

Ecological Assessment Report

**Mantsopa Local Municipality Water
Pipeline Development, Ladybrand, Free
State Province**

October 2021

Compiled for:



Compiled by:

AJH Lamprecht (*Pr.Sci.Nat*)

Ecological Specialist

EcoFocus Consulting

072 230 9598

ajhlamprecht@gmail.com

Table of Content

| | |
|--|----|
| 1. Introduction | 1 |
| 2. Date and Season of Ecological Site Assessment | 1 |
| 3. Assessment Rational | 2 |
| 4. Objectives of the Assessment | 3 |
| 5. Methodology | 4 |
| 6. Assessment Area | 10 |
| 6.1. Climate | 12 |
| 6.2. Geology and Soils | 12 |
| 6.3. Vegetation Type and Conservation Status | 12 |
| 7. Assumptions, Uncertainties and Gaps in Knowledge | 15 |
| 8. Results and Discussion | 17 |
| 8.1. Terrestrial Grassland | 18 |
| 8.1.1. Current Existing Vegetation and Site Description..... | 18 |
| 8.1.2. Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)..... | 23 |
| 8.2. Watercourse Crossings | 24 |
| 8.2.1. Current Existing Vegetation and Site Description..... | 24 |
| 8.2.2. Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS)..... | 28 |
| 8.3. Ecological Site Sensitivity Map | 29 |
| 8.4. Species List for the Assessment Area | 31 |
| 9. Ecological Impact Assessment | 32 |
| 9.1. Construction Phase | 32 |
| 9.2. Operational Phase | 38 |
| 9.3. Cumulative Impacts | 39 |
| 9.4. Risk Ratings of Potential Ecological Impacts | 41 |
| 9.4.1. Construction Phase | 42 |
| 9.4.2. Operational Phase..... | 59 |
| 10. Summary and Conclusion | 63 |
| 11. References | 68 |
| 12. Details of the Specialist | 69 |

Executive Summary

The project applicant, Mantsopa Local Municipality, proposes to construct a new 250 mm potable water pipeline of approximately 1.37 km in length within the town of Ladybrand, Free State Province. The proposed pipeline will tie into existing connection points at both ends of the pipeline route. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width.

NSVT Consultants was appointed by the applicant as the independent Environmental Assessment Practitioner (EAP), to conduct the legally required Basic Assessment (BA) process.

Due to the nature of potential ecological impacts posed by the proposed development to the local ecosystem and ecology, an Ecological study is required. This is required in order to determine the potential presence of ecologically/conservationally significant or sensitive species, habitats, wetlands or ecosystems, which may be adversely affected by the proposed development. Any potential ecological impacts associated with the proposed development, must be identified. Impact mitigation and management measures in accordance with the requirements of the National Environmental Management Act (Act 107 of 1998) Mitigation Hierarchy, must subsequently be recommended. This must be done in order to attempt to reduce/alleviate the adverse effects of identified potential ecological impacts.

EcoFocus Consulting was therefore subsequently appointed by the EAP as the independent ecological specialist, to conduct the required Ecological study for the proposed development. This report constitutes the Ecological Assessment.

A site assessment for the proposed development area was conducted on 20 October 2021. This date forms part of the growing season and most plant species present, could therefore be successfully identified.

Methodology

The proposed development area was assessed on foot. Visual observations/identifications were made of habitat conditions, any ecologically sensitive/conservationally significant areas as well as relevant species present. Identified species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 as well as the Provincially Protected species of the Free State's Nature Conservation Ordinance (No 8 of 1969). Georeferenced photographs were taken of ecologically sensitive/conservationally significant areas as well as any Red Data Species Listed, nationally- or provincially protected species if encountered, in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

Potential ecological impacts of the proposed development on the surrounding environment were identified, evaluated, rated and discussed. The Present Ecological State (PES) as well as the Ecological Importance and Sensitivity (EIS) of the proposed development area were also determined and discussed.

Assessment Area

The proposed potable water pipeline route is approximately 1.37 km in length. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width. Adequate watercourse crossing infrastructure will be constructed at the single significant watercourse crossing.

The proposed pipeline route as well as watercourse crossing infrastructure, will traverse the following two properties, within the town of Ladybrand:

- Remaining Extent of the Farm Dorp Gronden van Ladybrand No 451
 - (SG 21 Digit Code: F0210000000045100000)
- Portion 19 of the Farm Dorp Gronden van Ladybrand No 451
 - (SG 21 Digit Code: F0210000000045100019)

The town forms part of the Mantsopa Local Municipality which in turn, forms part of the Thabo Mufutsanyane District Municipality, Free State Province. The assessment area falls within the municipal urban edge. Access to the assessment area is obtained by way of Loop Street in town, from the south.

Conservation Status

The entire assessment area as well as the localised and broader surrounding landscape is categorised as a Degraded land, in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018), which sets out biodiversity priority areas in the province.

Results and Conclusion

Terrestrial Grassland

According to SANBI (2006-2019), the entire assessment area falls within the Eastern Free State Clay Grassland vegetation type (Gm 3), which is characterised by flat to slightly undulating and undulating/rolling closed grasslands with streams and rivers that drain the foothills of the Drakensberg. This vegetation type is classified as Vulnerable (SANBI, 2006-2019).

The proposed potable water pipeline route is approximately 1.37 km in length. The proposed pipeline will tie into existing connection points at both ends of the pipeline route. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width. The mechanical clearance associated with the trenching and excavation for the proposed pipeline, should in all probability merely transform the existing surface vegetation within this narrow linear section.

Extensive existing mixed residential, commercial and industrial transformation of the town and associated township, is evident throughout the local landscape surrounding the assessment area. Significant portions of the broader landscape surrounding the assessment area, has also mainly been transformed by extensive agricultural cultivation activities. The local and broader surrounding landscape is therefore mainly in a significantly degraded and transformed state.

The entire proposed pipeline route is in a moderate to highly disturbed and degraded state. This is mainly as a result of continued anthropogenic management impacts and defoliation activities, in the form of uncontrolled overgrazing by livestock from the local community, constant commuting through the area as well as regular burning of the local and broader landscape. The area is traversed by numerous footpaths, while old building rubble was also found to be present at one specific location along the proposed pipeline route.

The terrestrial grassland landscape along the proposed pipeline route as well as throughout the local surrounding landscape, is therefore not reminiscent of the natural climactic state of the relevant Vulnerable Eastern Free State Clay Grassland vegetation type (Gm 3), which reduces the conservational significance of the area. **It is therefore recommended that a sufficient grazing management plan and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of the local and broader surrounding undeveloped areas and to attempt to improve/restore the ecological condition of the relevant vegetation type, over time.**

The provincially protected species *Helichrysum sp.* was merely found to be sparsely present along the proposed pipeline route. **A Provincial Flora Permit has to be obtained from the Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA), for the potential removal/destruction of any provincially protected plant species individuals, prior to the commencement of any construction activities.**

No Red Data Listed-, nationally- or other provincially protected plant species or any other species of conservational significance, were found to be present throughout the terrestrial grassland landscape, along the proposed pipeline route.

The assessment area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important bird species/nests or locally distinct habitats were observed throughout the terrestrial grassland landscape along the proposed pipeline route, during the site assessment or are necessarily expected to utilise the assessment area for breeding, foraging and/or persistence purposes. Only common local resident bird species were found to traverse the local area.

No conservationally significant or important faunal species or locally distinct faunal habitats were observed throughout the terrestrial grassland landscape along the proposed pipeline, during the site assessment. The local and broader landscape is subjected to continued anthropogenic activity and disturbance and it is therefore not anticipated that any conservationally significant or important faunal species would utilise the assessment area for breeding, foraging and/or persistence purposes. The central portion of the proposed pipeline route is however extensively utilised by small common local resident burrowing rodents, as refuge and for breeding/persistence purposes. The mobility of such faunal species allows for individuals to simply leave an area where disturbance is taking place and relocate to surrounding similar, adequate areas.

Watercourse Crossings

The assessment area falls within the D22H quaternary surface water catchment- and drainage area. The localised catchment surrounding the assessment area, mainly drains towards the east. The proposed pipeline route will traverse a single significant fourth-order seasonal watercourse at the final northern portion of the route. Adequate watercourse crossing infrastructure will however be constructed at this single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.

This watercourse flows in an easterly direction and further joins a number of other significant watercourses, which eventually all discharge into the Caledon River, situated approximately 6.2 km east of the assessment area. The watercourse therefore forms an important part of the local and broader quaternary surface water catchment- and drainage area towards the east. Significant localised contamination of the watercourse is however evident, in the form of continued raw sewage leaks and discharges from the local township. **Immediate steps must be taken by the Mantsopa Local Municipality to locate and remediate the sources of this contamination.**

Although the assessment area does not fall within any Important Bird Areas (IBA), the aquatic habitat associated with the main active streamflow channel of the watercourse, provides significant refuge and locally distinct habitat for various common and habitat-specific waterbird species, for breeding, foraging and/or persistence purposes. No conservationally significant or important bird species/nests were however observed during the site assessment. Only common local resident waterbird species were observed. **It is however recommended that no clearance of aquatic vegetation or habitat, takes place during the construction of the proposed watercourse crossing infrastructure, if practicably possible/feasible. Disturbed areas within and immediately surrounding the proposed development footprint area associated with the watercourse crossing, must also be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to attempt to maintain the ecological functionality and -integrity of the aquatic habitat, associated with the watercourse.**

The initial southern portion of the proposed pipeline route will also traverse two small artificially/anthropogenically constructed stormwater flow channels. Due to the lack of continuous water flow through the local area and the artificial/anthropogenic nature of these flow channels, they do not possess any significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape.

It is not anticipated that the proposed development should significantly impede or impact on the flow regimes of these channels. **Disturbed areas within and immediately surrounding the proposed development footprint area associated with the two stormwater flow channel crossings, must however be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to allow for continued water flow through these channels.**

Conclusion

The terrestrial grassland landscape along the proposed pipeline route, scored a low Ecological Importance and Sensitivity (EIS) and is not viewed as being of any conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem or the broader Vulnerable vegetation type.

The single significant watercourse crossing associated with the proposed pipeline route, scored a moderate Ecological Importance and Sensitivity (EIS) value and is viewed as being of low to moderate conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader Vulnerable vegetation type and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Terrestrial and aquatic alien invasive species establishment as well as impeding and contamination of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater low channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area, were identified and addressed for the construction phase of the proposed development, as significant potential long-term ecological impacts.

Continued impeding of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater low channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area as well as continued raw sewage contamination of this single significant fourth-order seasonal watercourse, were identified and addressed for the operational phase of the proposed development, as significant potential long-term ecological impacts.

The potential long-term ecological impacts identified for the proposed development, could therefore potentially add moderate to moderately-high cumulative impact to existing negative impacts caused by the extensive transformation of the existing the town and associated township, throughout the local landscape surrounding the assessment area.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will necessarily add any significant residual cumulative ecological impacts to the surrounding environment, if all recommended mitigation measures as per this ecological report are adequately implemented and managed, for both the construction and operational phases of the proposed development.

It is the opinion of the specialist that the proposed development of the potable water pipeline should be considered by the competent authority, for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report must however be adequately implemented and managed for both the construction and operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

List of Figures

| | |
|---|----|
| Figure 1: Locality map illustrating the assessment area | 11 |
| Figure 2: Vegetation map illustrating the vegetation type associated with the assessment area..... | 13 |
| Figure 3: Conservation status map illustrating the conservation category associated with the assessment area..... | 14 |
| Figure 4: Image illustrating the moderate to highly disturbed and degraded anthropogenically managed state, associated with the short initial southern portion of the proposed pipeline route... | 20 |
| Figure 5: Image illustrating the one specific location along the proposed pipeline route, where old building rubble was found to be present..... | 20 |
| Figure 6: Image illustrating the moderate to highly disturbed and degraded anthropogenically managed state, associated with the central portion of the proposed pipeline route; this area is also moderately infested with the legally declared alien invasive species <i>Solanum elaeagnifolium</i> (Category 1b) | 21 |
| Figure 7: Image illustrating the moderate to highly disturbed and degraded anthropogenically managed state, associated with the final northern portion of the proposed pipeline route; the single isolated patch of the legally declared alien invasive tree species <i>Pinus pinaster</i> (Category 1b), is also visible in the upper left corner of the image | 21 |
| Figure 8: Image illustrating the extensive presence of small common local resident burrowing rodents, along the central portion of the proposed pipeline route | 22 |
| Figure 9: Two images illustrating examples of the aquatic vegetation and aquatic habitat associated with the main active streamflow channel of the single significant fourth-order seasonal watercourse, which will be traversed by the proposed pipeline route at the final northern portion of the route... | 25 |
| Figure 10: Image illustrating the presence of the artificially/anthropogenically formed small wetland portion with an associated semi-aquatic habitat, which will be traversed by the proposed pipeline route at the initial southern portion of the route | 27 |
| Figure 11: Image illustrating an example of the two small artificially/anthropogenically constructed stormwater flow channels, which will be traversed by the proposed pipeline route at the initial southern portion of the route..... | 27 |
| Figure 12: Site sensitivity map illustrating all the important/significant ecological features as identified and discussed in this Ecological Assessment Report..... | 30 |

