ESKOM HOLDINGS SOC LIMITED

PROPOSED CONSTRUCTION OF MAKE-UP AND RAW WATER SUPPLY PIPELINE AT THE MEDUPI COAL FIRED POWER STATION

FINAL BASIC ASSESSMENT REPORT, DEA REF: 14/12/16/3/3/1/2028

21 JUNE 2019

PUBLIC

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ESKOM HOLDINGS SOC LIMITED

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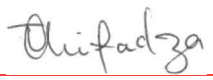
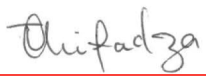
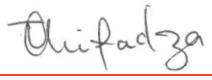
Signature				
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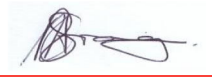
Signature				
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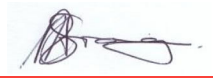
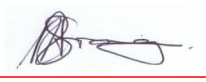
Signature				
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This Final Basic Assessment Report (Report) for the Proposed Construction of a Make-up and Raw Water Supply Pipeline at the Medupi Coal Fired Power Station has been prepared by WSP Environmental Proprietary Limited (WSP) on behalf and at the request of the Eskom Holdings SOC Ltd (Client), as part of the application process for Environmental Authorisation.

Unless otherwise agreed by us in writing, we do not accept responsibility or legal liability to any person other than the Client for the contents of, or any omissions from, this Report.

To prepare this Report, we have reviewed only the documents and information provided to us by the Client or any third parties directed to provide information and documents to us by the Client. We have not reviewed any other documents in relation to this Report, except where otherwise indicated in the Report.

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GLOSSARY

ABBREVIATION	MEANING
BA	Basic Assessment
BAR	Basic Assessment Report
BEC	Bathusi Environmental Consulting
C-Plan	Conservation Plan
CBA	Critical Biodiversity Area
CO	Carbon Monoxide
CRR	Comment and Response Report
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EI	Ecological Importance
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ES	Ecological Sensitivity
ESA	Ecological Support Area
FGD	Flue Gas Desulphurisation
GA	General Authorisation
HGM	Hydro-geomorphic
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
LLM	Lephalale Local Municipality

ABBREVIATION	MEANING
MCWAP-2	Mokolo Crocodile Water Augmentation Project – Phase 2
MSA	Middle Stone Age
MW	MegaWatt
NAAQS	National Ambient Air Quality Standards
NB	Nominal Bore
NEMA	National Environmental Management Act
NEM:WA	National Environmental Management: Waste Act
NFEPA	National Freshwater Ecosystem Priority Areas
NHRA	National Heritage Resource Act
NKP	National Key Point
NPAES	National Protected Areas Expansion Strategy
NSR	Noise Sensitive Receptors
NSS	Natural Scientific Services
PCD	Pollution Control Dam
PES	Present Ecological State
SAHRA	South African Heritage Resources Agency
TFR	Transnet Freight Rail
TIA	Traffic Impact Assessment
WBPA	Waterberg-Bojanala Priority Area
WDM	Waterberg District Municipality
WMA	Water Management Area
WML	Waste Management License
WRCS	Water Resource Classification System

ABBREVIATION	MEANING
WSP	WSP Environmental (Pty) Ltd
WUL	Water Use License

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A-1 Ashlea Strong

A-2 Tutayi Chifadza

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A-4 Andrew Husted

A-5 Len van Schalkwyk

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1 INTRODUCTION

1.1 BACKGROUND AND TERMS OF REFERENCE

Eskom Holdings SOC Limited (Eskom) proposes to construct a make-up and raw water supply pipeline at the Medupi Coal Fired Power Station on farms Naauw Ontkomen 509 LQ, Portion 0 and Kuipersbult 511 LQ, Portion 0, in Lephalale, Ward 2, Lephalale Local Municipality, Limpopo.

The proposed pipeline requires an environmental authorisation (EA) in terms of the National Environmental Management Act (Act 107 of 1998), as amended (NEMA) and the associated Environmental Impact Assessment (EIA) Regulations, 2014 as amended. WSP Environmental (Pty) Ltd (WSP) was appointed by Eskom as the independent Environmental Assessment Practitioner (EAP) to facilitate the Basic Assessment (BA) process in accordance with the EIA Regulations, 2014, as amended.

Medupi Power Station is being constructed with installation of Flue Gas Desulphurisation (FGD) system, to manage sulphur dioxide (SO_2) emissions, to each of the six 800 MegaWatt (MW) coal fired steam electric generating units. The FGD Project will result in the addition of wet limestone open spray tower FGD systems to each of the operating units. To support the FGD operation, substantial raw water is required, and this water will be supplied from the Mokolo Crocodile Water Augmentation Project – Phase 2 (MCWAP-2)[1]. The water will be provided through a project by the Department of Water and Sanitation (DWS), and Eskom was provided an offtake point for its Make-up water supply.

To deliver this additional water supply, Eskom proposes to construct a raw water supply pipeline of approximately 5 500 metres in length, in total, mostly within its premises at the Medupi Power Station.

The proposed pipeline will comprise two (2) segments:

- **Segment 1**: The first segment (raw water pipeline) will collect water from an offtake point of the MCWAP-2 pipeline on the north of the site. This pipeline will transfer water to Eskom's two holding reservoirs (Mokolo Water Reservoir or Crocodile West Water Reservoir). However, water will be taken primarily from the Crocodile West Water Reservoir.
- **Segment 2**: The second segment (FGD makeup water pipeline) of the pipeline water from the reservoirs and conveys it to the FGD Makeup Water Supply System. The function of the FGD Makeup Water Supply System will be to pre-treat and distribute makeup water from the holding reservoirs to the FGD Process Water Tanks and the Wastewater Treatment Plant. The existing raw water pump house has provision for a compartment for the FGD raw water pumps.

Figure 1-1 provides a locality map of the Medupi Power Station where the project will occur.

[1] Project is still in EA application phase with the DEA.

Figure 1-1: Medupi Power Station Locality Map

1.2 PURPOSE OF THE BA PROCESS

The BA process is an interdisciplinary procedure to ensure that environmental and social considerations are included in decisions regarding projects. Simply defined, the process aims to identify the possible environmental and social effects of a proposed activity and how those impacts can be mitigated. In the context of this report, the purpose of the BA process is to inform decision-makers and the public of potential negative and positive consequences of the proposed construction of the pipeline. This provides the competent authority sufficient information to make an informed decision with regards to granting or refusing the EA applied for.

1.3 DETAILS OF EAP AND PROJECT PROPONENT

WSP was appointed in the role of Independent EAP to undertake the BA processes for the proposed construction of the pipelines project. The CV of the EAP is available in **Appendix A-1**. The EAP declaration of interest and undertaking is included in **Appendix B**. **Table 1-1** details the relevant contact details of the EAP. In order to adequately identify and assess potential environmental impacts, the EAP was supported by a number of specialists. **Table 1-2** provides the relevant details of the project proponent.

Table 1-1: Details of the EAP

EAP	**WSP ENVIRONMENTAL (PTY) LTD**
Company Registration:	1995/08790/07
Contact Person:	Tutayi Chifadza

Postal Address:	P.O. Box 98867, Sloane Park 2151, Johannesburg
Telephone:	011 361 1390
Fax:	011 361 1301
Email:	Tutayi.Chifadza@wsp.com

Table 1-2: Details of Proponent

PROPONENT:	**ESKOM HOLDINGS SOC LIMITED**
Company Registration:	2002/015527/06
Contact Person:	Deidre Herbst
Physical Address:	Eskom Megawatt Park, 1 Maxwell Drive Sunninghill, Johannesburg, 2157
Telephone:	011 800 3501
Fax:	086 660 6092
Email:	HerbstDL@eskom.co.za

1.4 SPECIALISTS

Specialist input was required in support of this application for EA. The details of the specialists are provided in **Table 1-3** below. The Curriculum Vitae of the specialists are attached in **Appendix A** and their declarations in **Appendix B**.

Table 1-3: Details of Specialists

ASSESSMENT	NAME OF SPECIALIST	COMPANY	SECTIONS IN REPORT	SPECIALIST REPORT ATTACHED AS
Heritage Exemption Letter	Len van Schalkwyk	eThembeni Cultural Heritage	Section 6.9	**Appendix F-1**
Wetland Assessment	Zakariya Nakhooda	WSP	Section 6.3.4	**Appendix F-2**
Biodiversity Assessment	Andrew Husted, and Martinus Erasmus	The Biodiversity Company	Section 6.8	**Appendix F-3**

1.5 COMPETENT AND COMMENTING AUTHORITY

Table 1-4 provides the relevant details of the competent and commenting authorities on the project.

Table 1-4: Competent and Commenting Authorities

ASPECT	COMPETENT / COMMENTING AUTHORITY	CONTACT DETAILS
Competent Authority: Environmental Authorisation	Department of Environmental Affairs (DEA)	Integrated Environmental Authorisations Tel: 012 399 9388 Matlhodi Mogorosi (Case Officer) mmogorosi@environmental.gov.za
Commenting Authorities	Department of Environmental Affairs: Biodiversity Conservation Unit	Biodiversity Conservation Unit Tel: 012 399 9411 Portia Makitla Pmakitla@environment.gov.za
	South African Heritage Resource Agency (SAHRA)	Uploaded to SAHRA Website during public review period. No contact confirmed as SAHRA are yet to comment.
	Limpopo Department of Economic Development, Environment and Tourism (LEDET)	Tel: 015 293 8342 / 063 695 0760 M.E. Molepo MolepoME@ledet.gov.za
	Waterberg District Municipality	Tel: 014 718 3300 M.P. Sebatjane: Planning and Economic Development
	Lephalale Local Municipality	Tel: 014 762 1409 A.S. Naidoo Bob.naidoo@lephalale.gov.za
Water Use	Department of Water and Sanitation (DWS)	Deputy Director: Authorisation Administration Water Use Licence Applications Tel: 012 336 8851 Ndubanen@dwa.gov.za (Assessing officer to be confirmed)

1.6 BASIC ASSESSMENT REPORT STRUCTURE

The Final BAR (this report) was prepared to meet the requirements as described in Appendix 1 of GNR 326 of the NEMA EIA Regulations, 2014, as amended. To demonstrate legal compliance, **Table 1-5** cross-references the sections within the BA report with the requirements of Appendix 1 of GNR 326.

Table 1-5: Legal Requirements as detailed in Appendix 1 of GNR 326 of the 2014 EIA Regulations, as amended

APPENDIX 1 OF GNR 326	DESCRIPTION	RELEVANT REPORT SECTION
3(1) (a)	Details of the EAP who prepared the report and the expertise of the EAP, including a curriculum vitae	Section 1.3 **Appendix A**
3(1) (b)	The location of the activity	Section 4.1
3(1) (c)	A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale	Section 4.2
3(1) (d)	A description of the scope of the proposed activity	Section 4
3(1) (e)	A description of the policy and legislative context within which the development is proposed	Section 2
3(1) (f)	A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location	Section 4.3
3(1) (g)	A motivation for the preferred site, activity and technology alternative	Section 5
3(1) (h)	A full description of the process followed to reach the proposed alternative within the site	Section 5
3(1) (i)	A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity	Section 3.4
3(1) (j)	An assessment of each identified potentially significant impact and risk	Section 7
3(1) (k)	Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report	Section 7
3(1) (l)	An environmental impact statement	Section 8.4
3(1) (m)	Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the Environmental Management Programme (EMPr).	**Appendix G**
3(1) (n)	Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation.	Not applicable
3(1) (o)	A description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed	Section 3.6

APPENDIX 1 OF GNR 326	DESCRIPTION	RELEVANT REPORT SECTION
3(1) (p)	A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation	Section 8
3(1) (q)	Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be conducted, and the post construction monitoring requirements finalised	Section 4.2.1
3(1) (r)	An undertaking under oath or affirmation by the EAP	**Appendix B**
3(1) (s)	Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	Not applicable
3(1) (t)	Any specific information that may be required by the competent authority	Not applicable
3(1) (u)	Any other matters required in terms of section 24(4)(a) and (b) of the Act	Not applicable

2 GOVERNANCE FRAMEWORK

The South African regulatory framework establishes well-defined requirements and standards for environmental and social management of industrial and civil infrastructure developments. Environmental protection functions are carried out by different authorities at both national and regional levels. The applicable legislation and policies are shown in **Table 2-1** below.

Table 2-1: Applicable Legislation and Policies

APPLICABLE LEGISLATION AND POLICY	DESCRIPTION OF LEGISLATION
The Constitution of South Africa (No. 108 of 1996)	The Constitution cannot manage environmental resources as a stand-alone piece of legislation, hence additional legislation was promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld in an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.
National Environmental Management Act (No. 107 of 1998)	In terms of Section 24(2) of the NEMA, the Minister may identify activities which may not commence without prior authorisation. The Minister thus published GNR 327 (Listing Notice 1), 325 (Listing Notice 2) and 324 (Listing Notice 3) listing activities that may not commence prior to authorisation (7 April 2017). The regulations outlining the procedures required for authorisation are published in GNR 326 [Environmental Impact Assessment Regulations (EIA)] (7 April 2017). Listing Notice 1 identifies activities that require a Basic Assessment (BA) process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 2 identifies activities that require an S&EIR process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 3 identifies activities within specific areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. WSP undertook a review of the listed activities according to the proposed project description to conclude that **Listed Activities 9, 12 and 19 and 27 of GNR 327** are considered applicable and therefore a BA process must be followed. An EA is required and is being applied for.
Listing Notice 1: GNR 327	***Activity 9 –*** *The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—* *(i) with an internal diameter of 0,36 metres or more; or* *(ii) with a peak throughput of 120 litres per second or more* **Description:** Construction of two pipeline segments totalling approximately 5 500 metres for bulk transportation of raw water to the FGD system. Please note that the design stage identified a 0.9 metre internal diameter pipeline that triggers this activity. ***Activity 12 –*** *The development of:* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—* *(a) within a watercourse.* **Description:** The proposed construction of a raw water pipeline is an underground pipeline is within 500m of wetlands. The proposed pipeline segments will exceed the 100 square metre threshold footprint.

APPLICABLE LEGISLATION AND POLICY	DESCRIPTION OF LEGISLATION
	Activity 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.* **Description:** The proposed raw water pipeline comprises an underground and on-surface sections of the pipeline. As such, for the underground sections, dredging, excavation and removal of soil of more than 10 cubic metres will be conducted so as to bury the pipeline underground. Infilling of the area will be done using the same material as backfill after the pipeline has been installed in order to cover it up. The proposed area is within 500 metres of a wetland, hence within a watercourse. ***Activity 27*** *– The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for–* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.* **Description:** Eskom will require a 32m corridor for potential area to lay the pipeline, but will only clear 8m for majority of pipeline and 12m where the pipelines run together (from reservoir pump house until after road and rail crossing). The proposed pipeline servitude will require clearance of at least 1 hectare but less than 20 hectares.
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) is subsidiary and supporting legislation to the NEMA. The Act is a framework legislation that provides the basis for the regulation of waste management. The Act also contains policy elements and gives a mandate for further regulations to be promulgated. On 29 November 2013 GNR 921 was promulgated (repealing GN R718) which contains a list of waste management activities that, if triggered, require a Waste Management License (WML) and in turn a Basic Assessment (Category A activities) or Scoping and EIA (Category B activities) process to be undertaken in terms of the NEMA EIA Regulations. Category C activities are required to comply with the Norms and Standards for Storage of Waste 2013 (GN. 926) and do not require authorisation. It is anticipated that activities on the site will not trigger the NEM:WA. However, waste handling, storage and disposal during the construction and operational phase of the project must be undertaken in accordance with the requirements of this Act and the Best Practicable Environmental Option which will be incorporated into the site specific Environmental Management Programme (EMPr)/Environmental Management Systems (EMS).
National Water Act, 1998 (Act No. 36 of 1998)	The National Water Act, 1998 (Act No. 36 of 1998) (NWA) provides the framework to protect water resources against over exploitation and to ensure that there is water for social and economic development, human needs and to meet the needs of the aquatic environment. The Act defines water source to include watercourses, surface water, estuary or aquifer. A watercourse is defined in the Act as a river or spring, a natural channel 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 declare a watercourse. Section 21 of the Act outlines a number of categories which require a water user to apply for a Water Use License (WUL) and Section 22 requires water users to apply for a General Authorisation (GA) with the Department of Water and Sanitation (DWS) if they are under certain thresholds or meet certain criteria. The list of water uses applicable that require a GA under Section 21 are presented below: c) Impeding or diverting the flow of water in a watercourse; and i) Altering the bed, banks, course or characteristics of a watercourse;

APPLICABLE LEGISLATION AND POLICY	DESCRIPTION OF LEGISLATION
	It is anticipated that a GA will be required for the impeding or diverting of the flow of water in a watercourse and the altering of bed, banks, course or characteristics of a watercourse under Section 21(c) and (i) respectively as a result of the wetland systems present on the site.
National Heritage Resource Act (Act No. 25 of 1999)	The National Heritage Resource Act (Act No. 25 of 1999) (NHRA) serves to protect national and provincial heritage resources across South Africa. The NHRA provides for the protection of all archaeological and palaeontological sites, the conservation and care of cemeteries and graves by the South African Heritage Resource Agency (SAHRA), and lists activities which require any person who intends to undertake to notify the responsible heritage resources agency and furnish details regarding the location, nature, and extent of the proposed development. In terms of the Section 38 of NHRA, any person who intends to undertake a linear development exceeding 300m in length or a development that exceeds 5000m^2 must notify the heritage resources authority and undertake the necessary assessment requested by that authority. In the case of the proposed construction of a raw water pipeline, a Heritage exemption will be applied for to SAHRA as comprehensive studies have already been conducted on the site and the letter is attached as **Appendix F-1**. Construction activities should be conducted carefully and all activities ceased if any archaeological, cultural and heritage resources are discovered. The SAHRA should be notified and investigation conducted before any activities can commence.

