NKT CONSULTING SERVICES
WATER & ENVIRONMENTAL SERVICES

BASIC ENVIRONMENTAL IMPACT ASSESSMENT FOR THE UPGRADING OF WATER PIPELINE IN EMBALENHLE GOVANI MBEKI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

DRAFT REPORT

APRIL 2022

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1 INTRODUCTION

NKT Consulting was appointed by CV Chabane and Associates Consulting Engineers to provide professional environmental services for the proposed water pipeline replacement in Embalenhle, in the Mpumalanga Province. The project is to replace a 500mm asbestos pipeline. The line connects on a Rand water line on the N17 to Embalenhle.This report forms part of an application for an environmental authorisation for the proposed pipeline replacement.

The application process is undertaken on behalf of the applicant, by NKT Consulting, which was appointed, as independent environmental practitioner, to assist the applicant in complying with the 2014 EIA Regulations in terms of the National Environmental Management Act (Act 107 of 1998.

2 DETAILS OF PROJECT TEAM

2.1 Project Applicant

Table 1 below sets out information of the Project Applicant

Table 1: Project Applicant Information

Company/Entity Name	Govan Mbeki Local Municipality
Physical Address	Horwood Street; CBD; Secunda
Contact Person	Rofhiwa Mulaudzi
Contact Number	078 795 4533
Email Address	rofhiwa.m@govanmbeki.gov.za

2.2 Details of Environmental Assessment Practitioner (EAP)

Company/Entity Name	NKT Consulting
Physical Address	531 Unit E2, 6th Road Montana, Pretoria
Contact Person	Charles Chigurah
Designation	EAP
Contact Number	0735658847
Email Address	info@nktconsulting.co.za
Qualifications	Bsc Hons Geography and Environmental Management
Professional Registration	EAPASA

3 DESCRIPTION OF THE PROPOSED ACTIVITY

3.1 Existing Works

The existing bulk water supply to eMbalenhle consists of a 500mm steel pipe to the 2 x 10ML reservoirs at Adullam and a 400mm uPVC pipe to eMbalenhle. This pipeline is connected to a 600mm steel pipeline operated by Rand Water on an assumed 24-hour operational basis.

The purpose of this project is to construct parallel bulk lines next to the existing bulk pipeline in order to replace the existing aging pipelines to provide a continuous supply to the growing community for the next 30 years.

eMbalenhle bulk mains have been experiencing pipe bursts frequently due to aging pipeline infrastructure (some sections are more than 20 years old) which have reached the end of their useful design life.

Due to the relative high population growth rate for eMbalenhle and the household size which do not include the large number of backyard dwellers, the expected increase in demand outweighs the current available capacity of the bulk system.

3.1.1 Water Source

Water for eMbalenhle area is provided by the Rand Water Company in the Mpumalanga Province. The current average consumption as received from the municipality from July 2019 to June 2020 =18.4ML/day.

3.1.2 Bulk supply Pipelines

The existing supply mains are mainly large diameter steel and uPVC pipes, supplying water to two existing command reservoirs. The capacity of the existing pipe diameters to supply the full current and future demands will be assessed in order to determine whether larger diameter pipes should be installed.

Table 2 show the 4 reservoirs which provide storage for the various supply zones within the project area. Using the latest census count and population data, it will be determined whether a further need for storage exists in the town. This will be determined as part of the initial design stages of the project.

Table 2: eMbalenhle reservoirs

Reservoir Name	Volume (MI)	Floor Level (m)	Fully Supply Level (m)
Abdullam Command	10	1625.8	1626.3
Abdullam Command	12	1625.8	1626.3
eMbalenhle	(2.5)	1600	1605.5
eMbalenhle	10	1590	1595

3.2 Water Demand

According to historical water consumption figures for the project area, the future usage projections will be based on population date combined with water usage data. For the technical reporting phase, the usage type will be considered and calculated in the following ways:

- Residential use – using the 2011 census population multiplied by an average consumption per day to find the litres used per day by the city's population in residential settings.

3.2.1 Residential Water Consumption

According to the Red Book, the typical household consumption per capita per day can be summarised as follows for house connection:

Table 3: Household connection water consumption typical figures

Development Level	Typical Consumption (l/c/d)	Range (l/c/d)
Moderate	80	48-98
Moderate to High	130	80-145
High	250	130-280
Very High	450	260-480

According to the RDP Rural Water Supply Design Criteria Guideline, the minimum Average Annual Daily Demand (AADD) that should be allowed for is 60l/c/d for rural settlements with individual stand up taps and 150 l/c/d for towns with services. This seems to fall into the moderate to high development level. For the township of eMbalenhle a consumption correlating with a moderate or lower moderate to high development will be assumed. This is because the erfs are small, with few gardens and no swimming pools being seen.

3.3 Available Storage Versus Demand

As the current status of the existing reservoirs still needs to be verified, we assume the storage to be as follows:

- Abdullam : 1 x 10ML & 1 x 12ML Command
  eMbalenhle : 1 x 10ML Command (Square with 0.94kl pressure tower)
  eMbalenhle : 1 x 2.5 ML – not in service
- Current Consumption = 18.4ML/day
- Future (2050) Demand = 88.2 ML/day
- This required an additional storage of 58 ML/day (based on 150 l/c/d consumption).

3.4 Proposed Works

The scope of works includes the construction of suitable designed and sized parallel pipelines associated fittings too upgrade the supply and to cater for the future expansion of eMbalenhle. The parallel lines will replace the existing aging infrastructure. The project will be divided into 4 phases as it is estimated to be a lengthy construction period and expensive project. The following phases are proposed:

- Phase 1: New 630mm diameter line from the Rand Water connection up to the Abdullam Reservoirs.
- Phase 2: New 500mm line from Abdullam reservoirs up to the traffic circle branch connection.
- Phase 3: New 400mm line from the Traffic circle branch up to the 5ML reservoir
- Phase 4: New 355mm line from the old reservoir and pressure tower to the 5ML reservoir

The four (4) main pipe materials which are considered are to be used as follows:

- HDPE – Mainly in CBD areas where trenching will cause undesirable disruptions. In these areas pipe cracking methods will be employed to put the DDPE pipes in place with minimal excavations required.
- uPVC – Used in most other area where trench excavations are possible. This method is considered more affordable and labour intensive, therefore allowing for employment creation.
- PVC-O – Used for large diameter (450 – 600mm) or high pressure (16 – 25 bar) sections of pipeline where HDPE and uPVC pipes won't be sufficient.
- Steel – Only to be used in possible extreme situations where the above materials are insufficient.

3.5 Listed Activities

Activities applied for to be authorised are indicated in Table 4

Table 4: Listed activities

Government Notice R983 (as amended) Activity No.	**Describe the relevant Basic Assessment Activity in writing as per Listing Notice 1 (GN No. R983, as amended)**	**Describe the portion of the development as per the project description that relates to the applicable listed activity**

Government Notice R983		
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse	The construction of a pipeline over the river and wetland
Government Notice R985		
27	The development of— (ii) Infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse **Mpumalanga** (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	

4 Project Location

The project area is located in Embalenhle, Govan Mbeki Local Municipality in Mpumalanga. List of properties within servitude are listed in Table 5 below.

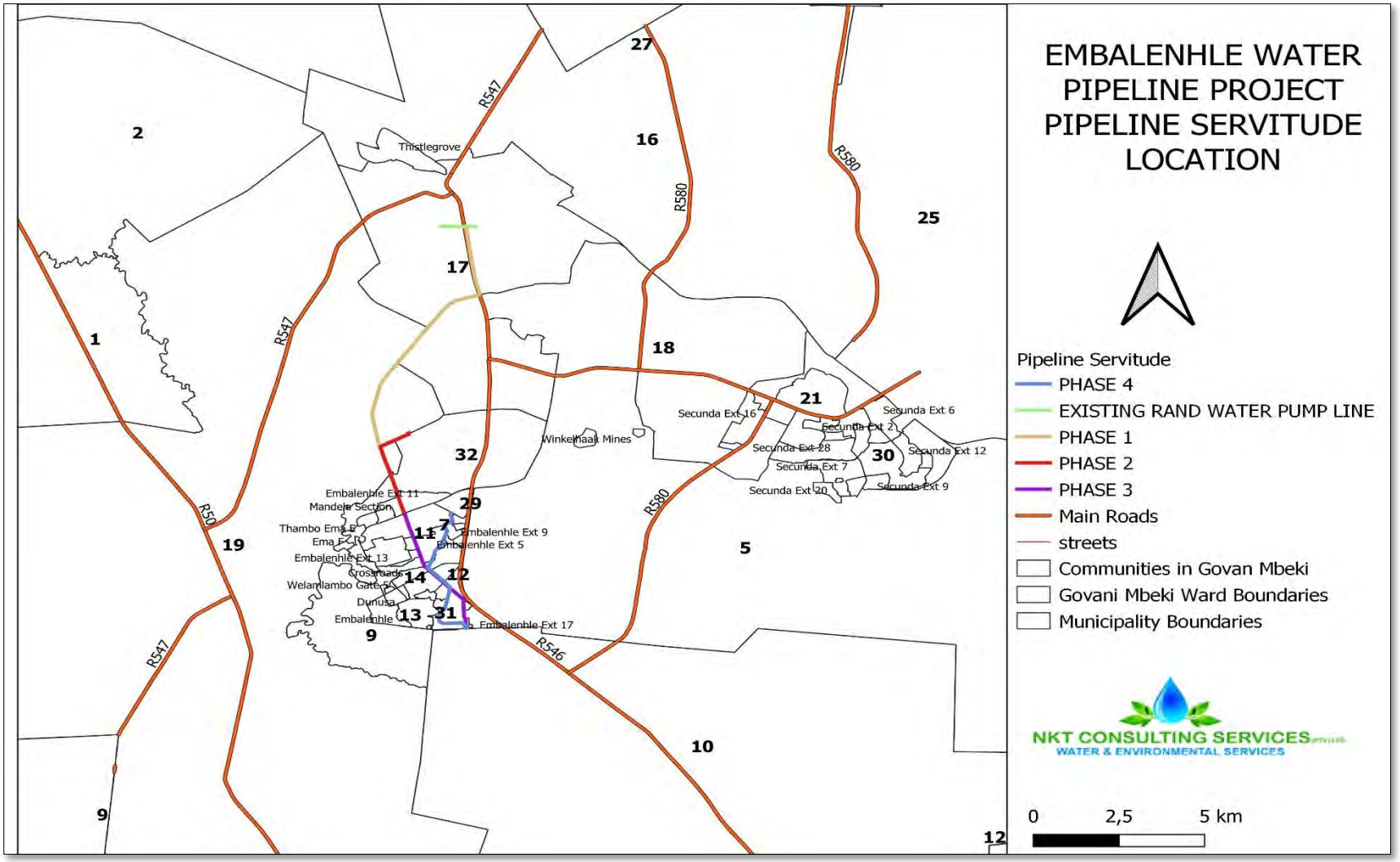


Figure 1: Pipeline location

Table 5: List of properties affected

FARM NAME	PORTION	SG CODE																			
Farm Winkelhaak 135 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	5	0	0	0	0
Farm Leeuwspruit 134 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	4	0	0	0	0
Farm Witkleifontein 131 IS	1	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	1
Farm Witkleifontein 131 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0
Farm Witkleifontein 131 IS	4	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	4
Farm Witkleifontein 131 IS	10	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	1	0
Farm Witkleifontein 131 IS	3	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	3
Farm Osizweni 575 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	5	7	5	0	0	0	0
Farm Winkelhaak 135 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	5	0	0	0	0
Farm Langverwacht 282 IS	52	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	5	2
Farm Langverwacht 282 IS	2	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	2
Farm Langverwacht 282 IS	17	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	1	7
Farm Langverwacht 282 IS	9	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	9
Farm Langverwacht 282 IS	1	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	1
Farm Langverwacht 282 IS	4	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	4
Farm Middelbult 284 IS	29	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	4	0	0	2	9
Farm Middelbult 284 IS	28	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	4	0	0	2	8

5 NEED AND DESIRABILITY

The requirement to consider and assess the need and desirability of a proposed project stems from the principle of sustainability as set out in both the Constitution and the NEMA. The Environmental Right enshrined in the Bill of Rights provides that:

"*Everyone has the right...to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*".

Addressing the need and desirability of a proposed project is therefore intended as a method of ensuring sustainable development, i.e., that a development is ecologically sustainable and socially and economically justifiable.

The Department of Environmental Affairs (DEA) has published a guideline document for consideration of the need and desirability of proposed developments. This guideline sets out a list of questions which should be addressed, divided into questions relating to ecological sustainability and justifiable economic and social development. The questions that relate to

ecological sustainability include how the development may impact ecosystems and biological diversity; Pollution; and renewable and non-renewable resources. When considering how the development may affect or promote justifiable economic and social development, the relevant spatial plans must be considered, including Municipal Integrated Development Plans (IDP), Spatial Development Frameworks (SDF) and Environmental Management Frameworks (EMF), which have been compiled through participatory process and therefore reflect the broader community's needs and interests. Environmental Impact Assessment Reports need to provide information as to how the development will address the socioeconomic impacts of the development, and whether any socio-economic impact resulting from the development will impact on people's environmental rights. Considering the need and desirability of a development entails the balancing of these factors.

For the purposes of discussing the need and desirability of the proposed development, the EAP has adopted the understanding that the **NEED** for the proposed development can be interpreted as the *demand for the activity,* whilst the **DESIRABILITY** of the proposed development can be understood as the *suitability of the placement of the activity*.
The need and desirability of the proposed project is discussed in two sections, split into a consideration of the ecological sustainability of the development, followed by a consideration of the socio-economic justification of the project in each section, the questions included in the Guideline Document have been listed and answered.

Table 6: An assessment of the needs and desirability for the development.

How will this development (and its separate elements / aspects) impact on the ecological integrity of the area?
It is anticipated that the impact of the proposed development of ecological integrity will be low. It is recommended that, prior to the commencement of construction activities, all protected plant and tree species be removed from site and relocated to a Protected Area (providing all necessary permits are in place). The loss of the indigenous vegetation occurring on the site is anticipated, following implementation of the recommended mitigation measures, to have **LOW** significance.
How were the following ecological integrity considerations considered? 1. Threatened ecosystems. 2. Sensitive, vulnerable, highly dynamic or stressed ecosystems such as coastal shores, estuaries, wetlands, and similar systems that require specific attention in management

and planning procedures, especially where they are subject to significant human resource usage and development pressure.

3. Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).
4. Conservation targets.
5. Ecological drivers of the ecosystem.
6. Environmental Management Framework (EMF); and
7. Global and international responsibilities relating to the environment (e.g., RAMSAR, climate change, etc.).

No sensitive, vulnerable, highly dynamic, or stressed ecosystems have been identified as occurring on the site. The phrase "*Ecological drivers of an ecosystem*" is understood to include those processes, parameters or pathways that have the potential to cause ecosystem changes. Drivers considered in the identification and assessment of impacts on ecological integrity, arising because of the proposed development, and reported on in this document, include:

a) Impacts arising from clearance of indigenous vegetation:
   - Possible disturbance / destruction of protected plant and tree species.
   - Invasion of the site by alien vegetation; and
   - General reduction in floral biodiversity
b) Impacts on fauna:
   - Habitat destruction, loss of foraging / hunting, nesting and movement areas.
   - Loss / displacement of fauna; and
   - General reduction in faunal biodiversity
c) Impacts on surface water features:
   - Contamination of groundwater.
   - Increased erosion risks.
d) Impacts on soil quality:
   - Compaction.
   - Erosion / loss; and
   - Contamination

Measures for the avoidance, minimisation and mitigation of these impacts have been recommended. Should these measures be effectively implemented, it is anticipated that these impacts will have low significance on ecological integrity.

The international environmental agreements to which South Africa is currently party are summarised in the table below, together with their applicability in the context of the proposed development:

Name of Agreement	Description	Relevance to the Development
Convention on Biological Diversity	• To develop national strategies for the conservation and sustainable use of biological diversity; and • To address the fair and equitable sharing of benefits arising out of the utilization of genetic resources	• The NSBA, 2004 was undertaken to meet the obligations imposed by this Convention. • The results and recommendations of the NSBA, in particular regarding ecosystem threat status and ecosystem protection level, have been considered in the compilation of this document.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	• To reduce transboundary movements of wastes subject to the Convention to a minimum consistent with the environmentally sound and efficient management of such wastes; • To minimize the amount and toxicity of wastes generated and ensure their environmentally sound management as closely as possible to the source of generation; and • To assist LDCs in environmentally sound management of the hazardous and other wastes they generate	• Measures aimed at the minimisation of wastes generated by the construction and operation of the proposed development has been recommended in this report. • Measures to ensure environmentally sound management of wastes generated by the construction and operation of the proposed development have been recommended in this report

How will this development disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

The proposed development will disturb ecosystems and result in the loss of biological diversity due to the clearance of indigenous vegetation from the site. Such clearance may give rise to additional, related, adverse impacts on biological diversity, including:

- The potential invasion of the site by alien vegetation.
- Habitat destruction, loss of foraging / hunting, nesting, and movement areas; and
- The loss / displacement of fauna.

In terms of avoiding these negative impacts, the no-go alternative was explored. This alternative would, however, result in the loss of significant social and economic benefits / opportunities, and the avoidance of environmental impacts that have MEDIUM significance (pre-mitigation) and LOW significance (post-mitigation). Based on this, therefore, the no-go alternative is not the preferred alternative.

In terms of minimising the identified impacts, the following mitigation measures have been recommended:

a) Vegetation clearance and disturbances associated with the construction of each individual phase of the proposed development must be limited to the footprint of that relevant phase
b) Vegetation occurring in the area designated as open space should not be cleared (apart from aliens).
c) All protected plant and tree species must be identified, removed from the site, and relocated either to the Open Space area or offsite to a suitable area (which is formally protected), as far as possible. Such search and rescue exercise must be undertaken prior to the commencement of each individual phase, and by an appropriately qualified Botanical Specialist
d) Prior to the removal of any protected plant or tree species, it will be necessary to apply for the relevant permits from the relevant authorities: protected plants require a permit from DAFF.

How will this development pollute and / or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be

avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?

The biophysical environment is understood to comprise of the water and soil elements of the natural environment. It is anticipated that the biophysical environment might be degraded or polluted in the following ways:

- It is unlikely that the proposed development will have any impact on surface water resources.
- Contamination of soil and groundwater because of poor control of hazardous materials (improper storage, spills, leaks, and poor clean-up).
- Increased demand for water.
- Soil compaction and physical removal.
- Erosion and / or damage of neighbouring properties.

In terms of avoiding these negative impacts, the no-go alternative was explored. This alternative would, however, result in the loss of significant social and economic benefits / opportunities, and the avoidance of biophysical impacts that have LOW significance, both pre- and post-mitigation. Based on this, therefore, the no-go alternative is not the preferred alternative. In terms of minimising the identified impacts, the following mitigation measures have been recommended:

- Vehicles and construction equipment should not undergo maintenance procedures on site. Maintenance procedures should only take place at a workshop.
- A Method Statement (MS) for the handling, storage, and management of hazardous substances during the construction phase must be drawn up by the appointed Contractor, and reviewed by the ECO, prior to the commencement of construction.
- As far as possible, water for construction purposes must be non-potable and sourced from legal supplies. Potable municipal water may not be used for construction purposes.
- A construction-phase stormwater management plan must be implemented across the entire development site to prevent and control potential stormwater impacts (flooding, erosion) on neighbouring properties.
- All potential soil and water contaminants (including oil, fuel, and cement) must be stored and handled in such a way so as to minimise the potential for spillage or leakage and contamination.

What waste will be generated by this development? What measures were explored to firstly avoid waste and where waste could not be avoided altogether, what measures

were explored to minimise, reuse and / or recycle the waste? What measures have been explored to safely treat and / or recycle the waste? What measures have been explored to safely treat and / or dispose of unavoidable waste?
Wastes generated during the construction phase are anticipated to include: • Excavated material from the levelling of the site. • Plant waste from the clearance of vegetation from the site. • Domestic waste from construction workers using the site. • Waste from equipment, packaging, materials, and vehicles. • Hazardous wastes; and • Sewage waste. Wastes generated during the operational phase are anticipated to include: • Solid, general waste will be generated by the residential use. This waste will comprise predominantly domestic waste, garden waste and non-hazardous waste; • Liquid waste (sewage) will be generated by development. In terms of avoiding waste, the no-go alternative was explored. This alternative would, however, result in the loss of significant social and economic benefits / opportunities. Based on this, therefore, the no-go alternative is not the preferred alternative. In terms of minimising, re-using, or recycling wastes, the following mitigation measures have been recommended: • The Contractor must, during the construction phase, investigate ways in which to implement the waste hierarchy on site by: i. Identifying ways to avoid and reduce waste generation. ii. Re-use waste materials. iii. Recycle waste. iv. Recover waste; and v. As a last resort, treat and dispose of wastes. This must be done by way of the preparation of a Waste Management Method Statement. • To reduce pressure on general waste landfill sites, it is recommended that, as far as possible, general solid wastes be separated and sorted into its recyclable components (glass, plastic, metal, paper). This will require the provision of separate waste bins within the site camp, and the removal of these wastes to appropriate recycling facilities.

- The requirement to separate and sort general wastes should be included as part of the environmental induction and awareness programme.

How will the ecological impacts resulting from this development impact on people's environmental right in terms following:

1. Negative impacts: e.g., access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?
2. Positive impacts: e.g., improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?

1. The following negative impacts on human health and well-being were identified:
    - Dust impacts; and
    - Noise impacts.

Measures for the mitigation of these impacts have been recommended, and include:

DUST:

- Dust minimisation and control measures should be implemented on the construction site at regular intervals. This could include irrigation (utilising legal, non-potable water) by water tankers.
- The frequency of implementation of dust suppression measures should be increased when it is expected that high wind conditions will develop.
- Vegetation clearing for each phase of development should only take place immediately prior to the commencement of construction activities for the relevant phase (i.e. immediately prior to the construction of each Phase), in order to minimise the amount of exposed soil on the site.
- A Complaints Register must be made available on the site for the duration of construction. Any dust-related complaints must be efficiently and effectively dealt with.

NOISE:

- Construction activities should be limited to normal working hours (08:00 – 17:00) during the week and 08:00 – 13:00 on Saturdays. No work should occur on Sundays or Public Holidays.
- All machinery and equipment to be utilised on the site should be fitted with mufflers and must be maintained in good working order to minimise noise levels.

- The Contractor should encourage construction workers to minimise shouting and hooting on the site.
- The Contractor shall warn any local communities and/or residents that could be disturbed by particularly noisy activities well in advance and shall keep such activities to a minimum.
- The Contractor shall be responsible for compliance with the relevant legislation with the respect to noise. It must be ensured that all potential noise sources conform to the South African Bureau of Standards recommended code of practice, SANS Code 0103:1983, so that it will not produce excessive or undesirable noise.
- Construction work should be completed in as short a time frame as possible in order to limit the longevity of these impacts.

Based on all the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?

Based on the preliminary specialist input, as well as the impact identification and significance rating exercise undertaken in the compilation of this document, it is expected that the proposed development will have limited negative impact on the ecological integrity of the area. The proposed development will not contribute negatively to the ecological integrity of the area.

Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of ecological considerations?

The Best Practicable Environmental Option (BPEO) is defined in the NEMA as the *option that provides the most benefit or causes the least damage to the environment, at a cost acceptable to society, in the long term, as well as in the short term*.

As described above, the proposed development will have socio-economic benefits of **MEDIUM** significance and detrimental ecological impacts of **LOW** significance (provided the recommended mitigation measures are implemented). The development will also not impact significantly on non-renewable resources, and the effect on renewable resources (such as water) can be minimised through the implementation of the recommended water conservation interventions, to enhance sustainable resource use. Based on information available at this time, therefore, the Preferred Alternative is deemed to be the BPEO.

Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope, and nature of the project in relation to its location and existing and other planned developments in the area?
Cumulative impacts identified include: • No reduction in floral biodiversity in the area. • No reduction in faunal biodiversity in the area. This will be due to the fact the pipeline will be underground.

5.1 Sustainable Development Goals

In South Africa, the significant convergence between South Africa's National Development Plan (NDP) and the SDGs is often emphasised. According to an unpublished analysis by the Department of Planning, Monitoring and Evaluation (DPME) and the UN Development Programme (UNDP), 74% of the SDG targets are directly addressed by the NDP, and sectoral programmes address 19% of the remaining targets (DPME, 2019). This development forms part and parcel of SDG 6 which seeks to ensure availability and sustainable management of water and sanitation for all. Access to safe water and sanitation and sound management of freshwater ecosystems are essential to human health and to environmental sustainability and economic prosperity (UN, 2019).

SDG 6 contains the following eight targets:

- 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all
- 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations
- 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally
- 6.4: By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity
- 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate
- 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

- 6.a: By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies
- 6.b: Support and strengthen the participation of local communities in improving water and sanitation management

6 LEGISLATION, POLICIES AND GUIDELINES

6.1 The Constitution of the Republic of South Africa, 1996 (Act no 108 of 1996)

With reference to the Bill of rights, Chapter 2 of the Constitution of the Republic of South Africa Act (108) includes the environmental right, section 24 to which everyone has the right to:

a) To an environment which is not harmful to their health or wellbeing

b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:

- Prevent pollution and ecological degradation.
- Promote conservation and.
- Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

6.2 ENVIRONMENT CONSERVATION ACT (ACT 73 OF 1989)

The National Environmental Management: Biodiversity Act (NEMBA) provides for the management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act, 1998; and provides for and includes:

- The protection of species and ecosystems that warrant national protection.
- The sustainable use of indigenous biological resources.
- The fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources;
- The establishment and functions of a South African National Biodiversity Institute; and for matters connected therewith.

6.3 NATIONAL HERITAGE RESOURCES ACT

In terms of Section 38 (1) (c) i, ii, iii, iv (d) (e) of the Heritage Resources Act (Act No 25 of 1999), a Heritage Impact Assessment has to be undertaken for the following developments:

a) Any development or other activity which will change the character of a site
   - Exceeding 5 000 m2 in extent; or
   - Involving three or more existing erven or subdivisions thereof; or
   - Involving three or more erven or divisions thereof which have been consolidated within the past five years; or
   - The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resource authority.

b) The re-zoning of a site exceeding 10 000 m2 in extent; or

c) Any other category of development provided for in regulations by SAHRA or a provincial

heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

Section 34, no person may alter or demolish any structure or part of a structure, which is older than 60 years without a permit issued by the relevant provincial heritage resources authority (SAHRA).

6.4 NATIONAL WATER ACT (ACT 36 OF 1998)

The National Water Act ([NWA] Act 36, 1998) identifies 11 consumptive and non-consumptive water uses which must be authorised under a tiered authorisation system. Section 27 of the NWA specifies that the following factors regarding water use authorisation must be taken into consideration:

a) The efficient and beneficial use of water in the public interest;
b) The socio-economic impact of the decision whether or not to issue a licence;
c) Alignment with the catchment management strategy;
d) The impact of the water use, resource directed measures; and
e) Investments made by the applicant in respect of the water use in question.

Section 21 of the National Water Act identifies listed activities for which a Water use License should be obtained. The Section 21 listed activities include:

a) Taking water from a water resource;
b) Storing water;
c) Impeding or diverting the flow of water in a water course;
d) Engaging in a stream flow reduction activity contemplated in Section 36;
e) Engaging in a controlled activity identified as such in section 37(1) or declared under Section 38(1);
f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
g) Disposing of waste in a manner which may detrimentally impact on a water resource;
h) Disposing in any manner which contains waste from, or which has been heated in any industrial or power generation process;
i) Altering the bed, banks, course or characteristics of a watercourse;
j) Removing, discharging, or disposing of waste found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
k) Using waste for recreational purposes.

6.5 NATIONAL ENVIRONMENTAL MANAGEMENT: AIR QUALITY ACT (ACT NO 39 OF 2004)

The National Air Quality Act 39 of 2004 was promulgated but only enacted in September 2005. However, some sections of the Atmospheric Pollution Prevention Act (APPA) of 1965 are still

valid and implemented and enforced by DEA and more specifically, the Chief Air Pollution Control Officer or CAPCO.

6.6 THE NATIONAL ENVIRONMENTAL MANAGEMENT: WASTE ACT (ACT 59 OF 2008)

The National Environmental Management: Waste Act, 2008 (Act No. 58 of 2008) (the Waste Act), came into operation on the 1st of July 2009. The Waste Act repealed Section 20 of the Environment Conservation Act, 1989 (Act No. 73 of 1989) (ECA) and introduced new provisions regarding the licensing of waste management activities. In terms of the Waste Act the Minister may publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment.

In terms of the Waste Act no person may commence, undertake or conduct a waste management activity except in accordance with:

a) The requirements or standards determined in terms of the Waste Act for that activity; and
b) A waste management license issued in respect of that activity, if a license is required.

A list of waste management activities was published on the 3rd of July 2009. This list of activities identifies activities that may not be commenced, undertaken or conducted by any person unless a waste management licence is issued in respect of that activity. The list of activities is divided into two Categories.

A person who wished to commence, undertake or conduct, an activity listed under Category A, must conduct a Basic Assessment process, and a person who wished to commence, undertake or conduct an activity listed under Category B, must conduct a Scoping and EIA process, as stipulated in the EIA Regulations made under NEMA, as part of a waste management licence application in terms of the Waste Act.

6.7 CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT NO 43 OF 1983)

To provide for the conservation of the natural agricultural resources of the Republic of South Africa by the preservation of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants

6.8 Policies and guidelines consulted

From the NEMA Environmental Impact Assessment Regulations Guideline and Information Document Series the following guidelines were used:

a) Guideline on Public Participation in the Environmental Impact Assessment Process (October 2012)
b) Draft Guideline on Need and Desirability in Terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (October 2012)
c) Guideline on Alternatives (August 2010

7 FEASIBLE AND REASONABLE ALTERNATIVES

According to Chapter 1 of the EIA Regulations 2014 (as amended), *"Alternatives"*, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

*a) The **property** on which or l**ocation** where it is proposed to undertake the activity;*
*b) The **type** of activity to be undertaken;*
*c) The **design** or **layout** of the activity;*
*d) The **technology** to be used in the activity;*
*e) The **operational** aspects of the activity; and*
*f) The option of **not implementing** the activity.*

The EIA Regulations 2014 (as amended), recognise that details on alternatives need to include a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.

The consideration of alternatives is therefore a key component of an EIA process. While an EIA process should investigate and comparatively consider all alternatives that have been identified, only those found to be feasible and reasonable must be comparatively ***assessed***, in terms of the advantages and disadvantages that the proposed activity and alternatives will have on the environment and on the socio-economic aspects of communities that may be affected by the activity. The feasibility and reasonability of an alternative are measured by:

a) The general purpose and requirements of the activity;
b) The need and desirability of the activity;
c) Opportunity costs;
d) The need to avoid and/or minimise negative impacts;
e) The need to maximise benefits; and
f) How it impacts on the community that may be affected by the activity (DEA&DP, 2013b).

7.1 Pipe Cracking

Pipe Cracking/Bursting Method:

- HDPE pipes on will be inspected for defects.
- All house connection along the section will be identified from design maps and on preconstruction CCTV footage and reports.
- Excavation for launch and receiving, and house connection will commence.
- HDPE pipes will be butt welded to the required length

Pipe Bursting (or pipe cracking) is a trenchless method of replacing buried pipelines, such as sewer- and water pipes, without the need for the construction of traditional construction trenches. Pipe Bursting refers to the technique of inserting a "bursting head" into and through the existing pipe. In doing so, the old pipe fractures and sends the remaining materials and fragments into the surrounding soil area. At the same time the new pipe is pulled into place.

Old, broken, or worn pipelines can be re-sleeved with smaller liners or pipes without any trenching. Pipes can also be replaced at the same diameter with alternative material (such as clay to HDPE) by means of Pipe Bursting. Pipe Bursting may also be used to expand pipeline capacity by replacing existing pipes with larger ones, or "up-sizing".

7.1.1 Advantages Of Pipe Bursting / Pipe Cracking / Re-Sleeving / Slip Lining To Conventional Excavation And Pipe Laying

- Trenchless technology - no trench, no dig.
- No disturbance of ground, structures, services, and traffic
- High speed efficiency that exceeds any conventional excavation or trenching
- No bedding or backfill required
- Less manpower required
- Safer than conventional construction
- More cost efficient than conventional construction

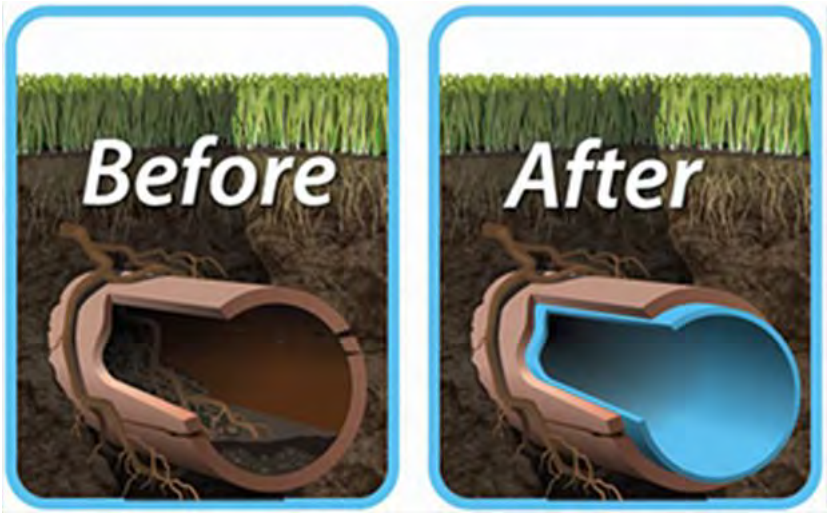


Figure 2: Illustration of pipe cracking

7.2 No-Go Alternative

The No Go alternative is the option of not developing the proposed development and associated service infrastructure. The no-development option would result in a lost opportunity in terms of the employment opportunities associated with the construction and operational phases as well as the benefits associated with the provision of water to the communities. A high negative socio-economic impact significance would occur if the proposed development is not constructed.

The socio-economic benefits of this project largely outweigh the environmental biophysical impacts in an area which is partly degraded, fragmented from any other natural areas, is completely enclosed by development, and which supports vegetation with a low conservation threat status. The No-Go Alternative is therefore not recommended

8 DESCRIPTION OF THE RECEIVING BIOPHYSICAL ENVIRONMENT

8.1 Climate

Govan Mbeki is situated in the Highveld. The Highveld is a high altitude grassland savannah and has an extremely varied climate associated with cool temperatures because of its higher altitude. The Highveld also experiences a summer rainfall during the months of October to February, and has contrasting temperatures of 8 degrees to 26 degrees during this time. Winter temperatures average in the range of 19 degrees during the months of April to August. Due to the Highveld climate this area is characterised by dry conditions. Frost occurs

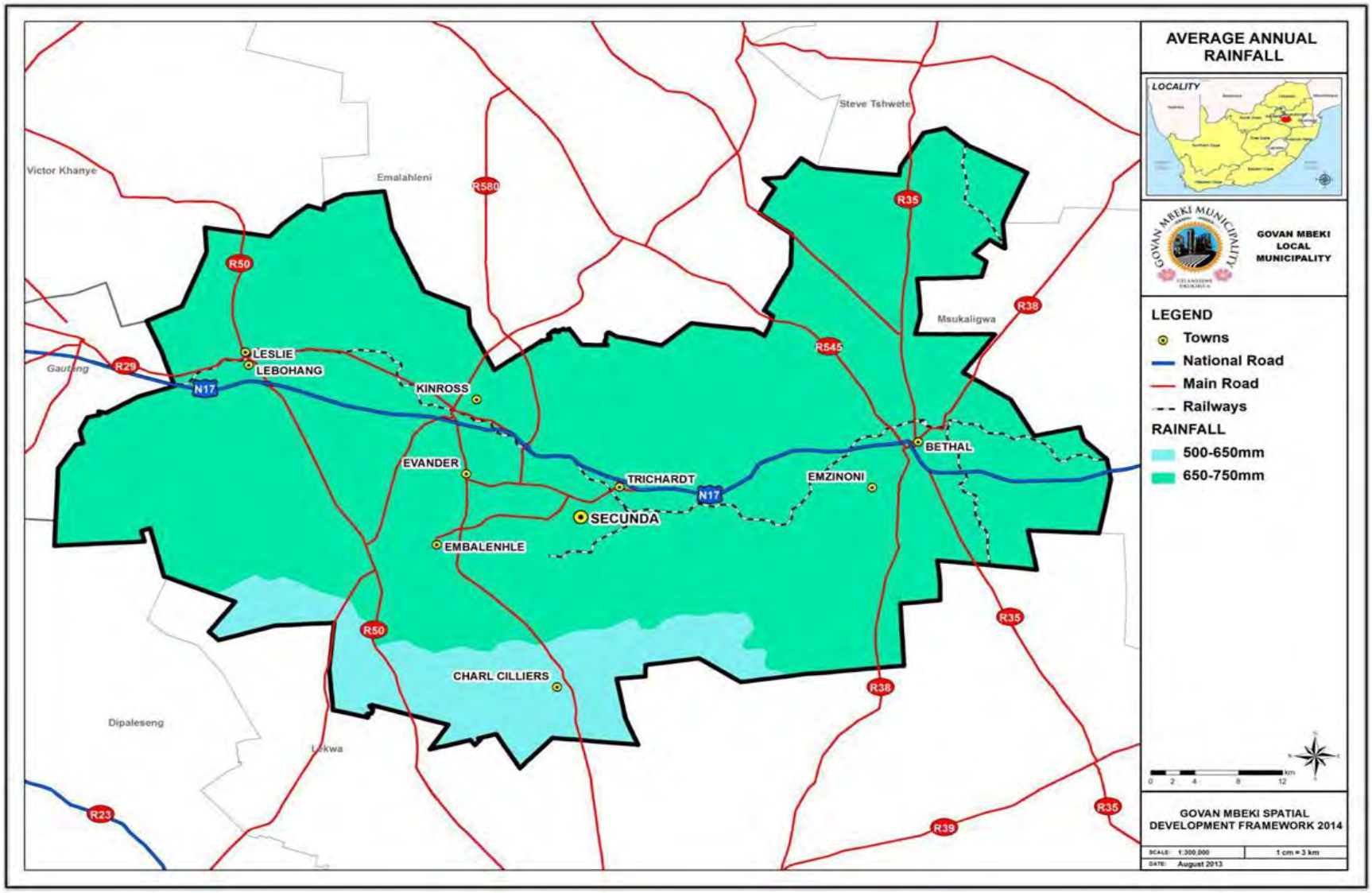


Figure 3: Average annual rainfall (Source: Govan Mbeki Local Municipality SDF)

8.2 Geology

The geology of Govan Mbeki is dominated by sedimentary rocks of the Vryheid Formation of the Ecca Group, Karoo Supergroup. These rocks primarily consist of sandstones, shales and coal beds and are extensively intruded by dolerites of Jurassic age. Quaternary alluvial deposits are present in topographical lower lying areas adjacent to the major surface water drainage bodies. The spatial distribution of the dominant underlying rock types forming part of the Karoo Super Group are as follows:

- Dolerite dominates the majority of Govan Mbeki.
- Arenite is spread throughout Govan Mbeki in the form of intrusions.

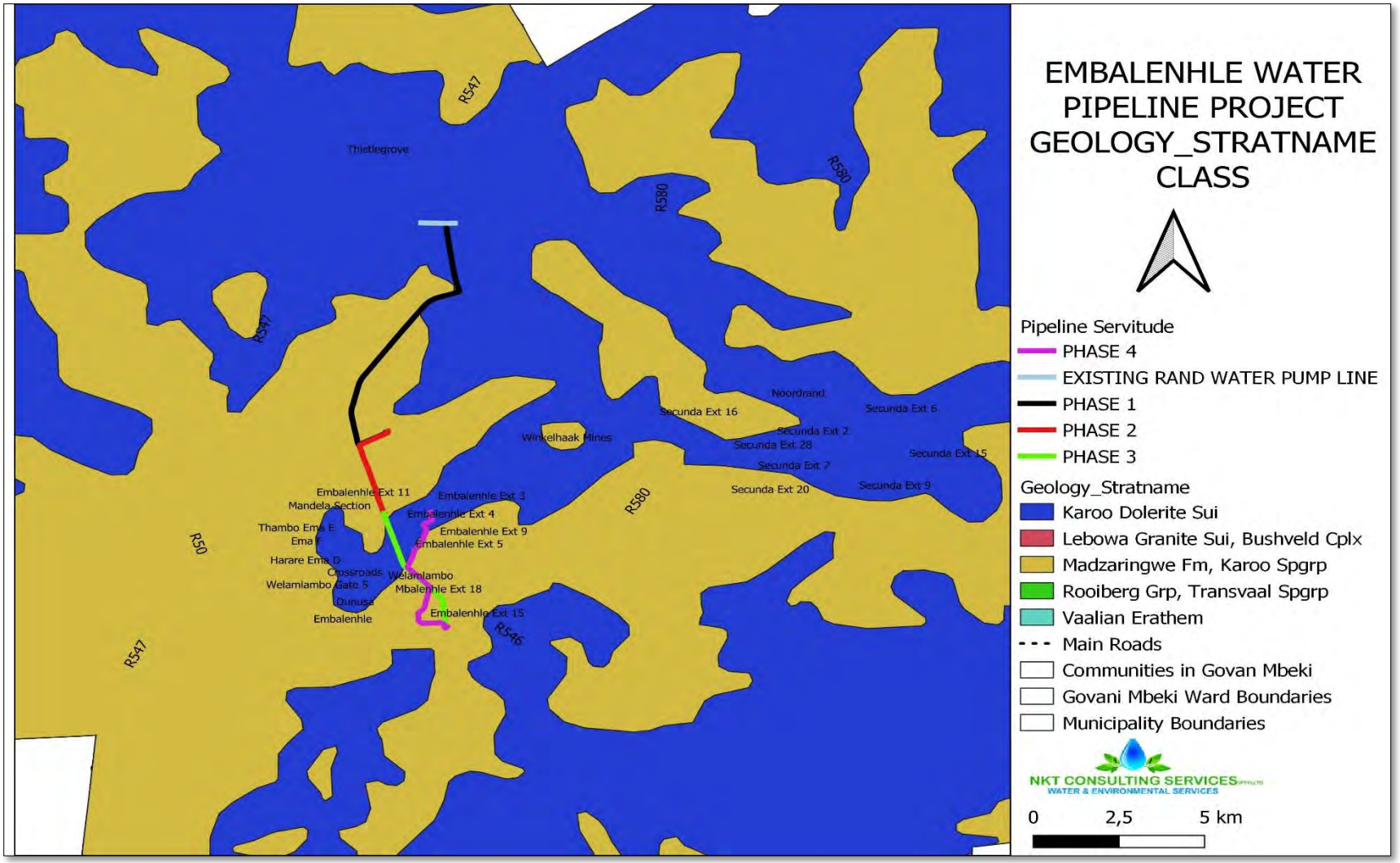


Figure 4: Geological map for study area

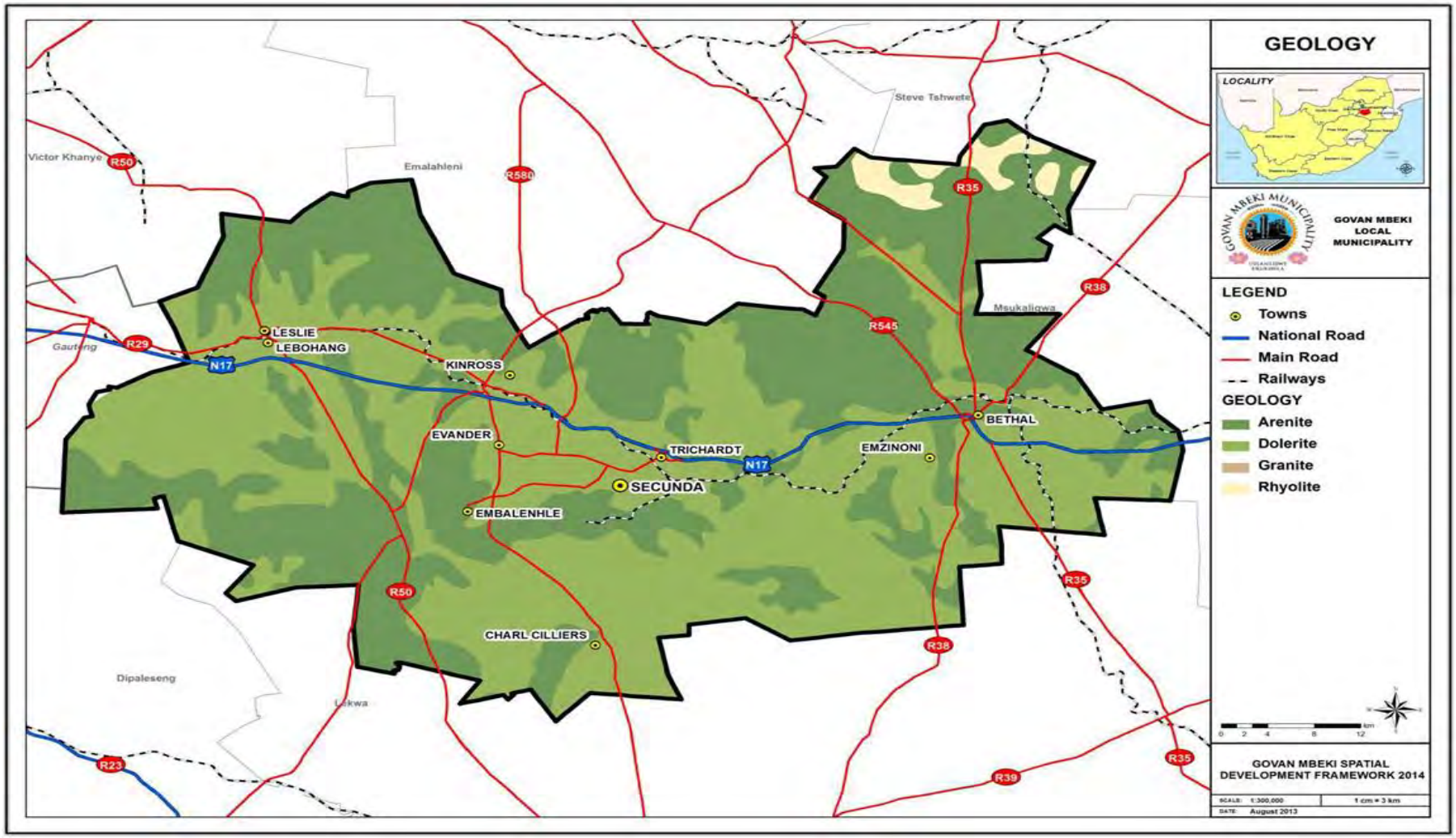


Figure 5: Regional geology

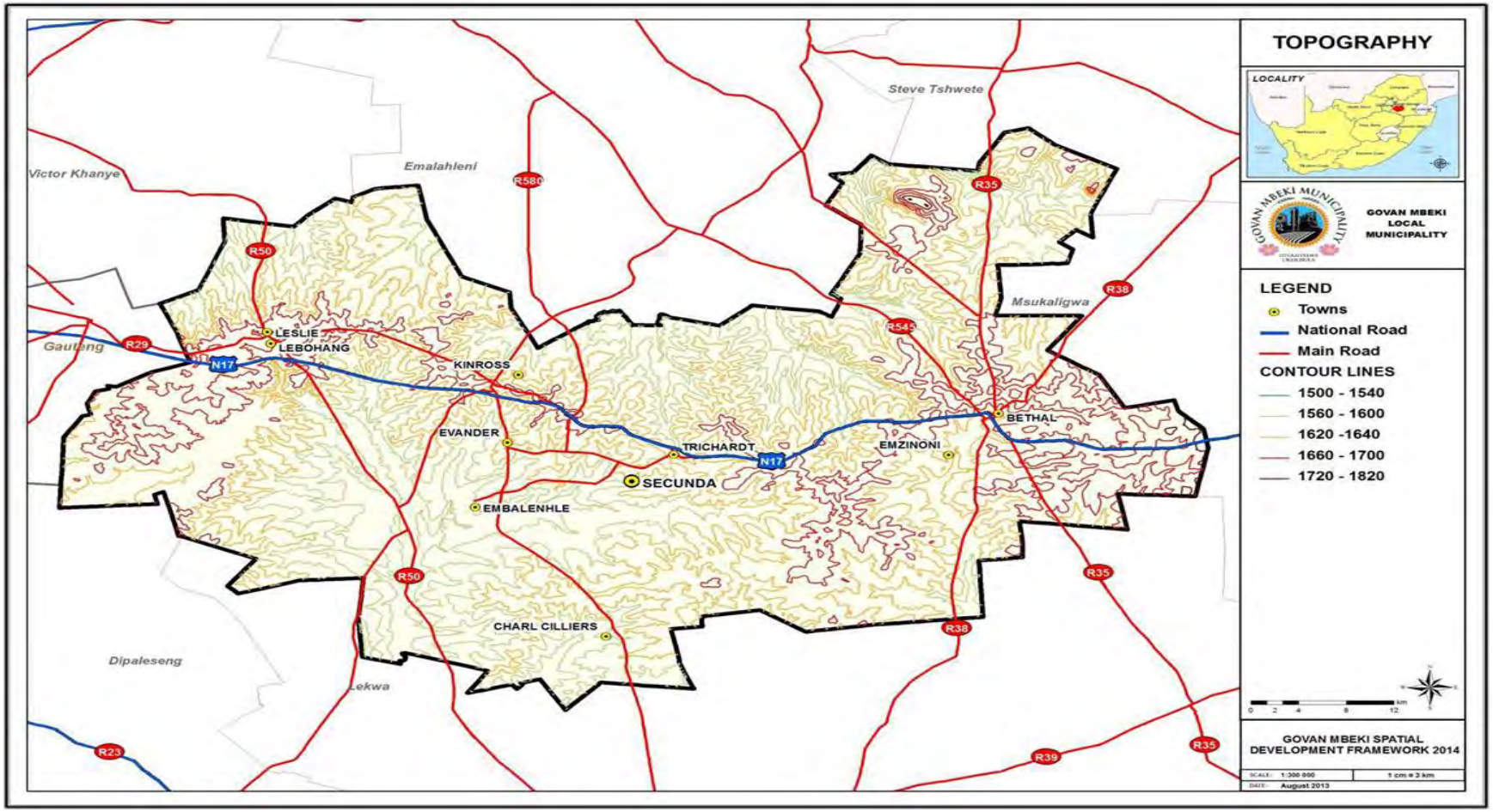


Figure 6: Govan Mbeki: Elevation above Sea Level

8.3 Slope

Govan Mbeki is fairly flat with no areas with a slope of more than 9% as illustrated in Figure 6.

8.4 Soils

The soil form associations are depicted on Figure 7. The soil associations provides Govan Mbeki with the agriculture potential needed for the production of food and the geotechnical basis supporting or restricting the physical development on land. The dominant soil types are Avalon (Av) and Hutton (Hu)

8.5 Agriculture Soil Potential

The agricultural potential of the soils are determined in terms of the soil type, the soils depth, and the clay contents of the soils. In terms of agriculture potential, the soils can be categorised as indicated on Figure 8:

- High
- Medium High
- Medium
- Medium Low
- Low

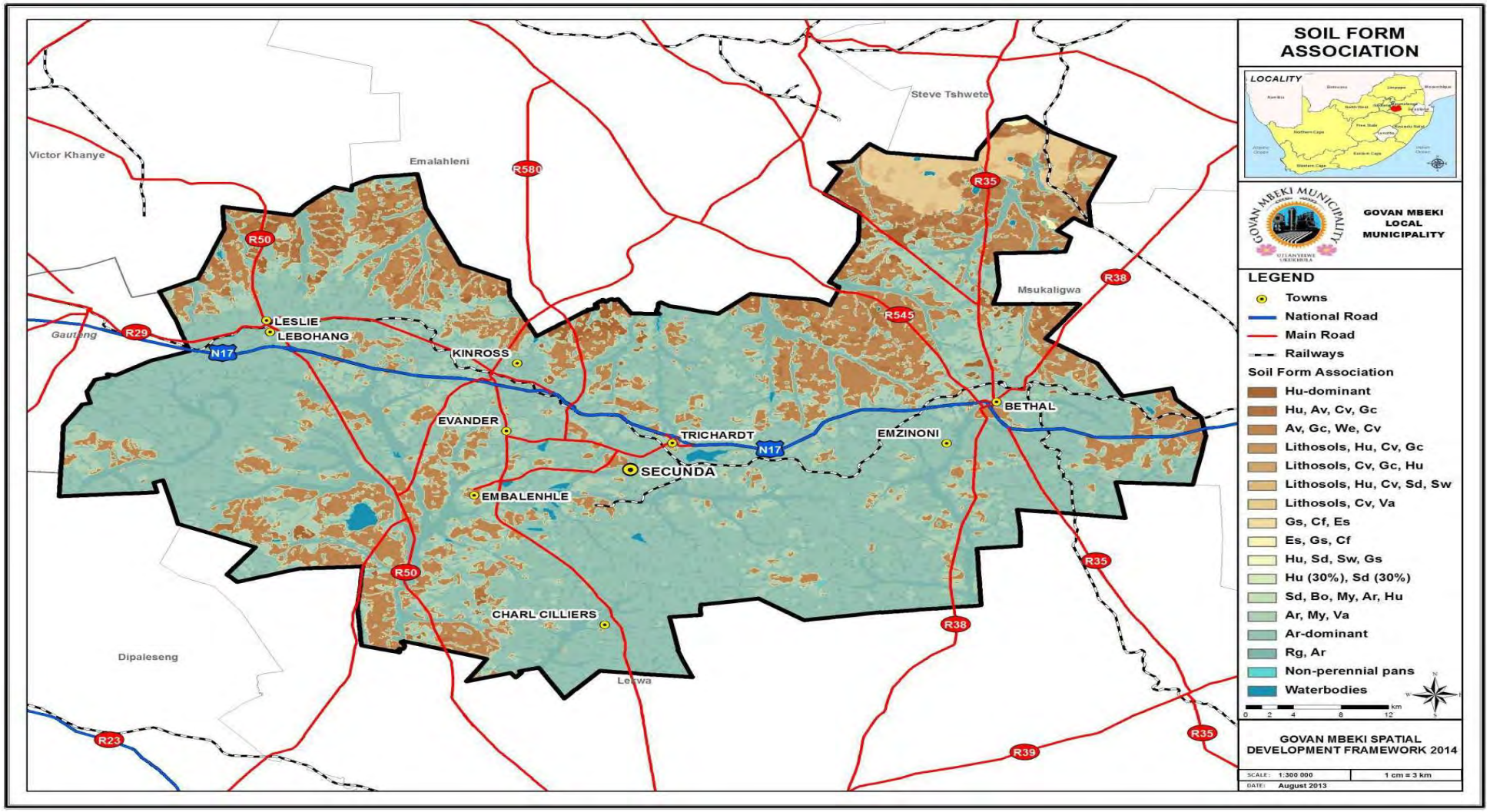


Figure 7: Govan Mbeki: Soils

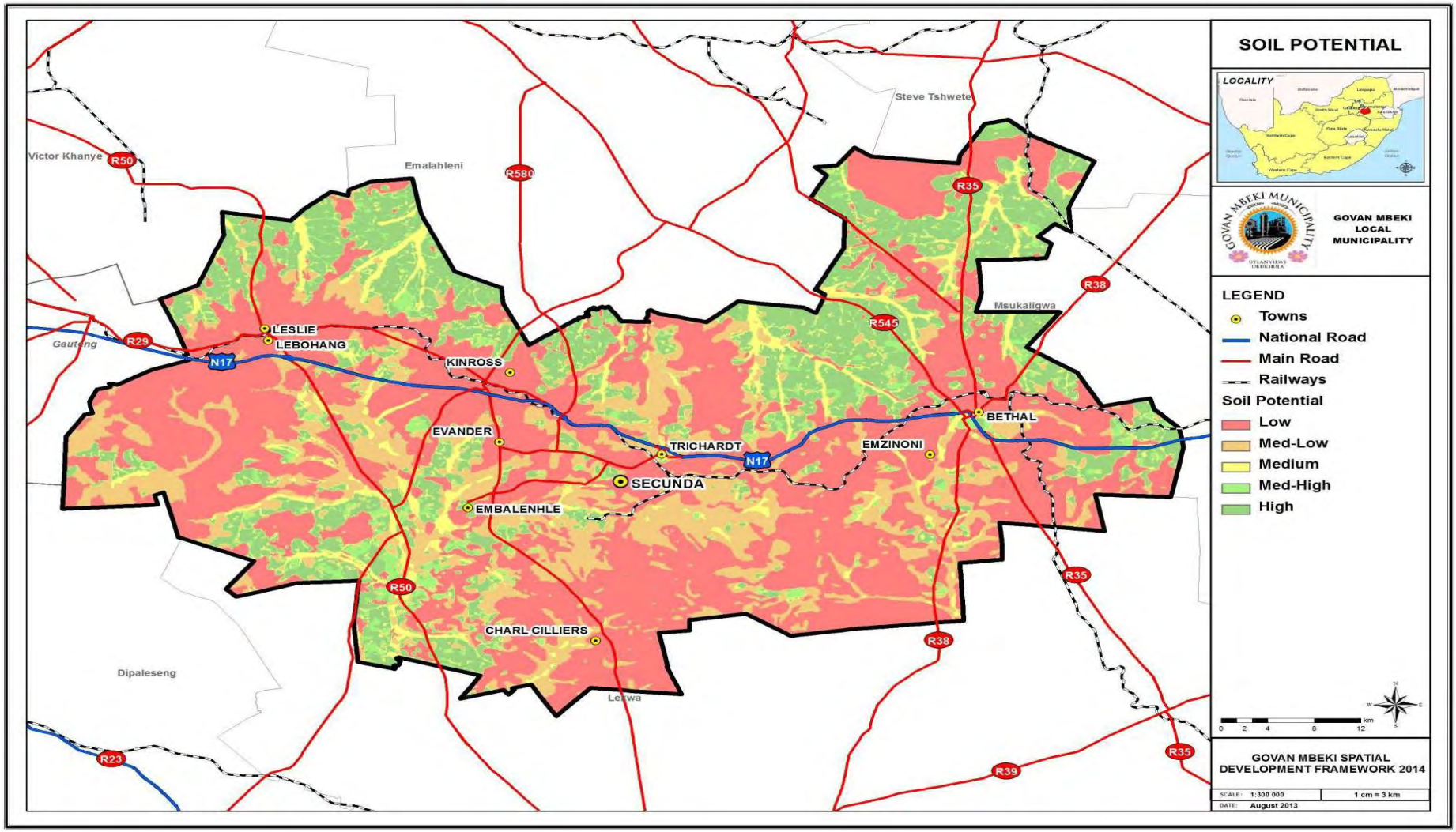


Figure 8: Agricultural Soil Potential

8.6 Hydrology

8.6.1 Rivers and Dams

Most of Govan Mbeki Local Municipality is situated in the catchments of the Blesbokspruit and Waterval River, which are in the Upper Vaal Water Management Area as well as the catchments of Olifants and Rietspruit which are in the Olifants River WMA. The project falls within the Upper Vaal Water Management Area as indicated in Figure 11. Givani Mbeki river crosses the pipeline servitude under Phase 3 and Phase 4 illustrated in Figure 10.

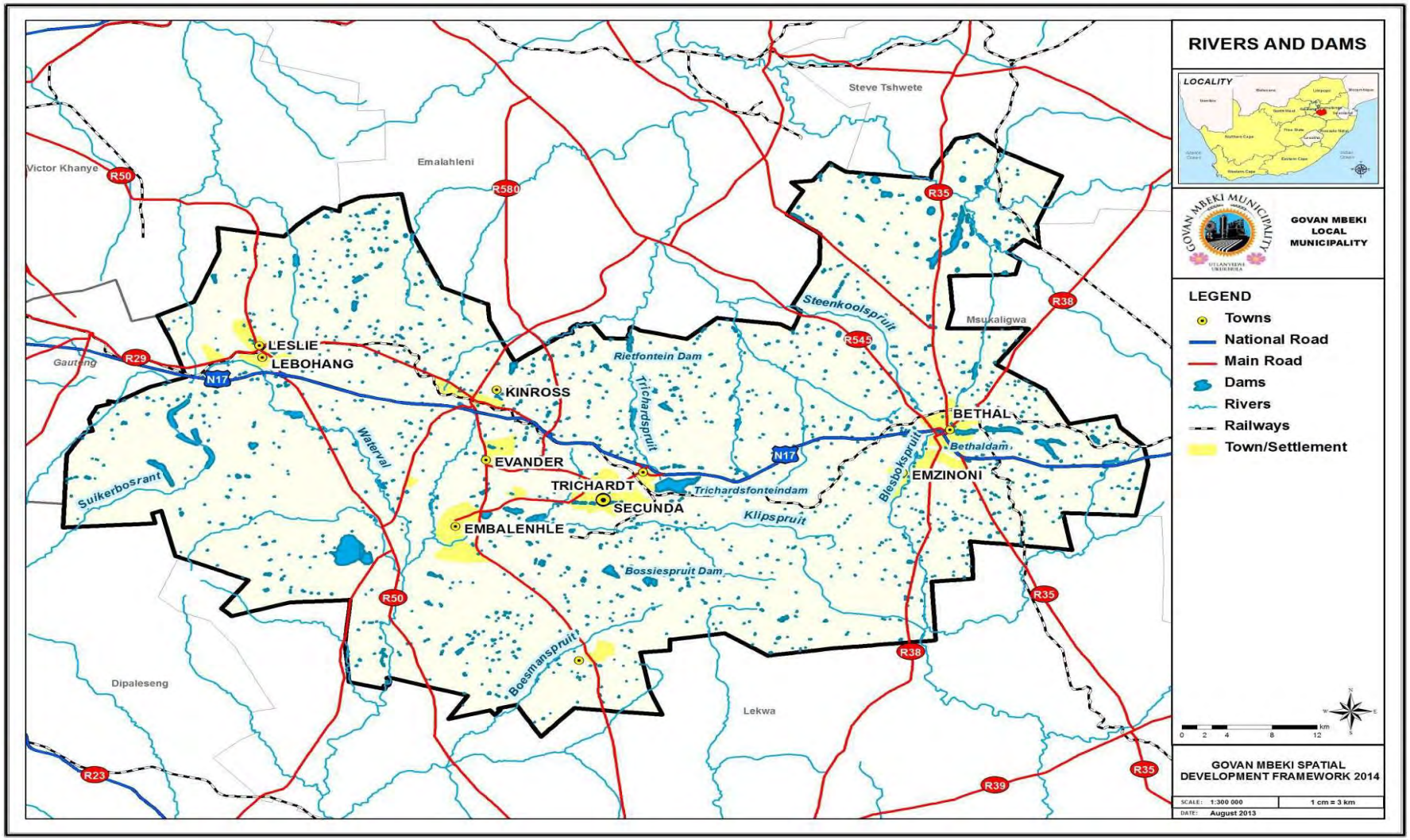


Figure 9: Govan Mbeki Rivers and Dams

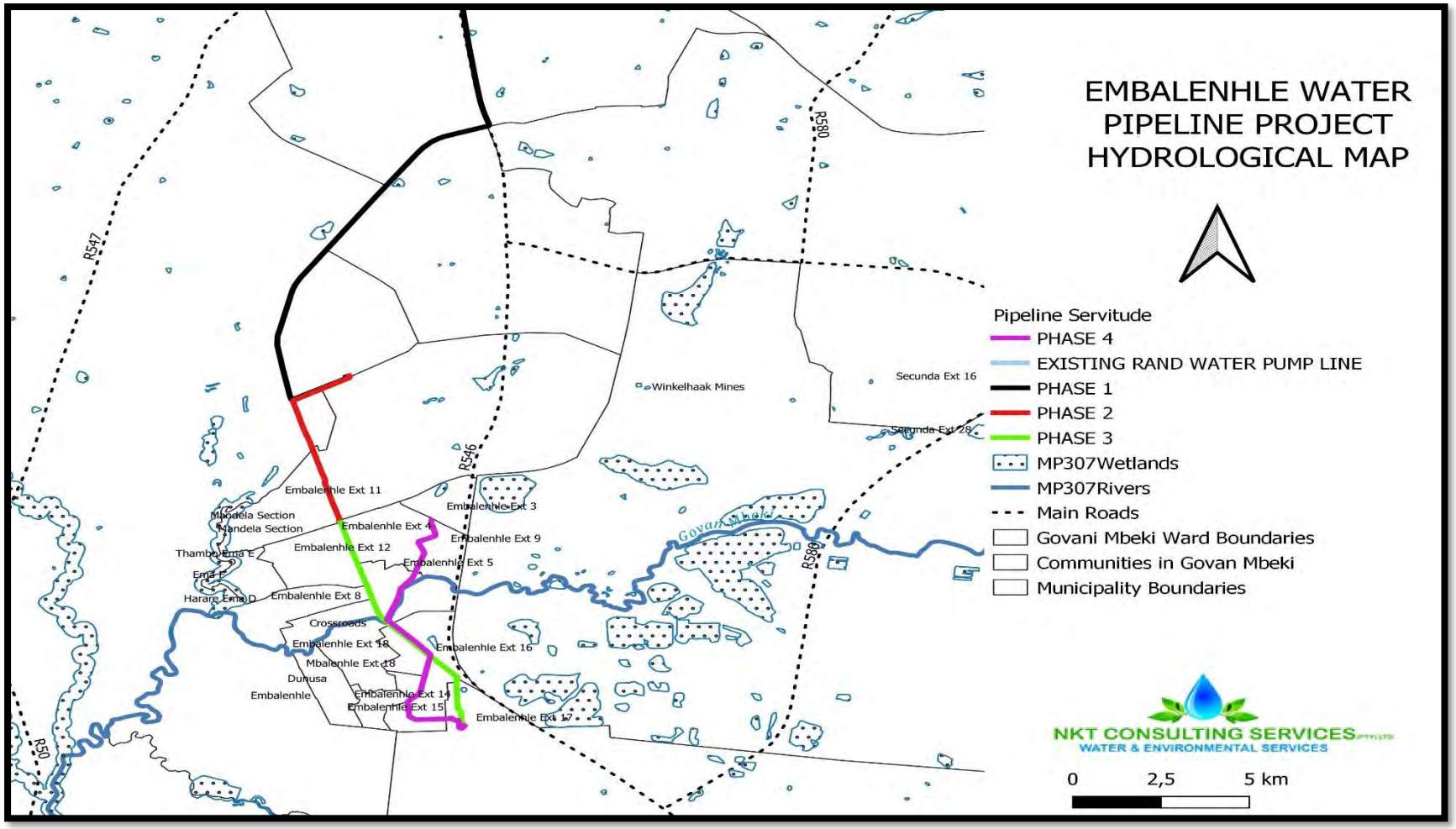


Figure 10: Hydrological map

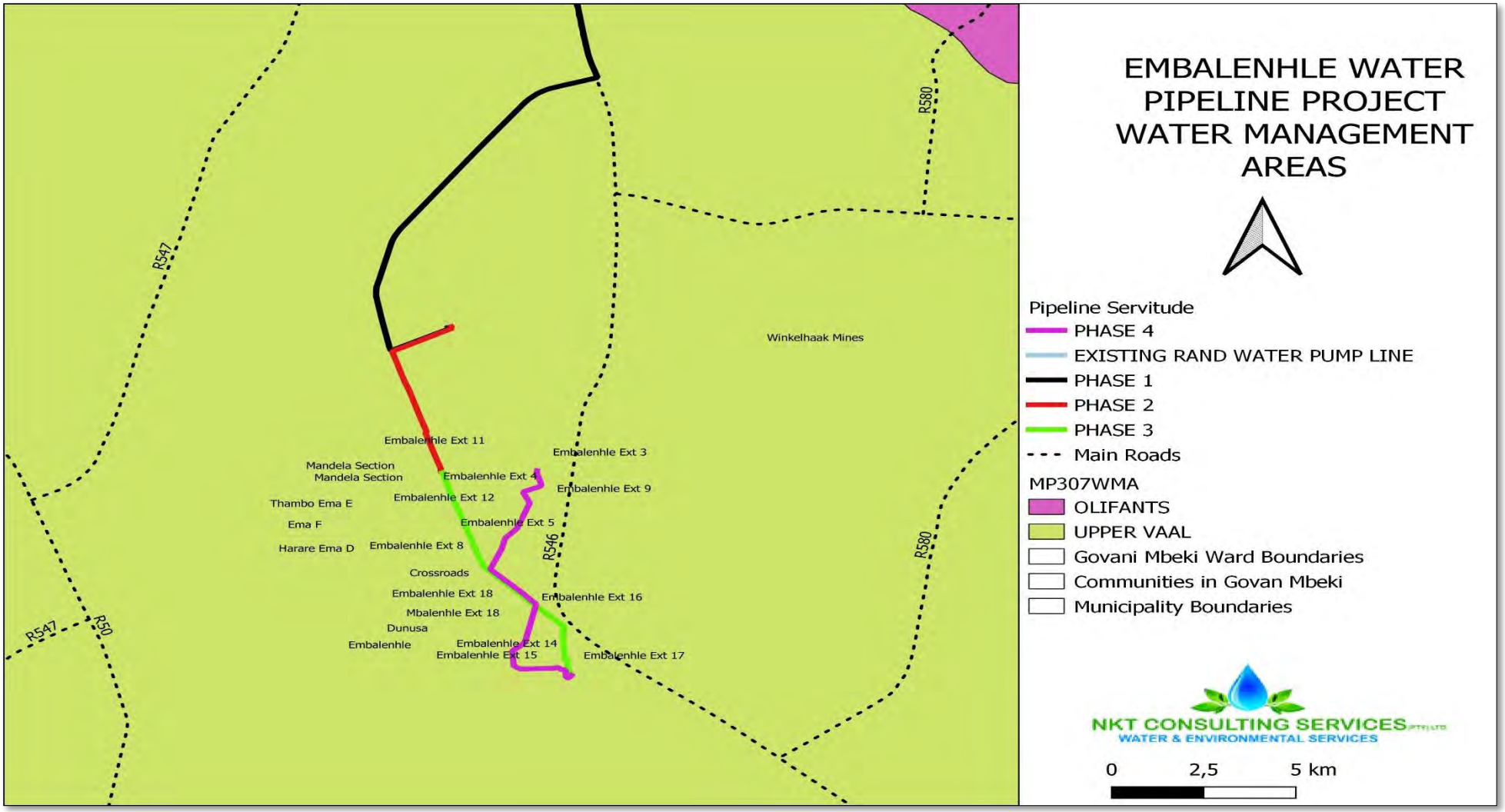


Figure 11: Water management areas

8.7 Biodiversity

The conservation of biodiversity, sustainable use of biological resources and the fair and equable sharing of benefits from the use of biodiversity within Govan Mbeki are protected by the:

- South African Constitution (Act 108 of 1996) stating that everyone is entitled to an environment that is:
  - ✓ Not harmful to their health of wellbeing.
  - ✓ Protected for the benefit of present and future generations through reasonable and other measures that prevent pollution and ecological degradation, promote conservation and secure the ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.
- Conservation and Natural Resources Act (43 of 1983).
- Environment Conservation Act (73 of 1989).
- National Forests Act (84 of 1998).
- National Environmental Management Act (107 of 1998).
- National Water Act (36 of 1998).
- National Environmental Management: The Protected Areas Act (57 of 2003).
- National Environmental Management: The Biodiversity Act (10 of 2004).