List of Tables

| | |
|--|----|
| Table 1: Criteria for PES calculations | 5 |
| Table 2: Criteria for EIS calculations | 6 |
| Table 3: Scale utilised for the evaluation of the Environmental Risk Ratings..... | 7 |
| Table 4: Scale used for the evaluation of the Environmental Significance Ratings | 9 |
| Table 5: Environmental Risk and Significance Ratings..... | 42 |
| Table 6: Environmental Risk and Significance Ratings..... | 59 |

Abbreviations

| | |
|--------|--|
| BA | Basic Assessment |
| CARA | Conservation of Agricultural Resources Act (Act 43 of 1983) |
| CBA | Critical Biodiversity Area |
| DAFF | Department of Agriculture Forestry and Fisheries |
| DESTEA | Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs |
| DWS | Department of Water and Sanitation |
| EAP | Environmental Assessment Practitioner |
| EIA | Environmental Impact Assessment |
| EIS | Ecological Importance and Sensitivity |
| ESA | Ecological Support Area |
| MAP | Mean Annual Precipitation |
| NEMBA | National Environmental Management: Biodiversity Act (Act 10 of 2004) |
| NEMA | National Environmental Management Act (Act 107 of 1998) |
| NFA | National Forests Act (Act 84 of 1998) |
| NWA | National Water Act (Act 36 of 1998) |
| ONA | Other Natural Area |
| PES | Present Ecological State |
| WULA | Water Use License Application |

Declaration of Independence

I, Adriaan Johannes Hendrikus Lamprecht, ID 870727 5043 083, declare that I:

- am the Director and Ecological Specialist of EcoFocus Consulting (Pty) Ltd
- act as an independent specialist consultant in the field of botany and ecology
- am assigned as the Ecological Specialist consultant by the Environmental Assessment Practitioner (EAP), NSVT Consultants, for the proposed development
- do not have or will not have any financial interest in the undertaking of the proposed project activity other than remuneration for work as stipulated in the Purchase Order terms of reference
- confirm that remuneration for my services relating to the proposed development is not linked to approval or rejection of the project by the competent authority
- have no interest in secondary or subsequent developments as a result of the authorisation of the proposed project
- have no and will not engage in any conflicting interests in the undertaking of the activity
- undertake to disclose to the applicant and the competent authority any information that has or may have the potential to influence the decision of the competent authority
- will provide the applicant and competent authority with access to all relevant project information in my possession whether favourable or not

AJH Lamprecht



Signature

1. Introduction

The project applicant, Mantsopa Local Municipality, proposes to construct a new 250 mm potable water pipeline of approximately 1.37 km in length within the town of Ladybrand, Free State Province. The proposed pipeline will tie into existing connection points at both ends of the pipeline route. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width.

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Due to the nature of potential ecological impacts posed by the proposed development to the local ecosystem and ecology, an Ecological study is required. This is required in order to determine the potential presence of ecologically/conservationally significant or sensitive species, habitats, wetlands or ecosystems, which may be adversely affected by the proposed development. Any potential ecological impacts associated with the proposed development, must be identified. Impact mitigation and management measures in accordance with the requirements of the National Environmental Management Act (Act 107 of 1998) Mitigation Hierarchy, must subsequently be recommended. This must be done in order to attempt to reduce/alleviate the adverse effects of identified potential ecological impacts.

EcoFocus Consulting was therefore subsequently appointed by the EAP as the independent ecological specialist, to conduct the required Ecological study for the proposed development. This report constitutes the Ecological Assessment.

Preliminary preparations conducted prior to the ecological site assessment, were as follows:

- Georeferenced spatial information was obtained of the proposed development area, in order to determine the direct impact footprint area.
- A desktop assessment was conducted of the most up-to-date information/data available on the relevant vegetation types and national/provincial conservation significance status, associated with the proposed development area.

2. Date and Season of Ecological Site Assessment

A site assessment for the proposed development area was conducted on 20 October 2021. This date forms part of the growing season and most plant species present, could therefore be successfully identified.

3. Assessment Rational

South Africa is a country rich in natural resources and splendour and is rated as having some of the highest biodiversity in the world. Other than the pure aesthetic value which our biodiversity and natural resources provides, it also plays a significant positive role in our national economy. While continuous economic development and progress is a key national focus area, which forms a cornerstone in the socio-economic improvement of society and the livelihoods of communities and individuals, the preservation and management of the integrity and sustainability of our natural resources is also essential in achieving this objective.

Socio-economic development and progress can therefore not be completely inhibited for the sake of ensuring environmental conservation, therefore solutions and compromises rather need to be explored in order to achieve the need for socio-economic development without unreasonably jeopardising the needs of environmental conservation. A sustainable and responsible balance needs to be maintained in order to accommodate the requirements of both.

Adequate, sustainable and responsible utilisation and management of our natural resources is crucial. Finding the required balance between socio-economic development and environmental conservation, should therefore always be a priority focus point during any proposed development process.

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).

An Ecological Assessment of the proposed development area was therefore conducted in order to identify and quantify any potential ecological impacts, associated with the proposed development.

4. Objectives of the Assessment

- Describe the vegetation within the assessment area and identify and list conservationally significant faunal and floral species encountered within the assessment area.
 - List any nationally- and/or provincially protected- and/or Red Data Listed species.
- Identify and discuss any ecologically sensitive/conservationally significant areas, if potentially found to be present within the assessment area.
- Identify, delineate and discuss any watercourses/wetlands, if potentially found to be present within the assessment area.
- Assess and discuss the Present Ecological State (PES) of the assessment area and directly surrounding areas, in order to provide an indication of the current ecological condition as well as the extent and severity of degradation and/or transformation of the assessment area, if applicable.
- Assess and discuss the Ecological Importance and Sensitivity (EIS) of the assessment area and directly surrounding areas, in order to provide an indication of the ecological sensitivity/conservational significance of the assessment area.
- Identify, evaluate, rate and discuss any potential ecological impacts associated with the proposed development.
 - Provide recommendations on impact mitigation and management measures in accordance with the requirements of the NEMA (Act 107 of 1998) Mitigation Hierarchy, in order to attempt to reduce/alleviate the adverse effects of identified potential ecological impacts.
- Provide recommendations on the ecological suitability/acceptability of the assessment area for the proposed development.
- A digital report (this document) as well as digital .KML files will be provided to the EAP, of any ecologically sensitive/conservationally significant areas and/or watercourses/wetlands, if potentially identified within the assessment area.

5. Methodology

- The proposed development area was assessed on foot.
- Visual observations/identifications were made of habitat conditions, any ecologically sensitive/conservationally significant areas as well as relevant species present.
- Identified species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 as well as the Provincially Protected species of the Free State's Nature Conservation Ordinance (No 8 of 1969).
- Wetlands/watercourses which are potentially present within the assessment area, were identified, delineated and discussed as per the methodology described below:
 - For the purposes of this investigation a wetland was defined according to the definition in the National Water Act (Act 36 of 1998) as: "land which is transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which in normal circumstances, supports or would support vegetation typically adapted to life in saturated soil."
 - In 2005 DWAF published a wetland delineation procedure in a guideline document titled "A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas". Guidelines for the undertaking of biodiversity assessments exist. These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments.
 - The wetland delineation procedure identifies the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas. This constitutes the part of the wetland that might remain flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.
 - The guidelines also state that the locating of the outer edge of the temporary zone must make use of four specific indicators namely:
 - terrain unit indicator
 - soil form indicator
 - soil wetness indicator
 - vegetation indicator

- In addition, the wetland/watercourse and a protective buffer zone beginning from the outer edge of the wetland temporary zone, was designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland. An adequate protective buffer zone, beginning from the outer edge of the wetland temporary zone, was implemented and designated as sensitive within which no development must be allowed to occur.
- Georeferenced photographs were taken of any ecologically sensitive/conservationally significant areas, watercourses/wetlands as well as any Red Data Species Listed-, nationally- or provincially protected species if encountered, in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

The **Present Ecological State (PES)** of the assessment area was determined and discussed as per the table 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 and pristine. |
| B | > 80-90% | Largely natural . A small change in natural habitats and biota may have taken place but the ecosystem functionality has remained essentially unchanged. |
| C | > 60-80% | Moderately modified . Moderate loss and transformation of natural habitat and biota have occurred, but the basic ecosystem functionality has still remained predominantly unchanged. |
| D | > 40-60% | Largely modified . A significant loss of natural habitat, biota and subsequent basic ecosystem functionality has occurred. |
| E | > 20-40% | Seriously modified . The loss of natural habitat, biota and basic ecosystem functionality is extensive. |
| F | 0-20% | Critically/Extremely modified . Transformation has reached a critical level and the ecosystem has been modified completely with a virtually complete loss of natural habitat and biota. The basic ecosystem functionality has virtually been destroyed and the transformation is irreversible. |

The **Ecological Importance and Sensitivity (EIS)** of the assessment area was determined and discussed as per the table 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. 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/or sensitive on any scale. Biodiversity is ubiquitous and not unique or sensitive to habitat modifications. |
| Moderate | C | Ecologically important and sensitive on local or possibly provincial scale. Biodiversity is still relatively ubiquitous and not usually sensitive to habitat modifications. |
| High | B | Ecologically important and sensitive on provincial or possibly national scale. Biodiversity is relatively unique and may be sensitive to habitat modifications. |
| Very High | A | Ecologically important and sensitive on national and possibly international scale. Biodiversity is very unique and sensitive to habitat modifications. |

Potential ecological impacts posed by the proposed development to the local ecosystem and ecology, were identified, evaluated, rated and discussed as per the methodology described below. 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 identified potential ecological impact is scored for each of the Evaluation Components, as per the table below.

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

| Evaluation Component | Rating Scale and Description/Criteria |
|--|---|
| Magnitude of Negative or Positive Impact | <p>10 - Very high: Bio-physical features and/or ecological functionality/processes may be severely impacted upon.</p> <p>8 - High: Bio-physical features and/or ecological functionality/processes may be significantly impacted upon.</p> <p>6 - Medium: Bio-physical features and/or ecological functionality/processes may be moderately impacted upon.</p> <p>4 - Low: Bio-physical features and/or ecological functionality/processes may be slightly impacted upon.</p> <p>2 - Very Low: Bio-physical features and/or ecological functionality/processes may be slightly impacted upon.</p> <p>0 - Zero: Bio-physical features and/or ecological functionality/processes will not be impacted upon.</p> |
| Duration of Negative or Positive Impact | <p>5 – Permanent: Impact will continue on a permanent basis.</p> <p>4 - Long term: Impact should cease a period (> 40 years) after the operational phase/project life of the activity.</p> <p>3 - Medium term: Impact may occur for the period of the operational phase/project life of the activity.</p> <p>2 - Short term: Impact may only occur during the construction phase of the activity after which it will cease.</p> <p>1 - Immediate: Impact may only occur as a once off during the construction phase of the activity.</p> |
| Extent of Positive or Negative Impact | <p>5 - International: Impact will extend beyond National boundaries.</p> <p>4 - National: Impact will extend beyond Provincial boundaries but remain within National boundaries.</p> <p>3 - Regional: Impact will extend beyond 5 km of the development footprint but remain within Provincial boundaries.</p> <p>2 - Local: Impact will not extend beyond 5 km of the development footprint.</p> <p>1 - Site-specific: Impact will only occur on or within 200 m of the development footprint.</p> <p>0 – No impact.</p> |
| Irreplaceability of Natural Resources being impacted upon | <p>5 – Definite loss of irreplaceable natural resources.</p> <p>4 – High potential for loss of irreplaceable natural resources.</p> <p>3 – Moderate potential for loss of irreplaceable natural resources.</p> <p>2 – Low potential for loss of irreplaceable natural resources.</p> <p>1 – Very low potential for loss of irreplaceable natural resources.</p> <p>0 – No impact.</p> |

| | |
|---|---|
| Reversibility of Impact | <p>5 – Impact cannot be reversed.</p> <p>4 – Low potential that impact may be reversed.</p> <p>3 – Moderate potential that impact may be reversed.</p> <p>2 – High potential that impact may be reversed.</p> <p>1 – Impact will be reversible.</p> <p>0 – No impact.</p> |
| Probability of Impact Occurrence | <p>5 - Definite: Probability of impact occurring is > 95 %.</p> <p>4 - High: Probability of impact occurring is > 75 %.</p> <p>3 - Medium: Probability of impact occurring is between 25 % - 75 %.</p> <p>2 - Low: Probability of impact occurring is between 5 % - 25 %.</p> <p>1 - Improbable: Probability of impact occurring is < 5 %.</p> |
| Cumulative Impact | <p>High: Numerous similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts.</p> <p>Medium: Few similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts.</p> <p>Low: Virtually no similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts. The development is anticipated to be an isolated occurrence and should therefore have a negligible cumulative impact.</p> <p>None: No cumulative impact.</p> |

Once the Environmental Risk Ratings have been evaluated for each identified potential ecological impact, the Significance Score of each 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 identified potential ecological impact, as per Table 4 below. The Environmental Significance rating process is completed for all identified potential ecological impacts for the construction- and subsequent operational phases of the proposed development, both before and after implementation of the recommended mitigation measures.