3 BASIC ASSESSMENT PROCESS

3.1 PROCEDURAL FRAMEWORK

As defined in Appendix 1 of the EIA Regulations, 2014 as amended, the objective of the impact assessment process is to, through a consultative process:

- Determine the policy and legislative context within which the proposed activity is located and how the activity complies with and responds to the policy and legislative context;
- Identify the alternatives considered, including the activity, location, and technology alternatives;
- Describe the need and desirability of the proposed alternatives;
- Through the undertaking of an impact and risk assessment process, inclusive of cumulative impacts which focused on determining the geographical, physical, biological, social, economic, heritage, and cultural sensitivity of the sites and locations within sites and the risk of impact of the proposed activity and technology alternatives on these aspects to determine—
    - The nature, significance, consequence, extent, duration, and probability of the impacts occurring to; and
    - The degree to which these impacts—
        - Can be reversed;
        - May cause irreplaceable loss of resources; and
        - Can be avoided, managed or mitigated
- Through a ranking of the site sensitivities and possible impacts the activity and technology alternatives will impose on the sites and location identified through the life of the activity to—
    - Identify and motivate a preferred site, activity and technology alternative;
    - Identify suitable measures to avoid, manage or mitigate identified impacts; and
    - Identify residual risks that need to be managed and monitored.

3.2 APPLICATION

The application phase consisted of completing the appropriate application form as well as the subsequent submission and registration of the application for EA with the DEA. The application form will be submitted to the DEA on **13 May 2019**. A reference number has been included in this Final BAR following acknowledgment of receipt from the DEA.

WSP notified a number of commenting authorities of the proposed project via a notification letter and by submitting the Draft BAR. The commenting authorities include:

- Department of Environmental Affairs: Biodiversity Conservation Unit;
- Department of Water and Sanitation (DWS);
- South African Heritage Resource Agency (SAHRA);
- Waterberg District Municipality (WDM); and
- Lephalale Local Municipality (LLM).

WSP has collated comments received during the public review phase (**13 May 2019 to 18 June 2019**) and compiled a Comments and Responses Report (CRR) that has been attached to this Final BAR as **Appendix E-5**. This Final BAR will be submitted to the DEA for decision making within 107 days on 21 June 2019. It will also be sent to the relevant commenting authorities as well as the interested and affected parties (I&APs) for their perusal. Since the commenting period expired, any comments should be sent directly to the DEA Case Officer, (Ms Matlhodi Mogorosi on mmogorosi@environment.gov.za and 012 399 9388).

3.3 BASELINE ENVIRONMENTAL ASSESSMENT

The description of the environmental attributes of the project area was compiled through a combination of desktop reviews and site investigations. Desktop reviews made use of available information including existing reports, aerial imagery and mapping. Site investigations were undertaken by the specialist team in March and April 2019 to verify the desktop review information.

3.4 IMPACT ASSESSMENT METHODOLOGY

The BAR uses a methodological framework developed by WSP to meet the combined requirements of international best practice and NEMA, Environmental Impact Assessment Regulations, 2014, as amended (GN No. 326).

As required by the EIA Regulations (2014) as amended, the determination and assessment of impacts is based on the following criteria:

- Nature of the Impact;
- Significance of the Impact;
- Consequence of the Impact;
- Extent of the impact;
- Duration of the Impact;
- Probability if the impact;
- Degree to which the impact:
    - can be reversed;
    - may cause irreplaceable loss of resources; and
    - can be avoided, managed or mitigated.

Following international best practice, additional criteria have been included to determine the significant effects. These include the consideration of the following:

- Magnitude: to what extent environmental resources are going to be affected;
- Sensitivity of the resource or receptor (rated as high, medium and low) by considering the importance of the receiving environment (international, national, regional, district and local), rarity of the receiving environment, benefits or services provided by the environmental resources and perception of the resource or receptor); and
- Severity of the impact, measured by the importance of the consequences of change (high, medium, low, negligible) by considering inter alia magnitude, duration, intensity, likelihood, frequency and reversibility of the change.

It should be noted that the definitions given are for guidance only, and not all the definitions will apply to all of the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

3.4.1 METHODOLOGY

Impacts are assessed in terms of the following criteria:

a) The **nature**; a description of what causes the effect, what will be affected and how it will be affected.

Table 3-1: Nature or Type of Impact

NATURE OR TYPE OF IMPACT	DEFINITION
Beneficial / Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change.
Adverse / Negative	An impact that is considered to represent an adverse change from the baseline, or introduces a new undesirable factor.
Direct	Impacts that arise directly from activities that form an integral part of the Project (e.g. new infrastructure).
Indirect	Impacts that arise indirectly from activities not explicitly forming part of the Project (e.g. noise changes due to changes in road traffic resulting from the operation of Project).
Secondary	Secondary or induced impacts caused by a change in the Project environment (e.g. employment opportunities created by the supply chain requirements).
Cumulative	Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.

b) The **physical extent**.

Table 3-2: Physical Extent Rating of Impact

SCORE	DESCRIPTION
1	the impact will be limited to the site;
2	the impact will be limited to the local area;
3	the impact will be limited to the region;
4	the impact will be national; or
5	the impact will be international;

c) The **duration**, wherein it is indicated what the lifetime of the impact will be:

Table 3-3: Duration Rating of Impact

SCORE	DESCRIPTION
1	of a very short duration (0 to 1 years)
2	of a short duration (1 to 5 years)
3	medium term (5–15 years)
4	long term (> 15 years)
5	Permanent

d) **Reversibility:** An impact is either reversible or irreversible. A scale of the level of reversibility if an impact is reversible and how long before impacts on receptors cease to be evident.

Table 3-4: Reversibility of Impact

SCORE	DESCRIPTION
1	The impact is immediately reversible.
3	The impact is reversible within 2 years after the cause or stress is removed.
5	The activity will lead to an impact that is in all practical terms permanent.

e) The **magnitude** of impact on ecological processes, quantified on a scale from 0-5, where a score is assigned.

Table 3-5: Magnitude Rating of Impact

SCORE	DESCRIPTION
0	small and will have no effect on the environment.
1	minor and will not result in an impact on processes.
2	low and will cause a slight impact on processes.
3	moderate and will result in processes continuing but in a modified way.
4	high (processes are altered to the extent that they temporarily cease).
5	very high and results in complete destruction of patterns and permanent cessation of processes.

f) The **probability** of occurrence, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:

Table 3-6: Probability Rating of Impact

SCORE	DESCRIPTION
1	very improbable (probably will not happen).
2	improbable (some possibility, but low likelihood).
3	probable (distinct possibility).
4	highly probable (most likely).
5	definite (impact will occur regardless of any prevention measures).

g) The **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;

h) The **status**, which is described as either positive, negative or neutral;

i) The degree to which the impact can be **reversed**;

j) The degree to which the impact may cause **irreplaceable loss** of resources; and

k) The degree to which the impact can be **mitigated**.

The significance is determined by combining the above criteria in the following formula:

Significance = (Extent + Duration + Reversibility + Magnitude) x Probability

$$[S = (E + D + R + M) \times P]$$

Where the symbols are as follows:

Table 3-7: Symbols Reference

SYMBOL	CRITERIA	DESCRIPTION
S	Significance Weighting	Refer to **Table 3-8**
E	Extent	Refer to **Table 3-2**
D	Duration	Refer to **Table 3-3**
R	Reversibility	Refer to **Table 3-4**
M	Magnitude	Refer to **Table 3-5**
P	Probability	Refer to **Table 3-6**

The significance weightings for each potential impact are as follows:

Table 3-8: Significance Ratings

OVERALL SCORE	SIGNIFICANCE RATING (NEGATIVE)	SIGNIFICANCE RATING (POSITIVE)	DESCRIPTION
< 30 points	**Low**	**Low**	where this impact would not have a direct influence on the decision to develop in the area
31 - 60 points	**Medium**	**Medium**	where the impact could influence the decision to develop in the area unless it is effectively mitigated
> 60 points	**High**	**High**	where the impact must have an influence on the decision process to develop in the area

3.4.2 MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact, and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures, and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this BAR.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. In the event that this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. In the event that impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail in order to remedy high/significant residual negative impacts. If no offsets can be done on a potential impact which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in **Figure 3-1** below.

Figure 3-1: Mitigation Sequence/Hierarchy

3.5 STAKEHOLDER ENGAGEMENT PROCESS

Stakeholder engagement (public participation) is a requirement of the BA process. It consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the BA decision-making process. Effective engagement requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project. The objectives of the stakeholder engagement process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the proposed project;
- Clearly outline the scope of the proposed project, including the scale and nature of the existing and proposed activities;
- Identify viable proposed project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the proposed project, issues and solutions.

3.5.1 STAKHOLDER CONSULTATION

Stakeholders were identified and will continue to be identified through several mechanisms. These included:

- Networking with local business owners, non-governmental agencies, community based organisations, and local council representatives;
- Field work in and around the project area;
- Advertising in the press:
  - Mogol Post (17 May 2019); and
  - The Citizen (17 May 2019).
- Placement of community site notices at the following locations:
  - Along fence of preferred site;
  - Ellisras Library;
  - Mogol Gold Club; and
  - Marapong Public Library.

Eskom's existing stakeholder database was used as the basis for public participation with I&APs. All stakeholders identified to date have been registered on the project stakeholder database. The EAP endeavoured to ensure that individuals/organisations from referrals and networking were notified of the proposed project. Stakeholders were identified at the horizontal (geographical) and vertical extent (organisations level). A list of stakeholders captured in the project database is included in **Appendix C**.

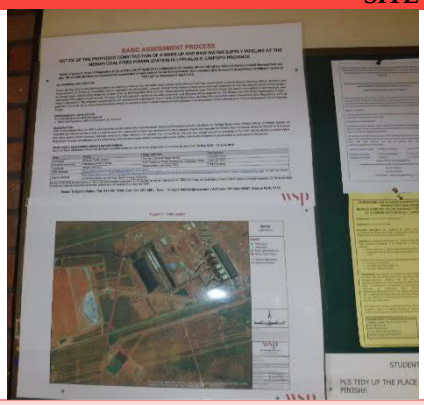
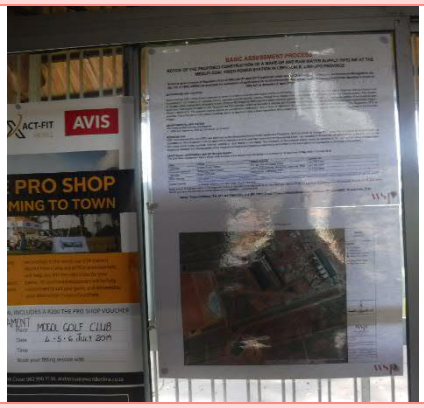
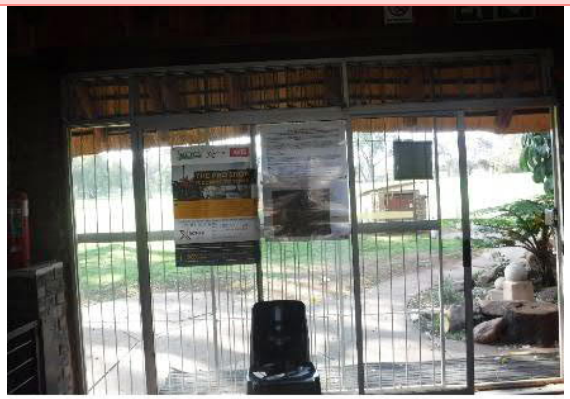
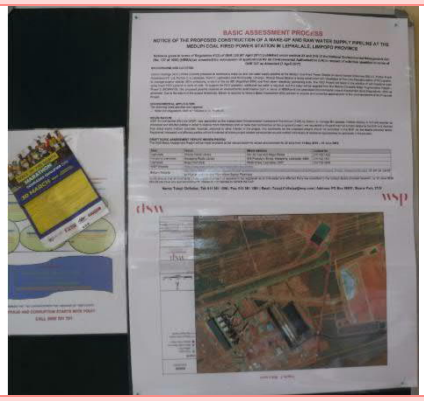
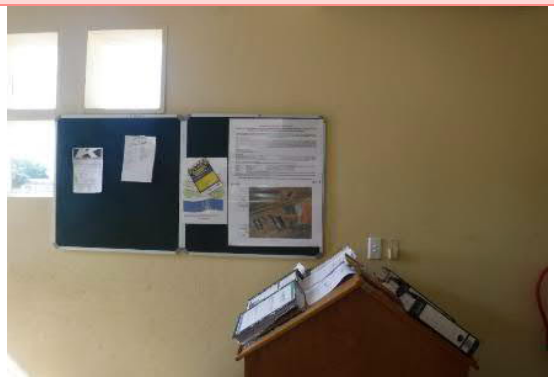
All concerns, comments, viewpoints and questions (collectively referred to as 'issues') that were received have been documented and responded to in a CRR, which is attached as Appendix E-5 of this Final BAR.

Specialist studies for Biodiversity, Wetland and Heritage Assessment and were conducted. The findings and recommendations from both studies have been incorporated in this Final BAR.

Table 3-9 below shows details of site notices used for stakeholder notification.

Table 3-9: Site Notice Locations

SITE NOTICE LOCATIONS	
ZOOMED IN	LANDSCAPE
	
Along fence of preferred site (23°42'00.05"S, 27°32'48.95"E)	

SITE NOTICE LOCATIONS	
	
Ellisras Library (23°40'38.23"S, 27°44'25.02"E)	
	
Mogol Golf Club (23°41'07.95"S, 27°41'33.42"E)	
	
Marapong Public Library (23°39'22.39"S, 27°37'45.24"E)	

The site notices served to inform the occupiers of the land along with the newspaper advert and existing stakeholder database.

In accordance with GN. R 326 41(2)(c) of Chapter 6 an advert was placed in two newspapers, the Mogol Post and The Citizen, both published 17 May 2019. The proof of the advert has been attached as Appendix E-1 of this Final BAR.

3.5.2 PUBLIC REVIEW

The draft BAR was placed on public review for a period of 36 days from **13 May 2019** to **18 June 2019**, at the Ellisras Public Library, Marapong Public Library and the Mogol Golf Club. The report was also made available on the following:

- WSP website (http://www.wsp-pb.com/en/WSP-Africa/What-we-do/Services/All-Services-A-Z/Technical-Reports/); and
- Eskom website (http://www.eskom.co.za/OurCompany/SustainableDevelopment/EnvironmentalImpactAssessments/Pages/Environment_Impact_Assessments.aspx).

All registered stakeholders and authorising/commenting state departments were notified of the public review period as well as the locations of the draft BAR via email and bulk sms. Proof of these notifications are attached as Appendix E-3 and Appendix E-4 of this final BAR.

