM 1.00) to the Calitzdorp Spa Turnoff (KM 15.64), Western Cape Province, BVi Consulting Engineers.

WATER USE LICENCE APPLICATIONS

- General Authorization for the rehabilitation of Divisional Road 1688 from Calitzdorp (KM 1.00) to the Calitzdorp Spa Turnoff (KM 15.64), Western Cape Province, BVi Consulting Engineers.
- General Authorization for the the periodic maintenance of TR1/2, TR1/3, TR44/1, TR88/1, MR401, MR402 and DR1834, near Uniondale, Western Cape Province, Western Cape Department of Transport and Public Works.
- Water Use Licence Application for chicken lay houses, Molote City, North West Province, Baramakama Poultry (Pty) Ltd.

SECTION 24G RECTIFICATION APPLICATION

- Section 24G Application for the unlawful clearing of indigenous vegetation and construction of chicken lay houses, Molote City, North West Province, Baramakama Poultry (Pty) Ltd.

ENVIRONMENTAL CONTROL OFFICER

- Environmental Control Officer for the rehabilitation of Divisional Road 1688 from Calitzdorp (KM 1.00) to the Calitzdorp Spa Turnoff (KM 15.64), Western Cape Province, BVi Consulting Engineers.

ENVIRONMENTAL REHABILITATION PLAN

- Environmental rehabilitation plan for all the areas affected by the continuous spillage of raw sewage in and around Upington, Northern Cape Province, Dawid Kruiper Local Municipality.

BASIC ASSESSMENT EXPERIENCE

- The proposed construction of a cellular telecommunications base station and associated infrastructure on Portion 76 of Farm No. 106, Robertson, Western Cape Province, Coast to Coast Towers (Pty) Ltd.
- The proposed construction of a cellular telecommunications base station and associated infrastructure on Portion 1 of Farm No. 178, Fisantekraal, City of Cape Town, Western Cape Province, Coast to Coast Towers (Pty) Ltd.
- The proposed development of a telecommunication base station and associated infrastructure on Portion 8 of the Farm Delta no. 1003, Groot Drakenstein, Western Cape Province, Coast to Coast Towers (Pty) Ltd.
- Proposed development of a free standing cellular communication base station and associated infrastructure on Portion 7 of the Farm Haane Kuil no. 335, Beaufort West, Western Cape Province, Warren Petterson Planning (Pty) Ltd.

INTEGRATED ENVIRONMENTAL AUTHORISATIONS

- Amendment of the Environmental Integrated Authorisation for the Continuous Ash Disposal at Matimba Power Station, Lephalale, Limpopo Province, Eskom Holdings SOC Ltd.

ENVIRONMENTAL MANAGEMENT PLANS

- The proposed construction of a cellular telecommunications base station and associated infrastructure on Portion 76 of Farm No. 106, Robertson, Western Cape Province, Coast to Coast Towers (Pty) Ltd.
- The proposed construction of a cellular telecommunications base station and associated infrastructure on Portion 1 of Farm No. 178, Fisantekraal, City of Cape Town, Western Cape Province, Coast to Coast Towers (Pty) Ltd.
- The proposed development of a telecommunication base station and associated infrastructure on Portion 8 of the Farm Delta no. 1003, Groot Drakenstein, Western Cape Province, Coast to Coast Towers (Pty) Ltd.
- Proposed development of a free standing cellular communication base station and associated infrastructure on Portion 7 of the Farm Haane Kuil no. 335, Beaufort West, Western Cape Province, Warren Petterson Planning (Pty) Ltd.

EXPERIENCE IN PERMITS AND LICENCING

- Flora removal permit and translocation guidelines for the periodic maintenance of National Route 2 Section 4 between Riviersonderend (km 0.0) and Swellendam (km 56.9), Western Cape Province, SANRAL.
- Flora removal permit for the re-surfacing of the Donkergat Access Road located within the Langebaan 4 Special Forces Regiment Base, Langebaan, Western Cape, Department of Public Works**.**
- Fauna and flora removal permits for the upgrading of intersections and resealing of road sections between Hotazel and Black Rock, Northern Cape, SMEC.
- Flora removal permit for the rehabilitation of Divisional Road 1688 from Calitzdorp (KM 1.00) to the Calitzdorp Spa Turnoff (KM 15.64), Western Cape Province, BVi Consulting Engineers.