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

| Environmental Significance Score | Environmental Significance Rating | Description/Criteria |
|----------------------------------|-----------------------------------|---|
| 125 – 150 | Very High | An impact of very high significance after mitigation will mean that the development may not take place. The impact cannot be suitably reduced and mitigated to within acceptable levels. |
| 100 – 124 | High | An impact of high significance after mitigation should influence a decision about whether or not to proceed with the development. Additional, impact-specific mitigation measures must be implemented if the continuation of the development is to be considered. |
| 75 – 99 | Medium-High | Additional, impact-specific mitigation measures must be implemented for an impact of medium-high significance if the continuation of the development is to be considered. |
| 50 – 74 | Medium | An impact of medium significance after mitigation must be adequately managed in accordance with the mitigation measures provided by the specialist. |
| < 50 | Low | If any mitigation measures are provided by the specialist for an impact of low significance after mitigation, the impact must be adequately managed in accordance with these measures. |
| + | Positive impact | A positive impact is likely to result in a beneficial consequence/effect and should therefore be viewed as a motivation for the development to proceed. |

6. Assessment Area

The proposed potable water pipeline route is approximately 1.37 km in length. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width. Adequate watercourse crossing infrastructure will be constructed at the single significant watercourse crossing.

The proposed pipeline route as well as watercourse crossing infrastructure, will traverse the following two properties, within the town of Ladybrand:

- Remaining Extent of the Farm Dorp Gronden van Ladybrand No 451
 - (SG 21 Digit Code: F02100000000045100000)
- Portion 19 of the Farm Dorp Gronden van Ladybrand No 451
 - (SG 21 Digit Code: F02100000000045100019)

The town forms part of the Mantsopa Local Municipality which in turn, forms part of the Thabo Mufutsanyane District Municipality, Free State Province. The assessment area falls within the municipal urban edge. Access to the assessment area is obtained by way of Loop Street in town, from the south.

See locality map below (see A3 sized map in the Appendices).



Figure 1: Locality map illustrating the assessment area

6.1. Climate

The rainfall of the region peaks during the summer months and the Mean Annual Precipitation (MAP) of the area is approximately 896 mm (www.climate-data.org). The maximum average monthly temperature is approximately 20.2°C in the summer months while the minimum average monthly temperature is approximately 6.5°C during the winter. Maximum daily temperatures can reach up to 26.4°C in the summer months and dip to as low as -1.2°C during the winter.

6.2. Geology and Soils

According to Mucina & Rutherford (2006) the geology of the landscape and associated vegetation type can be described as the following:

Mudstones, sandstones and shale of the Beaufort Group. Glenrosa, Bonheim, Avalon and Mayo soils dominate outcrops and slightly elevated areas. Major landtypes are Bb, Bd and Ca.

6.3. Vegetation Type and Conservation Status

Vegetation Type

According to SANBI (2006-2019), the entire assessment area falls within the Eastern Free State Clay Grassland vegetation type (Gm 3), which is characterised by flat to slightly undulating and undulating/rolling closed grasslands with streams and rivers that drain the foothills of the Drakensberg. This vegetation type is classified as Vulnerable (SANBI, 2006-2019).

Conservation Status

The entire assessment area as well as the localised and broader surrounding landscape is categorised as a Degraded land, in accordance with the Free State Provincial Spatial Biodiversity Plan 2018 (Collins, 2018), which sets out biodiversity priority areas in the province.

See vegetation- and conservation status maps below (see A3 sized maps in the Appendices).

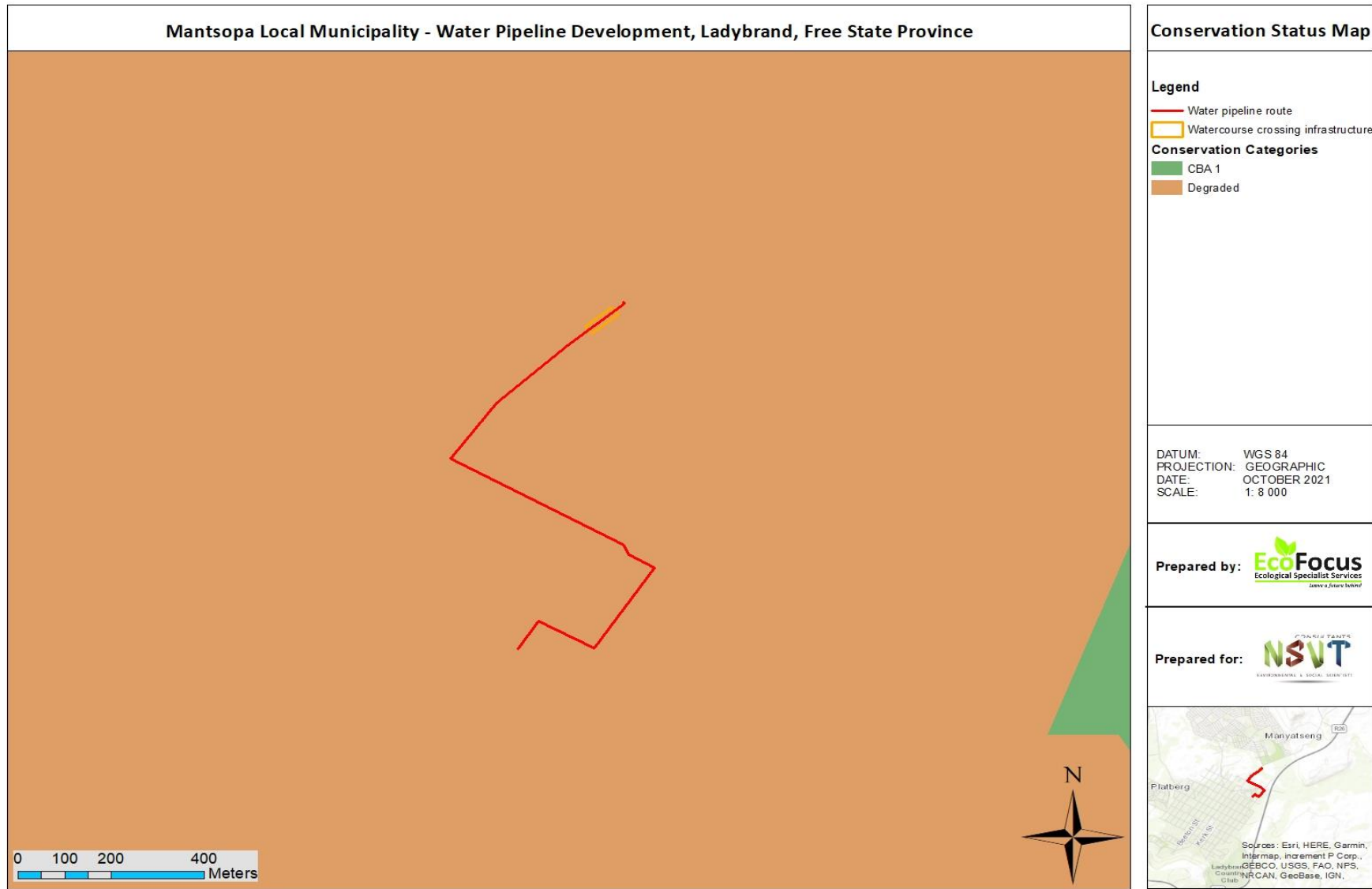


Figure 3: Conservation status map illustrating the conservation category associated with the assessment area

7. Assumptions, Uncertainties and Gaps in Knowledge

Various assumptions need to be made during the assessment process, at the hand of the relevant specialist. It is therefore assumed that:

- all relevant project information provided to the ecological specialist by the EAP, was correct and valid at the time that it was provided.
- the proposed development area as provided by the EAP, is correct and will not be significantly deviated from, as this was the only area assessed.
- strategic level investigations undertaken by the applicant prior to the commencement of the Basic Assessment process, determined that the proposed development area represents a potentially suitable and technically acceptable location.
- the public, local communities, relevant organs of state and surrounding landowners will receive a sufficient reoccurring opportunity to participate and comment on the proposed development during the Basic Assessment process, through the provision of adequately facilitated public participation interventions and timeframes as stipulated in the NEMA: EIA Regulations, 2014.
- the need and desirability of the proposed development is based on strategic national, provincial and local plans and policies, which reflect the interests of both statutory and public viewpoints.
- the BA 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 development.
- it is assumed that strategic level decision making by the relevant authorities will be conducted through cooperative governance principles, with the consideration of environmentally sustainable and responsible development principles underpinning all decision making

Given that a BA involves prediction, the uncertainty factor forms part of the assessment 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 observations, recommendations and conclusions are made, solely based on professional specialist opinion. Final certainty will only be obtained upon actual implementation of the proposed development. Adequate research, specialist experience and expertise should however minimise this uncertainty.
- Uncertainty of relevant decision making relates to the interpretation of provided information by relevant authorities during the BA process. Continual two-way communication and coordination between EAP's and relevant authorities should however decrease the uncertainty of subjective interpretation. The importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant information and impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the objective interpretation of results and limit the occurrence and scale of uncertainty and subjectivity.
- The principle of human nature provides for uncertainties and unpredictability with regards to the socio-economic impacts of the proposed development and the subsequent public reaction/opinion, which will be received during the Public Participation Process (PPP)

Gaps in knowledge can be attributed to:

- The ecological assessment process was undertaken prior to the availing of certain information, which would only be derived from the final development design and layout. The design layout for the proposed development, had not been finalised yet at the time of the ecological assessment.
- Extensive existing mixed residential, commercial and industrial transformation of the town and associated township, is evident within the local landscape surrounding the assessment area. Significant portions of the broader landscape surrounding the assessment area, has also mainly been transformed by extensive agricultural cultivation activities. The local and broader surrounding landscape is therefore mainly in a significantly degraded and transformed state.
- The potential for future similar pipeline developments in the same geographical area, which could lead to further cumulative impacts, cannot be meaningfully anticipated. It is however highly likely that further similar pipeline developments and subsequent transformation will take place within the local or broader area, over time.
- EcoFocus Consulting is an independent ecological specialist company. All information and recommendations as per this report are therefore provided in a fair and unbiased/objective manner and are based on the qualitative data gathered and professional specialist opinion.

8. Results and Discussion

The proposed potable water pipeline route is approximately 1.37 km in length. The proposed pipeline will tie into existing connection points at both ends of the pipeline route. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width. The mechanical clearance associated with the trenching and excavation for the proposed pipeline, should in all probability merely transform the existing surface vegetation within this narrow linear section.

Extensive existing mixed residential, commercial and industrial transformation of the town and associated township, is evident throughout the local landscape surrounding the assessment area. Significant portions of the broader landscape surrounding the assessment area, has also mainly been transformed by extensive agricultural cultivation activities. The local and broader surrounding landscape is therefore mainly in a significantly degraded and transformed state.

The entire proposed pipeline route is in a moderate to highly disturbed and degraded state. This is mainly as a result of continued anthropogenic management impacts and defoliation activities, in the form of uncontrolled overgrazing by livestock from the local community, constant commuting through the area as well as regular burning of the local and broader landscape. The area is traversed by numerous footpaths, while old building rubble was also found to be present at one specific location along the proposed pipeline route.

8.1. Terrestrial Grassland

8.1.1. Current Existing Vegetation and Site Description

The majority of the proposed pipeline route constitutes a slightly sloping low-growing terrestrial grassland landscape. The grassland landscape is merely covered by a low-growing grass 'carpet' and little aboveground grass biomass and -tufting still remains. The significantly disturbed and degraded state of the grass 'carpet' rendered the successful identification of grass species individuals very difficult, which reiterates the severity level of continued anthropogenic management impacts.

The proposed pipeline route mainly appears to be dominated by the grass species *Eragrostis spp.* and *Cynodon dactylon*. These species are robust/resilient Increaser 2 type grass species, which often tend to endure and increase in the event of disturbance and/or overgrazing, due to their robust/resilient nature (Van Oudtshoorn, 2004). The hardy grass species *Aristida spp.* and *Elionurus muticus* were also found to be present, but to a significantly lesser extent. A virtually complete absence of desired Decreaser type climax grass species (Van Oudtshoorn, 2004) associated with the relevant vegetation type, is evident along the proposed pipeline route as well as throughout the local surrounding landscape. This further reiterates the severity level of the disturbance and degradation.

The terrestrial grassland landscape along the proposed pipeline route as well as throughout the local surrounding landscape, is therefore not reminiscent of the natural climactic state of the relevant Vulnerable Eastern Free State Clay Grassland vegetation type (Gm 3), which reduces the conservational significance of the area. **It is therefore recommended that a sufficient grazing management plan and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of the local and broader surrounding undeveloped areas and to attempt to improve/restore the ecological condition of the relevant vegetation type, over time.**

A diverse forb or succulent layer was not evident throughout the terrestrial grassland landscape along the proposed pipeline route, during the site assessment. This is mainly as a result of the continued anthropogenic management impacts within the local and broader landscape. The forb species *Salvia runcinata*, *Hermannia depressa* and *Moraea pallida* were found to be well-represented along the proposed pipeline route, while individuals of the species *Berkheya rigida*, *Felicia sp.*, *Chlorophytum cooperi*, *Ledebouria sp.*, *Lobelia laxa*, *Trifolium africanum*, *Hermannia transvaalensis*, *Nothoscordum sp.*, *Papaver aculeatum* as well as the provincially protected species *Helichrysum sp.*, were merely found to be sparsely present.