This Final BAR will be submitted to the DEA for decision making within 107 days on 21 June 2019. It will also be sent to the relevant commenting authorities as well as the interested and affected parties (I&APs) for their perusal. Since the commenting period expired, any comments should be sent directly to the DEA Case Officer, (Ms Matlhodi Mogorosi on mmogorosi@environment.gov.za and 012 399 9388)

3.6 ASSUMPTIONS AND LIMITATIONS

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

- 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;
- The comments received in response to the public participation process, are representative of comments from the broader community; and
- The competent authority would not require additional specialist input, as per the proposals made in this report, in order to make a decision regarding the application.

Notwithstanding these assumptions, it is the view of WSP that this BA report provides a sound description of the issues associated with the project and the resultant impacts, and that the Competent Authority would be able to make a decision using this information.

4 PROJECT DESCRIPTION

4.1 LOCATION OF THE PROPOSED PROJECT

The proposed construction of a make-up water and raw water pipeline is to be located at the Medupi Coal Fired Power Station on farms Naauw Ontkomen 509 LQ, Portion 0 and Kuipersbult 511 LQ, Portion 0, in Lephalale, Ward 2, Lephalale Local Municipality, Limpopo Province (23°42'17.75"S, 27°34'3.02"E). The proposed pipeline segments are approximately 2 500 (raw water pipeline) metres and 3 000 metres (make-up water pipeline).

Figure 4-1 below shows the proposed pipeline alignment (i.e. preferred pipeline route) indicated in purple (segment 1) from an offtake point (which was provided by the DWS) and in green (segment 2) from the pump transfer house from the reservoirs to the FGD plant. The proposed pipeline segments will be within the Medupi Power Station site boundary (preferred route) and the potential alternative project routes are discussed in **Section 5**.

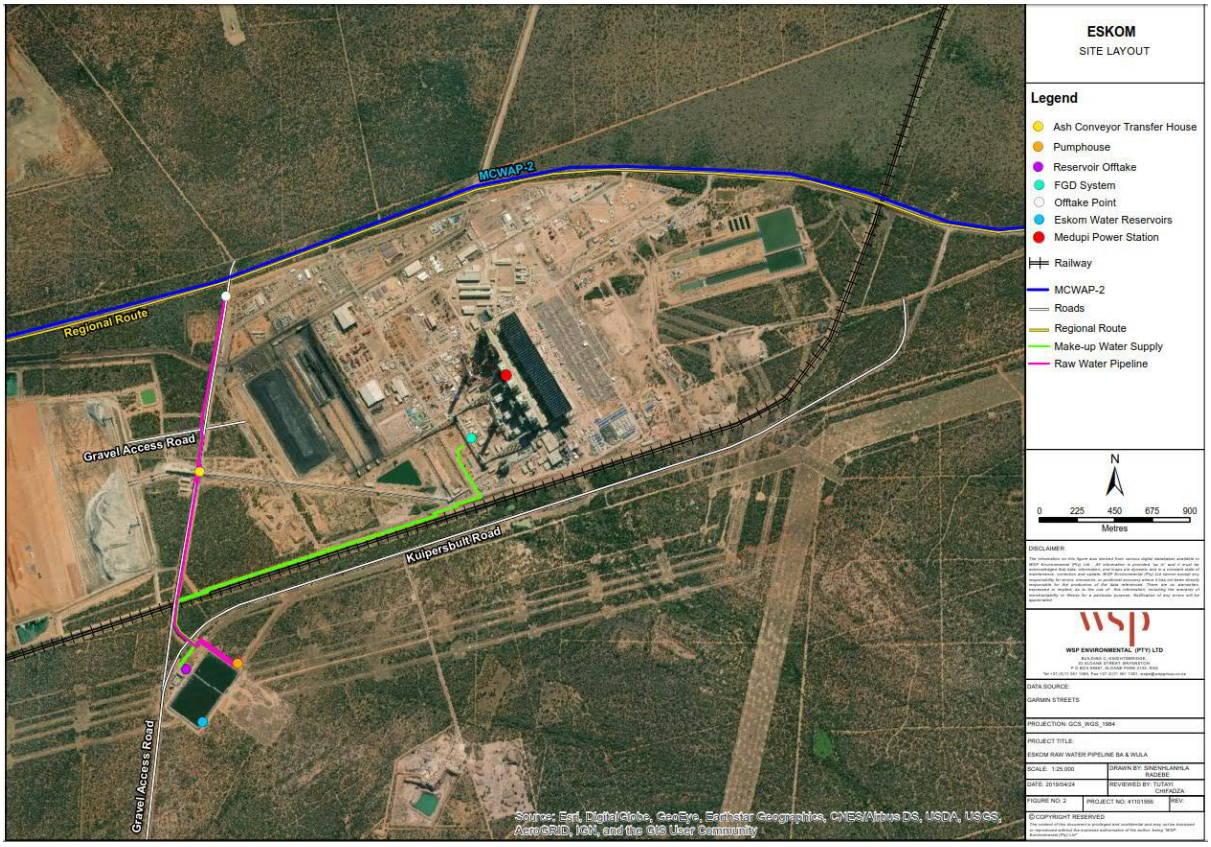


Figure 4-1: Preferred Pipeline Route Layout Map

The proposed pipeline segments will run through the land parcel outlined in **Table 4-1** within the confines of the site boundary.

Table 4-1: Cadastral Information of the site

DETAILS REQUIRED AS PER GN.R 326 ANNEX 1 (3)	DETAIL
21 Digit Surveyor General Code of each Cadastral Land Parcel	– T0LQ00000000050900000 – T0LQ00000000051100000
Physical Address and Farm Name	– Naauw Ontkomen 509 LQ, Portion 0; and – Kuipersbult 511 LQ, Portion 0,
Landuse Zoning	Industrial

The reference map for the raw water pipeline segment is illustrated in **Figure 4-2** below.

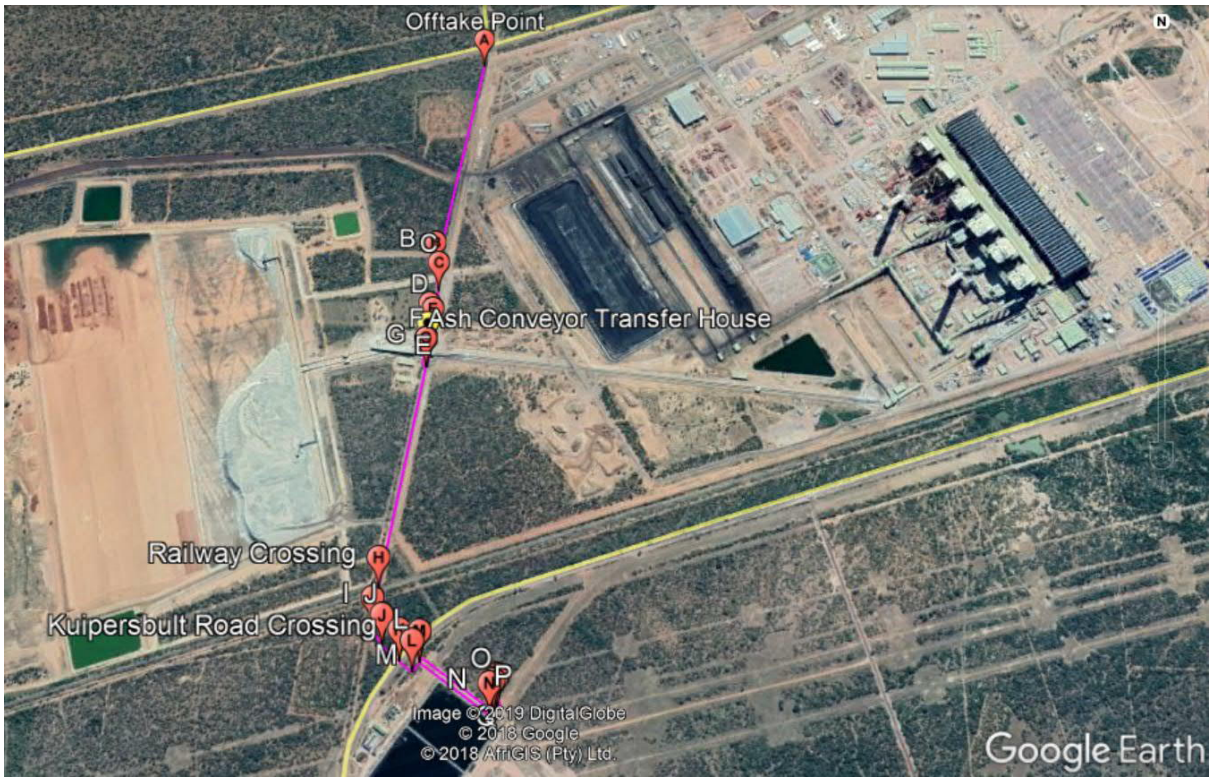


Figure 4-2: Raw Water Pipeline Segment Coordinates

The coordinates of the preferred proposed raw water pipeline segment from the off-take point are shown in **Table 4-2**.

Table 4-2: Coordinates of the Raw Water Pipeline Segment

POINTS	LATITUDE	LONGITUDE
A	23°41'59.33"S	27°32'47.29"E
B	23°42'24.86"S	27°32'41.73"E
C	23°42'27.23"S	27°32'42.13"E
D	23°42'31.98"S	27°32'41.16"E

POINTS	LATITUDE	LONGITUDE
E	23°42'32.58"S	27°32'41.59"E
F	23°42'35.91"S	27°32'40.94"E
G	23°42'35.96"S	27°32'40.84"E
H	23°42'59.46"S	27°32'36.24"E
I	23°43'3.48"S	27°32'35.74"E
J	23°43'5.16"S	27°32'36.81"E
K	23°43'6.63"S	27°32'38.75"E
L	23°43'7.69"S	27°32'40.15"E
M	23°43'6.78"S	27°32'40.92"E
N	23°43'11.80"S	27°32'48.48"E
O	23°43'11.47"S	27°32'48.77"E
P	23°43'11.53"S	27°32'48.91"E
Q	23°43'11.08"S	27°32'49.30"E
R	23°43'10.96"S	27°32'49.10"E

The reference map for the make-up water pipeline segment is illustrated in **Figure 4-3** below.

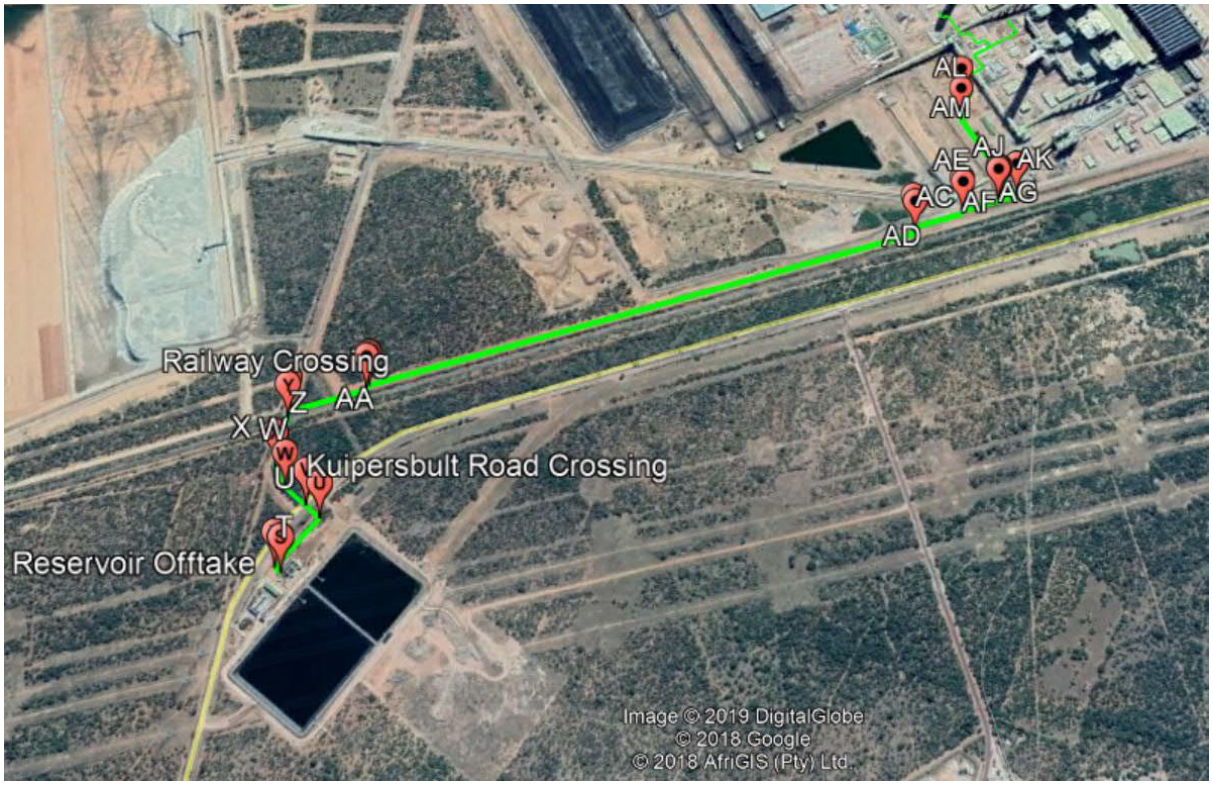


Figure 4-3: Make-Up Water Pipeline Segment Coordinates

The coordinates of the preferred proposed raw water pipeline segment from the off-take point and the make-up water pipeline segment from the holding dams are shown in **Table 4-2** and **Table 4-3** respectively.

Table 4-3: Coordinates of the Make-Up Water Pipeline Segment

POINTS	LATITUDE	LONGITUDE
S	23°43'11.81"S	27°32'37.39"E
T	23°43'11.42"S	27°32'36.83"E
U	23°43'7.57"S	27°32'40.08"E
V	23°43'6.56"S	27°32'38.80"E
W	23°43'5.11"S	27°32'36.86"E
X	23°43'3.46"S	27°32'35.80"E
Y	23°42'59.43"S	27°32'36.32"E
Z	23°42'58.90"S	27°32'36.38"E
AA	23°42'57.05"S	27°32'42.80"E
AB	23°42'56.70"S	27°32'43.01"E

POINTS	LATITUDE	LONGITUDE
AC	23°42'42.93"S	27°33'31.13"E
AD	23°42'42.38"S	27°33'30.95"E
AE	23°42'41.07"S	27°33'35.59"E
AF	23°42'40.78"S	27°33'35.50"E
AG	23°42'39.85"S	27°33'38.92"E
AH	23°42'39.67"S	27°33'38.87"E
AI	23°42'39.63"S	27°33'39.02"E
AJ	23°42'39.80"S	27°33'39.08"E
AK	23°42'39.35"S	27°33'40.62"E
AL	23°42'31.97"S	27°33'35.96"E
AM	23°42'29.97"S	27°33'36.10"E
AN	23°42'29.45"S	27°33'37.07"E

4.2 LAYOUT AND DESCRIPTION

4.2.1 CONSTRUCTION ACTIVITIES

The proposed pipeline route will begin at the MCWAP-2 pipeline offtake point, which is to the north of the site. The pipeline will be buried underground from just beyond the offtake point until it reaches the ash conveyor transfer house, where it will move aboveground in order to protect the integrity of this transfer house. After passing through the ash conveyor transfer house, the pipeline will be buried underground again, crossing under the railway line and the Kuipersbult Road until it reaches the raw water dams' boundary fence where it moves aboveground and crosses the new pipeline going to the FGD system and crossing the existing raw water lines to the power station. It then goes below ground to the raw water dam valve station where it connects to the existing terminal point. Eskom's raw water holding dams are made up of two compartments, the Mokolo Water Reservoir and the Crocodile West Water Reservoir. Water for the FGD system will be taken primarily from the Crocodile compartment of the raw water holding reservoir. The corridor with the pipeline route from the MCWAP-2 offtake point to the reservoirs is already impacted as a result of existing operations within the Medupi site, including truck movements for ash disposal as well as a storage yard, however, some vegetation clearance (shrubs, trees and grass) will be required within the pipeline servitude, but will be done to a scale of less than a hectare. There will be no requirement for the construction of access roads as existing access roads within the Medupi site will be used. The pipeline will be buried deeper at railway and road crossings in order to protect the integrity of this infrastructure. There will also be reinforcement structures under the rail and road crossings. No routing alternatives were considered for this pipeline segment as it is the only feasible route from the offtake point. However, the assessment will be undertaken for a corridor as wide as 32m, which is an available corridor that is bordered by existing station activities. Eskom will require a 32m corridor for potential area to lay the pipeline, but will only clear 8m for

majority of pipeline and 12m where the pipelines run together (from reservoir pump house until after road and rail crossing).