The Mpumalanga Biodiversity Sector Plan recognises the importance of conservation planning to every part of the landscape. It's not just about establishing protected areas. The outcomes of conservation plans should inform not only the work of conservation agencies, but also land-use planning and decision-making in all socio-economic sectors. (Driver, Cowling & Maze, 2003).

The Mpumalanga Biodiversity Conservation (Sector) Plan1 recognises the importance of the interdependence of the terrestrial and aquatic ecosystems within Mpumalanga and the importance thereof for the protection of biodiversity.

8.7.1 Land Cover

The land cover explains the physical material at the surface of the area. Govan Mbeki is mainly covered by unimproved grassland and cultivated land (refer to Figure 12)

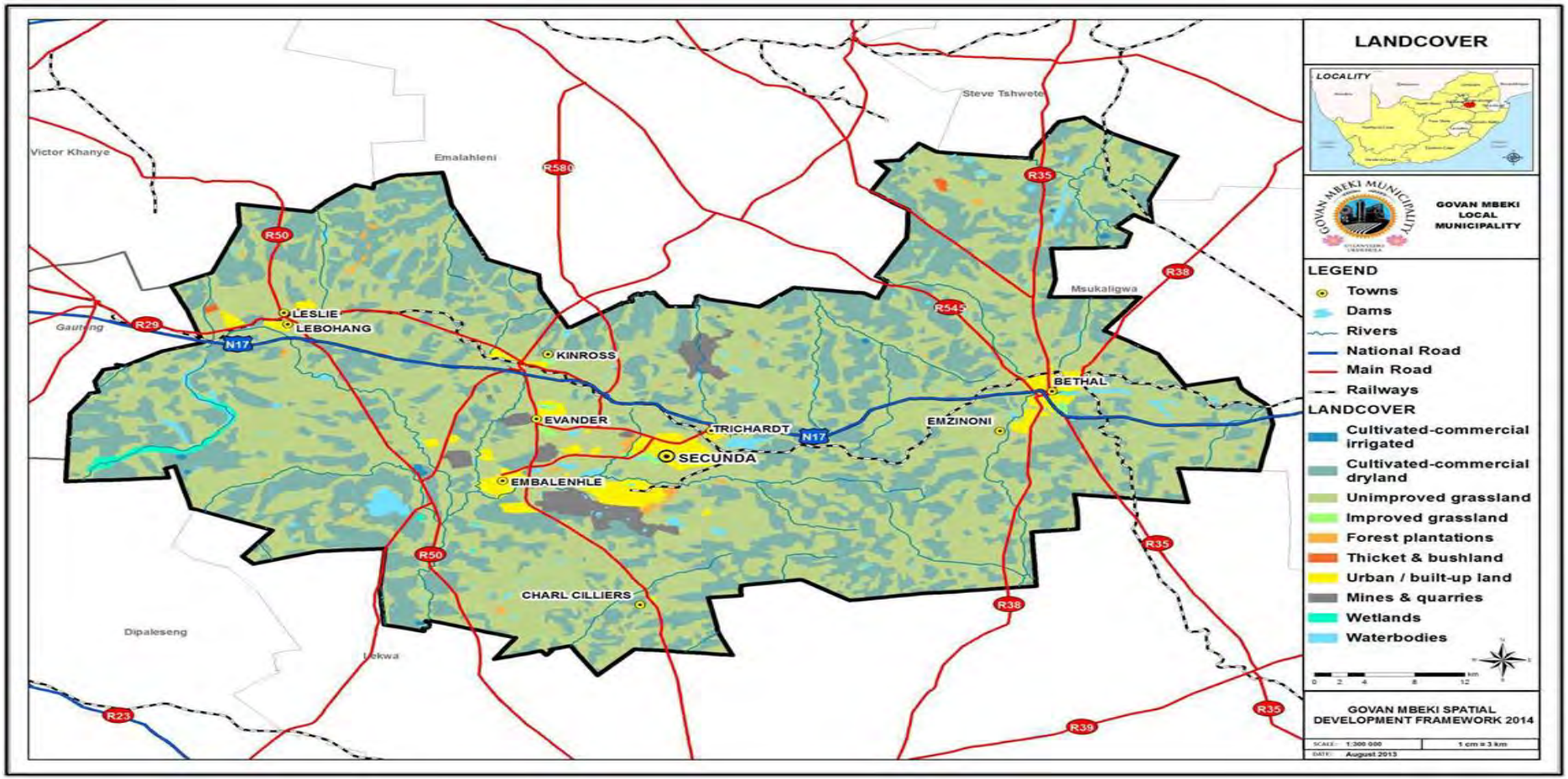


Figure 12: Govan Mbeki: Land Cover

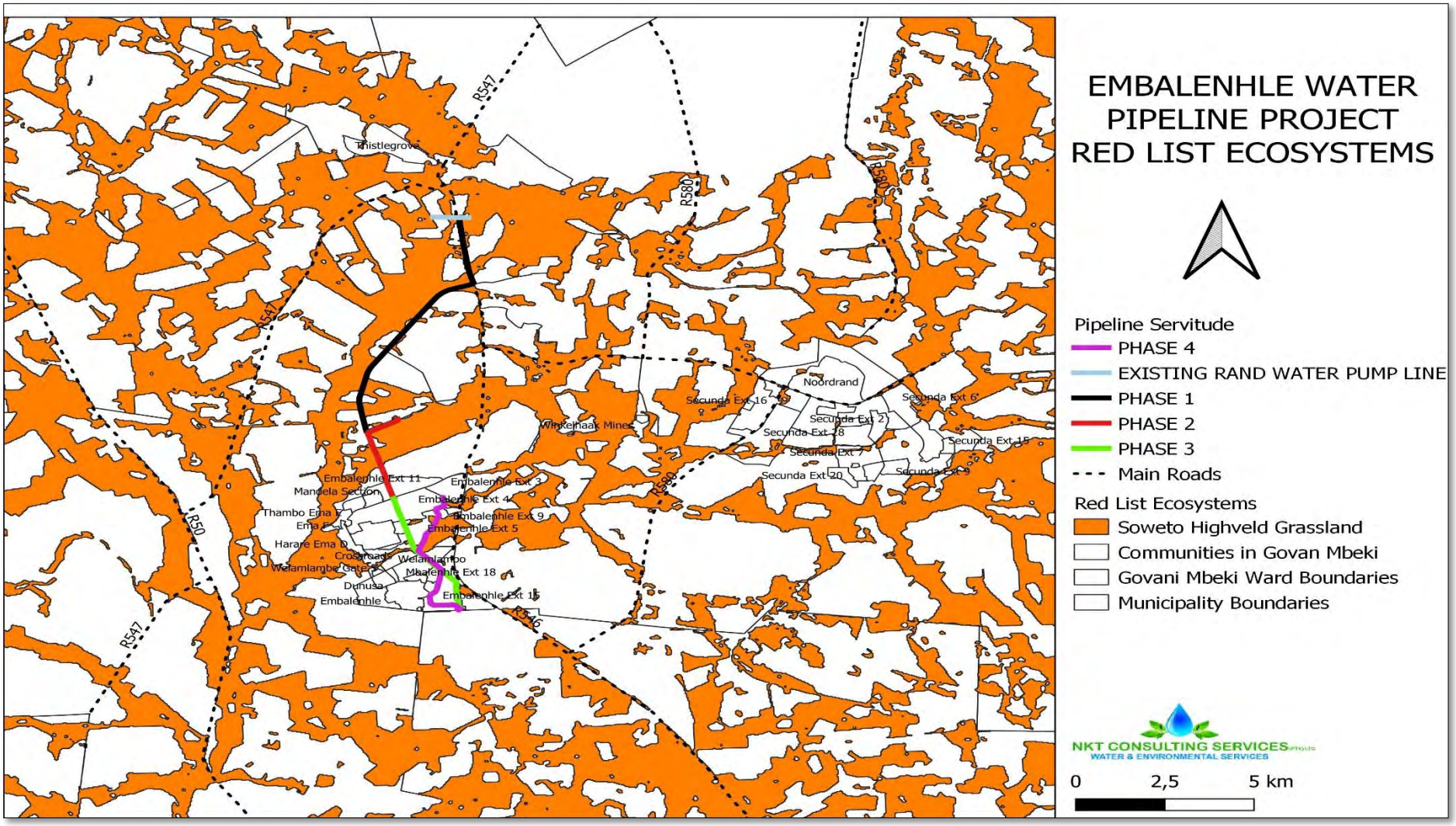


Figure 13: Red list ecosystems

8.7.2 Terrestrial Ecosystem

Govan Mbeki contains mainly the Grassland Biome. A biome can, in general terms, be described as a broad ecological unit, representing a large natural area with a relatively uniform plant and animal life, closely determined by environmental conditions and, especially, climate. Grassland landscapes are dominated by grass. Although grasses are the most visible plants, grasslands have a higher diversity than other herbaceous species, especially those with below-ground storage organs such as bulbs or tubers. These plants produce many spectacular wild flowers and contribute to biodiversity that is second only to the Cape Fynbos in species richness. Grassland species are particularly well adapted to being defoliated, whether by grazing, fire or frost. Repeated defoliation, within reason, does no real harm to such plants nor does it reduce productivity. (Ferrar and Lotter 2007): The cool, dry open landscapes of the Highveld , mainly above 1000 m, with rainfall of over 500 mm/yr, is subjected to the common occurrence of frost, hail storms and lightning strikes . The natural occurrence of fire and these other defoliating events favour grassland plants over woody species and help maintain the open treeless character of grasslands. Grasslands within Govan Mbeki have irreversibly been transformed by mainly agriculture and mining. These land uses destroy biodiversity but extensive livestock grazing can be reasonably biodiversity- friendly, provided good management and safe stocking rates are applied. Fire is a characteristic feature of grassland and is a necessary component of good land management. Grassland plants depend on fire, they resprout annually from their root-stocks. Without frequent fire, grasslands eventually become invaded with woody species and some herbaceous plants die. Regular burning to complement good grazing management helps to prevent the increase of species unpalatable to livestock, including woody species that form bush encroachment

The project area falls within the Soweto Highveld Grassland (Refer to Figure 14) which is regarded as vulnerable (refer to Figure 15). Vulnerability is mainly caused by habitat loss or destruction of the species' home due to urbanization.

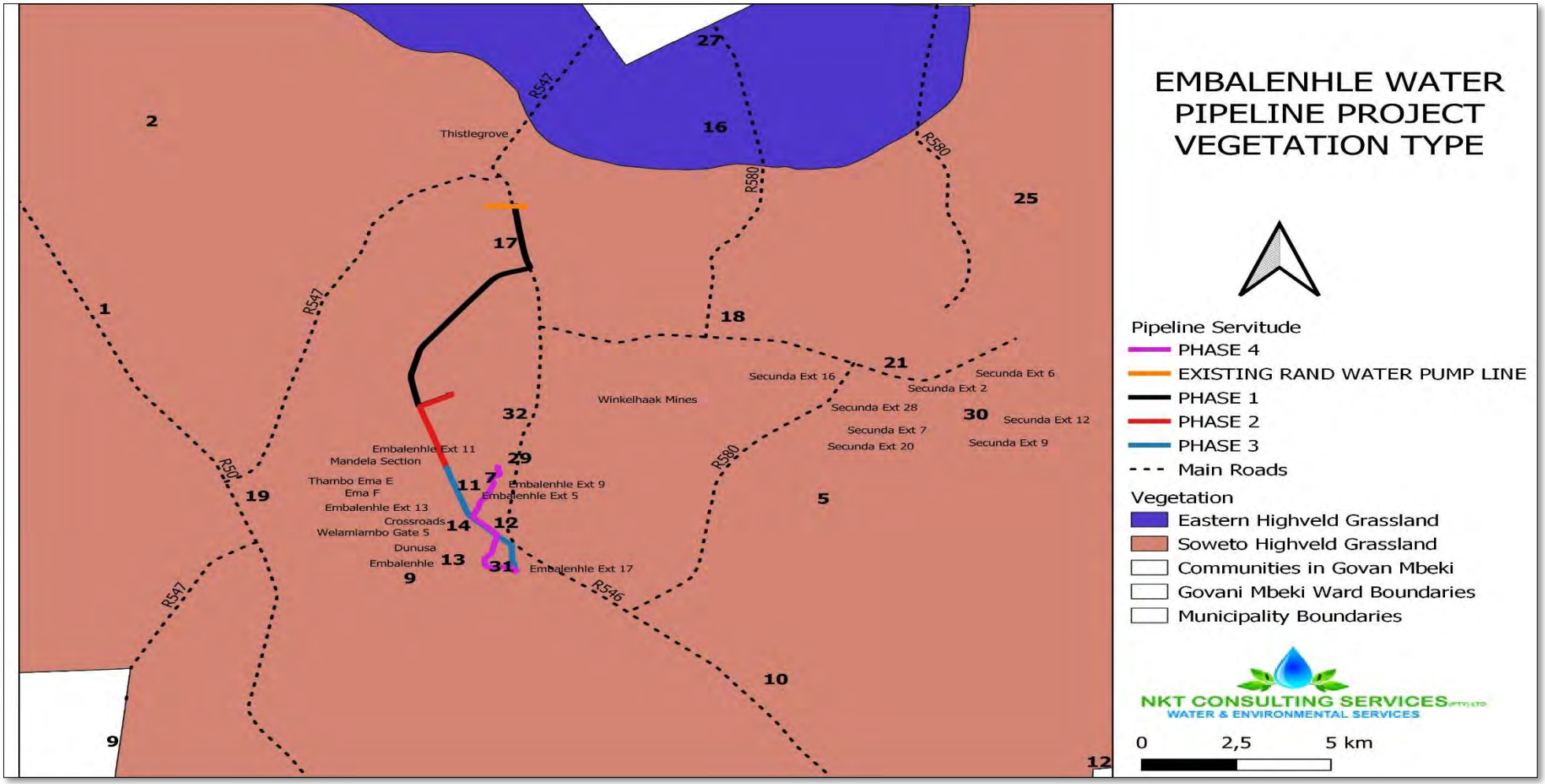


Figure 14: Vegetation type in the study area

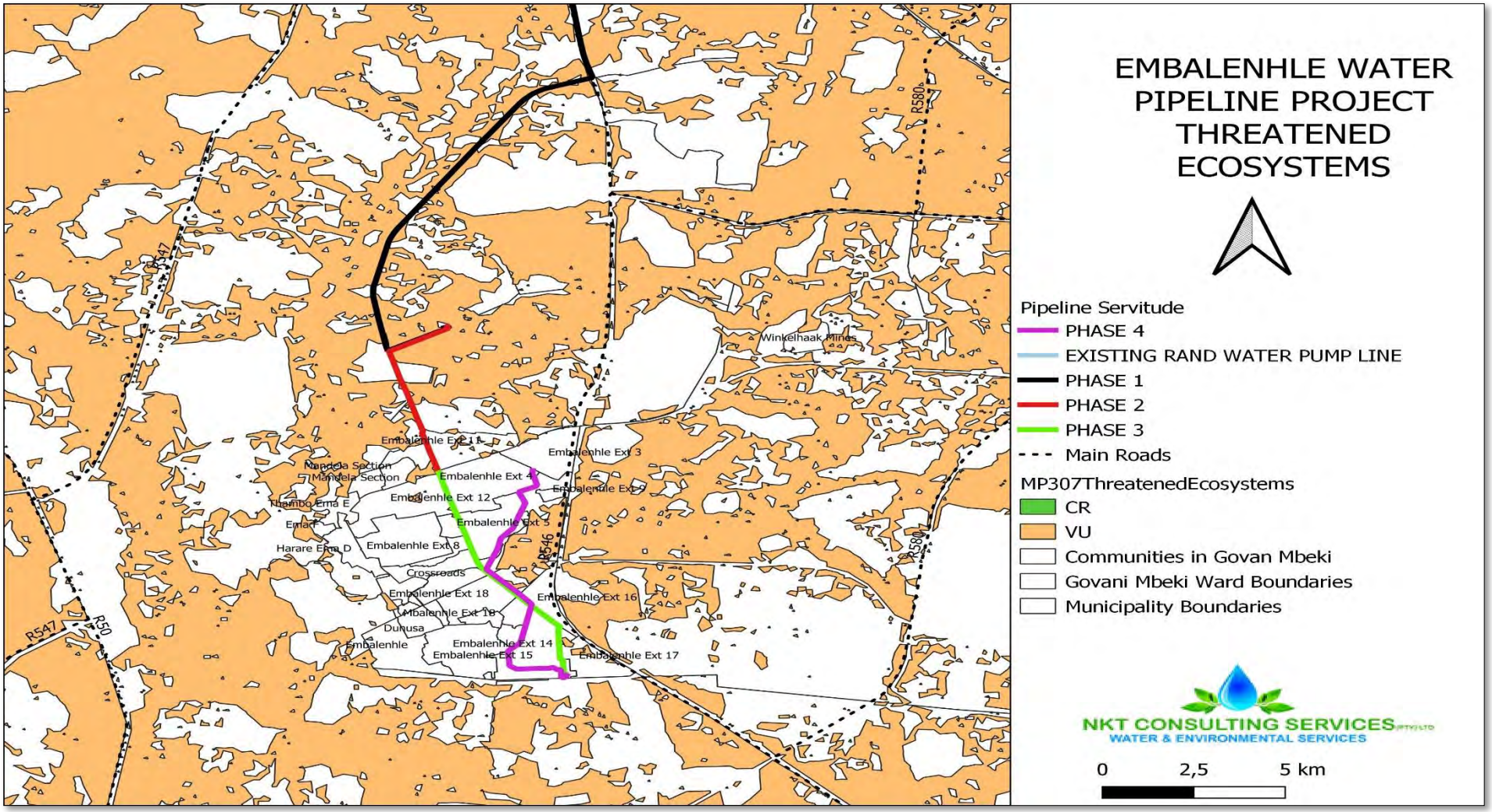


Figure 15: Threatened ecosystems

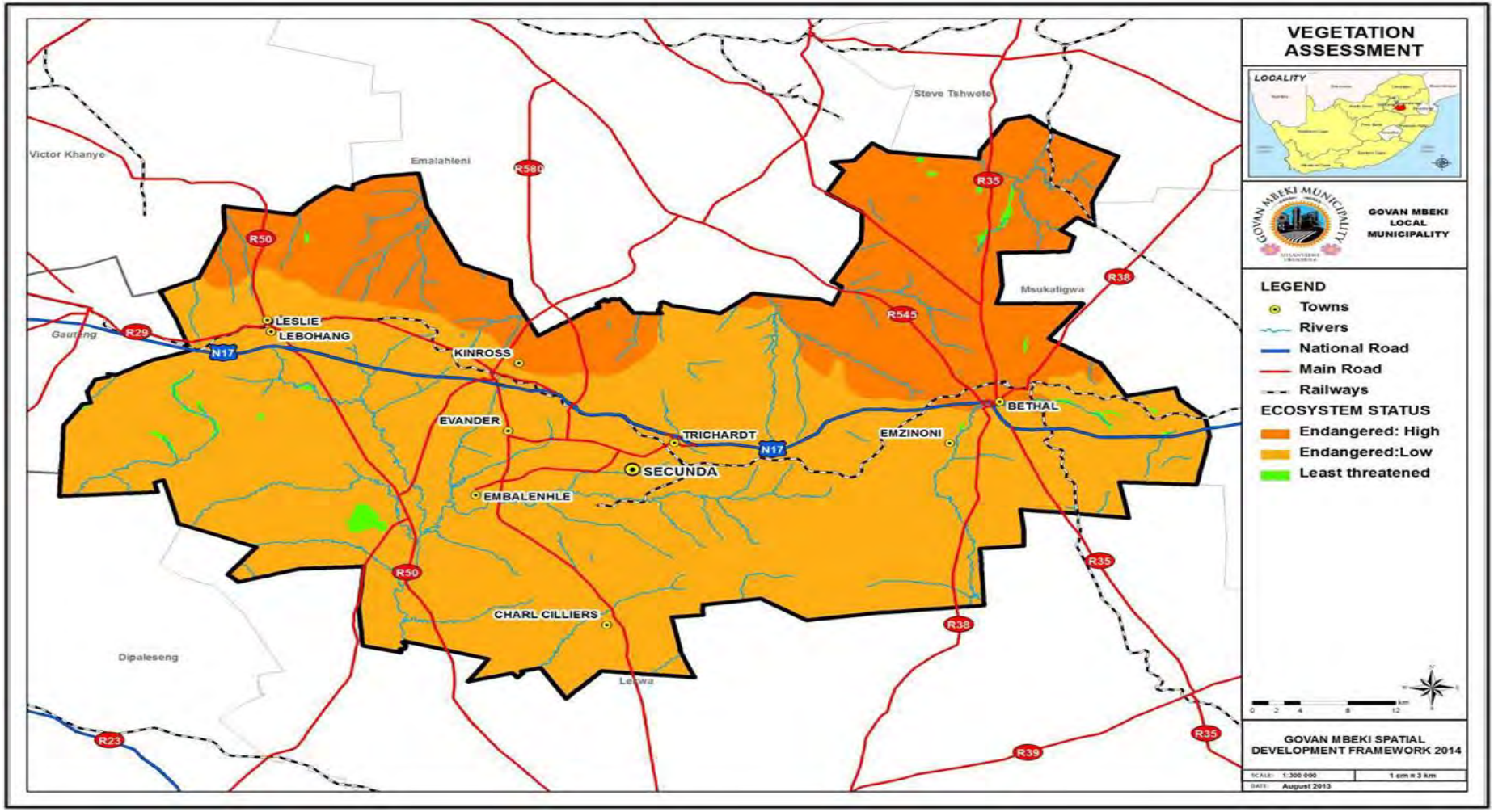


Figure 16: Vegetation Assessment

8.7.3 Critical Biodiversity Areas and Ecological Support Areas

Critical Biodiversity Areas are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan. Ecological Support Areas are not essential for meeting biodiversity targets but play an important role in supporting the ecological functioning of Critical Biodiversity Areas and/or in delivering ecosystem services. Critical Biodiversity Areas and Ecological Support Areas may be terrestrial or aquatic.

The primary purpose of a map of Critical Biodiversity Areas and Ecological Support Areas is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes.

The assessment for the local municipality and project area is illustrated in Table 7, Figure 17 and Figure 18 .

Table 7: Govan Mbeki Biodiversity Assessment

Biodiversity Assessment	Area (Ha)	%
CBA[1] Irreplaceable	27576.65	9.33%
CBA Optimal	49289.79	16.67%
ESA[2] Landscape corridor	1560.98	0.53%
ESA Local corridor	8693.80	2.94%
ESA Species Specific	4911.98	1.66%
Modified	134899.87	45.62%
Modified - Old lands	30001.34	10.15%
Other Natural Areas	38774.05	13.11%
Total	295708.45	100.00%

Source: Lötter, 2013[3]

ESA: Ecological Support Areas
CBA: Critical Biodiversity Areas
CR: Critical Endangered Rivers

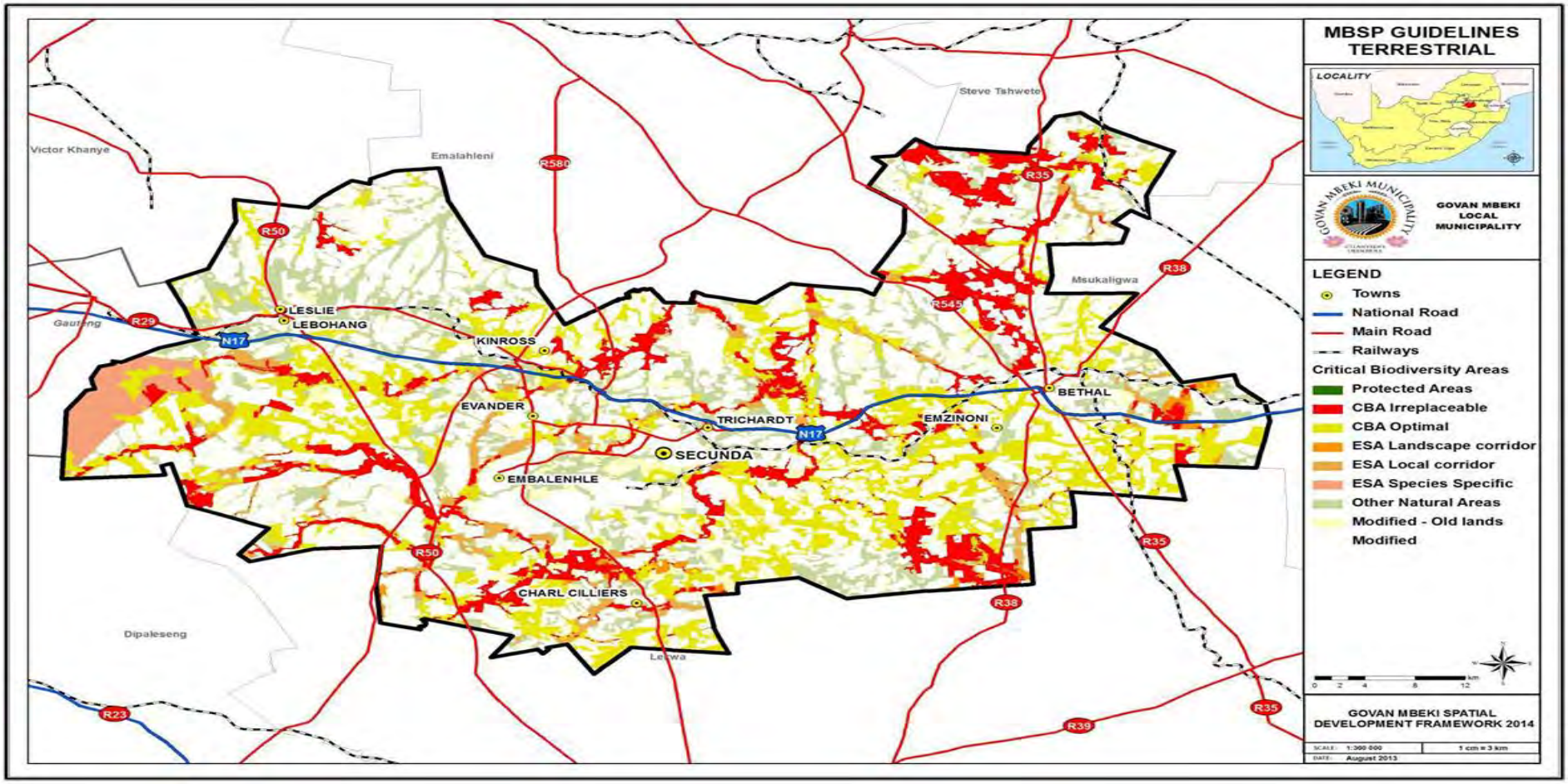


Figure 17: Biodiversity assessment

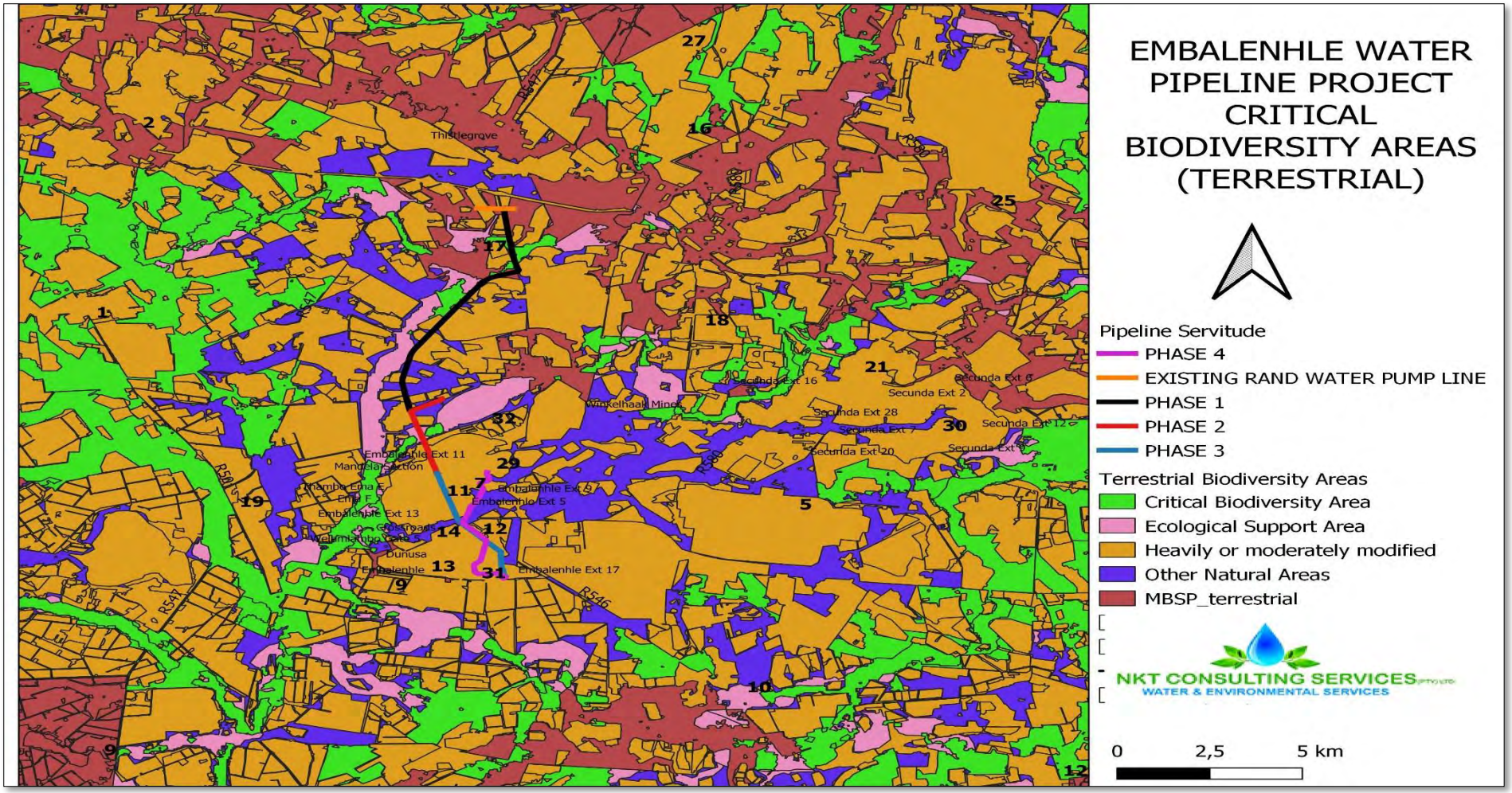


Figure 18: CBA and ESA for the project area

9 DESCRIPTION OF THE RECEIVING SOCIO-ECONOMIC ENVIRONMENT

This section provides an overview of the current economic situation, in the Govan Mbeki Local Municipality. This overview incorporates sectoral performances and composition as well as overall growth performance in the economy

9.1 Economic Sectors

The relevant features of the economic conditions in the areas are discussed in this section

Table 8: Main economic sectors

Sector	Description
Agriculture	Establishments and activities primarily engaged in farming activities. Also includes establishments focusing on commercial hunting and game propagation and forestry, logging and fishing.
Mining	The extracting, beneficiating of minerals occurring naturally, including solids, liquids and crude petroleum and gases. Also includes underground and surface mines, quarries and the operation of oil and gas wells and all supplemental activities for dressing and beneficiating for ores and other crude materials.
Manufacturing	The physical or chemical transformation of materials or compounds into new products.
Utilities (generally referred to as "electricity" and "water")	The supply of electricity, gas and hot water, the production, collection and distribution of electricity, the manufacture of gas and distribution of gaseous fuels through mains, supply of steam, and the collection, purification and distribution of water
Construction	The site preparation, building of complete constructions or parts thereof, civil engineering, building installation, building completion and the renting of construction or demolition equipment with operators.
Trade	Wholesale and commission trade, retail trade, repair of personal household goods, sales, maintenance and repair of motor vehicles and motor cycles, hotels, restaurants, bars, canteens, camping sites and other provision of short-stay accommodation.
Transport, storage and communication	Activities concerned with land transport, railway transport, water transport and transport via pipelines, air transport, activities of travel agencies, post and telecommunication, courier activities, as well as storage and warehousing activities.

Sector	Description
Financial and business services	Inter alia financial intermediation, insurance, and pension funding, real estate activities, renting or transport equipment, computer and related activities, research and development, legal, accounting, bookkeeping and auditing activities, architectural, engineering and other technical activities and business activities not classified elsewhere.
Social and community services	Public administration activities of government, government departments and agencies, education, public and private, health and social work, sewage and refuge disposal, sanitation and similar activities, activities of membership organisations, recreational, cultural and sporting activities, washing and dry- cleaning of textiles and fur products, hairdressing and other beauty treatment, funeral and related activities.

9.2 Employment

The sector contribution indicates the following:

- The highest levels of employment within Govan Mbeki are experienced in:
  - ✓ Trade (22%),
  - ✓ Mining (20%) and
  - ✓ Manufacturing (20.4%)
- Community services accommodate the highest % of formal employment within the country (22.1%)
- The Trade sector plays a major role as employment provider within:
  - ✓ The country (21.9%),
  - ✓ Province (22.4%),
  - ✓ District (19%),
  - ✓ Govan Mbeki (22%)
  - ✓ The surrounding municipalities (20%).

Table 9: Sectoral Formal Employment (IHS global Insight 2013)

Area		Agriculture	Mining	Manufacturing	Utilities	Construction	Trade	Transport	Finance	Community services	Households	Total
National Total	n	726 172	517 734	1 560 110	68 865	821 493	2 804 842	709 813	1 690 625	2 826 991	1 068 523	12 795 167
	%	5.7	4.0	12.2	0.5	6.4	21.9	5.5	13.2	22.1	8.4	100
Mpumalanga	n	106 526	104 906	111 871	11 179	67 880	219 035	40 418	61 643	176 050	78 824	978 332
	%	10.9	10.7	11.4	1.1	6.9	22.4	4.1	6.3	18.0	8.1	100
Gert Sibande District Municipality	n	33 397	35 722	29 727	2 659	12 511	46 540	10 735	12 349	40 811	20 295	244 747
	%	13.6	14.6	12.1	1.1	5.1	19.0	4.4	5.0	16.7	8.3	100
Govan Mbeki & surrounding municipalities	n	31 957	78 948	59 161	7 888	24 112	85 184	19 087	26 465	61 289	32 571	426 661
	%	7.5	18.5	13.9	1.8	5.7	20.0	4.5	6.2	14.4	7.6	100
Govan Mbeki	n	2 926	19 878	20 341	539	5 480	21 941	4 595	5 686	11 128	7 095	99 608
	%	2.9	20.0	20.4	0.5	5.5	22.0	4.6	5.7	11.2	7.1	100
Emalahleni	n	2 921	25 398	19 196	4 019	8 059	27 246	6 285	8 729	17 203	8 073	127 130
	%	2.3	20.0	15.1	3.2	6.3	21.4	4.9	6.9	13.5	6.4	100.0
Steve Tshwete	n	4 656	18 913	10 440	1 815	5 067	16 128	2 670	5 532	11 387	6 012	82619
	%	5.6	22.9	12.6	2.2	6.1	19.5	3.2	6.7	13.8	7.3	100.0
Msukaligwa	n	7841.8	3755.4	2296.0	285.0	1722.7	6987.8	2230.9	2324.9	7986.9	3660.2	39091.7
	%	20.1	9.6	5.9	0.7	4.4	17.9	5.7	5.9	20.4	9.4	100.0
Victor Khanye	n	4132.9	2883.1	1786.0	121.3	1279.8	4348.0	1233.5	1122.0	3249.3	2714.3	22870.1
	%	18.1	12.6	7.8	0.5	5.6	19.0	5.4	4.9	14.2	11.9	100.0
Dipaleseng	n	2291.4	387.5	389.1	189.7	406.9	1353.6	217.3	267.3	1509.3	832.0	7844.2
	%	29.2	4.9	5.0	2.4	5.2	17.3	2.8	3.4	19.2	10.6	100.0
Lekwa	n	6454.9	7708.0	2685.3	868.2	1274.7	4753.2	964.1	1291.6	6140.6	3152.4	35292.9
	%	18.3	21.8	7.6	2.5	3.6	13.5	2.7	3.7	17.4	8.9	100.0

Table 10: Sectoral formal employment distribution in percentages (IHS global Insight 2013)

	Agriculture	Mining	Manufacturing	Electricity	Construction	Trade	Transport	Finance	Community services	Households	Total
Mpumalanga: National	14.7	20.3	7.2	16.2	8.3	7.8	5.7	3.6	6.2	7	7.6
Gert Sibande: Mpumalanga	31.4	34.1	26.6	23.8	18.4	21.2	27	20	23.2	26	25
Govan Mbeki: Gert Sibande	8.8	55.6	68.4	20.3	43.8	47.1	43	46	27.3	35	40.7
Govan Mbeki:Govan Mbeki and surrounding municipalities	9.2	25.2	34.4	6.8	22.7	25.8	24	21.5	18.2	22	23

Table 11: Sectoral Formal Employment Distribution: Govan Mbeki and Surrounding Municipalities Percentages (IHS global Insight 2013)

Area	Agriculture	Mining	Manufacturing	Electricity	Construction	Trade	Transport	Finance	Community services
Govan Mbeki and surrounding areas	100	100	100	100	100	100	100	100	100
Govan Mbeki	9	25	34	7	23	26	24	21	18
Emalahleni	9	32	32	51	33	32	33	33	28
Steve Tshwete	15	24	18	23	21	19	14	21	19
Msukaligwa	24.5	4.8	3.9	3.6	7.1	8.2	12	8.8	13
Victor Khanye	0.4	3.7	3	1.5	5.3	5.1	6.5	4.2	5.3
Dipaleseng	7.2	0.5	0.7	2.4	1.7	1.6	1.1	1	2.5
Lekwa	20.2	0.2	4.5	11	5.3	5.6	5.1	4.9	10

Govan Mbeki as part of the district contributes:

- *68.4% to the manufacturing sector*
- *55.6% to the mining sector*
- *47.1% to trade sector*
- *27.3% to construction sector*
- *46% to finance sector*
- *35% to households sector*

9.3 Unemployment

The unemployment rate measures the number of people actively looking for a job as a percentage of the labour force.

Table 12: Unemployment Rate Percentages (IHS global Insight 2013)

	African			White			Coloured			Asian			Total		
	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total
Mpumalanga	21.80	33.00	26.50	4.50	7.80	5.90	23.40	26.20	24.70	5.50	8.30	6.40	20.20	30.60	24.50
Gert Sibande District Municipality	25.50	43.60	32.70	6.20	11.10	8.10	25.50	36.50	29.90	6.20	10.50	7.50	23.30	40.20	30.00
Govan Mbeki Local Municipality (MP307)	20.80	42.80	28.80	4.00	9.10	5.90	13.20	25.80	17.80	5.10	12.10	7.50	18.20	37.40	25.20
Emalahleni Local Municipality (MP312)	17.70	36.70	24.40	6.00	11.60	8.20	39.10	47.40	42.90	6.40	5.80	6.20	16.40	32.80	22.20
Steve Tshwete Local Municipality (MP313)	13.30	24.50	17.40	3.70	7.50	5.20	21.80	18.40	20.20	5.40	3.00	4.50	11.50	20.70	14.90
Msukaligwa Local Municipality (MP302)	23.00	44.60	31.70	6.80	11.40	8.70	4.70	6.80	5.50	7.10	1.80	5.60	21.20	40.80	29.10
Victor Khanye Local Municipality (MP311, Delmas)	23.10	50.90	33.50	7.30	9.40	8.10	14.50	18.40	16.20	5.20	9.50	6.20	20.60	44.20	29.40
Dipaleseng Local Municipality (MP306)	28.00	55.30	37.40	8.00	13.10	9.80	3.10	13.90	6.00	7.70	18.20	10.30	26.00	51.50	34.80
Lekwa Local Municipality (MP305)	25.70	38.90	31.40	8.30	13.80	10.40	62.00	57.70	60.00	10.70	19.50	13.60	24.30	36.80	29.70

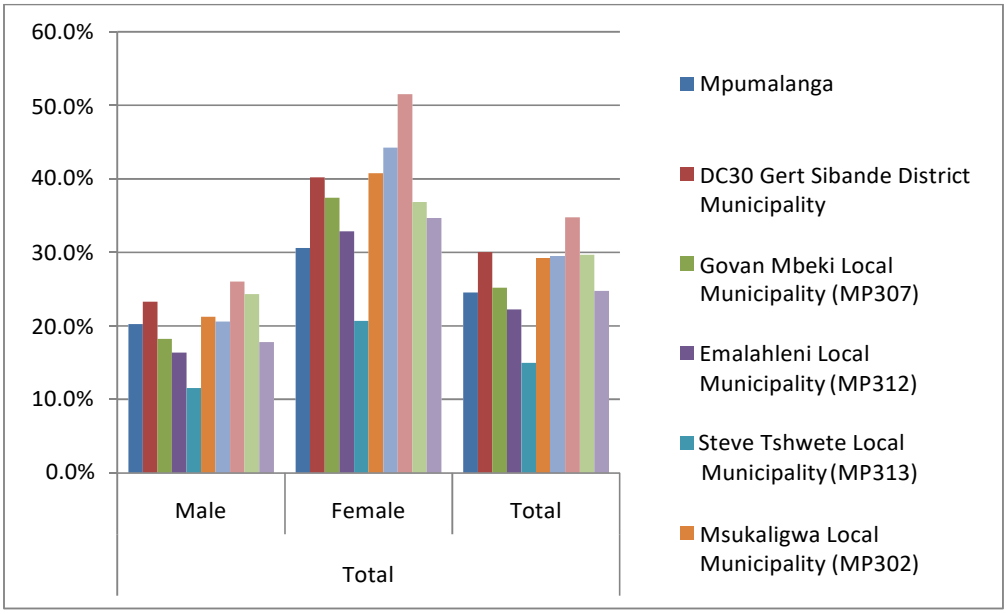


Figure 19: Unemployment rate

From the above table it is evident that:

- The Govan Mbeki unemployment rate (25.2%) is:
  - ✓ Higher than the provincial rate (24.5%)
  - ✓ Lower than the district rate (30.0%)
- Blacks experience the highest unemployment rates in all areas.
- Coloured unemployment rates are also significantly high in almost all areas.
- The female unemployment rate in Govan Mbeki (37.4%) exceeds:
  - ✓ The male rate (18.2%)
  - ✓ The male (20.2%) and female (30.6%) rate in the province
  - ✓ The male (23.3%) rate in the district

9.4 Population Distribution

According to Stats SA (2016 Community Survey - CS), Govan Mbeki's population increased from 294 538 in 2011 to 340 091 people in 2016 – 5th largest population in the province and 30% of total population of Gert Sibande in 2016 making it the 1st largest population in the Gert Sibande District. This could be the result of people migrating to the municipality seeking job opportunities as Govan Mbeki is considered to be one of the economical hub of Mpumalanga for job seekers. Population grew by 45 553 in the relevant period and recorded a population growth rate of 3.3% (2nd highest in Mpumalanga) per annum between 2011 & 2016. The population number for 2019 was estimated at 374 883 people (4th highest and 8.2% of the MP Population in 2019) and in 2030 estimated at 535 796 (10.2%) given the historic population growth per annum – will put pressure on the infrastructure, service delivery and economic/employment opportunities.

9.4.1 Age and Gender Distribution

Age and gender of the population are the key determinant of population dynamic and can influence the current and future needs and spending of the municipality. The analysis of the age and gender distribution of Govan Mbeki Municipality particularly highlight growth trends, the gender ratio, and functional age categorisation and how the age distribution impacts dependency on the working population. These statistics provide important insights into the age groups, where the bulk of the population is located and to target government, civil society, and non-governmental programmes more effectively. The 65 year and older age group gives an indication of persons that have retired and are elderly and potentially no longer economically active. It highlights the gender distribution for the GMM, based on the differentiation between male and female according to age groups. The age and gender distribution for Govan Mbeki is predominantly evenly spread out with males (52%) dominating females (48%) as can see from the below Table 13 comparison between 2011 and 2016. The 0 to 14 age group provides an indication of those persons still dependent on their parents and that are thus not economically active, whilst the 15 to 64 year age group shows persons potentially economically active within the population

Table 13: Age and gender distribution

2011Census Population Size			
Age	**Male**	**Female**	**Grand Total**
0 - 4	15129	15176	30305
5 - 9	12843	12761	25604
10 - 14	11778	11517	23295
15 - 19	12898	12842	25740
20 - 24	17261	14449	31710
25 - 29	18512	14829	33341
30 - 34	14306	11136	25441
35 - 39	11027	9795	20822
40 - 44	9202	8910	18112
45 - 49	8330	8689	17019
50 - 54	7741	7338	15079
55 - 59	5608	5021	10629
60 - 64	3272	3308	6580
65 - 69	1962	2321	4283
70 - 74	1020	1834	2854
75 - 79	703	1123	1826
80 - 84	328	717	1045
85+	291	560	851
Grand Total	**152211**	**142326**	**294538**

2016 Community Survey Population Size			
Age	**Male**	**Female**	**Grand Total**
00-04	14866	14931	29796
05-09	15040	14725	29766
10-14	12999	13165	26164
15-19	15709	14773	30481
20-24	19121	15683	34805
25-29	23295	19082	42377
30-34	17572	14691	32264
35-39	13397	11550	24947
40-44	10364	9294	19658
45-49	9383	9153	18536
50-54	8017	7277	15294
55-59	7127	6259	13386
60-64	4121	4214	8334
65-69	2931	3089	6020
70-74	1832	2359	4191
75-79	614	1237	1851
80-84	435	1073	1508
85+	116	595	711
Grand Total	**176939**	**163152**	**340091**

10 DETAILS OF THE PUBLIC PARTICIPATION PROCESS

The principles of the National Environmental Management Act, 1998 (Act No 107 of 1998) and the Environmental Impact Assessment Regulations, April 2006 govern many aspects of Environmental Impact Assessments, including Public Participation. These include provision of sufficient and transparent information on an ongoing basis to stakeholders to allow them to comment and ensuring the participation of previously disadvantaged people, women, and youth. Effective public involvement is an essential component of many decision-making structures, and effective community involvement is the only way in which the power given to communities can be used efficiently. The Public Participation Process is designed to provide sufficient and accessible information to interested and affected parties (I&AP's) in an objective manner to assist them to:

a) Raise issues of concern and suggestions for enhanced benefits.
b) Verify that their issues have been captured.
c) Verify that their issues have been considered by the technical investigations; and
d) Comment on the findings of the Basic Assessment Report.

In terms of the Guideline Document for Environmental Impact Assessment (EIA) Regulations promulgated in terms NEMA, stakeholders (I&AP's) were notified of the Environmental Evaluation Process through:

a) A site notice that was erected (at prominent points on and around the study area)
b) A public notice was distributed in a 100m radius around the proposed site to all parties concerned**.**
c) An advertisement was placed in the in the Citizen and published on the 16th of May 2022 (**refer to Appendix 6A**).
d) A list of all persons, organisations and organs of state that were registered as interested and affected parties in relation to the application are included in the final report (**refer to Appendix 6B)**
e) The draft reports were circulated to I&APs and State Organs as per the EIA regulations (**refer to Appendix 6C**

10.1 Public Review

The draft BAR was distributed to the interested and affected parties and local municipality for access to the public. Soft copies were also shared with affected government organs (**refer to Appendix 6C)**.

10.2 Assumptions and Limitations

General assumptions and limitations relating to the BA process are listed below:

a) The EAP hereby confirms that they have undertaken to obtain project information from the client that is deemed to be accurate and representative of the project.
b) Site visits have been undertaken to better understand the project and ensure that the information provided by the client is correct, based on site conditions observed.
c) The EAP hereby confirms their independence and understands the responsibility they hold in ensuring all comments received are accurately replicated and responded to within the assessment documentation.
d) The comments received in response to the public participation process, are representative of comments from the broader community; and
e) The competent authority would not require additional specialist input, as per the proposals made in this report, to make a decision regarding the application.

Notwithstanding these assumptions, it is the view of NKT Consulting that this BA report provides a sound description of the issues associated with the project and the resultant impacts.

11 ENVIRONMENTAL IMPACT ASSESSMENT

11.1 Introduction

The EIA of the project activities is determined by identifying the environmental aspects and then undertaking an environmental risk assessment to determine the significant environmental aspects. The environmental impact assessment has included all phases of the project namely:

a) Construction Phase; and
b) Operational Phase.

NB: due to the nature of the development it is anticipated that the infrastructure would be permanent, thus not requiring decommissioning or rehabilitation. Maintenance of infrastructure will be addressed under the operational phase.

11.2 Methodology

The potential environmental impacts associated with the project will be evaluated according to it nature, extent, duration, intensity, probability, and significance of the impacts, whereby:

a) **Nature**: A brief written statement of the environmental aspect being impacted upon by a particular action or activity.
b) **Extent:** The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms

of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale.

c) **Duration:** Indicates what the lifetime of the impact will be.
d) **Intensity:** Describes whether an impact is destructive or benign.
e) **Probability:** Describes the likelihood of an impact occurring; and
f) **Cumulative:** In relation to an activity, means the impact of an activity that may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The identification of potential impacts should include impacts that may occur during the construction, operational and decommissioning phases of the development. The assessment of impacts is to include direct, indirect as well as cumulative impacts. In order to identify potential impacts (both positive and negative) it is important that the nature of the proposed projects is well understood so that the impacts associated with the projects can be assessed. The process of identification and assessment of impacts will include:

a) Determining the current environmental conditions in sufficient detail so that there is a baseline against which impacts can be identified and measured.
b) Determining future changes to the environment that will occur if the activity does not proceed.
c) Develop an understanding of the activity in sufficient detail to understand its consequences; and
d) The identification of significant impacts which are likely to occur if the activity is undertaken.

As per the DEAT Guideline 5: Assessment of Alternatives and Impacts the following methodology is to be applied to the predication and assessment of impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative:

a) Direct impacts are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
b) Indirect impacts of an activity are indirect or induced changes that may occur because of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place because of the activity.
c) Cumulative impacts are impacting that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or

reasonably foreseeable future activities. The cumulative impacts will be assessed by identifying other project proposals and other applicable projects,

d) Spatial extent – The size of the area that will be affected by the impact:

- Site specific **(1)**.
- Local **(2):** (<2 km from site).
- Regional **(3):** (within 30 km of site).
- National **(4)**; or

e) Intensity – The anticipated severity of the impact:

- Very High (**4):** (Natural, cultural, and social functions and processes are altered to extent that they permanently cease)
- High **(3)**: (severe alteration of natural systems, patterns, or processes).
- Medium **(2)**: (notable alteration of natural systems, patterns, or processes); or
- Low **(1)**: (negligible alteration of natural systems, patterns, or processes).

f) Duration – The timeframe during which the impact will be experienced:

- Short term **(1)**: (1 to 6 years).
- Medium term **(2)**: (6 to 15 years).
- Long term **(3)**: (the impact will cease after the operational life of the activity); or
- Permanent **(4)**: (mitigation will not occur in such a way or in such a time span that the impact can be considered transient).

g) Reversibility of the Impacts - the extent to which the impacts are reversible assuming that the project has reached the end of its life cycle (decommissioning phase) will be

- High reversibility of impacts (impact is highly reversible at end of project life);
- Moderate reversibility of impacts.
- Low reversibility of impacts; or
- Impacts are non-reversible (impact is permanent).

h) Irreplaceability of Resource Loss caused by impacts – the degree to which the impact causes irreplaceable loss of resources if the project has reached the end of its life cycle (decommissioning phase) will be:

- High irreplaceability of resources (project will destroy unique resources that cannot be replaced).
- Moderate irreplaceability of resources.
- Low irreplaceability of resources; or
- Resources are replaceable (the affected resource is easy to replace/rehabilitate).

Using the criteria above, the impacts will further be assessed in terms of the following:

a) Probability –The probability of the impact occurring:

- Improbable **(1)**: (little or no chance of occurring).
- Probable **(2)**: (<50% chance of occurring).
- Highly probable **(3)**: (50 – 90% chance of occurring); or
- Definite **(4)**: (>90% chance of occurring).

b) Significance – Will the impact cause a notable alteration of the environment?

- Low to very low (the impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures and will not have an influence on decision-making).
- Medium (the impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated); or
- High (the impacts will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision making).

Table 14: Criteria for the rating of classified impacts

Low impact (4 -6 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
Medium impact (7 -9 points)	Mitigation is possible with additional design and construction inputs.
High impact (10 -12 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high impact (13 - 20 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact.
Negative (-)	Deleterious or adverse impact.
Neutral (/)	Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed. Therefore not all negative impacts are equally significant.	

11.3 Construction Phase

The potential direct, indirect, and cumulative environmental impacts associated with the construction / development phase of the Preferred Alternative are set out in Table 15 hereunder, together with recommended mitigation measures

Table 15: Potential Construction Phase Impacts of the Preferred Alternative

POTENTIAL ENVIRONMENTAL IMPACT	RECOMMENDED MITIGATION MEASURES
VEGETATION	
Direct Impacts: A direct, negative impact on indigenous vegetation will arise because of the clearance of vegetation for the purposes of the pipeline. **Indirect impacts** • Disturbance of the indigenous vegetation and the topsoil, because of clearing, will increase the risk of invasion of the remainder of the pipeline servitude by opportunistic alien invasive plant species. **Cumulative Impacts:** • General reduction in floral biodiversity in the area.	• It is recommended that vegetation clearance and disturbances associated with the construction of each individual phase be limited to the footprint of that relevant phase. • All protected plant and tree species must be identified, removed from the site, and relocated either to the Open Space area or offsite to a suitable area (which is formally protected), as far as possible. • An alien invasive plant management programme must be compiled and implemented as part of the EMPr for the construction phase. This plan must require that alien plants be continuously monitored and controlled throughout all phases of the construction, and not left until the post construction / rehabilitation phase

IMPACT SIGNIFICANCE RATING

Before Mitigation	E	D	I	P	Significance	After Mitigation	E	D	I	P	Significance
	3	4	4	4	-15 (Negative Very High)		1	4	3	3	-12 (Negative Very high)

FAUNAL IMPACTS	
Direct Impacts: • Vegetation clearance of the servitude will result in habitat destruction and loss, as well as displacement of fauna currently living along the servitude. **Indirect Impacts:**	All fauna captured must be relocated to a formally protected area.

<table>
<tr><th>POTENTIAL ENVIRONMENTAL IMPACT</th><th>RECOMMENDED MITIGATION MEASURES</th></tr>
<tr><td>• Loss of foraging / hunting, nesting, and movement areas as a result of maintenance of the servitude.
• Increased faunal mortality as a result of maintenance of the servitude.</td><td></td></tr>
<tr><td colspan="2">IMPACT SIGNIFICANCE RATING</td></tr>
<tr><td colspan="2">
<table>
<tr><th>Before Mitigation</th><th>E</th><th>D</th><th>I</th><th>P</th><th>Significance</th><th>After Mitigation</th><th>E</th><th>D</th><th>I</th><th>P</th><th>Significance</th></tr>
<tr><td>Impact Assessment</td><td>3</td><td>4</td><td>4</td><td>4</td><td>-15 (Negative Very High)</td><td>Impact Assessment</td><td>1</td><td>2</td><td>2</td><td>2</td><td>-7 (Negative Medium)</td></tr>
</table>
</td></tr>
<tr><td colspan="2">WATER RESOURCES IMPACTS</td></tr>
<tr><td>Direct Impacts:
• Due to the distance between the servitude and any surface water features, as well as the presence of physical barriers, such as roads and buildings, between the servitudes and the surface water features, it is unlikely that the construction will have severe impacts on surface water resources because the upgrade will happen on existing servitude. The impact will happen on the Govani Mbeki river crossing for Phase 3 and 4.
• Poor control of hazardous materials (improper storage, spills, leaks and poor clean-up), could cause contamination of groundwater and surface water.</td><td>To prevent contamination of surface water resources due to oil and fuel leakages and accidental spillages, vehicles and construction equipment should not undergo maintenance procedures on site.
• Maintenance procedures should only take place during the maintenance of the pipeline.
• A Method Statement (MS) for the handling, storage and management of hazardous substances during the construction phase must be drawn up by the appointed Contractor, and reviewed by the ECO, prior to the commencement of construction. This MS must, as a minimum, include the following:
a) Potentially hazardous materials used during the construction phase (including cement and solvents) must be housed under cover (where practical) and utilising bunded areas, where necessary.
b) All reasonable efforts must be made to prevent potential spills of these substances.
c) Accidental spillages of hazardous materials to be cleaned up immediately by the Contractor, placed in sealed containers and disposed of at a licensed hazardous waste disposal site.
d) Spill kits must be made available, and the correct procedures followed during the clean-up of spills.</td></tr>
</table>

POTENTIAL ENVIRONMENTAL IMPACT	RECOMMENDED MITIGATION MEASURES
	• Baseline sampling of groundwater and surface water quality should be undertaken prior to the commencement of construction activities, to provide a point of comparison for groundwater and surface water sampling recommended to be undertaken during the construction phase

IMPACTS SIGNIFICANCE RATING

Before Mitigation	E	D	I	P	Significance	After Mitigation	E	D	I	P	Significance
Impact Assessment	1	2	2	2	-7 (Negative Medium)	Impact Assessment	1	2	1	2	-6 (Negative Low)

SOIL IMPACTS

Direct Impacts: • Potential disturbances on the soil include compaction, physical removal and potential pollution by hydrocarbons (diesel and oil), pain, solvents, cleaners and other harmful chemicals.	• All potential soil and water contaminants (including oil, fuel and cement) must be stored and handled in such a way so as to minimise the potential for spillage or leakage and contamination.

IMPACTS SIGNIFICANCE RATING

Before Mitigation	E	D	I	P	Significance	After Mitigation	E	D	I	P	Significance
Impact Assessment	1	3	3	2	-9 (Negative Medium)	Impact Assessment	1	2	1	1	-5 (Negative Low)

DUST IMPACTS

POTENTIAL ENVIRONMENTAL IMPACT	RECOMMENDED MITIGATION MEASURES
Direct Impacts: • Clearance of vegetation, grading and levelling, excavation activities and increased traffic volumes will result in increased dust generation and impact on the local community residing in the area. • This impact will be limited to the construction phase. **Indirect Impacts:** • Potential health impacts for construction workers and neighbours (allergies / asthma, etc). • Alteration of the aesthetics / sense of place of the area, although this will be temporary, limited to the Construction Phase.	• Dust minimisation and control measures should be implemented on the construction site at regular intervals. • The frequency of implementation of dust suppression measures should be increased when it is expected that high wind conditions will develop. • Vegetation clearing for each phase of development should only take place immediately prior to the commencement of construction activities for the relevant phase (i.e. immediately prior to the construction of each Phase), in order to minimise the amount of exposed soil on the site. • A Complaints Register must be made available on the site for the duration of construction. Any dust-related complaints must be efficiently and effectively dealt with

IMPACT SIGNIFICANCE RATING

Before Mitigation	E	D	I	P	Significance	After Mitigation	E	D	I	P	Significance
Impact Assessment	1	3	3	2	-9 (Negative Medium)	Impact Assessment	1	2	1	1	-5 (Negative Low)

NOISE AND VIBRATION IMPACTS	
Direct Impacts: • Construction vehicles, including delivery trucks and excavation equipment will produce an increase in noise and vibration disturbance.	• Construction activities should be limited to normal working hours (08:00 – 17:00) during the week and 08:00 – 13:00 on Saturdays. No work should occur on Sundays or Public Holidays. • All machinery and equipment to be utilised on the site should be fitted with mufflers and must be maintained in good working order to minimise noise levels. • The Contractor should encourage construction workers to minimise shouting and hooting on the site.

POTENTIAL ENVIRONMENTAL IMPACT	RECOMMENDED MITIGATION MEASURES
• Construction activities on the site, such as excavation, earthworks and the use of machinery will generate noise impacts which will affect the local community residing in close proximity to the construction site. • It must be noted that these impacts will be limited to the construction phase. **Indirect Impacts:** • Alteration of the aesthetics / sense of place of the area, although this will be temporary, limited to the Construction Phase.	• The Contractor shall warn any local communities and/or residents that could be disturbed by particularly noisy activities well in advance and shall keep such activities to a minimum. • The Contractor shall be responsible for compliance with the relevant legislation with the respect to noise. It must be ensured that all potential noise sources conform to the South African Bureau of Standards recommended code of practice, SANS Code 0103:1983, so that it will not produce excessive or undesirable noise. • Construction work should be completed in as short a time frame as possible in order to limit the longevity of these impacts.

IMPACTS SIGNIFICANCE RATING

Before Mitigation	E	D	I	P	Significance	After Mitigation	E	D	I	P	Significance
Impact Assessment	1	3	3	2	-9 (Negative Medium)	Impact Assessment	1	2	1	1	-5 (Negative Low)

WASTE MANAGEMENT IMPACTS

Direct Impacts: Wastes from construction activities may arise from a range of sources including excavated material from the levelling of the site, waste from construction workers using the site, and waste from equipment, packaging, materials, and vehicles. • Increase in volumes of general solid waste generated, resulting	• The Contractor must investigate ways in which to implement the waste hierarchy on site by: a) Identifying ways to avoid and reduce waste generation; b) Re-use waste materials; c) Recycle waste; d) Recover waste; and e) As a last resort, treat and dispose of wastes. This must be done by way of the preparation of a Waste Management Method Statement. • In order to reduce pressure on general waste landfill sites, it is recommended that, as far as possible, general solid wastes be

POTENTIAL ENVIRONMENTAL IMPACT	RECOMMENDED MITIGATION MEASURES
in increased pressure on licensed general waste disposal facilities. • Increase in volumes of hazardous waste generated, resulting in increased pressure on licensed hazardous waste disposal facilities. • Increase in volumes of sewage waste generated, resulting in increased pressure on licensed wastewater treatment and disposal facilities. • Improper storage and handling of wastes on site, and insufficient waste collection / removal may result in windblown litter, the attraction of pests (rats, flies, etc), water and soil contamination or bad odours (in particular from chemical ablution facilities). • Insufficient waste collection / removal may result in soil contamination (in particular if chemical toilets should overflow). **Indirect Impacts:** • Windblown litter and bad odours may result in an altered sense of place. • Increased pest populations and bad odours may create a nuisance and / or have health impacts for surrounding neighbours.	separated and sorted into its recyclable components (glass, plastic, metal, paper). This will require the provision of separate waste bins within the site camp, and the removal of these wastes to appropriate recycling facilities • The requirement to separate and sort general wastes should be included as part of the environmental induction and awareness programme. • All general waste bins on the site must be weather- and scavenger-proof. • Litter must be cleared from the site daily. • Hazardous wastes must be stored on an impermeable surface, in a bunded area. Such storage area must be clearly demarcated. • Wastes must be collected / removed from site regularly to ensure that no overflow occurs. It is recommended that chemical ablution facilities be serviced once a week, by an authorised service provider. • Safe disposal slips must be maintained for all waste types generated on site and disposed of off-site.