A Provincial Flora Permit has to be obtained from the Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA), for the potential removal/destruction of any provincially protected plant species individuals, prior to the commencement of any construction activities.

The legally declared alien invasive species *Solanum elaeagnifolium* (Category 1b) was found to be moderately infested all along the central portion of the proposed pipeline route, while the legally declared alien invasive species *Verbena bonariensis* (Category 1b) was found to be sparsely infested along the short initial southern portion of the proposed pipeline route. Individuals of the legally declared alien invasives species *Argemone mexicana* and *Cirsium vulgare* (both Category 1b) were also found to be sparsely present, only at the one specific location along the proposed pipeline route, associated with the old building rubble.

No shrub species were found to be present along the proposed pipeline route. A single isolated patch of the legally declared alien invasive tree species *Pinus pinaster* (Category 1b) was however found to be present at the final northern portion of the proposed pipeline route.

It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the assessment area, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading.

See photographs below.



Figure 4: Image illustrating the moderate to highly disturbed and degraded anthropogenically managed state, associated with the short initial southern portion of the proposed pipeline route



Figure 5: Image illustrating the one specific location along the proposed pipeline route, where old building rubble was found to be present



Figure 6: Image illustrating the moderate to highly disturbed and degraded anthropogenically managed state, associated with the central portion of the proposed pipeline route; this area is also moderately infested with the legally declared alien invasive species *Solanum elaeagnifolium* (Category 1b)



Figure 7: Image illustrating the moderate to highly disturbed and degraded anthropogenically managed state, associated with the final northern portion of the proposed pipeline route; the single isolated patch of the legally declared alien invasive tree species *Pinus pinaster* (Category 1b), is also visible in the upper left corner of the image

No Red Data Listed-, nationally- or other provincially protected plant species or any other species of conservational significance, were found to be present throughout the terrestrial grassland landscape, along the proposed pipeline route.

The assessment area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important bird species/nests or locally distinct habitats were observed throughout the terrestrial grassland landscape along the proposed pipeline route, during the site assessment or are necessarily expected to utilise the assessment area for breeding, foraging and/or persistence purposes. Only common local resident bird species were found to traverse the local area.

No conservationally significant or important faunal species or locally distinct faunal habitats were observed throughout the terrestrial grassland landscape along the proposed pipeline, during the site assessment. The local and broader landscape is subjected to continued anthropogenic activity and disturbance and it is therefore not anticipated that any conservationally significant or important faunal species would utilise the assessment area for breeding, foraging and/or persistence purposes. The central portion of the proposed pipeline route is however extensively utilised by small common local resident burrowing rodents, as refuge and for breeding/persistence purposes. The mobility of such faunal species allows for individuals to simply leave an area where disturbance is taking place and relocate to surrounding similar, adequate areas.

See photograph below.



Figure 8: Image illustrating the extensive presence of small common local resident burrowing rodents, along the central portion of the proposed pipeline route

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

The Present Ecological State (PES) of the terrestrial grassland landscape along the proposed pipeline route, is classified as Class D as it is largely modified. A significant loss of natural habitat, biota and subsequent basic ecosystem functionality has occurred, mainly as a result of the continued anthropogenic management impacts.

The Ecological Importance and Sensitivity (EIS) of the terrestrial grassland landscape along the proposed pipeline route, is classified as Class D (low/marginal) as it is not viewed as being ecologically important and/or sensitive on any scale. The entire proposed pipeline route is in a moderate to highly disturbed and degraded state. The terrestrial grassland landscape along the proposed pipeline route as well as throughout the local surrounding landscape, is therefore not reminiscent of the natural climactic state of the relevant Vulnerable Eastern Free State Clay Grassland vegetation type (Gm 3), which reduces the conservational significance of the area.

The terrestrial grassland landscape along the proposed pipeline route, is therefore not viewed as being of any conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem or the broader Vulnerable vegetation type. It is the opinion of the specialist that the proposed development of the potable water pipeline should be considered by the competent authority, for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report, must however be adequately implemented and managed for both the construction and operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

8.2. Watercourse Crossings

8.2.1. Current Existing Vegetation and Site Description

The assessment area falls within the D22H quaternary surface water catchment- and drainage area. The localised catchment surrounding the assessment area, mainly drains towards the east. The proposed pipeline route will traverse a single significant fourth-order seasonal watercourse at the final northern portion of the route. Adequate watercourse crossing infrastructure will however be constructed at this single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.

This watercourse flows in an easterly direction and further joins a number of other significant watercourses, which eventually all discharge into the Caledon River, situated approximately 6.2 km east of the assessment area. The watercourse therefore forms an important part of the local and broader quaternary surface water catchment- and drainage area towards the east. Significant localised contamination of the watercourse is however evident, in the form of continued raw sewage leaks and discharges from the local township. **Immediate steps must be taken by the Mantsopa Local Municipality to locate and remediate the sources of this contamination.**

Due to the lack of continuous water flow through the local area, the watercourse does not necessarily possess a distinct riparian zone along its banks. The main active streamflow channel of the watercourse however constitutes aquatic vegetation and an associated aquatic habitat. The aquatic vegetation is mainly dominated by the hydrophytic species *Phragmites australis*, *Typha capensis* and *Cyperus spp.*, while the species *Ranunculus multifidus* and *Veronica anagallis-aquatica* were also found to be well-represented.

Although the assessment area does not fall within any Important Bird Areas (IBA) (see heading 8.1), the aquatic habitat associated with the main active streamflow channel of the watercourse, provides significant refuge and locally distinct habitat for various common and habitat-specific waterbird species, for breeding, foraging and/or persistence purposes. No conservationally significant or important bird species/nests were however observed during the site assessment. Only common local resident waterbird species were observed. **It is however recommended that no clearance of aquatic vegetation or habitat, takes place during the construction of the proposed watercourse crossing infrastructure, if practicably possible/feasible. Disturbed areas within and immediately surrounding the proposed development footprint area associated with the watercourse crossing, must also be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to attempt to maintain the ecological functionality and -integrity of the aquatic habitat, associated with the watercourse.** See photographs below.



Figure 9: Two images illustrating examples of the aquatic vegetation and aquatic habitat associated with the main active streamflow channel of the single significant fourth-order seasonal watercourse, which will be traversed by the proposed pipeline route at the final northern portion of the route

The initial southern portion of the proposed pipeline route will traverse a small wetland portion with an associated semi-aquatic habitat. It is however visibly evident that the origin/source of this wetland portion is solely as a result of a significant long-term underground water pipeline leakage. This continued leakage was in all probability responsible for the initial formation- and the subsequent continued subsistence of this wetland portion. Historic Google Earth imagery of the area support this presumption that the wetland portion has formed artificially/anthropogenically, solely as a result of underground pipeline leakages.

This wetland portion currently provides no important ecological services to the local and broader surrounding environment and forms no part of the local and broader quaternary surface water catchment- and drainage area towards the east. It is therefore not viewed as being of any conversational significance/value, due to its artificial/anthropogenic nature.

The initial southern portion of the proposed pipeline route will also traverse two small artificially/anthropogenically constructed stormwater flow channels. Due to the lack of continuous water flow through the local area and the artificial/anthropogenic nature of these flow channels, they do not possess any significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape.

It is not anticipated that the proposed development should significantly impede or impact on the flow regimes of these channels. **Disturbed areas within and immediately surrounding the proposed development footprint area associated with the two stormwater flow channel crossings, must however be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to allow for continued water flow through these channels.**

See photographs below.



Figure 10: Image illustrating the presence of the artificially/anthropogenically formed small wetland portion with an associated semi-aquatic habitat, which will be traversed by the proposed pipeline route at the initial southern portion of the route



Figure 11: Image illustrating an example of the two small artificially/anthropogenically constructed stormwater flow channels, which will be traversed by the proposed pipeline route at the initial southern portion of the route

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

The Present Ecological State (PES) of the single significant watercourse crossing associated with the proposed pipeline route, is classified as Class C as it is moderately modified. Moderate loss- and transformation of natural habitat and biota has occurred, mainly as a result of the significant localised contamination of the watercourse in the form of continued raw sewage leaks and discharges from the local township along with the continued anthropogenic management impacts. The basic ecosystem functionality has however remained predominantly unchanged.

The Ecological Importance and Sensitivity (EIS) of the single significant watercourse crossing associated with the proposed pipeline route, is classified as Class C (moderate) as it is viewed as being ecologically important and sensitive on local scale. The watercourse forms an important part of the local and broader quaternary surface water catchment- and drainage area towards the east. Although the assessment area does not fall within any Important Bird Areas (IBA), the aquatic habitat associated with the main active streamflow channel of the watercourse, provides significant refuge and locally distinct habitat for various common and habitat-specific waterbird species, for breeding, foraging and/or persistence purposes. No conservationally significant or important bird species/nests were however observed during the site assessment. Only common local resident waterbird species were observed. Biodiversity is also still relatively ubiquitous and not necessarily sensitive to further habitat modifications, due to the existing significantly contaminated state of the watercourse.

The single significant watercourse crossing associated with the proposed pipeline route, is therefore viewed as being of low to moderate conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader Vulnerable vegetation type and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. It is the opinion of the specialist that the proposed development of the potable water pipeline should be considered by the competent authority, for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report must however be adequately implemented and managed for both the construction and operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

8.3. Ecological Site Sensitivity Map

The site sensitivity map below (see A3 sized map in the Appendices) illustrates the presence of the single significant fourth-order seasonal watercourse as well as the locations of the small artificially/anthropogenically formed wetland portion and the two small artificially/anthropogenically constructed stormwater flow channels, which will be traversed by the proposed pipeline route.



Figure 12: Site sensitivity map illustrating the presence of the single significant fourth-order seasonal watercourse as well as the locations of the small artificially/anthropogenically formed wetland portion and the two small artificially/anthropogenically constructed stormwater flow channels, which will be traversed by the proposed pipeline route

8.4. Species List for the Assessment Area

Table 5: Species list for the assessment area (Provincially protected species highlighted in yellow; Legally declared alien invasive species highlighted in pink)

| Graminoids | Forbs & Succulents | Karroid & Woody Shrubs/Trees |
|-----------------------------|------------------------------------|------------------------------|
| <i>Aristida spp.</i> | <i>Argemone mexicana</i> | <i>Pinus pinaster</i> |
| <i>Cynodon dactylon</i> | <i>Berkheya rigida</i> | - |
| <i>Elionurus muticus</i> | <i>Chlorophytum cooperi</i> | - |
| <i>Eragrostis spp.</i> | <i>Cirsium vulgare</i> | - |
| <i>Phragmites australis</i> | <i>Cyperus spp.</i> | - |
| - | <i>Felicia sp.</i> | - |
| - | <i>Helichrysum sp.</i> | - |
| - | <i>Hermannia depressa</i> | - |
| - | <i>Hermannia transvaalensis</i> | - |
| - | <i>Ledebouria sp.</i> | - |
| - | <i>Lobelia laxa</i> | - |
| - | <i>Moraea pallida</i> | - |
| - | <i>Nothoscordum sp.</i> | - |
| - | <i>Papaver aculeatum</i> | - |
| - | <i>Ranunculus multifidus</i> | - |
| - | <i>Salvia runcinata</i> | - |
| - | <i>Solanum elaeagnifolium</i> | - |
| - | <i>Trifolium africanum</i> | - |
| - | <i>Typha capensis</i> | - |
| - | <i>Verbena bonariensis</i> | - |
| - | <i>Veronica anagallis-aquatica</i> | - |

9. Ecological Impact Assessment

The following section identifies the potential ecological impacts (both positive and negative), which the proposed development will have on the surrounding environment.

Once the potential ecological 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 associated with the proposed development 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 implementation of effective management strategies for them.

9.1. Construction Phase

Transformation of vegetation within the assessment area associated with the Eastern Free State Clay Grassland vegetation type (Gm 3)

According to SANBI (2006-2019), the entire assessment area falls within the Eastern Free State Clay Grassland vegetation type (Gm 3), which is characterised by flat to slightly undulating and undulating/rolling closed grasslands with streams and rivers that drain the foothills of the Drakensberg. This vegetation type is classified as Vulnerable (SANBI, 2006-2019).

The proposed potable water pipeline route is approximately 1.37 km in length. The proposed pipeline will tie into existing connection points at both ends of the pipeline route. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width. The mechanical clearance associated with the trenching and excavation for the proposed pipeline, should in all probability merely transform the existing surface vegetation within this narrow linear section.

Extensive existing mixed residential, commercial and industrial transformation of the town and associated township, is evident throughout the local landscape surrounding the assessment area. Significant portions of the broader landscape surrounding the assessment area, has also mainly been transformed by extensive agricultural cultivation activities. The local and broader surrounding landscape is therefore mainly in a significantly degraded and transformed state.

The entire proposed pipeline route is in a moderate to highly disturbed and degraded state. This is mainly as a result of continued anthropogenic management impacts and defoliation activities, in the form of uncontrolled overgrazing by livestock from the local community, constant commuting through the area as well as regular burning of the local and broader landscape. The area is traversed by numerous footpaths, while old building rubble was also found to be present at one specific location along the proposed pipeline route.