After raw water is deposited into the reservoirs, the second pipeline segment will be required in order to transfer water to the FGD system. This pipeline starts from the pump house at the reservoirs with a 32m corridor, and will mainly collect water from the Crocodile compartment as mentioned before (although water can also be conveyed from the Mokolo compartment as part of the design contingency for maintenance and emergency purposes). The pipeline exits the pump house and runs underground on the north side of the existing pipeline. The line turns east of the gravel road on the west of the site boundary and passes under the Kuipersbult Road at the same point as the other pipeline. The line passes under the railway line and turns east at the station boundary, and runs outside the station boundary for 250m where it enters the rail yard fence. The line runs east alongside the rail yard fence between the existing power station National Key Point (NKP) fences. The two inner fences will be relocated to the north of the rail yard. At the eastern end of the rail yard, the pipeline will turn north and then east within the NKP fence. At this point, the pipeline will move above ground. The pipeline will then turn to the north on the east side of Road 3 (Ring Road West). Finally, it will turn into the FGD Raw Water Pre-treatment Plant at the Gypsum Sales Loading Facility.

The proposed project will only see the development of the following infrastructure includes:

- Raw water pipeline from the MCWAP-2 pipeline offtake point that leads to the Eskom reservoirs. This pipeline has a proposed internal diameter design of 0.9 metres and total length of 2 500 metres.
- Make-up water pipeline from the Eskom reservoirs to the FGD system within the Medupi Power Station site boundary. This pipeline has a proposed internal diameter design of 0.9 metres and total length of 3 000 metres.

The proposed pipelines have a total length of 5 500 metres and are the only proposed infrastructure to be constructed. Existing access roads and culverts will be used over the course of the project.

During construction, all the topsoil and subsoil removed and will be stored along the pipeline servitude at a safe distance to prevent unwanted backfilling of the pipeline path before works are conducted. The soil will then be used as backfill after the pipeline is laid in the same order in which it was removed.

The pipeline runs within the rail yard and power station perimeter fences for the majority of the routing in an area that is not constrained with existing servitudes.

Construction activities are expected to commence from **January 2023 to December 2026** when the rehabilitation of the project construction footprint is concluded.

4.2.2 OPERATIONAL ACTIVITIES

The operational phase will commence once the FGD systems are ready to be implemented. Pipeline will be operated to transfer water and any other works are only needed when maintenance activities are done on the site.

4.2.3 DECOMMISSIONING ACTIVITIES

Decommissioning will be considered as part of the decommissioning of the broader facility which will be subject to a separate authorisation and impact assessment process.

4.2.4 ACCESSIBILITY

Medupi Power Station is directly accessible from a regional road mainly used by site personnel. No new access roads will be required for the project as the proposed pipeline servitude is close to existing access roads within the Medupi Power Station site boundary.

4.2.5 WATER DEMAND, SUPPLY AND STORAGE

During construction, the site personnel will have a contractor laydown area close to the proposed pipeline route. Water for use on the project (contractor's use) will be supplied from the Medupi Power Station and will be stored on the site camp.

4.2.6 ELECTRICITY DEMAND AND SUPPLY

The site camp will mainly be constituted of storage containers for materials, ablution facilities and the site office. Power to the main contractor's camp and site office will be supplied from the Medupi Power Station via an offtake point. The contractor will have to run their own cables from the take-off point to their camp. In the event that in-situ power is required along the proposed pipeline servitude, although unlikely, the contractor will have to provide this potentially via a diesel powered generator.

4.2.7 WASTE MANAGEMENT

Waste Management at the project site will be undertaken in line with the EMPr to consider the correct disposal of general and hazardous waste generated on the project. **Table 4-4** describes the different waste products that the proposed project will produce, as well as the various options to dispose of them. Waste will mainly be generated during both construction and decommissioning activities when contractors spend considerable amount of time on the site. During operation, contractors are only on the site for limited amount of time as and when maintenance is required.

Table 4-4: Waste Management Options

WASTE	TYPE OF WASTE	MANAGEMENT OPTIONS
Hydrocarbons (Contaminated soil)	Hazardous	Fuel and oil spillages can be a source of contamination of water sources and the soil. Management options include: – Using spill kits to clean any spillages; – Ensure storage facilities are maintained and meet industry regulations; – Transportation and storage of fuel must be regulated and correctly managed according to the EMPr; and – All hazardous waste is to be disposed of at a registered hazardous landfill (safe disposal certificates must be obtained).
Contaminated PPE	Hazardous	PPE can be contaminated during handling of hydrocarbons. Management options include: – Store contaminated PPE in hazardous waste skips; – Ensure contaminated PPE is disposed of at a registered hazardous landfill (safe disposal certificates must be obtained).
Office waste	General	Office waste (inorganic matter) can be disposed of as per normal and form part of the municipal waste management system. – Ensure waste is stored securely in refuse bins or selected areas; – Co-ordinate waste removal with the general removal of waste from the Medupi Power Station
Food waste	General	Food waste is generated as site personnel take their meals on the construction site. Management options include: – Store any waste and packaging into a labelled food waste bin; and – Co-ordinate waste removal with the general removal of waste from the Medupi Power Station.

4.3 NEEDS AND DESIRABILITY OF THE PROJECT

The Needs and Desirability Guidelines highlights the need to consider how the geographical, physical, biological, social, economic and cultural species of the environment that may be affected by the proposed activity. The

proposed project is a sub-project supporting the proposed FGD system whose ultimate goal is to minimise SO_2 emissions. As such, the assessment was done at the higher project level and the needs and desirability of the proposed raw water and make-up water supply pipeline project is reduced to ensure water is supplied to the FGD system. The proposed construction of a raw water pipeline is needed so as to provide additional raw water to support the FGD operation.

5 PIPELINE ROUTE ALTERNATIVES

In terms of the EIA Regulations, feasible alternatives are required to be considered within this Final BAR. All identified, feasible alternatives are required to be evaluated in terms of social, biophysical, economic and technical factors. However, since this section discusses the alternatives and provides key reasons (motivation) for elimination upfront as they will not be feasible, only the preferred option will be assessed in the impact assessment in **Section 7**.

A key challenge of the Basic Assessment (BA) Process is the consideration of alternatives. Most guidelines use terms such as 'reasonable', 'practicable', 'feasible' or 'viable' to define the range of alternatives that should be considered.

Essentially, there are two types of alternatives:

- Incrementally different (modifications) alternatives to the project; and
- Fundamentally (totally) different alternatives to the project.

Fundamentally different alternatives are usually assessed at a strategic level, and EIA practitioners recognise the limitations of project-specific BAs to address fundamentally different alternatives. Project level alternatives such as site selection and technology alternatives have been addressed below.

5.1 RAW WATER PIPELINE SEGMENT TO RESERVOIR

The route alternatives for the raw water pipeline from the MCWAP-2 pipeline offtake point to the reservoirs were assessed at two points. The first is at the ash conveyor transfer house and the second at the reservoir site where two alternatives were assessed for each. Alternatives assessed include:

- Alternative 1: Underground at ash conveyor transfer house;
- Alternative 2: Aboveground at ash conveyor transfer house (preferred);
- Alternative 1 at the reservoir site (preferred); and
- Alternative 2 at the reservoir site.

5.1.1 ALTERNATIVE 1: UNDERGROUND AT ASH CONVEYOR TRANSFER HOUSE

From the MCWAP-2 pipeline offtake point, the proposed raw water pipeline moves underground in a south-southwest direction until it reaches point D indicated in **Figure 5-1** below. The first option identified was to proceed underground but at a lower depth from point D to point D1 and then G, however, this option was discarded since the burrowing under the ash conveyor transfer house would potentially compromise its integrity which could lead to its eventual collapse. Furthermore, this path would require burrowing for deeper depths to avoid the ash conveyor transfer house foundation, which would lead to more costs.

5.1.2 ALTERNATIVE 2: ABOVEGROUND AT ASH CONVEYOR TRANSFER HOUSE (PREFERRED)

The second option, which is the preferred option considered for at the ash conveyor transfer house is to proceed from points D to E whilst underground and then move from point E to point F aboveground and through the ash conveyor house support structures (pillars). The pipeline is then buried again to continue towards the reservoirs. This is preferred because:

- It does not require burrowing to deeper depths, hence leading to lesser costs;
- It avoids affecting the integrity of the ash conveyor transfer house

The disadvantages with this route are:

- Creates a visual impact at the point of crossing the ash conveyor transfer house although it is very low as it is limited to few personnel who work in the area; and
- The pipeline is potentially exposed to external forces which can damage the pipeline.

Figure 5-1: Ash Conveyor Transfer House Route Options

5.1.3 ALTERNATIVE 1 AT THE RESERVOIR SITE (PREFERRED)

After the raw water pipeline from the MCWAP-2 offtake point reaches the reservoirs' site boundary, the first option considered was to move in a south-east direction from point M to R (pumphouse) via point N as shown in **Figure 5-2** below. The path from point M to N is underground with the engineers indicating that the integrity of the reservoirs will not be affected at the depth they intend to go.

This option is preferred because:

- It provides a shorter path to the pumphouse leading to lesser costs; and
- It does not require any vegetation clearance as it is within the reservoir boundary which is already impacted.

The disadvantage with this path is that it has the potential to affect the integrity of the reservoirs if the construction process is not undertaken cautiously.

5.1.4 ALTERNATIVE 2 AT THE RESERVOIR SITE

The second alternative considered is to proceed from point M1 to R (pumphouse) on the outside route indicated in **Figure 5-2** below. The advantage of this alternative is that it does not pose a threat to the integrity of the

reservoirs, however, it is a longer route (more costly) and will require some vegetation clearance as it moves closer to the pumphouse which is why it was discarded.

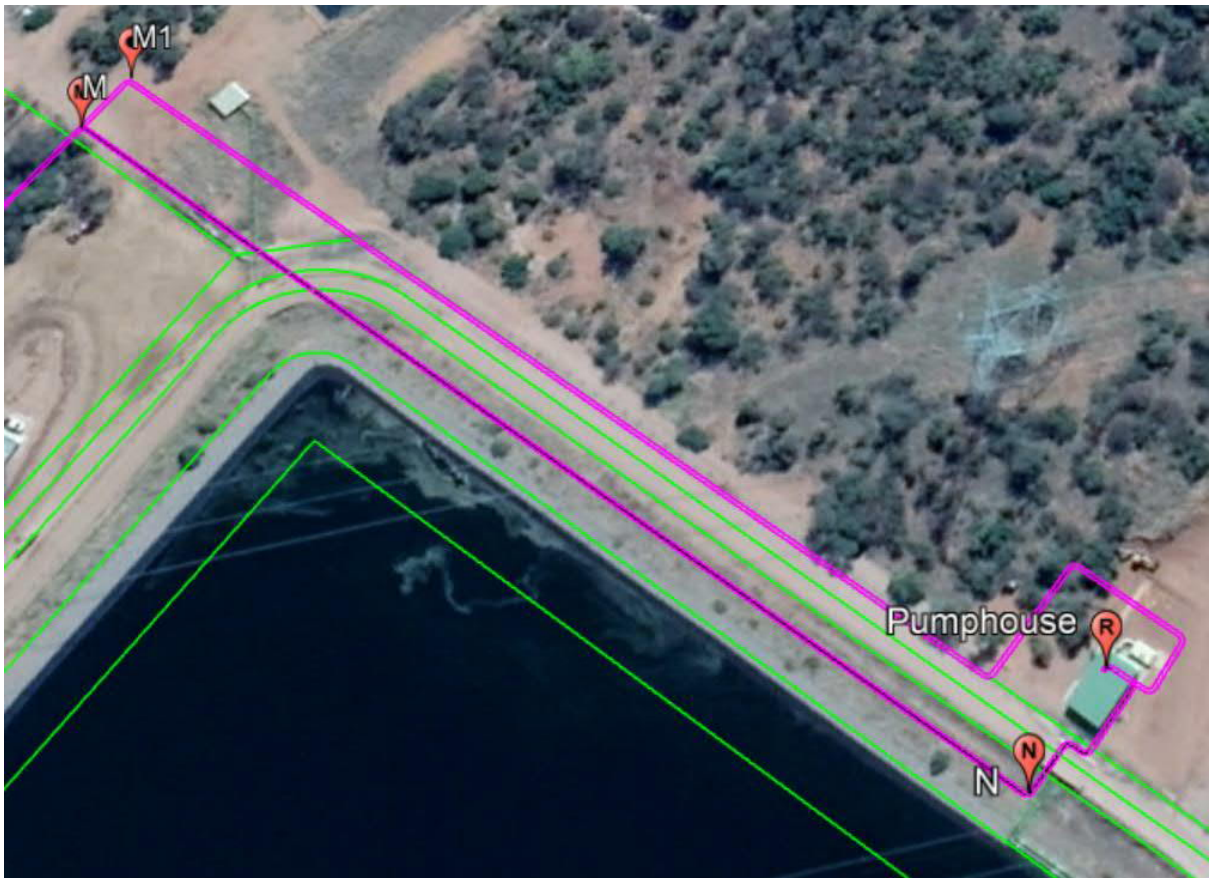


Figure 5-2: Pipeline Route Options at Reservoir Site

5.2 MAKE-UP WATER PIPELINE SEGMENT TO FGD SYSTEM

During basic design, a routing was identified for a 350mm Nominal Bore (NB)[2] pipe from the raw water pumphouse to the FGD Raw Water Pre- treatment Plant and the pipeline was routed between the existing Medupi Raw Water Pipelines and the Kuipersbult Road.

The available width of the servitude between the existing pipelines and the road servitude was evaluated and determined that not to be wide enough to enable the required excavation for the installation of the FGD raw water pipeline. Details of this can be seen in the detailed explanation of the original option (Alternative 1). ` to between 500mm and 900mm NB, and it is thus necessary to provide for a 900mm NB pipe. Alternatives assessed include:

- Alternative 1: Basic design routing underground;
- Alternative 2: Basic design routing aboveground;
- Alternative 3: Deviated design route aboveground;
- Alternative 4: Deviated design route above and underground;
- Alternative 5A: Preferred alternative;

[2] The bore is the hollow center of any pipe. Nominal is used in the sense of “in name only” or “putative” in this instance. Nominal bore is the approximate internal measurement across the diameter of the mouth of a pipe.

- Alternative 5B: Deviation from preferred; and
- Alternative 6.

5.2.1 ALTERNATIVE 1: BASIC DESIGN ROUTING UNDERGROUND

The pipeline exits the pumphouse and runs underground on the north side of the existing pipeline between this pipeline and the Kuipersbult Road. Adjacent to Transfer House 8 (644m South and 750m West of Plant Zero), it turns 90 degrees towards the Power Station and passes under the road, across the existing natural vegetation (approximately 100m), and under the railway line into the site. From here it will run South of Road 3 (Ring Road South), turn and run East of Road 3 (Ring Road West) and at the Gypsum Sales Loading Facility it will turn to the FGD Raw Water Pre-treatment Plant. The routing is shown in **Figure 5-3** below.

Figure 5-3: Alternative 1 and 2 Pipeline Routing

The advantages of this route alternative are:

- No deviations from basic design
- The pipe runs within the approved environmental servitude, except for approximately 200m: the portion that crosses the road, natural vegetation, and railway line.

The constraints and risks associated with this alternative are:

- The distance between the existing pipe and the road servitude is 5m. Excavations cannot occur within 3m of the existing pipeline based on the engineering design;
- The distance between the road servitude and the edge of the air release pit is 3m and no excavation is permitted within 1m of existing structures;
- The worst case scenario is that the FGD Raw Water Pipe will be 900mm diameter, there is thus insufficient space to excavate between the existing pipeline and the road servitude;
- It will be required to obtain permission from Transnet Freight Rail (TFR) to cross under the railway line. There is a risk that this could impact on the schedule.
- Deviation of the pipeline into the station will have to be far enough away (500m) from the wetlands/water course to avoid triggering a WUL Application process.

This alternative was discarded because it will be too close to the wetlands just outside of the site boundary and the fact that the existing services servitudes will not allow for work too close to them.

5.2.2 ALTERNATIVE 2: BASIC DESIGN ROUTING ABOVEGROUND

The routing is the same as Alternative 1 above with the exception that the pipeline is placed above ground with expansion loops at approximately 100m intervals. The routing is shown in **Figure 5-3** above (expansion loops are not shown).