POTENTIAL ENVIRONMENTAL IMPACT	RECOMMENDED MITIGATION MEASURES

IMPACT SIGNIFICANCE RATING

Before Mitigation	E	D	I	P	Significance	After Mitigation	E	D	I	P	Significance
Impact Assessment	1	2	2	2	-8 (Negative Medium)	Impact Assessment	1	2	1	2	-6 (Negative Low)

TRAFFIC IMPACT ASSESSMENT

Direct Impacts: • The construction phase will result in additional traffic volumes on the local roads. • This traffic will be large and slow moving, in general. This may result in congestion. • Increased volumes and congestion may cause safety risks. • Large, heavy traffic, may cause deterioration of the road surfaces	• A detailed Traffic Management Plan should be compiled by the Contractor to ensure that traffic on the local roads is disrupted as little as possible. • This plan should include measures for the optimization of the amount of travel on the local roads, thereby reducing impact. • The delivery of construction equipment and material should be limited to hours outside peak traffic times (including weekends).

IMPACT SIGNIFICANCE RATING

Before Mitigation	E	D	I	P	Significance	After Mitigation	E	D	I	P	Significance
Impact Assessment	1	2	2	2	-8 (Negative Medium)	Impact Assessment	1	2	1	2	-6 (Negative Low)

CULTURAL AND HERITAGE IMPACTS

Direct Impacts: • There is a risk of sub-surface archaeological and/or paleontological resources being impacted upon and damaged during excavation activities associated with construction activities	• A Phase 1 Heritage Assessment (including paleontological assessment) should be undertaken during the EIA Phase. The recommendations arising from this specialist assessment must be included into the EMPr. • Should sub-surface archaeological resources or artefacts be uncovered during construction, activity must be halted, and the relevant Heritage Authority informed / permit application made

IMPACT SIGNIFICANCE RATING

POTENTIAL ENVIRONMENTAL IMPACT						RECOMMENDED MITIGATION MEASURES					
Before Mitigation	**E**	**D**	**I**	**P**	**Significance**	**After Mitigation**	**E**	**D**	**I**	**P**	**Significance**
Impact Assessment	1	1	1	1	-4 (Negative Medium)	Impact Assessment	1	1	1	1	-4 (Negative Low)

SOCIO-ECONOMIC IMPACTS

Construction will result in the creation of skilled, semi-skilled and unskilled jobs. Skills transfer will be promoted. **Cumulative Impacts:** Availability of uninterrupted waster supply to the communities	• All labour (skilled and unskilled) and contractors should be sourced locally where possible. • A labour and recruitment policy must be developed, displayed and implemented by the contractor. • Recruitment at the construction site will not be allowed. • Where possible, labour-intensive practices (as opposed to mechanised) should be practiced. • The principles of equality, BEE, gender equality and non-discrimination will be implemented.

IMPACT SIGNIFICANCE RATING

Before Mitigation	**E**	**D**	**I**	**P**	**Significance**	**After Mitigation**	**E**	**D**	**I**	**P**	**Significance**
Impact Assessment	1	3	3	3	+10 (Positive High)	Impact Assessment	2	4	4	4	+14 (Positive Very High)

Potential influx of workers to the area may result in increased expenditure for food, accommodation and entertainment, within the local economy, generating economic growth in the region.	• If possible, all labour should be sourced locally. • Contractors and their families may not stay on site. • No informal settlements will be allowed.
An influx of job seekers may also have negative impacts including potential increases in sexually transmitted diseases, prostitution, alcohol and drug abuse, crime and creation of conflict in local communities).	• The developers need to be actively involved in the prevention of social ills associated with contractors. • If possible, all labour should be sourced locally. • Contractors and their families may not stay on site. • No informal settlements will be allowed. • Contractors must be educated about the risk of prostitution and spread of HIV and AIDS.

IMPACTS SIGNIFICANCE RATING

POTENTIAL ENVIRONMENTAL IMPACT						RECOMMENDED MITIGATION MEASURES					
Before Mitigation	**E**	**D**	**I**	**P**	**Significance**	**After Mitigation**	**E**	**D**	**I**	**P**	**Significance**
Impact Assessment	2	2	2	2	-8 (Negative Medium)	Impact Assessment	2	1	1	1	-5 (Negative Low)

12 ENVIRONMENTAL IMPACT STATEMENT

12.1 Summary of Key Findings

During the EIA, the impact of the development on the biophysical and social environments was assessed. From the assessment, it was determined which parts of the two environments will be more significantly affected as compared to others. Below is a summary of the main findings of the EIA:

12.1.1 Vegetation Findings

No impacts were identified that could lead to a beneficial impact on the ecological environment of the study site since the proposed development is largely destructive, involving the alteration of natural habitat or degradation of habitat that is currently in a climax status.

12.1.2 Waste Management

The potential waste streams for the project were identified as domestic, hazardous, building and sewerage waste. The impact of the waste streams would be minimised by the rigorous mitigation measures that have been developed.

Waste collection will be undertaken by local municipality and sent through to a licensed waste disposal facility. All sewerage waste will be sent through to a licensed treatment facility.

12.1.3 Dust

During construction, the pollutants likely to be emitted are particulate matter generated by vehicle movement and exposed soil to wind erosion. This is most likely to be a nuisance.

Dust suppression activities (e.g. wet suppression with water) must be implemented during construction and decommissioning activities

12.1.4 Noise

The construction and decommissioning phases will see an increase in noise in the study area. Impacts relating to noise can be effectively managed with the implementation of the EMPr

13 ASSUMPTIONS AND LIMITATIONS

The process of investigation which has led to the identification and recommended mitigation of impacts, the assessment of impacts and the production of this report, harbours several assumptions, which include the following:

- All information provided by the Applicant, his Project Manager and the Project Team to the EAP was correct and valid at the time that it was provided;
- The public received a fair and sufficient opportunity to participate in the EIA process, through the provision of adequate public participation timeframes stipulated in the Regulations;
- The need and desirability was based on strategic national, provincial and local plans and policies which reflect the interests of both statutory and public viewpoints;
- The information provided by specialists is accurate and unbiased;
- The EIA process is a project-level framework and is limited to assessing the anticipated environmental impacts associated with the construction and operational phases of the preferred alternative for the proposed facility; and
- Strategic level decision making is conducted through cooperative governance principles with the consideration of sustainable and responsible development principles underpinning all decision making.

Given that an EIA involves prediction, **uncertainty** forms an integral part of the process. Two types of uncertainty are associated with the EIA process, namely process-related and prediction-related.

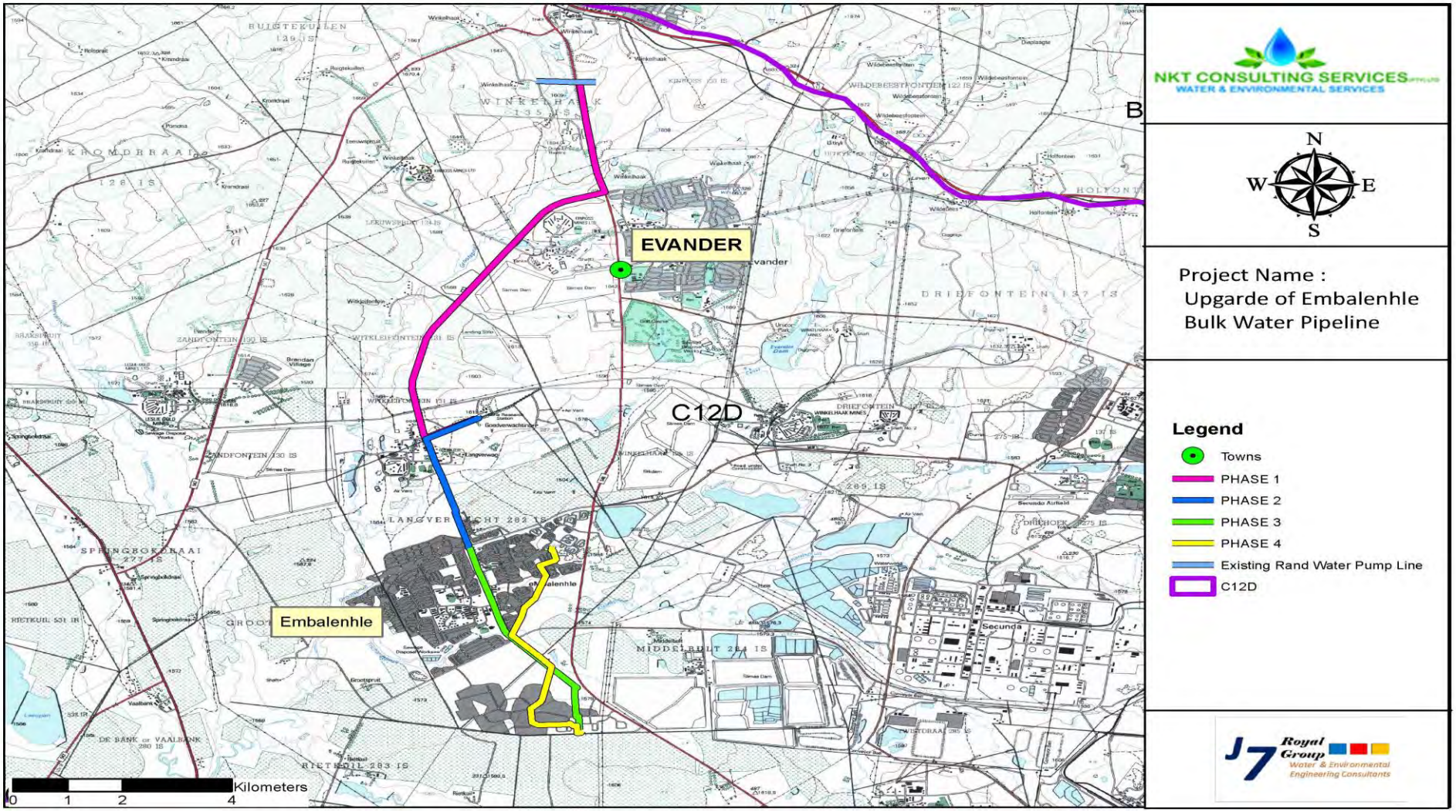
- Uncertainty of prediction is critical at the data collection phase as final certainty will only be obtained upon implementation of the proposed development. Adequate research, experience and expertise may minimise this uncertainty;
- Uncertainty of values depicts the approach assumed during the EIA process, while final certainty will be determined at the time of decision making. Enhanced communication and widespread/comprehensive coordination can lower uncertainty;
- Uncertainty of related decision relates to the interpretation and decision-making aspect of the EIA process, which shall be appeased once monitoring of the project phases is undertaken.

14 CONCLUSION

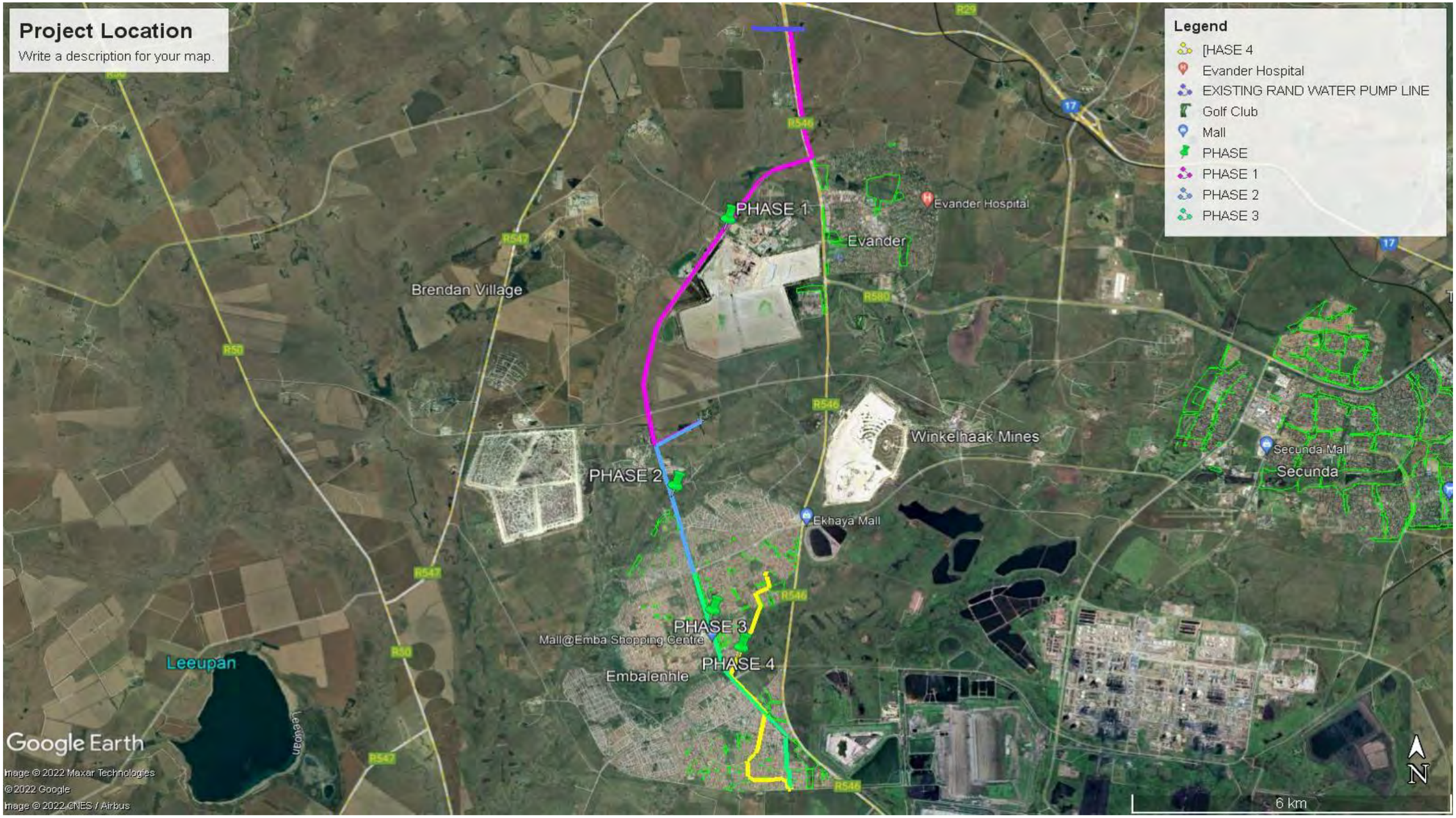
The Environmental Impact Assessment (EIA) process for the pipeline upgrade has been undertaken in accordance with the EIA Regulations In order to protect the environment and ensure that the development is constructed and operate in an environmentally responsible

manner, there are a number of significant pieces of environmental legislation that have been taken into account during this study. This relevant legislation has informed the identification and development of appropriate management and mitigation measures that should be implemented in order to minimise potentially significant impacts associated with the project.

Appendix 1: Local Map


EVANDER
C12D
Embalenhle
Kilometers
0 1 2 4
NKT CONSULTING SERVICES
WATER & ENVIRONMENTAL SERVICES
N
W
E
S
Project Name :
Upgarde of Embalenhle
Bulk Water Pipeline
Legend
Towns
PHASE 1
PHASE 2
PHASE 3
PHASE 4
Existing Rand Water Pump Line
C12D
J7 Royal Group
Water & Environmental
Engineering Consultants

Appendix 2: Layout Plan


Project Location
Write a description for your map.
Legend
[HASE 4
Evander Hospital
EXISTING RAND WATER PUMP LINE
Golf Club
Mall
PHASE
PHASE 1
PHASE 2
PHASE 3
PHASE 1
Evander Hospital
Evander
Brendan Village
Winkelhaak Mines
Secunda Mall
Secunda
PHASE 2
Ekhaya Mall
PHASE 3
Mall@Emba Shopping Centre
PHASE 4
Embalenhle
Leeupan
Google Earth
Image © 2022 Maxar Technologies
©2022 Google
Image © 2022 CNES / Airbus
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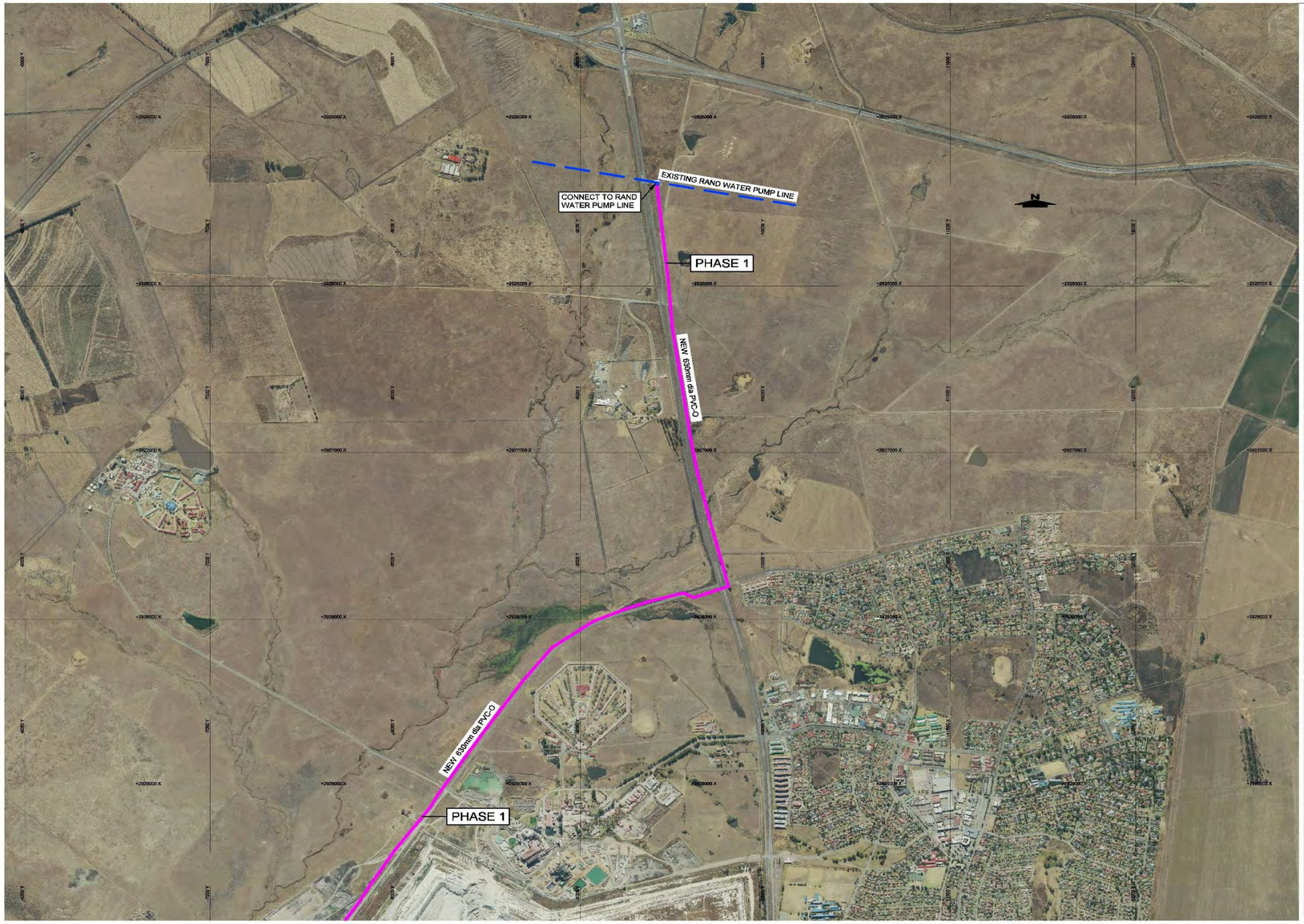
6 km



Associated Drawings

Dwg No:	Description

Notes

1. This drawing is the property of EVN Africa Consulting Services (Pty) LTD. Copyright Patents and all industrial rights reserved.
2. Read this plan in conjunction with all the relevant drawings.
3. Read this plan in conjunction with the Architect's drawings when applicable.
4. All dimensions in millimetres.
5. Only dimensions shown on the drawings may be scaled without the written instruction of the engineer.
6. All levels and dimensions to be verified on site prior to the commencement of any work, and the Engineer to be notified in case of any discrepancies.
7. Any approval, check, certificate, consent, examination, inspection, instruction, notice, observation, proposal, request, test or similar act by the Engineer (including absence of disapproval) shall not relieve the contractor from any responsibility he has under the contract, including responsibility for errors, omissions, discrepancies and non-compliances.

LEGEND

- BULK PIPLINE PHASE 1
- BULK PIPLINE PHASE 2
- BULK PIPLINE PHASE 3
- BULK PIPLINE PHASE 4

Revision	Description	Auth	Date

Amendments

Govan Mbeki Municipality

Employer ..... Date .....

Authorised ..... Date .....

Project.

BULK WATER FOR EMBALENHLE

Title:

BULK WATER SUPPLY PIPELINE

LAYOUT PLAN 1

Drawing Classification

A1 | ● CONCEPT | ○ TENDER | ○ CONSTRUCTION | ○ AS BUILT

Design Engineer		LG
Drawn		FK
Adapted		
Survey		
Project Number	Sheet No	Revision
2006A0	616.1	

Associated Drawings

Dwg No:	Description

Notes

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LEGEND:

- BULK PIPLINE PHASE 1
- BULK PIPLINE PHASE 2
- BULK PIPLINE PHASE 3
- BULK PIPLINE PHASE 4

Revision	Description	Auth	Date

Amendments

Govan Mbeki Municipality

Employer ..... Date .....

Authorised ..... Date .....

Project:
BULK WATER FOR EMBALENHLE

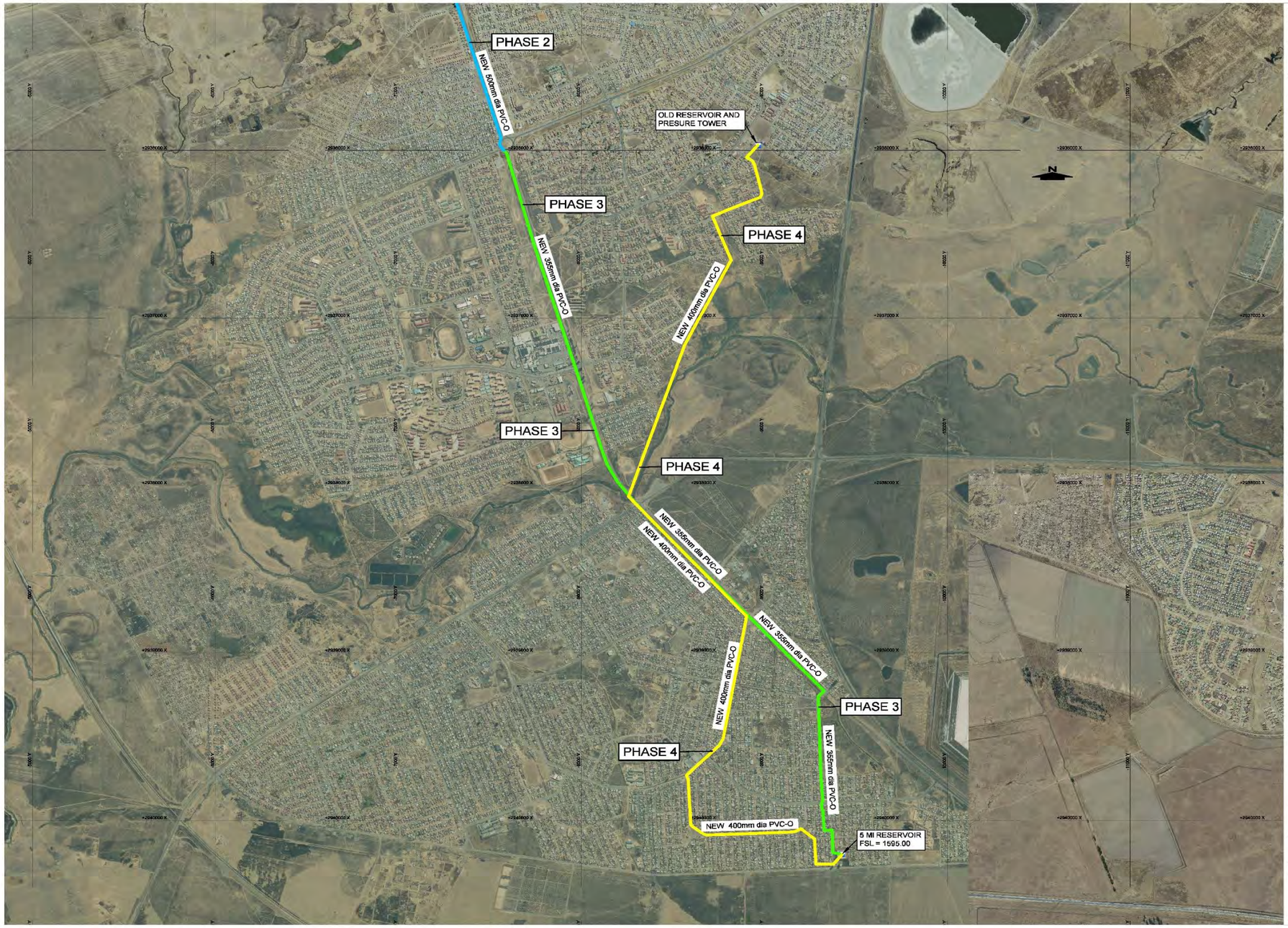
Title:
BULK WATER SUPPLY PIPELINE

LAYOUT PLAN 2

Drawing Classification

A1 | ● CONCEPT | ○ TENDER | ○ CONSTRUCTION | ○ AS RUN

Design Engineer		LG
Drawn		FK
Adapted		
Survey		
Project Number	Sheet No	Revision
2006A0	616.2	



Associated Drawings

Dwg No:	Description

Notes

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2. Read this plan in conjunction with all the relevant drawings.
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LEGEND:

- BULK PIPLINE PHASE 1
- BULK PIPLINE PHASE 2
- BULK PIPLINE PHASE 3
- BULK PIPLINE PHASE 4

Revision	Description	Auth	Date
	Amendments		

Govan Mbeki Municipality

Employer Date

Authorised Date

Project:

BULK WATER FOR EMBALENHLE

Title:

BULK WATER SUPPLY PIPELINE

LAYOUT PLAN 3

Drawing Classification

A1 ● CONCEPT ○ TENDER ○ CONSTRUCTION ○ AS BUILT

Design Engineer		LG
Drawn		FK
Adapted		
Survey		
Project Number	Sheet No	Revision
2006A0	616.3	

Appendix 3: Preliminary Designs

Appendix 4: Specialist Report

Appendix 4A: Wetland Report

Wetland Risk Assessment for the proposed Embalenhle Bulk Water Pipeline Project)

SECUNDA, MPUMALANGA

CLIENT: NKT CONSULTING SERVICES

JUNE 2022

This report titled Wetland Risk Assessment for the proposed Embalenhle Bulk Water Pipeline Project) was compiled by Ndumiso Dlamini. Ndumiso is registered with the South African Council for Natural Scientific Professions and has completed training in various ecological tools.

Prepared For:	Nkt Consulting Services E-mail: info@nktconsulting.co.za
Prepared By:	Ndumiso Dlamini Ecologist 9ZeroSeven Environmental (Pty) Ltd Mobile: 071 343 1503 Email: ndumiso@9zeroseven.com

Table of Contents

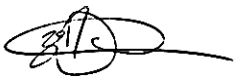
Tables

Figures

Declaration

I Ndumiso Ian Dlamini, as duly authorised representative of 9ZeroSeven Environmental, hereby confirm my independence and declare that I:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.

Signature of the specialist:	
Designation:	Ecologist (Pr. Sci. Nat.)
Qualifications:	BSc Life and Environmental Sciences (UJ) BSc Hons Botany (UJ)
Experience (years):	Six (6)
Date:	July 2020

1 Introduction

9ZeroSeven Environmental (907 Environmental or 907) was appointed to undertake a Wetland Risk Assessment for the proposed Embalenhle Bulk Water pipeline project within the Embalenhle of the Secunda area within the Mpumalanga Province.

This report presents the results of a wetland ecological assessment completed for the proposed project. This report should be interpreted after taking into consideration the findings and recommendations provided by the specialist herein. Further, this report should inform and guide the Environmental Assessment Practitioner (EAP) and regulatory authorities, enabling informed decision making, as to the ecological viability of the proposed project.

1.1 Aim and objectives

As part of this assessment, the following objectives were established:

- The identification of wetland areas through a desktop assessment;
- The identification and delineation of wetland areas within 500m of the proposed project;
- A risk/impact assessment for the proposed development; and
- The prescription of mitigation measures and recommendations for identified impacts / risks.

2 Key Legislative Requirements

The legislation, policies and guidelines listed below are applicable to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Explanation of certain documents or organisations is provided where these have a high degree of relevance to the project and/or are referred to in this assessment.

2.1 International Legislation and Policy

- Convention on Biological Diversity (Rio de Janeiro, 1992);
- The Ramsar Convention (on wetlands of international importance);
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). CITES is an international agreement between governments. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival; and
- The IUCN (World Conservation Union). The IUCN's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable

2.2 National Legislation

- Constitution of the Republic of South Africa (Act 108 of 1996). The Bill of Rights, in the Constitution of South Africa states that everyone has a right to a nonthreatening environment and requires that reasonable measures be applied to protect the environment. This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development;
- The National Environmental Management Act (NEMA) No. 107 of 1198): Ecological Assessment Regulations, 2014. Specifically, the requirements of the specialist report as per the requirements of Appendix 6;
- The National Environmental Management: Biodiversity Act (NEM:BA) No. 10 of 2004: specifically, the management and conservation of biological diversity within the RSA and of the components of such biological diversity;
- National Environmental Management: Biodiversity Act, 2004: Threatened and Protected Species Regulations;
- National Environmental Management: Protected Areas Act, 2003 (Act 57 of 2003);
- National Water Act, 1998 (Act 36 of 1998);
- Environmental Conservation Act, 1989 (ECA), (Act no. 73 of 1989);
- National Forests Act, 1998 (Act 84 of 1998), specifically with reference to Protected Tree species;
- National Heritage Resources Act, 1999 (Act 25 of 1999);
- Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983).

2.3 National Policy and Guidelines

- South Africa's National Biodiversity Strategy and Action Plan (NBSAP);
- National Spatial Ecological Assessment (NSBA); and
- National Freshwater Ecosystem Priority Areas (NFEPA's).

2.4 Provincial and Municipal Level

In addition to national legislation, South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996).

- The Mpumalanga Biodiversity Sector Plan (2017); and
- Mpumalanga Highveld Wetlands.

2.5 Structure of the Report

Aspect	Section
The person who prepared the report; and the expertise of that person to carry out the specialist study or specialised process.	Section 6
A declaration that the person is independent	Page viii
An indication of the scope of, and the purpose for which, the report was prepared	Section 1.1
A description of the methodology adopted in preparing the report or carrying out the specialised process	Section 4
A description of any assumptions made and any uncertainties or gaps in knowledge	Section 5
(f) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment	Section 7 and Section 8
Recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority	Section 8 and Section 9
A description of any consultation process that was undertaken during the course of carrying out the study	N/A
A summary and copies of any comments that were received during any consultation process	N/A
Any other information requested by the competent authority.	N/A

3 Description of the Project Area

The project area is located in the Embalenhle Township area within the town of Secunda. The project area is situated in a densely populated area that is dominated by informal and formal residential areas, informal business districts and road networks as presented in Figure 3-1.

The project is situated within the C12D Quaternary Catchment within the Vaal Water Management area and Highveld Ecoregion. The project area falls within the portion of the WMA that was previously known as the Upper Vaal WMA. This portion of the WMA is pivotal to the country and lies in the eastern interior of South Africa. It is situated in a semi-arid part of the country with a mean annual precipitation of 600 to 800 mm. Large quantities of water are transferred into the area from two neighbouring areas, as well as water sourced from the Upper Orange River via Lesotho. Similarly, large quantities of water are transferred out to other parts of the Vaal WMA, which are dependent on water from this part of the WMA to meet much of their requirements. The area is characterised by extensive urbanization and industrial and mining activity, and activities include livestock farming and rain fed cultivation (StatsSA, 2010).

The land uses within the local area includes semi-urban rural settlements of varied size, livestock grazing and informal business districts.

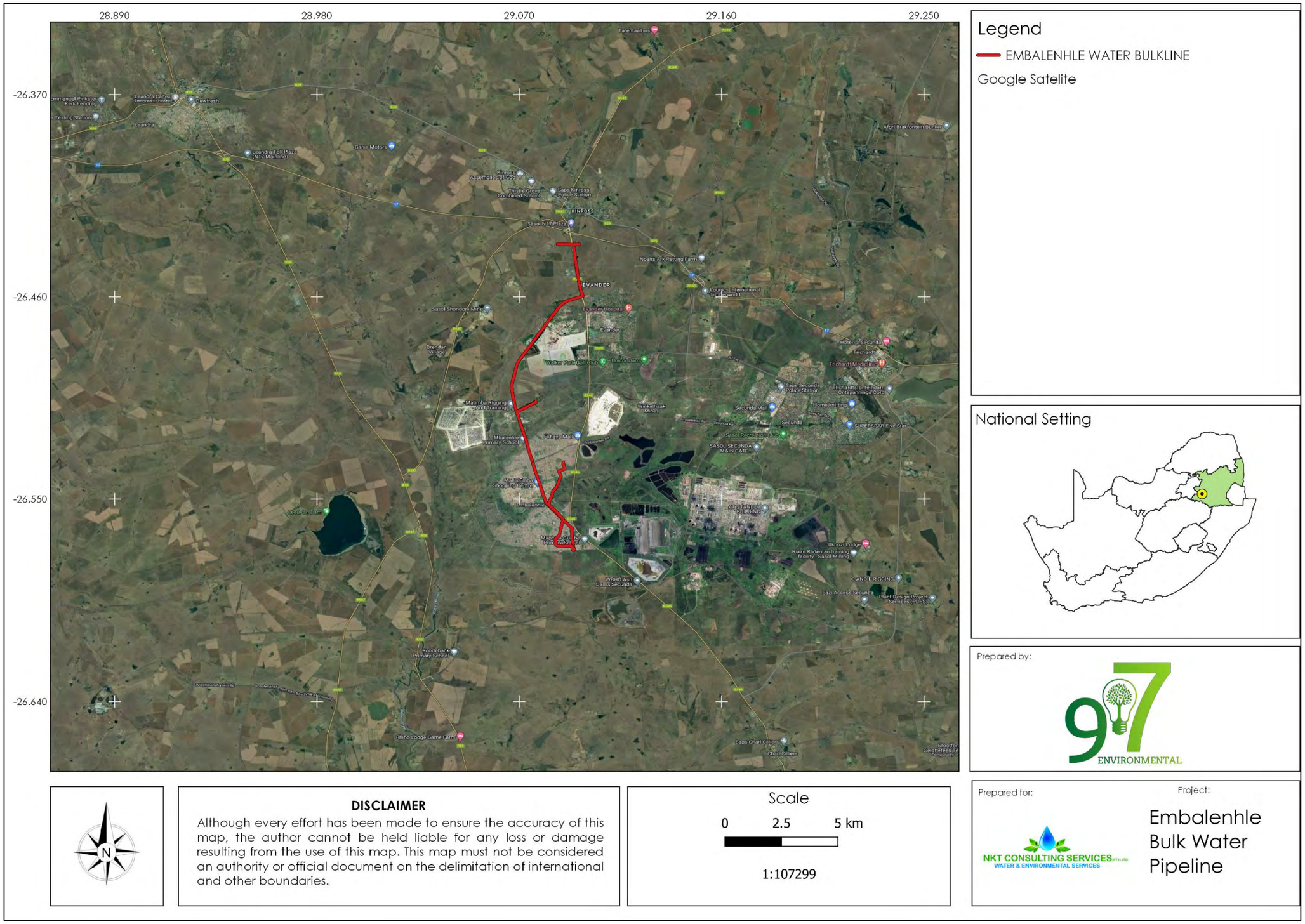


Figure 3-1: Location of the Project Area

3.1.1 Climate

The area is characterised as a summer rainfall area with a Mean Annual Precipitation (MAP) of 662mm. Much of the rainfall is predominantly in December and January with occasional storms in other wet season months. The winters can be cold with frost being frequent in the area (Mucina and Rutherford, 2006). The climate diagram for the area is presented in Figure 3-2.

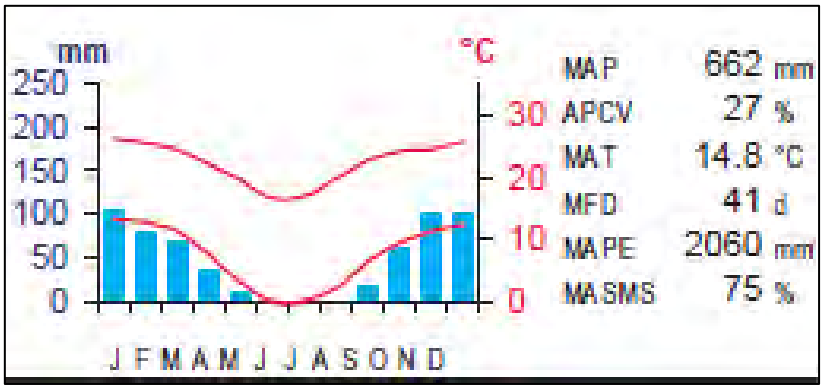


Figure 3-2: Climate diagram (Mucina and Rutherford, 2006)

3.1.2 Landtype Soils

The geology of the area is shale, sandstone or mudstone of the Madzaringwe Formation (Karoo Supergroup) or the Karoo Suite dolerites which occur prominently as intrusions.

According to the land type database (Land Type Survey Staff, 1972-2006) the project falls largely within the Ea 20 Landtype. The landtype was characterised by one or more of vertic, melanic and red structured diagnostic horizons.

3.1.3 Regional Vegetation

The project area is located within the Soweto Highveld Grassland vegetation unit (Mucina and Rutherford, 2006) within the Highveld bioregion. The vegetation unit occurs largely in the Gauteng and Mpumalanga provinces and marginally in the Free State and North-West provinces. The vegetation unit occurs in altitudes of 1420 m – 1760 m above sea level. The vegetation unit falls within a summer rainfall climate with MAP of 662 mm.

The vegetation unit is characterised by gentle to moderately undulating plains that support short to medium-high dense grasslands which are dominated by *Themeda triandra* in natural conditions.

The vegetation unit is considered as Endangered in terms of the conservation status. Several patches of the vegetation unit are statutorily conserved within Nature Reserves with the conservation target set at 24%. An approximate 50% of the vegetation unit has been transformed by cultivation, urban sprawl, infrastructure and mining throughout the unit. Some of the plant species of significance within the vegetation unit are presented in Table 3-1.

Table 3-1: Plants of significance within the Dwaalboom Thornveld vegetation unit

Plant type	Plant species
Graminoids	*Themeda triandra, Aristida bipartite, Aristida congesta, Digitaria eriantha subsp. eriantha, Hyparrhenia hirta, Panicum maximum, Cymbopogon posposchilli, Eragrostis curvula, Eragrostis obtuse, Eragrostis racemosa*

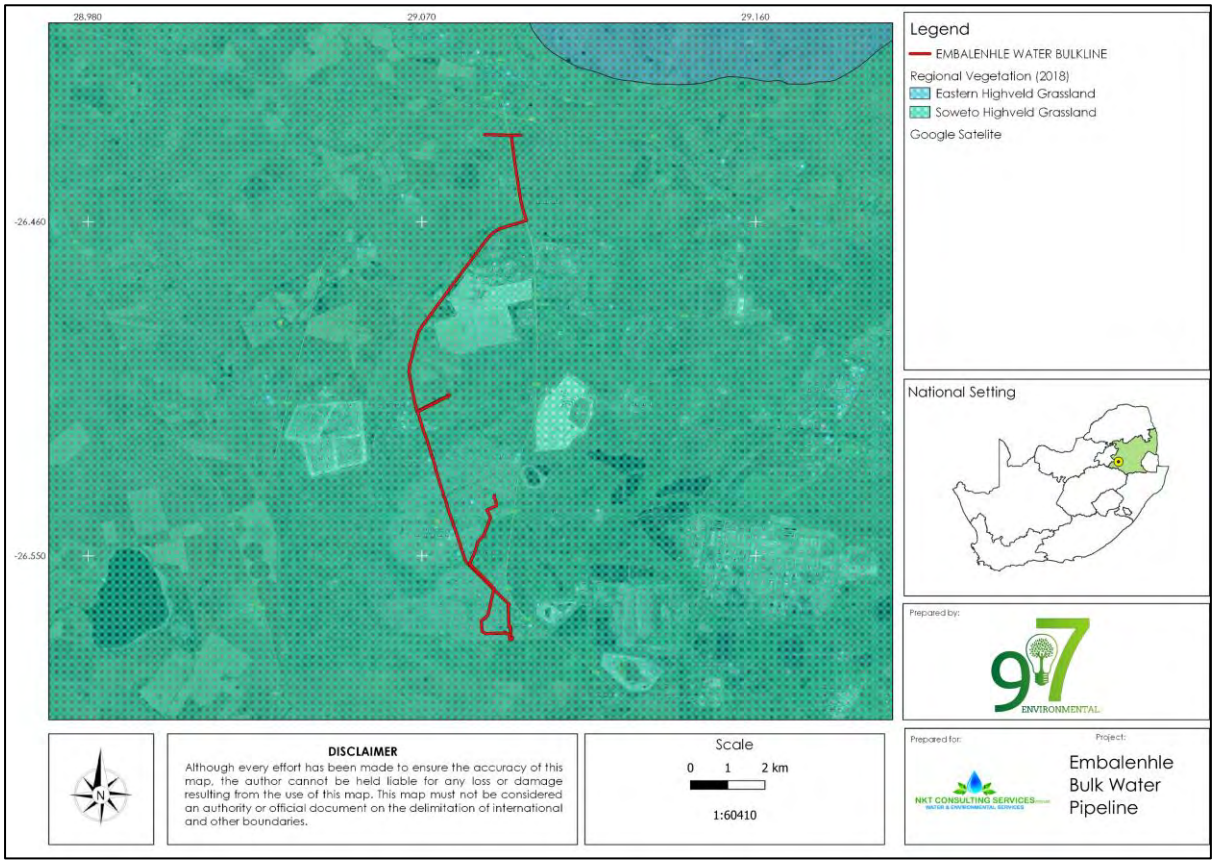


Figure 3-3: The regional vegetation associated with the project area

4 Methodology

4.1 Desktop Assessment

The following information sources were considered for the desktop assessment;

- Aerial imagery (Google Earth Pro);
- Department of Water and Sanitation (DWS, 2019);
- Land Type Data (Land Type Survey Staff 1972 - 2006);
- The National Freshwater Ecosystem Priority Areas (Nel et al., 2011);
- Provincial and municipal spatial datasets; and
- Contour data (5m).

4.2 Field Survey

A survey was conducted on the 13th of July 2020 by an ecologist where the wetland areas in the project area was delineated and assessed. The survey was conducted during the wet season. The project area was ground-truthed on foot. Photographs were recorded during the site visit.

4.2.1 Wetland Assessment

The National Wetland Classification Systems (NWCS) developed by the South African National Biodiversity Institute (SANBI) will be considered for this study. This system comprises a hierarchical classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels, and also then includes structural features at the lower levels of classification (Ollis *et al.,* 2013) as presented in Figure 4-1. The methodology to assess wetlands is presented in Table 4-1.

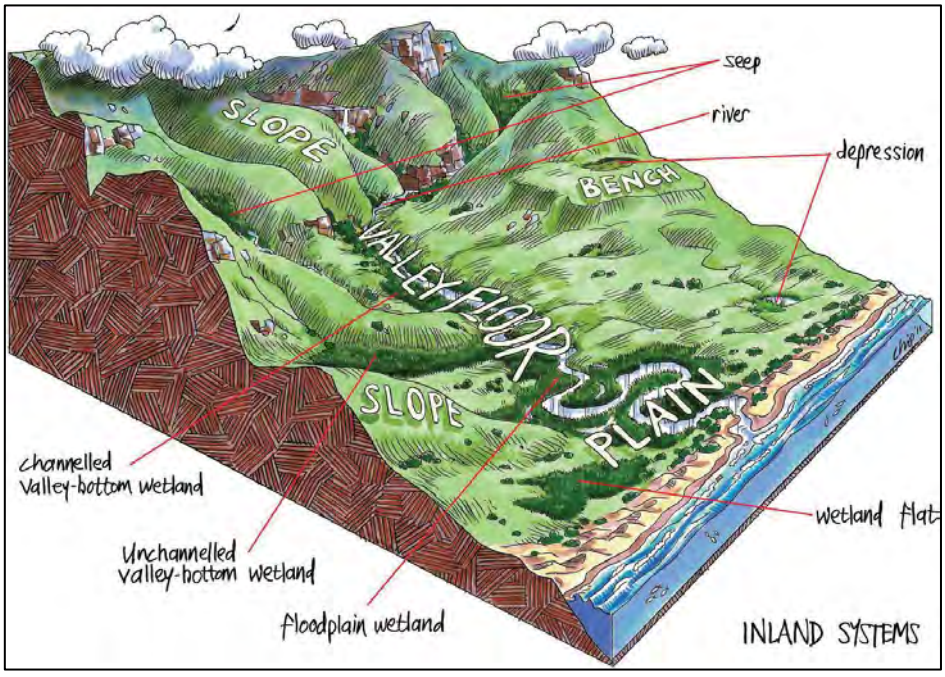
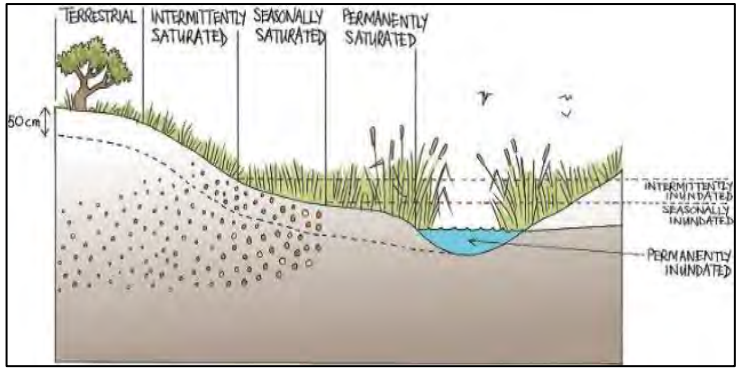


Figure 4-1: Wetland hydrogeomorphic (HGM) units (Ollis et al., 2013)

Table 4-1: Wetland assessment methodolgy

<table>
<tr><th>Assessment Aspect</th><th>Criteria</th><th>Determinant</th></tr>
<tr><td>Delineation</td><td>❖ The Terrain Unit Indicator
❖ The Soil Form Indicator
❖ The Soil Wetness Indicator
❖ The Vegetation Indicator

Vegetation is used as the primary wetland indicator. However, in practise the soil wetness indicator tends to be the most important and reliable, and the other three indicators are used in a confirmatory role</td><td> 
</td></tr>
<tr><td>Present Ecological State (PES)/ Wetland Health</td><td>The overall approach is to quantify the impacts of human activity or clearly visible impacts on wetland health, and then to convert the impact scores to a Present Ecological Status (PES) score. This takes the form of assessing the spatial extent of impact of individual activities/occurrences and then separately assessing the intensity of impact of each activity in the affected area. The extent and intensity are then combined to determine an overall magnitude of impact</td><td>
<table>
<tr><th>Impact Category</th><th>Description</th><th>Impact Score Range</th><th>Present State Category</th></tr>
<tr><td>None</td><td>Unmodified, natural</td><td>0 to 0.9</td><td>A</td></tr>
<tr><td>Small</td><td>Largely Natural</td><td>1.0 to 1.9</td><td>B</td></tr>
<tr><td>Moderate</td><td>Moderately Modified</td><td>2.0 to 3.9</td><td>C</td></tr>
<tr><td>Large</td><td>Largely Modified</td><td>4.0 to 5.9</td><td>D</td></tr>
<tr><td>Serious</td><td>Seriously Modified.</td><td>6.0 to 7.9</td><td>E</td></tr>
<tr><td>Critical</td><td>Critical Modification.</td><td>8.0 to 10</td><td>F</td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Assessment Aspect</th><th>Criteria</th><th>Determinant</th></tr>
<tr><td>Wetland Functionality/ Ecosystem Services</td><td>The assessment of the ecosystem services supplied by the identified wetlands was conducted per the guidelines as described in WET-EcoServices (Kotze, et al, 2009). An assessment was undertaken that examines and rates the following services according to their degree of importance and the degree to which the services are provided</td><td>
<table>
<tr><th>Score</th><th>Rating of functionality</th></tr>
<tr><td>< 0.5</td><td>Low</td></tr>
<tr><td>0.6 - 1.2</td><td>Moderately Low</td></tr>
<tr><td>1.3 - 2.0</td><td>Intermediate</td></tr>
<tr><td>2.1 - 3.0</td><td>Moderately High</td></tr>
<tr><td>> 3.0</td><td>High</td></tr>
</table>
</td></tr>
<tr><td>Wetland Ecological Importance and Sensitivity (EIS)</td><td>The method used for the EIS determination was adapted from the method as provided by DWS (1999) for floodplains. The method takes into consideration PES scores obtained for WET-Health as well as function and service provision to enable the assessor to determine the most representative EIS category for the wetland feature or group being assessed. A series of determinants for EIS are assessed on a scale of 0 to 4.</td><td>
<table>
<tr><th>EIS Category</th><th>Range of Mean</th><th>Recommended Ecological Management Class</th></tr>
<tr><td>Very High</td><td>3.1 to 4.0</td><td>A</td></tr>
<tr><td>High</td><td>2.1 to 3.0</td><td>B</td></tr>
<tr><td>Moderate</td><td>1.1 to 2.0</td><td>C</td></tr>
<tr><td>Low Marginal</td><td>< 1.0</td><td>D</td></tr>
</table>
</td></tr>
</table>

4.3 Buffer Determination

A buffer zone is defined as "A strip of land with a use, function or zoning specifically designed to protect one area of land against impacts from another." (Macfarlane, et al., 2014).

Buffer zones protect water resources in a variety of ways, such as;

- Maintenance of basic aquatic processes;
- The reduction of impacts on water resources from activities and adjoining land uses;
- The provision of habitat for aquatic and semi-aquatic species;
- The provision of habitat for terrestrial species; and
- The provision of societal benefits.

The "Preliminary Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries" (Macfarlane, et al., 2014) was used to determine the appropriate buffer zone for the proposed activity. This guideline was designed to assist in the determination of the appropriate buffer zones for water resources. The assessment procedure can be seen in Figure 4-2.

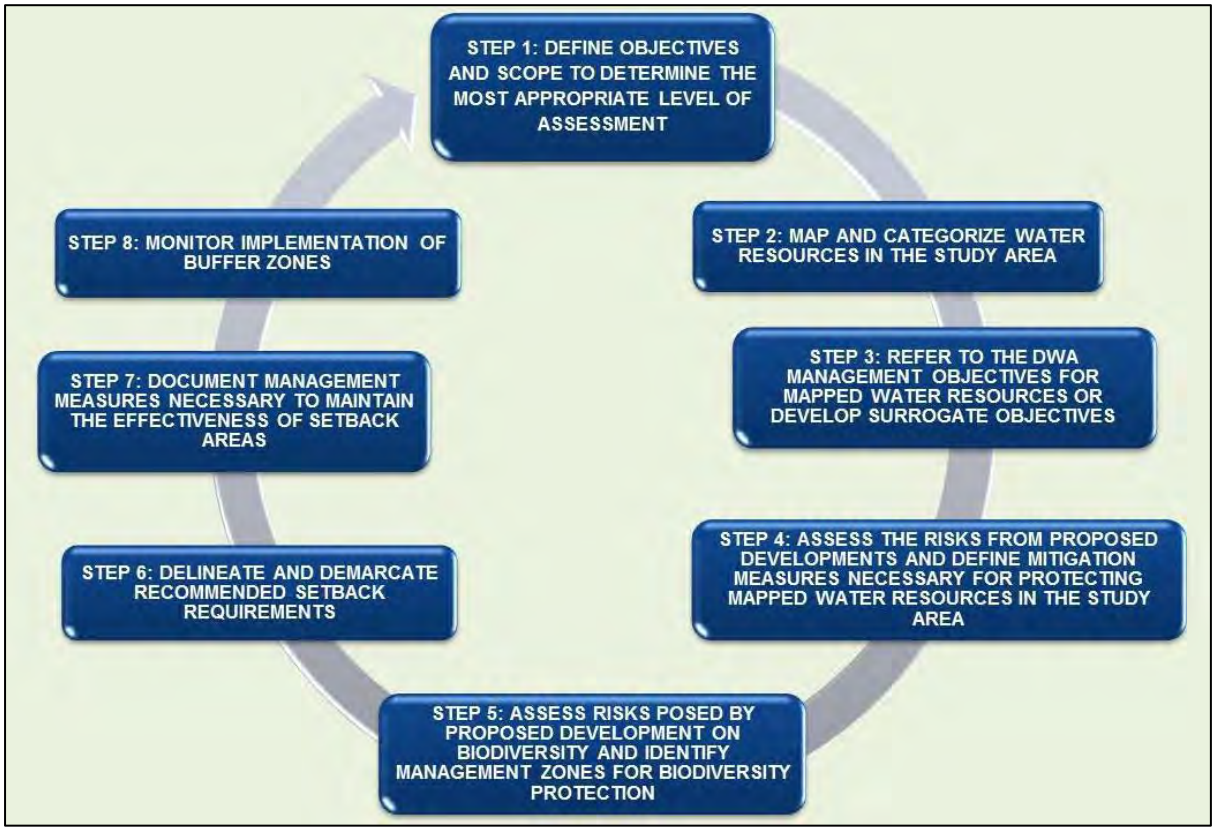


Figure 4-2: The assessment for the determination of the appropriate buffer zone follows this procedure

An Excel tool was developed as part of this project to help assessors identify a suite of alternative mitigation measures and management guidelines that can be used to reduce potential impacts on aquatic ecosystems. The tool is designed to act as a quick reference to a wide range of mitigation measures and guidelines which would otherwise need to be accessed through a plethora of different guidelines. The tool is structured according to nine primary threats which are also assessed as part of the buffer zone determination process. These include:

- Alteration to flow volumes;
- Alteration of patterns of flows (increased flood peaks);
- Increase in sediment inputs & turbidity;
- Increased nutrient inputs;
- Inputs of toxic contaminants (including organics & heavy metals);
- Alteration of acidity (pH);
- Increased inputs of salts (salinization);
- Change (elevation) of water temperature; and
- Pathogen inputs (i.e. disease-causing organisms).

4.4 Risk Assessment

The risk assessment was conducted in accordance with the DWS risk-based water use authorisation approach and delegation guidelines. The significance of the impact is calculated according to Table 4-2.

Table 4-2: Significance ratings matrix

Rating	Class	Management Description
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	(M) Moderate Risk	Risk and impact on watercourses are notably and require mitigation measures on a higher level, which costs more and require specialist input. Wetlands are excluded.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s)impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.

5 Limitations and Assumptions

The following assumptions and limitations are applicable to this report:

- The wetland assessment is confined to the proposed project area, and does not include the neighbouring and adjacent areas beyond a 50m radius of the project site; these were however considered as part of the desktop assessment;
- With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most

floral and faunal communities have been accurately assessed and considered;

- The data presented in this report is based on a single site visit, undertaken in May 2022 (dry season) by the author and an assistant. A more accurate assessment would require that assessments take place in all seasons of the year. It is therefore anticipated that some aspects of the ecology may not be identified as a result of seasonal changes in the vegetation.
- It is assumed that the proposed pipeline route will follow the existing pipeline route as this project is for a proposed upgrade; and
- No activities list has been provided and as such the risk assessment will be conducted based on the proposed works outlined in the technical documents.

6 Expertise of the Specialists

Ndumiso Dlamini obtained his BSc Hons degree in Botany in 2011 at the University of Johannesburg and is a registered Pr. Sci. Nat with SACNASP (116579) in Botanical Science and Ecological Science. Ndumiso has been conducting biodiversity, ecological and water resources assessments as an Environmental Consultant for over 8 years. He has performed numerous ecological impact assessments for various projects which include mining, housing developments, roads and infrastructure and rehabilitation. A detailed CV can be made available on request.

7 Findings

7.1 Desktop Assessment

7.1.1 National Wetland Map 5

The National Wetland Map 5 includes inland wetlands and estuaries, associated with river line data and many other data sets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 2018. Mapping the locality of wetlands is essential so that they may be classified into the different wetland ecosystem types across the country, which in turn can be used along with other data to identify wetlands of conservation significance. The identified wetland areas of the NWP5 within the project area are presented in Figure 7-1. The wetland areas identified were predominantly FLOOD (Floodplain), CVB (Channelled Valley Bottom) and SEEP (Seepage) wetlands.

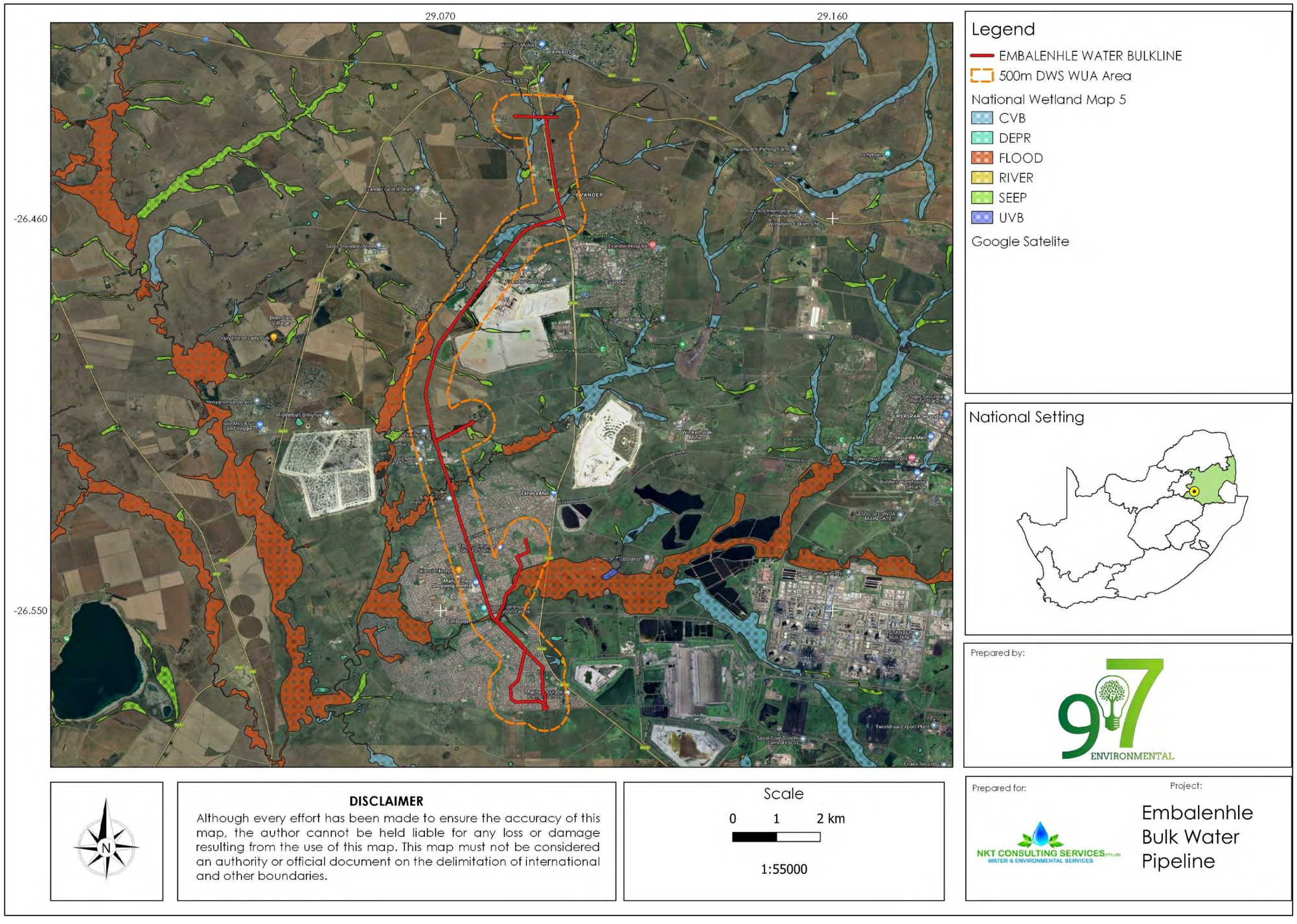


Figure 7-1: The National Wetland Map 5 areas associated with the project area

7.1.2 Mpumalanga Highveld Wetlands

The purpose of the Mpumalanga Highveld Wetlands project was to:

- Ground-truth and refine the current data layers of the extent, distribution, condition and type of freshwater ecosystems in the Mpumalanga Highveld coal belt, to support informed and consistent decision-making by regulators in relation to the water-biodiversity-energy nexus;
- To incorporate these revised data layers into the atlas of high-risk freshwater ecosystems and guidelines for wetland offsets, currently being developed by SANBI, to improve the scientific robustness of these tools; and
- To support the uptake, and development of the necessary capacity to apply the data, atlas and guidelines by regulators in their planning and decision-making processes'' (SANBI, 2012).

The Mpumalanga Highveld Wetlands data also classifies NFEPA land cover based on the defined condition of each area. These are known as the NFEPA wetland conditions categories

Several wetlands (Figure 7-2) were identified within the 500m regulated area for the project. The wetlands are classified as floodplain, channelled valley bottom and seep wetlands. The wetland condition for the wetlands was determined to be class C (Moderately Modified) or class D (Largely Modified).

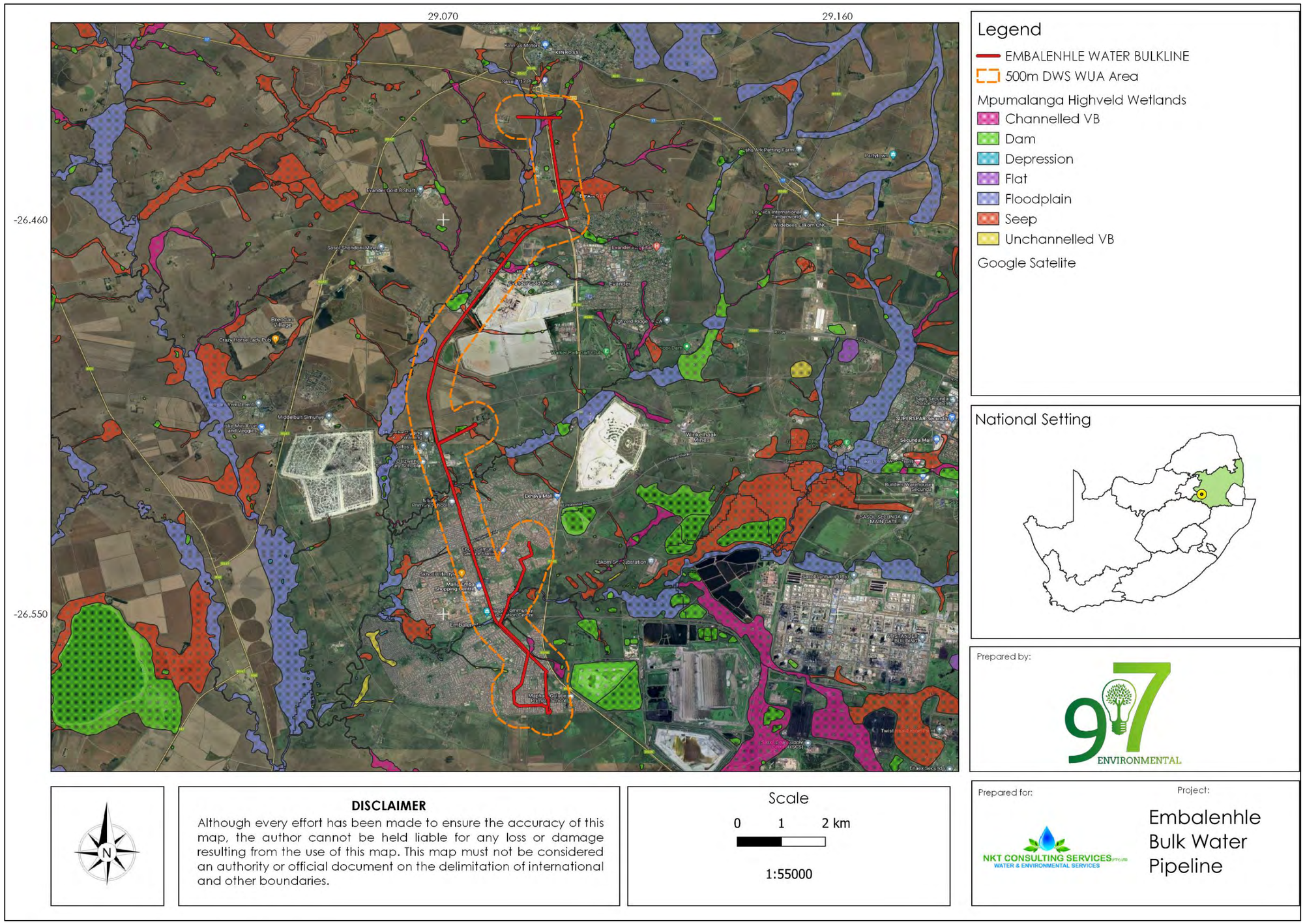


Figure 7-2: The Mpumalanga Highveld wetlands associated with the project area

7.2 Field Survey

The field investigation was conducted to identify wetland areas within the proposed project area and with 500m of the project area. Four (4) wetland HGM units were identified within the project area. The identified wetlands were classified as floodplain, channelled valley bottom (CVB), unchannelled valley bottom (UCVB) and seepage wetlands as classified according to the SANBI Guideline shown in Table 7-1. The identified wetland areas are presented in Figure 7-3, Figure 7-4, Figure 7-5 and Figure 7-6.