The terrestrial grassland landscape along the proposed pipeline route as well as throughout the local surrounding landscape, is therefore not reminiscent of the natural climactic state of the relevant Vulnerable Eastern Free State Clay Grassland vegetation type (Gm 3), which reduces the conservational significance of the area.

The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Destruction of-/damage to Red Data Listed, nationally or provincially protected species individuals/habitats associated with the assessment area

The proposed potable water pipeline route is approximately 1.37 km in length. The proposed pipeline will tie into existing connection points at both ends of the pipeline route. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width. The mechanical clearance associated with the trenching and excavation for the proposed pipeline, should in all probability merely transform the existing surface vegetation within this narrow linear section.

Extensive existing mixed residential, commercial and industrial transformation of the town and associated township, is evident throughout the local landscape surrounding the assessment area. Significant portions of the broader landscape surrounding the assessment area, has also mainly been transformed by extensive agricultural cultivation activities. The local and broader surrounding landscape is therefore mainly in a significantly degraded and transformed state.

The entire proposed pipeline route is in a moderate to highly disturbed and degraded state. This is mainly as a result of continued anthropogenic management impacts and defoliation activities, in the form of uncontrolled overgrazing by livestock from the local community, constant commuting through the area as well as regular burning of the local and broader landscape. The area is traversed by numerous footpaths, while old building rubble was also found to be present at one specific location along the proposed pipeline route.

The provincially protected species *Helichrysum sp.* was merely found to be sparsely present along the proposed pipeline route. No Red Data Listed-, nationally- or other provincially protected plant species or any other species of conservational significance, were found to be present throughout the terrestrial grassland landscape, along the proposed pipeline route.

The assessment area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important bird species/nests or locally distinct habitats were observed throughout the terrestrial grassland landscape along the proposed pipeline route, during the site assessment or are necessarily expected to utilise the assessment area for breeding, foraging and/or persistence purposes. Only common local resident bird species were found to traverse the local area.

No conservationally significant or important faunal species or locally distinct faunal habitats were observed throughout the terrestrial grassland landscape along the proposed pipeline, during the site assessment. The local and broader landscape is subjected to continued anthropogenic activity and disturbance and it is therefore not anticipated that any conservationally significant or important faunal species would utilise the assessment area for breeding, foraging and/or persistence purposes. The central portion of the proposed pipeline route is however extensively utilised by small common local resident burrowing rodents, as refuge and for breeding/persistence purposes. The mobility of such faunal species allows for individuals to simply leave an area where disturbance is taking place and relocate to surrounding similar, adequate areas.

Although the assessment area does not fall within any Important Bird Areas (IBA), the aquatic habitat associated with the main active streamflow channel of the watercourse, provides significant refuge and locally distinct habitat for various common and habitat-specific waterbird species, for breeding, foraging and/or persistence purposes. No conservationally significant or important bird species/nests were however observed during the site assessment. Only common local resident waterbird species were observed.

The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Terrestrial and aquatic alien invasive species establishment

The legally declared alien invasive species *Solanum elaeagnifolium* (Category 1b) was found to be moderately infested all along the central portion of the proposed pipeline route, while the legally declared alien invasive species *Verbena bonariensis* (Category 1b) was found to be sparsely infested along the short initial southern portion of the proposed pipeline route. Individuals of the legally declared alien invasives species *Argemone mexicana* and *Cirsium vulgare* (both Category 1b) were also found to be sparsely present, only at the one specific location along the proposed pipeline route, associated with the old building rubble. A single isolated patch of the legally declared alien invasive tree species *Pinus pinaster* (Category 1b) was found to be present at the final northern portion of the proposed pipeline route.

The proposed pipeline route as well as the local and broader surrounding landscape, could also potentially be prone to significant alien invasive species establishment due to surface disturbance and vegetation clearance caused by construction activities. The aquatic habitat of the single significant fourth-order seasonal watercourse which will be traversed by the proposed pipeline route, could further also potentially act as a significant transport/distribution vector for numerous terrestrial and aquatic invasive species, into the broader region.

The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Surface material erosion

The localised catchment surrounding the assessment area, mainly drains towards the east. The majority of the proposed pipeline route constitutes a slightly sloping landscape.

The proposed pipeline route could therefore potentially be prone to slight surface soil erosion, due to the loosening of materials and clearance of vegetation caused by construction activities, which usually binds surface material.

The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Dust generation and emissions

The construction activities associated with the proposed development, could potentially result in slight fugitive dust emissions, due to vegetation clearance and movement of machinery and equipment. Generated dust could spread into the local and broader surrounding landscape and potentially contaminate the single significant fourth-order seasonal watercourse, which will be traversed by the proposed pipeline route.

The significance of this potential impact will be low.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Impeding and contamination of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater flow channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area

The assessment area falls within the D22H quaternary surface water catchment- and drainage area. The localised catchment surrounding the assessment area, mainly drains towards the east. The proposed pipeline route will traverse a single significant fourth-order seasonal watercourse at the final northern portion of the route. Adequate watercourse crossing infrastructure will however be constructed at this single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.

This watercourse flows in an easterly direction and further joins a number of other significant watercourses, which eventually all discharge into the Caledon River, situated approximately 6.2 km east of the assessment area. The watercourse therefore forms an important part of the local and broader quaternary surface water catchment- and drainage area towards the east. Significant localised contamination of the watercourse is however evident, in the form of continued raw sewage leaks and discharges from the local township.

The initial southern portion of the proposed pipeline route will also traverse two small artificially/anthropogenically constructed stormwater flow channels. Due to the lack of continuous water flow through the local area and the artificial/anthropogenic nature of these flow channels, they do not possess any significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape. It is not anticipated that the proposed development should significantly impede or impact on the flow regimes of these channels.

The activities associated with the construction phase could potentially result in impeding of natural surface water flow towards the significant watercourse and two stormwater flow channels, within the associated local and broader quaternary surface water catchment- and drainage area, due to artificial obstruction of flow during rainfall events. The construction phase could potentially also result in contamination of natural surface water flow within the associated local and broader quaternary surface water catchment- and drainage area, due to hydrocarbon and/or other chemical spills by construction machinery and equipment.

The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

9.2. Operational Phase

Once the construction phase of the proposed development has been completed, the subsequent operational phase of the proposed pipeline should not result in any significant additional potential ecological impacts, apart from the potential long-term ecological impacts discussed under heading 9.1. Terrestrial and aquatic alien invasive species establishment as well as impeding and contamination of the flow regime of the single significant fourth-order seasonal watercourse, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area, were identified and addressed for the construction phase of the proposed development, as significant potential long-term ecological impacts.

A number of potential ecological impacts identified for the construction phase, could however change in nature and increase in significance during the operational phase and will continue throughout the entire operational phase and lifespan of the proposed development. The following continued potential ecological impacts could take place during the operational phase:

Continued impeding of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater flow channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area

The established water pipeline and associated watercourse crossing infrastructure could potentially continuously impede on natural surface water flow at the single significant watercourse crossing and the two stormwater flow channels, within the associated local and broader quaternary surface water catchment- and drainage area, due to continued artificial obstruction of flow during rainfall events.

The significance of this potential impact will be medium.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Continued raw sewage contamination/eutrophication of the single significant fourth-order seasonal watercourse, which will be traversed by the proposed pipeline route

The single significant fourth-order seasonal watercourse forms an important part of the local and broader quaternary surface water catchment- and drainage area towards the east. Significant localised contamination of the watercourse is however evident, in the form of continued raw sewage leaks and discharges from the local township.

The significance of this potential impact will be medium-high.

Mitigation measures to reduce impacts are recommended under heading 9.4.

9.3. Cumulative Impacts

The proposed potable water pipeline route is approximately 1.37 km in length. The proposed pipeline will tie into existing connection points at both ends of the pipeline route. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width. The mechanical clearance associated with the trenching and excavation for the proposed pipeline, should in all probability merely transform the existing surface vegetation within this narrow linear section.

Extensive existing mixed residential, commercial and industrial transformation of the town and associated township, is evident throughout the local landscape surrounding the assessment area. Significant portions of the broader landscape surrounding the assessment area, has also mainly been transformed by extensive agricultural cultivation activities. The local and broader surrounding landscape is therefore mainly in a significantly degraded and transformed state.

The entire proposed pipeline route is in a moderate to highly disturbed and degraded state. This is mainly as a result of continued anthropogenic management impacts and defoliation activities, in the form of uncontrolled overgrazing by livestock from the local community, constant commuting through the area as well as regular burning of the local and broader landscape. The area is traversed by numerous footpaths, while old building rubble was also found to be present at one specific location along the proposed pipeline route.

The terrestrial grassland landscape along the proposed pipeline route as well as throughout the local surrounding landscape, is therefore not reminiscent of the natural climactic state of the relevant Vulnerable Eastern Free State Clay Grassland vegetation type (Gm 3), which reduces the conservational significance of the area.

The terrestrial grassland landscape along the proposed pipeline route, scored a low Ecological Importance and Sensitivity (EIS) and is not viewed as being of any conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem or the broader Vulnerable vegetation type.

The single significant watercourse crossing associated with the proposed pipeline route, scored a moderate Ecological Importance and Sensitivity (EIS) value and is viewed as being of low to moderate conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader Vulnerable vegetation type and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Terrestrial and aquatic alien invasive species establishment as well as impeding and contamination of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater low channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area, were identified and addressed for the construction phase of the proposed development, as significant potential long-term ecological impacts.

Continued impeding of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater low channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area as well as continued raw sewage contamination of this single significant fourth-order seasonal watercourse, were identified and addressed for the operational phase of the proposed development, as significant potential long-term ecological impacts.

The potential long-term ecological impacts identified for the proposed development, could therefore potentially add moderate to moderately-high cumulative impact to existing negative impacts caused by the extensive transformation of the existing the town and associated township, throughout the local landscape surrounding the assessment area.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential cumulative ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will necessarily add any significant residual cumulative ecological impacts to the surrounding environment, if all recommended mitigation measures as per this ecological report are adequately implemented and managed, for both the construction and operational phases of the proposed development.

It is the opinion of the specialist that the proposed development of the potable water pipeline should be considered by the competent authority, for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report must however be adequately implemented and managed for both the construction and operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

9.4. Risk Ratings of Potential Ecological Impacts

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

9.4.1. Construction Phase

Table 5: Environmental Risk and Significance Ratings

| | Terrestrial Grassland associated with the Proposed Pipeline Route | Single Significant Watercourse Crossing associated with the Proposed Pipeline Route |
|--|---|--|
| Identified Environmental Impact | Transformation of vegetation within the assessment area associated with the Eastern Free State Clay Grassland vegetation type (Gm 3) | |
| Magnitude of Negative or Positive Impact | Very low (2) | - |
| Duration of Negative or Positive Impact | Long term (4) | - |
| Extent of Positive or Negative Impact | Local (2) | - |
| Irreplaceability of Natural Resources being impacted upon | Low (2) | - |
| Reversibility of Impact | Moderate (3) | - |
| Probability of Impact Occurrence | Medium (3) | - |
| Cumulative Impact Rating prior to mitigation | Low | - |
| Environmental Significance Score and Rating prior to mitigation | Low (39) | - |

Mitigation Measures to be implemented

The proposed development construction footprint must be kept as small as practicably possible/feasible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the broader undeveloped landscape surrounding the proposed development footprint, may take place.

Vegetation clearance must be restricted to the narrow linear physical impact footprint section of the proposed pipeline route, as far as practicably possible/feasible.

No site construction basecamps may be established within the local undeveloped landscape, surrounding the proposed development footprint.

Adequately cordon off the proposed development construction footprint area and ensure that no construction activities, -machinery or -equipment operate or impact within the local undeveloped landscape, outside the cordoned off area.

Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed development construction footprint area and to ensure environmentally responsible construction practices and activities.

Existing roads and farm tracks in close proximity to the proposed development construction footprint area, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented within the local undeveloped landscape, surrounding the proposed development footprint.

Disturbed areas within and immediately surrounding the proposed development footprint area, must be adequately rehabilitated concurrently with the construction activities. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

| | | |
|--|--|--|
| | It is recommended that a sufficient grazing management plan and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of the local and broader surrounding undeveloped areas and to attempt to improve/restore the ecological condition of the relevant vegetation type, over time. | |
| Cumulative Impact Rating after mitigation implementation | Low | - |
| Environmental Significance Score and Rating after mitigation implementation | Low (12) | - |
| | | |
| | Terrestrial Grassland associated with the Proposed Pipeline Route | Single Significant Watercourse Crossing associated with the Proposed Pipeline Route |
| Identified Environmental Impact | Destruction of-/damage to Red Data Listed, nationally or provincially protected species individuals/habitats associated with the assessment area | |
| Magnitude of Negative or Positive Impact | Very low (2) | Very low (2) |
| Duration of Negative or Positive Impact | Long term (4) | Long term (4) |
| Extent of Positive or Negative Impact | Local (2) | Local (2) |

| | | |
|--|---|--------------|
| Irreplaceability of Natural Resources being impacted upon | Low (2) | Moderate (3) |
| Reversibility of Impact | Low (4) | Low (4) |
| Probability of Impact Occurrence | Medium (3) | Low (2) |
| Cumulative Impact Rating prior to mitigation | Low | Low |
| Environmental Significance Score and Rating prior to mitigation | Low (42) | Low (30) |
| Mitigation Measures to be implemented | <p>A Provincial Flora Permit has to be obtained from the Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA), for the potential removal/destruction of any provincially protected plant species individuals, prior to the commencement of any construction activities.</p> <p>Immediate steps must be taken by the Mantsopa Local Municipality to locate and remediate the sources of the continued raw sewage contamination of the significant fourth-order seasonal watercourse.</p> <p>Adequate watercourse crossing infrastructure will be constructed at the single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.</p> <p>It is recommended that no clearance of aquatic vegetation or habitat, takes place during the construction of the proposed watercourse crossing infrastructure, if practicably possible/feasible.</p> | |

Disturbed areas within and immediately surrounding the proposed development footprint area associated with the watercourse crossing, must be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to attempt to maintain the ecological functionality and -integrity of the aquatic habitat, associated with the watercourse.