The advantages of this alternative are:

- No deviations in the route from basic design;
- The pipe runs within the approved environmental servitude except for approximately 200m: the portion that crosses the road, natural vegetation, and railway line;
- Route is simpler and cheaper to install and maintain; and
- The constraint regarding excavation is resolved.

The constraints and risks for this alternative include:

- The pipeline runs on the road side of the existing pipeline, thus blocking access for maintenance of the existing pipeline; valve stations, cathodic protection stations, air vents, etc. The only access will be via the road to the batching plant or at the raw water reservoir area;
- The pipeline will be required to "bridge" the access road to the batching plant. The raised height may impede the hydraulic flow in the pipe;
- An above ground pipeline is exposed along the entire length thus increasing the risk of damage and vandalism;
- A number of expansion loops are required which has a negative impact on the water flow;
- It will be required to obtain permission from TFR to cross under the railway line. There is a risk that this could impact on the schedule; and
- There will be impact to existing wetlands/watercourses and heritage sites that will require a WUL instead of the GA.

This alternative was discarded as it has impact to the existing wetlands/watercourses and heritage sites that will require a WUL instead of the GA.

5.2.3 ALTERNATIVE 3: DEVIATED DESIGN ROUTE ABOVEGROUND

The pipeline exits the pumphouse and runs above ground on the north side of the existing pipeline between this pipeline and the Kuipersbult Road. The line turns to the station at the same location as the existing raw water pipeline and passes under the road, across the existing natural vegetation (approximately 100m), and under the railway line into the site. From here it will run above ground South of Road 3 (Ring Road South), turn and run East of Road 3 (Ring Road West) and at the Gypsum Sales Loading Facility it will turn to the Raw Water Pre-treatment Plant. The routing is shown in **Figure 5-4** below.

Figure 5-4: Alternative 3 Pipeline Routing

The advantages of this alternative include:

- The pipeline runs within the approved environmental servitude;
- The pipeline runs aboveground and excavation is not required along the length of the pipeline thus making this route possible;
- The pipeline passes under the railway line at the same location as the existing pipeline. The advantage of this is that it will be easier and quicker to obtain permission from TFR thus reducing/mitigating the risk of impacting on the schedule.

The risks and constraints for this alternative include:

- The pipeline runs on the road side of the existing pipeline thus blocking access for maintenance of the existing pipeline; valve stations, cathodic protection stations. air vents, etc. The only access will be via the road to the batching plant or at the raw water reservoir area;
- The pipeline will be required to "bridge" the access road to the batching plant. The raised height may impede the hydraulic flow in the pipe;
- An aboveground pipeline is exposed along the entire length thus increasing the risk of damage and vandalism;
- A number of expansion loops are required, which has a negative impact on the water flow;
- This routing is 1 256m (48%) longer than Alternatives 1, 2, 5 and 6 resulting in significantly higher cost and friction/flow losses within the pipeline;
- There will be impact to existing wetlands/watercourses and heritage sites that will require a WUL instead of a GA.

This alternative was discarded as it has impact to the existing wetlands/watercourses and heritage sites that will require a WUL instead of the GA. Furthermore, this route is 48% longer than the preferred alternative, which leads to significantly higher cost and friction/flow losses in the pipeline.

5.2.4 ALTERNATIVE 4: DEVIATED DESIGN ROUTE ABOVE AND UNDERGROUND

The pipeline exits the pumphouse and runs underground on the north side of the existing pipeline. The pipeline turns east of the gravel road on the west of the site boundary and passes under the Kuipersbult road. It turns to the east before crossing the railway line and service road and runs between the railway line and the Kuipersbult Road. The line turns to the station at the same location as the existing Main Water Treatment Plant raw water pipeline under the railway line into the site. From here it will run above ground South of Road 3 (Ring Road South), turn and run East of Road 3 (Ring Road West) and at the Gypsum Sales Loading Facility it will turn to the FGD Raw Water Pre-treatment Plant. The routing is shown in **Figure 5-5** below.

Figure 5-5: Alternative 4 Pipeline Routing

The advantages of this alternative are:

- The line passes under the railway line at the same location as the existing pipeline. The advantage of this is that it will be easier and quicker to obtain permission from TFR thus reducing/mitigating the risk of impacting on the schedule.

The risks and constraints of this alternative are:

- This routing is not within the approved environmental servitude and will require a new environmental application and EIA;
- The pipeline will run too close to an environmentally sensitive area (wetlands);
- Removal of vegetation will be required over a distance of 2 500m; and
- This routing is 1 256m (48%) longer than Options 1, 2, 5 and 6 resulting in significantly higher cost and friction/flow losses within the pipeline.

This route is 48% longer than the preferred alternative, which leads to significantly higher cost and friction/flow losses in the pipeline. Furthermore this option runs too close to the wetlands and will also require removal of vegetation over a longer distance along the pipeline servitude.

5.2.5 ALTERNATIVE 5A: PREFERRED ALTERNATIVE

The pipeline exits the pumphouse and runs underground on the north side of the existing pipeline. The pipeline turns east of the gravel road on the west of the site boundary and passes under the Kuipersbult road. It then passes under the railway line and turns east at the site boundary. It runs outside the site boundary for 250m where it enters the rail yard fence. The pipeline then runs east alongside the rail yard fence between the existing power station NKP fences. The two inner fences will be relocated to the north of the rail yard. At the eastern end of the rail yard, the pipeline will turn north and then east within the NKP fence. At this point, it will move aboveground and then turn to the north on the east side of Road 3 (Ring Road West). At the Gypsum Sales Loading Facility, it will turn to the FGD Raw Water Pre-treatment Plant. The routing is shown in **Figure 5-6** below.

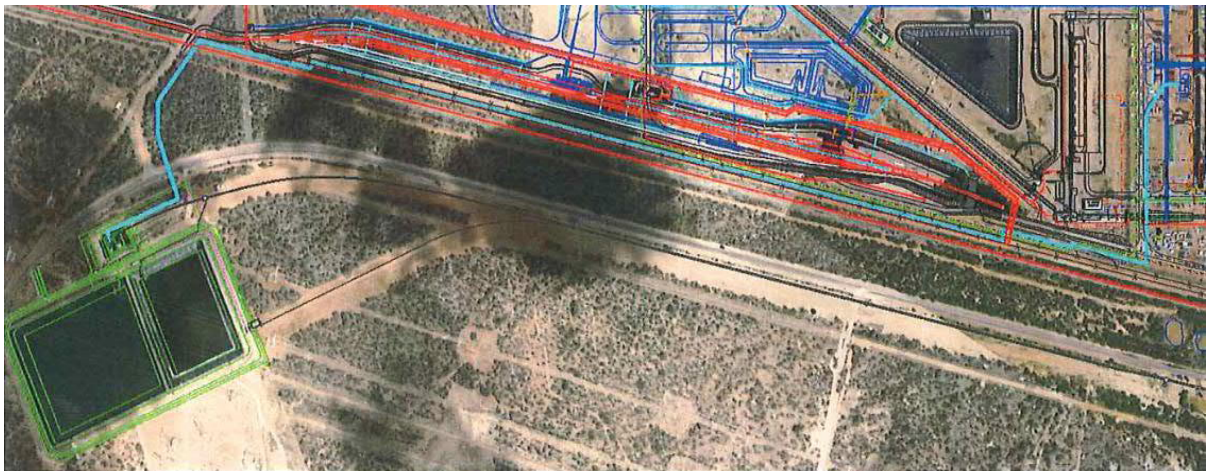


Figure 5-6: Alternative 5A Pipeline Routing (Preferred)

The advantages of this alternative include:

- The pipeline passes under the Kuipersbult road and the railway line at the same location as the MCWAP-2 pipeline, thus requiring a single road crossing and culvert under the railway line for both pipelines, resulting in significant cost savings;
- Eskom will require a 32m corridor for potential area to lay the pipeline, but will only clear 8m for majority of pipeline and 12m where the pipelines run together (from reservoir pump house until after road and rail crossing). The area of vegetation required to be removed over a distance of 266m is 2 128 m^2 (for clearance corridor width of 8m required for installation of the FGD raw water pipeline). If the MCWAP-2 pipeline is included, this will increase to 2 660 m^2 due to a wider servitude of 12m for part of the route. Should the routing be as in Alternatives 1, 2 and 6, the total area of vegetation required to be removed will be 3 769.6m^2 (1 105.6 m^2 for the FGD raw water pipeline plus 2 664 m^2 for the MCWAP- 2 pipeline);
- Rail siding construction activities will be occurring in the area where the pipeline will be routed, hence there will be disturbance to the area during a similar period of time;
- The crossing from the Kuipersbult Road to the site is well away from environmentally sensitive areas; and
- The pipeline runs within the rail yard and power station perimeter fences for the majority of the routing in an area that is not constrained with existing servitudes.

The risks and constraints for the alternative include:

- This option requires that the existing NKP fence in the vicinity of the rail siding is moved early in the construction phase, however it is currently foreseen that the NKP fence will be moved during the early construction works performed by Package 8; and
- It will be required to obtain permission from TFR to cross under the railway line. There is a risk that this could impact on the schedule.

This alternative is preferred as it essentially has the least environmental impacts as it avoids sensitive areas (wetlands, heritage) and also has the least amount of vegetation clearance as it makes use of already disturbed areas. The alternative also offers the most economical route as it is shorter. A GA will be required for this route a it is within 500 m of a wetland but poses a low risk due to the buffers provided by existing infrastructure (road and rail) separating the works and the wetland. Other routes are directly adjacent to the wetlands and will lead to direct impact on the wetlands.

5.2.6 ALTERNATIVE 5B: DEVIATION FROM PREFERRED

The pipeline exits the pumphouse and runs underground on the north side of the existing pipeline. The pipeline turns east of the gravel road on the west of the site boundary and passes under the Kuipersbult road. The pipeline passes under the railway line and turns east at the site boundary. The pipeline runs outside the site boundary for 250m where it enters the rail yard fence to the north of the existing NKP fence. The pipeline runs east between the rail siding embankment and the NKP fence. The pipeline will then turn north on the east side of Road 3 (Ring Road West). At the Gypsum Sales Loading Facility it will turn to the Raw Water Pre-treatment Plant. The routing is shown in **Figure 5-7** below.

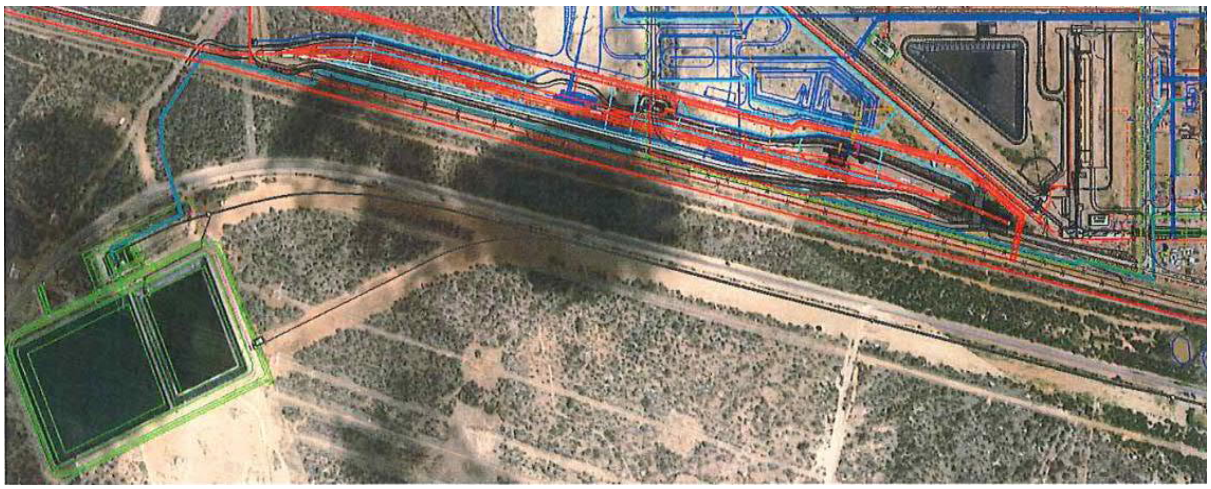


Figure 5-7: Option 5B Pipeline Routing

The advantages of this alternative are:

- The pipeline passes under the Kuipersbult road and the railway line at the same location as the MCWAP-2 pipeline, thus requiring a single road crossing and culvert under the railway line for both pipelines, resulting in significant cost savings;
- Eskom will require a 32m corridor for potential area to lay the pipeline, but will only clear 8m for majority of pipeline and 12m where the pipelines run together (from reservoir pump house until after road and rail crossing). The area of vegetation required to be removed over a distance of 266m is 2 128 m^2 (for clearance corridor width of 8m required for installation of the FGD raw water pipeline). If the MCWAP-2 pipeline is included, this will increase to 2 660 m^2 due to a wider servitude of 12m for part of the route. Should the routing be as in Alternatives 1, 2 and 6, the total area of vegetation required to be removed will be 3 769.6m^2 (1 105.6 m^2 for the FGD raw water pipeline plus 2 664 m^2 for the MCWAP- 2 pipeline);
- Rail siding construction activities will be occurring in the area where pipeline will be routed, hence there will be disturbance to the area during a similar period of time;
- The crossing from the Kuipersbult Road to the site is well away from environmentally sensitive areas; ad
- The pipeline runs within the rail yard and power station perimeter fences for the majority of the routing in an area that is not constrained with existing servitudes.

The risks and constraints for this alternative include:

- It will be required to obtain permission from TFR to cross under the railway line. There is a risk that this could impact on the schedule;
- The raised height will impede the hydraulic flow in the pipe;

- The pipeline will run aboveground for the entire distance within the site thus preventing access to all services and equipment between the pipeline and the fence and the raised height will impede the hydraulic flow in the pipe; and
- A number of expansion loops may be required, which will have a negative impact on the hydraulic flow.

This alternative was discarded because the raised height impedes the hydraulic flow in the pipeline and also prevents access to all services and equipment between the pipeline and the fence as it is aboveground.

5.2.7 ALTERNATIVE 6

The pipeline exits the pumphouse and runs aboveground on the north side of the existing pipeline between this pipeline and the Kuipersbult Road for approximately 400m, until it clears the existing buried Mokolo supply pipeline. The pipeline will then go underground and run east. Adjacent to Transfer House 8 (644m South and 750m West of Plant Zero), it will exit the ground and turn 90 degrees towards the Power Station to pass under the road, across the existing natural vegetation (approximately 100m), and under the railway line into the site. From here, it will run South of Road 3 (Ring Road South), turn and run East of Road 3 (Ring Road West) and at the Gypsum Sales Loading Facility, it will turn to the FGD Raw Water Pre-treatment Plant. The routing is shown in **Figure 5-8** below.

Figure 5-8: Alternative 6 Pipeline Routing

The advantages of this alternative include:

- There are minimal deviations from basic design; and
- The pipeline runs within the approved environmental servitude (except for approximately 200m: the portion that crosses the road, natural vegetation and railway line).

The constraints and risks of this alternative include:

- The pipeline will be required to come aboveground at two points to clear the existing services. The pipeline will remain aboveground for approximately 400m when it first crosses the existing pipelines. This area will be exposed to the risk of damage and vandalism and may require fencing off;
- The rising of the pipe aboveground will impede the ability to gravity flow;
- The FGD pipeline will come in close vicinity to the existing pipeline where it is required to cross over. There is a risk that the existing pipeline may be damaged during construction of these areas;
- It will be required to obtain permission from TFR to cross under the railway line. There is risk that this could impact on the schedule;
- The movement of heavy equipment over the existing raw water pipeline is not allowed. Construction activities will have to occur across the road, disturbing additional area; and
- The movement of heavy equipment over the existing Main Water Treatment Plant raw water pipeline is not allowed.

This alternative was discarded because the FGD pipeline will come in close vicinity to the existing pipeline where it is required to cross over. There is a risk that the existing pipeline may be damaged during construction of these

areas. Furthermore, the movement of heavy equipment over the existing raw water pipeline is not allowed. Construction activities will have to occur across the road, disturbing additional area.