Table 7-1: Wetland classification as per SANBI guideline (Ollis et al., 2013)

Wetland Name	Level 1	Level 2		Level 3	Level 4		
	System	DWS Ecoregion/s	NFEPA Wet Veg Group/s	Landscape Unit	4A (HGM)	4B	4C
HGM 1	Inland System	Highveld	Mesic Highveld Grassland	Valley Bottom	Floodplain	N/A	N/A
HGM 2	Inland System	Highveld	Mesic Highveld Grassland	Valley Bottom	Channelled Valley Bottom	N/A	N/A
HGM 3	Inland System	Highveld	Mesic Highveld Grassland	Valley Bottom	Unchannelled Valley Bottom	N/A	N/A
HGM 4	Inland System	Highveld	Mesic Highveld Grassland	Slope	Seep	N/A	N/A

Figure 7-3: The identified floodplain wetlands

Figure 7-4: The identified channelled valley bottom wetlands

Figure 7-5: The identified unchannelled valley bottom wetlands

Figure 7-6: The identified seepage wetlands

The wetland vegetation could not be identified due to the seasonal changes and condition of the wetlands; however, remanants of what resembled *Typha capensis, Juncus effusus, Imperata cylindrica* and *Persicaria spp.* were identified as presented in Figure 7-7. The wetland areas wer haracterised by soils of the Rensburg, Katspruit and Kroonstad soil forms. The wetland delineation can be seen in Figure 7-8.

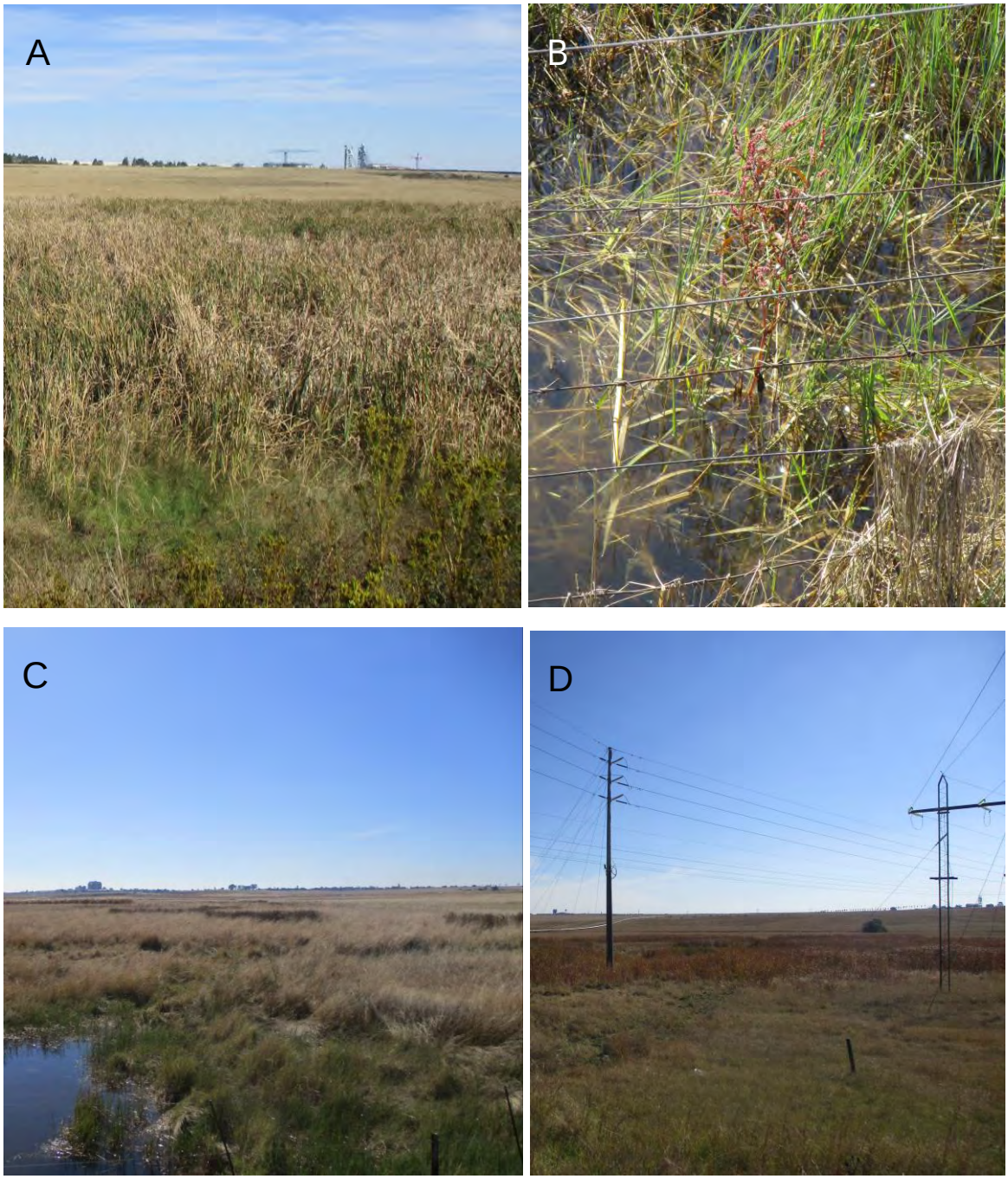


Figure 7-7: Identified wetland plants – a) Typha capensis b) Persicaria spp. c) Juncus effuses d) Imperata cylindrica

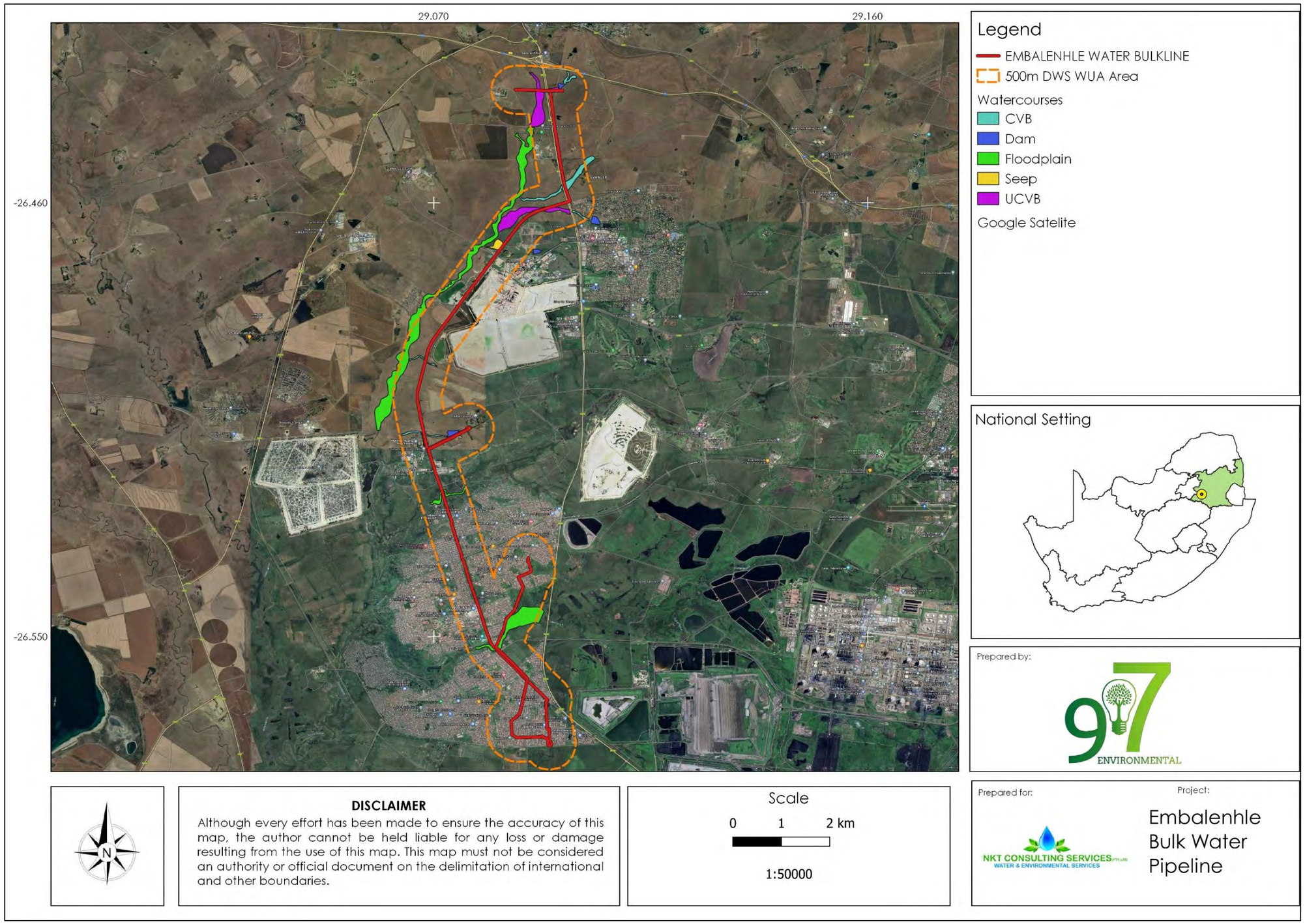


Figure 7-8: Wetland delineation for proposed Embalenhle Bulk Water Pipeline

7.3 Present Ecological State (PES)

The PES assessment measures the amount of alteration a wetland has undergone, as a result of impacts, and how much it has diverted from the reference state. The wetlands observed in the study area were classified as floodplain, dam and seepage wetlands.

The PES assessment determined and evaluated impacts to the wetland and the level of modification these impacts have brought about to the wetland. The following impacts were observed:

- Incised wetland areas – indicative of altered hydrology and flows (Figure 7-9a);
- Incised wetland channel – indicative of increased soil exportation with little or no sediment trapping;
- Pollution (soild waste) – indicative of anthropogenic disturbance to the wetland area (Figure 7-9b);
- Sewerage spillage into the wetland areas;
- Loss of natural wetland vegetation.

The overall PES of the wetland areas was determined to be Largely Modified (PES Class D) for the wetland areas. The scores for the respective modules can be seen in Table 7-2.

Table 7-2: Summary of the wetland PES Score and PES Class

Wetland	Hydrology	Geomorphology	Vegetation
	Rating	Rating	Rating
HGM 1	D: Largely Modified	C: Moderately Modified	D: Largely Modified
Overall PES Class			D: Largely Modified
HGM 2	D: Largely Modified	D: Largely Modified	D: Largely Modified
Overall PES Class			D: Largely Modified
HGM 3	C: Moderately Modified	C: Moderately Modified	D: Largely Modified
Overall PES Class			C: Moderately Modified
HGM 4	D: Largely Modified	D: Largely Modified	C: Moderately Modified
Overall PES Class			D: Largely Modified

Figure 7-9: Prominent impoacts to wetland areas – a) Channel incision b) Solid waste dumping

7.4 Ecosystem Services Assessment

The ability of the wetlands to provide Ecosystem Services is linked to the PES of the wetland. The wetlands were determined to be Largely Modified which in turn affected the level of services that the wetlands could provide. However, in the local setting the wetlands provided elevated flood attenuation and streamflow regulation. The direct benefits offered by the wetland were not evident during the field survey. Furthermore, direct benefits provided by the wetland were further decreased by the local setting of the wetland, in a densely populated area with sewage discharging into the wetlands and cattle grazing within wetland areas (Figure 7-10). The summarised results for the Ecosystem Services Assessment are shown in Table 7-3.

Figure 7-10: Reduced vegetation cover and cattle grazing in wetland area

Table 7-3: The EcoSystem Services scores for the wetland

Wetland Unit					HGM 1	HGM 2	HGM 3	HGM 4
Ecosystem Services Supplied by Wetlands	Indirect Benefits	Flood attenuation			2.2	1.8	2.1	1.6
		Streamflow regulation			2.2	2.1	2.2	1.8
		Regulating and supporting benefits	Water Quality enhancement benefits	Sediment trapping	2.0	1.6	2.0	1.6
				Phosphate assimilation	2.0	1.5	2.0	1.5
				Nitrate assimilation	2.0	1.5	2.0	1.5
				Toxicant assimilation	1.9	1.5	1.9	1.9
				Erosion control	1,5	1.8	1.5	2.0
			Carbon storage		1.5	1.8	1.5	1.8
	Direct Benefits	Biodiversity maintenance			2.0	1.8	2.0	1.8
		Provisioning benefits	Provisioning of water for human use		1.1	0.5	1.1	1.1
			Provisioning of harvestable resources		0.4	0.5	1.5	1.5
			Provisioning of cultivated foods		1.0	0.5	1.0	1.0
		Cultural benefits	Cultural heritage		0.0	0.0	0.0	0.0
			Tourism and recreation		1.1	1.0	1.0	1.0
			Education and research		0.8	0.8	0.8	0.8
Overall					20.9	18.1	20.8	19.6
Average					1,4	1.2	1.4	1.2

7.5 Ecological Importance and Sensitivity

The EIS assessment was applied to the wetland described in the previous section in order to assess the levels of sensitivity and ecological importance of the wetland. The results of the assessment are shown in Table 7-4.

The Ecological Importance & Sensitivity for the wetlands was determined to have a Moderate (C) level of importance. The EIS was determined to be moderate as there were no signs of ecologically important taxa within the wetland area and none had been recorded within the area.

The Hydrological Functionality of wetlands was determined to have a Moderate (C) level of importance. The Direct Human Benefits were calculated to have a Marginal (D) level of importance.

Table 7-4: The EIS results for the delineated wetland

Category	Importance			
	HGM 1	HGM 2	HGM 3	HGM 4
Ecological Importance & Sensitivity	2.0	1.5	2.0	1.5
Hydrological/Functional Importance	1.9	1.8	1.9	1.9
Direct Human Benefits	1.0	1.0	1.0	1.0

7.6 Buffer Zone Determination

The wetland buffer zone tool was used to calculate the appropriate buffer required for the installatiob of a bulk water pipeline. The model shows that the largest risks (Moderate) posed by the project during the construction phase is that of "increased sediment inputs and turbidity" and "inputs of metal contaminants". During the operational phase, the High risks identified for the project included "Increase in sediment inputs and turbidity", "altered patterns of flows", "inputs of toxic organic contaminants" and the "input of metal contaminants" (Table 7-7). These risks are calculated with no prescribed mitigation and the calculated buffer requirement is presented in Table 7-5.

Table 7-5: Pre-mitigation buffer requirement

Required Buffer before mitigation measures have been applied	
Construction Phase	31m
Operational Phase	16m

According to the buffer guideline (Macfarlane, et al. 2014) a high-risk activity would require a buffer that is 95% effective to reduce the risk of the impact to a low level threat.

The risks were then reduced to Low with the prescribed mitigation measures and therefore the recommended buffer was calculated to be 15m (Table 7-6) for the construction and operational phases.

Table 7-6: Post-mitigation buffer requirement

Required Buffer after mitigation measures have been applied	
Construction Phase	15 m
Operational Phase	15 m

A conservative buffer zone was suggested of 15 m for the construction and operation phases respectively, this buffer is calculated assuming mitigation measures are applied.

The buffer zone will not be applicable for areas of the project that traverse wetland areas, however, for all secondary activities such as lay down yards, storage areas and camp sites, the buffer zone must be implemented. It is recommended that the operational phase buffer zone of 15m be applied throughout all phases of the project (Figure 7-11).

Table 7-7: The risk results from the wetland buffer model for the proposed project

Threat Posed by the proposed land use / activity		Specialist Threat Rating	Threat Rating after Mitigation	Recommended Mitigation
Construction Phase	1. Alteration to flow volumes	Very Low	Very Low	
	2. Alteration of patterns of flows (increased flood peaks)	Low	Low	
	3. Increase in sediment inputs & turbidity	Very High	Medium	There is an existing pipeline over the wetland areas and the proposed project will not introduce a new impact. Dry season construction, silt traps, managed stockpiles, storm water management will reduce the risk of sedimentation during the construction.
	4. Increased nutrient inputs	Low	Low	
	5. Inputs of toxic organic contaminants	Medium	Very Low	
	6. Inputs of toxic heavy metal contaminants	Medium	Low	Off-site equipment vehicle fuelling and maintenance, storage in bunded area, no on-site fabrication, oil spill kits, equipment & vehicle inspections.
	7. Alteration of acidity (pH)	Low	Low	
	8. Increased inputs of salts (salinization)	N/A	N/A	
	9. Change (elevation) of water temperature	Very Low	Very Low	
	10. Pathogen inputs (i.e. disease-causing organisms)	Very Low	Very Low	
Operational Phase	1. Alteration to flow volumes	Medium	Low	The proposed pipeline will be underground and will not impact on the surface hydrology during the duration of its operation. An infrastructure monitoring plan will be devised to regularly check for leaks and remedy these. Furthermore, the project is for existing infrastructure upgrade and will minimse the current impacts. The pipeline will be placed on piers or attached to existing infrastructure over wetland crossings.
	2. Alteration of patterns of flows (increased flood peaks)	High	Low	
	3. Increase in sediment inputs & turbidity	High	Low	
	4. Increased nutrient inputs	High	Low	
	5. Inputs of toxic organic contaminants	High	Low	
	6. Inputs of toxic heavy metal contaminants	High	Low	
	7. Alteration of acidity (pH)	High	Low	
	8. Increased inputs of salts (salinization)	High	Low	
	9. Change (elevation) of water temperature	Medium	Low	
	10. Pathogen inputs (i.e. disease-causing organisms)	High	Very low	

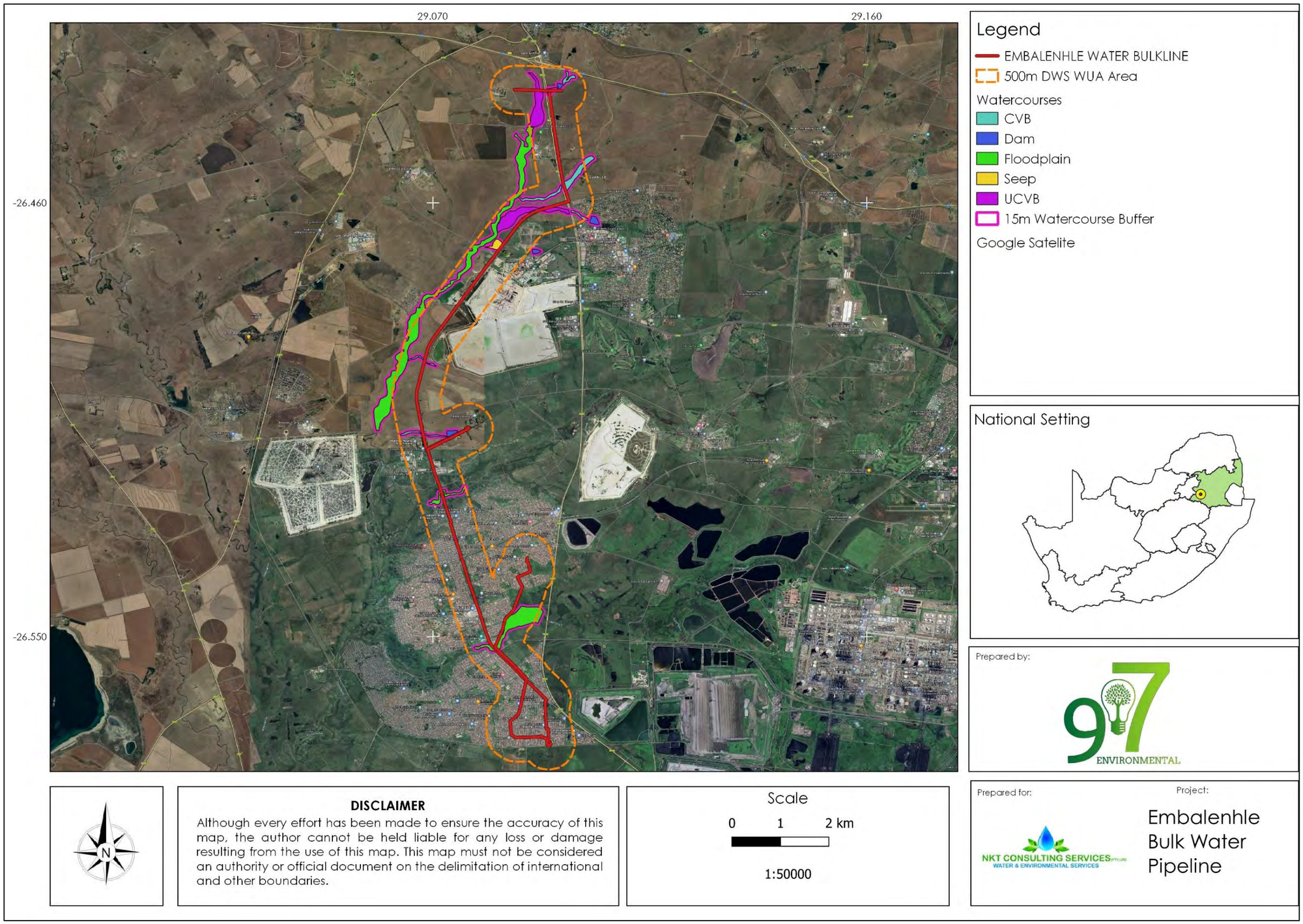


Figure 7-11: 15m Wetland Buffer Zone for the delineated wetland areas

8 Risk Assessment

The project is for the installation and operation of pipeline, that will directly and indirectly impact watercourses in proximity to the project area. The majority of the proposed pipeline is aligned with existing road and infrastructure servitudes with existing areas of impact. As this project is for the installation of a buried pipeline, impacts associated with the area are potentially moderate to low. Modifications to wetlands are likely to occur during construction. The project will entail the clearing of moderate amounts of vegetation and levelling of areas for the construction activities. This has the potential to increase erosion and sedimentation of downstream habitats due to surface runoff during the wet season. Furthermore, due to the proximity of the construction to the water resources, direct impacts to the wetland zones are likely. Some of the more notable impacts identified during the site visit and that will be considered for the risk assessment include the following:

- Portions of the pipeline within wetland areas
- Portions of the pipeline in proximity wetland areas,
- Potential for inadequate measures to dissipate flows and prevent erosion resulting in the sedimentation of the receiving systems.

8.1 Identification of Risk

Risks posed by the proposed project can be seen in Table 8-1. The findings of the risk assessment will determine the level and enable the opportunity to address some of the identified impacts. Findings from the DWS aspect and impact register / risk assessment are provided in

Table 8-2.

Table 8-1: Risks identified for the proposed project

NDUMISO DLAMINI	PR. SCI. NAT.	116579
ACTIVITY	Aspect	Impacts to watercourse
CONSTRUCTION AND INSTALLATION OF PIPELINE AND CROSSINGS	Site clearing and preparation	❖ Increase in sediment inputs & turbidity
	Excavation of pipeline trenches	❖ Alteration to flow volumes ❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity
	Soil stockpiles and management	❖ Alteration to flow volumes ❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity
	Operation of machinery and vehicles within watercourse area	❖ Alteration to flow volumes ❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity
	Operation of machinery and vehicles in adjacent areas	❖ Alteration to flow volumes ❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity
	Waste and ablutions facilities	❖ Inputs of toxic organic contaminants
	Pipeline trench back-filling and surface levelling	❖ Alteration to flow volumes ❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity
	Final landscaping and shaping	❖ Alteration to flow volumes ❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity
	Post-construction rehabilitation	❖ Increase in sediment inputs & turbidity
OPERATION OF PIPELINE AND CROSSINGS	Possible leaks (underground and above surface)	❖ Alteration to flow volumes ❖ Alteration of patterns of flows (increased flood peaks) ❖ Inputs of toxic organic contaminants
	Increased water runoff (manhole overflows)	❖ Alteration to flow volumes ❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity ❖ Inputs of toxic organic contaminants
	Routine monitoring and maintenance work (vehicular movement)	❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity
	Establishment of alien plants and erosion from disturbed areas	❖ Alteration of patterns of flows (increased flood peaks) ❖ Increase in sediment inputs & turbidity

Table 8-2: DWS Risk Impact Matrix for the proposed project

NAME and REGISTRATION No of SACNASP Professional member: Ndumiso Dlamini Reg no.: 116579

Phase	Aspect	Severity: Flow Regime	Water Quality	Habitat	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Without Mitigation	Confidence	With Mitigation	PES/EIS of Watercourse
Construction	Site clearing and preparation	2	2	2	1	1,75	2	2	5,75	1	2	1	3	7	40,25	Low	80	Low	D
	Excavation of pipeline trenches	3	3	2	2	2,5	2	2	6,5	1	3	5	1	10	65	Moderate*	80	Low	D
	Soil stockpiles and management	1	2	1	2	1,5	2	2	5,5	1	1	5	1	8	44	Low	80	Low	D
	Operation of machinery and vehicles within watercourse area	2	2	2	2	2	2	2	6	1	1	5	2	9	54	Low	80	Low	D
	Operation of machinery and vehicles in adjacent areas	1	2	1	1	1,25	2	2	5,25	1	1	1	2	5	26,25	Low	80	Low	D
	Waste and ablutions facilities	1	3	1	3	2	1	2	5	1	1	5	3	10	57,5	Moderate*	80	Low	D
	Pipeline trench back-filling and surface levelling	2	2	1	1	1,5	2	2	5,5	1	1	1	1	4	26	Low	80	Low	D
	Final landscaping and shaping	1	1	2	1	1,25	2	2	5,25	1	1	1	2	5	27,5	Low	80	Low	D
	Post-construction rehabilitation	1	1	2	1	1,25	2	2	5,25	1	2	1	2	6	36	Low	80	Low	D
Operational	Possible leaks (underground and above surface)	2	1	2	1	1,5	2	4	7,5	4	3	1	1	9	67,5	Moderate*	80	Low	D
	Altered surface hydrology (presence of pipeline)	2	1	2	1	1,5	2	4	7,5	2	2	1	1	6	45	Low	80	Low	D
	Routine monitoring and maintenance work (vehicular movement)	1	1	1	1	1	1	4	6	2	1	1	1	5	30	Low	80	Low	D
	Establishment of alien plants and erosion from disturbed areas	1	1	2	1	1,25	1	4	6,25	2	2	1	2	7	43,75	Low	80	Low	D
	Abstraction from Doornpoort Dam	2	2	2	3	2,25	2	3	7,25	2	2	1	2	7	50,75	Low	80	Low	D

(*) denotes - In accordance with General Notice 509 "Risk is determined after considering all listed control / mitigation measures. Borderline Low / Moderate risk scores can be manually adapted downwards up to a maximum of 25 points (from a score of 80) subject to listing of additional mitigation measures detailed below.

The installation and operation of the pipeline does pose a risk to the identified water resources, with the level of risk determined to be low. The low risks are largely attributed to the proposed project being for the once-off installation of a bulk water pipeline (clean water). Furthermore, the majority of the pipeline will be buried and far enough away from wetland areas which reduces the risk of surface and sediment impacts. The moderate risk ratings were re-allocated a low status due to implementation of additional mitigation measures.

8.2 Unplanned Events

The planned activities will have known impacts as discussed above; however, unplanned events may occur on any project and may have potential impacts which will need mitigation and management. Table 8-3 is a summary of the findings from a wetland ecological perspective.

Please note not all potential unplanned events may be captured herein and this must therefore be managed throughout all phases.

Table 8-3: Unplanned Events, Low Risks and their Management Measures

Unplanned Event	Potential Impact	Mitigation
Hydrocarbon spill on natural areas	Contamination of sediments and wetland areas associated with the spillage.	A spill response kit must be available at all times. All incidents must be reported on and if necessary, a wetland specialist must investigate the extent of the impact and provide remedial actions.
Uncontrolled erosion	Degradation of grassland habitat and wetland areas	Erosion control measures

8.3 Cumulative Impacts

It is necessary to consider the impacts that the development will have from a broad area perspective, by considering land-use and transformation of natural habitat in areas surrounding the site. Cumulative impacts are assessed by considering past, present and anticipated changes to biodiversity.

Even with extensive mitigation, significant latent impacts on the receiving terrestrial ecological environment are deemed likely. The following points highlight the key latent impacts that have been identified:

- Destruction of wetland habitat structures;
- Permanent loss of and altered wetland species diversity;
- Alien floral invasion; and
- Disturbed areas are highly unlikely to be rehabilitated to pre-development conditions of ecological functioning and a loss of ecoservices.

8.4 Mitigation Measures

The mitigation measures are prescribed to address the risks that may arise from the proposed activities and can be seen in Table 8-4.:

Table 8-4: Mitigation Measures and Actions

Impact/Risk Aspect	Mitigation Measure	Responsible Person
Site Establishment	❖ The footprint area of the working area should be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas; ❖ All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping"; ❖ Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation); ❖ Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems;	Environmental Control Officer & Site Foreman
Excavation and pipeline construction	❖ The recommended buffer zones must be strictly adhered to during the construction phase of the project, with exception of the activities and structures required to traverse a watercourse. Any supporting aspects and activities not required to be within the buffer area must adhere to the buffer zone; ❖ All construction activities and access must make use of the existing road and any access to be established must be beyond the wetland area; ❖ A suitable storm water management plan must be compiled for the construction phase. This plan must attempt to displace and divert storm water and discharge the water into adjacent areas without eroding the receiving areas. It is preferable that run-off velocities be reduced with energy dissipaters and flows discharged into the local watercourses; ❖ Laydown yards, camps and storage areas must be beyond the aquatic areas. Where possible, the construction of the crossings must take place from the existing road and not from within the watercourse and associated buffer; ❖ The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;	Environmental Control Officer & Site Foreman

Impact/Risk Aspect	Mitigation Measure	Responsible Person
	❖ It is preferable that construction takes place during the dry season to reduce the erosion potential of the exposed surfaces; ❖ Prevent uncontrolled access of vehicles through the water resources system that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas; ❖ All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site; ❖ Temporary storm water channels should be filled with aggregate and/or logs (branches included) to dissipate flows. ❖ The pipeline must be aligned as close to the road as possible; ❖ Pipeline trenches and sandy bedding material may produce preferential flow paths for water across the project area perpendicular to the general direction of flow instead of angle. This risk can be reduced by installing clay plugs at intervals down the length of the trench to force water out of the trench and down the natural topographical gradient; ❖ Pipelines crossing drainage areas, should preferably span the drainage lines above ground. This prevents disruptions to sub surface flow dynamics and allows the pipeline to be monitored for leaks. Pipelines buried underground should be buried at a sufficient depth below ground level such that the pipelines do not interfere with surface water movement or create obstructions, where flows can cause erosion; ❖ Contamination of aquatic systems with unset cement or cement powder should be negated as it is detrimental to aquatic biota. Pre-cast structures should be made use of (where possible) to avoid the mixing of these materials on site, reducing the likelihood of cement in the river system; ❖ During the excavation of trenches, flows should be diverted around active work areas where required. Water diversion must be temporary and re-directed flow must not be diverted towards any stream banks that could cause erosion; ❖ Cut off valves should be placed at regular intervals to shut down the pipeline in case of leaks, bursts and repairs	
Operational Phase, Maintenance and Monitoring	❖ The pipeline should be regularly inspected (quarterly) for any signs of failure, damage or leaks. Adequate maintenance measures need to be implemented upon finding pipeline issues and failures; and ❖ Post-Rehabilitation monitoring must be performed after the final rehabilitation is completed.	Environmental Control Officer & Site Foreman

9 Recommendation/Opinion of the Specialist

An impact statement is required as per the NEMA regulations with regards to the proposed development.

The impacts as described, rated and mitigated in this report pose a risk to the wetland area. The ecological sensitivity of the area is determined to be moderatly sensitive. With firm adherence to the mitigation measures prescribed in this report, the risks have been rated as low and it is the opinion of the specialist the proposed Embalenhle Bulk Water Pipeline project may proceed, following authorisations with the following conditions:

- An infrastructure monitoring and service plan must be compiled and implemented during the operational phase.
- An Environmental Control Officer (ECO) must oversee the construction phase of the project, with wetland areas as a priority.
- Based on the wetland assessment there is no envisaged alternative route, especially since the project is for the upgrade of existing infrastructure.

10 Conclusion

The installation of pipeline will entail the clearing of areas and digging of trenches, laying of pipeline and the upgrade of the manholes, with the level of risk determined to vary from low to moderate.

The moderate risks determined for the study are associated with the digging works, soil stockpile management and operation of equipment and machinery in proximity to wetland areas. Notable expected risks include the potential for increased sedimentation of the wetlands as the soils in the area may be susceptible to dispersion. The impairment of water quality during as a result of sedimentation is expected.

The operation of the pipeline does pose a risk to the identified water resources, with the level of risk determined to be low. The moderate risk ratings were re-allocated a low status due to implementation of additional mitigation measures.

It is the opinion of the specialists that the project be favourably considered and allow for the proposed project to proceed, should all prescribed mitigation measures and recommendations be implemented. Furthermore, the proposed project was determined to pose a low risk to wetland areas and a GA is deemed permissible.

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Appendix 4B: Ecological Report

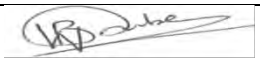
NKT CONSULTING SERVICES (PTY) LTD
WATER & ENVIRONMENTAL SERVICES

2022

ECOLOGICAL IMPACT ASSESSMENT FOR THE UPGRADING OF WATER PIPELINE IN EMBALENHLE - GOVANI MBEKI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

Compiled By Witness Dube
For NKT Consulting (Pty) Ltd
11/6/2022

DOCUMENT SUMMARY

REPORT TITTLE	eMbalenhle Water Pipeline Ecological Impact Assessment Report
CLIENT	Govan Mbeki Local Municipality Horwood Street CBD Secunda 2302, Mpumalanga Republic or South Africa www.govanmbeki.gov.za
PREPARED BY	Witness Dube (Ecologist and Environmental Specialist) SACNASP Registration Number: 300180/15 Signature:  E-mail: witnessdube77@gmail.com; witdube@yahoo.co.uk Cell: +27761153206
REVIEWED & APPROVED BY	
STATUS	Final
REPORTING SCOPE	This report is an Ecological investigation and assessment update of the eMbalenhle Water Pipeline project. It includes a thorough evaluation and Impact Assessment on how the project implementation will affect area's existing ecological state.

DECLARATION

I, ***Witness Dube***, as an appointed Ecological Impact Assessment Specialist hereby declare that i:

- Act as an independent ecological assessment specialist in this application;
- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998); the Environmental Impact Assessment Regulations, 2017 and any specific environmental management act;
- Am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2017 (specifically in terms of regulation 13 of GN No. R. 326) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- Have and will not have no vested interest in the proposed activity proceeding;
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- As a registered member of the South African Council for Natural Scientific Professions, will undertake our profession in accordance with the Code of Conduct of the Council, as well as any other societies to which we are members;
- Based on information provided to me by project proponent, and in addition to information obtained during this study, have presented the results and conclusion within the associated document to the best of my professional judgement; and
- Am aware that a false declaration is an offence in terms of regulation 48 of GN No. R326.

Field of Expertise

Terrestrial Biodiversity Assessments; Wetland Ecological Assessments, Delineations and Habitat Evaluations.

ACKNOWLEDGEMENTS

The author acknowledges CV Chabane and Associates Consulting Engineers, Govani Mbeki Municipality (GMM) and Rand Water for their assistance with project information, and the associated project BID as well as responding to technical queries related to the project.

LIST OF ABBREVIATIONS & ACCRONYMS

POSA	Plants of South Africa, a PRECIS related database hosted by SANBI
MBCP	Mpumalanga Biodiversity and Conservation Plan
M&R (2006)	Mucina and Rutherford (2006)
SANBI	South African National Biodiversity Institute
PRECIS	National Herbarium Pretoria (PRE) Computerised Information System;
GIS	Geographic Information System
CWB	Central Weather Bureau;
CBA	Critical Biodiversity Area
ESA	Ecological Support Area
SCC	Species of Conservation Concern
PES	Present Ecological State;
SEIP	Scoping and Environmental Impact Reporting
QDS	Quarter Degree Squares;
NEPAD	New Partnerships for Africa's Development;
DAFF	Department of Agriculture, Forestry and Fisheries
SAHRA	South African Heritage Resources Agency;
BAR	Basic Assessment Report
POC	Probability of Occurrence
DEAT	Department of Environmental Affairs and Tourism
VIS	Vegetation Index Score
VegMap	Vegetation Map of South Africa, as per Mucina & Rutherford (2006)
IWRM	Integrated Water Resources Management
ECO	Environmental Control Officer
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
I&AP	Interested and Affected Party
uPVC	Unplasticized Polyvinyl Chloride
IWUL	Integrated Water Use License
WUL	Water Use Licence
EIA	Environmental Impact Assessment
NEMA:	National Environmental Management Act (Act No. 107 of 1998)
NEMWA:	National Environmental Management: Waste Act (Act 59 of 2008)
BAP	Biodiversity Action Plan
NWA:	National Water Act (Act No. 36 of 1998)
BPG	Best Practice Guidelines
EAP	Environmental Assessment Practitioner
IDP	Integrated Development Plan
MP	Mpumalanga Province

GENERAL TERMS

Environmental Management Programme: (i) Defines the measures to be taken during the life of a project, including design, construction, and operation and decommissioning to prevent and / or manage adverse environmental impacts; (ii) defines the actions needed to implement these measures; and (iii) describes how this will be achieved;

Environmental Impact: A positive or negative condition that occurs to an environmental component as a result of the activity of a project or facility. This impact can be directly or indirectly caused by the project's different phases (i.e., Construction, Operation, and Decommissioning);

Environmental monitoring: The process of checking, observing, or keeping track of something for a specified period of time or at specified intervals;

Interested and affected party: Any person, group of persons or organization interested in or affected by an activity and any organ of state that may have jurisdiction over any aspect covered by the activity;

Biodiversity: the number and variety of living organisms on earth, the millions of plants, animals, and micro-organisms, the genes they contain, the evolutionary history and potential they encompass, and the ecosystems, ecological processes, and landscapes of which they are integral parts;

Operation: The time period that corresponds to any event, process, or activity that occurs during the operation (i.e., fully functioning) phase of the proposed project or development. (The operation phase follows the Construction phase, and then terminates when the project or development goes into the Decommissioning phase.);

Terrain Unit Morphological Classes: areas of the land surface with homogenous form and slope. Terrain may be seen as being made up of all or some of the following units: crest (1), scarp (2), mid-slope (3) foot slope (4), and valley bottom (5);

Ecosystem: An ecosystem is a working natural system, maintained by internal ecological processes, relationships and interactions between the biotic (plants & animals) and the non-living or abiotic environment (e.g., soil, atmosphere). Ecosystems can operate at different scales, from very small (e.g., a small wetland pan) to large landscapes (e.g., an entire water catchment area);

Ecosystem Goods and Services: The goods and benefits people obtain from natural ecosystems. Various different types of ecosystems provide a range of ecosystem goods and services. Aquatic ecosystems such as rivers and wetlands provide goods such as forage for livestock grazing or sedges for craft production and services such as pollutant trapping and flood attenuation. They also provide habitat for a range of aquatic biota;

Buffer zone: The strip of vegetation maintained to limit impacts to natural ecosystems from adjoining land use activities;

Catchment: A catchment is an area where water is collected by the natural landscape. In a catchment, all rain and run-off water eventually flow to a river, wetland, lake or ocean, or into the groundwater system;

Endemic: Refers to a plant, animal species or a specific vegetation type which is naturally restricted to a defined region (not to be confused with indigenous). A species of animal may, for example, be endemic to South Africa in which case it occurs naturally anywhere in the country, or endemic only to a specific geographical area within the country, which means it is restricted to this area and occurs naturally nowhere else in the country;

Environmental Control Officer (ECO): Person tasked with monitoring and supervision of the implementation and controlling of environmental issues;

Land rehabilitation: Is the process of returning the land in a given area to some degree of its former state, after some process (industry, natural disasters etc.) has resulted in its damage;

Watercourse: Means a river or spring; a natural channel or depression in which water flows regularly or intermittently; a wetland, lake or dam into which or from which water flows; and any collection of water which the Minister may, by notice in the gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998);

Conservation: In relation to a water resource means the efficient use and saving of water, achieved through measures such as water saving devices, water-efficient processes, water demand management and water rationing; and

Contaminate: Make something impure by exposure to or addition of a poisonous or polluting substance.

EXECUTIVE SUMMARY

This Ecological Impact Assessment report has been prepared to address requirements of National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), the Environmental Impact Assessment Regulations, 2017 (specifically in terms of regulation 13 of GN No. R. 326) and any other specific environmental management Act.

NKT Consulting (Pty) Ltd as the Environmental Practitioner appointed the independent specialist to conduct this Ecological Impact Assessment study for the eMbalenhle water pipeline construction of parallel bulk lines next to the existing bulk pipeline to replace the existing aging pipelines for provision of a continuous supply to the growing community for the next 30 years. This ecological impact assessment report also consists of impact management section which will assist significantly on the development of the Environmental Management Programme (EMPr) which is meant to minimise the construction and operational impacts of the development project to the natural environment. In addition to the above, the report will also be part of the Basic Assessment Report (BAR).

Based on the findings of this ecological assessment, it is the opinion of the ecologists that from a specialist viewpoint after thorough investigation of the study area's ecological composition, the proposed project be considered positively mainly because of the need to ensure unaltered flow of water within eMbalenhle area. It is however a recommendation that all essential mitigation measures and commendations presented in this report should be adhered to as to ensure minimum impact on natural systems.

The major activities will be clearing of vegetation of the footprint area (site office and trench-lines), replacement of the pipelines as well as operation of the water pipeline. All the mentioned activities above will definitely affect the catchment ecology from construction to operation of the water pipeline. A sensitivity map has been prepared and is part of this report for the whole project footprint which is dominated by low to medium class residential areas.

The following conclusions were made by the specialist;

- No animal nor plant species of concern have been identified from ground survey done;
- Highly sensitive areas of wetlands and watercourses should have a water use licence applied for with relevant department;
- Mature flora to be spared as they are deep rooted; and
- Recommendations from this report should be adhered to as it forms part of a working technical document that will assist significantly in the production of the Environmental Management Plan.

There is a general dominance of eastern highveld grassland and the Soweto grassland, weeping willow trees located on the low-lying water course lines, wattle and eucalyptus also perched on disturbed landscapes within the catchment. It must however be noted that the study area lies within the old gold mining and processing area as well as the built-up area close to Secunda town and from the ecological perspective, the specific area or siting is mainly located in the peripheries of the built-up area where the sensitive areas of concern are will be affected. This can also be confirmed by South Africa National Biodiversity Institute (SANBI).

A walk through the survey area resulted in none of the CBA or ESA species being found. However, a list of the expected plant and animal species for this particular area is therefore included in this

report in support of the already available sensitivity map prepared for the area of concern. In addition to the above, a proper ecological management system needs to be put in place and adhered to in order to ensure that the marked sensitive areas for instance, identified watercourse and its systems (habitat areas) are not affected by this essential development.

SCOPE OF WORKS

The scope of works is mainly ecological impact assessment which encompasses the following:

- To determine the environmental impacts of the proposed development on the Terrestrial ecology within the proposed project area and to develop mitigation and management measures;
- To define the Present Ecological State (PES) of the ecological resources in the vicinity of the proposed development area;
- To conduct a Species of Conservation Concern (SCC) assessment, including potential for species occurrence within the study area; and
- To identify and consider all sensitive landscapes including wetlands and any other ecologically important features;

Sensitivity analyses

The ecological sensitivity of the study area is determined by combining the sensitivity analyses of both the floral and faunal components. The highest calculated sensitivity unit of the two categories is taken to represent the sensitivity of that ecological unit, whether it is floristic or faunal in nature (Table 1).

Table 1: Ecological sensitivity analysis model used in the studies.

Ecological community	Floristic sensitivity	Faunal sensitivity	Ecological sensitivity	Development Go-ahead
Farmland	Low	Low	Low	Go
Bushveld	Medium	Medium	Medium	Go-But
Urban	Low	Low	Low	Go
Hills	Medium / High	Medium / High	Medium / High	Go-But
Watercourses	Medium	Medium	High	Go-But

The classification according to the table above is “medium” mainly because of the ecological community as well as the nature of activity which will be confined to already disturbed landscape in the partially disturbed low to medium class residential and industrial setup.

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1. INTRODUCTION

NKT Consulting was appointed by CV Chabane and Associates Consulting Engineers to provide professional environmental services for the proposed water pipeline replacement in eMbalenhle, in the Mpumalanga Province. The project is to replace a 500mm asbestos pipeline. The line connects on a Rand water line on the N17 to eMbalenhle. This report forms part of an application for an environmental authorisation for the proposed pipeline replacement. The application process is undertaken on behalf of the applicant, by NKT Consulting, which was appointed, as independent environmental practitioner, to assist the applicant in complying with the 2014 EIA Regulations in terms of the National Environmental Management Act (Act 107 of 1998.

The professional services included this specialist ecological assessment studies for the water pipeline replacement using the existing water reticulation networks as required in terms of Chapter 4 (Government Notice 326) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ("NEMA"): Environmental Impact Assessment Regulations (2014) as amended ("Basic Assessment Reporting process").

This report, after consideration of the ecological integrity of the study area, must guide the Environmental Assessment Practitioner (EAP), regulatory authorities and proponent, by means of the presentation of results and recommendations, as to the ecological viability of the proposed activities. This document follows on from results obtained during a literature survey as well as utilising information from previous studies subjected to similar environmental conditions (e.g., soil form, topography, catchments and agricultural activities. Several important national and provincial conservation plans were also reviewed, with the results of those studies being included in this report.

2. DESCRIPTION OF THE PROPOSED ACTIVITY

2.1. Existing Works

The existing bulk water supply to eMbalenhle consists of a 500mm steel pipe to the 2 x 10ML reservoirs at Adullam and a 400mm uPVC pipe to eMbalenhle. This pipeline is connected to a 600mm steel pipeline operated by Rand Water on an assumed 24-hour operational basis.

The purpose of this project is to construct parallel bulk lines next to the existing bulk pipeline in order to replace the existing aging pipelines to provide a continuous supply to the growing community for the next 30 years.

eMbalenhle bulk mains have been experiencing pipe bursts frequently due to aging pipeline infrastructure (some sections are more than 20 years old) which have reached the end of their useful design life.

Due to the relative high population growth rate for eMbalenhle and the household size which do not include the large number of backyard dwellers, the expected increase in demand outweighs the current available capacity of the bulk system.

2.2. Water Source

Water for eMbalenhle area is provided by the Rand Water Company in the Mpumalanga Province. The current average consumption as received from the municipality from July 2019 to June 2020 =18.4ML/day.

2.3. Bulk supply Pipelines

The existing supply mains are mainly large diameter steel and uPVC pipes, supplying water to two existing command reservoirs. The capacity of the existing pipe diameters to supply the full current and future demands will be assessed in order to determine whether larger diameter pipes should be installed. The table below (**Error! Reference source not found.**) shows the 4 reservoirs which provide storage for the various supply zones within the project area. Using the latest census count and population data, it will be determined whether a further need for storage exists in the town. This will be determined as part of the initial design stages of the project.

Table 2: eMbalenhle reservoirs

Reservoir Name	Volume (Ml)*	Floor Level (m)	Fully Supply Level (m)
Abdullam Command	10	1625.8	1626.3
Abdullam Command	12	1625.8	1626.3
eMbalenhle	(2.5)	1600	1605.5
eMbalenhle	10	1590	1595

***ML-Million Litres**

2.4. Water Demand

According to historical water consumption figures for the project area, the future usage projections will be based on population date combined with water usage data. For the technical reporting phase, the usage type will be considered and calculated in the following ways:

- Residential use – using the 2011 census population multiplied by an average consumption per day to find the litres used per day by the city's population in residential settings.

2.5. Residential Water Consumption

According to the RDP Rural Water Supply Design Criteria Guideline, the minimum Average Annual Daily Demand (AADD) that should be allowed for is 60l/c/d for rural settlements with individual stand up taps and 150 l/c/d for towns with services. This seems to fall into the moderate to high development level. For the township of eMbalenhle a consumption correlating with a moderate or lower moderate to high development will be assumed. This is because the erfs are small, with few gardens and no swimming pools being seen. According to the Red Book, the typical household consumption per capita per day can be summarised as follows for house connection:

Table 3: Household connection water consumption typical figures

Development Level	Typical Consumption (l/c/d)	Range (l/c/d)
Moderate	80	48-98
Moderate to High	130	80-145
High	250	130-280
Very High	450	260-480

2.6. Available Storage Versus Demand

As the current status of the existing reservoirs still needs to be verified, we assume the storage to be as follows:

- Abdullam : 1 x 10ML & 1 x 12ML Command;
- eMbalenhle : 1 x 10ML Command (Square with 0.94kl pressure tower);
- eMbalenhle : 1 x 2.5 ML – not in service;
- Current Consumption = 18.4ML/day
- Future (2050) Demand = 88.2 ML/day; and
- This required an additional storage of 58 ML/day (based on 150 l/c/d consumption).

2.7. Proposed Works

The scope of works includes the construction of suitable designed and sized parallel pipelines associated fittings too upgrade the supply and to cater for the future expansion of eMbalenhle. The parallel lines will replace the existing aging infrastructure. The project will be divided into 4 phases as it is estimated to be a lengthy construction period and expensive project. The following phases are proposed:

- Phase 1: New 630mm diameter line from the Rand Water connection up to the Abdullam Reservoirs;
- Phase 2: New 500mm line from Abdullam reservoirs up to the traffic circle branch connection;
- Phase 3: New 400mm line from the Traffic circle branch up to the 5ML reservoir; and
- Phase 4: New 355mm line from the old reservoir and pressure tower to the 5ML reservoir.

The four (4) main pipe materials which are considered are to be used as follows:

- HDPE – Mainly in CBD areas where trenching will cause undesirable disruptions. In these areas pipe cracking methods will be employed to put the DDPE pipes in place with minimal excavations required;
- uPVC – Used in most other area where trench excavations are possible. This method is considered more affordable and labour intensive, therefore allowing for employment creation;
- PVC-O – Used for large diameter (450 – 600mm) or high pressure (16 – 25 bar) sections of pipeline where HDPE and uPVC pipes won't be sufficient.; and
- Steel – Only to be used in possible extreme situations where the above materials are insufficient.

2.8. Listed Activities

Activities applied for to be authorised are indicated in **Error! Reference source not found.**

Table 4: Listed activities

Government Notice R983 (as amended) Activity No.	Describe the relevant Basic Assessment Activity in writing as per Listing Notice 1 (GN No. R983, as amended)	Describe the portion of the development as per the project description that relates to the applicable listed activity
Government Notice R983		
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving	The construction of river crossing

	of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse	
Government Notice R985		
27	The development of— (ii) Infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— (a) within a watercourse Mpumalanga (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	The construction of student accommodation and associated infrastructure

3. PROJECT LOCATION

The project area is located in Embalenhle, Govan Mbeki Local Municipality in Mpumalanga within the property servitudes as listed in table 5.

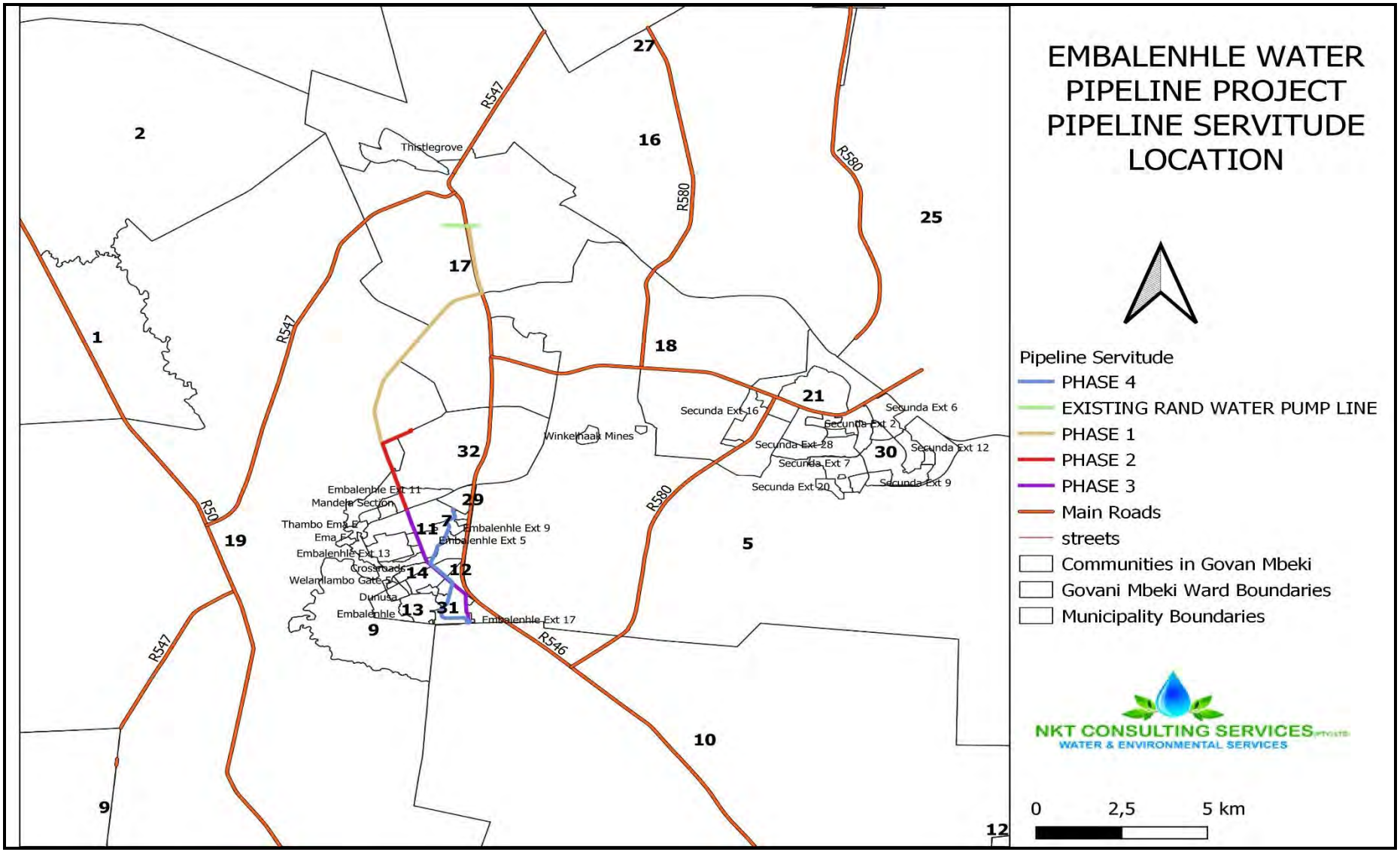

Figure 1: Project locality Map for eMbalenhle Pipeline Project in Secunda

Table 5: List of properties that will be affected

FARM NAME	PORTION	SG CODE																				
Farm Winkelhaak 135 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	5	0	0	0	0	0
Farm Leeuwspruit 134 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	4	0	0	0	0	0
Farm Witkleifontein 131 IS	1	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	1
Farm Witkleifontein 131 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0
Farm Witkleifontein 131 IS	4	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	4
Farm Witkleifontein 131 IS	10	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	1	0
Farm Witkleifontein 131 IS	3	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	3
Farm Osizweni 575 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	5	7	5	0	0	0	0	0
Farm Winkelhaak 135 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	5	0	0	0	0	0
Farm Langverwacht 282 IS	52	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	5	2
Farm Langverwacht 282 IS	2	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	2
Farm Langverwacht 282 IS	17	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	1	7
Farm Langverwacht 282 IS	9	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	9
Farm Langverwacht 282 IS	1	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	1
Farm Langverwacht 282 IS	4	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	4
Farm Middelbult 284 IS	29	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	4	0	0	0	2	9
Farm Middelbult 284 IS	28	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	4	0	0	0	2	8

4. FEASIBLE AND REASONABLE ALTERNATIVES

4.1. Alternatives

Alternatives include a consideration of all possible means by which the purpose and need of the proposed activity could be accomplished. The determination of whether the site or activity (including different processes etc.) or both is appropriate needs to be informed by the specific circumstances of the activity and its environment. The no-go option must in all cases be included in the assessment phase as the baseline against which the impacts of the other alternatives are assessed.

According to Chapter 1 of the EIA Regulations 2014 (as amended), *"Alternatives"*, in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

*a) The **property** on which or l**ocation** where it is proposed to undertake the activity;*
*b) The **type** of activity to be undertaken;*
*c) The **design** or **layout** of the activity;*
*d) The **technology** to be used in the activity;*
*e) The **operational** aspects of the activity; and*
*f) The option of **not implementing** the activity.*

The EIA Regulations 2014 (as amended), recognise that details on alternatives need to include a description of identified potential alternatives to the proposed activity, including advantages and disadvantages that the proposed activity or alternatives may have on the environment and the community that may be affected by the activity.

The consideration of alternatives is therefore a key component of an EIA process. While an EIA process should investigate and comparatively consider all alternatives that have been identified, only those found to be feasible and reasonable must be comparatively ***assessed***, in terms of the advantages and disadvantages that the proposed activity and alternatives will have on the environment and on the socio-economic aspects of communities that may be affected by the activity. The feasibility and reasonability of an alternative are measured by:

a) The general purpose and requirements of the activity;
b) The need and desirability of the activity;
c) Opportunity costs;
d) The need to avoid and/or minimise negative impacts;
e) The need to maximise benefits; and
f) How it impacts on the community that may be affected by the activity (DEA&DP, 2013b).

4.2. Alternative 1: Pipe Cracking

Pipe Cracking/Bursting Method:

- HDPE pipes on will be inspected for defects;
- All house connection along the section will be identified from design maps and on preconstruction CCTV footage and reports;
- Excavation for launch and receiving, and house connection will commence;

- HDPE pipes will be butt welded to the required length;
- Pipe Bursting (or pipe cracking) is a trenchless method of replacing buried pipelines, such as sewer- and water pipes, without the need for the construction of traditional construction trenches. Pipe Bursting refers to the technique of inserting a "bursting head" into and through the existing pipe. In doing so, the old pipe fractures and sends the remaining materials and fragments into the surrounding soil area. At the same time the new pipe is pulled into place. Old, broken, or worn pipelines can be re-sleeved with smaller liners or pipes without any trenching. Pipes can also be replaced at the same diameter with alternative material (such as clay to HDPE) by means of Pipe Bursting. Pipe Bursting may also be used to expand pipeline capacity by replacing existing pipes with larger ones, or "up-sizing".

4.2.1. Advantages Of Pipe Bursting / Pipe Cracking / Re-Sleeving / Slip Lining to Conventional Excavation and Pipe Laying

- Trenchless technology - no trench, no dig;
- No disturbance of ground, structures, services, and traffic;
- High speed efficiency that exceeds any conventional excavation or trenching;
- No bedding or backfill required;
- Less manpower required;
- Safer than conventional construction; and
- More cost efficient than conventional construction.

The figure below shows sections of the pipeline on cracking or bursting

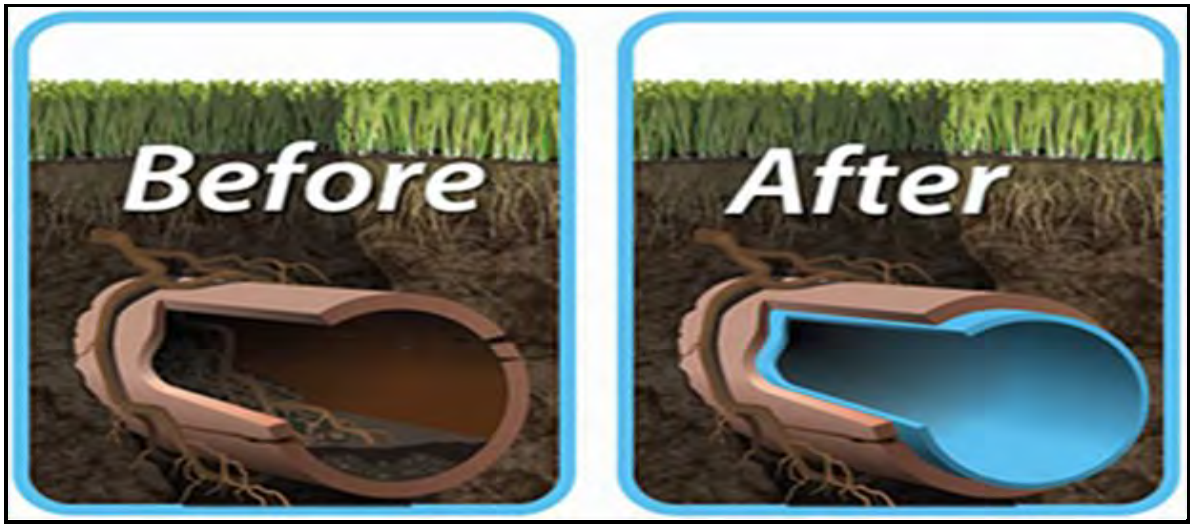

Figure 2: Illustration of pipe cracking

4.3. No-Go Alternative

The No Go alternative is the option of not developing the proposed development and associated service infrastructure. The no-development option would result in a lost opportunity in terms of the employment opportunities associated with the construction and operational phases as well as the benefits associated with the provision of water to the communities. A high negative socio-economic impact significance would occur if the proposed development is not constructed.

The socio-economic benefits of this project largely outweigh the environmental biophysical impacts in an area which is partly degraded, fragmented from any other natural areas, is completely enclosed by development, and which supports vegetation with a low conservation threat status. The No-Go Alternative is therefore not recommended

4.4. Assumptions and Limitations

This report considers likely impacts that can arise during the construction, operation and maintenance of the replaced water pipeline. However, some unique impacts may arise that must be recorded during monitoring and appropriate corrective actions taken, which are;

- The time lapse between the phases of construction depends on the contactor's work plan;
- There is limited information on specific availability and behaviour of flora and fauna within this catchment as the assessment was done only within one season which is winter season;
- Budgetary constraints and time limitations are some of the issues that might lead to limited assessment of the whole area;
- Engineering designs and the specification of rehabilitation structures fall outside of the scope of this general ecological impact assessment report, but consideration will be given on overlaying important sections on final alignments; and
- All information contained in this report is based on what the specialist discovered on site as well as what was provided to him by the project management team, Rand Water and Govani Mbeki Municipality.

It should be noted that findings, recommendations and conclusions provided in this report are based on the author's best scientific and professional knowledge. No part of this report may be amended or extended without prior written consent of the author. Any recommendations, statements or conclusions drawn from or based on this report must clearly cite or refer to this report. Whenever such recommendations, statements or conclusions form part of the main report to current investigation, this report must be included in its entirety.

5. LEGAL FRAMEWORK

An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of this comprehensive ecological impact assessment report are given in the table below.

Table 6: Applicable Legal Instruments

Legislation	Sections	Relates to:
The Constitution (No 108 of 1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental rights.
National Environmental Management Act (No 107 of 1998 [as amended])	Section 2	Defines the strategic environmental management goals and objectives of the government. Applies through-out the Republic to the actions of all organs of state that may significantly affect the environment.
	Section 24	Provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.
	Section 28	The Client has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
Environment Conservation Act (No 73 of 1989) and regulations	Sections 19 and 19A	➢ Prevention of littering by employees and subcontractors during construction and the maintenance phases of the proposed project; ➢ The protection of species and ecosystems that warrant national protection; ➢ The sustainable use of indigenous biological resources; ➢ The fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; and ➢ The establishment and functions of a South African National Biodiversity

Legislation	Sections	Relates to:
		Institute; and for matters connected therewith.
National Heritage Resources Act (No 25 of 1999) and regulations	Section 32	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 34	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. Grave is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
	Section 35	This section provides for Heritage Impact Assessments (HIAs), which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The Heritage Impact Assessment (HIA) will be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decision on the HIA.
Occupational Health and Safety Act (No 85 of 1993)	Section 8	Control of dust
	Section 9	Control of noise
National Environmental Management Biodiversity Act (Act No. 10 of 2004)		Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.

Legislation	Sections	Relates to:
Occupational Health and Safety Act-Major Hazard Installation Regulations (GN R692, July 2001)	Sections 5 and 6	Control of offensive odours
National Water Act (No 36 of 1998) and regulations	Section 19	General duties of employers to their employees
	Section 20	General duties of employers and self-employed persons to persons other than their employees.
	Section 21	a) Taking water from a water resource; b) Storing water; c) Impeding or diverting the flow of water in a water course; d) Engaging in a stream flow reduction activity contemplated in Section 36; e) Engaging in a controlled activity identified as such in section 37(1) or declared under Section 38(1); f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit; g) Disposing of waste in a manner which may detrimentally impact on a water resource; h) Disposing in any manner which contains waste from, or which has been heated in any industrial or power generation process; i) Altering the bed, banks, course or characteristics of a watercourse; j) Removing, discharging, or disposing of waste found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and k) Using waste for recreational purposes.
National Road Traffic Act (No 93 of 1996)		Road safety.

Legislation	Sections	Relates to:
Town Planning and Townships Ordinance 15 of 1986		Town Planning.
SANS 10103 (Noise Regulations)		The measurement and rating of environmental noise with respect to annoyance and to speech communication.

5.1. International Agreements & Policies

The international community has agreed to treat and attend to environmental and water management with one voice. Regional and individual nations have developed their own policies and legislation in line with international agreements, policies as well as protocols. This is meant to save the biodiversity, ecosystem and environment at large. The list below is international agreements and policies:

- Convention Concerning the Protection of World Cultural and Natural Heritage (1972);
- Agenda 21 regarding sustainable development at global and national levels (1992);
- United Nations Framework Convention on Climate Change (1994);
- Convention on Wetlands of International Importance, especially as Waterfowl Habitat (1975)-Ramsar;
- Convention on the Conservation of Migratory Species of Wild Animals (1983), - Bonn;
- Convention on Biological Diversity including eco-systems and genetic resources (1992);
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975); and
- Copenhagen Accord on climate change (2009).

5.2. Regional Agreements

The following lists of agreements are from the sub-tropical and continental as in the African way of co-operating:

- Action Plan of the Environmental Initiative of NEPAD for sustainable development in Africa (2003); and
- African Convention on the Conservation of Nature and Natural Resources (1969).

5.3. Policies and guidelines consulted

From the NEMA Environmental Impact Assessment Regulations Guideline and Information Document Series the following guidelines were used:

- Guideline on Public Participation in the Environmental Impact Assessment Process (October 2012);
- Draft Guideline on Need and Desirability in Terms of the Environmental Impact Assessment (EIA) Regulations, 2010 (October 2012); and
- Guideline on Alternatives (August 2010).

6. DESCRIPTION OF THE RECEIVING BIOPHYSICAL ENVIRONMENT

6.1. Climate

Govan Mbeki is situated in the Highveld with the Mpumalanga Province. The Highveld is a high-altitude tropical grassland savannah and has an extremely varied climate associated with cool temperatures because of its higher altitude. The Highveld also experiences a summer rainfall during the months of October to February, and has contrasting temperatures of 8 degrees to 26 degrees during this time. Winter temperatures average in the range of 19 degrees during the months of April to August. Due to the Highveld climate this area is characterised by dry conditions. Frost occurs frequently during the winter seasons and the figure below shows all the Republic's climatic regions with eMbalenhle in Secunda indicated.