The proposed development construction footprint must be kept as small as practicably possible/feasible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the broader undeveloped landscape surrounding the proposed development footprint, may take place.

Vegetation clearance must be restricted to the narrow linear physical impact footprint section of the proposed pipeline route, as far as practicably possible/feasible.

No site construction basecamps may be established within the local undeveloped landscape, surrounding the proposed development footprint.

Adequately cordon off the proposed development construction footprint area and ensure that no construction activities, -machinery or -equipment operate or impact within the local undeveloped landscape, outside the cordoned off area.

Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed development construction footprint area and to ensure environmentally responsible construction practices and activities.

| | | |
|--|--|----------|
| | <p>Existing roads and farm tracks in close proximity to the proposed development construction footprint area, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented within the local undeveloped landscape, surrounding the proposed development footprint.</p> <p>Disturbed areas within and immediately surrounding the proposed development footprint area, must be adequately rehabilitated concurrently with the construction activities. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>It is recommended that a sufficient grazing management plan and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of the local and broader surrounding undeveloped areas and to attempt to improve/restore the ecological condition of the relevant vegetation type, over time.</p> | |
| Cumulative Impact Rating after mitigation implementation | Low | Low |
| Environmental Significance Score and Rating after mitigation implementation | Low (26) | Low (14) |

| | Terrestrial Grassland associated with the Proposed Pipeline Route | Single Significant Watercourse Crossing associated with the Proposed Pipeline Route |
|--|--|--|
| Identified Environmental Impact | Terrestrial and aquatic alien invasive species establishment | |
| Magnitude of Negative or Positive Impact | Very low (2) | Low (4) |
| Duration of Negative or Positive Impact | Long term (4) | Long term (4) |
| Extent of Positive or Negative Impact | Local (2) | Regional (3) |
| Irreplaceability of Natural Resources being impacted upon | Low (2) | Moderate (3) |
| Reversibility of Impact | High (2) | Moderate (3) |
| Probability of Impact Occurrence | Medium (3) | High (4) |
| Cumulative Impact Rating prior to mitigation | Low | Medium |
| Environmental Significance Score and Rating prior to mitigation | Low (36) | Medium (68) |

Mitigation Measures to be implemented

It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the assessment area, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading.

Implement an adequate Alien Invasive Species Management and Prevention Plan during the construction and operational phases. Such a Management Plan must be compiled by a suitably qualified and experienced ecologist.

Immediate steps must be taken by the Mantsopa Local Municipality to locate and remediate the sources of the continued raw sewage contamination of the significant fourth-order seasonal watercourse.

Adequate watercourse crossing infrastructure will be constructed at the single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.

It is recommended that no clearance of aquatic vegetation or habitat, takes place during the construction of the proposed watercourse crossing infrastructure, if practicably possible/feasible.

Disturbed areas within and immediately surrounding the proposed development footprint area associated with the watercourse crossing, must be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to attempt to maintain the ecological functionality and -integrity of the aquatic habitat, associated with the watercourse.

| | | |
|---|--|-----------------|
| | <p>Disturbed areas within and immediately surrounding the proposed development footprint area associated with the two stormwater flow channel crossings, must however be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to allow for continued water flow through these channels.</p> <p>Disturbed areas within and immediately surrounding the proposed development footprint area, must be adequately rehabilitated concurrently with the construction activities. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>It is recommended that a sufficient grazing management plan and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of the local and broader surrounding undeveloped areas and to attempt to improve/restore the ecological condition of the relevant vegetation type, over time.</p> | |
| <p>Cumulative Impact Rating after mitigation implementation</p> | <p>Low</p> | <p>Low</p> |
| <p>Environmental Significance Score and Rating after mitigation implementation</p> | <p>Low (11)</p> | <p>Low (26)</p> |

| | Terrestrial Grassland associated with the Proposed Pipeline Route | Single Significant Watercourse Crossing associated with the Proposed Pipeline Route |
|--|---|---|
| Identified Environmental Impact | Surface material erosion | |
| Magnitude of Negative or Positive Impact | Very low (2) | Very low (2) |
| Duration of Negative or Positive Impact | Long term (4) | Long term (4) |
| Extent of Positive or Negative Impact | Local (2) | Local (2) |
| Irreplaceability of Natural Resources being impacted upon | Low (2) | Moderate (3) |
| Reversibility of Impact | High (2) | High (2) |
| Probability of Impact Occurrence | Low (2) | Low (2) |
| Cumulative Impact Rating prior to mitigation | Low | Low |
| Environmental Significance Score and Rating prior to mitigation | Low (24) | Low (26) |

Mitigation Measures to be implemented

Implement an adequate Stormwater and Erosion Management Plan during the construction and operational phases of the proposed development. This must be done to sufficiently manage storm water runoff and clean/dirty water separation, in order to prevent any significant soil erosion in and around the assessment area.

Vegetation clearance must be restricted to the narrow linear physical impact footprint section of the proposed pipeline route, as far as practicably possible/feasible.

Adequate watercourse crossing infrastructure will be constructed at the single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.

It is recommended that no clearance of aquatic vegetation or habitat, takes place during the construction of the proposed watercourse crossing infrastructure, if practicably possible/feasible.

Disturbed areas within and immediately surrounding the proposed development footprint area associated with the watercourse crossing, must be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to attempt to maintain the ecological functionality and -integrity of the aquatic habitat, associated with the watercourse.

Disturbed areas within and immediately surrounding the proposed development footprint area associated with the two stormwater flow channel crossings, must however be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to allow for continued water flow through these channels.

| | | |
|--|---|--|
| | <p>Disturbed areas within and immediately surrounding the proposed development footprint area, must be adequately rehabilitated concurrently with the construction activities. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>It is recommended that a sufficient grazing management plan and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of the local and broader surrounding undeveloped areas and to attempt to improve/restore the ecological condition of the relevant vegetation type, over time.</p> | |
| Cumulative Impact Rating after mitigation implementation | Low | Low |
| Environmental Significance Score and Rating after mitigation implementation | Low (11) | Low (12) |
| | | |
| | Terrestrial Grassland associated with the Proposed Pipeline Route | Single Significant Watercourse Crossing associated with the Proposed Pipeline Route |
| Identified Environmental Impact | Dust generation and emissions | |
| Magnitude of Negative or Positive Impact | Very low (2) | Low (4) |
| Duration of Negative or Positive Impact | Short term (2) | Short term (2) |

| | | |
|--|---|--------------|
| Extent of Positive or Negative Impact | Local (2) | Regional (3) |
| Irreplaceability of Natural Resources being impacted upon | Low (2) | Moderate (3) |
| Reversibility of Impact | High (2) | Moderate (3) |
| Probability of Impact Occurrence | Low (2) | Medium (3) |
| Cumulative Impact Rating prior to mitigation | Low | Low |
| Environmental Significance Score and Rating prior to mitigation | Low (20) | Low (45) |
| Mitigation Measures to be implemented | <p>Implement suitable dust management and prevention measures during the construction phase of the proposed development.</p> <p>Vegetation clearance must be restricted to the narrow linear physical impact footprint section of the proposed pipeline route, as far as practicably possible/feasible.</p> <p>It is recommended that no clearance of aquatic vegetation or habitat, takes place during the construction of the proposed watercourse crossing infrastructure, if practicably possible/feasible.</p> | |

| | | |
|--|---|----------|
| | <p>Construction areas and –roads to be sufficiently wetted down during the construction phase in order to prevent significant fugitive dust emissions.</p> <p>Adequate operational procedures for machinery and equipment must be developed to strictly govern and restrict movement of machinery, in order to avoid unnecessary fugitive dust emissions and ensure environmentally responsible construction practices and activities.</p> <p>Disturbed areas within and immediately surrounding the proposed development footprint area associated with the watercourse crossing, must be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to attempt to maintain the ecological functionality and -integrity of the aquatic habitat, associated with the watercourse.</p> <p>Disturbed areas within and immediately surrounding the proposed development footprint area associated with the two stormwater flow channel crossings, must however be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to allow for continued water flow through these channels.</p> <p>Disturbed areas within and immediately surrounding the proposed development footprint area, must be adequately rehabilitated concurrently with the construction activities. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> | |
| Cumulative Impact Rating after mitigation implementation | Low | Low |
| Environmental Significance Score and Rating after mitigation implementation | Low (9) | Low (11) |

| | Terrestrial Grassland associated with the Proposed Pipeline Route | Single Significant Watercourse Crossing associated with the Proposed Pipeline Route |
|--|--|--|
| Identified Environmental Impact | Impeding and contamination of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater flow channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area | |
| Magnitude of Negative or Positive Impact | Very low (2) | Low (4) |
| Duration of Negative or Positive Impact | Short term (2) | Short term (2) |
| Extent of Positive or Negative Impact | Local (2) | Regional (3) |
| Irreplaceability of Natural Resources being impacted upon | Low (2) | Moderate (3) |
| Reversibility of Impact | Moderate (3) | Low (4) |
| Probability of Impact Occurrence | Low (2) | High (4) |
| Cumulative Impact Rating prior to mitigation | Low | Medium |
| Environmental Significance Score and Rating prior to mitigation | Low (22) | Medium (64) |

Mitigation Measures to be implemented

Implement an adequate Stormwater and Erosion Management Plan during the construction and operational phases of the proposed development. This must be done to sufficiently manage storm water runoff and clean/dirty water separation within the local and broader quaternary surface water catchment- and drainage area, in order to attempt to maintain the ecological functionality and -integrity of the catchment.

Immediate steps must be taken by the Mantsopa Local Municipality to locate and remediate the sources of the continued raw sewage contamination of the significant fourth-order seasonal watercourse.

Adequate watercourse crossing infrastructure will be constructed at the single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.

It is recommended that no clearance of aquatic vegetation or habitat, takes place during the construction of the proposed watercourse crossing infrastructure, if practicably possible/feasible.

Disturbed areas within and immediately surrounding the proposed development footprint area associated with the watercourse crossing, must also be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to attempt to maintain the ecological functionality and -integrity of the aquatic habitat, associated with the watercourse.

Disturbed areas within and immediately surrounding the proposed development footprint area associated with the two stormwater flow channel crossings, must however be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to allow for continued water flow through these channels.

| | | |
|--|--|----------|
| | <p>If hydrocarbons or other chemicals are to be stored on site during the construction phase, the storage areas must be situated as far away as practicably/feasibly possible from the significant fourth-order seasonal watercourse.</p> <p>Hydrocarbon and other chemical storage areas must be adequately banded in order to be able to contain a minimum of 150 % of the capacity of storage tanks/units.</p> <p>Adequate hydrocarbon and other chemical storage, handling, usage and spillage clean-up procedures must be developed and all relevant construction personnel must be sufficiently trained on- and apply these procedures during the entire construction phase.</p> <p>Spill kits must be readily available on the construction site. All employees must be adequately trained on the correct procedure and use of the spill kits.</p> <p>A Water Use License Application (WULA) must be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed development at the single significant watercourse crossing, in accordance with the National Water Act (Act 36 of 1998).</p> | |
| Cumulative Impact Rating after mitigation implementation | Low | Low |
| Environmental Significance Score and Rating after mitigation implementation | Low (10) | Low (24) |