ECOLOGICAL IMPACT ASSESSMENT EXPERIENCE

- Ecological Impact Assessment for the proposed development of 100 erven on Erf 210 in Sutherland, Karoo Hoogland Local Municipality, Northern Cape, COGHSTA Northern Cape.
- Ecological Impact Assessment for the periodic maintenance of National Route 2 Section 4 between Riviersonderend (km 0.0) and Swellendam (km 56.9), Western Cape Province, SANRAL.
- Flora identification study for the re-surfacing of the Donkergat Access Road located within the Langebaan 4 Special Forces Regiment Base, Langebaan, Western Cape, Department of Public Works.
- Quarterly monitoring assessment for the rehabilitation efforts on Portion 5 of Farm 830 Doornekraal, Malmesbury, Western Cape.
- Botanical inspection and recommendations for vegetation rehabilitation at 13 Duikerweg, Melkbosstrand, Western Cape.
- Botanical inspection along R60 selected road crossing and road widening between Worcester and Ashton, Western Cape, BVi Consulting Engineers.
- Ecological Impact Assessment for the proposed development of the Mapungubwe Visitor Interpretation Centres and Overnight Facilities, Limpopo Province, SANParks.

- Ecological Impact Assessment for the proposed development of Erf 3976 for a mixed use development in Hartswater, Phokwane Municipality, Northern Cape, Makespace Architects.
- Ecological Impact Assessment for the proposed construction of a cellular telecommunications base station and associated infrastructure in Roodekrans, Gauteng, Coast to Coast Towers (Pty) Ltd.
- Ecological Impact Assessment for the proposed construction of six lay houses and two new production (hen) houses at Frans Dam Farm, No. 803 Portion 3 in Brandfort, Free State, Moreson Pluimvee Boerdery (Pty) Ltd.
- Ecological Impact Assessment for the 24G Application for the unlawful clearing of indigenous vegetation and construction of chicken lay houses, Molote City, North West Province, Baramakama Poultry (Pty) Ltd.
- Ecological Impact Assessment for the proposed construction of a composting facility on Farm No. 1136 Terugval Portion 1 in Brandfort, Free State, Moreson Pluimvee Boerdery (Pty) Ltd.
- Ecological Impact Assessment for the 24G Application for the unlawful construction of a poultry farm, Belgie, Thaba 'Nchu, Free State, Country Bird Holdings.
- Ecological Impact Assessment for the the periodic maintenance of TR1/2, TR1/3, TR44/1, TR88/1, MR401, MR402 and DR1834, near Uniondale, Western Cape Province, Western Cape Department of Transport and Public Works.
- Botanical Survey for the proposed 20m monopole mast and base station on Erf 455, Simon's Town, Western Cape Province, Atlas Tower (Pty) Ltd.

ALIEN INVASIVE SPECIES MANAGEMENT EXPERIENCE

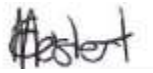
- Preparation of a plan to control and eradicate invasive species as contemplated in Section 76 of the Act, National Environmental Management: Biodiversity Act, 2004 (Act No.10 Of 2004) (NEMBA) for Theewaterskloof Local Municipality**.**
- Baseline Biodiversity Database and Alien Management Strategy Recommendations, Drakenstein, Western Cape, Drakenstein Municipality.
- Review and presentation of Lafarge Saldanha Alien Invasive Species Management Plan, Saldanha, Western Cape Province, Lafarge South Africa.
- Alien Invasive Species Training for staff and management, Saldanha, Western Cape Province, Lafarge South Africa.

B.2. Declaration of Independence

I, Elana Mostert, ID 910523 0099 085, declare that I:

- am an Environmental Specialist for Enviroworks;
- act as an independent specialist consultant in the field of Botany and Ecology;
- am assigned as specialist consultant by Enviroworks (Pty) Ltd. Consultants for this proposed project;
- I do not have or will not have any financial interest in the undertaking of the activity other than remuneration for work as stipulated in the terms of reference;
- remuneration for services by the proponent in relation to this proposal is not linked to approval by decision-making authorities responsible for permitting this proposal;
- the consultancy has no interest in secondary or downstream developments as a result of the authorisation of this project;
- have no and will not engage in conflicting interests in the undertaking of the activity;
- undertake to disclose to the client and the competent authority any material, information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations 2017; and,
- will provide the client and competent authority with access to all information at my disposal, regarding this project, whether favourable or not.

Elana Mostert



Signature