Figure 3: The Republic of South Africa Climatic Regions

The figure below indicates the eMbalenhle average annual rainfall

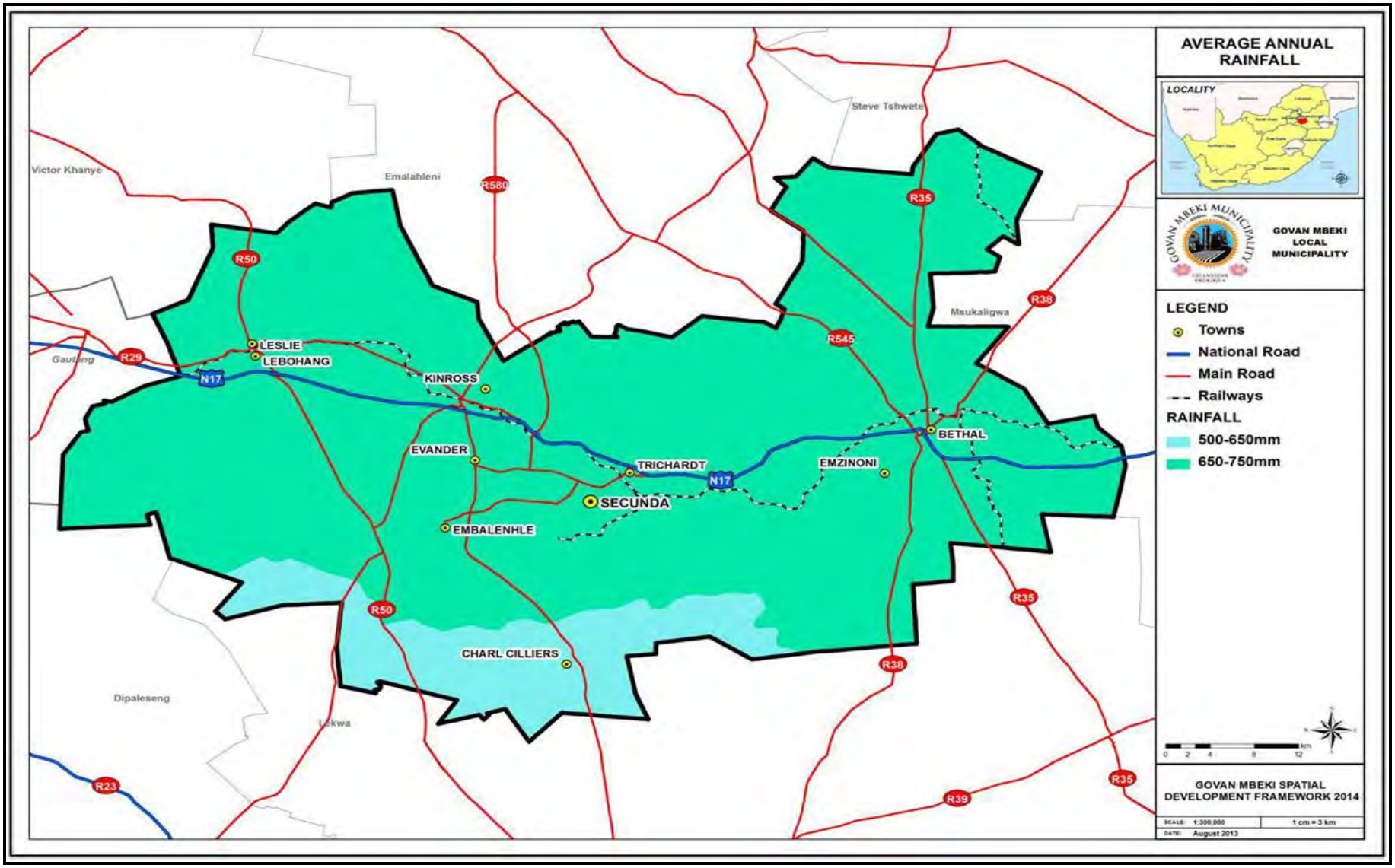

Figure 4: Average annual rainfall (Source: Govan Mbeki Local Municipality SDF)

6.2. Geology and Topography

The geology of Govan Mbeki is dominated by sedimentary rocks of the Vryheid Formation of the Ecca Group, Karoo Supergroup. These rocks primarily consist of sandstones, shales and coal beds and are extensively intruded by dolerites of Jurassic age. Quaternary alluvial deposits are present in topographical lower lying areas adjacent to the major surface water drainage bodies. The three figures that follow depict the geo-topological layout of the Govani Mbeki area which houses eMbalenhle site investigation area. The spatial distribution of the dominant underlying rock types forming part of the Karoo Super Group are as follows:

- Dolerite dominates the majority of Govan Mbeki; and
- Arenite is spread throughout Govan Mbeki in the form of intrusions.

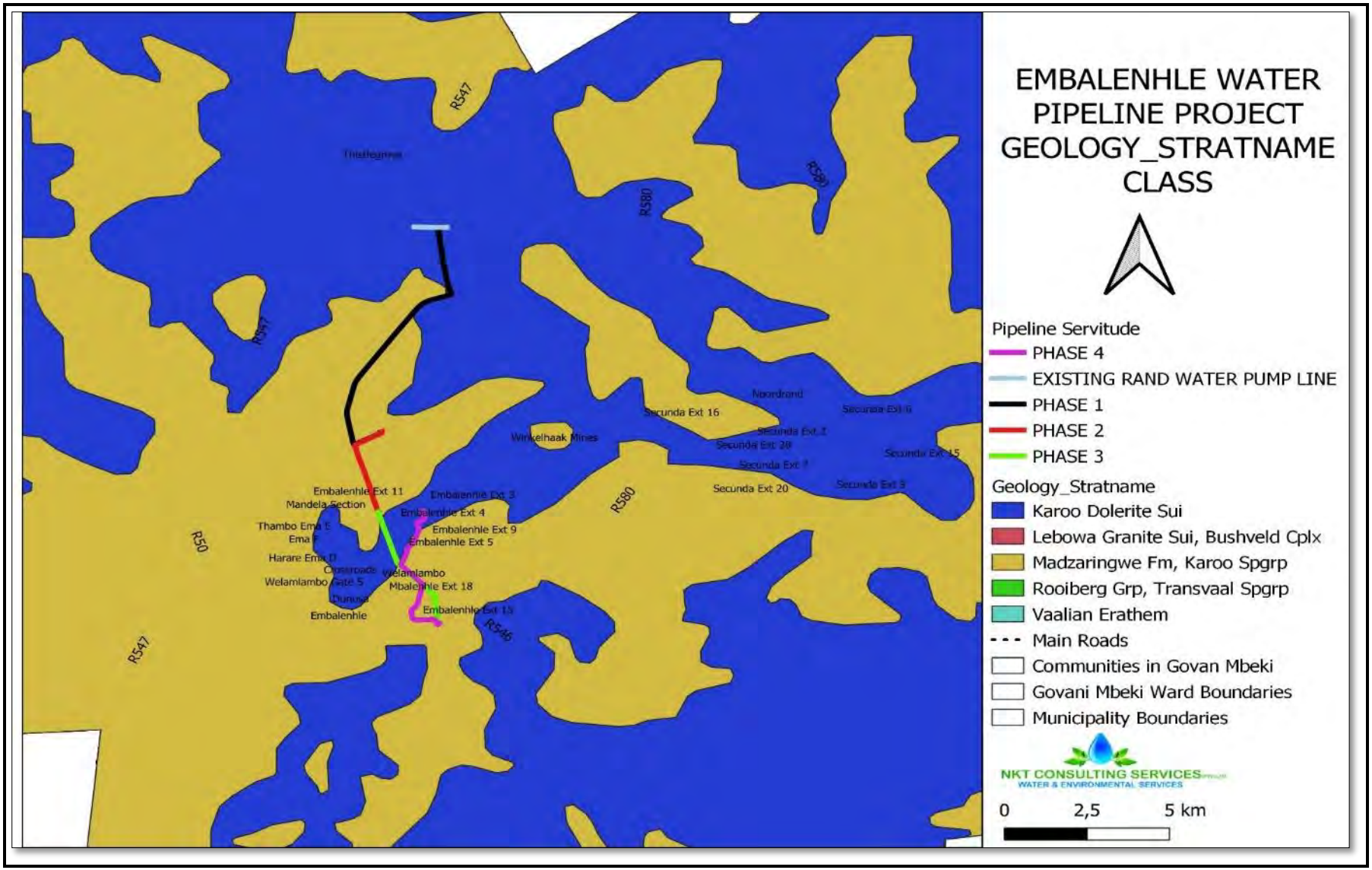

Figure 5: Geological map of eMbalenhle's water pipeline

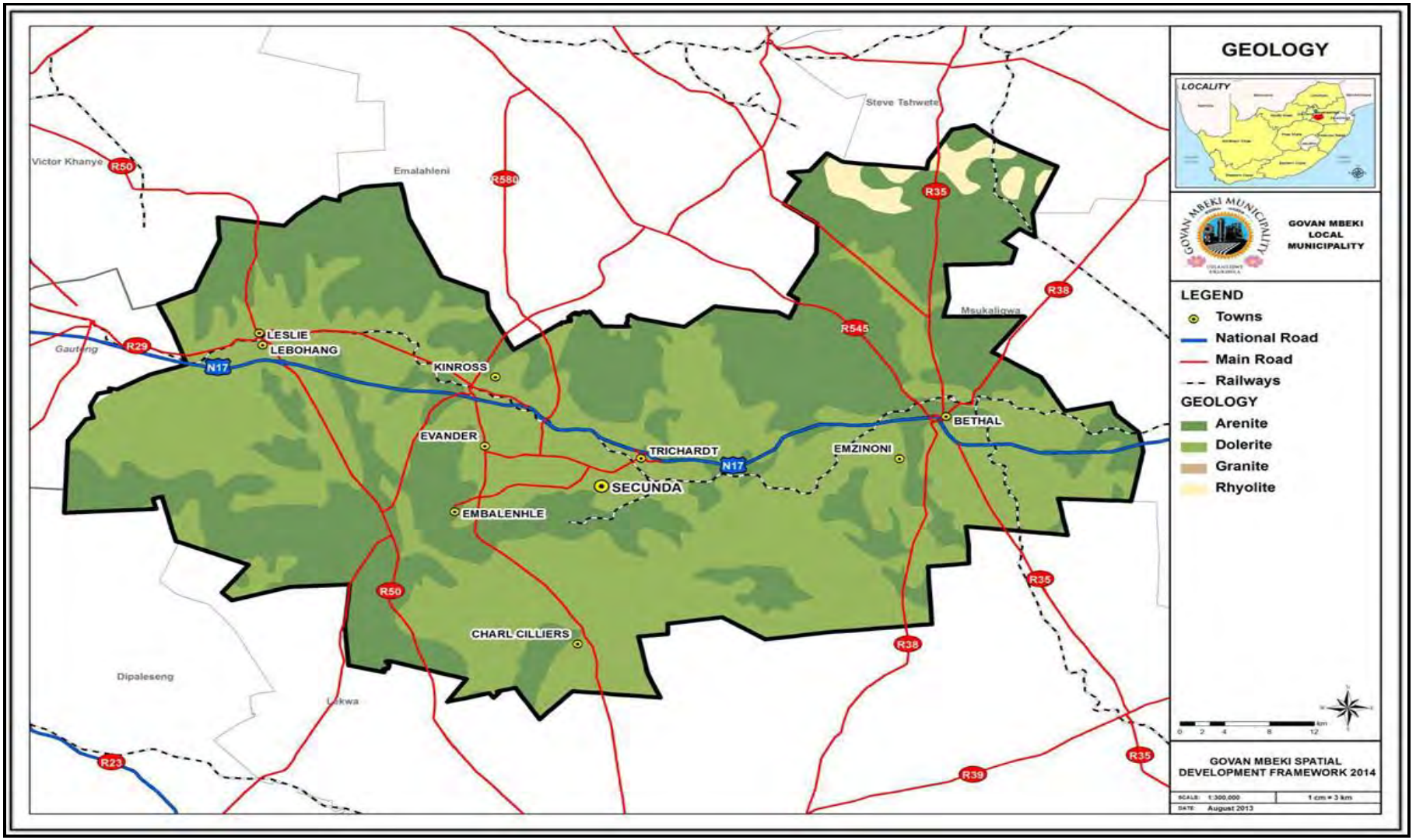

Figure 6: Govani Mbeki Municipal Geological Map

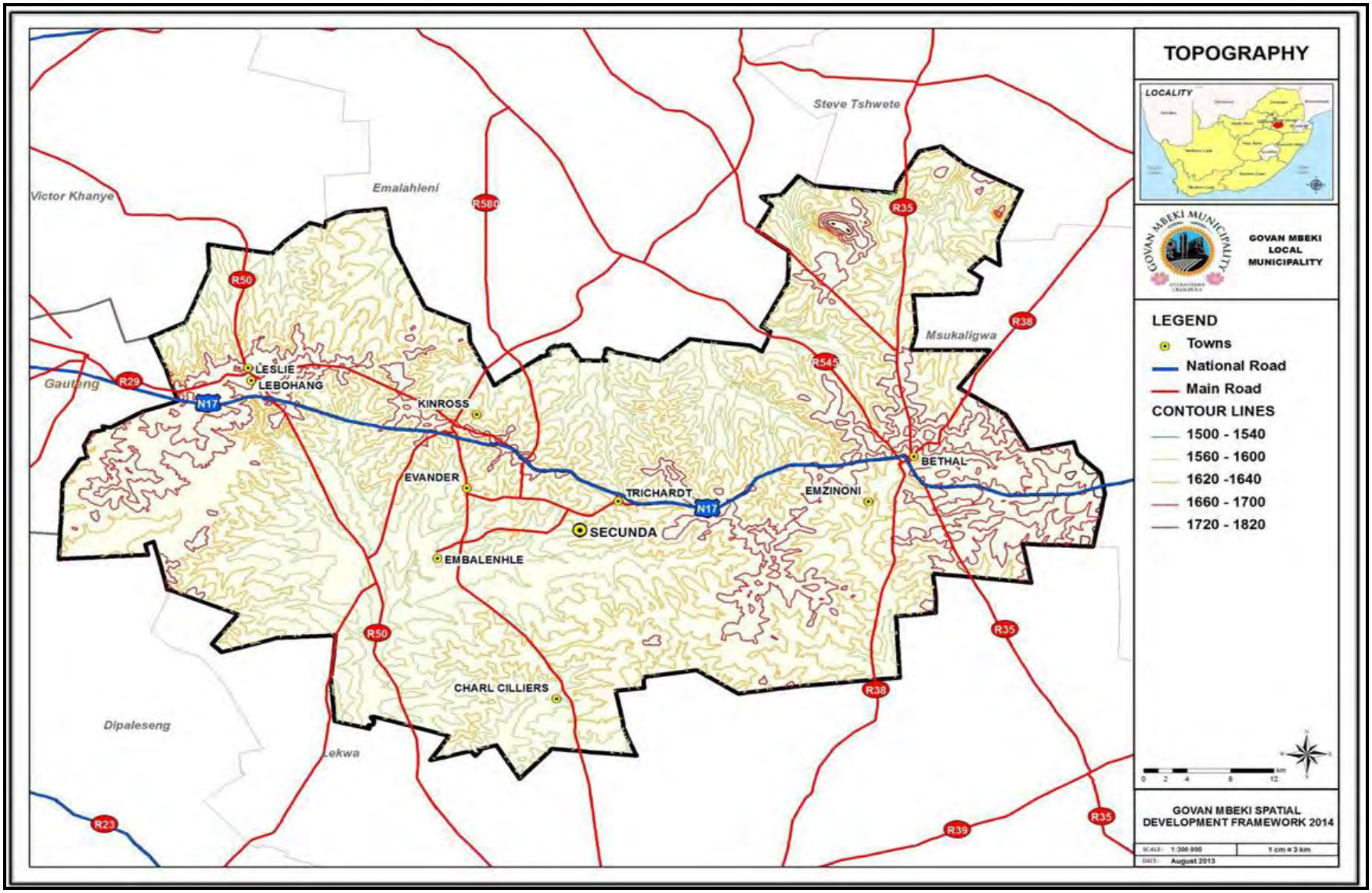

Figure 7: eMbalenhle's Catchment topological map

6.3. Hydrology

6.3.1. Rivers and Dams

Most of Govan Mbeki Local Municipality is situated in the catchments of the Blesbokspruit and Waterval River, which are in the Upper Vaal Water Management Area as well as the catchments of Olifants and Rietspruit which are in the Olifants River WMA. The project falls within the Upper Vaal Water Management Area as indicated in Figure 8. Givani Mbeki river crosses the pipeline servitude under Phase 3 and Phase 4 illustrated in the water management area map (Figure 10).

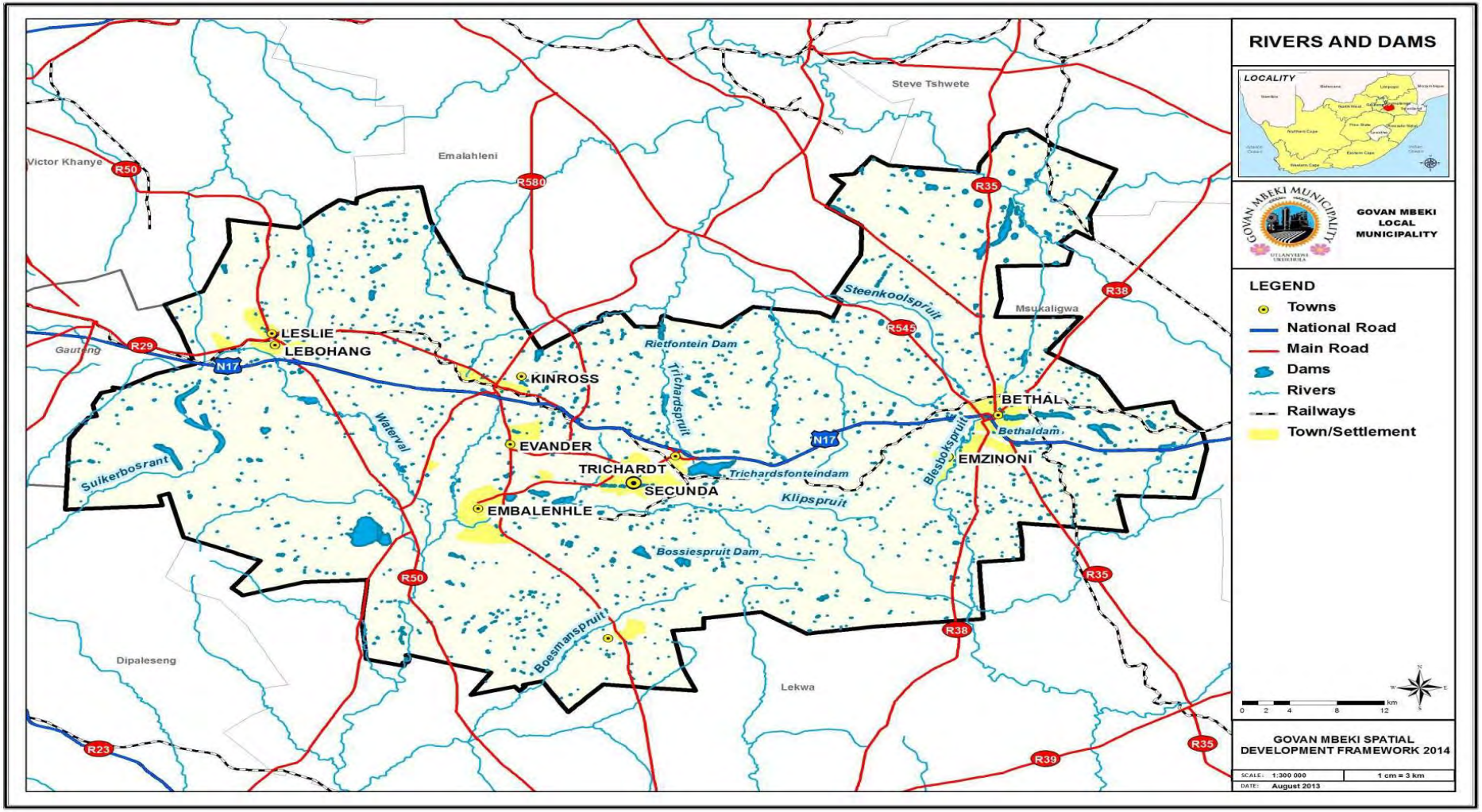

Figure 8: Govan Mbeki Municipality Dams and Rivers map

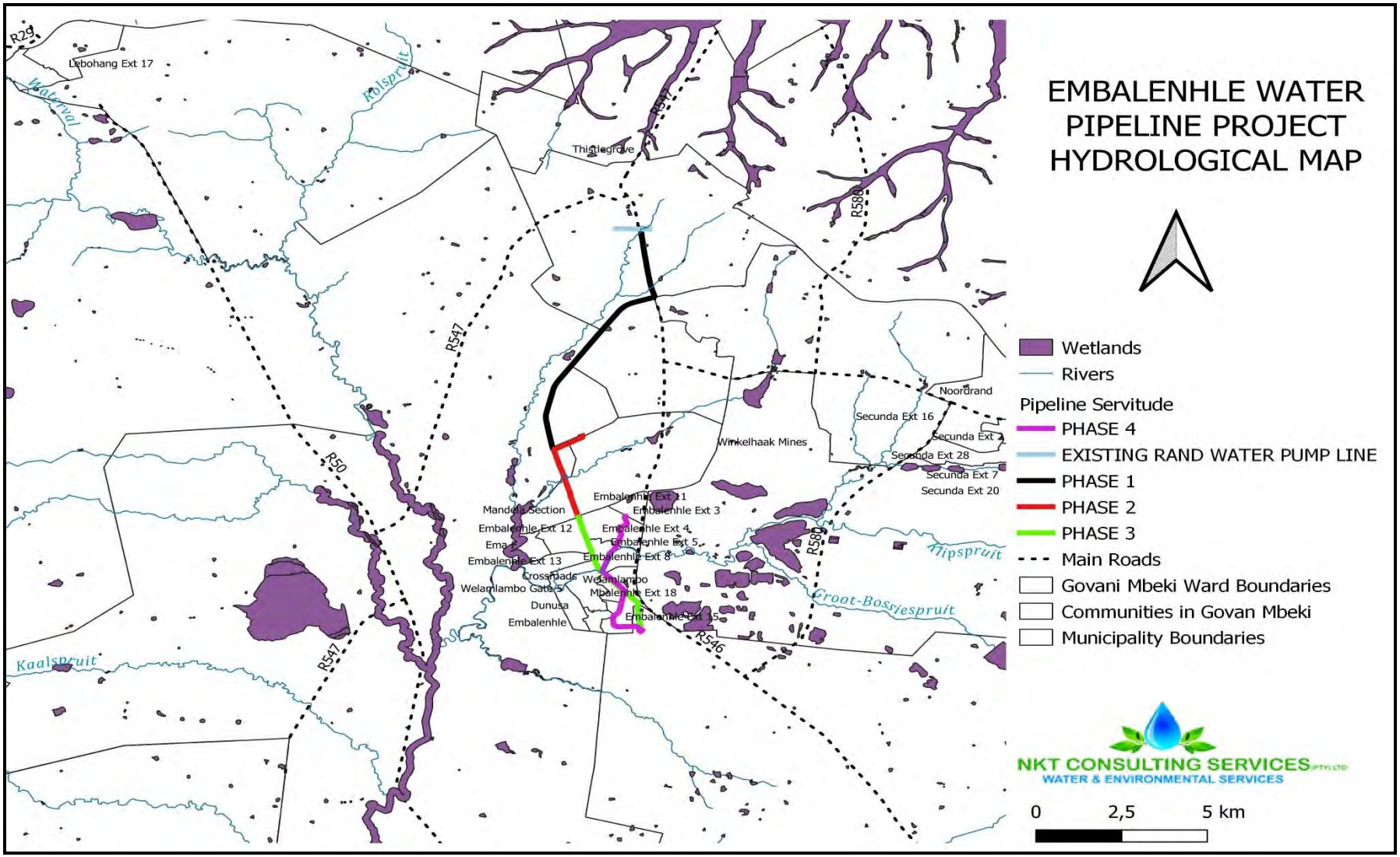

Figure 9: Water Pipeline Hydrological Map

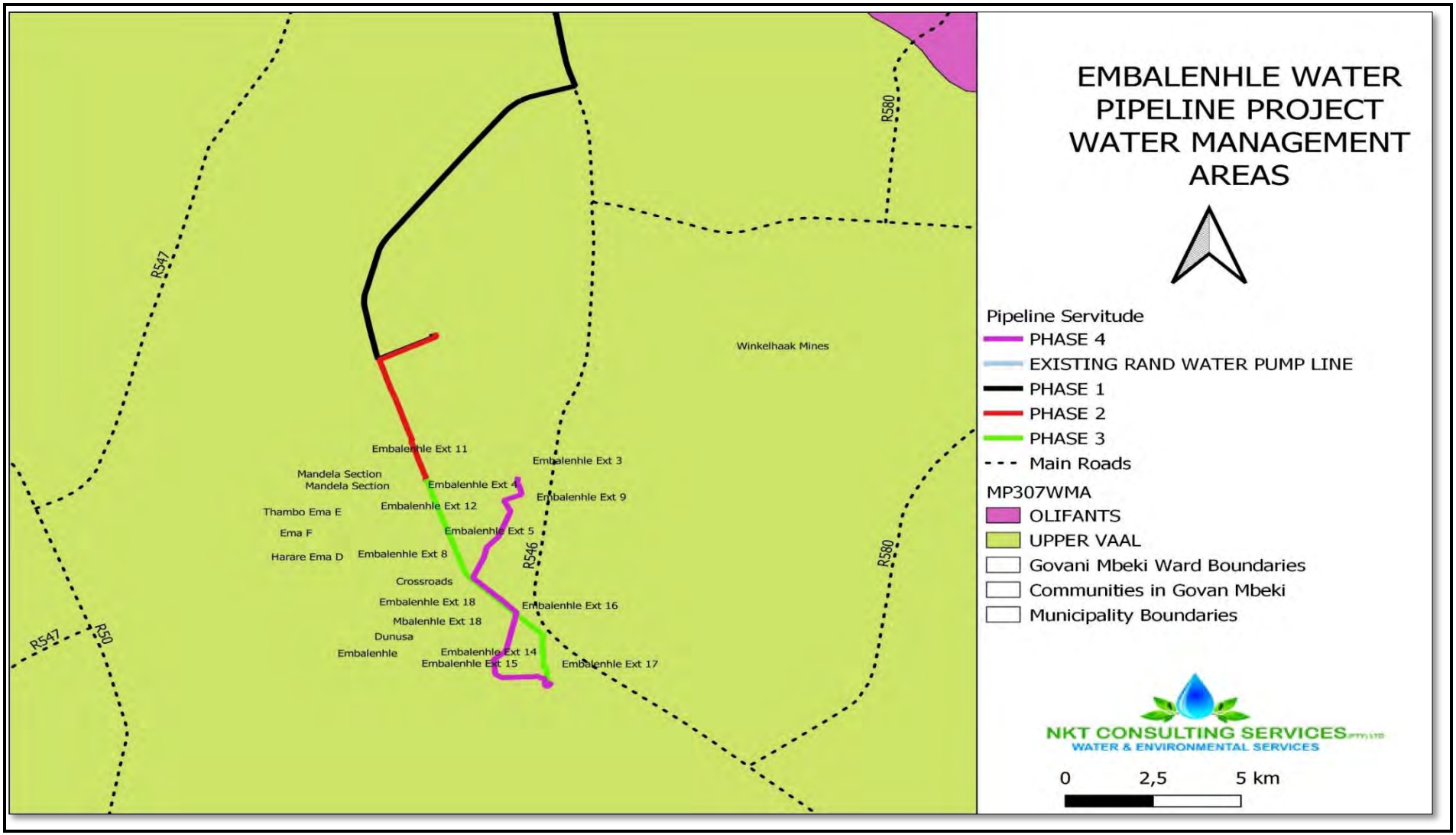

Figure 10: Project Site crossings within a water management area

6.4. Terrestrial Ecosystem

Govan Mbeki contains mainly the Grassland Biome. A biome can, in general terms, be described as a broad ecological unit, representing a large natural area with a relatively uniform plant and animal life, closely determined by environmental conditions and, especially, climate. Grassland landscapes are dominated by grass. Although grasses are the most visible plants, grasslands have a higher diversity than other herbaceous species, especially those with below-ground storage organs such as bulbs or tubers. These plants produce many spectacular wild flowers and contribute to biodiversity that is second only to the Cape Fynbos in species richness. Grassland species are particularly well adapted to being defoliated, whether by grazing, fire or frost. Repeated defoliation, within reason, does no real harm to such plants nor does it reduce productivity. (Ferrar and Lotter 2007): The cool, dry open landscapes of the Highveld, mainly above 1000 m, with rainfall of over 500 mm/yr., is subjected to the common occurrence of frost, hail storms and lightning strikes. The natural occurrence of fire and these other defoliating events favour grassland plants over woody species and help maintain the open treeless character of grasslands. Grasslands within Govan Mbeki have irreversibly been transformed by mainly agriculture and mining. These land uses destroy biodiversity but extensive livestock grazing can be reasonably biodiversity- friendly, provided good management and safe stocking rates are applied. Fire is a characteristic feature of grassland and is a necessary component of good land management. Grassland plants depend on fire, they resprout annually from their root-stocks. Without frequent fire, grasslands eventually become invaded with woody species and some herbaceous plants die. Regular burning to complement good grazing management helps to prevent the increase of species unpalatable to livestock, including woody species that form bush encroachment

The project area falls within the Soweto Highveld Grassland which is regarded as vulnerable Vulnerability is mainly caused by habitat loss or destruction of the species' home due to urbanization all is reflected in the map below (figure 11)

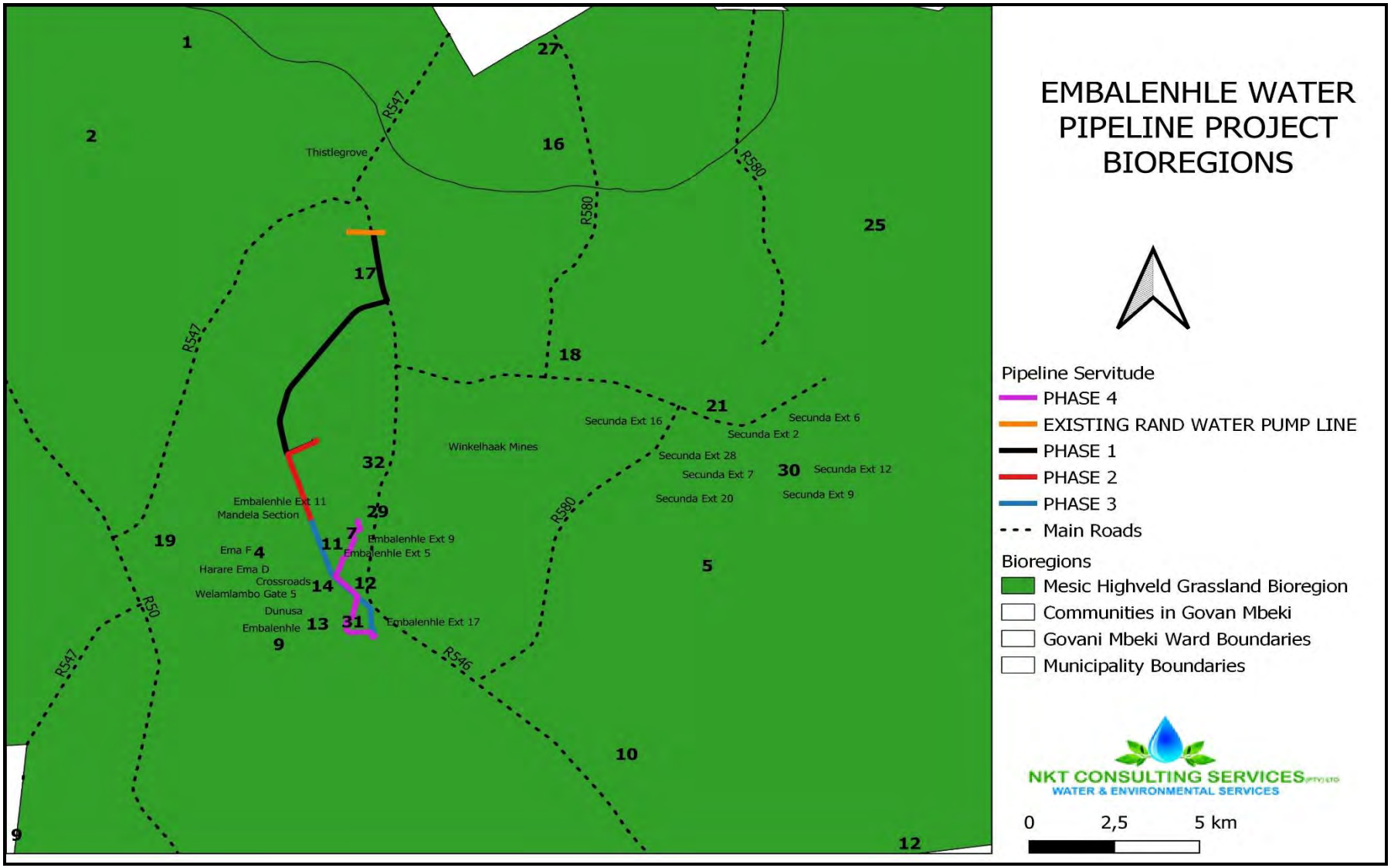

Figure 11: Bio-regional map of eMbalenhle's pipeline project

7. PRACTICAL ASSESSMENT TECHNIQUES

7.1. Desktop Assessment

A literature review was conducted regarding the main vegetation types and fauna of the general region and of the specific study area. The primary guidelines used were those of Mucina & Rutherford (eds) (2006), Low & Rebelo (1996) and Acocks (1988). Background data regarding soils, geology, climate and general ecology were also consulted. These are useful in determining what species of fauna and flora can be expected or possibly present within the different habitats of the study area.

Lists of plant species for the relevant 1:50 000 base map grid references within which the proposed project is situated, were obtained from the South Africa National Biodiversity Institute's (SANBI) database. The lists represent all plant species that have been identified and recorded within the designated grid coordinates. The main aim was to initially determine if any protected species or Red Data species were known to occur in the study area or in the immediate vicinity of the study area.

Red data and protected species listed by the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) as well as in other authoritative publications were consulted and taken into account. Alien invasive species and their different Categories (1, 2 & 3) as listed by the Conservation of Agricultural Resources Act (Act No. 43 of 1983) and the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) were also consulted.

7.2. Field surveys

Digital photographs and GPS reference points of importance were recorded during field investigations and used throughout the specialist report. Also, during field surveys or investigations, cognisance was taken of the following environmental features and attributes:

- Biophysical environment;
- Regional and site-specific vegetation;
- Habitats ideal for potential red data fauna species;
- Sensitive floral habitats;
- Red data fauna and flora species;
- Protected fauna and flora species; and
- Watercourses and water bodies

7.3. Floristic Sensitivity

The methodology used to estimate the floristic sensitivity is aimed at highlighting floristically significant attributes and is based on subjective assessments of floristic attributes. Floristic sensitivity is determined across the spectrum of communities that characterize the study area. Phytosociological attributes (species diversity, presence of exotic species, etc.) and physical characteristics (human impacts, size, fragmentation, etc.) are important in assessing the floristic sensitivity of the various communities. The criteria employed in assessing the floristic sensitivity vary in different areas, depending on location, type of habitat, size, etc. The following factors were considered significant in determining floristic sensitivity:

- Habitat availability, status and suitability for the presence of Red Data species;
- Landscape and/or habitat sensitivity;

- Current floristic status;
- Floristic diversity; and
- Ecological fragmentation or performance.

Floristic Sensitivity Values are expressed as a percentage of the maximum possible value and placed in a particular class or level as shown in the table below.

Table 7: Floristic Sensitivity Values Table

Classification	Percentage Index Values (%)
High	80-100
Medium -High	60-80
Medium	40-60
Low - Medium	20-40
Low	0-20

- **High Sensitivity Index Values** indicate areas that are considered pristine, unaffected by human influences or generally managed in an ecological sustainable manner. Nature reserves or even well managed game farms typify these areas; and
- **Low Sensitivity Index Values** indicate areas of poor ecological status or importance in terms of floristic attributes, including areas that have been negatively affected by human impacts or poor management.

Each vegetation unit is subjectively rated on a scale of 1 to 10 (Sensitivity Values) in terms of the influence that the particular Sensitivity Criterion has on the floristic status of the plant community. Separate Values are multiplied with the respective Criteria Weighting, which emphasizes the importance or triviality that the individual Sensitivity Criteria have on the status of each community.

7.4. GO, NO - GO Criteria

The sensitivity analysis is also expressed in terms of whether the "Go Ahead" has or has not been given for development in a specific area or ecological unit, with regards to the ecological sensitivity along with mitigating measures. The criteria are directly linked to all the other analyses used in the study and can be expressed as follows:

- **GO:** Areas of low sensitivity-These would typically be areas where the veld has been totally or mostly transformed;
- **GO-SLOW**: Areas of medium/low sensitivity-These would typically be areas where large portions of the veld has been transformed and/or is highly infested with alien vegetation and lacks any real faunal component. Few mitigating measures are typically needed, but it is still always wise to approach these areas properly and slowly;
- **GO-BUT**: Areas of medium sensitivity and medium/high sensitivity-These are areas that are sensitive and should generally be avoided if possible. But, with the correct implementation of mitigating and management measures can be entered if need be.; and
- **NO-GO**: Areas of high sensitivity-These are areas of high sensitivity and should be avoided at all cost. In these areas mitigating measures are typically futile in limiting impacts.

It should be noted that "The Precautionary Principle" is applied throughout this investigation.

7.5. Floral Assessment – Species of Conservation Concern

Baseline data for the quarter degree grids in which the study area is situated were obtained from the SANBI database and was compared to the Interim Red Data List of South African Plant Species (Threatened Species Programme, 2004) to compile a list of Floral Species of Conservation Concern (which include all Red Data flora species) that could potentially occur within the study area.

A snapshot investigation of an area presents limitations in terms of locating and identifying Red Data floral species. Therefore, particular emphasis is placed on the identification of habitats deemed suitable for the potential presence of Red Data species by associating available habitat to known habitat types of Red Data floral species. The verification of the presence or absence of these species from the study area is not perceived as part of this investigation as a result of project limitations.

7.6. Mpumalanga Biodiversity and Conservation Plan

The Mpumalanga Tourism and Parks Agency (MTPA) and the Department of Agriculture and Land Administration (DALA) have jointly developed the Mpumalanga Biodiversity Conservation Plan (MBCP). As the first such plan produced for the province, it is intended to guide conservation and land-use decisions in support of sustainable development. The project has been funded by the Development Bank of Southern Africa and widely supported from outside the province by planners and scientists from the South African National Biodiversity Institute (SANBI), and from other provinces, universities and research institutes.

The MBCP builds on other national plans at the provincial level in Mpumalanga. It is intended to be used by all who are involved in land-use and development planning, most particularly those specialists who need a comprehensive source of biodiversity information. It provides a basis for MTPA to review its biodiversity conservation policy and to focus its attention on high value areas for future protection initiatives. The plan, and in particular its land-use guidelines, are intended to supplement other spatial planning tools such as municipal Integrated Development Plans and Spatial Development Frameworks.

Information from the Provincial Conservation Plan was also used in the assessment criterion for the ecological impact assessment of the study area and of special concern is the CBA or ESA data from the main plan as shown in the figure below. In addition to the above guide, a sensitivity map which is part of this report is also developed using the Critical Biodiversity Area (CBA). With the list of expected vegetation and animal species in mind, it becomes very easy to search within habitats, some of which have high chances of being found within the study area. Incorporation of the findings and expected findings are however done in the tables that follows. The figure below shows the vegetation type and state of the study area with the vulnerable classification as shown below.

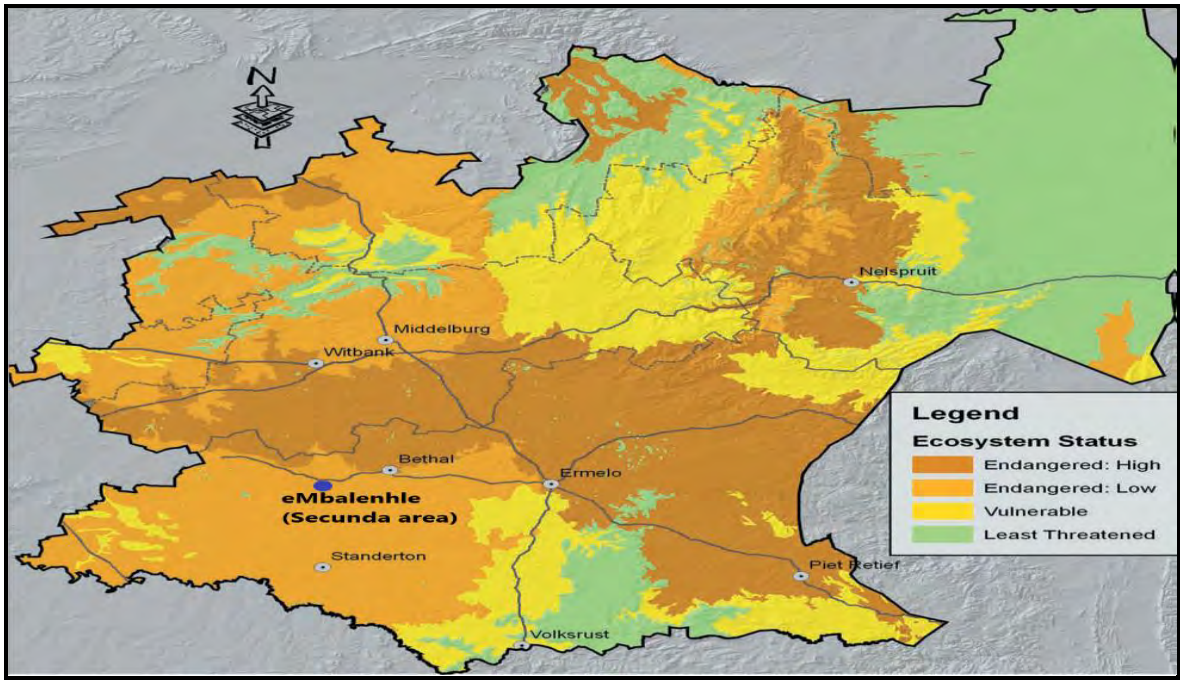

Figure 12: Mpumalanga Provincial Ecosystem Status (Source: MBCP Handbook)

In investigating the type of vegetation found within a specific area, the MBCP is then used to check the chances of identifying vulnerable plant and animal species. In addition to the above information, the figure below (figure 8) also indicates the region's protected areas in comparison to the study area's relation to Mpumalanga ecological vulnerability.

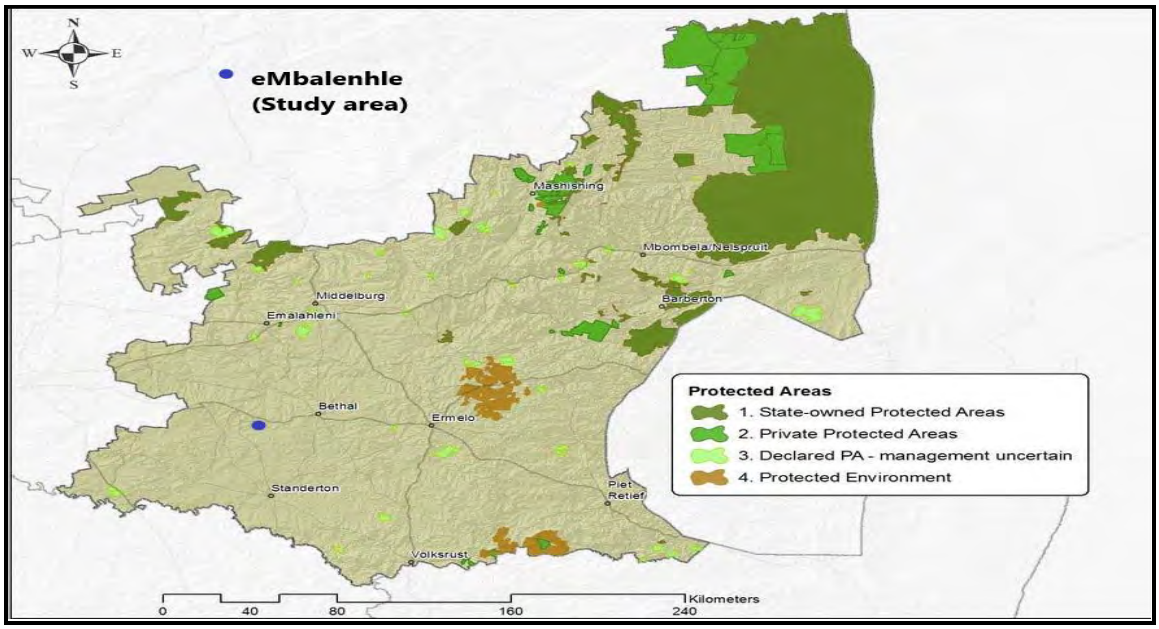

Figure 13: Protected areas of Mpumalanga (used in MBSP-2015)

A closer picture below shows the location of protected areas within the vicinity of the study area which is crucial when identification of specific ecosystems and threatened plants and animals.

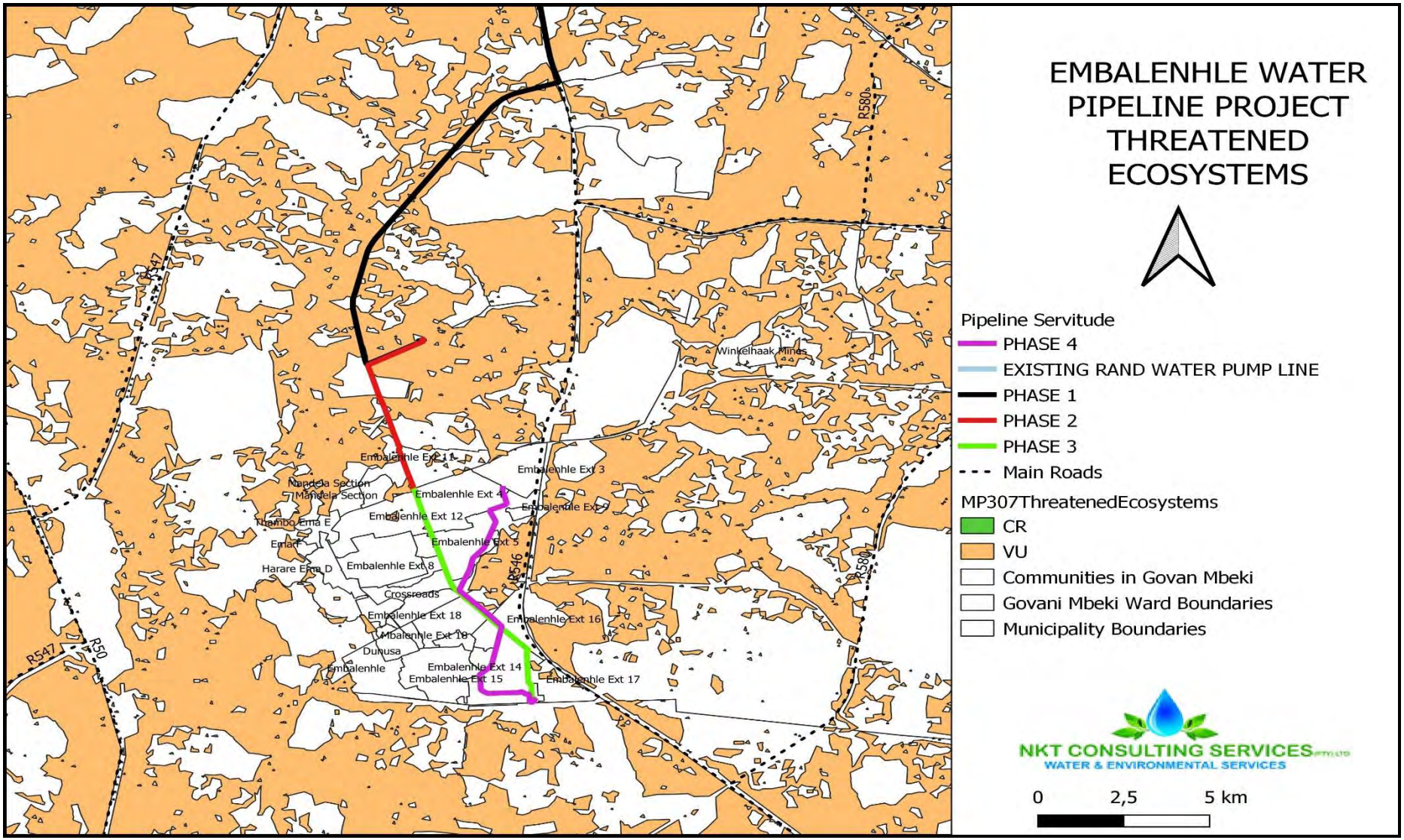

Figure 14: Figure 16: Locality map showing protected sections of the study area

7.7. Faunal Sensitivity

Determining the full faunal component of a study area during a short time scale of a few field trips can be highly limiting. Therefore, the different habitats within the study area and nearby surrounding areas were scrutinized for attributes that are deemed to be suitable for high diversity of fauna, as well as for Red Data species. Special consideration was given to habitats of pristine condition and high sensitivity. Areas of faunal sensitivity were calculated by considering the following parameters:

- ***Habitat status*** – the status or ecological condition of the habitat. A high level of habitat degradation will often reduce the likelihood of the presence of Red Data species;
- ***Habitat linkage*** – Movement between areas used for breeding and feeding purposes forms an essential part of ecological existence of many species. The connectivity of the study area to surrounding habitats and adequacy of these linkages are evaluated for the ecological functioning of Red Data species within the study area; and
- ***Potential presence of Red Data species*** – Areas that exhibit habitat characteristics suitable for the potential presence of Red Data species are considered sensitive.

The same rating scale and indices that are used for the floral sensitivities are used for the faunal sensitivities.

7.8. Faunal Assessment – Species of Conservation Concern

Literature was reviewed and relevant experts contacted to determine which faunal species of conservation concern (which include all Red Data species) are present, or likely to be present, in the study area. A snapshot investigation of an area presents limitations in terms of locating and identifying Red Data fauna species. Particular emphasis was therefore placed on the identification of habitat deemed suitable for the potential presence of Red Data fauna species by associating available habitat to known habitat types of Red Data species. The verification of the presence or absence of these species from the study area is not perceived as part of this investigation as a result of project limitations. The red data species map is shown in the figure below.

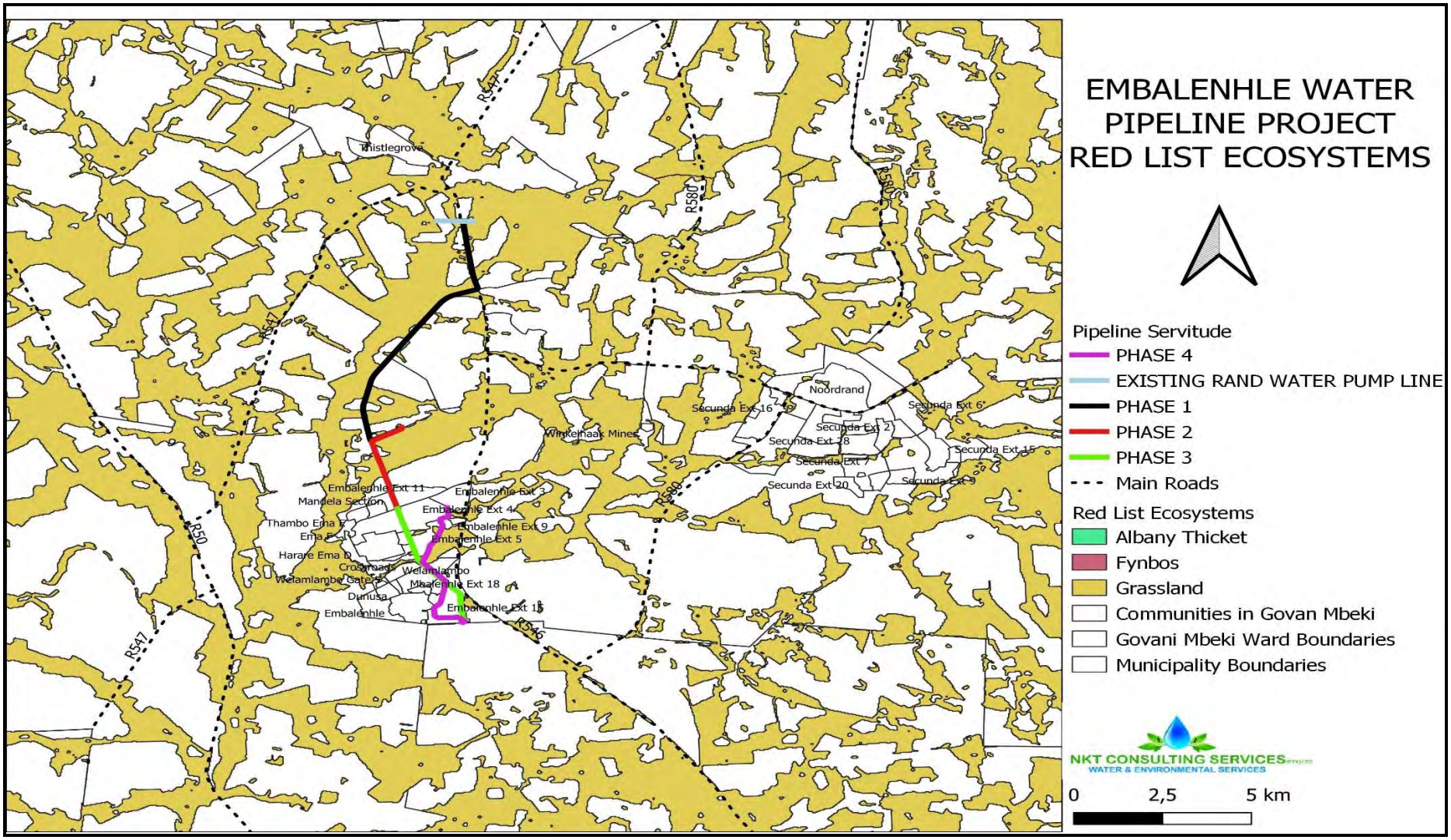

Figure 15: Red-Data Map for eMbalenhle Water Project

7.9. Probability of Occurrence (POC)

Known distribution range (D), habitat suitability of the site (H) and availability of food sources (F) on site is determined for each of the species. Each of these variables is expressed as a percentage (where 100% is a perfect score). The average of these scores provides a POC score for each species.

The POC is calculated as follows:

POC = (D+H+F) / 3

The POC value is then categorized as follows:

- 0-20% = Low;
- 21-40% = Low / Medium;
- 41-60% = Medium;
- 60-80% = Medium/High; and
- 81-100% = High

7.10. Total Species Score (TSS)

Species with a POC score of more than 60% (Medium/High) are considered when applying the RDSIS. A weighting factor is assigned to the different IUCN categories providing species with a higher conservation status, a higher score. This weighting factor is then multiplied with the POC to calculate the total species score (TSS) for each species. The weighting assigned to each category rating is shown in the table below.

Table 8: Total Species Score for Fauna

Status Category	Abbreviation	Weighting
Data deficient	DD	0,2
Rare	RA	0,5
Near Threatened	NT	0,7
Vulnerable	VU	1,2
Endangered	EN	1,7
Critically Endangered	CR	2,0

The TSS is calculated as follows:

TSS = (IUCN weighting x POC) where POC is > 60%.

7.11. Average Total Species & Average Threatened Taxa Score

The average of the Total Species (TSS) potentially occurring on the site is calculated. The average of all the Threatened Taxa (TT) (Near threatened, Vulnerable, Endangered and Critically Endangered) TSS scores are also calculated. The average of these two scores (Av.TSS and Av.TT) is then calculated in order to add more weight to threatened taxa with POC higher than 60%.

The average is calculated as follows:

Average = (Av.TSS [TSS / Tot.Species] + Av.TT [TT TTS / No. of species]) / 2

7.12. Red Data Sensitivity Index Score (RDSIS)

The average score obtained above and the sum of the percentage of species with a POC of >60% of the total number of Red Data Listed species listed for the area is then calculated. The average of these two scores, expressed as a percentage, gives the RDSIS for the area investigated.
The RDSIS is calculated as follows:
RDSIS = (Average + [Spp. with POC >60% / Total No. of Spp*100]) / 2; and is simplified below.

Table 9: The RDSIS Category Ratings

RDSIS Score	Category Rating
0 – 20%	LOW
21 – 40%	LOW / MEDIUM
41 – 60%	MEDIUM
61 – 80%	MEDIUM / HIGH
81 – 100%	HIGH

7.13. Biodiversity Impact Assessment

The impact assessment takes into account the nature, scale and duration of the effects on the natural environment and whether such effects are positive (beneficial) or negative (detrimental). A rating/point system is applied to the potential impact on the affected environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each issue, the following criteria are used and points awarded as shown:

- Extent: National - 4; Regional – 3; Local – 2; Site – 1;
- Duration: Permanent – 4; Long term – 3; Medium term – 2; Short term – 1;
- Intensity: Very high – 4; High – 3; Moderate – 2; Low – 1; and
- Probability of Occurrence: Definite – 4; Highly probable – 3; Possible – 2; Impossible – 1.

7.14. Criteria for the classification of an impact

7.14.1. Nature

A brief description of the environmental aspect being impacted upon by a particular action or activity is presented.

7.14.2. Extent (Scale)

Considering the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact.

- Site: Within the construction site;
- Local: Within a radius of 2 km of the construction site;
- Regional: Provincial (and parts of neighboring provinces); and
- National: The whole of South Africa

7.14.3. Duration

Indicates what the lifetime of the impact will be.

- Short-term: The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase;
- Medium-term: The impact will last for the period of the construction phase, where after it will be entirely negated;
- Long-term: The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter; and
- Permanent: The only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

7.14.4. Intensity

Describes whether an impact is destructive or benign.

- Low: Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected;
- Medium: Effected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way;
- High: Natural, cultural and social functions and processes are altered to extent that they temporarily cease; and
- Very high: Natural, cultural and social functions and processes are altered to extent that they permanently cease.

7.14.5. Probability

Probability is the description of the likelihood of an impact actually occurring.

- Improbable: Likelihood of the impact materializing is very low;
- Possible: The impact may occur;
- Highly probable: Most likely that the impact will occur; and
- Definite: Impact will certainly occur.

7.14.6. Significance

Significance is determined through a synthesis of impact characteristics. It is an indication of the importance of the impact in terms of both the physical extent and the time scale and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact. Using the scoring from the previous section, the significance of impacts is rated as follows:

- Low impact: 4-7 points. No permanent impact of significance. Mitigating measures are feasible and are readily instituted as part of a standing design, construction or operating procedure;
- Medium impact: 8-10 points. Mitigation is possible with additional design and construction inputs;
- High impact: 11-13 points. The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment; and

- Very high impact: 14-16 points. The design of the site may be affected. Intensive remediation as needed during construction and/or operational phases. Any activity, which results in a "very high impact", is likely to be a fatal flaw.

7.14.7. Status

Status gives an indication of the perceived effect of the impact on the area.

- Positive (+): Beneficial impact;
- Negative (-): Harmful or adverse impact; and
- Neutral Impact (0): Neither beneficial nor adverse.

It is important to note that the status of an impact is assigned based on the *status quo.* That is, should the project not proceed, thus not all negative impacts are equally significant. The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented.

7.15. Sensitivity Mapping & Assessment

An ecological sensitivity map of the site is normally produced by integrating the information collected on-site with the available ecological and biodiversity information available in the literature and various spatial databases. This includes delineating the different vegetation and habitat units identified in the field and assigning sensitivity values to the units based on their ecological properties, conservation value and the potential presence of species of conservation concern as highlighted in the information supplied by sections mentioned earlier in the chapter. The ecological sensitivity of the different units identified in the mapping procedure was rated according to the following scale:

- ***Low*****:** Units with a low sensitivity where there is likely to be a negligible impact on ecological processes and terrestrial biodiversity. This category is reserved specifically for areas where the natural vegetation has already been transformed, usually for intensive agricultural purposes such as cropping. Most types of development can proceed within these areas with little ecological impact;
- ***Medium***: Areas of natural or previously transformed land where the impacts are likely to be largely local and the risk of secondary impact such as erosion low. Development within these areas can proceed with relatively little ecological impact provided that appropriate mitigation measures are taken;
- ***High:*** Areas of natural or transformed land where a high impact is anticipated due to the high biodiversity value, sensitivity or important ecological role of the area. Development within these areas is highly undesirable and should only proceed with caution as it may not be possible to mitigate all impacts appropriately; and
- ***Very High*****:** Critical and unique habitats that serve as habitat for rare/endangered species or perform critical ecological roles. These areas are essentially **''no-go''** areas from a developmental perspective and should be avoided at all costs. Usually represented in "red".

Under normal circumstances, a map is then created to represent the area's sensitivity to any type of development and will be shown in the chapter that follows.

8. ECOLOGICAL ASSESSMENT FINDINGS

8.1. Floral Species

The table below shows the kind of plants observed as well as those expected to be seen, during the walk through the investigation site and note that some of the plants observed are classified as alien or invasive plant species and are therefore categorized accordingly. The table below was generated after taking into consideration the eMbalenhle vegetation and Mpumalanga Bioregional maps for the expected versus the observed and the observed pictures are highlighted below. Please note that some plant species can be recorded as not observed while they are grown within areas or zones which were difficult to penetrate, or off season and dominance affected, therefore all-season's observation might be required to fully exhaust the list of plants or even animals likely to be seen on site.

Table 10: List of Plant Species Observed and Expected on Site

Common name	RSA Tree Number	Scientific name	Conservation status (RED List)	Observed or Not (O/N)
River bushwillow	536	*Combretum erythrophyllum*	Least concern	O
Karee tree	386	*Searsia lancea*	Least concern	O
Callitris		*Cypress pine*	Invasive	O
Black wattle		*Acacia mearnsii*	Invasive	O
Water berry	555	*Syzygium cordatum*	Least concern	N
Bulrush	Grass	*Typhae capensis*	LC	O
Mace Sedges	Grass	*Currex greyii sedges*	LC	O
Red river gum		*Eucalyptus camaldulensis*	Invasive	O
Weeping willow		*Salix babylonica*	LC	O
Velvet Bushwillow	537	*Combretum molle*	LC	N
Wild Pear	471	*Dombeya rotundifolia*	Least Threatened	N
Transvaal Milkplum	581	*Englerophytum magalismontanum*	LC	N
Date Palm tree		*Phoenix rupicola*	LC	O
Buffalo thorn		*Zizipus mucronata*	LC	O
Lavender Tree	455	*Heteropyxis natalensis*	LC	N
Wild Pride-of-India	523	*Galpinia transvaalica*	LC	N
Transvaal Red Milkwood	585	*Mimusops zeyheri*	LC	N
Weeping Wattle	215	*Peltophorum africanum*	Not threatened	N
Kiaat	236	*Pterocarpus angolensis*	LC	N

Common name	RSA Tree Number	Scientific name	Conservation status (RED List)	Observed or Not (O/N)
Weeping Boer-bean	202	*Schotia brachypetala*	LC	N
Toad Tree	644	*Tabernaemontana elegans*	LC	N
Kikuyu grass		*Pennisetum Clandestinum*	Invasive	O

Figure 16: Wattle trees on the river edges

Figure 17: Matured clusters of Eucalyptus with cypress tree within the eMbalenhle Residential area

Figure 18: Mature weeping Willow tree growing on low-lying areas near waterways.

Figure 19: Mexican Merigold and kikuyu grass with other invasive plant species

8.2. Conservation status

The conservation status of the study area's catchment is best described by the MPCP (Mpumalanga Province Conservation Plan) as Least threatened although activities that have an impact on the watercourse or riparian zone are considered or classified to be requiring permission from legal authorities. There are riparian belts and aquatic habitats in the vicinity (www.bgis.sanbi.org/LUDS). The table below gives a basic description of the status categories. The Biodiversity Act (Act 10 of 2004) provides for listing of threatened or protected ecosystems, in one of four categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or protected. The main purpose for the listing of threatened ecosystems is an attempt to reduce the rate of ecosystem and species destruction and habitat loss, leading to extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems (SANBI).

The first national list of threatened terrestrial ecosystems has been gazetted, together with supporting information on the listing process. This includes the purpose and rationale for listing ecosystems, the criteria used to identify listed ecosystems, the implications of listing ecosystems, and summary statistics and national maps of listed ecosystems (National Environmental Management: Biodiversity Act: National list of ecosystems that are threatened and in need of protection, (G 34809, GN 1002), 9 December 2011) (SANBI).

Table 11: Ecosystem Status: Simplified Explanation of Categories Used

Status	Percentage Transformed (%)	Effect on Ecosystem
Least Threatened (LT)	0-20% (<20% loss)	No significant disruption of ecosystem functions
Vulnerable (VU)	20-40% (>20% loss)	Can result in some ecosystem functions being altered
Endangered (EN)	40-60% (>40% loss)	Partial loss of ecosystem functions
Critically Endangered (CR)	>60% or BT Index for that specific veld-type	Species loss. Remaining habitat is less than is required to represent 75% of species diversity

Source: *South African National Spatial Biodiversity Assessment Technical Report. Volume 1: Terrestrial Component. 2004. SANBI. Mucina & Rutherford (eds) (2010).*

Note: BT stands for the Biodiversity Threshold and is an index value that differs for each veld-type. In other words, because the composition, recovery rate, etc. differs for each veld-type there will be a different threshold (in this case percentage transformed) at which species become extinct and ecosystems breakdown. That is, at which point the veld-type is critically endangered. The major plant species identified during field investigations are listed in the photographs that follow. During field investigations no red data listed (RDL) species where observed. A final and comprehensive walk through will be required prior to commencement with the construction of the sewer pipeline project activities to conduct a search and rescue operation since the area of concern is considered a sensitive ecosystem.

8.3. Alien plants identified in the Study Area

The Department of Environmental Affairs defines invasive alien plants as plant species that are exotic, non-indigenous or non-native to an ecosystem. Due to the lack of natural enemies and the resistance to local diseases, these plants tend to spread aggressively, which then threatens biodiversity, reduce water availability and increase the risk and intensity of wildfires. The Alien and Invasive Species Regulations of the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) regulates all invasive organisms in South Africa and categorizes invasive plant species into four different categories: Category 1a & 1b, Category 2 and Category 3. These categories of IAP's need to be controlled or removed from areas where they may cause harm to the environment or where they are prohibited. In South Africa there is a total of 383 invasive plant species that must be controlled and these species are listed in the NEMBA Alien and Invasive Species list of 2016.

A few alien invasive plant species common to the area and province are present in the study area. The alien plant species encountered in the study area are recorded, along with their category rating, in table below. Although there are invasive alien species present there are not many areas of significant encroachment or serious infestation. Most invasive species are within disturbed areas. A specific invasive species monitoring and management programme should be designed and followed to enable the management of these plants especially during construction and operation of the eMbalenhle water project.