9.4.2. Operational Phase

Table 6: Environmental Risk and Significance Ratings

| | Terrestrial Grassland associated with the Proposed Pipeline Route | Single Significant Watercourse Crossing associated with the Proposed Pipeline Route |
|--|--|--|
| Identified Environmental Impact | Continued impeding of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater flow channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area | |
| Magnitude of Negative or Positive Impact | - | Low (4) |
| Duration of Negative or Positive Impact | - | Medium term (3) |
| Extent of Positive or Negative Impact | - | Regional (3) |
| Irreplaceability of Natural Resources being impacted upon | - | Moderate (3) |
| Reversibility of Impact | - | Low (4) |
| Probability of Impact Occurrence | - | High (4) |
| Cumulative Impact Rating prior to mitigation | - | Medium |

| | | |
|--|--|-------------|
| Environmental Significance Score and Rating prior to mitigation | - | Medium (68) |
| Mitigation Measures to be implemented | <p>All the recommended mitigation measures for the construction phase must be adequately implemented and managed.</p> <p>If all the recommended mitigation measures for the construction phase are adequately implemented and managed, it should prove sufficient in preventing any continued impeding of- or significant impact on the local and broader quaternary surface water catchment- and drainage area.</p> <p>Implement an adequate Stormwater and Erosion Management Plan during the construction and operational phases of the proposed development. This must be done to sufficiently manage storm water runoff and clean/dirty water separation within the local and broader quaternary surface water catchment- and drainage area, in order to attempt to maintain the ecological functionality and -integrity of the catchment.</p> <p>Adequate watercourse crossing infrastructure will be constructed at the single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.</p> | |
| Cumulative Impact Rating after mitigation implementation | - | Low |
| Environmental Significance Score and Rating after mitigation implementation | - | Low (13) |

| | Terrestrial Grassland associated with the Proposed Pipeline Route | Single Significant Watercourse Crossing associated with the Proposed Pipeline Route |
|--|--|---|
| Identified Environmental Impact | Continued raw sewage contamination/eutrophication of the single significant fourth-order seasonal watercourse, which will be traversed by the proposed pipeline route | |
| Magnitude of Negative or Positive Impact | - | Medium (6) |
| Duration of Negative or Positive Impact | - | Long Term (4) |
| Extent of Positive or Negative Impact | - | Regional (3) |
| Irreplaceability of Natural Resources being impacted upon | - | Moderate (3) |
| Reversibility of Impact | - | Low (4) |
| Probability of Impact Occurrence | - | High (4) |
| Cumulative Impact Rating prior to mitigation | - | Medium-High |
| Environmental Significance Score and Rating prior to mitigation | - | Medium-High (80) |

| | | |
|--|--|----------|
| Mitigation Measures to be implemented | Immediate steps must be taken by the Mantsopa Local Municipality to locate and remediate the sources of the continued raw sewage contamination of the significant fourth-order seasonal watercourse. | |
| Cumulative Impact Rating after mitigation implementation | - | Low |
| Environmental Significance Score and Rating after mitigation implementation | - | Low (32) |

10. Summary and Conclusion

Terrestrial Grassland

According to SANBI (2006-2019), the entire assessment area falls within the Eastern Free State Clay Grassland vegetation type (Gm 3), which is characterised by flat to slightly undulating and undulating/rolling closed grasslands with streams and rivers that drain the foothills of the Drakensberg. This vegetation type is classified as Vulnerable (SANBI, 2006-2019).

The proposed potable water pipeline route is approximately 1.37 km in length. The proposed pipeline will tie into existing connection points at both ends of the pipeline route. The entire proposed pipeline route will merely constitute a narrow linear physical impact footprint section of approximately ≤ 5 m in width. The mechanical clearance associated with the trenching and excavation for the proposed pipeline, should in all probability merely transform the existing surface vegetation within this narrow linear section.

Extensive existing mixed residential, commercial and industrial transformation of the town and associated township, is evident throughout the local landscape surrounding the assessment area. Significant portions of the broader landscape surrounding the assessment area, has also mainly been transformed by extensive agricultural cultivation activities. The local and broader surrounding landscape is therefore mainly in a significantly degraded and transformed state.

The entire proposed pipeline route is in a moderate to highly disturbed and degraded state. This is mainly as a result of continued anthropogenic management impacts and defoliation activities, in the form of uncontrolled overgrazing by livestock from the local community, constant commuting through the area as well as regular burning of the local and broader landscape. The area is traversed by numerous footpaths, while old building rubble was also found to be present at one specific location along the proposed pipeline route.

The terrestrial grassland landscape along the proposed pipeline route as well as throughout the local surrounding landscape, is therefore not reminiscent of the natural climactic state of the relevant Vulnerable Eastern Free State Clay Grassland vegetation type (Gm 3), which reduces the conservational significance of the area. **It is therefore recommended that a sufficient grazing management plan and practices must be implemented for livestock of the local community in order to prevent continued significant overgrazing of the local and broader surrounding undeveloped areas and to attempt to improve/restore the ecological condition of the relevant vegetation type, over time.**

The provincially protected species *Helichrysum sp.* was merely found to be sparsely present along the proposed pipeline route. **A Provincial Flora Permit has to be obtained from the Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA), for the potential removal/destruction of any provincially protected plant species individuals, prior to the commencement of any construction activities.**

No Red Data Listed-, nationally- or other provincially protected plant species or any other species of conservational significance, were found to be present throughout the terrestrial grassland landscape, along the proposed pipeline route.

The assessment area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important bird species/nests or locally distinct habitats were observed throughout the terrestrial grassland landscape along the proposed pipeline route, during the site assessment or are necessarily expected to utilise the assessment area for breeding, foraging and/or persistence purposes. Only common local resident bird species were found to traverse the local area.

No conservationally significant or important faunal species or locally distinct faunal habitats were observed throughout the terrestrial grassland landscape along the proposed pipeline, during the site assessment. The local and broader landscape is subjected to continued anthropogenic activity and disturbance and it is therefore not anticipated that any conservationally significant or important faunal species would utilise the assessment area for breeding, foraging and/or persistence purposes. The central portion of the proposed pipeline route is however extensively utilised by small common local resident burrowing rodents, as refuge and for breeding/persistence purposes. The mobility of such faunal species allows for individuals to simply leave an area where disturbance is taking place and relocate to surrounding similar, adequate areas.

Watercourse Crossings

The assessment area falls within the D22H quaternary surface water catchment- and drainage area. The localised catchment surrounding the assessment area, mainly drains towards the east. The proposed pipeline route will traverse a single significant fourth-order seasonal watercourse at the final northern portion of the route. Adequate watercourse crossing infrastructure will however be constructed at this single significant watercourse crossing. It is therefore not anticipated that the proposed development should significantly impede or impact on the flow regime of the watercourse.

This watercourse flows in an easterly direction and further joins a number of other significant watercourses, which eventually all discharge into the Caledon River, situated approximately 6.2 km east of the assessment area. The watercourse therefore forms an important part of the local and broader quaternary surface water catchment- and drainage area towards the east. Significant localised contamination of the watercourse is however evident, in the form of continued raw sewage leaks and discharges from the local township. **Immediate steps must be taken by the Mantsopa Local Municipality to locate and remediate the sources of this contamination.**

Although the assessment area does not fall within any Important Bird Areas (IBA), the aquatic habitat associated with the main active streamflow channel of the watercourse, provides significant refuge and locally distinct habitat for various common and habitat-specific waterbird species, for breeding, foraging and/or persistence purposes. No conservationally significant or important bird species/nests were however observed during the site assessment. Only common local resident waterbird species were observed. **It is however recommended that no clearance of aquatic vegetation or habitat, takes place during the construction of the proposed watercourse crossing infrastructure, if practicably possible/feasible. Disturbed areas within and immediately surrounding the proposed development footprint area associated with the watercourse crossing, must also be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to attempt to maintain the ecological functionality and -integrity of the aquatic habitat, associated with the watercourse.**

The initial southern portion of the proposed pipeline route will also traverse two small artificially/anthropogenically constructed stormwater flow channels. Due to the lack of continuous water flow through the local area and the artificial/anthropogenic nature of these flow channels, they do not possess any significant variations in vegetation species composition or -structure, relative to the surrounding terrestrial landscape.

It is not anticipated that the proposed development should significantly impede or impact on the flow regimes of these channels. **Disturbed areas within and immediately surrounding the proposed development footprint area associated with the two stormwater flow channel crossings, must however be adequately rehabilitated, as soon as practicably possible/feasible after construction. This must be done in order to allow for continued water flow through these channels.**

Conclusion

The terrestrial grassland landscape along the proposed pipeline route, scored a low Ecological Importance and Sensitivity (EIS) and is not viewed as being of any conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem or the broader Vulnerable vegetation type.

The single significant watercourse crossing associated with the proposed pipeline route, scored a moderate Ecological Importance and Sensitivity (EIS) value and is viewed as being of low to moderate conversational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader Vulnerable vegetation type and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Terrestrial and aquatic alien invasive species establishment as well as impeding and contamination of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater low channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area, were identified and addressed for the construction phase of the proposed development, as significant potential long-term ecological impacts.

Continued impeding of the flow regime of the single significant fourth-order seasonal watercourse and the two stormwater low channels, which will be traversed by the proposed pipeline route, within the associated local and broader quaternary surface water catchment- and drainage area as well as continued raw sewage contamination of this single significant fourth-order seasonal watercourse, were identified and addressed for the operational phase of the proposed development, as significant potential long-term ecological impacts.

The potential long-term ecological impacts identified for the proposed development, could therefore potentially add moderate to moderately-high cumulative impact to existing negative impacts caused by the extensive transformation of the existing the town and associated township, throughout the local landscape surrounding the assessment area.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will necessarily add any significant residual cumulative ecological impacts to the surrounding environment, if all recommended mitigation measures as per this ecological report are adequately implemented and managed, for both the construction and operational phases of the proposed development.

It is the opinion of the specialist that the proposed development of the potable water pipeline should be considered by the competent authority, for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report must however be adequately implemented and managed for both the construction and operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

11. References

Collins, N.B. 2018. Free State Province Biodiversity Plan: Technical Report v1.0. Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs. Internal Report.

Conservation of Agricultural Resources Act (Act 43 of 1983)

Free State Nature Conservation Ordinance (No 8 of 1969)

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Van Oudtshoorn, F. 2004. Gids tot Grasse van SuidAfrika. 2nd Ed. Briza Publikasies.

www.climate-data.org

12. Details of the Specialist

Adriaan Johannes Hendrikus Lamprecht (*Pr.Sci.Nat*)

M.Env.Sci. Ecological remediation and sustainable utilisation (NWU: Potchefstroom)

South African Council for Natural Scientific Professions (SACNASP): Professional Ecological Scientist
(No 115601)

EcoFocus Consulting (Pty) Ltd

Physical Address: Edenglen number 7
 Waterberg Street
 Langenhovenpark
 Bloemfontein, 9330

Mobile Phone: 072 230 9598

Email Address: ajhlamprecht@gmail.com

Abbreviated Curriculum Vitae

Qualifications

- M.Env.Sci Ecological Remediation and Sustainable Utilisation/Vegetation Ecology
 - 2010 - North West University Potchefstroom
- B.Sc Botany and Zoology (Cum Laude)
 - 2008 - North West University Potchefstroom

Accredited courses completed

- Implementing Environmental Management Systems ISO 14001
 - 2011 - North West University Potchefstroom
- Environmental Law for Environmental Managers
 - 2011 - North West University Potchefstroom
- SASS 5 Aquatic Biomonitoring Training Course
 - 2017 – GroundTruth Consulting

Professional registrations

- South African Council for Natural Scientific Professions (**SACNASP**)
 - Professional Ecological Scientist Registration number 115601
- International Association for Impact Assessment (**IAIA**)
 - Registration number 5232
- South African Green Industries Council (**SAGIC**) Invasive Species training
 - Registration number 2405/2459

Employment and Experience Background

Upon completion of his studies, Rikus started his career in 2011 as an **Environmental Professional in Training (PIT) at Anglo American Thermal Coal: Environmental Services**. He received environmental training and practical implementation experience in all environmental facets of the mining industry with the focus on: Environmental rehabilitation, land management (biodiversity and invasive species eradication), waste & water-, air quality-, game reserve-, environmental management and legislation, as well as corporate reporting. He was also appointed as the Biodiversity management custodian at Anglo American Thermal Coal collieries.

He was subsequently employed by **Fraser Alexander Tailings from October 2011 to the end of November 2015 as an Environmental Contracts Manager**, where he was responsible for the technical and operational management of all Fraser Alexander Tailings' mining environmental rehabilitation work. He was responsible for all facets of project management, as well as implementation of rehabilitation and environmental strategies, by planning activities, organising physical, financial and human resources, delegating task responsibilities, leading people, controlling risks and providing technical support.

He conducted a significant amount of quantitative and qualitative ecological vegetation monitoring during his employment period with the company. Such monitoring mainly included environmentally rehabilitated mining areas in the open-cast coal-, gold-, platinum- and chrome mining industries situated in the Free State, Gauteng, Mpumalanga, North West and Limpopo Provinces. He was involved with analysis, processing and interpretation of environmental monitoring data and compilation of high quality technical/scientific environmental monitoring reports for clients. He was subsequently further involved with providing adequate ecological management and maintenance recommendations for rehabilitated areas. He also provided technical/scientific environmental rehabilitation support to mining clients, with regards to sufficient soil preparation and amelioration, grassing processes, as well as grass species mixtures and ratios.

He was then employed by **Enviroworks Consulting from January 2016 to the end of May 2017 as a Senior Ecological Specialist** where he was responsible for virtually all Ecological, Aquatic and Wetland specialist assessments and reporting related to Environmental Impact Assessment (EIA) and Basic Assessment (BA) projects. He also completed numerous EIA and BA projects as the main project Environmental Assessment Practitioner (EAP).

Rikus then subsequently established the company EcoFocus Consulting (Pty) Ltd at the end of May 2017, which provides high quality professional environmental and ecological specialist services and solutions to the industrial development-, construction-, mining-, agricultural and other sectors.

He possesses significant qualifications, vast knowledge, skills and practical experience in the specialist field of ecological and environmental management. This, coupled with his disciplined, determined and goal-driven approach, as well as his high level of personal standards, ensure high quality, timely and outcomes-based outputs and service delivery relating to any project.