5.2.8 CONCLUSION

Eskom prefer Alternative 5A as the preferred route for the FGD raw water pipeline from the raw water reservoir to the FGD Raw Water Pre-treatment Plant. This route is preferred due to the reasons provided in Section **5.2.5**. The EAP, WSP, are also in agreement with this route as it avoids sensitive areas and minimises vegetation clearance while also meeting good technical criteria. Since the routes were eliminated based on technical considerations and cost basis as well as environmental sensitivity, this Final BAR focuses on conducting a deeper impact assessment on the preferred alternative only.

5.3 NO-GO ALTERNATIVE

The no-go option entails that the development area stays in the current state (i.e. status quo). Parts of the proposed site are in a disturbed state (i.e. not a pristine natural environment) due to ongoing construction activities at the Medupi Power Station. The no-go alternative will see the continual growth of indigenous grass that can then be used to feed the current stock of cattle on the farm.

If the proposed development does not continue and the no-go option is pursued it will result in a lack of water supply to the FGD system, which is essential to minimising SO_2 emissions to the atmosphere and hence prevent Eskom from meeting the SO_2 emissions limit (1 000 mg/m^3). In this instance, it is not recommended that the No-Go option be followed due to the negative impact it eventually has on the air quality in the area. The No-Go option hinders compliance with regards to SO_2 emissions limits.

6 BASELINE ENVIRONMENT

This section provides a description of the baseline environment of the project area. The descriptions encompass the geographical, physical, biological, social, economic, heritage and cultural aspects in accordance with Appendix 1 of GNR 326.

6.1 CLIMATE

6.1.1 REGIONAL CLIMATE

The Lephalale area climate is characterised by hot summers and mild winters. The long-term annual average rainfall is 485mm, of which 420mm falls between October and March. The area experiences high temperatures, especially in the summer months, where daily maxima of >40°C are common with an average annual temperature of 21.1°C. Rainfall acts as a natural pollution suppressant, which may have had a contributory effect in suppressing pollutant concentrations.

The climate within the Lephalale Municipality and Limpopo Province in general results in a negative climatic water balance, and very little water for utilisation by industry, mining, agricultural and domestic land use. The Lephalale climograph is shown in **Figure 6-1** below.

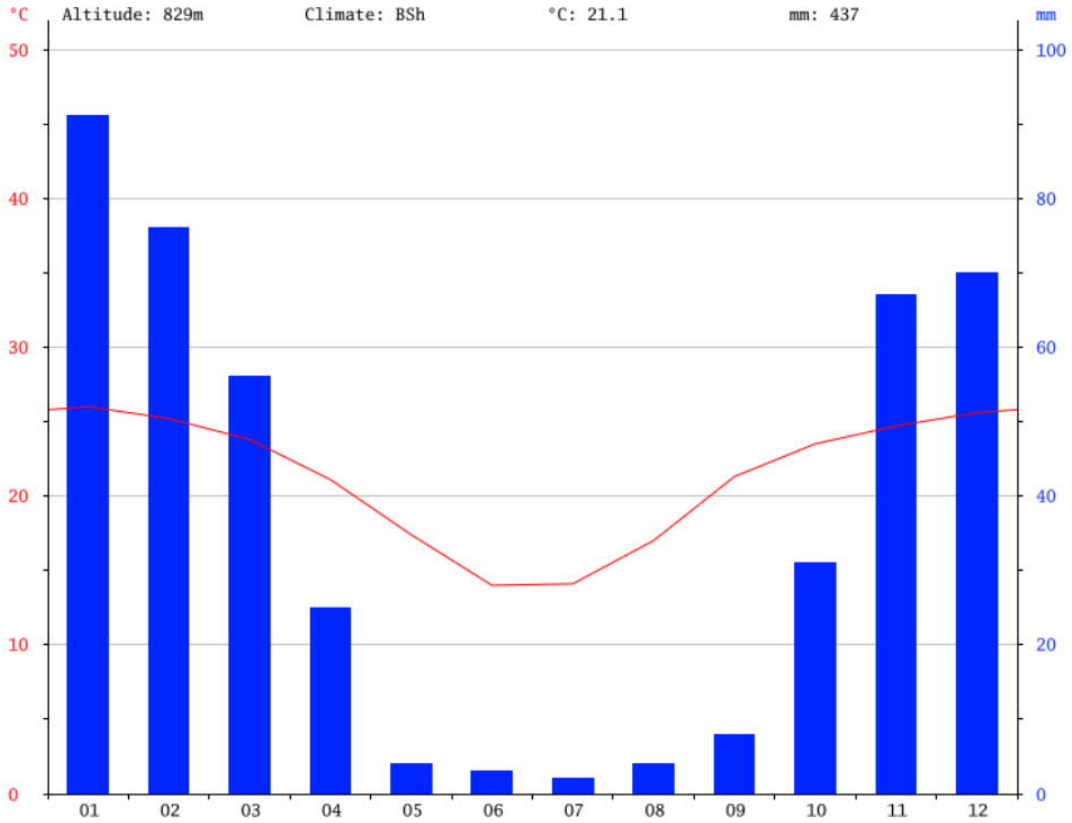


Figure 6-1: Lephalale Climograph (Source: climate-data.org as per April 2019)

The difference in precipitation between the driest month and the wettest month is 89 mm. The variation in annual temperature is around 12.0°C as shown in **Figure 6-2** below.

	January	February	March	April	May	June	July	August	Septem-ber	October	Novem-ber	Decem-ber
Avg. Temperature (°C)	26	25.2	23.8	21.1	17.4	14	14.1	17	21.3	23.5	24.7	25.6
Min. Temperature (°C)	19.5	18.9	16.9	13.4	8.2	4.4	4.5	7.6	12.4	15.6	17.8	18.9
Max. Temperature (°C)	32.5	31.6	30.7	28.8	26.6	23.6	23.7	26.5	30.2	31.4	31.6	32.4
Avg. Temperature (°F)	78.8	77.4	74.8	70.0	63.3	57.2	57.4	62.6	70.3	74.3	76.5	78.1
Min. Temperature (°F)	67.1	66.0	62.4	56.1	46.8	39.9	40.1	45.7	54.3	60.1	64.0	66.0
Max. Temperature (°F)	90.5	88.9	87.3	83.8	79.9	74.5	74.7	79.7	86.4	88.5	88.9	90.3
Precipitation / Rainfall (mm)	91	76	56	25	4	3	2	4	8	31	67	70

Figure 6-2: Lephalale Historical Data / Climate Table (Source: climate-data.org as per April 2019)

6.1.2 TEMPERATURE

As mentioned before, the Lephalale area experiences high temperatures, especially in the summer months, where daily maxima of >40°C are common with an average annual temperature of 21.1°C. The warmest month of the year is January, with an average temperature of 26.0 °C. The variation in annual temperature is around 12.0°C. At 14.0°C on average, June is the coldest month of the year as shown in **Figure 6-3** below.

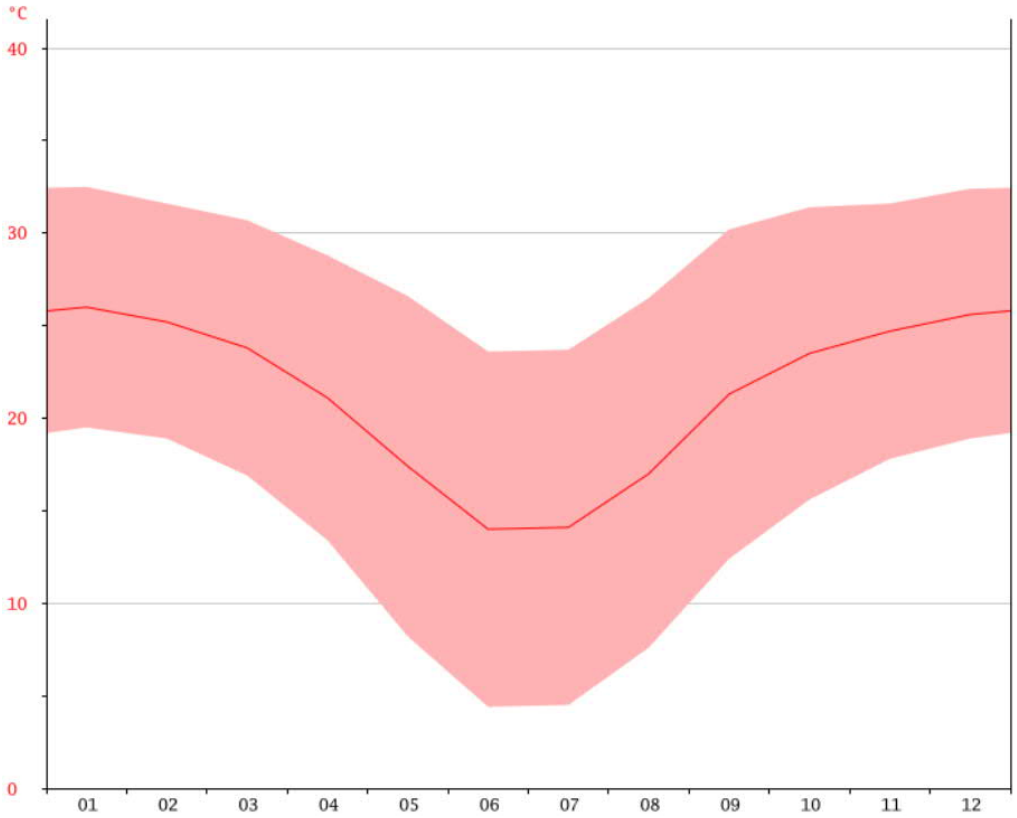


Figure 6-3: Lephalale Temperature Graph (Source: climate-data.org as per April 2019)

6.1.3 RAINFALL

The long-term annual average rainfall is 485mm, of which 420mm falls between October and March. The difference in precipitation between the driest month and the wettest month is 89 mm. The average monthly

precipitation is shown in **Figure 6-4** below and also illustrates the number of days specific precipitation amounts are expected on a monthly basis.

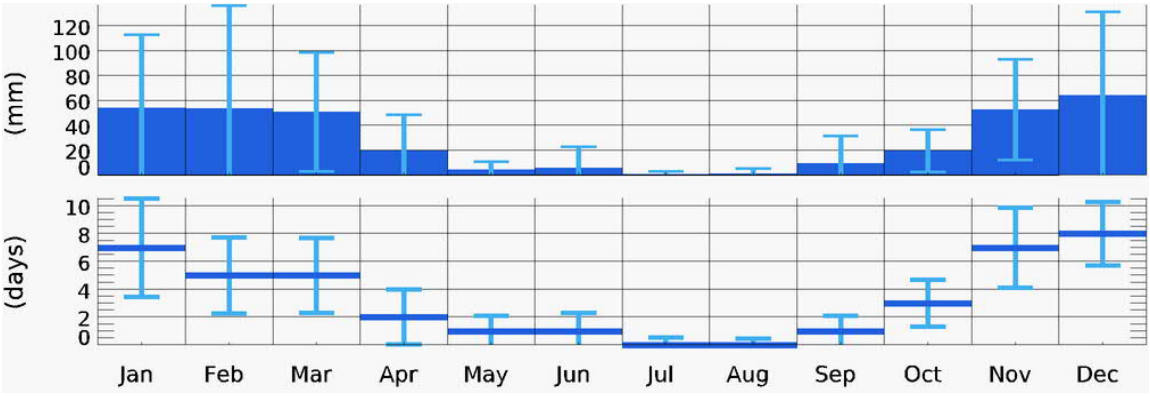


Figure 6-4: Lephalale Monthly Precipitation (Source meteoblue.com as per April 2019)

6.1.4 LOCAL WIND FIELD

Based on the available meteorological data, winds originate predominantly from the South West to the North East. Wind speeds are generally slow to moderate. Calm conditions, which are defined as wind speeds less than 1 m/s, occur infrequently. The chart in **Figure 6-5** below shows the days per month the wind reaches a certain speed around the Lephalale area.

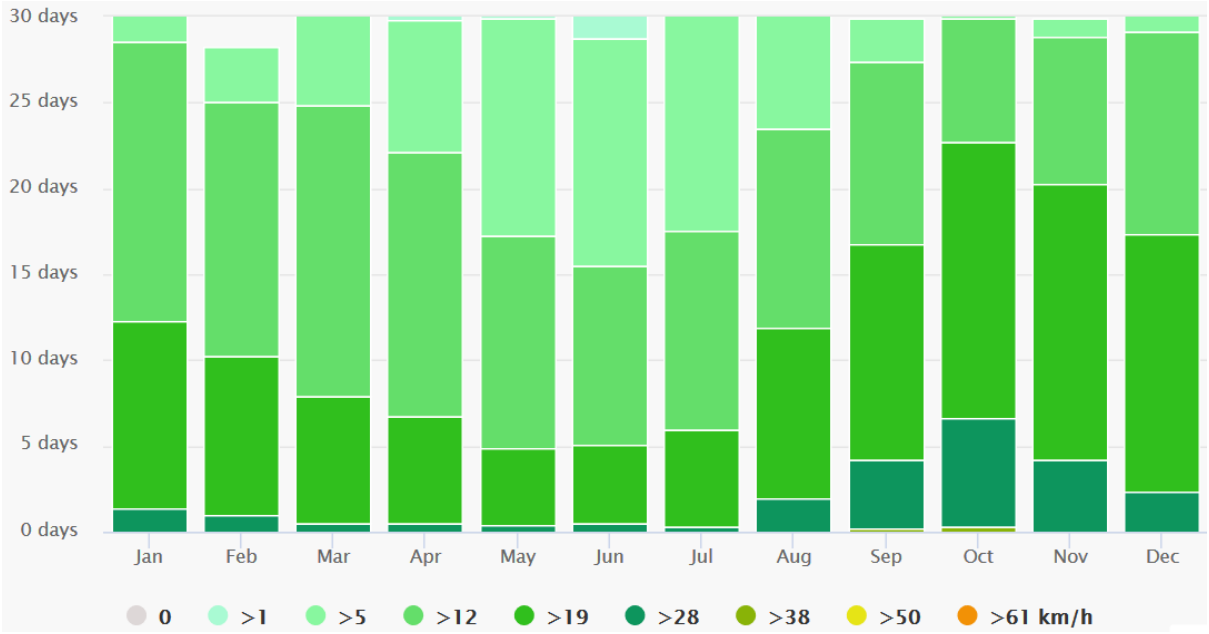


Figure 6-5: Lephalale Airport Wind Speed Chart (Source meteoblue.com as per April 2019)

The wind rose in **Figure 6-6** below shows how many hours per year the wind blows from a particular direction around the Lephalale area.