Table 12: Alien Plant Species Observed on Site

Botanical Name	Common Name	Category
Mexican merigold	Marigold	1b
Bidens pilosa	Black jack	1b
Acacia mearnsii	Black wattle	1b
Eucalyptus camaldulensis	Red river gum	1b
Pennisetum Clandestinum	Kikuyu grass	1b
Typhae capensis	Typha	1b
Arundo donax	Giant reeds	1b
Solanum linnaeanum	Devil's apple	1a

Figure 20: Typhae Plants with Kikuyu grass

8.4. Fauna

During field investigations only a few common birds were observed, small mammals' holes and droppings were seen on site. Water fowl and domesticated mammals were also observed. The rodents are also common around waste heaps as well as close to residential areas. Other mammals include the rabbits, and duikers which were noticed to been within the vicinity because of their droppings. The table below indicates the animals seen on site and those expected to be seen. A detailed table with a list of other faunal species found and/or expected within study area is on appendix 1

Table 13: Fauna Observed on Site

Biological Name	Common Name	Red Data Status	Habitat Type	Habitat Restrictions
Mammals				
Rodentia rattus	Rats	Pests	Not specific (organic waste areas)	None

Biological Name	Common Name	Red Data Status	Habitat Type	Habitat Restrictions
Bos taurus	Cattle	Farm animals	Not specific as long as its grazing area	None
Sylvicapra grimmia	Common duiker	Veld wildlife	Veld small bushes	None
Oryctolagus cuniculus	Rabbits	Veld wildlife	Veld grasslands	None
Avifauna				
Streptopelia roseogrisea	African Collared-Dove	Least concern	Tree branches	On Mature vascular trees found on dry landscape
Red-billed weaver	Quillea birds	Least concern	Grass seed producing plants	None
Anas platyrhynchos	Wild duck	Least concern	Water courses	Riparian and watercourses

Figure 21: Cattle and wild ducks on the veld

8.5. Sensitivity Mapping

The sensitivity mapping system is used to mark areas which are perceived to be sensitive around or in the vicinity of the project development area. These zones which are deemed sensitive should be avoided when project implementation and operation occur, or some precautionary measures need to be partaken in order to minimise the impacts of the project development (Construction and operation). Some of the mitigation measures are therefore highlighted in this report as well

as the Environmental Management Programme (EMPr). Some of the areas to be avoided or treated with care are watercourses, wetlands, riparian belts, granite rock outcrops and buffer zones as they are classified and/ or deemed sensitive. These are areas with sensitive species (biodiversity), sensitive habitats and their disturbance or human interference can destabilise the natural ecological recovery patterns or its natural system of operation. If operations or activities are to proceed, some mitigation measures should then be implemented.

Information from the following maps (threatened Ecosystem map, vegetation map and regional biomes map) were very crucial in the development of the detailed sensitivity map for the sewer project. From the map below, it shows the pipeline servitude close to the Ecological Support Area (ESA)which is the low-lying veld with sensitive plant and animal species. It must be fully understood that this project will not involve opening up of new areas but replacement of bigger diameter water pipelines with little trenching on mainly roadside areas as well as previously affected areas. So, the impacts for this development will be centred on manholes areas and related places which are already in existence.

The figure below shows the phases (three) of the eMbalenhle water pipeline within a vulnerable to less threatened ecosystem which represents a typical sensitivity map of the project site. Please note there is no critical ecosystem which may limit project development cause of sensitivity

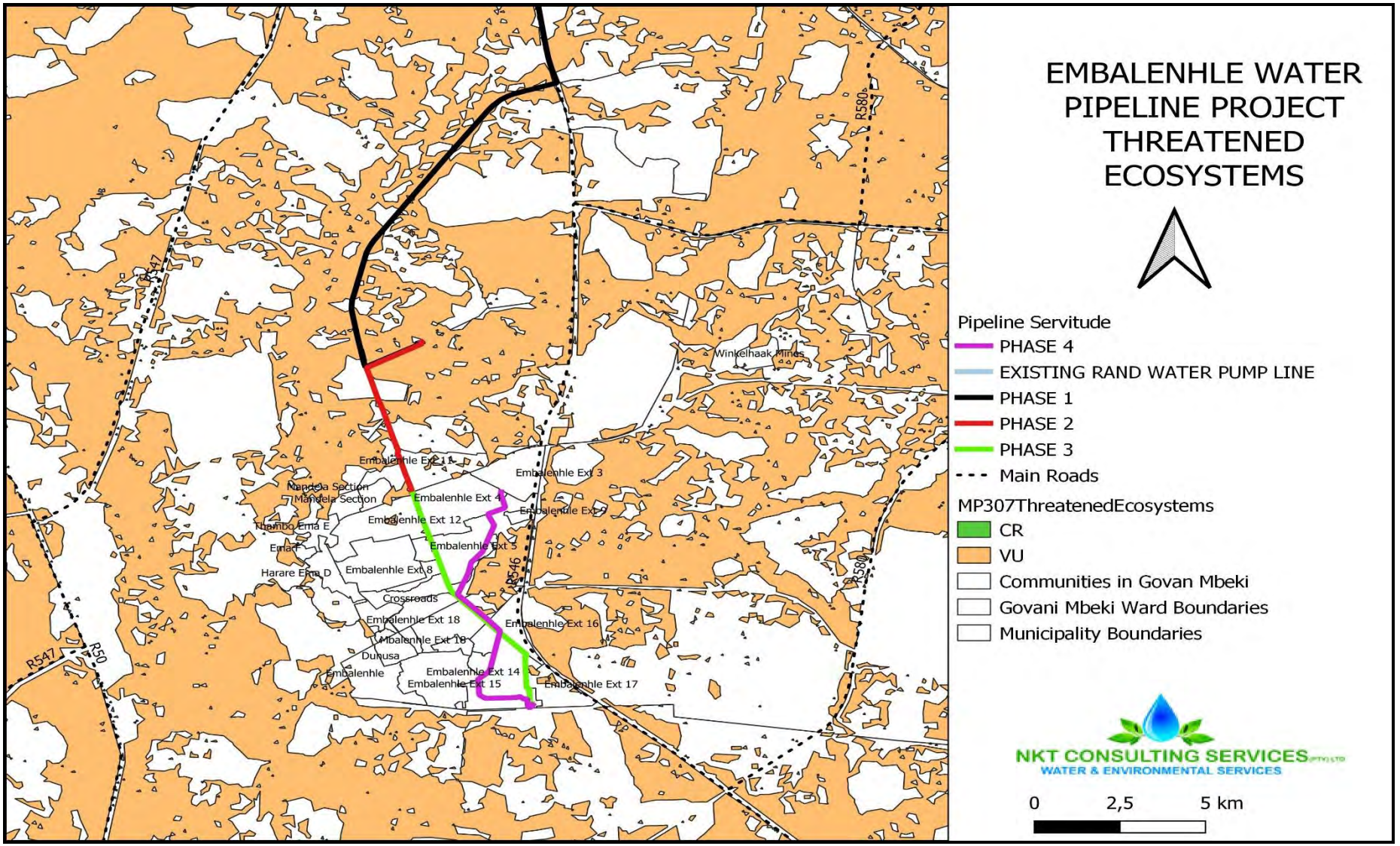

Figure 22: Ecosystem map representing the area's sensitivity

From the sensitivity map above, all water pipeline replacement activities will be concentrated on already developed landscape of the eMbalenhle residential existing water reticulation network and minimum impact to low-lying veld will be done.

9. IMPACT ASSESSMENT

The aim of this section is to identify the potential ecological impacts that are likely to arise as a result of the proposed modification and operation of the eMbalenhle water pipeline. The major impacts affect the main two phases of development (modification and operation) though they should be noted during the planning stage.

9.1. Impact Assessment Methodology

The impact assessment was done according to the following methodology:

- Direction of an impact may be positive, neutral or negative with respect to the particular impact (e.g., a habitat gain for a key species would be classed as positive, whereas a habitat loss would be considered negative);
- The magnitude and outline the rationale used. Appropriate, widely recognised standards are used as a measure of the level of impact;
- Magnitude is a measure of the degree of change in a measurement or analysis (e.g., the area of pasture, is therefore, classified as none/negligible, low, moderate or high. The categorization of the impact magnitude may be based on a set of criteria (e.g., health risk levels, ecological concepts and/or professional judgment) pertinent to each of the discipline areas and key questions analysed;
- Duration refers to the length of time over which an environmental impact may occur i.e., transient (less than 1 year), short-term (0 to 5 years), medium term (5 to 15 years), long-term (greater than 15 years with impact ceasing after closure of the project) or permanent;
- Scale/Geographic extent refers to the area that could be affected by the impact and is classified as site, local, regional, national, or international;
- Probability of occurrence is a description of the probability of the impact actually occurring as improbable (less than 5% chance), low probability (5% to 40% chance), medium probability (40 % to 60 % chance), highly probable (most likely, 60% to 90% chance) or definite (impact will definitely occur); and
- Impact significance was rated by the specialist using the scoring system shown in the table below.

Table 14: Model Scoring System for Assessment of Significance

Magnitude	Scale	Duration	Probability
10-Very high	5-International	5-Permanent	5-Definite
8- High	4-National	4-Long-term (impact ceases after closure of activity)	4-Highly probable

Magnitude	Scale	Duration	Probability
6-Moderate	3-Regional	3-Moderate (5 to 15years)	3-Medium probability
4-Low	2-Local	2-Short-term (0 to 5 years)	2-Low probability
2-Minor	1-Site only	1-Transient	1-Improbable
0-None			0-None
Maximum SP is 100 points **SP> 75 High Environmental Significance** **SP 30 to 75 Moderate Environmental Significance** **SP< 30 Low Environmental Significance**			

After ranking these factors for each impact, the significance of the two aspects, occurrence and severity were assessed using the following formula:

SP (Significance Points) = (Magnitude + Duration + Scale) x Probability

The maximum value is 100 significance points (SP). The potential environmental impacts were then rated as of High (SP >75), Moderate (SP 30 – 75) or Low (SP <30) significance, both with and without mitigation measures on the following basis:

Table 15: Significance Points Table

SP> 75	Indicates high environmental Significance	Where it would influence the decision regardless of any possible mitigation. An impact which could influence the decision about whether or not to proceed with the project.
SP 30 to 75	Indicate moderate environmental significance	Where it could have an influence on the decision unless it is mitigated. An impact or benefit which is sufficiently important to require management. Of moderate significance - could influence the decisions about the project if left unmanaged.
SP< 30	Indicate Low Environmental Significance	Where it will not have an influence on the decision. Impacts with little real effect and which should not have an influence on or require modification of the project design or alternative mitigation.
+	Positive	An impact that is likely to result in positive consequences / effects.

9.2. Impacts Rating Matrix

The Impact rating matrix for the project is shown below. Please refer to the table above for the Impact Rating Matrix scoring system.

9.3. Cumulative Environmental Impacts

Cumulative environmental impacts, can be defined as changes to the environment caused by the combined impact of past, present and future human activities and natural processes. Cumulative impacts to the environment are the result of multiple activities whose individual direct impacts may be relatively minor but in combination with others. The multiple impacts of different activities may have an additive, synergistic or antagonistic effect on one another and with natural processes. Cumulative impacts can be difficult to predict and manage due to inadequate environmental baseline data, complex ecological processes, and the large scale at which human development occurs. Many human activities result in direct and indirect impacts that collectively impact the environment. The impacts of activities in combination with natural processes can result in cascading responses in ecosystems that can become unpredictable. The construction and operation of the sewer pipeline project also contribute significantly to the cumulative environmental impacts as highlighted in the table below. The major impacts being waste management, main water line leakage incidences contributing attraction of waterfowl, invasive plants and contamination of piped water due to reverse movement of water when pressure is low. The cumulative impacts of the eMbalenhle water pipeline project is shown in the table that follows 9table 16)

Table 16: Cumulative Impacts of the eMbalenhle Water Pipeline replacement

Project Phase	Potential Impact and/or Aspect	Significance rating of Impact before Mitigation	Mitigation	Significance rating after mitigation
Replacement and Operation	➢ Poor waste management by service personnel for the pipeline resulting in littering of some places especially at control points and site offices where all activities will be centred; ➢ Soil contamination from use of hydrocarbons on site as well as on active sites; and ➢ Unattended leakages leading to invasive plant encroachment and attraction of scavenger animals esp. at link points or manholes;	Extent: Local (2) Duration: Medium-term (2) Intensity: Moderate (2) Probability: Possible (2) Significance: Medium (8)	❖ Workers environmental awareness on waste management will assist significantly; ❖ Municipality and ECO to monitor the site frequently; ❖ Ensure reported leaks are attended to as quickly as possible.	Extent: Site (1) Duration: Medium-term (2) Intensity: Low (1) Probability: Possible (2) Significance: Low (6)

Table 17: Ecological impact assessment matrix for the Water pipeline Replacement at eMbalenhle

Project Development Phase	Potential Impact and/or Aspect	Significance rating of Impact before Mitigation	Mitigation	Significance rating after mitigation
Connection points	➢ Irresponsible practices could lead to the pollution of the surface and groundwater resources from hydrocarbon contamination, fumes from HDPE welding and cement dust and litter material); ➢ Soil compaction from movement of machinery could cause compaction or physical disturbance of these soils; ➢ Fine dust from cutting of the old pipeline can diffuse into the atmosphere or can land onto animal respiratory systems;	**Extent:** Local (2) **Duration:** Medium-term (2) **Intensity:** Moderate (2) **Probability:** Possible (2) **Significance:** Medium (8)	➢ All operations to be guided by the EMPr and the mitigation measures stipulated in this report; ➢ The ECO to monitor all activities; ➢ No batching or chemical / fuel storage areas to be laid on unprotected ground; ➢ All waste from the operations site to be deposited into marked and protected areas like bins depending on their sizes and or nature e.g., organic waste on their own etc;	**Extent:** Site (1) **Duration:** Medium-term (2) **Intensity:** Low (1) **Probability:** Possible (2) **Significance:** Low (6)

Project Development Phase	Potential Impact and/or Aspect	Significance rating of Impact before Mitigation	Mitigation	Significance rating after mitigation
Operation Phase	➢ Waste management from service crew can choke the buffer zone systems as well attracting scavenging animals like birds, rats and dogs to the campsites as well; ➢ Increased possibilities of having uncontrolled sprouting of invasive plant species due to traffic movement to site esp. manholes which considered breathing points for piped liquid as well as checkpoints or link points.	**Extent:** Local (2) **Duration:** Medium term (2) **Intensity:** High (3) **Probability:** Possible (2) **Significance:** Medium (9)	➢ Ensure that waste management services are provided to service crew men. Safety Health and Environmental (SHE) representative to assist in ensuring service areas are clear from litter and other kinds of waste before moving to the next station; ➢ Always wear PPE to minimise impact on lungs; and ➢ Mark the existing invasive plant species for destruction on a continuous process via use of a monitoring plan.	**Extent:** Local (2) **Duration:** Medium term (2) **Intensity:** Low (1) **Probability:** Possible (2) **Significance:** Medium (7)

9.4. Ecological Management Plan

The eMbalenhle water pipeline replacement project if properly managed will have almost insignificant impacts to the existing project buffer zone of 15m from main line sides ecosystem especially during operation. In most cases, ecological management plans are designed for once off projects, it would be advisable to develop an ecological monitoring schedule and/or system to frequently check and advice on the condition of the ecologically sensitive parts within the peripheries of the project for instance water quality of the water-way and affected area's drainage ways. A pipeline buffer zone should be cleared of plants to separate and/or the pipeline servitude from wild fires as well as to easily manage ecological boundaries.

9.5. Rehabilitation Plan

As for rehabilitation, this activity should not wait until operational stage of the project but should continue as a concurrent activity from construction stage right through to operation. This stage is mainly meant to ensure that as the construction process will be progressing, there will be minimum impacts on the environment till the operational stage. After each stage of construction, the affected area should therefore be cleared of waste and if heavily compacted, it must be ripped and a seed-mix is broadcast on top to allow regeneration (secondary succession). The area should also drain to minimise stagnation of water during operation. The above sensitivity maps will assist significantly when trying to identify the zones which should not be impacted by all kinds of activities in line with this project.

The riparian area is a sensitive habitat for sensitive species, therefore proper handling of such is of uttermost importance during all stages of the project. Flood lines should also not be affected in this instance.

In real terms, all affected areas within project development site should be rehabilitated to suit the original state before development thus to blend the new environment with the old and surrounding environs. The project budget under most cases includes the rehabilitation planning and costs. This section of the report defines rehabilitation as the reinstatement of the temporarily disturbed areas affected by project development and in this case "construction or construction related activities" to a state that resemble the conditions prior to the disturbances. The ECO will also assist in identifying other areas that might require rehabilitation and include them during the process so as to ensure that all the footprints (external) caused by the project are addressed. These additional points will definitely affect budget and should be expected, therefore when planning for every development, the rehabilitation related costs should be flexible.

It is highly recommended that rehabilitation around the construction footprint takes place immediately after disturbances in order to limit detrimental effects resulting from for example, rainfall events after removal or clearing of the existing material especially storm-water drainage.

The final stage of rehabilitation requires that local and/or indigenous plant species be planted to enable the area to naturally recover (natural succession) as well as blending with the already existing natural vegetation for the area. Sloping areas will be terraced or benched and top-soil covered (at least 30cm) to assist in encouraging natural growth of plants, a local agricultural expert will be consulted to assist in the determination of what plant species seed-mix should be applied. Proper care and maintenance should therefore be done with independent supervision from the ECO. Monitoring of the rehabilitation process from each phase should be emphasised and the ECO should assist with the blending mechanisms as promulgated in this report. The table below lists the rehabilitation measures that should be undertaken when monitoring post-

construction with corrective actions. Please note that each impact is followed by the corrective measure which in this instance is the rehabilitation and the time frames will act as a guide, which can be altered depending on the on-site activities.

Table 18: Impact Related Rehabilitation Plan Table for the eMbalenhle Water Pipeline Replacement Project

Impact	Rehabilitation Measures	Time Frame
Compacted Surfaces (at link points)	➢ Clear the affected area of waste materials (debris, litter etc), please note that the material should be disposed of properly, put top soil that would have been cleared at start; ➢ The top soil filled area should be ripped in a way to allow plant regeneration; and ➢ All cement contaminated soil should be removed from site for safe disposal so as to minimise the panning of the affected soil.	➢ Immediately after each manhole station is perfected to acceptable standard and ➢ As and when monitoring indicates degradation of the footprint area for the project.
Pollutants release during service and construction: (construction activity can expose hydrocarbons to surface and groundwater resources)	➢ In case of emergencies or unforeseen events, the problem must be remediated immediately and any spillage into the ground should be cleared to the satisfaction of the ECO; and ➢ Remove all project-related material / support equipment immediately on completion of any of the construction phases. Drip trays and spill kits to be part of the soil contamination amelioration and should be on site all the time.	➢ Immediately after a construction phase; ➢ Anytime during operational phase of the project, especially when maintenance activities might have resulted in pollution.
Invasive and alien species spreading:	➢ Appoint a specialist in invasive species control, eradication, management and monitoring and identified invasive species should be removed prior to construction related soil disturbances. This will prevent seed spreading into disturbed soils; ➢ Mechanical removal is the most preferred control mechanism using machinery depending on how congested the area is and this should be a continuous programme, biological eradication mechanisms	➢ Immediately after project commissioning and during progression of the project; and ➢ Should be an on-going process.

Impact	Rehabilitation Measures	Time Frame
	will also work but this requires an ecological specialist for population blooming management; and ➢ A register of the methods used, dates undertaken, as well as herbicides (if used) and dosage used must be kept and available on site. The register must also include incidents of poisoning or spillage.	

10. CONCLUSIONS AND RECOMMENDATIONS

Rehabilitation and mitigation measures should be, as far as possible be done concurrently throughout the duration of the project (project lifecycle), thus resulting in minimal effort to apply final rehabilitation approaches. Any monitoring program as suggested in the EMPr must be adhered to, both during the construction and operational stages. The following are the recommendations from the ecological perspective;

- An invasive species monitoring plan should be prepared to assist in the control of such species;
- A qualified and competitive Environmental Control Officer (ECO) should be employed to assist in ensuring that all is done in accordance with the conditions set in the Environmental Authorisation and EMPr;
- From the ecological perspective, the proposal is to proceed with construction and operation of the project but highlighted impact monitoring schedule, from the Environmental Management Plan/or programme (EMPr) should be followed extensively. The ecological management and rehabilitation from this report should however be followed as well to assist in the sustainable project development for the area of concern;
- Sensitive habitats like water courses and wetlands should be avoided and where it is not viable to avoid them, an application for Water Use Licence (WUL) should be initiated; and
- No identified endangered species was discovered but a walk through the construction footprint must be emphasised before project kick-off to ensure that no surprise incidences are noticed when activities are on-going.

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11. APPENDIX: SHORT CV

OVERVIEW

Career Objective:

A mature professional man who is an extremely enthusiastic Environmental Scientist with exceptional skills in environmental management, water resource management, environmental health as well as quality management to sectors inclusive of the mining, construction, municipal, natural resources management, provincial governance right through to consultancy at regional and national level.

Key Skills and Qualifications:

- Excellent analytical skills and communication skills for environmental reporting, report writing as well as incident investigation;
- Regulatory compliance monitoring skills and environmental risk assessment to construction projects as well as mining;
- Have facilitation and training skills in development of strategy, planning and assessment of project impact;
- Strategic planning in resources optimisation, loss prevention, quality evaluation and/or auditing;
- Up to date knowledge on how to implement the integrated Environmental Management Systems (EMS) as well as for Integrated Water Resources Management (IWRM);
- Hands on experience in basic assessments, environmental impact assessment, wetland delineation as well as ecological impact and biodiversity assessment using local and international guidelines;
- Excellent mining catchment environmental and water use licence application, auditing and monitoring for compliance, land restoration and rehabilitation;
- Remarkable skills in working with local municipalities, provincial governments and national governments with unparalleled knowhow on how to compile strategic provincial reports;
- Registered scientist (SACNASP) who operates within statutory regulations in executing the natural scientist duties;
- Working knowledge of local legislation and application to operational activities, thus National Environmental Management Act (NEMA), Water Act of 1998, Waste Management Act, MPRDA. Current Employment.

SUMMARIZED SPECIALIST PROJECTS EXPERIENCE

Consulting Specialist Projects:

- Wetland delineation and Ecological Impact Assessment for RDP housing project for Phalaborwa's Majenje community area in Limpopo-2010 (Dumicol Consulting);
- Wetland delineation and impact assessment for Mandela Village Road upgrading (paving) project in Modjajikloof area near Tzaneen in Limpopo Province (2013);

- Ecological impact assessment and wetland delineation for Klarinet foot bridge construction project in Witbank (2013) under DIGES Group (Pty) Ltd;
- Tokologo Municipality bulk-water supply from Vaal River in Free state- Ecological and Bio-diversity assessment studies-2011;
- Wetland delineation and ecological assessment for Volkrust's Vukuzenzele RDP housing project-Mpumalanga province (2016) under Phuka-tsa-nong environmental consulting (pty) Ltd;
- Wetland delineation for Silindile Extension of the RDP housing project-2019 (Lothair-Phuka-tsa-nong);
- Transnet Phalaborwa (Foskor station) Ecological and biodiversity impact assessment 2016 under Kimopax (Pty) Ltd;
- Dullstroom Low-cost housing project Wetland Delineation and ecological impact assessment studies-Makhazeni District Municipality- 2016 (DIGES Grp);
- J.B Marks Cemetery Project (Potschefsroom-North West)- Wetland delineation and ecological impact assessment-2019;
- Identification, evaluation and assessment of suitable target wetlands, conceptual rehabilitation measures, evaluation of gains and compilation of wetland management plan within Manicaland Province specifically for updating the National Wetland and Protected ecosystems-Zimbabwe under Environmental Management Agency (EMA)-2005;
- Bankfontein Coal Mine (Just Coal-Middelburg)-specialist wetland study as part of IWULA (2014-2015); and
- Hendrina Transnet Substation-WUL audit (Kimopax 2017-18)

EDUCATIONAL ACHIEVEMENTS

Highest Grade	Advanced Level (Metric Equivalent)	**Institution**	St Faith's High-Zimbabwe
Year Passed	1996		
Qualification	Bachelor of science Honours degree in Environmental Science and Health	**Institution**	National University of Science and Technology, (NUST),
Year Passed	2005		
Qualification	Water and air pollution management certificate	**Institution**	Standards Association of Zimbabwe.
Year Passed	2005		
Qualification	NQF 6-Total Quality Management	**Institution**	University of South Africa (UNISA)
Year Passed	2015		

ADDITIONAL COURSES / CERTIFICATES

- Registered with SACNASP;
- Affiliate member of the International Association of Impact Assessment (IAIAsa);
- Excellent passes in Advanced Level Sciences;
- Certificate in Water Quality Monitoring: CEM-NWU

COMPUTER LITERACY

- MS Word;
- MS Excel;
- MS Power Point;
- e-mail; and
- Electronic environmental science & health audit management.

CAREER DETAILS

Name of Employer	**Nkomati Anthracite Coal Mine (Pty) Ltd**
Designation / Title	**Environmental Officer**
Period of Employment	**2020- Current**

- Mine Solid and liquid waste management using approved waste management techniques from EMPR and statutory guidelines;
- Pollution Monitoring, Control and Management around the mine Catchment;
- Environmental and Water monitoring for compliance with regulatory standards as well as in accordance with Environmental Authorization (EA) conditions from the Department of Environmental Affairs (DEA), Department of Water and Sanitation (DWS) and Department of Mineral Resources (DMR);
- Compiling the Mine Environmental Performance Assessment, environmental liability and financial provisions for submission to regulatory authorities;
- Direct involvement in internal Water Use Licence (WUL) auditing and Environmental Inspection of the natural resources within the mine catchment;
- Water resources management through sampling, quality monitoring as well as assessment using the DWS guidelines as well as the conditions stipulated in the WUL;
- Invasive species control and monitoring in compliance with WUL;
- Developing mine environmental risk assessments, rehabilitation plans and closure plans for the mine;
- Any other duty as assigned by supervisor; and
- Active involvement in the mining project management, administration and reporting.

Name of Employer	**Vierfontein Colliery (Pty) Ltd**
Designation / Title	**Environmental Officer**
Period of Employment	**2018– 2020 January**
Reason for Leaving	**Career Advancement**

- Pollution Monitoring, Control and Management around the mine Catchment;
- Environmental monitoring for compliance with regulatory standards as well as in accordance with Environmental Authorization (EA) conditions from the Department of Environmental Affairs (DEA), Department of Water and Sanitation (DWS) and Department of Mineral Resources (DMR);
- Compiling the Mine Environmental Performance Assessment, environmental liability and financial provisions for submission to regulatory authorities;
- Direct involvement in internal Water Use Licence (WUL) auditing and Environmental Inspection of the natural resources within the mine catchment;
- Water resources management through sampling, quality monitoring as well as assessment using the DWS guidelines as well as the conditions stipulated in the WUL;
- Developing mine environmental risk assessments, rehabilitation plans and closure plans for the mine; and
- Active involvement in the mining project management, administration and reporting.

Name of Employer	**Kimopax (Pty) Ltd**
Designation / Title	**Senior Environmental Scientist**
Period of Employment	**2014 – 2018**
Reason for Leaving	**Career Advancement**

- Assisting coal mining companies in the development of Integrated Waste Water Management Plan (IWWMP) for the application of water use licences as well as updating them;
- Compiling and reviewing EMPRs, IWULA and practical involvement in the wetland and ecological assessment of proposed project areas;
- Direct involvement in environmental control officer duties to the Transnet Leeufontein and Bosmanskop sub-stations construction in Mpumalanga;
- Environmental auditing to monitor compliance with EMPr and related regulations for the coal mines as well as Transnet capital projects;
- Pollution control and management at mining companies;
- Environmental monitoring for compliance with regulatory standards as well as in accordance with Environmental Authorization (EA) conditions from the DEA and DMR;
- Compiling mines environmental performance assessment, environmental liability and financial provisions for submission to DMR;
- Compilation and involvement in the application for water use licence with DWS as well as active involvement in mine water use licence external and internal auditing;
- Water resources management through sampling, quality monitoring as well as assessment using the DWS guidelines as well as the conditions stipulated in the WUL;

- Developing mine environmental risk assessments, rehabilitation plans and closure plans for the coal mines within Mpumalanga province;
- Active involvement in the Basic assessment studies reports, Scoping and Environmental Impact Assessments for mining, municipal and tourism industries;
- Active involvement in project management, administration, reporting and development of Environmental management Programme (EMPr), and
- Active representation to mines environmental and water related official audits.

Name of Employer	**Maztech Consulting and Skills development**
Designation / Title	**Development and Training Manager**
Period of Employment	**2013 – 2014**
Reason for Leaving	**Career Advancement**

- Development of strategy on extension and expansion of meat inspection services to abattoirs within the catchment;
- Involved in the designing and production of the Hygiene Management System (HMS) for abattoirs contracted to Maztech;
- Enforcing the Meat Safety Act of 2000 in line with the Department of Agriculture and Rural Development regulations on meat safety;
- Advising the high throughput and low throughput abattoirs on handling and management of waste and condemns;
- Training meat and food handlers at abattoirs on cleaning and sanitation, hygiene awareness, handling of condemns, humane handling of animals, transportation of meat and resources management;
- Management of abattoir operations so as to produce a quality meat ready for the market;
- Offering relief meat inspection services to various abattoirs contracted to Maztech as well as the roles of the abattoir hygiene manager;
- Managing the health and safety services of both abattoir and Maztech staff;
- Doing other administration duties aimed at steering the goals of the Meat Inspection Services (MIS) provider;
- Common animal disease assessment and analysis from various catchments of different abattoirs;
- Capturing disease and slaughter statistics and assisting abattoir on how best to rectify problems identified during audits; and
- Strategic planning for the implementation of the environmental health standards for contracted abattoirs in line with the veterinary public health regulations for the North West province.

Name of Employer	**Dumicol Consulting**
Designation / Title	**Environmental Consultant**
Period of Employment	**2010 – 2012**
Reason for Leaving	**Career Advancement**

- Conducting baseline ecological and biodiversity assessment for a number of projects ranging from mining, water and tourism;
- Assisting mines in the development of effective and working guidelines for their SHEQ as well as initiating the implementation;
- In depth involvement in wetland vegetation, hydrological assessment and delineation for development projects in the national parks, game reserves municipal catchments;
- Mining environment catchment pollution assessment, analysis and control including waste management techniques, treatment and environmentally friendly disposal mechanisms;
- Environmental inspection, monitoring and auditing for compliance with appropriate legislative requirements of construction sites of well-known companies;
- Basic Assessment Report Compilation, Environmental Impact Assessment and Environmental Management Plans and report analysis;
- Identification of mining impacts on the catchment's environs and ensuring sustainable utilization of natural resources within the catchment;
- Designing site specific and user-friendly disaster management plans for specific operations;
- Mine air quality management and ventilation audits for compliance with specific regulations;
- Developing and updating natural resources inventory for bio-geophysical mapping using GIS;
- Contaminated natural resources sampling, assessment, analysis and designing of rehabilitation strategies;
- Assisting the mining giants in the developing a working mine closure plan and program as well as updating the existing ones;
- Designing and implementation of Environmental Management Systems (EMS) in accordance with local and international standards.

Name of Employer	**Sanparks –Kruger National Park**
Designation / Title	**Environmental Control Officer**
Period of Employment	**2007 – 2009**
Reason for Leaving	**Career Advancement**

- Site inspection and monitoring for compliance with relevant statutory instruments as well as Environmental Authorisation conditions from DEA on all construction projects for the park;
- Practical involvement in accident investigation, risk assessment and training of the contractors' representatives on environmental management, rehabilitation of affected areas;
- Active involvement in developing site-specific environmental risk assessment, rehabilitation and management plan for active projects;
- Technical advisory strategist for environmental policy making;
- Direct involvement in monthly environmental audit using the park's environmental management plan as well as making follow-ups on non-conforming issues;
- Ecological assessment of Kruger wetlands and river catchments to ensure there is controlled natural disturbance;

- Scientific research on grass and vascular plant species natural regeneration in the middle section of the park where degradation is rampant;
- Ensuring that activities on construction sites comply with legislation of relevance to the environment as well as the Park's by laws;
- Involvement in the design, facilitation and implementation of the park's environmental management system using principles of the ISO 14001; and
- Involvement in the environmental education and awareness of social projects designed to link the community conservation principles with the national policies.

Name of Employer	**Environmental Management Agency, Manicaland Province, Zimbabwe**
Designation / Title	**Provincial Ecologist**
Period of Employment	**2005 – 2006**
Reason for Leaving	**Career Advancement**

- Planning, designing and management of artificial bio-remediation process and projects for use by mining, pulp and paper industries;
- Pollution monitoring and control within industrial catchments which include mining catchments;
- Waste-water treatment and toxicity level testing, analysis and control;
- Administering Environmental compliance programs in consultation with the Chamber of Mines for the provincial mines;
- Direct involvement in championing the survival of provincial nature conservation parks using sustainable site-specific ecological management techniques;
- Practical involvement in the provincial environmental impact assessment, review process and report writing;
- Reviewing the specialist ecological assessment reports which forms part of the EIA report Document;
- Waste-water treatment and toxicity level testing, analysis and control;
- Advising and educating local authorities on sustainable utilisation of natural resources;
- Involvement in the district to provincial level natural resources inventory assessment, planning and finalisation into National State of Environment Report.

Name of Employer	**Metallon resources Africa, Mazowe mine,**
Designation / Title	**Assistant Safety, Health and Environmental Officer**
Period of Employment	**2002 – 2003**
Reason for Leaving	**Career Advancement**

- Facilitation and implementation of the mine's EMS incorporating the ISO 14001 using both local and international guidelines;
- Responsible for the advocating, design and implementation of the Environmental Management System;
- New recruits training and staff development on environmental, health and safety;

- Involvement in the design of environmental monitoring programme for water and noise pollution management;
- Active involvement in the Mine's Safety, Health and Environmental audits which also include mine ventilation systems audits;
- Mine catchment water resources sampling, analysis and involvement in remedial activities using artificial wetland systems;
- Tailings dam management and constant rehabilitation of affected areas;
- Designing and implementation of the mine's disaster preparedness and management plan using strategic guidelines from the national hazard management offices;
- Active in the risk management and incident analysis for the mine together with epidemiological analysis in relation to the mining environment; and
- Development and up-dating of the mine closure and rehabilitation plan.

Appendix 4C: HIA Report

PHASE 1 ARCHAEOLOGICAL AND HERITAGE IMPACT ASSESSMENT REPORT FOR THE PROPOSED UPGRADING OF WATER PIPELINES IN EMBALENHLE GOVANI MBEKI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE.

DATE: JUNE 2022

Document Information

Item	Description
Proposed development and location	Upgrading of water pipeline in eMbalenhle Govani Mbeki Local Municipality, Mpumalanga Province.
Purpose of the study	To carry out a heritage sensitivity assessment to determine the presence of cultural heritage sites and the impact of the proposed project on heritage resources
1:50 000 Topographic Map	2628CC
Coordinates	See Table 1
Municipalities	Govan Mbeki Local Municipality
Predominant land use of surrounding area	Agriculture, residential and mining
Applicant	RAND WATER
EAP	Minenviro Pty Ltd (Pty) Ltd Physical Address: 31 Newquay Road, Alberton, 1450. Tell: 071 887 1394 Email: charles@minenviro.com
Heritage Consultant	Integrated Specialist Services (Pty) Ltd 65 Naaldehout Avenue, Heuweloord, Centurion, 0157 Tel: +27 11 037 1565, Cell: +27 71 685 9247 Email: trust@issolutions.co.za
Authors	Trust Mlilo (Archaeology and Heritage Specialist)
Date of Report	11 June 2022

NATIONAL LEGISLATION AND REGULATIONS GOVERNING THIS REPORT

This is a specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2014.

DECLARATION OF INDEPENDENCE

In terms of Chapter 5 of the National Environmental Management Act of 1998 specialists involved in Impact Assessment processes must declare their independence.

Trust Mlilo do hereby declare that we are financially and otherwise independent of the client and their consultants, and that all opinions expressed in this document are substantially my own, notwithstanding the fact that we have received fair remuneration from the client for the preparation of this report.

Expertise:

Trust Mlilo, MA. (Archaeology), BA Hons, PDGE, BA & (Univ. of Pretoria) and PhD (Cand. Wits) ASAPA (Professional member) with more than 15 years of experience in archaeological and heritage impact assessment and management. Mr Mlilo is an accredited member of the Association for Southern African Professional Archaeologists (ASAPA), Amafa akwaZulu Natali and Eastern Cape Heritage Resources Agency (ECPHRA). He has conducted more than hundred AIA/HIA Studies, heritage mitigation work and heritage development projects over the past 15 years of service. The completed projects vary from Phase 1 and Phase 2 as well as heritage management work for government, parastatals (Eskom) and several private companies such as BHP Billiton, Rhino Minerals e.t.c.

Independence

The views expressed in this document are the objective, independent views of Mr Trust Mlilo. The survey was carried out under Minenviro Pty Ltd. Integrated Specialist Services (Pty) Ltd has no business, personal, financial, or other interest in the proposed pipeline route apart from fair remuneration for the work performed.

Conditions relating to this report

The content of this report is based on the authors' best scientific and professional knowledge as well as the available information. Integrated Specialist Services (Pty) Ltd reserves the right to modify the report in any way deemed fit should new, relevant or previously unavailable, or undisclosed information becomes known to the author from ongoing research or further work in this field or pertaining to this investigation.

This report must not be altered or added to without the prior written consent of the author, and Minenviro Pty Ltd. This also refers to electronic copies of the report which are supplied for the purposes of inclusion as part of other

reports, including main reports. Similarly, any recommendations, statements, or conclusions drawn from or based on this report must make reference to this report. If these form part of the main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

Authorship: This AIA/HIA Report has been prepared by Mr. Trust Mlilo. The report is for the review of the Heritage Resources Agency (PHRA).

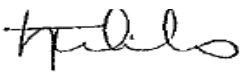
Geographic Co-ordinate Information: Geographic coordinates in this report were obtained using a hand-held Garmin Global Positioning System device. The manufacturer states that these devices are accurate to within +/- 5 m.

Maps: Maps included in this report use data extracted from the NTS Map and Google Earth Pro.

Disclaimer: The Authors are not responsible for omissions and inconsistencies that may result from information not available at the time this report was prepared.

The Archaeological and Heritage Impact Assessment Study was carried out within the context of tangible and intangible cultural heritage resources as defined by the SAHRA Regulations and Guidelines as to the authorisation of the proposed water pipeline upgrade, being proposed by Rand Water.

Signed by



11/ 06/ 2022

Acknowledgments

The author acknowledges Minenviro (Pty) Ltd for the assistance with project information, and the associated project BID as well as for responding to technical queries related to the project.

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EXECUTIVE SUMMARY

Rand Water intends to upgrade the existing water pipelines within eMbalenhle, Govan Mbeki Local Municipality, Highveld Ridge Magisterial District, Mpumalanga Province. This Archaeology and Heritage Impact Assessment (AIA/HIA) is in fulfilment of Section 38 (8) of the National Heritage Resources Act 25 of 1999 (NHRA). This Phase 1 study serves to inform and guide the applicant and contractors about the potential impacts that the proposed upgrade of water pipelines may have on heritage resources (if any) located in the study area. The document must also inform the Mpumalanga Province Heritage Resource Agency (MPHRA) and the South African Heritage Resource Agency (SAHRA) Burial Ground and Graves Unit about the presence, absence and significance of heritage resources that may be located within the proposed development site.

The identification, recording, reporting, and salvaging (if necessary) of significant heritage resources that may occur on the development footprint should be undertaken by a competent heritage practitioner as required by South African heritage legislation. In compliance with the NHRA and Section 39(3)(b) (iii), Minenviro (Pty) Ltd retained Integrated Specialist Services (ISS) to conduct a Phase 1 AIA/HIA of the proposed upgrade of water pipelines in eMbalenhle, Govan Mbeki Local Municipality, Highveld Ridge Magisterial District, Mpumalanga Province.

A stepped approach involving desktop studies, drive-through and detailed field walking was employed in order to identity any heritage landmarks on and around the development footprint. However, it should be noted that the proposed pipeline site is not on pristine grounds, having been previously occupied (see Figure 1). However, when these heritage resources (including graves) are encountered, work must be stopped forth-with, and the finds must be reported to the Mpumalanga Provincial Heritage Resources Agency/SAHRA. However, in terms of the archaeology of the area under study no archaeological remains were identified, as such heritage mitigation will not be required prior to approval of the pipeline upgrade project.

This report must also be submitted to SAHRA for review.

- The findings of this report have been informed by desktop data review, field survey and impact assessment reporting which include recommendations to guide heritage authorities in making decisions with regards to the proposed development.
- The proposed pipeline route is accessible, and the field survey was effective enough to cover most sections of the pipeline route.
- The immediate project area is predominantly mining, agriculture and roads.

The report sets out the potential impacts of the proposed pipeline upgrade development on heritage matters and recommends appropriate safeguard and mitigation measures that are designed to reduce the impacts where appropriate. The report makes the following recommendations:

- The construction team must be inducted on the possibility of encountering archaeological resources that may be accidentally exposed during clearance and excavations of pipeline trenches along the pipeline route in order to ensure appropriate mitigation measures and that course of action is afforded to any chance finds.
- If archaeological materials are uncovered, work must cease immediately and the SAHRA be notified, and activity should not resume until appropriate management provisions are in place.
- The findings of this report, with approval of the SAHRA, may be classified as accessible to any interested and affected parties within the limits of the legislations.

In terms of Section 35 and 36 of the NHRA, the proposed water pipeline development may be approved without any further archaeological investigations. The impacts of the proposed development on the cultural environmental values are not likely to be significant on the entire development site if the Environmental Management Programme (EMPr) includes recommended safeguard and mitigation measures identified in this report.

The assessment reached the following conclusions

- The entire water pipeline route has been heavily disturbed by previous and current agriculture, residential along the proposed pipeline route (see Figure 1).

Recommendations

- The identified municipal cemetery must be preserved in situ and properly mapped before any construction activity commences.
- The planners for the proposed pipeline upgrade must provide for a 30m buffer zone for the recorded cemetery or alternately divert the route to avoid the cemetery completely.
- The proposed pipeline upgrade may be approved to proceed as planned under observation that project work does not extend beyond the surveyed pipeline route.
- Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of the project EMPr, there are no other significant cultural heritage resources barriers to the proposed pipeline upgrade.
- If during development, operational or closure phases of this project, any person employed by the applicant, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the site manager.
- The Site Manager must then make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area before informing an archaeological practitioner.

- In the event that archaeological materials are unearthed, all construction activities within a radius of at least 30m of such indicator should cease and the area be demarcated by a danger tape. Accordingly, a professional archaeologist should be contacted immediately
- It is the responsibility of the applicant to protect the site from publicity (i.e., media) until a mutual agreement is reached.
- Noteworthy that any measures to cover up the suspected archaeological material or to collect any resources is illegal and punishable by law. In the same manner, no person may exhume or collect such remains, whether of recent origin or not, without the endorsement by MPHRA.
- The applicant is reminded that unavailability of archaeological materials (e.g., pottery, stone tools, remnants of stonewalling, graves, etc.) and fossils does not mean they do not occur, archaeological material might be hidden underground, and as such the client is reminded to take precautions during construction.
- Overall, impacts to heritage resources are not considered to be significant for the project receiving environment. It is thus concluded that the project may be cleared to proceed as planned subject to the Heritage Authority ensuring that detailed heritage monitoring procedures are included in the project EMPr for the construction phase, include chance archaeological finds mitigation procedure in the project EMPr
- It is also advised that the SAHRA/ MPHRA is alerted when work on site begins.
- Strict and clear reporting procedures for chance findings must be followed by and its contractors throughout the whole construction period.

ABBREVIATIONS

AIA	Archaeological Impact Assessment
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
A	Environmental Impact Assessment
EM	Environmental Manager
EMP	Environmental Management Plan
HIA	Heritage Impact Assessment
LIA	Late Iron Age
NHRA	Nation Heritage Resources Act, Act 25 of 1999
PHRA	Provincial Heritage Resources Agency
PM	Project Manager
SAHRA	South African Heritage Resources Agency
SM	Site Manager
ISS	Integrated Specialist Services (Pty) Ltd

KEY CONCEPTS AND TERMS

Periodization

Archaeologists divide the different cultural epochs according to the dominant material finds for the different time periods. This periodization is usually region-specific, such that the same label can have different dates for different areas. This makes it important to clarify and declare the periodization of the area one is studying. These periods are nothing a little more than convenient time brackets because their terminal and commencement are not absolute and there are several instances of overlap. In the present study, relevant archaeological periods are given below;

Early Stone Age (~ 2.6 million to 250 000 years ago)

Middle Stone Age (~ 250 000 to 40-25 000 years ago)

Later Stone Age (~ 40-25 000, to recently, 100 years ago)

Early Iron Age (~ AD 200 to 1000)

Late Iron Age (~ AD1100-1840)

Historic (~ AD 1840 to 1950, but a Historic building is classified as over 60 years old)

Definitions

Just like periodization, it is also critical to define key terms employed in this study. Most of these terms derive from South African heritage legislation and its ancillary laws, as well as international regulations and norms of best-practice. The following aspects have a direct bearing on the investigation and the resulting report:

Cultural (heritage) resources are all non-physical and physical human-made occurrences, and natural features that are associated with human activity. These can be singular or in groups and include significant sites, structures, features, ecofacts and artefacts of importance associated with the history, architecture, or archaeology of human development.

Cultural significance is determined by means of aesthetic, historic, scientific, social, or spiritual values for past, present, or future generations.

Value is related to concepts such as worth, merit, attraction or appeal, concepts that are associated with the (current) usefulness and condition of a place or an object. Although significance and value are not mutually exclusive, in some cases the place may have a high level of significance but a lower level of value. Often, the evaluation of any feature is based on a combination or balance between the two.

Isolated finds are occurrences of artefacts or other remains that are not in-situ or are located apart from archaeological sites. Although these are noted and recorded, but do not usually constitute the core of an impact assessment, unless if they have intrinsic cultural significance and value.

In-situ refers to material culture and surrounding deposits in their original location and context, for example an archaeological site that has not been disturbed by farming.

Archaeological site/materials are remains or traces of human activity that are in a state of disuse and are in, or on, land and which are older than 100 years, including artefacts, human and hominid remains, and artificial features and structures. According to the National Heritage Resources Act, 1999, (Act No. 25 of 1999), as amended (NHRA), no archaeological artefact, assemblage, or settlement (site) and no historical building or structure older than 60 years may be altered, moved or destroyed without the necessary authorisation from the SAHRA or a provincial heritage resources authority.

Historic material are remains resulting from human activities, which are younger than 100 years, but no longer in use, including artefacts, human remains and artificial features and structures.

Chance finds means archaeological artefacts, features, structures or historical remains accidentally found during development.

A grave is a place of interment (variably referred to as burial) and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place. A grave may occur in isolation or in association with others where upon it is referred to as being situated in a cemetery (contemporary) or burial ground (historic).

A site is a distinct spatial cluster of artefacts, structures, organic and environmental remains, as residues of past human activity.

Heritage Impact Assessment (HIA) refers to the process of identifying, predicting, and assessing the potential positive and negative cultural, social, economic, and biophysical impacts of any proposed project, which requires authorisation of permission by law, and which may significantly affect the cultural and natural heritage resources. Accordingly, an HIA must include recommendations for appropriate mitigation measures for minimising or circumventing negative impacts, measures enhancing the positive aspects of the proposal and heritage management and monitoring measures.

Impact is the positive or negative effects on human well-being and / or on the environment.

Mitigation is the implementation of practical measures to reduce and circumvent adverse impacts or enhance beneficial impacts of an action.

Mining heritage sites refer to old, abandoned mining activities, underground or on the surface, which may date from the prehistorical, historical or the relatively recent past.

Study area or 'project area' refers to the area where the developer wants to focus its development activities (refer to plan).

Phase 1 studies refer to surveys using various sources of data and limited field walking in order to establish the presence of all possible types of heritage resources in any given area

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1 INTRODUCTION

1.1. Background

Most heritage sites occur within communities, whose development should not be neglected in the name of heritage preservation but should be encouraged and embraced within legal and adaptive management frameworks (Carter and Grimwade 1997; Salafsky *et al* 2001). This case is true for the entire project area, which hosts archaeological, historical, natural and contemporary heritage resources (see sensitivity map). The purpose of this AIA/HIA Study is to assess presence/absence of heritage resources along the proposed pipeline upgrade route. The study was designed to ensure that any significant archaeological or cultural physical property or sites are located and recorded, and site significance is evaluated to assess the nature and extent of expected impacts from the proposed pipeline upgrade project. The assessment includes recommendations to manage the expected impact of the proposed development. The report includes recommendations to guide heritage authorities in making appropriate decision with regards to the environmental approval process for the proposed water pipeline upgrade project. The report concludes with detailed recommendations on heritage management associated with the proposed development.

Integrated Specialist Services (Pty) Ltd an independent consulting firm, conducted an assessment, research and consultations required for the preparation of the AIA/HIA report in accordance with its obligations set in the NHRA, as well as the environmental management legislations.

In line with SAHRA guidelines, this report, not necessarily in that order, provides:

- 1) Management summary
- 2) Methodology
- 3) Information with reference to the desktop study
- 4) Map and relevant geodetic images and data
- 5) Global Positioning System (GPS) co-ordinates
- 6) Directions to the site
- 7) Site description and interpretation of the cultural area where the project will take place
- 8) Management details, description of affected cultural environment, photographic records of the project area
- 9) Recommendations regarding the significance of the site and recommendations regarding further monitoring of the site.
- 10) Conclusion

1.2. Description of the proposed project

Existing Works

The existing bulk water supply to eMbalenhle consists of a 500mm steel pipe to the 2 x 10ML reservoirs at Adullam and a 400mm uPVC pipe to eMbalenhle. This pipeline is connected to a 600mm steel pipeline operated by Rand

Water on an assumed 24-hour operational basis. The purpose of this project is to construct parallel bulk lines next to the existing bulk pipeline in order to replace the existing aging pipelines to provide a continuous supply to the growing community for the next 30 years. eMbalenhle bulk mains have been experiencing pipe bursts frequently due to aging pipeline infrastructure (some sections are more than 20 years old) which have reached the end of their useful design life. Due to the relative high population growth rate for eMbalenhle and the household size which do not include the large number of backyard dwellers, the expected increase in demand outweighs the current available capacity of the bulk system.

Water Source

Water for eMbalenhle area is provided by the Rand Water Company in the Mpumalanga Province. The current average consumption as received from the municipality from July 2019 to June 2020 =18.4ML/day.

Bulk supply Pipelines

The existing supply mains are mainly large diameter steel and uPVC pipes, supplying water to two existing command reservoirs. The capacity of the existing pipe diameters to supply the full current and future demands will be assessed in order to determine whether larger diameter pipes should be installed.

Available Storage Versus Demand

As the current status of the existing reservoirs still needs to be verified, we assume the storage to be as follows:

- Abdullam : 1 x 10ML & 1 x 12ML Command
- eMbalenhle : 1 x 10ML Command (Square with 0.94kl pressure tower)
- eMbalenhle : 1 x 2.5 ML – not in service
- Current Consumption = 18.4ML/day
- Future (2050) Demand = 88.2 ML/day
- This required an additional storage of 58 ML/day (based on 150 l/c/d consumption).

Proposed Works

The scope of works includes the construction of suitable designed and sized parallel pipelines associated fittings too upgrade the supply and to cater for the future expansion of eMbalenhle. The parallel lines will replace the

existing aging infrastructure. The project will be divided into 4 phases as it is estimated to be a lengthy construction period and expensive project. The following phases are proposed:

- Phase 1: New 630mm diameter line from the Rand Water connection up to the Abdullam Reservoirs.
- Phase 2: New 500mm line from Abdullam reservoirs up to the traffic circle branch connection.
- Phase 3: New 400mm line from the Traffic circle branch up to the 5ML reservoir
- Phase 4: New 355mm line from the old reservoir and pressure tower to the 5ML reservoir

The four (4) main pipe materials which are considered are to be used as follows:

- HDPE – Mainly in CBD areas where trenching will cause undesirable disruptions. In these areas pipe cracking methods will be employed to put the DDPE pipes in place with minimal excavations required.
- uPVC – Used in most other area where trench excavations are possible. This method is considered more affordable and labour intensive, therefore allowing for employment creation.
- PVC-O – Used for large diameter (450 – 600mm) or high pressure (16 – 25 bar) sections of pipeline where HDPE and uPVC pipes won't be sufficient.
- Steel – Only to be used in possible extreme situations where the above materials are insufficient.

1.4. Location of the proposed development

The project area is located in eMbalenhle, Govan Mbeki Local Municipality in Mpumalanga. List of properties within servitude are listed.

Table 1: SG Coordinates of properties within Pipeline servitude

FARM NAME	PORTION	SG CODE																				
Farm Winkelhaak 135 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	5	0	0	0	0	0
Farm Leeuwspruit 134 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	4	0	0	0	0	0
Farm Witkleifontein 131 IS	1	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	1
Farm Witkleifontein 131 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0
Farm Witkleifontein 131 IS	4	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	4
Farm Witkleifontein 131 IS	10	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	1	0
Farm Witkleifontein 131 IS	3	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	3
Farm Osizweni 575 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	5	7	5	0	0	0	0	0
Farm Winkelhaak 135 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	5	0	0	0	0	0
Farm Langverwacht 282 IS	52	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	5	2
Farm Langverwacht 282 IS	2	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	2
Farm Langverwacht 282 IS	17	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	1	7
Farm Langverwacht 282 IS	9	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	9
Farm Langverwacht 282 IS	1	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	1
Farm Langverwacht 282 IS	4	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	4
Farm Middelbult 284 IS	29	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	4	0	0	0	2	9
Farm Middelbult 284 IS	28	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	4	0	0	0	2	8

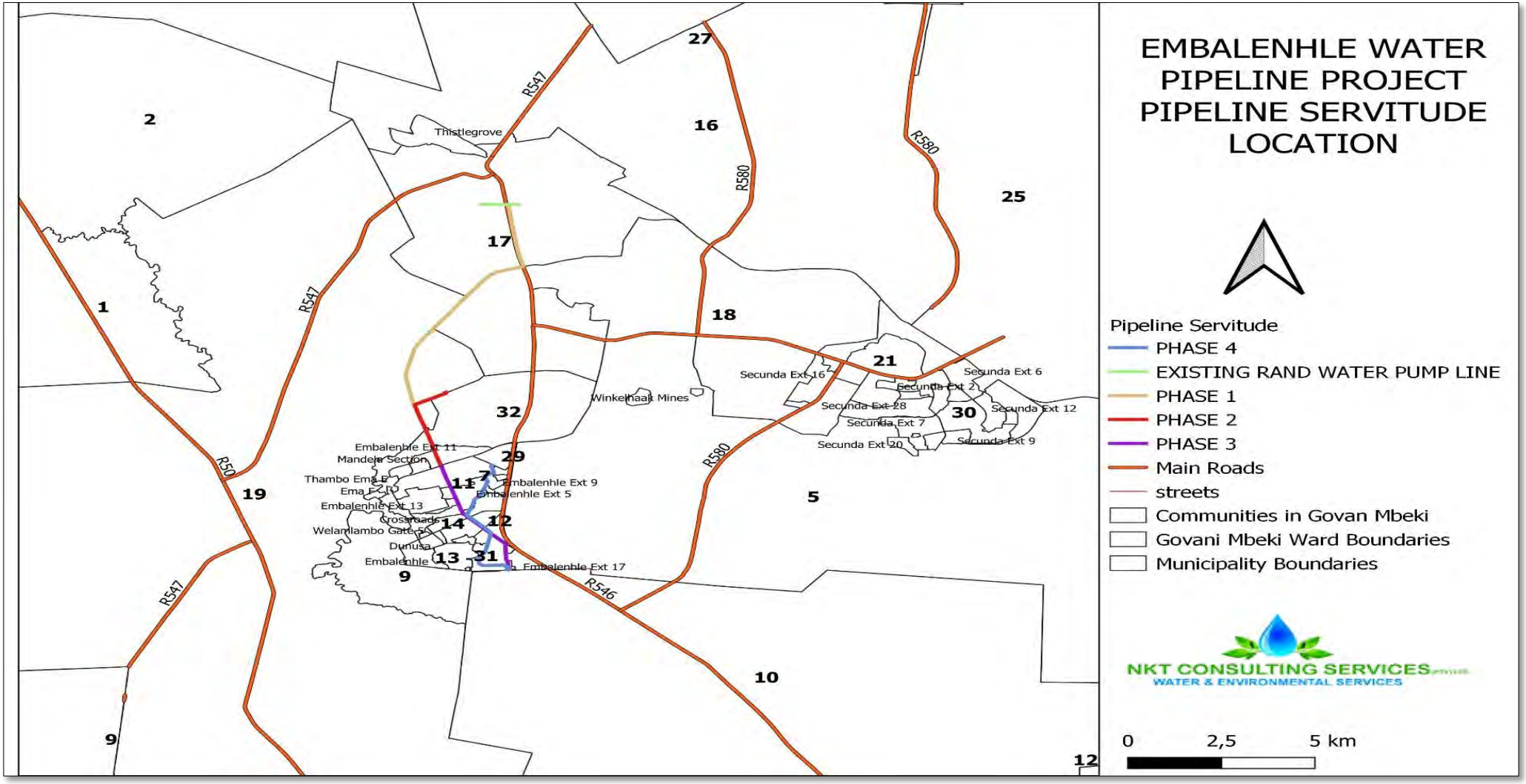

Figure 1: Proposed pipeline route (NKT Consulting Services (Pty) Ltd 2022)

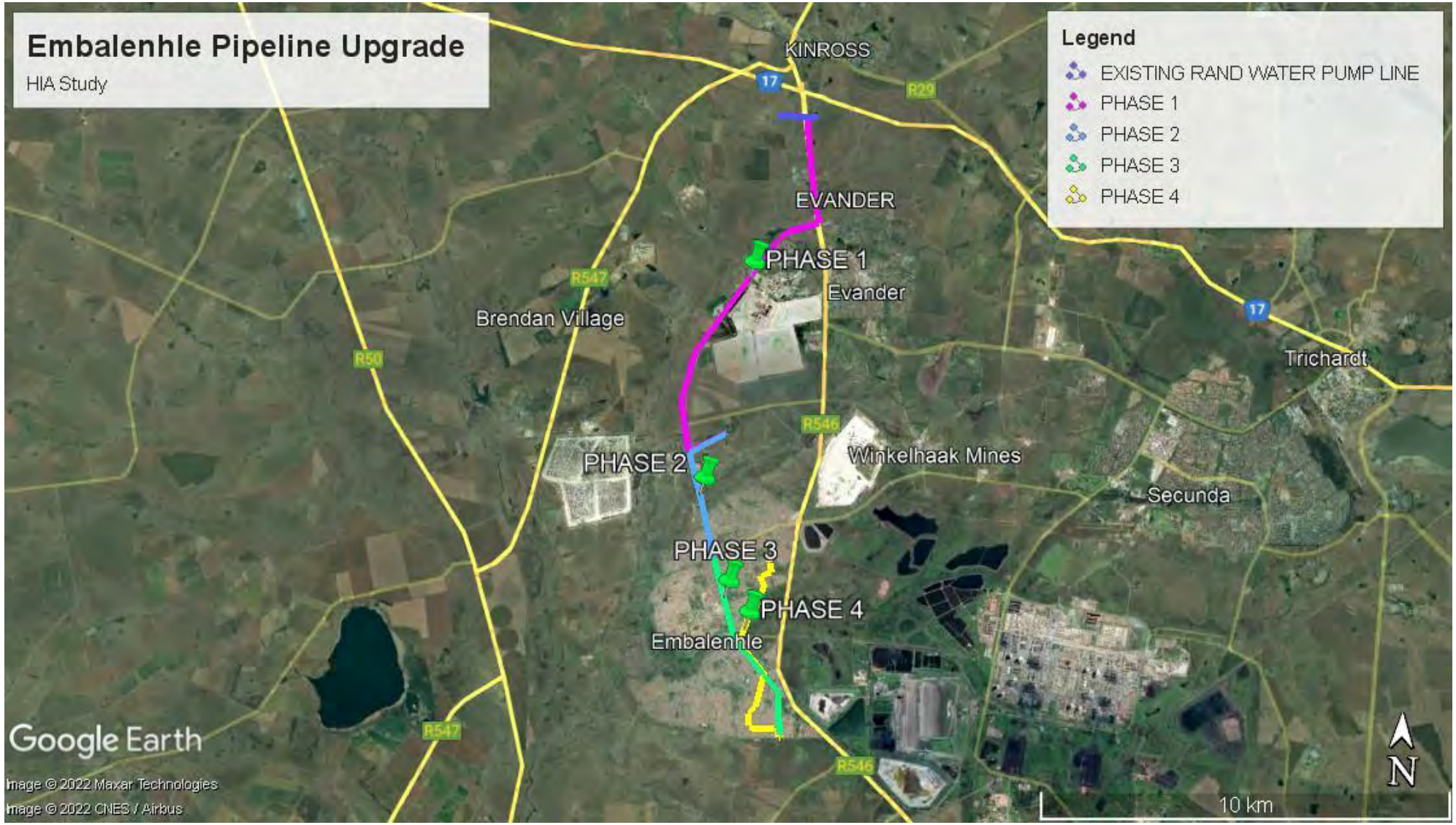

Figure 2: Proposed pipeline route (ISS, 2022)

2 LEGAL REQUIREMENTS

Relevant pieces of legislation are applicable to the present study and are presented in this section. Under the NHRA, Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), as amended (MPRDA), and the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA) and the Environmental Impact Assessment (A) Regulations of 2014, as amended, an AIA/HIA is required as a specialist sub-section of the impact assessment.

Heritage management and conservation in South Africa is governed by the NHRA and falls under the overall jurisdiction of the SAHRA and its Provincial Heritage Resources Authorities (PHRAs), ECPHRA in this case. There are different sections of the NHRA that are relevant to this study. The proposed development is a listed activity in terms of Section 38 of the NHRA which stipulates that the following development categories require an HIA to be conducted by an independent heritage management consultant:

- Construction of a road, wall, powerline, pipeline, canal or other linear form of development or barrier exceeding 300m in length
- Construction of bridge or similar structure exceeding 50m in length
- Development or other activity that will change the character of a site -
    - Exceeding 5 000 square metres (m^2)
    - Involving three or more existing erven or subdivisions
    - Involving three or more erven or divisions that have been consolidated within past five years
    - Rezoning of site exceeding 10 000m^2
    - The costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority
- Any other development category, public open space, squares, parks, recreation grounds

Thus, any person undertaking any development in the above categories, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. Section 38(2)(a) of the NHRA also requires the submission of a HIA report for authorization purposes to the responsible heritage resources agencies (SAHRA/PHRA).

Related to Section 38 of the NHRA are Sections 34, 35, 36 and 37. Section 34 stipulates that no person may alter, damage, destroy, relocate etc. any building or structure older than 60 years, without a permit issued by SAHRA or a provincial heritage resources authority. Section 35(4) of the NHRA stipulates that no person may, without a permit issued by SAHRA, destroy, damage, excavate, alter or remove from its original position, or collect, any archaeological material or object. This section may apply to any significant archaeological sites that may be

discovered before or during construction. This means that any chance find must be reported to SAHRA or Mpumalanga PHRA, who will assist in investigating the extent and significance of the finds and inform about further actions. Such actions may entail the removal of material after documenting the find site or mapping of larger sections before destruction.

Section 36(3) of the NHRA also stipulates that no person may, without a permit issued by the SAHRA, destroy, damage, alter, exhume or remove from its original position or otherwise disturb any grave or burial ground older than 60 years, which is situated outside a formal cemetery administered by a local authority. This section may apply in case of the discovery of chance burials, which is unlikely. The procedure for reporting chance finds also applies to the likely discovery of burials or graves by the developer or his contractors. Section 37 of the NHRA deals with public monuments and memorials which may exist in the proposed project area.

In addition, the EIA Regulations promulgated in terms of NEMA determine that any environmental reports will include cultural (heritage) issues. The EIA Regulations in terms of Chapter 5 of the NEMA provide for an assessment of development impacts on the cultural (heritage) and social environment and for Specialist Studies in this regard. The end purpose of such a report is to alert the applicant and, the environmental consultant, SAHRA and/or Mpumalanga PHRA, and interested and affected parties about existing heritage resources that may be affected by the proposed development, and to recommend mitigatory measures aimed at reducing the risks of any adverse impacts on these heritage resources.

2.1. Assessing the Significance of Heritage Resources

The appropriate management of cultural heritage resources is usually determined on the basis of the assessed significance as well as the likely impacts of any proposed developments. Cultural significance is defined in the Burra Charter as meaning aesthetic, historic, scientific, or social value for past, present, or future generations (Article 1.2). Social, religious, cultural, and public significance are currently identified as baseline elements of this assessment, and it is through the combination of these elements that the overall cultural heritage values of the site of interest, associated place or area are resolved.

Not all sites are equally significant and not all are worthy of equal consideration and management. The significance of a place is not fixed for all time, and what is considered of significance at the time of assessment may change as similar items are located, more research is undertaken, and community values change. This does not lessen the value of the heritage approach but enriches both the process and the long-term outcomes for future generations as the nature of what is conserved and why, also changes over time (Pearson and Sullivan 1995:7). This assessment of the Indigenous cultural heritage significance of the Site of Interest as its environments of the study area will be

based on the views expressed by the traditional authority and community representatives, consulted documentary review and physical integrity.

African indigenous cultural heritage significance is not limited to items, places or landscapes associated with pre-European contact. Indigenous cultural heritage significance is understood to encompass more than ancient archaeological sites and deposits, broad landscapes, and environments. It also refers to sacred places and story sites, as well as historic sites, including mission sites, memorials, and contact sites. This can also refer to modern sites with particular resonance to the indigenous community.

Archaeological sites, as defined by the NHRA are places in the landscape where people once lived in the past – generally more than 60 years ago – and have left traces of their presence behind. In South Africa, archaeological sites include hominid fossil sites, places where people of the Earlier, Middle and Later Stone Age lived in open sites, river gravels, rock shelters and caves, Iron Age sites, graves, and a variety of historical sites and structures in rural areas, towns and cities. Palaeontological sites are those with fossil remains of plants and animals where people were not involved in the accumulation of the deposits. The basic principle of cultural heritage conservation is that archaeological and other heritage sites are valuable, scarce and non-renewable. Many such sites are unfortunately lost on a daily basis through infrastructure developments such as powerlines, roads and other destructive economic activities such as mining and agriculture. It should be noted that once archaeological sites are destroyed, they cannot be replaced as site integrity and authenticity is permanently lost. Archaeological heritage contributes to our understanding of the history of the region and of our country and continent at large. By preserving links with our past, we may be able to appreciate the role past generations have played in the history of our country and the continent at large.