Ecological & Wetland Specialist Assessment & Report Completion for the last two years

2021

- Proposed 126.77 ha Orania Residential development project in Orania, Northern Cape Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Tweefontein no 3344, outside Newcastle, KwaZulu-Natal Province.
- Proposed 245.5 ha Kgatelopele Local Municipality Residential development project in Danielskuil, Northern Cape Province.
- Relocation of provincially protected plant species individuals for the proposed 30 ha Portion 30 of the Farm Lilyvale no 2313 Residential development project in Bloemfontein, Free State Province.
- Proposed 0.5 ha Mduwelanga Projects Agricultural development project outside Paul Roux, Free State Province.
- Proposed Moledi Gorge Watercourse Weir NEMA Section 24G development outside Derby, North West Province.
- Revision of a proposed 135 ha Farm Zulani no 167 agricultural development project outside Douglas, Northern Cape Province.
- Grazing and Invasive Species Management Plan for the Farm Kuilenburg no 241, outside Reitz, Free State Province.

- Revision of the Biodiversity Offset Feasibility Report for a proposed 385 ha Idstone Farming agricultural development projects outside Douglas, Northern Cape Province.
- Erosion and Invasive Species Management Plan for the Farms Nebo A no 957, Tevrede no 1088, Sarona no 1089 & Uitkyk no 1119, outside Reitz, Free State Province.
- Proposed 267.2 ha Tswaing Local Municipality residential development project in Ottosdal, North West Province.
- Proposed 10.2 ha PepsiCo Inc residential development project in Marchand, Northern Cape Province.
- Proposed 3.5 ha Itau Milling NEMA Section 24G Solar Power Development project in Bloemfontein, Free State Province.
- Grazing and Invasive Species Assessment for the Farm Brakfontein no 244, outside Verkykerskop, Free State Province.
- Wetland/watercourse Assessment for the proposed 250 ha Subsolar Energy Serurubele Solar Development project near Bloemfontein, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 250 ha Subsolar Energy Serurubele Solar Development project near Bloemfontein, Free State Province.
- Wetland/watercourse Assessment for the proposed 171 ha Subsolar Energy Sonneblom Solar Development project near Bloemfontein, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 171 ha Subsolar Energy Sonneblom Solar Development project near Bloemfontein, Free State Province.
- Proposed 13.6 ha Haldon Estate development project in Bloemfontein, Free State Province.
- Wetland/watercourse Assessment for the proposed 200 ha Subsolar Energy Delta Solar Development project near Bloemhof, North West Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 200 ha Subsolar Energy Delta Solar Development project near Bloemhof, North West Province.
- Water Use License Application (WULA) Specialist Opinion and Recommendation Letter for the proposed three Subsolar Energy Solar Development projects.
- Grazing and Invasive Species Follow-up Assessment for the Farm Waterval West no 653, outside Steynsrus, Free State Province.
- Proposed 25 ha Letsemeng Local Municipality landfill site development project in Luckhof, Free State Province.
- *Vachellia erioloba* Counting Report for the proposed 286 ha Subsolar Energy Gamma Solar Development project near Vryburg, North West Province.

- *Vachellia erioloba* Counting Report for the proposed 243 ha Subsolar Energy Khubu Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 224 ha Subsolar Energy Protea Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 262 ha Subsolar Energy Impala Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 265 ha Subsolar Energy Sonbesie Solar Development project near Vryburg, North West Province.
- Ecological site suitability assessments for three potential 583 ha, 300 ha and 227 ha Alt-e Developments Herbert Phase 2 Solar Power Facility development projects near Douglas, Northern Cape Province.
- Proposed 113 ha Danrika Boerdery Edms BPK Vineyard Development project near Prieska, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Ecological Rehabilitation and Alien Invasive Species Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Protected Plant Species Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Ecological Stormwater and Erosion Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- GIS Master Layout Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Klipfontein No 71 outside Lindley, Free State Province.
- Proposed 384.3 ha Prieska Power Reserve Solar Power Facility Development outside Prieska, Northern Cape Province.
- Aquatic Ecological Assessment for the proposed Farm Bullhoek Chicken Layer Houses and Evaporation Ponds Expansion near Swartruggens, North West Province.

- Water Use License Application (WULA) Risk Assessment for the proposed Farm Bullhoek Chicken Layer Houses and Evaporation Ponds Expansion near Swartruggens, North West Province.
- Grazing and Invasive Species Assessment for the Farm Kleine Fontein No 1160, outside Bergville, KwaZulu-Natal Province.

2020

- Proposed 120 ha Northern Cape Department Agriculture Hopetown Agricultural Development outside Hopetown, Northern Cape Province.
- Proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Rehabilitation and Alien Invasive Species Management Plan for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Protected Species Relocation Management Plan for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Stormwater Management Plan for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- GIS Master Layout Plan for a proposed 3.27 ha Lynette Brand Ritchie NEMA Section 24G river lodge development project in Ritchie, Northern Cape Province.
- Preliminary Ecological Specialist Findings and Opinion Letter for the proposed 294 ha Northern Cape Department Agriculture Bucklands Agricultural Development, Douglas Northern Cape Province.
- Proposed 1.58 km Dihlabeng Local Municipality Sewer Bridge and Pipeline Development, Paul Roux, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 1.58 km Dihlabeng Local Municipality Sewer Bridge and Pipeline Development, Paul Roux, Free State Province.
- Rehabilitation and Alien Invasive Species Management Plan for a proposed 1.58 km Dihlabeng Local Municipality Sewer Bridge and Pipeline Development, Paul Roux, Free State Province.
- Proposed 2064 ha Free State Strategic Solar Project Development outside Bethulie, Free State Province.

- Proposed 7.83 ha Carpe Diem Raisins NEMA Section 24G Evaporation Pond Development project outside Upington, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 7.83 ha Carpe Diem Raisins NEMA Section 24G Evaporation Pond Development project outside Upington, Northern Cape Province.
- Desktop Protected Species and Alien Invasive Species Management Plan for a proposed Northern Cape N 8 & N 10 highway maintenance project between Britstown, Prieska, Groblershoop and Upington, Northern Cape Province.
- Proposed 10.7 ha Dikgatlong Local Municipality NEMA Section 24G residential development in Barkly West, Northern Cape Province.
- Erosion and Rehabilitation Monitoring Report for the Farms Die Kranse no 1174 and De Rotsen no 52 outside Vrede, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Tweefontein no 3344, outside Newcastle, KwaZulu-Natal Province.
- Grazing and Invasive Species Management Plan for the Farm Malpha Noord no 1063, outside Senekal, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Mizpah no 706, outside Memel, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Welgelegen no 102, outside Clarens, Free State Province.
- Proposed 123 ha Slovo Park Residential development project in Brandfort, Free State Province.
- Proposed 2.43 ha Zeekoefontein Resort development project in Vaal Oewer, Gauteng Province.
- Grazing and Invasive Species Assessment for the Farm De Hoek no 1238, outside Bethlehem, Free State Province.
- Proposed 236 ha Northern Cape Department Agriculture Bucklands Agricultural Development outside Douglas, Northern Cape Province.
- Proposed 9.1 ha Motheo College Expansion NEMA Section 24G development in Bloemfontein, Free State Province.
- Proposed 84.7 ha Sol Plaatje Local Municipality Residential development project in Kimberley, Northern Cape Province.
- Proposed 201 ha Siyathemba Local Municipality Residential development project in Prieska, Northern Cape Province.

- Proposed 60.2 ha Siyancuma Local Municipality Residential development project in Douglas, Northern Cape Province.
- Proposed 58.9 ha Maremane Communal Property Association Residential development project in Maremane, Northern Cape Province.
- Proposed 15 ha Maketshemo Trading Filling Station and Truckstop development project in Winburg, Free State Province.
- Rehabilitation and Alien Invasive Species Management Plan for the Moledi Gorge Watercourse Weir decommissioning outside Derby, North West Province.
- GIS Master Layout Plan for a proposed 35 ha Gladium Boerdery Familietrust NEMA Section 24G agricultural development project outside Niekerkshoop, Northern Cape Province.
- Proposed 46.5 ha Siyathemba Local Municipality Residential development project in Niekerkshoop, Northern Cape Province.
- Proposed 475 m Setsoto Local Municipality Pipeline development and water treatment works upgrade project in Clocolan, Free State Province.

2019

- Water Use License Application (WULA) Risk Assessment for a proposed Kopanong Local Municipality Bridge Upgrading development project in Philippolis, Free State Province.
- Proposed 4.9 ha Royal Vision Developments Gravel Quarry development project outside Kroonstad, Free State Province.
- Proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Proposed 53 ha Arborlane Estates (Pty) Ltd agricultural development project outside Augrabies, Northern Cape Province.
- Proposed 42.7 ha Arborlane Estates (Pty) Ltd NEMA Section 24G agricultural development project outside Augrabies, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 53 ha Arborlane Estates (Pty) Ltd agricultural development project outside Augrabies, Northern Cape Province.
- Proposed 20.2 km Water Pipeline Development from Lindley to Arlington, Free State Province.
- Watercourse delineation and report for a proposed 5.36 ha Filling Station and Shopping Centre Development project in Thaba Nchu, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 20.2 km Water Pipeline Development from Lindley to Arlington, Free State Province.

- Grazing and Invasive Species Management Plan for the Farm Driefontein no 274, outside Ficksburg, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Rehabilitation and Alien Invasive Species Management Plan for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Protected Species Relocation Management Plan for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- GIS Master Layout Plan for a proposed 1262.7 ha Paul de Villiers NEMA Section 24G agricultural development project outside Douglas, Northern Cape Province.
- Proposed 535 ha Farms Bultfontein & Folmink agricultural development project outside Prieska, Northern Cape Province.
- Proposed 6.42 ha Phokwane Local Municipality Residential development project in Jan Kempdorp, Northern Cape Province.
- Stormwater Management Plan for a proposed 2 ha Chimoio Game Camp Lodging development project outside Kroonstad, Free State Province.
- GIS Master Layout Plan for a proposed 2 ha Chimoio Game Camp Lodging development project outside Kroonstad, Free State Province.
- Proposed 13.8 ha Phokwane Local Municipality Cemetery expansion project in Jan Kempdorp, Northern Cape Province.
- Proposed 19.9 ha Vergenoeg NEMA Section 24G residential development project in Wesselsbron, Free State Province.
- Proposed 20.5 ha Khalinkomo NEMA Section 24G residential development project in Wesselsbron, Free State Province.
- Erosion and Rehabilitation Monitoring Report for the Farms Die Kranse no 1174 and De Rotsen no 52 outside Vrede, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Zaaihoek no 1251, outside Vrede, Free State Province.
- Grazing and Invasive Species Management Plan for Plot 19 of the Farm Ballyduff no 1594, in Bethlehem, Free State Province.

- Grazing and Invasive Species Management Plan for the Farm Mooiuitzicht no 205, outside Bethlehem, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Rietfontein no 1457, outside Bethlehem, Free State Province.
- Proposed Gamagara Local Municipality Water Reticulation Development project in Olifantshoek, Northern Cape Province.
- Rehabilitation and Alien Invasive Species Management Plan for a proposed Kopanong Local Municipality Bridge Upgrading development project in Philippolis, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed Gamagara Local Municipality Water Reticulation Development project in Olifantshoek, Northern Cape Province.
- Rehabilitation and Alien Invasive Species Management Plan for a proposed Gamagara Local Municipality Water Reticulation Development project in Olifantshoek, Northern Cape Province.
- Protected Species Relocation Management Plan for a proposed Gamagara Local Municipality Water Reticulation Development project in Olifantshoek, Northern Cape Province.
- Grazing and Invasive Species Management Plan for the Farm Erfenis no 1014, outside Bethlehem, Free State Province.
- Proposed 35 ha Gladium Boerdery Familietrust NEMA Section 24G agricultural development project outside Niekerkshoop, Northern Cape Province.
- Grazing and Invasive Species Management Plan for the Farms Liebenbergsvlei no 148 & Aasvogelkrans no 96, outside Bethlehem, Free State Province.
- Grazing and Invasive Species Management Plan for the Farm Dwarsberg no 350, outside Paul Roux, Free State Province.
- Proposed 50 ha Siyathemba Local Municipality residential development project in Prieska, Northern Cape Province.
- Rehabilitation and Alien Invasive Species Management Plan for a proposed 35 ha Gladium Boerdery Familietrust NEMA Section 24G agricultural development project outside Niekerkshoop, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 35 ha Gladium Boerdery Familietrust NEMA Section 24G agricultural development project outside Niekerkshoop, Northern Cape Province.
- Stormwater Management Plan for a proposed 35 ha Gladium Boerdery Familietrust NEMA Section 24G agricultural development project outside Niekerkshoop, Northern Cape Province.

- Grazing and Invasive Species Management Plan for the Farm Waterval West no 653, outside Steynsrus, Free State Province.
- Proposed 7.6 ha Annie van den Hever NEMA Section 24G agricultural development project outside Hanover, Northern Cape Province.
- Revision of a proposed 535 ha Farms Bultfontein & Folmink agricultural development project outside Prieska, Northern Cape Province.