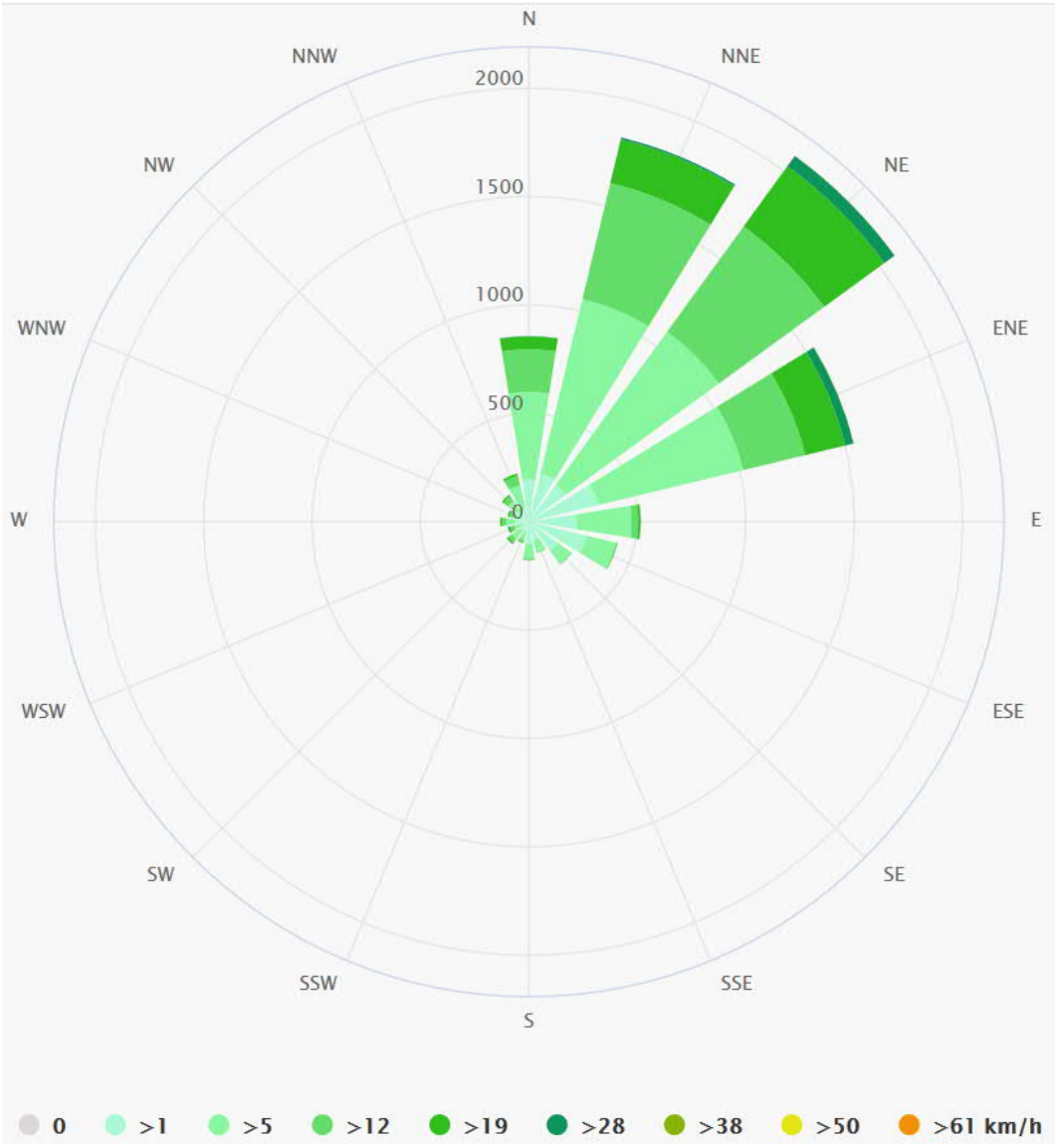


Figure 6-6: Lephalale Airport Wind Rose (Source meteoblue.com as per April 2019)

6.2 GEOLOGY

6.2.1 REGIONAL GEOLOGY

According to the Golder & Associates Hydrogeological Impact Assessment for the Medupi Flue Gas Desulphurisation Retrofit Project report dated February 2018, based on 1:250 000 geological map series 2326, Ellisras (Council for Geoscience), the regional geology in the area is characterised by sedimentary rocks of the Karoo Supergroup (**Figure 6-7**).The Waterberg Coalfield is composed of sediments of the Karoo Supergroupand forms a graben structure, bound in the north by the Zoetfontein fault and in the south by the Eenzaamheid fault (**Figure 6-7**). The Daarby fault subdivides the coalfield into the shallow open-cast able western part of the coalfield and the deeper north-eastern part of the coalfield (IGS 2008).The Zoetfontein fault resulted from pre-/during Karoo depositional tectonism, whilst the Eenzaamheid and Daarby faults resulted from post-Karoo depositional tectonism. All the units of the Karoo Supergroupare present in this coalfield, and the subdivision of the Karoo Sequence is mainly based on lithological boundaries, consisting, from top to bottom of the Stormberg Group (Letaba), followed by the Beaufort Group, the Ecca Group and the Dwyka Group. The Waterberg Group

represents the basin depositional floor, which is mainly composed of the Paleoproterozoic (mokolian) quartzites, arkoses and conglomerates. Regionally, the Waterberg sediments rest on the rocks of the Transvaal Sequence (IGS 2008).

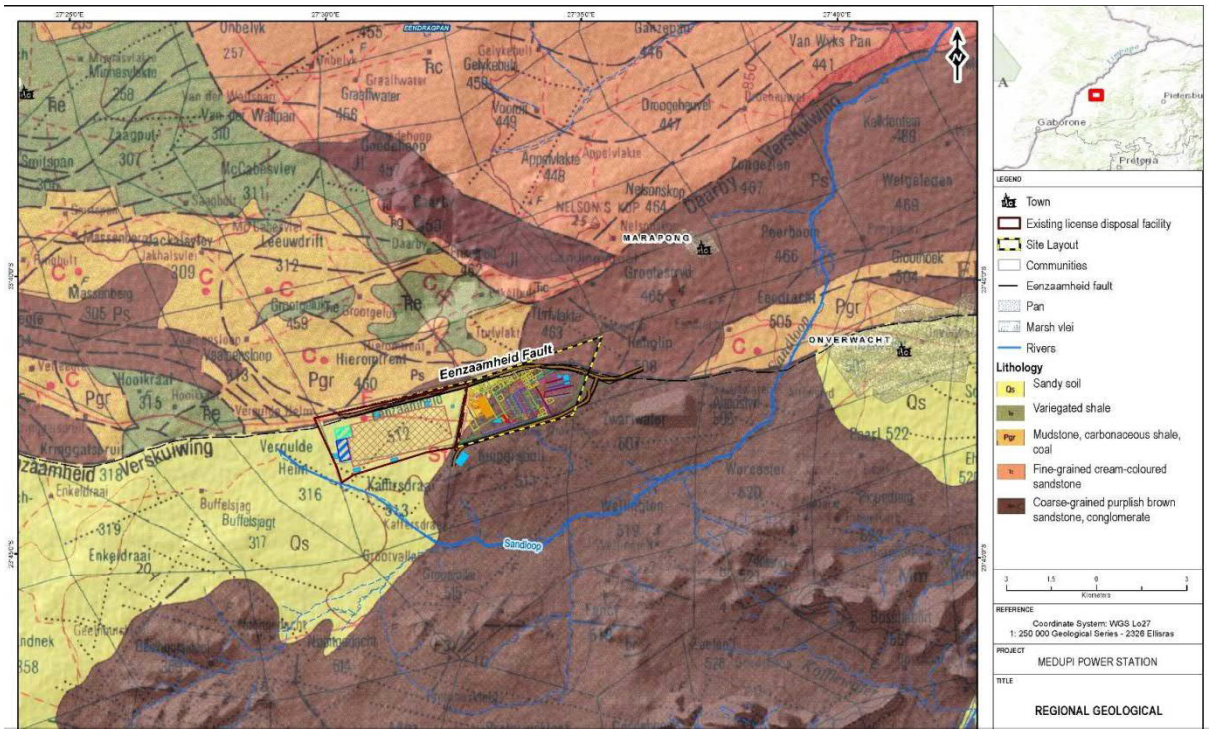


Figure 6-7: Regional Geology (Source Zitholele FGD FEIR, May 2018)

The Daarby fault is a major north-east, then north-west trending fault, assumed to be part of one set of events, as both legs exhibit the same throw and throw direction. Thus both faults are combined into one name. The Daarby fault has a down throw of 360m to the north, and the fault dips at an angle of between 50° and 60° to the north. It serves to bring the up-thrown Beaufort and Ecca Groups to the south into contact with the down-thrown Letaba, Clarens, Elliott and Molteno formations to the north (IGS 2008). The Eenzaamheid fault (**Figure 6-7**), situated south of the Daarby fault, and has a throw of 250m to the north, bringing the up-thrown Waterberg sediments on the southern side of the fault into contact with the down-thrown Beaufort and Ecca groups on the northern side of the fault. The angle of the Eenzaamheid fault is near vertical (IGS 2008).

6.2.2 LOCAL AND SITE GEOLOGY

The local geology of the area can be subdivided into a northern and southern type. The Matimba Power Station and all its facilities, except for the ash dump, as well as Grootegeluk Mine, lies on Karoo sediments. The existing licensed disposal facility, Medupi Power Station and the Matimba ash dump lie on Waterberg sandstone, just south of the Eenzaamheid fault (**Figure 6-8**).The existing licensed disposal facility and Medupi Power Station is underlain by the sediments of the Waterberg Group (siliclastic red bed successions).This is part of the up-thrown sediments comprising the fining upward conglomerate-quartzites facies assemblages of the Mogalakwena Formation. The Waterberg sediments are somewhat recrystallized and fully oxidised; hence the hardness and red colour of the rock. A thin but permeable layer of sandy topsoil overlies it (IGS 2008).

The Eenzaamheid fault separates the Waterberg rocks from the Karoo strata to the north. The proposed raw water pipeline project lies to the south of the fault. South of the fault, the site is generally overlain by sandy soil at surface. On the southern side of the Eenzaamheid fault, below the sandy soil the site is underlain by Waterberg sediments (**Figure 6-8**) comprising of sandstone, subordinate conglomerate siltstone and shale. The portion of the existing licensed disposal facility site north of the Eenzaamheid fault zone is underlain by Karoo sediments of the Beaufort and Ecca groups, comprising of mudstones, sandstone, grit, siltstone, carbonaceous shale and coal. This Eenzaamheid fault zone could act as a preferred groundwater flow path.

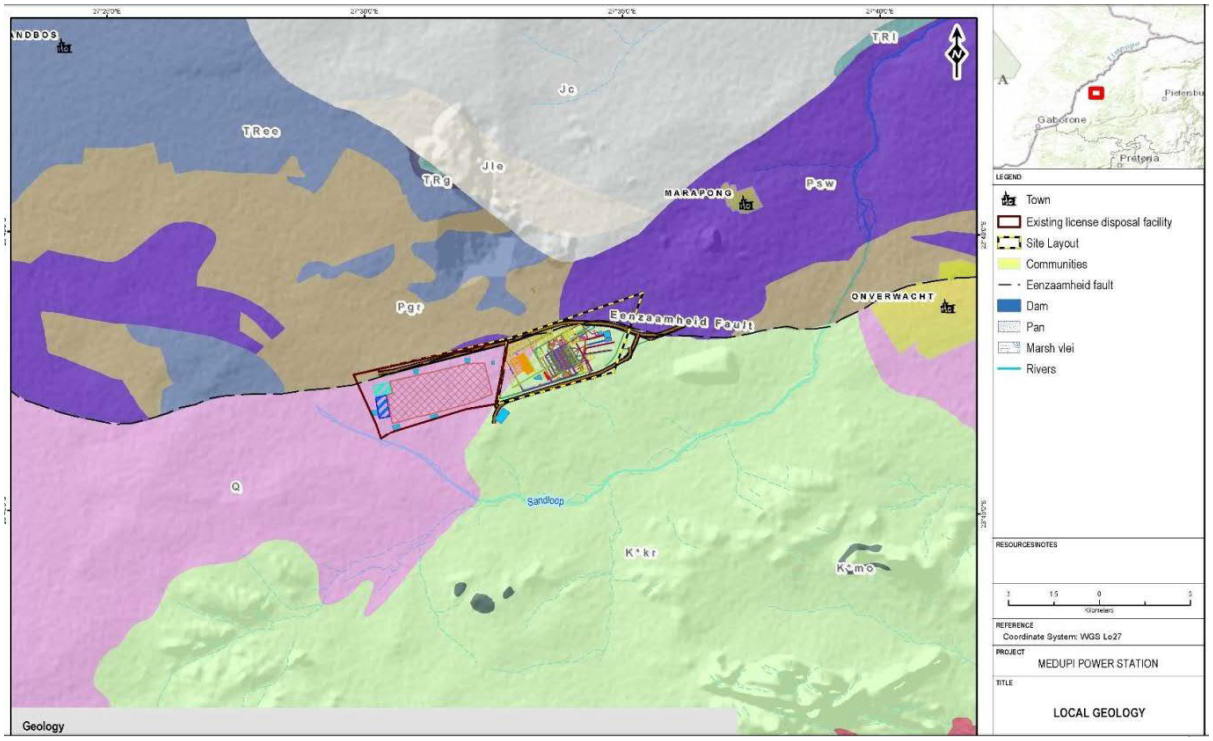


Figure 6-8: Local and Site Geology (Source Zitholele FGD FEIR, May 2018)

6.3 SURFACE WATER

Information relating to groundwater resources within the proposed study area was obtained from the Surface Water Impact Assessment and Baseline Report undertaken by Golder & Associates (Sithole & Jordaan, 2018), including literature sited within the study report.

6.3.1 REGIONAL DRAINAGE NETWORK

According to the Golder & Associates Surface Water Impact Assessment and Baseline Report for Medupi Power Station -FGD Project report dated January 2018, the study area is located within the A42J Quaternary catchment to the south of the Lephalale coalfield where numerous mining developments are foreseen predominantly to the north of the Eenzaamheid Fault line. There are no perennial streams originating within the area itself and the closest perennial river is the Mokolo into which the non-perennial Sandloop River drains. The Mokolo flows through A42J to the Limpopo River. Medupi is situated in the Mokolo catchment, with the non-perennial Sandloop River flowing around the site in an easterly to north easterly direction to confluence with the Mokolo River approximately 16 kilometres downstream of the town of Lephalale. This is a predominantly flat area of the Limpopo Water Management Area (WMA). Medupi is approximately 19 km west of the town of Lephalale and the Mokolo River and approximately 42 km south of the Limpopo River. Except for those areas where mining and power generation has commenced, the catchment is still largely natural with limited cultivated areas. The water resources are also limited. Game farming is a common land use in the area. The town of Lephalale has seen considerable growth in the past decade.

Based on previous studies, the nearest National Freshwater Ecosystem Priority Areas (NFEPA) listed system is the Sandloop (PES= C Moderately Modified) situated 3 km south-west of the proposed pipeline routes. No Threatened Ecosystems occur within the study area, the nearest being the Springbokflats Thornveld. According to the Limpopo conservation plan (C-Plan), the study area is situated within an Ecological Support Area (ESA) with parts of the FGD area (mainly associated with the Sandloop and southern properties) listed as a Critical Biodiversity Area (CBA).

WATER RESOURCE CLASSIFICATION AND RESOURCE QUALITY OBJECTIVES

The classification of significant water resources in the Crocodile (West), Marico, Matlabas and Mokolo catchments in accordance with the Water Resource Classification System (WRCS) was undertaken in 2011/ 2012 and finalised in 2013 (Department of Water Affairs, 2013). Classification of water resources aims to ensure that a balance is reached between the need to protect and sustain water resources on the one hand and the need to develop and use them on the other. The WRCS places the following principles at the forefront of implementation:

- Maximising economic returns from the use of water resources;
- Allocating and benefits of utilising the water resources fairly; and
- Promoting the sustainable use of water resources to meet social and economic goals without detrimentally impacting on the ecological integrity of the water resource.

Each quaternary catchment is classified as a Class I, II or III, defined as:

- Class I -Minimally used: Water resource is one which is minimally used and the overall condition of that water resource is minimally altered from its pre-development condition;
- Class II -Moderately used: Water resource is one which is moderately used and the overall condition of that water resource is moderately altered from its pre-development condition; and
- Class III -Heavily used: Water resource is one which is heavily used and the overall condition of that water resource is significantly altered from its pre-development condition.

The recommended Class for quaternary catchment A42J is a Class II (Department of Water Affairs, 2013). In this respect, mitigation implemented must be such that it will protect the water resources so that an ecological category of B/C is maintained. Ecological category refers to the assigned ecological condition by the Minster to a water resource that reflects the ecological condition of that water resource in terms of the deviation of its biophysical components from a pre-development condition. These ecological categories are in the order of A, B, C, and D with intermediate A/B, B/C, and C/D, where A is a well maintained ecological system and D is a poorly maintained system.

6.3.2 LOCAL NETWORK DRAINAGE MEDUPI POWER STATION

The Medupi Power Station is situated in the Limpopo Plain climate zone (Kleynhans et al. 2005). This climate zone is characterised by plains and lowlands, with low to moderate relief. The vegetation consists mostly of Bushveld and Mopane Veld. The study area is situated in the Steenbokpan area which lies in the A42J quaternary catchment.

The tributary of the Sandloop River drains from the North West to the southeast of the existing Medupi Station. The possible impacts to surface water would therefore be the potential reduction in catchment runoff and impacts from contaminants from the proposed project servitude.

6.3.3 STORMWATER MANAGEMENT SYSTEM

The existing water management system at Medupi includes:

- A dirty water management system to ensure that polluted water the power station and its associated infrastructure, as well as sediment-laden runoff from disturbed areas is separated from clean area runoff and that it is collected in Pollution Control Dams (PCD); and
- A clean water management system to divert water undisturbed by the power station's operations around the disturbed project footprint.

The majority of the pipeline is within the Medupi Power Station boundary and thus, any clean or dirty water generated during the construction period is diverted into the relevant system.