2.2. Categories of Significance

Rating the significance of archaeological sites, and consequently grading the potential impact on the resources is linked to the significance of the site itself. The significance of an archaeological site is based on the amount of deposit, the integrity of the context, the kind of deposit and the potential to help answer present research questions. Historical structures are defined by Section 34 of the NHRA while other historical and cultural significant sites, places and features, are generally determined by community preferences. The guidelines as provided by the NHRA in Section 3, with special reference to subsection 3 are used when determining the cultural significance or other special value of archaeological or historical sites. In addition, ICOMOS (the Australian Committee of the International Council on Monuments and Sites) highlights four cultural attributes, which are valuable to any given culture:

2.3. Aesthetic Value:

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria include consideration of the form, scale, colour, texture and material of the fabric, the general atmosphere associated with the place and its uses and also the aesthetic values commonly assessed in the analysis of landscapes and townscape.

2.4. Historical Value:

Historic value encompasses the history of aesthetics, science and society and therefore to a large extent underlies all of the attributes discussed here. Usually, a place has historical value because of some kind of influence by an event, person, phase or activity.

2.5. Scientific Value:

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality and on the degree to which the place may contribute further substantial information.

2.6. Social Value:

Social value includes the qualities for which a place has become a focus of spiritual, political, national or other cultural sentiment to a certain group. It is important for heritage specialist input in the impact assessment process to take into account the heritage management structure set up by the NHRA. It makes provision for a 3-tier system of management including the SAHRA at a national level, PHRAs at a provincial and the local authority. The NHRA makes provision for two types or forms of protection of heritage resources; i.e. formally protected and generally protected sites:

2.7. Formally Protected Sites

- Grade 1 or national heritage sites, which are managed by SAHRA
- Grade 2 or provincial heritage sites, which are managed by the PHRAs.
- Grade 3 or local heritage sites.

2.8. General Protection

- Human burials older than 60 years.
- Archaeological and palaeontological sites.
- Shipwrecks and associated remains older than 70 years.
- Structures older than 60 years.

The certainty of prediction is definite, unless stated otherwise and if the significance of the site is rated high, the significance of the impact will also result in a high rating. The same rule applies if the significance rating of the site is low. The significance of archaeological sites is generally ranked into the following categories:

2.9. Significance Rating Action

No significance: sites that do not require mitigation.

Low significance: sites, which may require mitigation.

2a. Recording and documentation (Phase 1) of site; no further action required

2b. Controlled sampling (shovel test pits, auguring), mapping and documentation (Phase 2 investigation); permit required for sampling and destruction.

Medium significance: sites, which require mitigation.

3. Excavation of representative sample, C14 dating, mapping and documentation (Phase 2 investigation); permit required for sampling and destruction [including 2a & 2b]

High significance: sites, where disturbance should be avoided.

4a. Nomination for listing on Heritage Register (National, Provincial or Local) (Phase 2 & 3 investigation); site management plan; permit required if utilised for education or tourism.

High significance: Graves and burial places

4b. Locate demonstrable descendants through social consulting; obtain permits from applicable legislation, ordinances and regional by-laws; exhumation and reinternment [including 2a, 2b & 3]

Furthermore, the significance of archaeological sites was based on six main criteria:

- Site integrity (i.e. primary vs. secondary context),
- Amount of deposit, range of features (e.g., stonewalling, stone tools and enclosures),
- Density of scatter (dispersed scatter),
- Social value,
- Uniqueness, and
- Potential to answer current and future research questions.

An important aspect in assessing the significance and protection status of a heritage resource is often whether or not the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and mitigated in order to gain data /information, which would otherwise be lost.

Table 2: Evaluation of the proposed development as guided by the criteria in NHRA, MPRDA and NEMA

ACT	Stipulation for developments	Requirement details
NHRA Section 38	Construction of road, wall, powerline, pipeline, canal or other linear form of development or barrier exceeding 300m in length	Yes
	Construction of bridge or similar structure exceeding 50m in length	No
	Development exceeding 5 000m^2	Yes
	Development involving three or more existing erven or subdivisions	Yes
	Development involving three or more erven or divisions that have been consolidated within past five years	No
	Rezoning of site exceeding 10 000m^2	No
	Any other development category, public open space, squares, parks, recreation grounds	No
NHRA Section 34	Impacts on buildings and structures older than 60 years	Subject to identification during Phase 1 walk down survey
NHRA Section 35	Impacts on archaeological and paleontological heritage resources	Subject to identification during Phase 1 walk down survey
NHRA Section 36	Impacts on graves	Subject to identification during Phase 1
NHRA Section 37	Impacts on public monuments	No
Chapter 5 (21/04/2006) NEMA	HIA is required as part of the impact assessment	Yes
Section 39(3)(b) (iii) of the MPRDA	AIA/HIA is required as part of the impact assessment	No because it is not a mining project

2.10. Other relevant legislations

The Human Tissue Act, 1983

Human Tissue Act, 1983 (Act No. 65 of 1983), as amended (HTA) and Ordinance on the Removal of Graves and Dead Bodies, 1925 (Ordinance No. 7 of 1925), as amended, states that Graves 60 years or older are heritage resources and fall under the jurisdiction of both the NHRA and the HTA. However, graves younger than 60 years are specifically protected by the HTA and the Ordinance on the Removal of Graves and Dead Bodies, 1925 as well as any local and regional provisions, laws and by-laws. Such burial places also fall under the jurisdiction of the National Department of Health and the Provincial Health Departments. Approval for the exhumation and re-burial must be obtained from the relevant Provincial Member of the Executive Committee (MEC) as well as the relevant Local Authorities.

2.11. Terms of Reference

The author was instructed to conduct an AIA/HIA study addressing the following issues:

- Archaeological and heritage potential of the proposed pipeline upgrade development route including any known data on affected areas.
- Provide details on methods of study; potential and recommendations to guide the SAHRA/MPHRA to make an informed decision in respect of authorisation of the proposed water pipeline upgrade.
- Identify all objects, sites, occurrences, and structures of an archaeological or historical nature (cultural heritage sites) located along the water pipeline upgrade route
- Assess the significance of the cultural resources in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value.
- Describe the possible impact of the proposed pipeline upgrade on these cultural remains, according to a standard set of conventions.
- Propose suitable mitigation measures to minimize possible negative impacts on the cultural resources.
- Review applicable legislative requirements.

PHOTOGRAPHIC PRESENTATION OF THE PROJECT SITE

Plate 1: Photo 1: Showing proposed pipeline route along road servitude (Photograph © by Author 2022).

Plate 2: Photo 2: Proposed pipeline route is in a previously disturbed and cleared agricultural field (Photograph © by Author 2022).

Plate 3: Photo 3: Showing dense grass cover along the proposed pipeline route. Note dense vegetation cover compromises the visibility of archaeological material (Photograph © by Author 2022)

Plate 4: Photo 4: View of the proposed pipeline route along the road servitude (Photograph © by Author 2022).

Plate 5: Photo 5: View of the proposed pipeline route along powerline servitude (Photograph © by Author 2022)

Plate 6: Photo 6: The pipeline route traverses across a landscape disturbed by previous agricultural activities (Photograph © by Author 2022).

Plate 7: Photo 7: View of existing infrastructure along the proposed pipeline route (Photograph © by Author 2022).

Plate 8: Photo 8: View of the existing reservoirs at the terminal point of the proposed pipeline route(Photograph © by Author 2022).

Plate 9: Photo 9: View of the proposed pipeline route (Photograph © by Author 2022).

Plate 10: Photo 10: View of dumping site along road and powerline servitude (Photograph © by Author 2022).

Plate 11: Photo 11: Proposed pipeline route along street servitude (Photograph © by Author 2022).

Plate 12: Photo 12: View of proposed pipeline route (Photograph © by Author 2022).

Plate 13: Photo 13: View of proposed pipeline route cutting through a built up area. (Photograph © by Author 2022).

Plate 14: Photo 14: View of proposed pipeline route cutting through a built-up area (Photograph © by Author 2022).

Plate 15: Photo 15: View of the proposed pipeline route along a built-up area. (Photograph © by Author 2022).

Plate 16: Photo 16: View of proposed pipeline route within a disturbed built-up area. (Photograph © by Author 2022).

Plate 17: Photo 17: View of proposed pipeline route. (Photograph © by Author 2022).

Plate 18: Photo 18: View of proposed pipeline route (Photograph © by Author 2022).

Plate 19: Photo 19: View of the existing water reservoirs to be upgraded. (Photograph © by Author 2022).

3 METHODOLOGY

Relevant published and unpublished sources were consulted in generating desktop information for this report. This included online databases such as the United Nations Educational, Scientific and Cultural Organization (UNESCO) website, Google Earth, Google Scholar and South African Heritage Resources Information System (SAHRIS). Previous HIA in the project area were also consulted. A number of published works on the archaeology, history and palaeontology were also consulted. This included dedicated archaeological, paleontological and geological works by (Breutz 1956; 1968; 1987; Button 1971; Clarck 1971; Eriksson *et al* 1975; Bertrand and Eriksson 1977; Humphreys 1978; Humphreys and Thackeray 1983; Beaumont and Vogel 1984; Beaumont and Morris 1990; Beaumont 1999; Holmgren *et al* 1999; Johnson *et al* 1997; Peabody 1954; Shillington 1985; Wills 1992; Young 1934; 1940, Huffman 2007, Mason 1962). Thus, the proposed pipeline upgrade development was considered in relation to the broader landscape, which is a key requirement of the International Council on Monuments and Sites (ICOMOS) Guidelines.

This document falls under the Basic assessment phase of the AIA/HIA and therefore aims at providing an informed heritage-related opinion about the proposed pipeline upgrade project. This is usually achieved through a combination of a review of any existing literature and a basic site inspection. As part of the desktop study, published literature and cartographic data, as well as archival data on heritage legislation, the history and archaeology of the area were studied. The desktop study was followed by field surveys. The field assessment was conducted according to generally accepted AIA/HIA practices and aimed at locating all possible objects, sites and features of cultural significance on the development footprint. Initially a drive-through was undertaken along the proposed pipeline upgrade site as a way of acquiring the archaeological impression of the general area. This was then followed by a walk-down survey in the study area, with a handheld Global Positioning System (GPS) for recording the location/position of each possible site. Detailed photographic recording was also undertaken where relevant. The findings were then analysed in view of the proposed pipeline upgrade project in order to suggest further action. The result of this investigation is a report indicating the presence/absence of heritage resources and how to manage them in the context of the proposed pipeline upgrade development.

3.1 The Fieldwork surveys

The fieldwork survey was undertaken on the 06 June 2022. The main focus of the survey involved a pedestrian survey which was conducted along the proposed powerline route. The pedestrian survey focused on parts of the project area where it seemed as if disturbances may have occurred in the past, for example bald spots in the grass veld; stands of grass which are taller that the surrounding grass veld; the presence of exotic trees; evidence for building rubble, and ecological indicators such as invader weeds. The literature survey suggests that prior to the 20th century modern residential and on-going infrastructure developments; the general area where the proposed development is located would have been a rewarding region to locate heritage resources related to Stone Age and particularly Iron Age and historical sites (Bergh 1999). However, the situation today is completely different. The

study area now lies on a clearly modified landscape that has been cleared of vegetation and residential development (Plates 1-19).

3.2 Visibility and Constraints

The proposed powerline route is accessible although covered by dense grass cover making it difficult to identify surface archaeological remains. In addition, due to the subterranean nature of cultural remains this report should not be construed as a record of all archaeological and historic sites in the area.

3.3 Assumptions and Limitations

The investigation has been influenced by the unpredictability of buried archaeological remains (absence of evidence does not mean evidence of absence) and the difficulty in establishing intangible heritage values. It should be noted that archaeological deposits (including graves and traces of archaeological heritage) usually occur below the ground level. Should artefacts or skeletal material be revealed at the site during construction, such activities should be halted immediately, and a competent heritage practitioner, SAHRA must be notified in order for an investigation and evaluation of the find(s) to take place (see NHRA, Section 36(6). Recommendations contained in this document do not exempt the applicant from complying with any national, provincial and municipal legislation or other regulatory requirements, including any protection or management or general provision in terms of the NHRA. The author assumes no responsibility for compliance with conditions that may be required by SAHRA in terms of this report.

The field survey did not include any form of subsurface inspection beyond the inspection of burrows, road cut sections, and the sections exposed by erosion. Some assumptions were made as part of the study and therefore some limitations, uncertainties and gaps in information would apply. It should, however, be noted that these do not invalidate the findings of this study in any significant way:

The proposed project activities will be limited to specific right of site as detailed in the development layout.

- The construction team to provide link and access to the proposed site by using the existing access roads and there will be no construction, excavation beyond the demarcated site.
- This study did not include any ethnographic and oral historical studies, nor did it investigate the settlement history of the area.

3.4 Consultations

Public consultations are being conducted by the EAP and issues raised by Interested and Affected parties will be presented during Specialist integration meetings for the project. Issues relating to heritage will be forwarded to the heritage specialist.

4 CULTURE HISTORY BACKGROUND OF THE PROJECT AREA

4.1 Archaeological Context

In order to place the project area in archaeological and historical context, primary and secondary sources were consulted. Ethnographical and linguistic studies by early researchers such as Theal and Van Warmelo provide insights on the cultural groups who lived in and around the project area since ca 1600. Historic and academic sources by Küsel and Bergh, Makhura, Delius, and Webb were also consulted. There are no museums in the eMalahleni and Middelburg towns which could be consulted, and no historical information was available at the municipalities or information centres (Van Wyk Rowe 2012). Very little contemporary research has been done on prehistoric African settlements in the study area, and according to Bergh, there are no recorded sites that date from the Stone Age, (including Rock paintings or engravings), Early or Later Iron Age. The topographical map 2529CC Witbank, shows that the project area is highly disturbed with cultivated land, residential and mining developments as well as other infrastructure development.

4.2 Stone Age Archaeology

Stone Age sites are marked by stone artefacts that are found scattered on the surface of the earth or as parts of deposits in caves and rock shelters. The Stone Age is divided into the Early Stone Age (covers the period from 2.5 million years ago to 250 000 years ago), the Middle Stone Age (refers to the period from 250 000 years ago to 22 000 years ago) and the Late Stone Age (the period from 22 000 years ago to 200 years ago). The Later Stone Age is also associated with rock paintings and engravings which were done by the San, Khoi Khoi and in more recent times by Iron Age farmers. Heritage surveys up to now have recorded few outstanding Stone Age sites, rock paintings and engravings in the Eastern Highveld - primarily as a result of limited extensive archaeological surveys. Stone tools have been recorded around some of the pans which occur on the Eastern Highveld.

In the larger geographical area, there is material manifestation of Stone Age people but generally, Highveld area did not attract much of habitation in these early times due to lack of rock-shelters and domination of exposed environments. Thus, it is mostly in the vicinity of large watercourses and lower parts of mountains that some ESA (~ 2.6 million to 250 000 years ago) materials (crude chopper and other unifacial tools of the Oldowan industry and the characteristic Acheulian hand axes and cleavers) and MSA (~ 250 000 to 40-25 000 years ago) materials are generally found. The MSA is a flake-technological stage characterized by faceted platforms, produced from prepared cores, as distinct from the core tool-based ESA technology. More technological and behavioural changes than those witnessed in the MSA, occurred during the LSA (~ 40-25 000, to recently, 100 years ago), which is also associated with Homo Sapiens (Barham and Mitchell 2008). For the first time we get evidence of people's activities derived from material other than stone tools (ostrich eggshell beads, ground bone arrowheads, small, bored stones

and wood fragments) (Deacon and Deacon 1999). The LSA people are also credited with the production of rock art (engravings and paintings), which is an expression of their complex social and spiritual beliefs (Parkington et al. 2008). However, it is important to note that no Stone Age materials were recorded during the field walking, perhaps due to the presence of tall grass. Nonetheless, it is possible to encounter isolated finds of these objects in the study area, even though these would most likely be out of context due to the modern disturbances.

4.3 Iron Age Archaeology

The Iron Age of the Mpumalanga region dates back to the 5th Century AD when the Early Iron Age (EIA) proto-Bantu-speaking farming communities began arriving in this region which was then occupied by hunter-gatherers. These EIA communities are archaeologically referred to as the Mzonjani Facies of the Urewe EIA Tradition (Huffman, 2007: 127-9). They occupied the foothills and valley lands along the general Indian Ocean coastland introducing settled life, domesticated livestock, crop production and the use of iron (also see Maggs 1984a; 1984b; Huffman 2007). Alongside the Urewe Tradition was the Kalundu Tradition whose EIA archaeological sites have been recorded along the Mpumalanga areas. From AD 650 to 750 the EIA sites in the region were classified as the Msuluzi facies which was replaced by the Ndondondwane and Ntsekane facies from AD 750 to 950 and AD 950 to 1050 respectively (Huffman, 2007).

By 1050 AD proto-Nguni Bantu-speaking groups associated with the Late Iron Age (LIA) called the Blackburn sub-branch of the Urewe Tradition had arrived in the eastern regions of South Africa, including modern day Mpumalanga, migrating from the central African region of the Lakes Tanganyika and Victoria (Huffman 2007: 154-5). According to archaeological data available, the Blackburn facies ranged from AD 1050 to 1500 (ibid. p.155). The Mpumalanga and the Natal inland regions saw the development of the LIA Moor Park facies between AD 1350 and 1750. These archaeological facies are interpreted as representing inland migration by LIA Nguni speaking groups (Huffman 2007). Moor Park is associated with settlements marked by stonewalling. The period from AD 1300 to 1750 saw multiple Nguni dispersal from the coastland into the hinterland and eventually across the Drakensberg Escapement into central and eastern South Africa (ibid).

No Iron Age sites are indicated in a historical atlas around the town of Witbank, but this may only indicate a lack of research. The closest known Iron Age occurrences to the surveyed area are Late Iron Age sites that have been identified to the west of Bronkhorstspruit and in the vicinity of Bethal (Bergh 1999: 7-8). The good grazing and access water in the area would have provided a good environment for Iron Age people although building material seem to be reasonably scarce. One would therefore expect that Iron Age people may have utilized the area. This is the same reason why white settlers moved into this environment later on.

4.4 Historical Background

The Late Iron Age Nguni communities engaged in the Indian Ocean Trade exporting ivory and importing consumables such as cloth and glass beads. The exporting point was Delagoa. This brought the Nguni speaking community in touch with the Indo-Asian and first Europeans (Portuguese). It was the arrival of the Dutch and the English traders that opened up Delagoa Bay to more trade did the Nguni engaged in extensive trade with the international traders (Huffman 2007). From the late 1700s, trade in supply of meat to passing ship had increased substantially to an extent that by 1800 meat trade is estimated to have surpassed ivory trade. At the same time population was booming following the increased food production that came with the introduction of maize that became the staple food. Naturally, there were signs that population groups had to compete for resources especially along the east coastal regions. The KwaZulu Natal coastal region has a special place in the history of the region and country at large. This relates to the most referenced Mfecane (wandering hordes) period of tremendous insecurity and military stress which eventually affected the entire Southern Africa including the modern-day Mpumalanga area. Around the 1830s, the region also witnessed the massive movements associated with the Mfecane. The causes and consequences of the Mfecane are well documented elsewhere (e.g. Hamilton 1995; Cobbing 1988). In this context, new African kingdoms emerged such as the Zulu Kingdom under Shaka in the second quarter of the 1800s AD. Military pressure from Zululand spilled onto the Highveld by at least 1821. Various marauding groups of displaced Sotho-Tswana moved across the plateau in the 1820s. Mzilikazi raided the plateau extensively between 1825 and 1837. For example, at the beginning of the 19th century, the Phuthing, a South Sotho group, stayed to the east of eMalahleni. During the Difaquane they fled to the south from the Ndebele of Mzilikazi who established several settlement complexes in Eastern Bankveld between Pretoria and Witbank (Bergh 1999: 10-11; 109).

At the same time the Boers trekked into this area in the 1830s. And throughout this time settled communities of Tswana people also attacked each other. As a result of this troubled period, Sotho-Tswana people concentrated into large towns for defensive purposes. Their settlements were built of stone because of the lack of trees in the project area. These stone-walled villages were almost always located near cultivatable soil and a source of water. Such sites are known to occur near Kriel (e.g., Pelser, *et al* 2006) and to the south (Taylor 179). However stonewalled sites associated with Sotho Tswana clans have not been reported in the Witbank area as yet.

White farmers only settled in the Witbank area after 1850 (Bergh 1999: 16). One may therefore expect to find farm buildings, structures and objects from this period in time in the area. Many graveyards from this period have indeed been identified in surrounding areas during past surveys.

4.6 Intangible Heritage

As defined in terms of the UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage (2003) intangible heritage includes oral traditions, knowledge and practices concerning nature, traditional craftsmanship and rituals and festive events, as well as the instruments, objects, artefacts and cultural spaces associated with group(s) of people. Thus, intangible heritage is better defined and understood by the particular group of people that uphold it. In the present study area, very little intangible heritage remains because no historically known groups occupied the study area and most of the original settler descendants moved away from the area.

4.7 SAHRIS Data Base and Impact Assessment Reports in the project area

Several archaeological and heritage studies were conducted within the project area and its vicinity since 2002 and these presents the nature and heritage character of the area. The HIA conducted in the area also provide some predictive evidence regarding the types and ranges of heritage resources to be expected in the proposed project area: (see reference list for HIA reports). The studies include mining, water pipeline and powerline projects completed by Pistorius (2002, 2003, 2004, 2005, 2006a, 2006b, 2007, 2008, 2009, 2010, 2011, 2013, 2014). No sites were recorded, but the reports mention that structures older than 60 years occur in the area, Pelser and Van Vollenhoven (2010, 2011, 2014, 2015) for mining and infrastructure development survey also recorded no sites. Van Schalkwyk did extensive work in the project area mostly for mining and infrastructure developments for example Van Schalkwyk, (2002, 2004, 2006, 2006, and 2010). Other than burial sites and buildings older than 60 years the studies did not record any significant archaeological sites in the project area.

5 RESULTS OF THE ARCHAEOLOGICAL/HERITAGE ASSESSMENT STUDY

The main cause of impacts to archaeological sites is direct, physical disturbance of the archaeological remains themselves and their contexts. It is important to note that the heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose buried archaeological sites and artefacts, the artefacts are relatively meaningless once removed from their original position.

The severe impacts are likely to occur during clearance and excavations within the proposed development site; indirect impacts may occur during movement of construction vehicles. The excavation and construction activities will result in the relocation or destruction of all existing surface heritage material. Similarly, the clearing of access roads will impact material that lies buried below the surface. Since heritage sites, including archaeological sites, are non-renewable, it is important that they are identified, and their significance assessed prior to any construction activities at the site. It is important to note, that due to the localised nature of archaeological resources, that

individual archaeological sites could be missed during the survey, although the probability of this is very low along the proposed pipeline route.

Further, archaeological sites and unmarked graves may be buried beneath the surface and may only be exposed during, clearance of the site and excavations. The purpose of the AIA/HIA is to assess the sensitivity of the area in terms of archaeology and to avoid or reduce the potential impacts of the proposed development by means of mitigation measures (see appended Chance Find Procedure). The study concludes that the impacts will be negligible since the general project area is currently occupied and built up. The following section presents results of the archaeological and heritage survey conducted along the proposed pipeline route.

Table 3: Summary of findings

Heritage resource	Status/Findings
Buildings, structures, places and equipment of cultural significance	None were recorded along the pipeline servitide
Areas to which oral traditions are attached or which are associated with intangible heritage	None exists on the study area
Historical settlements and townscapes	None exist within the study site
Landscapes and natural features of cultural significance	None
Archaeological and paleontological sites	No significant archaeological remains were recorded within the proposed development site
Graves and burial grounds	A formal municipal cemetery was recorded along the pipeline route, However, a formal cemetery was recorded along the proposed powerline route.
Movable objects	None
Overall comment	The pipeline route did not yield any confirmable archaeological remains.

5.1. Archaeological Sites

The study did not record any confirmable archaeological remains along the proposed pipeline route. Surface visibility was compromised by dense vegetation cover in various sections of the pipeline route. However, even though no archaeological artefacts, features or structures were noted chances are that there could be archaeological material that may be buried underneath the surface, and they can only be exposed during excavation work. The affected landscape is heavily degraded from previous agriculture and mining activities (see Figure 1), this limited the chances of encountering significant *in situ* archaeological sites. Given the high sensitivity potential of the study area it is assumed that there was always a chance of finding archaeological remains. However, the chances of recovering significant archaeological materials were seriously compromised and limited due to previous agricultural and settlement activities and other destructive land use activities such access roads, agriculture fields and residential settlements in the vicinity that already exist along the pipeline route.

Based on the field study results and field observations, it is the considered opinion of the author that the receiving environment for the proposed pipeline upgrade site is low to medium potential to yield previously unidentified archaeological sites during subsurface excavations and construction work.

5.2. Buildings and Structures older than 60 years

In terms of built environment, buildings or structures were recorded along the proposed pipeline upgrade route. In terms of Section 34 of the NHRA, the proposed pipeline route may be approved without any further investigation and mitigation.

5.3. Burial grounds and graves

Human remains and burials are commonly found close to archaeological sites; they may be found in abandoned and neglected burial sites or occur sporadically anywhere as a result of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human remains on the landscape as these burials, in most cases, are not marked on the surface. Archaeological and historical burials are usually identified when they are exposed through erosion, mining and earth moving activities for infrastructure developments such as powerlines and roads. In some instances, packed stones or stones may indicate the presence of informal pre-colonial burials.

The field survey recorded a formal municipal cemetery along the proposed pipeline route. The section of the pipeline from GPS coordinates 26°33'11.50"S, 29° 5'2.14"E to GPS coordinates 26°33'23.05"S, 29° 5'14.12"E traverses through the cemetery. As such mitigation is required for the cemetery before any construction activities commence. The cemetery must be treated as a No-Go area and a 30m buffer zone must be provided for the cemetery. In terms of Section 36 of the NHRA the proposed pipeline upgrade site may be approved subject to the recommendations

herein made. The possibility of encountering previously unidentified burial sites is low to medium along the proposed pipeline route, should such sites be identified during excavation, they are still protected by applicable legislations, and they should be protected (also see Appendixes for more details). Burial sites older than 60 years are protected by the NHRA and those younger than 60 years are protected by the Human Tissue Act.

Plate 20: Photo 20: View of the formal cemetery along the proposed pipeline route (Photograph © by Author 2022).

Plate 21: Photo 21: View of the formal cemetery along the proposed pipeline route (Photograph © by Author 2022).

Figure 3: Section of the proposed pipeline route within formal cemetery (ISS, 2022)

5.4. Significance valuation for Burial Ground, Historic Cemeteries, and Individual Graves

The significance of burial grounds and grave sites is closely tied to their age and historical, cultural, and social context. Nonetheless, every burial should be considered as of high socio-cultural significance protected by practices, a series of legislations, and municipal ordinances.

5.5. Public Monuments and Memorials

The survey did not identify any historical monument and public memorials along the proposed development site. There are no monuments or plaques along the proposed development site that are on the National Heritage or provincial List. The proposed pipeline upgrade will not impact on any listed monuments and memorials in the project area.

5.6. Battle fields

No known battles or skirmishes associated with the Anglo-Boer war, colonial wars and the struggle against apartheid were fought on the proposed pipeline upgrade site.

5.7. Archaeo-Metallurgy, Prehistoric Mining and Mining Heritage

No archeo-metallurgy and mining heritage traces were recorded along the proposed pipeline upgrade site.

5.8. Visual impacts

The proposed pipeline upgrade site is not on the view shed of any listed heritage site.

5.9. Mitigation

No mitigation is required however the potential for chance finds is for ever present in the area. As such the chance find procedure will apply (see appended Chance finds procedure).

6 CUMMULATIVE IMPACTS

Cumulative impacts are defined as impacts that result from incremental changes caused by other past, present, or reasonably foreseeable actions together with the project. Therefore, the assessment of cumulative impacts for the proposed pipeline upgrade project are considered the total impact associated with the proposed project when combined with other past, present, and reasonably foreseeable future developments projects. The impacts of the proposed pipeline upgrade were assessed by comparing the post-project situation to a pre-existing baseline. This section considers the cumulative impacts that would result from the combination of the proposed pipeline upgrade.

7 ASSESSMENT OF SIGNIFICANCE

7.1. Assessment Criteria

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significance of the aspects/impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts.

The significance of the impacts will be determined through a synthesis of the criteria below:

Table 4: Criteria Used for Rating of Impacts

Nature of the impact (N)		
Positive	+	Impact will be beneficial to the environment (a benefit).
Negative	-	Impact will not be beneficial to the environment (a cost).
Neutral	0	Where a negative impact is offset by a positive impact, or mitigation measures, to have no overall effect.
`Magnitude(M)		
Minor	2	Negligible effects on biophysical or social functions / processes. Includes areas / environmental aspects which have already been altered significantly and have little to no conservation importance (negligible sensitivity*).
Low	4	Minimal effects on biophysical or social functions / processes. Includes areas / environmental aspects which have been largely modified, and / or have a low conservation importance (low sensitivity*).
Moderate	6	Notable effects on biophysical or social functions / processes. Includes areas / environmental aspects which have already been moderately modified and have a medium conservation importance (medium sensitivity*).
High	8	Considerable effects on biophysical or social functions / processes. Includes areas / environmental aspects which have been slightly modified and have a high conservation importance (high sensitivity*).
Very high	10	Severe effects on biophysical or social functions / processes. Includes areas / environmental aspects which have not previously been impacted upon and are pristine, thus of very high conservation importance (very high sensitivity*).
Extent (E)		
Site only	1	Effect limited to the site and its immediate surroundings.
Local	2	Effect limited to within 3-5 km of the site.
Regional	3	Activity will have an impact on a regional scale.
National	4	Activity will have an impact on a national scale.
International	5	Activity will have an impact on an international scale.
Duration (D)		
Immediate	1	Effect occurs periodically throughout the life of the activity.

Short term	2	Effect lasts for a period 0 to 5 years.
Medium term	3	Effect continues for a period between 5 and 15 years.
Long term	4	Effect will cease after the operational life of the activity ther because of natural process or by human intervention.
Permanent	5	Where mitigation there by natural process or by human intervention will not occur in such a way or in such a time span that the impact can be considered transient.
Probability of occurrence (P)		
Improbable	1	Less than 30% chance of occurrence.
Low	2	Between 30 and 50% chance of occurrence.
Medium	3	Between 50 and 70% chance of occurrence.
High	4	Greater than 70% chance of occurrence.
Definite	5	Will occur, or where applicable has occurred, regardless or in spite of any mitigation measures.

Once the impact criteria have been ranked for each impact, the significance of the impacts will be calculated using the following formula:

Significance Points (SP) = (Magnitude + Duration + Extent) x Probability

The significance of the ecological impact is therefore calculated by multiplying the severity rating with the probability rating. The maximum value that can be reached through this impact evaluation process is 100 SP (points). The significance for each impact is rated as High (SP≥60), Medium (SP = 31-60) and Low (SP<30) significance as shown in the below.

Table 5: Criteria for Rating of Classified Impacts

Significance of predicted NEGATIVE impacts		
Low	0-30	Where the impact will have a relatively small effect on the environment and will require minimum or no mitigation and as such have a limited influence on the decision
Medium	31-60	Where the impact can have an influence on the environment and should be mitigated and as such could have an influence on the decision unless it is mitigated.
High	61-100	Where the impact will definitely have an influence on the environment and must be mitigated, where possible. This impact will influence the decision regardless of any possible mitigation.
Significance of predicted POSITIVE impacts		
Low	0-30	Where the impact will have a relatively small positive effect on the environment.
Medium	31-60	Where the positive impact will counteract an existing negative impact and result in an overall neutral effect on the environment.
High	61-100	Where the positive impact will improve the environment relative to baseline conditions.

Table 6: Impact Assessment Matrix

Impacts and Mitigation measures relating to the proposed pipeline upgrade project during construction phase														
Activity/Aspect	Impact /	Aspect	Nature	Magnitude	Extent	Duration	Probability	Significance before mitigation	Mitigation measures	Magnitude	Extent	Duration	Probability	Significance after mitigation
Clearing and Excavations	Destruction of archaeological remains	Cultural heritage	-	6	1	1	2	16	• Use chance find procedure to cater for accidental finds	2	1	1	1	4
	Disturbance of graves	Cultural heritage	-	6	2	2	4	40	• Chance finds procedure and heritage induction for workers	2	1	1	1	4
	Disturbance of buildings and structures older than 60 years old	Operational	-	6	2	1	2	18	• Mitigation is not required since no buildings and structures exist on the proposed development site	4	1	1	1	4
Haulage	Destruction public monuments and plaques	Operational	-	2	1	1	1	4	• Mitigation is not required because there are no public monuments within the proposed development site	2	1	1	4	4

Based on the results of the Impact Assessment Matrix the proposed project is viable from a heritage perspective.

8 STATEMENT OF SIGNIFICANCE

8.1. Aesthetic Value

Aesthetic value includes aspects of sensory perception for which criteria can and should be stated. Such criteria may include consideration of the form, scale, colour, texture, and material of the fabric; sense of place, the smells and sounds associated with the place and its use.

The proposed development site will be situated within an environment and associated cultural landscape, which, although developed by existing settlements, remains representative of the original historical environment and cultural landscape of this part of Mpumalanga Province. The local communities consider the project area a cultural landscape linked to their ancestors and history. However, the proposed development will not alter this aesthetic value in any radical way since it will add to the constantly changing and developing settlements.

8.2. Historic Value

Historic value encompasses the history of aesthetics, science, and society, and therefore to a large extent underlies all the terms set out in this section. A place may have historic value because it has influenced, or has been influenced by, an historic figure, event, phase, or activity. It may also have historic value as the site of an important event. For any given place, the significance will be greater where evidence of the association or event survives in situ, or where the settings are substantially intact, than where it has been changed or evidence does not survive. However, some events or associations may be so important that the place retains significance regardless of subsequent treatment.

8.3. Scientific value

The scientific or research value of a place will depend upon the importance of the data involved, on its rarity, quality, or representativeness, and on the degree to which the place may contribute further substantial information. Scientific value is also enshrined in natural resources that have significant social value. For example, pockets of forests and bushvelds have high ethnobotany value.

8.4. Social Value

Social value embraces the qualities for which a place has become a focus of spiritual, religious, political, local, national, or other cultural sentiment to a majority or minority group. Social value also extends to natural resources such as bushes, trees and herbs that are collected and harvested from nature for herbal and medicinal purposes.

9 DISCUSSIONS

Various specialists conducted several Phase 1 Archaeological/ Heritage studies for various infrastructure developments in the project area since 2006. The current study should be read in conjunction with previous Phase 1 Impact Studies conducted in the proposed project area. Although these studies recorded sites of significance for example Kruger, (2016), (Kusel (2003, 2008), Van Schalkwyk (2011a, 2011b, 2012) and Pistorius (2011, 2012) the recorded sites are far from the current proposed site. Although the proposed pipeline upgrade site did not yield confirmable heritage resources, it is important to note that any heritage site located within 500m form the boundary may be indirectly affected by the proposed pipeline upgrade. As such, it is the responsibility of the applicant to ensure that the heritage sites located near the proposed development site are protected during construction. The sites must be clearly marked, and workers made aware of their existence and significance. In this case a management plan covering the formal burial site must be compiled. The lack of confirmable archaeological sites recorded during the current survey is thought to be a result of two primary interrelated factors:

- The proposed pipeline route is located within a degraded area and have reduced sensitivity for the presence of high significance physical cultural site remains, be they archaeological, historical, or burial sites, due to previous disturbances resulting from developments and other land uses in the project area.
- Limited ground surface visibility on sections of the proposed development that were not cleared at the time of the study may have impended the detection of other physical cultural heritage site remains, or archaeological signatures immediately associated with the construction activities. It should be borne in mind that the absence of confirmable and significant archaeological cultural heritage site is not evidence in itself that such sites did not exist within the proposed project site.

Based on the significance assessment criterion employed for this report, the proposed development site was rated low from an archaeological perspective, However, it should be noted that significance of the sites of Interest is not limited to presence or absence of physical archaeological sites. Significant archaeological remains may be unearthed during construction. (See appended chance find procedure).

10 RECOMMENDATIONS

The study did not find any permanent barriers to the proposed pipeline upgrade route. It is the considered opinion of the authors that the proposed pipeline upgrade may be approved as planned from an archaeology and heritage perspective, provided that mitigation measures are implemented for the formal cemetery recorded (see Figure 3). The following recommendations are based on the results of the AIA/HIA research, cultural heritage background review, site inspection and assessment of significance.

- The identified municipal cemetery must be preserved *in situ* and properly mapped before any construction activity commences.
- The planners for the proposed pipeline upgrade must provide for a 30m buffer zone for the recorded cemetery or alternately divert the route to avoid the cemetery completely.
- The proposed pipeline upgrade may be approved to proceed as planned under observation that project work does not extend beyond the surveyed pipeline route.
- Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of the project EMPr, there are no other significant cultural heritage resources barriers to the proposed pipeline upgrade.
- If during development, operational or closure phases of this project, any person employed by the applicant, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance, work must cease at the site of the find and this person must report this find to their immediate supervisor, and through their supervisor to the site manager.
- The Site Manager must then make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area before informing an archaeological practitioner.
- In the event that archaeological materials are unearthed, all construction activities within a radius of at least 30m of such indicator should cease and the area be demarcated by a danger tape. Accordingly, a professional archaeologist should be contacted immediately
- It is the responsibility of the applicant to protect the site from publicity (i.e., media) until a mutual agreement is reached.
- Noteworthy that any measures to cover up the suspected archaeological material or to collect any resources is illegal and punishable by law. In the same manner, no person may exhume or collect such remains, whether of recent origin or not, without the endorsement by MPHRA.
- The applicant is reminded that unavailability of archaeological materials (e.g., pottery, stone tools, remnants of stonewalling, graves, etc.) and fossils does not mean they do not occur, archaeological material might be hidden underground, and as such the client is reminded to take precautions during construction.
- Overall, impacts to heritage resources are not considered to be significant for the project receiving environment. It is thus concluded that the project may be cleared to proceed as planned subject to the Heritage Authority ensuring that detailed heritage monitoring procedures are included in the project EMPr for the construction phase, include chance archaeological finds mitigation procedure in the project EMPr (See Appendix 1).

- The findings of this report, with approval of the MPHRA, may be classified as accessible to any interested and affected parties within the limits of the laws.

11 CONCLUDING REMARKS

The literature review and field research confirmed that the project area is situated within a contemporary cultural landscape dotted with settlements with long local history. Field survey established that the proposed pipeline upgrade site was degraded by previous and ongoing agriculture, residential and mining activities. The field survey recorded a cemetery along the pipeline route, that may be indirectly affected by excavation work. As such it is the responsibility of the applicant to protect the sites during construction. In terms of the archaeology and heritage in respect of the proposed pipeline upgrade site, there are no obvious 'Fatal Flaws' or 'No-Go' areas on the site, however the recorded burial site must be treated as No Go areas until appropriate mitigation measures are implemented. The potential for chance finds is rated low, however, the applicant and contractors are advised to be diligent during clearance and construction, should construction activities commence on the site. The procedure for reporting chance finds has clearly been laid out (see appended chance find procedure). This report concludes that the proposed pipeline upgrade may be approved by SAHRA/MPHRA to proceed as planned subject to recommendations herein made and heritage monitoring and management plan being incorporated into the EMPr (also see Appendices). The mitigation measures are informed by the results of the AIA/HIA study and principles of heritage management enshrined in the NHRA.

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APPENDIX 1: CHANCE FIND PROCEDURE FOR THE PROPOSED UPGRADING OF WATER PIPELINES IN EMBALENHLE WITHIN GOVANI MBEKI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE.

June 2022

ACRONYMS

BGG	Burial Grounds and Graves
CFPs	Chance Find Procedures
ECO	Environmental Control Officer
HIA	Heritage Impact Assessment
ICOMOS	International Council on Monuments and Sites
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
SAHRA	South African Heritage Resources Authority
SAPS	South African Police Service
UNESCO	United Nations Educational, Scientific and Cultural Organisation

CHANCE FIND PROCEDURE

Introduction

An Archaeological Chance Find Procedure (CFP) is a tool for the protection of previously unidentified cultural heritage resources during construction. The main purpose of a CFP is to raise awareness of all construction workers and management on site regarding the potential for accidental discovery of cultural heritage resources and establish a procedure for the protection of these resources. Chance Finds are defined as potential cultural heritage (or paleontological) objects, features, or sites that are identified outside of or after Heritage Impact studies, normally as a result of construction monitoring. Chance Finds may be made by any member of the project team who may not necessarily be an archaeologist or even visitors. Appropriate application of a CFP on development projects has led to discovery of cultural heritage resources that were not identified during archaeological and heritage impact assessments. As such, it is considered to be a valuable instrument when properly implemented. For the CFP to be effective, the site manager must ensure that all personnel on the proposed pipeline route understand the CFP and the importance of adhering to it if cultural heritage resources are encountered. In addition, training or induction on cultural heritage resources that might potentially be found on site should be provided. In short, the Chance find procedure details the necessary steps to be taken if any culturally significant artefacts are found during construction.

Definitions

In short, the term 'heritage resource' includes structures, archaeology, meteors, and public monuments as defined in the South African National Heritage Resources Act (Act No. 25 of 1999) (NHRA) Sections 34, 35, and 37. Procedures specific to burial grounds and graves (BGG) as defined under NHRA Section 36 will be discussed separately as this require the implementation of separate criteria for CFPs.

Background

The proposed water pipeline in eMbalenhle within, Govan Mbeki Local Municipality, Highveld Ridge Magisterial District, Mpumalanga Province. The proposed development is subject to heritage survey and assessment at planning stage in accordance with the NHRA. These surveys are based on surface indications alone and it is therefore possible that sites or significant archaeological remains can be missed during surveys because they occur beneath the surface. These are often accidentally exposed in the course of construction or any associated construction work and hence the need for a Chance Find Procedure to deal with accidental finds. In this case an extensive Archaeological Impact Assessment was completed by Mlilo (2022) along the entire pipeline route. The AIA/HIA conducted was very comprehensive covering the entire site. The current study (Mlilo 2022) recorded a municipal burial site along the pipeline route.

Purpose

The purpose of this Chance Find Procedure is to ensure the protection of previously unrecorded heritage resources along the proposed project site. This Chance Find Procedure intends to provide the applicant and contractors with appropriate response in accordance with the NHRA and international best practice. The aim of this CFP is to avoid or reduce project risks that may occur as a result of accidental finds whilst considering international best practice. In addition, this document seeks to address the probability of archaeological remains finds and features becoming accidentally exposed during construction and movement of construction equipment. The proposed construction activities have the potential to cause severe impacts on significant tangible and intangible cultural heritage resources buried beneath the surface or concealed by tall grass cover. Integrated Specialist Services developed this Chance Find Procedure to define the process which govern the management of Chance Finds during construction. This ensures that appropriate treatment of chance finds while also minimizing disruption of the construction schedule. It also enables compliance with the NHRA and all relevant regulations. Archaeological Chance Find Procedures are to promote preservation of archaeological remains while minimizing disruption of construction scheduling. It is recommended that due to the low to moderate archaeological potential of the project area, all site personnel and contractors be informed of the Archaeological Chance Find procedure and have access to a copy while on site. This document has been prepared to define the avoidance, minimization and mitigation measures necessary to ensure that negative impacts to known and unknown archaeological remains as a result of project activities and are prevented or where this is not possible, reduced to as low as reasonably practical during construction.

Thus, this Chance Finds Procedure covers the actions to be taken from the discovering of a heritage site or item to its investigation and assessment by a professional archaeologist or other appropriately qualified person to its rescue or salvage.

CHANCE FIND PROCEDURE

General

The following procedure is to be executed in the event that archaeological material is discovered:

- All clearance activities in the vicinity of the accidental find/feature/site must cease immediately to avoid further damage to the find site.
- Briefly note the type of archaeological materials you think you have encountered, and their location, including, if possible, the depth below surface of the find.
- Report your discovery to your supervisor or if they are unavailable, report to the project ECO who will provide further instructions.

- If the supervisor is not available, notify the Environmental Control Officer immediately. The Environmental Control Officer will then report the find to the Site Manager who will promptly notify the project archaeologist and SAHRA.
- Delineate the discovered find/ feature/ site and provide 25m buffer zone from all sides of the find.
- Record the find GPS location, if able.
- All remains are to be stabilised *in situ.*
- Secure the area to prevent any damage or loss of removable objects.
- Photograph the exposed materials, preferably with a scale (a yellow plastic field binder will suffice).
- The project archaeologist will undertake the inspection process in accordance with all project health and safety protocols under direction of the Health and Safety Officer.

- Finds rescue strategy: All investigation of archaeological soils will be undertaken by hand, all finds, remains and samples will be kept and submitted to a museum as required by the heritage legislation. In the event that any artefacts need to be conserved, the relevant permit will be sought from the SAHRA.
- An on-site office and finds storage area will be provided, allowing storage of any artefacts or other archaeological material recovered during the monitoring process.
- In the case of human remains, in addition to the above, the SAHRA Burial Ground Unit will be contacted and the guidelines for the treatment of human remains will be adhered to. If skeletal remains are identified, an archaeological will be available to examine the remains.
- The project archaeologist will complete a report on the findings as part of the permit application process.
- Once authorisation has been given by SAHRA, the Applicant will be informed when development activities can resume.

Management of chance finds

Should the Heritage specialist conclude that the find is a heritage resource protected in terms of the NRHA (1999) Sections 34, 36, 37 and NHRA (1999) Regulations (Regulation 38, 39, 40), ISS will notify SAHRA and/or PHRA on behalf of the applicant. SAHRA/PHRA may require that a search and rescue exercise be conducted in terms of NHRA Section 38, this may include rescue excavations, for which Integrated Specialist Services (Pty) Ltd will submit a rescue permit application having fulfilled all requirements of the permit application process.

In the event that human remains are accidently exposed, SAHRA Burial Ground Unit or ISS Heritage Specialist must immediately be notified of the discovery in order to take the required further steps:

a. Heritage Specialist to inspect, evaluate and document the exposed burial or skeletal remains and determine further action in consultation with the SAPS and Traditional authorities:

b. Heritage specialist will investigate the age of the accidental exposure in order to determine whether the find is a burial older than 60 years under the jurisdiction of SAHRA or that the exposed burial is younger than 60 years under the jurisdiction of the Department of Health in terms of the Human Tissue Act.

c. The local SAPS will be notified to inspect the accidental exposure in order to determine where the site is a scene of crime or not.

d. Having inspected and evaluated the accidental exposure of human remains, the project Archaeologist will then track and consult the potential descendants or custodians of the affected burial.

e. The project archaeologist will consult with the traditional authorities, local municipality, and SAPS to seek endorsement for the rescue of the remains. Consultation must be done in terms of NHRA (1999) Regulations 39, 40, 42.

f. Having obtained consent from affected families and stakeholders, the project archaeologist will then compile a Rescue Permit application and submit to SAHRA Burial Ground and Graves Unit.

g. As soon as the project archaeologist receives the rescue permit from SAHRA he will in collaboration with the company/contractor arrange for the relocation in terms of logistics and appointing of an experienced undertaker to conduct the relocation process.

h. The rescue process will be done under the supervision of the archaeologist, the site representative and affected family members. Retrieval of the remains shall be undertaken in such a manner as to reveal the stratigraphic and spatial relationship of the human skeletal remains with other archaeological features in the excavation (e.g., grave goods, hearths, burial pits, etc.). A catalogue and bagging system shall be utilised that will allow ready reassembly and relational analysis of all elements in a laboratory. The remains will not be touched with the naked hand; all Contractor personnel working on the excavation must wear clean cotton or non-powdered latex gloves when handling remains in order to minimise contamination of the remains with modern human DNA. The project archaeologist will document the process from exhumation to reburial.

i. Having fulfilled the requirements of the rescue/burial permit, the project archaeologist will compile a mitigation report which details the whole process from discovery to relocation. The report will be submitted to SAHRA and to the company.

Note that the relocation process will be informed by SAHRA Regulations and the wishes of the descendants of the affected burial.

Appendix 2: Heritage Management Plan Input into the proposed pipeline route EMPr

Objective	• Protection of archaeological sites and land considered to be of cultural value; • Protection of known physical cultural property sites against vandalism, destruction and theft; and • The preservation and appropriate management of new archaeological finds should these be discovered during construction. • Protection of Burial Grounds and Graves							
No.	Activity	Mitigation Measures	Duration	Frequency	Responsibility	Accountable	Contacted	Informed
Pre-Construction Phase								
1	Planning	Ensure all known sites of cultural, archaeological, and historical significance are demarcated on the site layout plan and marked as no-go areas.	Throughout Project	Weekly Inspection	Contractor [C] CECO	SM	ECO	EA EM PM
Construction Phase								
1	Emergency Response	Should any archaeological or physical cultural property heritage resources be exposed during excavation for the purpose of construction, construction in the vicinity of the finding must be stopped until heritage authority has cleared the development to continue.	N/A	Throughout	C CECO	SM	ECO	EA EM PM
		Should any archaeological, cultural property heritage resources be exposed during excavation or be found on development site, a registered heritage specialist or MPHRA official must be called to site for inspection.		Throughout	C CECO	SM	ECO	EA EM PM
		Under no circumstances may any archaeological, historical or any physical cultural property heritage material be destroyed or removed form site;		Throughout	C CECO	SM	ECO	EA EM PM
		Should remains and/or artefacts be discovered on the development site during earthworks, all work will cease in the area affected and the Contractor will immediately inform the Construction/Site Manager who in turn will inform SAHRA/MPHRA.		When necessary	C CECO	SM	ECO	EA EM PM
		Should any remains be found on site that is potentially human remains, the PHRA and South African Police Service should be contacted.		When necessary	C CECO	SM	ECO	EA EM PM
Rehabilitation Phase								
		Same as construction phase.						
Operational Phase								
		Same as construction phase.						

Appendix 3: Legal background in South Africa

Extracts relevant to this report from the National Heritage Resources Act No. 25 of 1999, (Sections 5, 36 and 47):

General principles for heritage resources management

5. (1) All authorities, bodies and persons performing functions and exercising powers in terms of this Act for the management of heritage resources must recognise the following principles:

(a) Heritage resources have lasting value in their own right and provide evidence of the origins of South African society and as they are valuable, finite, non-renewable and irreplaceable they must be carefully managed to ensure their survival;

(b) every generation has a moral responsibility to act as trustee of the national heritage for succeeding generations and the State has an obligation to manage heritage resources in the interests of all South Africans;

(c) heritage resources have the capacity to promote reconciliation, understanding and respect, and contribute to the development of a unifying South African identity; and

(d) heritage resources management must guard against the use of heritage for sectarian purposes or political gain.

(2) To ensure that heritage resources are effectively managed—

(a) the skills and capacities of persons and communities involved in heritage resources management must be developed; and

(b) provision must be made for the ongoing education and training of existing and new heritage resources management workers.

(3) Laws, procedures and administrative practices must—

(a) be clear and generally available to those affected thereby;

(b) in addition to serving as regulatory measures, also provide guidance and information to those affected thereby; and

(c) give further content to the fundamental rights set out in the Constitution.

(4) Heritage resources form an important part of the history and beliefs of communities and must be managed in a way that acknowledges the right of affected communities to be consulted and to participate in their management.

(5) Heritage resources contribute significantly to research, education and tourism and they must be developed and presented for these purposes in a way that ensures dignity and respect for cultural values.

(6) Policy, administrative practice and legislation must promote the integration of heritage resources conservation in urban and rural planning and social and economic development.

(7) The identification, assessment and management of the heritage resources of South Africa must—

(a) take account of all relevant cultural values and indigenous knowledge systems;

(b) take account of material or cultural heritage value and involve the least possible alteration or loss of it;

(c) promote the use and enjoyment of and access to heritage resources, in a way consistent with their cultural significance and conservation needs;

(d) contribute to social and economic development;

(e) safeguard the options of present and future generations; and

(f) be fully researched, documented and recorded.

Burial grounds and graves

36. (1) Where it is not the responsibility of any other authority, SAHRA must conserve and generally care for burial grounds and graves protected in terms of this section, and it may make such arrangements for their conservation as it sees fit.

(2) SAHRA must identify and record the graves of victims of conflict and any other graves which it deems to be of cultural significance and may erect memorials associated with the grave referred to in subsection (1), and must maintain such memorials.

(3) (a) No person may, without a permit issued by SAHRA or a provincial heritage resources authority—

(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or

(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

(4) SAHRA or a provincial heritage resources authority may not issue a permit for the destruction or damage of any burial ground or grave referred to in subsection (3)(a) unless it is satisfied that the applicant has made satisfactory arrangements for the exhumation and re-interment of the contents of such graves, at the cost of the applicant and in accordance with any regulations made by the responsible heritage resources

authority.

(5) SAHRA or a provincial heritage resources authority may not issue a permit for any activity under subsection (3)(b) unless it is satisfied that the applicant has, in accordance with regulations made by the responsible heritage resources authority—

(a) made a concerted effort to contact and consult communities and individuals who by tradition have an interest in such grave or burial ground; and

(b) reached agreements with such communities and individuals regarding the future of such grave or burial ground.

(6) Subject to the provision of any other law, any person who in the course of development or any other activity discovers the location of a grave, the existence of which was previously unknown, must immediately cease such activity and report the discovery to the responsible heritage resources authority which must, in co-operation with the South African Police Service and in accordance with regulations of the responsible heritage resources authority—

(a) carry out an investigation for the purpose of obtaining information on whether or not such grave is protected in terms of this Act or is of significance to any community; and

(b) if such grave is protected or is of significance, assist any person who or community which is a direct descendant to make arrangements for the exhumation and re-interment of the contents of such grave or, in the absence of such person or community, make any such arrangements as it deems fit.

(7) (a) SAHRA must, over a period of five years from the commencement of this Act, submit to the Minister for his or her approval lists of graves and burial grounds of persons connected with the liberation struggle and who died in exile or as a result of the action of State security forces or agents provocateur and which, after a process of public consultation, it believes should be included among those protected under this section.

(b) The Minister must publish such lists as he or she approves in the Gazette.

(8) Subject to section 56(2), SAHRA has the power, with respect to the graves of victims of conflict outside the Republic, to perform any function of a provincial heritage resources authority in terms of this section.

(9) SAHRA must assist other State Departments in identifying graves in a foreign country of victims of conflict connected with the liberation struggle and, following negotiations with the next of kin, or relevant authorities, it may re-inter the remains of that person in a prominent place in the capital of the Republic.

General policy

47. (1) SAHRA and a provincial heritage resources authority—

(a) must, within three years after the commencement of this Act, adopt statements of general policy for the management of all heritage resources owned or controlled by it or vested in it; and

(b) may from time to time amend such statements so that they are adapted to changing circumstances or in accordance with increased knowledge; and

(c) must review any such statement within 10 years after its adoption.

(2) Each heritage resources authority must adopt for any place which is protected in terms of this Act and is owned or controlled by it or vested in it, a plan for the management of such place in accordance with the best environmental, heritage conservation, scientific and educational principles that can reasonably be applied taking into account the location, size and nature of the place and the resources of the authority concerned, and may from time to time review any such plan.

(3) A conservation management plan may at the discretion of the heritage resources authority concerned and for a period not exceeding 10 years, be operated either solely by the heritage resources authority or in conjunction with an environmental or tourism authority or under contractual arrangements, on such terms and conditions as the heritage resources authority may determine.

(4) Regulations by the heritage resources authority concerned must provide for a process whereby, prior to the adoption or amendment of any statement of general policy or any conservation management plan, the public and interested organisations are notified of the availability of a draft statement or plan for inspection, and comment is invited and considered by the heritage resources authority concerned.

(5) A heritage resources authority may not act in any manner inconsistent with any statement of general policy or conservation management plan.

(6) All current statements of general policy and conservation management plans adopted by a heritage resources authority must be available for public inspection on request.

Appendix 5: EMPr

ENVIRONMENTAL MANAGEMENT PROGRAMME FOR THE UPGRADING OF WATER PIPELINE IN EMBALENHLE GOVANI MBEKI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE.

REF No.

ABBREVIATIONS

EMPr:	Environmental Management Programme
NEMA:	National Environmental Management Act
EIA:	Environmental Impact Assessment
I&APs:	Interested and Affected Parties
DEO:	Designated Environmental Officer
ECO:	Environmental Control Officer
SDC:	Safe Disposal Certificate
MSDS:	Material Safety Data Sheets
SAHRA:	South African Heritage Resource Agency
SANS:	South African National Standards
DWS:	Department of Water and Sanitation

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1 INTRODUCTION

The Bill of Rights – Chapter 2 of the Constitution Act No. 108 of 1996, includes an environmental right (Section 24) according to which, "*everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation and the sustainable use of natural resources while promoting justifiable economic and social development*". In addition, Section 28 of the National Environmental Management Act No 107 of 1998 (NEMA), requires, "*every person causing significant pollution or degradation of the environment, to take reasonable measures to prevent it from occurring, continuing or recurring*". Therefore, in order to promote effective environmental management throughout the life-cycle of a project, it is important that management actions arising from Environmental Impact Assessments (EIAs) are clearly defined and translated into an Environmental Management Programme (EMPr) for the design, construction, operation and/or decommissioning phases of a project.

According to the Western Cape Department of Environmental Affairs and Development Planning (2005), an Environmental Management Programme (EMPr) can be defined as, "*an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the project are enhanced*".

1.1 Purpose of the EMPr

The purpose of an EMPr is therefore to:-

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
  - Minimise the extent of environmental impacts and to manage environmental impacts and where possible, to improve the condition of the environment;
  - Prevent long-term or permanent environmental degradation.
  - Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
  - Provide guidance regarding method statements which are required to be implemented to achieve environmental specifications;
  - Define the corrective actions which must be taken in the event of non-compliance with the specifications of the EMPr;
  - Describe all monitoring procedures required to identify impacts on the environment, and;

- Train employees and contractors with regard to environmental obligations.

1.2 Project Location

The project is located in in Embalenhle in Govan Mbeki Local Municipality, Mpumalanga

Province. Table 1 below indicates the properties affected by the servitude.

Table 1: List of properties affected

FARM NAME	PORTION	SG CODE																			
Farm Winkelhaak 135 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	5	0	0	0	0	0
Farm Leeuwspruit 134 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	4	0	0	0	0	0
Farm Witkleifontein 131 IS	1	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	1
Farm Witkleifontein 131 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	0
Farm Witkleifontein 131 IS	4	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	4
Farm Witkleifontein 131 IS	10	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	1	0
Farm Witkleifontein 131 IS	3	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	1	0	0	0	0	3
Farm Osizweni 575 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	5	7	5	0	0	0	0	0
Farm Winkelhaak 135 IS	0	T	0	I	S	0	0	0	0	0	0	0	0	0	1	3	5	0	0	0	0	0
Farm Langverwacht 282 IS	52	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	5	2
Farm Langverwacht 282 IS	2	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	2
Farm Langverwacht 282 IS	17	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	1	7
Farm Langverwacht 282 IS	9	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	9
Farm Langverwacht 282 IS	1	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	1
Farm Langverwacht 282 IS	4	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	2	0	0	0	0	4
Farm Middelbult 284 IS	29	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	4	0	0	0	2	9
Farm Middelbult 284 IS	28	T	0	I	S	0	0	0	0	0	0	0	0	0	2	8	4	0	0	0	2	8

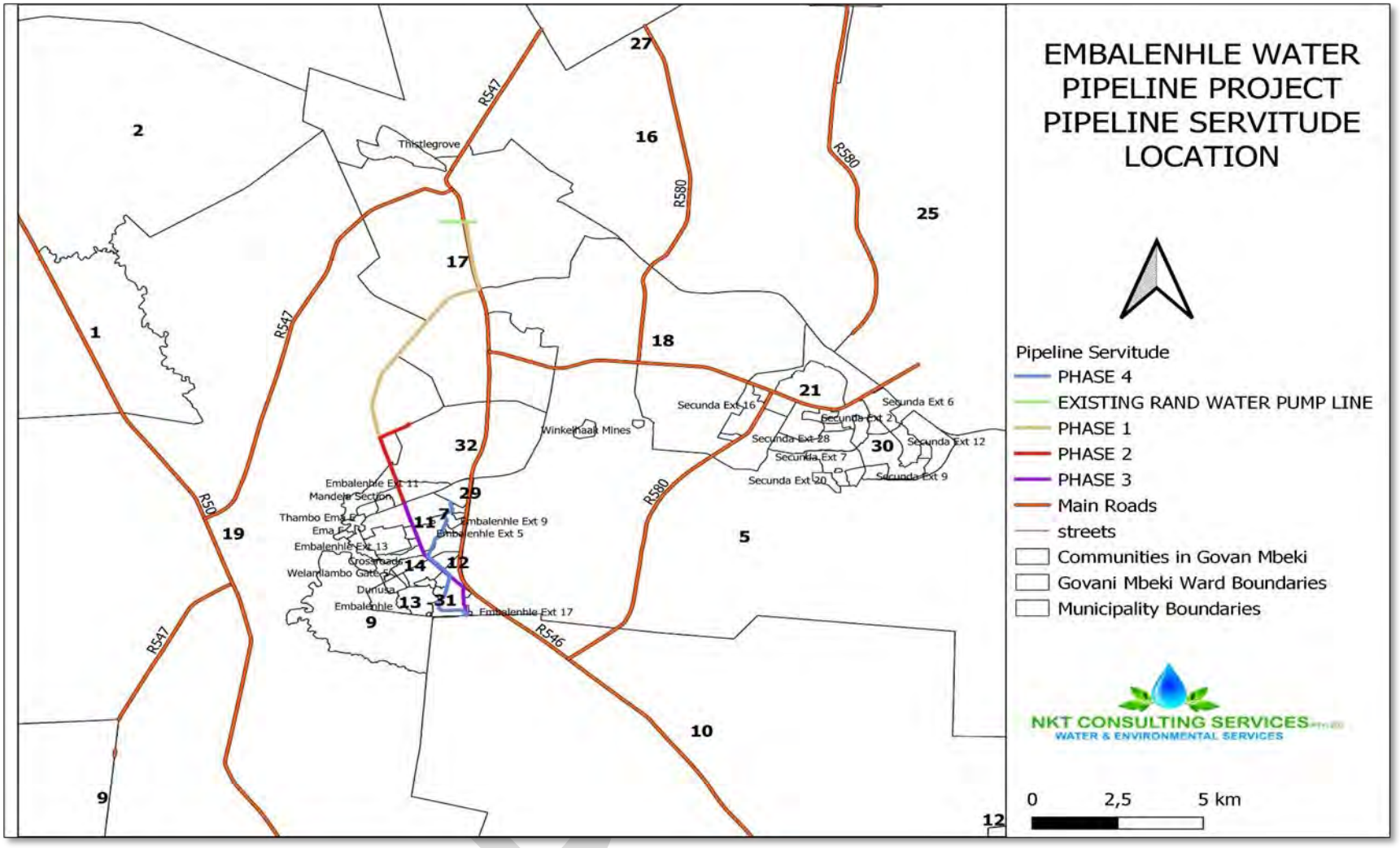

Figure 1: Project Location

2 PROJECT APPLICANT AND ENVIRONMENTAL ASSESSMENT PRACTITIONER DETAILS

Below are details of the project applicant and environmental assessment practitioner:

Table 2: EAP and applicant details

PROJECT APPLICANT	
Name	Govan Mbeki Local Municipality
Contact Person	Rofhiwa Mulaudzi
Contact Details:	078 795 4533 rofhiwa.m@govanmbeki.gov.za
NAME OF ENVIRONMETAL ASSESSMENT PRACTITIONER	
Name	NKT Consulting
Contact Person	Charles Chigurah
Contact Details:	073 565 8847 info@nktconsulting.co.za

3 PROJECT DESCRIPTION

3.1 Existing Works

The existing bulk water supply to eMbalenhle consists of a 500mm steel pipe to the 2 x 10ML reservoirs at Adullam and a 400mm uPVC pipe to eMbalenhle. This pipeline is connected to a 600mm steel pipeline operated by Rand Water on an assumed 24-hour operational basis.

The purpose of this project is to construct parallel bulk lines next to the existing bulk pipeline in order to replace the existing aging pipelines to provide a continuous supply to the growing community for the next 30 years.

eMbalenhle bulk mains have been experiencing pipe bursts frequently due to aging pipeline infrastructure (some sections are more than 20 years old) which have reached the end of their useful design life.

Due to the relative high population growth rate for eMbalenhle and the household size which do not include the large number of backyard dwellers, the expected increase in demand outweighs the current available capacity of the bulk system.

3.1.1 Water Source

Water for eMbalenhle area is provided by the Rand Water Company in the Mpumalanga Province. The current average consumption as received from the municipality from July 2019 to June 2020 =18.4ML/day.

3.1.2 Bulk supply Pipelines

The existing supply mains are mainly large diameter steel and uPVC pipes, supplying water to two existing command reservoirs. The capacity of the existing pipe diameters to supply the full current and future demands will be assessed in order to determine whether larger diameter pipes should be installed.

Table 3 show the 4 reservoirs which provide storage for the various supply zones within the project area. Using the latest census count and population data, it will be determined whether a further need for storage exists in the town. This will be determined as part of the initial design stages of the project.

Table 3: eMbalenhle reservoirs

Reservoir Name	Volume (MI)	Floor Level (m)	Fully Supply Level (m)
Abdullam Command	10	1625.8	1626.3
Abdullam Command	12	1625.8	1626.3
eMbalenhle	(2.5)	1600	1605.5
eMbalenhle	10	1590	1595

3.2 Water Demand

According to historical water consumption figures for the project area, the future usage projections will be based on population date combined with water usage data. For the technical reporting phase, the usage type will be considered and calculated in the following ways:

- Residential use – using the 2011 census population multiplied by an average consumption per day to find the litres used per day by the city's population in residential settings.

3.2.1 Residential Water Consumption

According to the Red Book, the typical household consumption per capita per day can be summarised as follows for house connection:

Table 4: Household connection water consumption typical figures

Development Level	**Typical Consumption (l/c/d)**	**Range (l/c/d)**
Moderate	80	48-98
Moderate to High	130	80-145
High	250	130-280
Very High	450	260-480

According to the RDP Rural Water Supply Design Criteria Guideline, the minimum Average Annual Daily Demand (AADD) that should be allowed for is 60l/c/d for rural settlements with individual stand up taps and 150 l/c/d for towns with services. This seems to fall into the moderate to high development level. For the township of eMbalenhle a consumption correlating with a moderate or lower moderate to high development will be assumed. This is because the erfs are small, with few gardens and no swimming pools being seen.

3.3 Available Storage Versus Demand

As the current status of the existing reservoirs still needs to be verified, we assume the storage to be as follows:

- Abdullam : 1 x 10ML & 1 x 12ML Command
  eMbalenhle : 1 x 10ML Command (Square with 0.94kl pressure tower)
  eMbalenhle : 1 x 2.5 ML – not in service
- Current Consumption = 18.4ML/day
- Future (2050) Demand = 88.2 ML/day
- This required an additional storage of 58 ML/day (based on 150 l/c/d consumption).

3.4 Proposed Works

The scope of works includes the construction of suitable designed and sized parallel pipelines associated fittings too upgrade the supply and to cater for the future expansion of eMbalenhle. The parallel lines will replace the existing aging infrastructure. The project will be divided into 4 phases as it is estimated to be a lengthy construction period and expensive project. The following phases are proposed:

- Phase 1: New 630mm diameter line from the Rand Water connection up to the Abdullam Reservoirs.
- Phase 2: New 500mm line from Abdullam reservoirs up to the traffic circle branch connection.
- Phase 3: New 400mm line from the Traffic circle branch up to the 5ML reservoir
- Phase 4: New 355mm line from the old reservoir and pressure tower to the 5ML reservoir

The four (4) main pipe materials which are considered are to be used as follows:

- HDPE – Mainly in CBD areas where trenching will cause undesirable disruptions. In these areas pipe cracking methods will be employed to put the DDPE pipes in place with minimal excavations required.
- uPVC – Used in most other area where trench excavations are possible. This method is considered more affordable and labour intensive, therefore allowing for employment creation.
- PVC-O – Used for large diameter (450 – 600mm) or high pressure (16 – 25 bar) sections of pipeline where HDPE and uPVC pipes won't be sufficient.
- Steel – Only to be used in possible extreme situations where the above materials are insufficient

4 LEGISLATIVE FRAMEWORK

The following is a summary of the environmental legislation applicable to the proposed project.

Legislation	Sections	Relates to:
The Constitution (No 108 of 1996)	Chapter 2	Bill of Rights.
	Section 24	Environmental rights.
National Environmental Management Act (No 107 of 1998 [as amended])	Section 2	Defines the strategic environmental management goals and objectives of the government. Applies through-out the Republic to the actions of all organs of state that may significantly affect the environment.
	Section 24	Provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.
	Section 28	The Client has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
Environment Conservation Act (No 73 of 1989) and regulations	Sections 19 and 19A	Prevention of littering by employees and subcontractors during construction and the maintenance phases of the proposed project
National Heritage Resources Act (No 25 of 1999) and regulations	Section 32	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 34	No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial

Legislation	Sections	Relates to:
		ground older than 60 years which is situated outside a formal cemetery administered by a local authority. Grave is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
	Section 35	This section provides for Heritage Impact Assessments (HIAs), which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The Heritage Impact Assessment (HIA) will be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decision on the HIA.
Occupational Health and Safety Act (No 85 of 1993)	Section 8	Control of dust
	Section 9	Control of noise
National Environmental Management Biodiversity Act (Act No. 10 of 2004)		Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.
Occupational Health and Safety Act-Major Hazard Installation Regulations (GN R692, July 2001)	Sections 5 and 6	Control of offensive odours
National Water Act (No 36 of 1998) and regulations	Section 19	General duties of employers to their employees
	Section 20	General duties of employers and self employed persons to persons other than their employees
National Road Traffic Act (No 93 of 1996)		Road safety.
Town Planning and Townships Ordinance 15 of 1986		Town Planning.
SANS 10103 (Noise Regulations)		The measurement and rating of environmental noise with respect to annoyance and to speech communication.

5 ADMINISTRATION AND REGULATION OF ENVIRONMENTAL OBLIGATIONS

5.1 Management Structure

The Contractor must compile an organogram illustrating the management structure for inclusion within the final EMPr. This organogram should depict the organisation structure of the Contractor and must contain supporting documentation to demonstrate the environmental responsibilities, accountability, and liability of the Contractor's employees. The Contractor should assign responsibilities for the following:

- Reporting structures.
- Actions to be taken to ensure compliance.
- Overall design, development, and implementation of the EMPr.
- Documenting the environmental policy and strategy.
- Implementing the EMPr in all stages/phases of the project.
- All the aspects which require action under the other core elements and sub-elements of the EMPr.

All official communication and reporting lines including instructions, directives and information shall be channelled according to the organisation structure.

5.2 Roles and Responsibilities

5.2.1 Govan Mbeki Local Municipality

Govani Mbeki Local Municipality (GMLM) is the client and will therefore be the entity monitoring the implementation of the EMPr. However, if GMLM) appoints a Contractor to implement the project and hence implement the proposed mitigation measures documented in this EMPr on their behalf.

5.2.2 Contractor

The successful Contractor shall:

- Be responsible for the overall implementation of the EMPr in accordance with the requirements of GMLM;
- Ensure that all third parties who carry out all or part of the Contractor's obligations under the Contract comply with the requirements of this EMPr

5.2.3 Designated Environmental Officer

The Contractor shall appoint a nominated representative of the contractor as the Designated Environmental Officer (DEO) for the contract. The DEO will be site-based and shall be the responsible person for implementing the environmental provisions of the construction contract. There shall be an approved DEO on the site at all times.

The DEO's duties will include, *inter alia*, the following:

- Ensuring that all the permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Reviewing and approving construction method statements with input from the ECO and Engineer, where necessary, in order to ensure that the environmental specifications contained within the construction contract are adhered to.
- Assisting the Contractor in finding environmentally responsible solutions to problems.
- Keeping accurate and detailed records of all activities on site.
- Keeping a register of complaints on site and recording community comments and issues, and the actions taken in response to these complaints.
- Ensuring that the required actions are undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance to the ECO and Contractor.

The DEO shall submit regular written reports to the ECO, but not less frequently than once a month.

The DEO must have:

- The ability to manage public communication and complaints;
- The ability to think holistically about the structure, functioning and performance of environmental systems; and
- The DEO must be fully conversant with the Environmental Management Programme and all relevant environmental legislation.

The ECO shall have the authority to instruct the contractor to replace the DEO if, in the ECO's opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the construction contract. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required and within what timeframe.

5.2.4 Environmental Control Officer

For the purposes of implementing the conditions contained herein, GMLM shall appoint an Environmental Control Officer (ECO) for the contract. The ECO shall be the responsible person for ensuring that the provisions of the EMPr are complied with. The ECO will be responsible for issuing instructions to the contractor and where environmental considerations call for action to be taken. The ECO shall submit regular written reports to GMLM, but not less frequently than once a month. The ECO will be responsible for the monitoring, reviewing and verifying of compliance with the EMPr by the Contractor. The ECO's duties in this regard will include, *inter alia*, the following:

- Confirming that all the environmental permits required in terms of the applicable legislation have been obtained prior to construction commencing.
- Monitoring and verifying that the EMPr and Contract are adhered to at all times and taking action if specifications are not followed.
- Monitoring and verifying that environmental impacts are kept to a minimum.
- Reviewing and approving construction method statements with input from the DEO and Engineer, where necessary, in order to ensure that the environmental specifications contained within this EMPr are adhered to.
- Inspecting the site and surrounding areas on a regular basis regarding compliance with the EMPr and Contract.
- Monitoring the undertaking by the Contractor of environmental awareness training for all new personnel on site.
- Ensuring that activities on site comply with all relevant environmental legislation.
- Ordering the removal of or issuing spot fines for person/s and/or equipment not complying with the specifications of the EMPr.
- Undertaking a continual internal review of the EMPr and submitting any changes to GMLM for review and approval.
- Checking the register of complaints kept on site and maintained by the DEO and ensuring that the correct actions are/were taken in response to these complaints.
- Checking that the required actions are/were undertaken to mitigate the impacts resulting from non-compliance.
- Reporting all incidences of non-compliance to the GMLM.
- Conducting annual environmental performance audits in respect of the activities undertaken relating to the project.
- Keeping a photographic record of progress on site from and environmental perspective.
- Recommending additional environmental protection measures, should this be necessary.
- Providing report back on any environmental issues at site meetings

The ECO must have:

- A good working knowledge of all relevant environmental policies, legislation, guidelines, and standards;
- The ability to conduct inspections and audits and to produce thorough, readable, and informative reports;
- The ability to manage public communication and complaints;

- The ability to think holistically about the structure, functioning and performance of environmental systems; and
- Proven competence in the application of the following integrated environmental management tools:
  - Environmental Impact Assessment.
  - Environmental management plans/programmes.
  - Environmental auditing.
  - Mitigation and optimisation of impacts.
  - Monitoring and evaluation of impacts.
  - Environmental Management Systems.

The ECO must be fully conversant with the Environmental Management Programme and all relevant environmental legislation. GMLM shall have the authority to replace the ECO if, in their opinion, the appointed officer is not fulfilling his/her duties in terms of the requirements of the EMPR or this specification. Such instruction will be in writing and shall clearly set out the reasons why a replacement is required and within what timeframe.

5.3 Emergency Preparedness

The Contractor shall compile and maintain environmental emergency procedures to ensure that there will be an appropriate response to unexpected or accidental actions or incidents that will cause environmental impacts, throughout the life cycle of the project. Such activities may include, *inter alia*:

- Accidental discharges to water and land.
- Accidental exposure of employees to hazardous substances.
- Accidental veld or forest fires.
- Accidental spillage of hazardous substances.
- Specific environmental and ecosystem effects from accidental releases or incidents.

These plans should include:

- Emergency organisation (manpower) and responsibilities, accountability, and liability.
- A list of key personnel.
- Details of emergency services applicable to the various areas along the route (e.g., the fire department, spill clean-up services, etc.).
- Internal and external communication plans, including prescribed reporting procedures where required by legislation.
- Actions to be taken in the event of different types of emergencies.

- Incident recording, progress reporting and remediation measures required to be implemented.
- Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release.
- Training plans, testing exercises and schedules for effectiveness.

The Contractor shall comply with the emergency preparedness and incident and accident-reporting requirements, as required by the Occupational Health and Safety Act, 1993 (Act No 85 of 1993), the National Environmental Management Act, 1998 (Act No 107 of 1998), the National Water Act, 1998 (Act No 36 of 1998) and the National Veld and Forest Fire Act, 1998 (Act No 101 of 1998) as amended and/or any other relevant legislation.

5.4 Checking and Corrective Action

5.4.1 Non-Compliance

Non-compliance with the specifications of the EMPr and/or conditions of any environmental permits, both of which will be present on-site at all times, constitutes a breach of Contract for which the Contractor may be liable to pay penalties. The Contractor is deemed not to have complied with the EMPr if:

- There is evidence of contravention of the EMPr specifications within the boundaries of the construction site, site extensions and haul/access roads;
- There is contravention of the EMPr specifications which relate to activities outside the boundaries of the construction site.
- Environmental damage ensues due to negligence;
- Construction activities take place outside the defined boundaries of the site; and/or
- The Contractor fails to comply with corrective or other instructions issued by the Engineer and/or ECO within a specific time period.
- The contractor shall act immediately when a notice of non-compliance is received and correct whatever was the cause for the issuing of the notice.

Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed therefore any avoidable non-compliance, dependant on severity, shall be considered sufficient grounds for contact to be made with relevant provincial or national authorities.

The engineer's decision with regard to what is considered a violation, its seriousness and the action to be taken against the contractor shall be final. Failure to redress the cause shall be

reported to the relevant authority. The responsible provincial or national authorities shall ensure compliance and impose penalties relevant to the transgression as allowed for within its statutory powers.

5.4.2 Monitoring

A monitoring programme will be implemented for the duration of the construction phase of the project. This programme will include:

- **Performance Audits**: Monthly inspection reports which are performance based compiled by the ECO. This must also incorporate monitoring of compliance issues as well as permits, licenses, the EMPr and all contract documentation's conditions. These audits can be conducted randomly and do not require prior arrangement with the project manager.
- **Compliance Audits**: The auditor will initially undertake compliance audits every month. Compilation of an audit report with a rating of the compliance with the EMPr. This report will be submitted to the relevant authorities as and when required.

The following will also assist with monitoring: -

Complaints Register

The Contractor will ensure that a dedicated Complaints Register is kept on site at all times. The register will contain the details of the person who made the complaint, the nature of the complaint received, the date on which the complaint was made, and the response noted with the date and action taken. The Complaints register will be kept in accordance with the requirements of the ECO. This record shall be submitted with the monthly reports and an oral report given at the monthly site meetings.

Inspections

On-going visual inspections will be conducted daily by the DEO. The DEO will spend the bulk of his/her time on site on the lookout for any unsafe acts and activities that transgress the requirements as specified in the EMP. The DEO compiles the site register, and the ECO maintains the complaints register and any other records required (the DEO would also have input into this as well, as he/she would be site-based).

Incident Reporting and Remedy

If a leakage or spillage of hazardous substances occurs on site, the local emergency services must be immediately notified of the incident (within 24 hours). The following information must be provided:

- The location;

- The nature of the load; and
- The status at the site of the accident itself (i.e., whether further leakage is still taking place, whether the vehicle or the load is on fire).

Written records must be kept on the corrective and remedial measures decided upon and the progress achieved therewith over time. Such progress reporting is important for monitoring and auditing purposes. The written reports may be used for training purposes in an effort to prevent similar future occurrences.

Public Communication and Liaison with Interested and Affected Parties

The Contractor shall comply with the requirements for public consultation as required by the Constitution Act, 1996 (Act No 108 of 1996) and the National Environmental Management Act, 1998 (Act No 107 of 1998). During the construction phase of the project, the Contractor shall be responsible for erecting information boards, in the position, quantity, design and dimensions approved by the Engineer.

The information boards shall contain relevant information regarding the construction activity and the relevant contact details to assist persons who wish to submit complaints regarding construction activities.

Information distribution

Copies of the EMPr will be made available to I&APs at appropriate locations. Copies will also be distributed to all senior contract personnel. All senior personnel on the construction site will be required to familiarize themselves with the contents of the document.

5.5 Management Review

A formal management review needs to be conducted on a regular basis in which the monthly internal audit reports written by the ECO and based on frequent inspections and interactions with the DEO based on the latter's daily reports, audit reports by the independent external auditor will be reviewed. The purpose of the review is to critically examine the effectiveness of the EMPr and its implementation and to decide on potential modifications to the EMPr as and when necessary. The process of management review is in keeping with the principle of continual improvement. Management review will take place monthly for the duration of the project.

6 DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

The EMPr forms part of the Contract Documentation and is thus a legally binding document. It is also necessary for the Contractor to make provisions as part of their budgets for the implementation of the EMPr. In terms of the NEMA an individual responsible for environmental damage must pay costs both to the environment and human health and the preventative measures to reduce or prevent additional pollution and/or environmental damage from occurring. This is referred to as the Polluter Pays Principle. Section 28 of the NEMA embodies the

Polluter Pays Principle. The Contractor is deemed not to have complied with the Environmental Specifications/EMPr if:

- Environmental damage ensues due to negligence;
- The Contractor ignores or fails to comply with corrective or other instructions issued by GMLM, the Engineer or ECO within a specified time; and
- The Contractor fails to respond adequately to complaints from the public.

6.1 Pre-Construction Phase

6.1.1 Permits and Licenses

All necessary permits and licences must be obtained by GMLM prior to the commencement of construction

6.1.2 Appointment of Contractor

- GMLM must ensure that this EMPr forms part of any Contractual agreements with the Contractor(s) and sub-Contractors for the execution of the proposed project. The Contractor must make adequate provision in their budgets for the implementation of the EMPr.
- The Principal Contractor (including sub-Contractors and suppliers) must comply with the relevant provisions of the EMPr, applicable environmental legislation, by-laws and associated regulations promulgated in terms of these laws.
- Tender documents should include statements to include the use of local communities or local community organisation where possible in supplying services and labour to the construction activities.
- Local labourers should be used for such methods

6.1.3 Preparation of Method Statements

- Method Statements must be submitted by the Contractor to the ECO and must be adhered to by the Contractor and Project Engineer for the duration of the Project. These relate to water and storm water management requirements, traffic requirements, solid waste management requirements, and hydrocarbon spills, contaminated water treatment, the storage of hazardous materials, standard emergency procedures, and biohazard control, and any further activities which the ECO and Project Engineer deem necessary.
- The ECO will monitor the implementation of the Method Statements. All copies of the statements and plans must be submitted to the appointed ECO.

7 ASSESSMENT APPROACH TO ENVIRONMENTAL ISSUES DURING CONSTRUCTION PHASE

The assessment and description of identified environmental issues were conducted according to the structure and approach detailed below. The following is a brief description of how these impacts were identified and rated. The approach may be tailored and altered where required to deal adequately with the description and assessment of a specific impact.

Nature: classification of whether the impact is positive or negative, direct or indirect

Extent: spatial scale of impact and classified as:

- Site: the impacted area is the whole or significant portion of the site.
- Local: Within a radius of 2 km of the construction site.
- Regional: the impacted area extends to the immediate, surrounding and neighbouring properties.
- National: the impact can be considered to be of national significance. o International: impact has international ramifications

Duration: Indicates what the lifetime of the impact will be and is classified as:

- Short term: The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase.
- Medium term: The impact will last for the period of the construction phase, where after it will be entirely negated.
- Long term: The impact will continue or last for the entire operational life of the development but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory.
- Permanent: Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.

Intensity: Describes whether an impact is destructive or benign;

- Low: Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.
- Moderate: Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way.
- High: Natural, cultural and social functions and processes are altered to extent that they temporarily cease.
- Very High: Natural, cultural and social functions and processes are altered to extent that they permanently cease.

Probability: Describes the likelihood of an impact occurring:

- **Improbable:** Likelihood of the impact materialising is very low
- **Possible:** The impact may occur
- **Highly Probable**: Most likely that the impact will occur o Definite: Impact will certainly occur

Significance: Based on the above criteria the significance of issues was determined. The total number of points scored for each impact indicates the level of significance of the impact, and is rated as:

- **Low:** the impacts are less important.
- **Medium:** the impacts are important and require attention; mitigation is required to reduce the negative impacts.
- **High:** the impacts are of great importance. Mitigation is therefore crucial.

Cumulative: In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area
Mitigation: Mitigation for significant issues is incorporated into the EMP.

Table 5: Impacts assessment

No.	Impact	Description		Assessment					
		Nature	**Probability**	**Status**	**Extent**	**Duration**	**Significance**	**Intensity/Reversibility**	**Cumulative / non-cumulative**
1	**Noise**: It is expected that the construction activities will create noise pollution in the area during working hours.	The current site is a disturbed land surrounded by a residential area. Noise experienced in the area does not exceed the allowable ambient noise limit.	The probability of change is certain with regard to the potential sources of noise pollution during construction, if the development were to go ahead.	An increase in noise pollution would be a negative impact to the surrounding environment.	Impacts would be site specific and in the local environment.	Increase in noise would be during the construction phase due to construction vehicles and machinery.	Medium	When the construction is completed the noise level would return to the initial state. Reversible.	Cumulative. The noise level would increase due to the construction activity or vehicle.
2.	**Air Quality**: The creation of dust will be evident in the area during construction.	The current site is an open space field. Dust pollution at site is at moderate level. Increasing of dust level during construction phase could have an impact to the air quality.	During construction period dust level could rise as a result of heavy construction vehicles movement and the construction itself.	An increase in dust would be a negative impact to the surrounding environment.	Impact would be site specific and in the local environment.	The impact would only result during construction phase.	Medium.	When the construction is completed the dust level will be lower than the initial state. Reversible.	Non- Cumulative.
3.	**Soil erosion**: The construction activities have the potential to create soil erosion.	The current environmental site is a disturbed land, with vegetations.	The probability of change is uncertain during construction.	The current site infrastructure does not cater for the storm water management. If it is not addressed in the proposed development, it could increase the impact.	The impact would be site specific.	Might occur only during construction phase. Short term	Medium The surrounding might be negatively affected	When the construction is completed, the storm water management in the area is improved, in turn soil erosion issue could be addressed. reversible	Non-cumulative if the proposed development design addresses the storm water management issue.
4.	**Waste disposal**: Uncontrolled and random disposal of waste has a negative effect on the health status of the local environment.	The existing current site is disturbed and affected by poor waste disposal on some parts of the proposed site. .	The probability of change is uncertain.	An increase in waste and improper disposal might result in an encouragement of illegal dumping site establishment that could later pose serious environmental health hazard to the environment	Impacts would be site specific and in the local environment.	Only during construction phase. Short term	Medium	If well managed can be reversed or even avoided.	Non-cumulative
5.	**Mixing of concrete**: Concrete residue when left to harden can create areas, which will be difficult to remove or rehabilitate.	The current site is free from concrete slabs, proper measures need to be implemented to avoid adverse impacts	The probability of change is uncertain which may rise as a result dry concrete	If concrete mixing is not well managed and left to dry it may result into concrete slab formation or	Impacts would be site specific and in the local environment.	This might permanently affect the soil.	Medium. The soil character might be changed.	Reversible.	Non-cumulative.

No.	Impact	Description		Assessment					
		Nature	Probability	Status	Extent	Duration	Significance	Intensity/Reversibility	Cumulative / non-cumulative
			mixture left during construction.	negatively impact to the surrounding.					
6.	**Storage of equipment and materials**: Equipment and materials if not stored in an appropriate manner could be a source of pollution.	Materials and equipment storage should be done properly to eliminate injuries and accidents.	The probability of change is uncertain.	Equipment and materials if not stored in an appropriate manner could be sources of pollution.	Impacts would be site specific and in the local environment.	Short term	Low	If well managed can be reversible.	Non-cumulative.
7.	**Waste generation and disposal**: Waste generation and inappropriate disposal could lead to wide array of environmental problems such as soil, surface and ground water contamination, among others.	The current state of the site is not affected by illegal waste disposal	The probability of change is uncertain.	Generated waste and disposal method could be sources of pollution.	Impacts would be site specific and in the local environment.	if waste management plans are not in place, this could be a long-term effect	high	If well managed can be reversible	Cumulative
8.	**Soil and Water Contamination**: Various hazardous materials, construction waste and by- products as thinners, and oils used during construction could become sources of pollution if not disposed of in an appropriate manner.	The current state of the site is free from toxic chemicals.	The probability of change is uncertain, depend on the management.	Hazardous substances if not managed or used in an appropriate manner can be sources of pollution.	Impacts would be site specific and could extend to regional environment. As a result of the rock type of the site	Short term if early managed.	high.	If well managed can be reversible.	Cumulative
9.	**Vehicle Maintenance and Refueling**: Spillages of hazardous liquids such as fuel, engine oil and other liquids used during vehicle maintenance and equipment handling, on the ground surface could result into contamination of soil, surface water and ground water	Due to the magnitude of the project, a lot of mobile equipment is expected.	The probability of change is uncertain.	Oil/Hydrocarbons spillages would be a negative impact to the current environment.	Impacts would be site specific and in the regional environment.	Short term.	Medium.	When the construction is completed could be reversed.	Could be cumulative. Soil characteristic could change.
10.	**Vehicle and Equipment Washing**: Spillages of washing detergents and wash water containing detergents and oils could impact the environment negatively.	The site is not contaminated by any spillage of washing detergents or oil.	The probability of change is uncertain.	An increase in washing detergents would have a negative impact. This has to be avoided.	Impacts would be site specific and extend to national environment as a result of the rock type of that area	Short term. If well managed	high.	If appropriately managed could be reversed.	Non-cumulative.
11.	**Visual impacts**: Building material waste will have an unpleasant visual impact. Careless dumping of waste by workers anywhere leading to littering of ground surface will also produce a negative visual impact within the immediate surrounding.	The site is currently clean and well taken of. The current state of the site does not pose negative visual impact to the surrounding environment.	The probability of change is certain regarding the potential visual impact, if the development were to go ahead.	The presence of construction could pose visual impact and the operational phase could also pose visual impact to the current owners of the existing residential.	Impacts would be site specific and in the local environment.	Temporary. Waste generation only during construction	Low	Impact is reversible	Cumulative

No.	Impact	Description		Assessment					
		Nature	Probability	Status	Extent	Duration	Significance	Intensity/Reversibility	Cumulative / non-cumulative
12.	**Flora and fauna**: Endemic flora and fauna in and around the construction site should be protected as much as possible. However, this is not applicable in this regard because this is already a disturbed environment with less or no endemic flora and fauna issues.	The site is not a virgin land, disturbance to the vegetation is expected during construction.	The probability of change is certain if the development were to go ahead.	The current states of the site pose impact to flora and fauna through exotic vegetation.	Impacts would be site specific and in the local environment.	Permanent	Low	It could be reversible or rehabilitated	Cumulative
13.	**Labour force**: Environmentally unfriendly actions and a lack of good social behavior of the labour force can create various problems such as crime, pollution, to some extend lead to a spreading of HIV.	The targeted site is situated amongst residential, agricultural areas, and accessed by near-by locals.	The probability of change is uncertain.	The current local communities are faced with high unemployment rate, reckless behavior from construction employees could lead to negative impacts to the vulnerable communities	Impacts would be site specific and in the local community however could extend.	Permanent	Not applicable	Not applicable	To some extent cumulative.
14.	**Job Creation**: It is important for the well-being of the local community to use local labour where possible and comply with the public requirement for the proposed development.	A place/site where development is to be located, job seekers are always making ups and downs around the area for employment.	The probability of change is uncertain.	Un-employment is a negative effect in and around the local community. Not employing the local labours could impact the project negatively.	Impacts could be site specific and in the local community however could extend national.	Permanent	Not applicable	Not applicable	Not applicable
15.	**Security and crime**: Security on the construction site needs to be maintained. Construction work and related activities are usually associated with an increase in criminal incidents in the area where development occurs.	The site is currently not adequately protected since there is no light and fence for security purposes.	The probability of change is uncertain.	Crime is currently a problem, escalated by un-employment in the area. Construction site could invite more criminal elements hence construction material would be on site.	Impacts could be site specific and in the local community however it could extend.	Permanent	Medium	Low	Non-cumulative
16.	**Fire Prevention and Control**: The activities that take place in the contractor's camp may pose the threat of the creation of fires. Therefore, appropriate measures are to be taken.	The site currently does not have any activities that may pose fire threats except out of natural course.	The probability of change is uncertain.	The presence of construction operation could pose fire hazards.	Impacts could be site specific and in the local environment.	Short term	Medium	Low	Cumulative
17.	**Environmental complaint register**: It is expected that there could be complaints with regards to environmental non-compliance during	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable	Not applicable

No.	Impact	Description		Assessment					
		Nature	Probability	Status	Extent	Duration	Significance	Intensity/Reversibility	Cumulative / non-cumulative
	the construction phase of the project. The environmental compliant register should make available to the entire community.								
18.	**Traffic**: Sufficient safety measures should be taken to avoid unnecessary accidents and or injuries.	Safety in areas of high unemployment rate is always a concern.	The probability of change is certain.	Safety is currently a big concern to the community members as they are affected by crime. The construction	Impacts would be site specific and in the local environment.	Short term	Medium	Non-reversible	Non-cumulative. But could cumulate if not managed.
19.	**Materials Handling**: Handling of materials such as fuel, grease and oils must be supervised daily on a continuous basis.	The site is currently without material such as fuel, grease storages.	The probability of change is certain during construction period.	The hydrocarbon materials if not stored in an appropriate manner can be sources of pollution.	Impacts would be site specific and extend to regional environment.	Short term if not well managed	Low, if well managed	If well managed can be reversible	Non-cumulative
22.	**Construction Camps**: The choice of site for the contractors' camp requires the Environmental Control Officer and Engineers permission.	Location of site camps is significant, To avoid unnecessary negative impacts	The probability of change is uncertain.	Construction camps are associated with environmental impacts, if not properly selected and managed.	Impacts would be site specific and in the local environment.	Medium term	Medium	Irreversible	Non-Cumulative
23.	**Policy compliance:** The proposed development may not be consistent with relevant environmental policy and/or spatial guideline documents, (e.g., close to a wetland/watercourse).	The servitude of the pipeline is already existing. The development is for an upgrade of an existing pipeline	The probability of change is uncertain.	Policy compliance is when the development proceeds without approvals from relevant authorities.	Impacts would be site specific and in the local environment.	Medium term	Medium	Irreversible	Non-Cumulative

7.1 Proposed Mitigation and Management

The table below is an illustration of the criteria utilised to identify proposed mitigation and the management of the mitigation. The table below fatherly illustrate the period of mitigation and the responsible party.

<table>
<tr><th>Mitigation</th><th>Impact and proposed mitigation and management actions</th><th>Responsibility</th><th>Timeframe</th></tr>
<tr><td>Potential to mitigate negative impact</td><td rowspan="2">Description of mitigation measures. Extent to which mitigation measures could influence the significance and status of impact.

Wherever possible a description of the optimization measures. Extent to which they could influence the significance of impact.</td><td rowspan="2">The responsible person to ensure that the mitigation measures are taken.</td><td rowspan="2">Implementation period for the mitigation</td></tr>
<tr><td>Potential to enhance positive impacts</td></tr>
<tr><td rowspan="3">Significant rating of impact after mitigation</td><td colspan="3">Low, i.e., natural, and social functions and processes are not affected or minimally affected.</td></tr>
<tr><td colspan="3">Medium, i.e., affected environment is notably altered. Natural and social functions and processes continue albeit in a modified way.</td></tr>
<tr><td colspan="3">High, i.e., natural, or social functions or processes could be substantially affected or altered to the extent that they could temporarily or permanently cease.</td></tr>
<tr><td>Comment on the overall assessment and conclusion.</td><td colspan="3">Overall Assessment and concluding comments as to the predicted impacts after mitigation and their:
o Severity and permanence
o Size and relative significance
o Ecological and socio – economic context
o Balance between positive and negative aspect
o Cost and benefits
o Acceptability / Unacceptability</td></tr>
</table>

Table 6: Mitigation and management measures

No.	Impact	Mitigation	Responsibility	Time Frame	Significant Rating of Impact After Mitigation	Comment on the overall assessment and conclusion
1.	**Noise**:	• Construction and other noise generating activities should be restricted to between 06h00 and 18h00 Monday to Friday, unless otherwise approved by the appropriate competent person in consultation with adjacent landowners/affected persons and ECO. • During the operational phase all activities must take place in a manner that will allow as little noise as possible. • Activities, which are deemed to generate high levels of noise, will be restricted to normal working hours.	Contractor	During construction	Low	If construction vehicles are serviced and properly maintained the level of noise should be less.
2.	**Dust:**	• The liberation of dust into the surrounding environment shall be effectively controlled by the use of, water spraying • The speed of haul trucks and other vehicles must be strictly being controlled to avoid dangerous conditions, excessive dust or deterioration of the road being used. Site clearance to be done only as needed in phases.	Contractor	During construction	Low	The level of dust should be reduced to minimal as the result of water spraying during working hours and pilling of soil should be avoided wherever possible.
3.	**Soil:**	• Submission of an operational plan for the construction phase indicating technical and management measures to prevent soil erosion. • Stockpiled topsoil should not be compacted and should be replaced as final soil layer. • Soil should be exposed for the minimum time possible once cleared of vegetation, i.e., the timing of clearing and grubbing should be co-ordinate as much as possible to avoid prolonged exposure of soils to wind and water erosion. • The A-horizon will be removed and used for rehabilitation purposes. The lower soil horizons will be used for construction activities. The A-horizon will be stockpiled in a responsible manner and replaced during rehabilitation	Contractor. Contractor. Contractor	During construction phase.	Low	The design lay out plan should address all issues relating to storm water management and soil erosion. This could be a complete mitigation of this soil erosion.
4.	**Disposal of sewage:**	The contractor to install adequate portable chemical toilets to meet the sanitation needs on the construction site (14 people per toilet).	Contractor	During construction	Low or completely mitigated	Ablution facility should be made available during construction phase for the employee to able to use this facility. All type of waste should be classified and disposed in an appropriate registered waste disposal site.
5.	**Mixing of concrete:**	• Where concrete has been mixed, especially in the natural environment, all residues must be removed and disposed of in an environmentally responsible manner approved by the ECO.	Contractor	During construction	Low	Unused cement should not be left to dry on the ground. If proper housekeeping rules are complied with, most impacts should not affect the environment.
6	**Storage of Equipment and Materials:**	• Choice of location for storage areas must consider prevailing winds, exposure sun, distance to water bodies and general onsite topology. • All equipment and materials must be stored in a designated area in an appropriate manner as to prevent pollution. • Storage areas must be designated, demarcated, and fenced as effective as possible. Fire prevention facilities must be always present and accessible.	Contractor	Through-out the life cycle of a project.	Low	If employees on site shall practice good housekeeping behaviour, the work condition will be free of injuries, and everything would be in its place and there will be space for everything.
7.	**Waste generation and disposal:**	• A waste management plan to be developed for the construction site. • Plan to ensure that all waste is contained in suitable containers to prevent waste being washed into water bodies.	Contractor	During construction	Low	Waste removal should be done regularly and that could make the environment free from any hazards. There could completely mitigate this impact.

No.	Impact	Mitigation	Responsibility	Time Frame	Significant Rating of Impact After Mitigation	Comment on the overall assessment and conclusion
		• Containers for waste to ensure that any fluids generated by waste are trapped and can be disposed of in a suitable				
8.	**Hazardous Substances:**	• Hazardous materials to be stored correctly, marked, labelled, without the risk of contamination and hazardous waste to be disposed of correctly with the necessary certificates issued. • All oils, hydraulic fluids and other hazardous materials will be stored in suitable containers in a structure or facility designated for this purpose. • Material Safety Data Sheets (MSDSs) shall be readily available on site for all chemicals and hazardous substances to be used on site. • Storage areas containing hazardous substances must be clearly signed and the designated person contact, and names should be displayed. • Residents living adjacent to the construction site must be notified of the existence of the hazardous storage area. • Staff dealing with these materials/substances must be aware of their potential impacts and follow the appropriate safety measures.	Contractor in co-operation with ECO. Contractor	During construction	Low	Employees dealing with hazardous substances should be trained and be competent to do so. This could completely mitigate reduce the risk posed by this impact.
9.	**Vehicle Maintenance & Refuelling:**	• Vehicle maintenance and equipment handling to be carried out in areas especially equipped for this purpose in order to prevent spillage and contamination. • All oil changes, lubrication and maintenance will take place only at the designated areas. Refueling of vehicles will and must take place at the designated refueling area. This area will have a sufficiently impermeable surface to prevent seepage into ground water. The refueling area will be bounded to prevent any surface water from running over this area	Contractor	During construction	Low	The impact should be completely mitigated or reduced form posing danger to the environment.
10.	**Visual impacts:**	• Waste (construction and domestic) must be disposed of in a proper manner and not allowed to be strewn around on site and surrounding areas. • Storage facilities elevated tanks and other temporary structures on site should be located such that they have as little visual impact on residents as possible. • Special attention should be given to the screening of highly reflective materials on site. • The soil extracted from the furrows should be dumped in a designated area.	Contractor.	During construction	Low	The current existing area will be less impacted visually.
11.	**Flora and fauna:**	• No endemic flora and fauna species will be deliberately destroyed or permanent alienated from their natural habitat during construction. • Excavations left open during construction should be checked periodically such that animals falling in can be safely removed and released away from construction activities. All excavations should be filled as soon as possible. • Construction staff should be advised not to chase, kill or catch animals found or encountered during construction. • Only vegetation falling in directly in demarcated in operational area should be removed where necessary. • No exotic/invasive plants are to be planted on common ground of the site. No	Contractor and ECO.	During construction	Low	Identified indigenous plants and species existing in the area will be protected by all means.

No.	Impact	Mitigation	Responsibility	Time Frame	Significant Rating of Impact After Mitigation	Comment on the overall assessment and conclusion
		vegetation will be removed without prior permission from ECO.				
12.	**Maintenance of access roads:**	• Access roads to be maintained with an acceptable surface, free of erosion and no surface water ponding. All access routes will be planned to make optimal use of existing roads.	Contractor maintains roads.	During construction & maintenance phase.	Low	The roads will be in good condition and safe.
13.	**Labour force:**	• Laborers to be restricted to construction area. • Access to the site should be restricted to employees of the contractor. • Temporary ablution facilities to be provided at appropriate sites (one toilet for 14 laborers). • Such ablution facilities to be kept away from natural water bodies. • Cooking facilities to be provided in demarcated areas. • All informal traders to be discouraged. • All labor will undergo basic induction, where safety, health and environmentally issues will be discussed. • Construction staff should be educated, prior to commencement of construction, as to the need to refrain from destruction or killing of animals and plants, as well as from indiscriminate defecation, waste disposal and / or pollution of local soil and water sources. • The contractor should ensure proper supervision of employees at all times.	Contractor to identify suitable areas for the said facilities. Contractor to maintain the above facilities.	During construction	Not applicable	Skills and knowledge should be gained by these employees who assist in building local communities.
14.	**Temporary jobs:**	• Local labor and contractors must be used wherever possible. Basic skills development and capacity development must be incorporated with this. It will be a specific condition in the contractors' agreements that local labor be used wherever possible. All reasonable attempts will be made to appoint people from the local communities as temporary laborers for non- specialize tasks and they will be subject to the necessary basic skills training.	Contractor	During construction	Low	Local laborers should be given priorities.
15.	**Construction Workers:**	The following restriction will be placed on the construction workers: • No use of wetland areas, rivers or dams for washing; • No collection of sand for construction purposes; • No indiscriminate disposal of rubbish, construction waste; • No collection of firewood; • No damage to vegetation; • No use of open field as toilet facility; • No burning of waste and cleared vegetation.	Contractor	During construction	Low	If construction workers could be well managed and given induction that will include HIV awareness that should assist in alleviating the impact that could result from the workers.
16.	**Fire protection:**	• Contractor must make sure that there is supervision for all fires that are used in the construction camp. • Smoking should be prohibited in the vicinity of flammable substances. The contractor should ensure that fire- fighting equipment is available on site, where flammable substances are stored. • Fires started for comfort(warmth) should be discouraged by the contractor, due to the risk of vegetation fires and risk to adjacent property • Fire-fighting equipment and emergency plans must be in place prior to the	Contractor	During construction	Low	Every public structure has to have fire prevention measures in place the presence of this facility is a necessity.

No.	Impact	Mitigation	Responsibility	Time Frame	Significant Rating of Impact After Mitigation	Comment on the overall assessment and conclusion
		construction phase. • The contractor will plan and implement a fire prevention program and develop a contingency plan in the event of any fire. • No refuse or waste may be burn. • The contractor will be responsible for all damages caused by the outbreak of a fire originating from a site where work is undertaken. Damage to adjacent properties will be to his account. • areas where fire risks will be minimized and controllable				
17.	**Environmental complaint register to be maintained:**	• All complaints with regards to environmental non-compliance on the construction site need to be recorded and addressed accordingly. Address complaints timorously and report back to the ECO.	The Site Manager (Contacts Manager) Will be responsible for maintaining the register and reporting any complaints received to the ECO.	During construction phase	Not applicable	In order to keep trace of any compliance or non-compliance acts on the site register is required.
22.	**Storm water runoff:**	• To prevent storm water damage, the increase in storm water run-off resulting from construction activities must be estimated and the drainage systems assessed accordingly. • A drainage plan must be submitted to the Engineer for approval and must include the location and design criteria of any temporary stream crossing. All storm water runoff from compacted materials must be monitored if signs of erosion become apparent.	Contractor	During construction	Low	This should be able to address soil erosion as well as the design of the site should have appropriate storm water management as well as drainage system that should have oil trap/ filters if necessary.

8 MITIGATION MEASURES FROM THE ECOLOGICAL SPECIALIST

Table 7: Ecological mitigation measures for the Water pipeline Replacement

PROJECT DEVELOPMENT PHASE	POTENTIAL IMPACT AND/OR ASPECT	MITIGATION	RESPONSIBILITY
Replacement and Operation	• Poor waste management by service personnel for the pipeline resulting in littering of some places especially at control points and site offices where all activities will be centred; • Soil contamination from use of hydrocarbons on site as well as on active sites; and • Unattended leakages leading to invasive plant encroachment and attraction of scavenger animals esp. at link points or manholes;	• Workers environmental awareness on waste management will assist significantly; • Municipality and ECO to monitor the site frequently; • Ensure reported leaks are attended to as quickly as possible.;	Contractor
Operation Phase	• Waste management from service crew can choke the buffer zone systems as well attracting scavenging animals like birds, rats and dogs to the campsites as well; • Increased possibilities of having uncontrolled sprouting of invasive plant species due to traffic movement to site esp. manholes which considered breathing points for piped liquid as well as checkpoints or link points.	• Ensure that waste management services are provided to service crew men. Safety Health and Environmental (SHE) representative to assist in ensuring service areas are clear from litter and other kinds of waste before moving to the next station; and • Mark the existing invasive plant species for destruction on a continuous process via use of a monitoring plan.	Contractor

8.1 Management Objectives and Measurable Targets for the Proposed Development site.

The below management of identified impacts and measurable targets are similar to those identified during construction therefore the information below is a summary of management of these impacts which is in essence mitigation measures. The method used is the same and the information will not vary.

8.1.1 Physical issues: Objectives and Measurable targets.

8.1.1.1 Access roads

Objectives

- Minimise damage to existing access roads
- Minimise damage to environment due to construction and rehabilitation of new access roads
- Minimise loss of topsoil and enhancement of erosion

Measurable Targets

- No claims due to damage on existing access roads
- No visible erosion on access roads six months after completion of construction
- No loss of topsoil due to runoff water on access roads

8.1.1.2 Rumble and Refuse Disposal

Objectives

- To keep the site servitude neat and clean
- Disposal of rubble and refuse in an appropriate manner
- Minimise litigation
- Minimise Landowner complaints

Measurable targets

- No rubble or refuse lying around on site
- No incidents of litigation
- No complaints from Landowners
- No visible concrete spillage on the servitude

8.1.1.3 Fire prevention

Objectives

- Minimise risk of veld fires
- Prevent runaway fires

Measurable targets

- No veld fires started by the Contractor's work force
- No claims from Landowners for damages due to veld fires
- No litigation

8.1.1.4 Servicing of Vehicles

Objectives

- Prevention of pollution of the environment
- Minimise chances of transgression of the acts controlling pollution

Measurable targets

- No pollution of the environment
- No litigation due to transgression of pollution control acts
- No complaints from Landowners

8.1.1.5 Claims for damages

Objectives

- Minimise complaints from Landowners
- Prevent litigation due to outstanding claims
- Successful completion of the contract and all Landowners signing release forms

Measurable targets

- All claims investigated and settled within one month
- No litigation due to unsettled claims
- All Landowners signing release forms within six months after completion of the contract

8.1.1.6 Clearance of vegetation

Vegetation clearing shall be done in accordance with the Vegetation Management Guideline. Only an 8m strip may be cleared flush with the ground to allow vehicular passage during construction. No scalping shall be allowed on any part of the servitude road unless necessary. The removal of all economically valuable trees or vegetation shall be negotiated with the Landowner before such vegetation is removed. No vegetation shall be pushed into heaps or left lying all over the servitude. Protected or endangered species of plants shall not be removed unless they are interfering with a structure. Where such species must be removed due to interference with a structure, the necessary permission and permits shall be obtained from Provincial Nature Conservation. All protected species not to be removed must be clearly marked and such areas fenced off if required.

It is recommended that a contractor for vegetation clearing should comply with the following parameters:

- The contractor must have the necessary knowledge to be able to identify protected species as well as species not to be interfering with;
- The operation of the line due to their height and growth rate;
- The contractor must also be able to identify declared weeds and alien species that can be totally eradicated; and
- The contractor must be in possession of a valid herbicide applicators license.

Objectives

- Minimise damage to vegetation
- Keep servitude as natural looking as possible
- Minimise interference by vegetation to flow of electricity
- Minimise possibility of erosion due to removal of vegetation
- Minimise removal of plant material on river and stream embankments
- Eradication of alien invader and densifier species that cause a fire hazard

Measurable targets

- No vegetation interfering with structures and statutory safety requirements upon completion of the contract
- No de-stumping of vegetation on river and stream embankments
- All alien invaders and densifiers removed to limit the fire hazard
- No visible herbicide damage to the vegetation along the servitude one year after completion of the contract due to incorrect herbicide use
- No litigation due to unauthorised removal of vegetation

8.1.2 Social issues: Objectives and Measurable targets.

8.1.2.1 Sanitation

The Contractor shall install mobile chemical toilets on site. Staff shall be sensitized to the fact that they should always use these toilets. No use of the veld shall be allowed, as this always creates problems with the landowners and may lead to claims for problems with stock diseases. Toilet paper is also a source of littering, and the Contractor shall be forced to clean up any litter.

Objectives

- Ensure that proper sanitation is achieved

Management objectives

- No complaints received from Landowners regarding sanitation

8.1.2.2 Interaction with adjacent landowners

The successful completion of the project depends a lot on the good relations with the adjacent landowners. It is therefore required that the Contractor will supply one person to be the liaison officer for the entire contract, and that this person shall be available to investigate all problems arising on the work sites concerning adjacent landowners. All negotiations for any reason shall be between the Department of Local Government and Housing, the landowners, and the Contractor. No verbal agreements shall be made. All agreements shall be recorded properly, and all parties shall co-sign the documentation. It is proposed that a photographic record of access roads be kept. This will then be available should any claims be instituted by any Landowners. Any claims instituted by the Landowners shall be investigated and treated promptly. Unnecessary delays should be avoided at all costs.

The Landowners shall always be kept informed about any changes to the construction program should they be involved. If Environmental Control Officer is not on site the project manager should keep the Landowners informed. The contact numbers of the Contractor's ECO officer shall be made available to the Landowners. This will ensure open channels of communication and prompt response to queries and claims. All contact with the Landowners shall be courteous at all times. The rights of the Landowners shall be respected at all times and all staff shall be sensitized to the effect that we are working on surrounding of private property.

Objectives

- Maintain good relations with Landowners

Management Objectives

- No delays in the project due to Landowner interference

- Landowner signs final release form

8.1.2.3 Littering

Objectives

- Neat workplace and site

Management objectives

- No complaints regarding littering

9 ECOLOGICAL MANAGEMENT PLAN

The water pipeline replacement project if properly managed will have almost insignificant impacts to the existing project buffer zone of 15m from main line sides ecosystem especially during operation. In most cases, ecological management plans are designed for once off projects, it would be advisable to develop an ecological monitoring schedule and/or system to frequently check and advice on the condition of the ecologically sensitive parts within the peripheries of the project for instance water quality of the waterway and drainage system

10 REHABILITATION PLAN

As for rehabilitation, this activity should not wait until operational stage of the project but should continue as a concurrent activity from construction stage right through to operation. This stage is mainly meant to ensure that as the construction process will be taking place, there will be minimum impacts on the environment till the operational stage. After each stage of construction, the affected area should therefore be cleared of waste and if heavily compacted, it must be ripped, and a seed-mix is broadcast on top to allow regeneration (secondary succession) the area should also drain to minimise stagnation of water during operation. The above sensitivity maps will assist significantly when trying to identify the zones which should not be impacted by both replacement and operational activities.

The riparian area is a sensitive habitat for sensitive species, there proper handling of such is of uttermost importance during all stages of the project. Flood lines should also not be affected in this instance.

In real terms, all affected areas within project development site should be rehabilitated to suit the original state before development thus to blend the new environment with the old and surrounding environs. The project budget under most cases includes the rehabilitation planning and costs. This report defines rehabilitation as the reinstatement of the temporarily disturbed areas affected by project development and in this case “construction or construction related activities” to a state that resemble the conditions prior to the disturbances. The ECO will also assist in identifying other areas that might require rehabilitation and include them during the

process so as to ensure that all the footprints (external) caused by the project are addressed. These additional points will definitely affect budget and should be expected, therefore when planning for every development, the rehabilitation related costs should be flexible.

It is highly recommended that rehabilitation around the construction footprint takes place immediately after disturbances in order to limit detrimental effects resulting from for example, rainfall events after removal or clearing of the existing material especially storm-water drainage towards the existing stream. They are supposed to blend well with the existing ecological buffer of the area as proposed in the above chapters or sub-sections. It is therefore imperative that rehabilitation of disturbed areas takes places after each construction phase. This will minimise costs and time at the end.

The final stage of rehabilitation requires that local and/or indigenous plant species be planted to enable the area to naturally recover (natural succession) as well as blending with the already existing natural vegetation for the area. Sloping areas will be terraced or benched and top-soil covered (at least 30cm) to assist in encouraging natural growth of plants, a local agricultural expert will be consulted to assist in the determination of what plant species seed-mix should be applied. Proper care and maintenance should therefore be done with independent supervision from the ECO. Monitoring of the rehabilitation process from each phase should be emphasised and the ECO should assist with the blending mechanisms as promulgated in this report. The table below lists the rehabilitation measures that should be undertaken when monitoring post-construction with corrective actions. Please note that each impact is followed by the corrective measure which in this instance is the rehabilitation and the time frames will act as a guide, which can be altered depending on the on-site activities.

Table 8: Impact Related Rehabilitation Plan Table for the Water Pipeline Replacement Project

IMPACT	REHABILITATION MEASURES	TIME FRAME
Compacted Surfaces (at link points)	• Clear the affected area of waste materials (debris, litter etc), please note that the material should be disposed of properly, put topsoil that would have been cleared at start; • The topsoil filled area should be ripped in a way to allow plant regeneration; and • All cement contaminated soil should be removed from site for safe disposal so as to minimise the panning of the affected soil.	• Immediately after each manhole station is perfected to acceptable standard and • As and when monitoring indicates degradation of the footprint area for the project.
Pollutants release during service and construction: (construction activity can expose hydrocarbons to surface and groundwater resources)	• In case of emergencies or unforeseen events, the problem must be remediated immediately and any spillage into the ground should be cleared to the satisfaction of the ECO; and • Remove all project-related material / support equipment immediately on completion of any of the construction phases. Drip trays and spill kits to be part of the soil contamination amelioration and should be on site all the time.	• Immediately after a construction phase; • Anytime during operational phase of the project, especially when maintenance activities might have resulted in pollution.
Invasive and alien species spreading:	• Appoint a specialist in invasive species control, eradication, management and monitoring and identified invasive species should be removed prior to construction related soil disturbances. This will prevent seed spreading into disturbed soils; • Mechanical removal is the most preferred control mechanism using machinery depending on how congested the area is and this should be a continuous programme, biological eradication mechanisms will also work but this requires an ecological specialist for population blooming management; and • A register of the methods used, dates undertaken, as well as herbicides (if used) and dosage used must be kept and available on site. The register must also include incidents of poisoning or spillage.	• Immediately after project commissioning and during progression of the project; and • Should be an on-going process.

11 GENERAL

This EMPr will be accepted by the applicant and its appointed representatives such as engineers, contractors, architects, and project managers will be represented by their signatures herein under. All conditions and recommendations will be implemented, and the necessary records kept for referral

Appendix 6: Public Participation Process

Appendix 6A: Newspaper Advert

Legals

Legals@citizen.co.za

Building , 140 Pretorius ST, Pretoria, Pretoria,0002 within 2 (Two) weeks from the date of the publication of this notice. Objection if any to be addressed to: Suite 4, 1st floor, Russells Building, No 54 President Kruger Street Vanderbijlpark Tel: 016 931 0982 / 78 Our Ref: Mashaba /Hartzenburg Kind Regards MOKI ATTORNEYS

BH007995

SYMINGTON DE KOK ATTORNEYS

Julies IL & I (T1061/1997)
LOST OR DESTROYED DEED
Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of Deed of Transfer Nr T1061/1997 passed by Reder Agencies CC, Registration Number: CK1993 /26002/23, in favour of Israel Levy Julies, Identity Number: 681217 5238 015 and Ida Julies, Identity Number: 720811 0059 088, Married in community of property to each other, in respect of certain Portion 4 of Erf 4443 Heidedal, Extension 10, district Bloemfontein, Province Free State, which has been lost or destroyed. All interested persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds at BLOEMFONTEIN, 85 Nelson Mandela Drive, Westdene, Bloemfontein, within two weeks from the date of publication of this notice. DATED AT BLOEMFONTEIN ON THIS 7th DAY OF APRIL 2022. Applicant Symington de Kok Per: Natalie Wolmarans (LPCM - 59405) Address: 169b Nelson Mandela Drive, Westdene, Bloemfontein, 9301 E-mail address: nwolmarans@symok.co.za Contact number: 051 505 6703.

KP065110

NKOPANE M M (T65636 /2006)
Lost or destroyed deed
Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act , 1937, of the intention to apply for the issue of a certified copy of T65636 /2006 passed by MERBUILD PTY LTD favour of MASEBOLELO MAVIS NKOPANE Identity number:630304 0473 086 in respect of certain ERF 4902 LAKESIDE EXTENSION 2 TOWNSHIP which has been lost or destroyed.
All interested persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds at PRETORIA within two weeks from date of the publication of this notice.
DATED AT EDENVALE THIS 10th MAY 2022.
APPLICANT
MASEBOLELO MAVIS NKOPANE
IDENTITY NUMBER:630304 0473 086
ADDRESS:DMB ATTORNEYS,139-10TH AVENUE, EDENVALE 1609, EMAIL:admin@dmbattorneys.co.za
Contact number:011 392 5583

NW030225

Lauret Villas Section 23 (ST56/2015(23)(UNIT))
LOST OR DESTROYED DEED
Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of CERTIFICATE OF REGISTERED SECTIONAL TITLE Number ST56/2015 (23)(UNIT) in the name of WHIRLAWAY TRADING 297 CC, Registration Number : 2003/026481/23 in respect of certain SECTION 23 IN THE SCHEME KNOWN AS LAURET VILLAS SITUATE AT GREENHILLS EXTENSION 3 TOWNSHIP, LOCAL AUTHORITY : RAND WEST CITY LOCAL MUNICIPALITY which has been lost or destroyed. All interested persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds Office Information Section, Mezzanine Floor, 2208-212 Marble Towers, Cnr Von Weilligh & Pritchard Streets, Johannesburg, within two weeks from the date of the publication of this notice. Dated at RANDFONTEIN on this 12th day of MAY 2022. Applicant - WHIRLAWAY TRADING 297 CC c/o Dykes & Nel Attorneys, 15 Ontdekkers Road ROODEPOORT Phone - 011 664-8188 : ZLR/B1091

BH008072

Mawela EK (T54209/1997)
LOST OR DESTROYED DEED
Notice is hereby given in terms of regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of DEED OF TRANSFER NUMBER T54209 /1997 passed by JOHANNESBURG in favour of the late EPHRAIM KOMSASA MAWELA (estate number 2510 /2010) in respect of certain ERF 20878 TSAKANE EXTENSION 11 TOWNSHIP which has been lost or destroyed. All interested persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deed at Pretoria within two weeks from the date of publication of this notice. Dated at this Day of NONKOSI SYBLE SHEMBE (REPRESENTATIVE) Address: 92, 4TH STREET, SPRINGS E-mail address: nkm.springs@gmail.com Contact number:0118153281

BH007893

OTTO H (T090010/2007)
NOTICE OF APPLICATION TO APPLY FOR A CERTIFIED COPY OF A LOST OR DESTROYED DEED Notice is hereby given in terms of Regulation 68 of the Deeds Registries Act, 1937, of the intention of the Executor in the Estate Late Hermann Otto (Master`s reference 014955 /2016) to apply for the issue of a certified copy of Deed of Transfer Number T090010 /2007 passed by Strub-SA CC in favour of Hermann Otto ID No. 460403 5530 18 2 in respect of certain The Farm Weltevreden 618, Registration Division L.Q., The Limpopo Province which has been lost or destroyed. All interested persons having objection to the issue of such copy are hereby required to lodge same in writing with the REGISTRAR OF DEEDS LIMPOPO at POLOKWANE at 101 Dorp Street, Polokwane Central, Polokwane within two weeks from the date of the publication of this notice. Dated at JOHANNESBURG this day of MAY 2022. Applicant Nishandrin Govender In his capacity as Executor in the Estate Late Hermann Otto c/o Chunilal and Tanna Attorneys First Floor, Central House 69 8th Avenue Mayfair Johannesburg c-t@global.co.za estates@global.co.za 011 839 4357

BH008071

Peacock LD (T50868/1994)
NOTICE OF INTENTION TO APPLY FOR A CERTIFIED COPY OF A TITLE DEED: Application in terms of Regulation 68(1) of the Deeds Registries Act 47 of 1937 for the issuing of a certified copy of the Title Deed T50868/1994: LINDSEY DAWN PEACOCK (formerly known as PRETORIUS) Identity Number 610412 0033 08 3 Married out of Community of Property Whereas the Transferor had truly and legally sold the undermentioned property on 3 April 2022 by Private Treaty Now therefore the Appearer on behalf of the Transferor, did by these presents, cede and transfer to and on behalf of 1. JASON HORSWILL Identity Number 891016 5110 08 3 Married out of Community of Property 2. ANELIZIA JEAN-MARI KRUGER Identity Number 931209 0159 08 8 Married out of Community of Property their heirs, executors, administrators or assigns, in full and free property ERF 51 HOMESTEAD TOWNSHIP, REGISTRATION DIVISION IR, PROVINCE OF GAUTENG MEASURING 714 (SEVEN HUNDRED AND FOURTEEN) SQUARE METRES HELD BY DEED OF TRANSFER T50868 /1994 Which has been lost or destroyed. Registrar of Deeds at Johannesburg, situated at Deeds Office Information Section, Mezzanine Floor, 208-212 Marble Towers Building, c /n Von Weilligh and Pritchard Street, Johannesburg For any objections, contact: Kruger Attorneys and Conveyancers Inc. 284 Oak Avenue, Randburg, 2194 PO Box 4801, Randburg, 2125 makhuvele@krugerincorporated.co.za 010 443 4373.

KP065122

POTGIETER J A & C (T75594 /2021)
NOTICE IN TERMS OF REGULATION 68(1) OF THE DEEDS REGISTRIES ACT, 1937 (No. 47 OF 1937)
Notice is hereby given in terms of regulation 68(1) of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of Deed of Transfer Number T75594/2021 dated 22 October 2021 in favour of JAN ABRAHAM POTGIETER, Identity Number 9012155039080, Married out of community of property AND CARLA POTGIETER, Identity Number: 8908280006087, Married out of community of property in respect of ERF 1306 CELTISDAL EXTENSION 61 TOWNSHIP REGISTRATION DIVISION JR, PROVINCE OF GAUTENG MEASURING 1000 (ONE THOUSAND) Square metres Held by Deed of Transfer Number T75594/2021, which has been lost or destroyed.
All interested persons having objection to issue copy are hereby required to lodge the same in writing with the Registrar of Deeds at Pretoria, Deeds Office Information Section, Merino Building, 140 Pretorius Street, Pretoria Central, Pretoria, 0002, within two weeks from date of the publication of this notice.
DATED at Pretoria on this 13TH OF MAY 2022.
KRUGER & CO INCORPORATED ATTORNEYS & CONVEYANCERS THE CORNER OFFICE, CNR LYNNWOOD & ROSEMARY RD MENLO PARK PRETORIA TEL: 012 035 0366 REF: NE BURGER / L107

NW030241

ROODT CJ (T79544/1992)
LOST OR DESTROYED DEED
Notice is hereby given in terms of regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of DEED OF TRANSFER NR T79544/1992 passed by CASPER JOHANNES ROODT Identity Number 501002 5100 08 6 Married out of community of property in favour of CASPER JOHANNES ROODT Identity Number 501002 5100 08 6 Married out of community of property in respect of certain ERF 795 RAYTON EXTENSION 1 TOWNSHIP REGISTRATION DIVISION J.R GAUTENG PROVINCE which has been lost or destroyed. All persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds at PRETORIA within two weeks after the date of the publication of this notice. Dated at PRETORIA on 12 MAY 2022 Applicant Address: 222 Burger Street, Pretoria North E-mail address: liezl@vandykattorneys.co.za Contact number: 012 565 6431

BH008086

The Trustees for the time being of SMITH PROPERTY TRUST (ST178237/2004)
LOST OR DESTROYED TITLE DEED
Notice is hereby given in terms of regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of ST178237 /2004 dated 20 December 2004 passed by: STEPHANUS WILLEM DU TOIT Identity Number 260829 5014 08 6 Married out of community of property in favour of The Trustees for the time being of SMITH PROPERTY TRUST Nr IT297/2004 in respect of certain A Unit consisting of (a)Section No. 28 as shown and more fully described on Sectional Plan No SS 406/99 in the scheme known as EAGLES NEST in respect of the land and building or buildings situated at MIDDELBURG TOWNSHIP, LOCAL MUNICIPALITY: STEVE TSHWETE LOCAL MUNICIPALITY, of which section the floor area, according to the said sectional plan is 73 (Seventy Three) square metres in extent and (b)An undivided share in the common property in the scheme apportioned to the said section in accordance with the participation quota as endorsed on the said sectional plan. which has been lost or destroyed. All interested persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds Mpumalanga at Nelspruit, situated at 25 Bell Street Nelspruit, within two weeks from the date of the publication of this notice. Dated at Middelburg this 12th day of APRIL 2022 Applicant: KRUGER & BEKKER ATTORNEYS Address: 32 WALTER SISULU STREET, MIDDELBURG, MPUMALANGA E-mail address: bonds@krugerbekker.co.za Contact Number: 013 282 4880 IZELLE BEKKER

BH008056

Van Der Walt C & T N J (ST124616/2004)
LOST OR DESTROYED DEED
LOST OR DESTROYED DEED Notice is hereby given in terms of regulation 68 of the Deeds Registries Act, 1937, of the intention to apply for the issue of a certified copy of DEED OF TRANSFER ST124616/2004 passed by ERF 527 NINAPARK BK REGISTRATONA NUMBER 1989/035622/23 in favour of CORNELIUS VAN DER WALT IDENTITY NUMBER 6307305071089 MARRIED OUT OF COMMUNITY OF PROPERTY AND TJAART NICOLAAS JACOBUS VAN DER WALT IDENTITY NUMBER 9510255126083 MARRIED OUT OF COMMUNITY OF PROPERTY in respect of certain A Unit consisting of (a)Section No. 18 as shown and more fully described on Sectional Plan No SS 705/2004 in the scheme known as BERGHANG F1 in respect of the land and building or buildings situated at ERF 1004 NINAPARK EXTENSION 33 TOWNSHIP; LOCAL AUTHORITY; CITY OF TSHWANE METROPOLITAN MUNICIPALITY, of which section the floor area, according to the said sectional plan is 72 (Seventy Two) square metres in extent and (b)An undivided share in the common property in the scheme apportioned to the said section in accordance with the participation quota as endorsed on the said sectional plan. which has been lost or destroyed. All interested persons having objection to the issue of such copy are hereby required to lodge the same in writing with the Registrar of Deeds Office Information Section Merino Building, 140 Pretorius Street Pretoria within two weeks from the date of the publication of this notice. Applicant:GERNEKE & POTGIETER ATTORNEY Address:307 DANIE THERON STREET PRETORIA NORTH 0182 E-mail address:e.steenkamp@mweb.co.za Contact number:012-546 3407 REFERENCE LV0209

JD054158

MUNICIPAL NOTICE

80 GENERAL

EMBALENHLE
NOTICE IS HEREBY GIVEN IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998) IN ACCORDANCE WITH THE AMENDED 2014 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS (2017) (GOVERNMENT NOTICE NO. 983 & 985): INTENT IS TO CARRY OUT THE ENVIRONMENTAL ASSESSMENT PROCESS FOR THE PROPOSED UPGRADING OF WATER PIPELINE IN EMBALENHLE GOVAN MBEKI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE Basic Assessment Process The proposed developments trigger activities listed under Listing Notice 3 (No. R. 985) of the amended EIA Regulations published under the National Environmental Management Act, 1998 (Act No. 107 of 1998) in terms of section 24(2) and 24D. This requires Govan Mbeki Local Municipality to obtain environmental authorisation from the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA) for consideration and decision-making via the undertaking of a Basic Assessment prior to commencing with listed activities as mentioned above Project Location The project area is located in Embalenhle, Govan Mbeki Local Municipality in Mpumalanga. Invitation to Participate To register as an Interested and/or Affected Party and to obtain further information related to the proposed development, please contact the Public Participation Office within 30 days from the date of publication of this notice. Availability of Draft Basic Assessment Reports The draft reports are now available and can be requested from NKT Consulting at the contact details below should you need a soft copy or hard copy couriered to you. NKT CONSULTING SERVICES (PTY) LTD Contact Person: Charles Tel: 073 565 8847 E-mail: info@nktconsulting.co.za.

KP065121

Appendix 6B: List of I&APs

Appendix 6C: Draft Report Circulation

Appendix 6D: Site Notice

NOTICE IS HEREBY GIVEN IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998) IN ACCORDANCE WITH THE AMENDED 2014 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS (2017) (GOVERNMENT NOTICE NO. 983 & 985): INTENT IS TO CARRY OUT THE ENVIRONMENTAL ASSESSMENT PROCESS FOR THE PROPOSED UPGRADING OF WATER PIPELINE IN EMBALENHLE GOVAN MBEKI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

Basic Assessment Process

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Project Location

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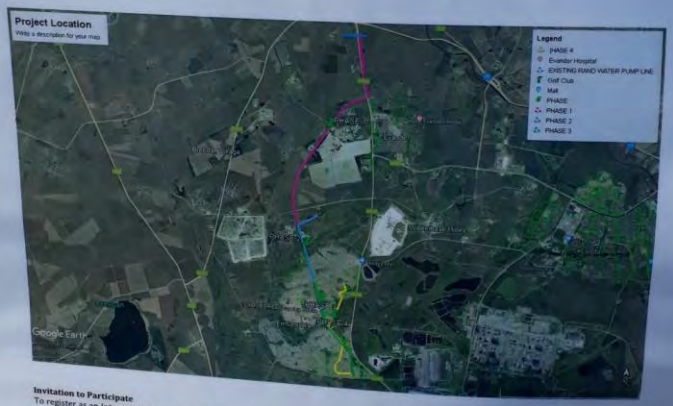

Invitation to Participate
To register as an Interested and/or Affected Party and to obtain further information related to the proposed development, please contact the Public Participation Office within **30 days from the 2nd of June 2022**.

Availability of Draft Basic Assessment Reports

The draft reports are now available and can be requested from NKT Consulting at the contact details below should you need a soft copy or hard copy couriered to you.

NKT CONSULTING SERVICES (PTY) LTD
Contact Person: Charles
Tel: 073 565 8847
E-mail: info@nktconsulting.co.za

NOTICE IS HEREBY GIVEN IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT NO. 107 OF 1998) IN ACCORDANCE WITH THE AMENDED 2014 ENVIRONMENTAL IMPACT ASSESSMENT (EIA) REGULATIONS (2017) (GOVERNMENT NOTICE NO. 983 & 985): INTENT IS TO CARRY OUT THE ENVIRONMENTAL ASSESSMENT PROCESS FOR THE PROPOSED UPGRADING OF WATER PIPELINE IN EMBALENHLE GOVAN MBEKI LOCAL MUNICIPALITY, MPUMALANGA PROVINCE

Basic Assessment Process

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Contact Person: Charles
Tel: 073 565 8847
E-mail: info@nktconsulting.co.za

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Contact Person: Charles
Tel: 073 565 8847
E-mail: info@nktconsulting.co.za

NKT CONSULTING SERVICES

Appendix 6E: Comments Received

Appendix 6F: Comments and Response Report

Appendix 7: SAHRA Correspondence