6.3.4 WETLANDS IN THE STUDY AREA (PREVIOUS ASSESSMENTS)

Due to the extent of the areas to be investigated, Natural Scientific Services (NSS) identified and delineated watercourses and wetland systems at a desktop level within a 500m buffer of the Medupi Power Station and

undertook ground-truthing during December 2015 and November 2016 within the areas identified. The main focus of the study was to investigate wetlands within the 500m buffer zone from the boundary of the Medupi Power Station since most of the Medupi Power Station footprint was already either under construction or totally transformed with the installation of infrastructure and support services.

The Sandloop is a tributary of the Mokolo River. The Sandloop has a Present Ecological State (PES) of moderately modified (C category) where the loss and change of natural habitats and biota have occurred but the basic ecosystem functions are still predominately unchanged. The Ecological Importance (EI) and Ecological Sensitivity (ES) are reported as Moderate and Low, respectively.

Four Hydro-geomorphic (HGM) wetland units were identified surrounding the Medupi Power Station, which include two southeast and one northeast draining Washes (SEW 1 – 3), and multiple inward-draining depressions (D1) (**Figure 6-9**). No wetland units were however identified within the study area depicted by the red shape in **Figure 6-9**, although SEW 2 is located just southeast of the study site outside the Medupi Power Station property boundary.

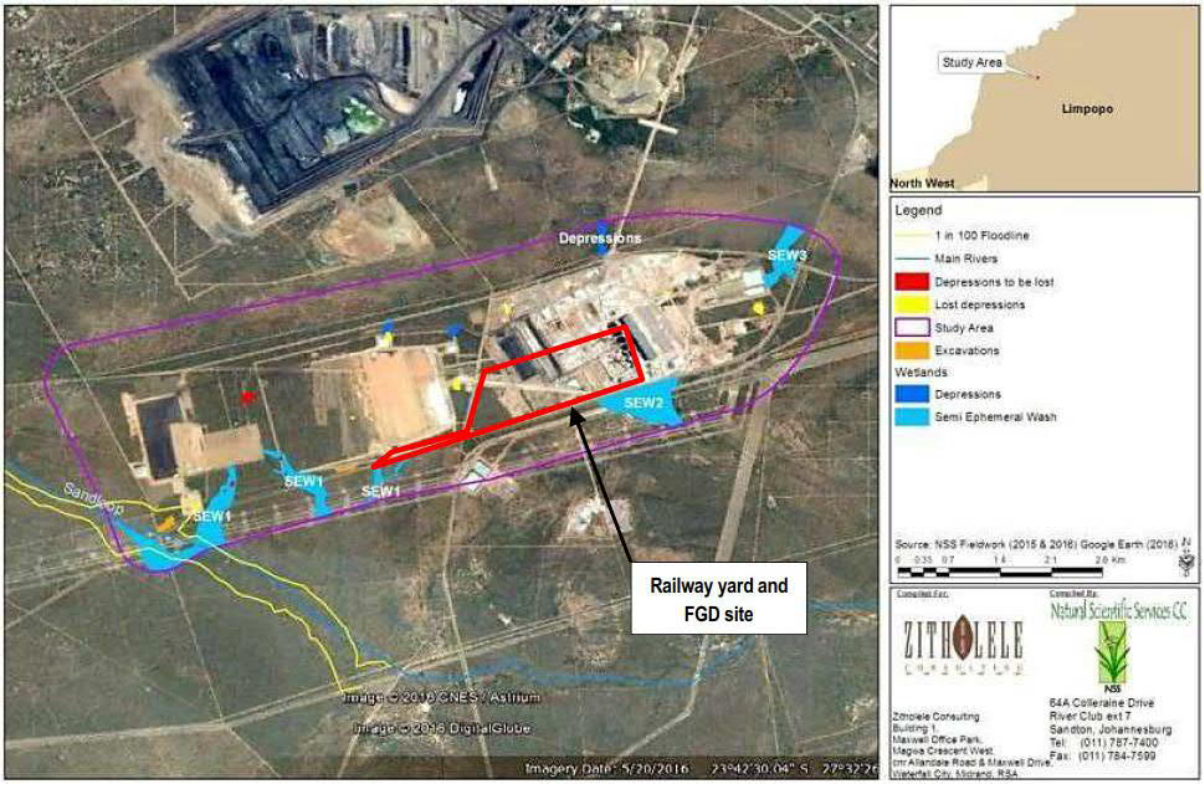


Figure 6-9: Wetlands Map

6.3.5 2019 WETLAND ASSESSMENT

According to the Wetland Habitat Impact Assessment report by WSP (**Appendix F-2**), an in-depth desktop assessment, utilising aerial imagery (2004 – 2017) and available datasets (WSP, 2016;NSS CC, 2018), was conducted to determine potential wetland or riparian habitats in the area under consideration. An in-field assessment was conducted during March 2019 and the confirmed wetlands were delineated and assessed, along with additional systems identified during the assessment. A total of three wetlands (D1, D2 and SEW 2) were identified within a 500m radius of the proposed pipelines.

The identified wetlands were classified into respective HGM units and are described below (**Table 6-1**; **Figure** 6-10). HGM units D1 and SEW 2 were also identified by NSS CC (2018).

An initial risk screening assessment was undertaken to determine whether the aforementioned wetlands would potentially be impacted on by the proposed pipeline. This followed a qualitative assessment approach that encompassed a rapid risk screening exercise. The screening exercise is not considered a risk matrix assessment

and therefore the rating is not a calculated representative of the severity and likelihood that a watercourse may be impacted.

Figure 6-10: Wetlands at Medupi Power Station

Owing to its proximity, wetland D1 was identified as the only wetland that may potentially be impacted on by the proposed pipeline (**Table 6-1**). The depression wetland unit identified (D1) on site is characterised by its endorheic character and is circular in shape. The D1 wetland is a relatively small enclosed basin and is typically ephemeral in nature, usually being intermittently filled to shallow water levels during the rainy season. This is typical of the depressions that are found in this region. The risk matrix assessment was also conducted for this wetland in order to understand and quantify the potential impacts of the proposed pipeline on the wetland.

Eskom have no intention of deviating from the proposed pipeline route and will stick to the stipulated 32 m corridor for construction activities. Furthermore, the laydown area within the vicinity of the Wetland D1 identified in the wetland assessment report should be on the opposite side of the proposed pipeline with no activities within a 10 m buffer of it as the wetland must be demarcated as a no-go area. This is because the overall risk rating in the surface water study was identified as low with regards to this wetland which was used as motivation for application of a GA to DWS. In the event operations or activities are done within Wetland D1's footprint, the risk rating becomes **medium to high** and there will be a need to apply for a WUL.

Table 6-1: Preliminary Impact Assessment

WETLAND ID	HGM UNIT	FURTHER ASSESSMENT	JUSTIFICATION
D1	Seasonal Depression	**Yes**	This wetland is located approximately 10m away from the to the proposed pipeline route; as such, the construction and operation of the pipeline will have the potential to impact on the wetland.

WETLAND ID	HGM UNIT	FURTHER ASSESSMENT	JUSTIFICATION
D2	Seasonal Depression	No	This wetland is located up gradient of the proposed pipeline route; as such, any surface water flows are not anticipated to enter to the wetland. The D2 wetland appears to have been modified due to the presence of the infrastructure associated with the Medupi Power Station.
SEW 2	Semi-Ephemeral Washes (NSS CC, 2018)	No	Although this wetland is located down gradient of the proposed pipeline route, impacts to this wetland have not been considered as there exists a railway line between this wetland and the proposed pipeline. The railway line is on a raised platform, therefore any surface water runoff from this area would be restricted from entering the SEW 2 wetland.

PES ASSESSMENT OF THE D1 WETLAND

The PES assessment of a wetland is based on an understanding of both catchment and on-site impacts and the impact that these aspects have on the wetland hydrology, geomorphology and vegetation. The level 1 WET-Health assessment determined the PES of the D1 wetland as being moderately modified resulting in a loss of natural habitat and biota ('C' Class) (**Table 6-2**).

Table 6-2: PES Assessment of Depression D

ASPECT	PES SCORE (OUT OF 10)	CLASS	JUSTIFICATION (IMPACT DESCRIPTION)
Hydrology	**3.5**	**C: Moderately Modified**	The surrounding land use has changed from natural to now containing the Power Station and associated infrastructure. Beside the D1 wetland, there exists an access road where trucks transport ash on a frequent basis. The changes to the surrounding landscape has had an impact on hydrology of the wetland. The hydrological integrity of the wetland is assessed to deteriorate slightly over the next 5 years.
Geomorphology	**2.9**	**C: Moderately Modified**	The surrounding land use has changed from natural to now containing the Power Station and associated infrastructure. Beside the D1 wetland, there exists an access road where trucks transport ash on a frequent basis. The changes to the surrounding landscape has had an impact on geomorphology of the wetland. The increased sediments from the adjacent road and the ash dump have contributed to the modifications of this system. The geomorphological integrity of the wetland is assessed to deteriorate slightly over the next 5 years.
Vegetation	**3.4**	**C: Moderately Modified**	The surrounding land use has changed from natural to containing the Power Station and associated infrastructure. As a result, the natural vegetation has been altered. The vegetation integrity of the wetland is assessed to deteriorate slightly over the next 5 years.

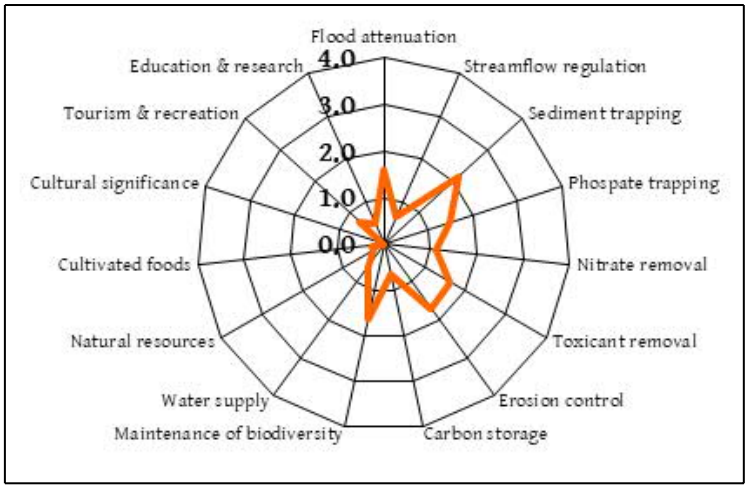
Overall	**3.3**	**C: Moderately Modified**	**Moderately Modified**. A significant change in ecosystem processes and loss of natural habitat and biota and has occurred.

WETLAND ECOLOGICAL FUNCTION ASSESSMENT

The overall goods and services provided by the wetland (D1) were assessed as being mostly low to moderate (**Table 6-3**). Indirect services are the most important and include water quality enhancement, maintenance of biodiversity and erosion control. Bullfrogs have been located within this system.

Table 6-3: EcoServices of the Assessed Units

ECOSYSTEM GOODS & SERVICES	OVERALL SCORE (OUT OF 4)
Flood attenuation	1.6
Streamflow regulation	0.7
Sediment trapping	**2.2**
Phosphate trapping	**1.5**
Nitrate removal	1.1
Toxicant removal	**1.6**
Erosion control	**1.7**
Carbon storage	0.7
Maintenance of biodiversity	**1.6**
Water supply for human use	0.6
Natural resources	0.3
Cultivated foods	0.3
Cultural significance	0.0
Tourism and recreation	0.7
Education and research	0.5



ECOLOGICAL IMPORTANCE AND SENSITIVITY

The D1 wetland was assessed as having an overall moderate EIS (**Table 6-4**) driven by the hydrological functional importance, i.e. erosion control, water quality enhancement and maintenance of biodiversity. This is due to the current functionality of the wetland and the surrounding land use. It is not classified as 'Wetland FEPA' (Nel *et al.*, 2011) and is thus not considered important in meeting national wetland conservation targets. The wetland has low direct benefits to society mainly due to the lack of harvestable resources.

Table 6-4: The EIS Assessment for the D1 Wetland

UNIT	ECOLOGICAL/ BIOLOGICAL IMPORTANCE	FUNCTIONAL/ HYDROLOGICAL IMPORTANCE	DIRECT BENEFITS TO SOCIETY	OVERALL IMPORTANCE (/4)	
D1	1.33	1.38	0.40	1.38	**Moderate**

6.4 GROUNDWATER

Information relating to groundwater resources within the proposed study area was obtained from the Hydrogeological Impact Assessment Study undertaken by Golder & Associates (Brink & van der Linde, 2018), including literature sited within the study report.

6.4.1 REGIONAL GROUNDWATER

Two distinct and superimposed groundwater systems are present in the geological formations of the coal fields in South Africa. They are the upper weathered aquifer and the system in the fractured rock below.

The Weathered Aquifer System generally occurs in the top 5-15 m and normally consists of soil and weathered rock. The upper aquifer is associated with the weathered horizon. In boreholes, water may often be found at this horizon. The aquifer is recharged by rainfall.

In a Fractured Aquifer System, grains in the fresh rock below the weathered zone are well cemented, and do not allow significant water flow. All groundwater movement therefore occurs along secondary structures such as fractures, cracks and joints in the rock. These structures are best developed in sandstone and quartzite, hence the better water-yielding properties of the latter rock type. Dolerite sills and dykes are generally impermeable to water movement, except in the weathered state.

6.4.2 GROUNDWATER QUALITY

An analysis of groundwater monitoring results from 2016 were undertaken and it was found that the water quality of the existing boreholes is largely poor quality, with water quality classes ranging from Class 0 (Ideal water quality) to Class IV (Unacceptable water quality).

6.4.3 REGIONAL AQUIFER RECHARGE

From the published hydrogeological maps (DWAF 1996) the average recharge for the study area is shown as between 10 to 15mm per annum.

6.4.4 GROUNDWATER VULNERABILITY

Groundwater vulnerability gives an indication of how susceptible an aquifer is to contamination. Groundwater vulnerability at the Medupi Power Station is shown on the national groundwater is indicated as medium.

6.4.5 GROUNDWATER LEVELS AND FLOW DIRECTIONS

From the available data and previous groundwater studies undertaken in the area, groundwater levels ranged from between 4.41 to 69.98 meters below ground level (mbgl), with the average water level as 30.4mbgl. The groundwater flow from the study area is primarily away from the site, towards the east/south-east and northeast towards the non-perennial Sandloop River.

6.5 LAND-USE CAPABILITY

The Specialist Soils and Land Capability study conducted by Earth's Sciences Solutions in support of the FGD project was used to support this section.

6.5.1 LOCAL SOILS

The major attributes of the groupings of soil include (**Figure 6-11**), the soil depth, structure and texture. These variables have been used to construct a soils map of the dominant soils units. These have been defined as:

- Shallow (<400mm) sandy to silty loam(salm/silm);
- Moderate to shallow (400mm to 600mm) sandy loam(salm);
- Moderate to deep (500mm to 750mm) sandy loam; and sandy clay loams(sacllm); and
- Wet based soils with a variety of depths and clay composition.

In line with the Taxonomic classification used, the major or dominant soil forms mapper include those of the orthic phase Hutton, Clovelly, Glenrosa and Mispah forms with sub dominant soils of the Tukulu, Valsrivier and Shortlands Form, while the major hydromorphic forms mapped includethe Glencoe, Dresden, Avalon, Pinedene, Bloemdal and Westleigh forms. The semi-arid climate and negative water balance combined with the horizontal attitude of the sedimentary host lithologies that characterise the Karoo sediments in the area have aided in the development of evaporites within the vadose zone. These include calcrete, and in places ferricrete or laterite (Ouklip) formation as a feature of some of the soil profile. The presence of a hard pan calcrete and in places ferricrete and plinthic horizons is considered of importance to the soil moisture regime and in many cases is the reason for wet features within the soil profile (barrier layer). This moisture is important to the biodiversity, the presence of pans and water features within the landscape, and the success or failure of the wetland systems in the extreme. These soils classify as highly sensitive where they occur within the top 500mm of the soil profile. In addition to the geomorphological aspects mentioned above, soil texture and structure also played a role in the soil classification and the resultant sensitivity of the materials mapped. The fine to medium grained nature of the top soils, the relatively low clay contents (<12%) and the generally low organic carbon renders the majority of the top soils highly sensitive to erosion. This is only tempered by the relative flatness of the topography for all but a few areas, with a resultant moderate to low erosion index for most of the site if not well protected. Once the cover is disturbed or removed, the potential for erosion is increased.

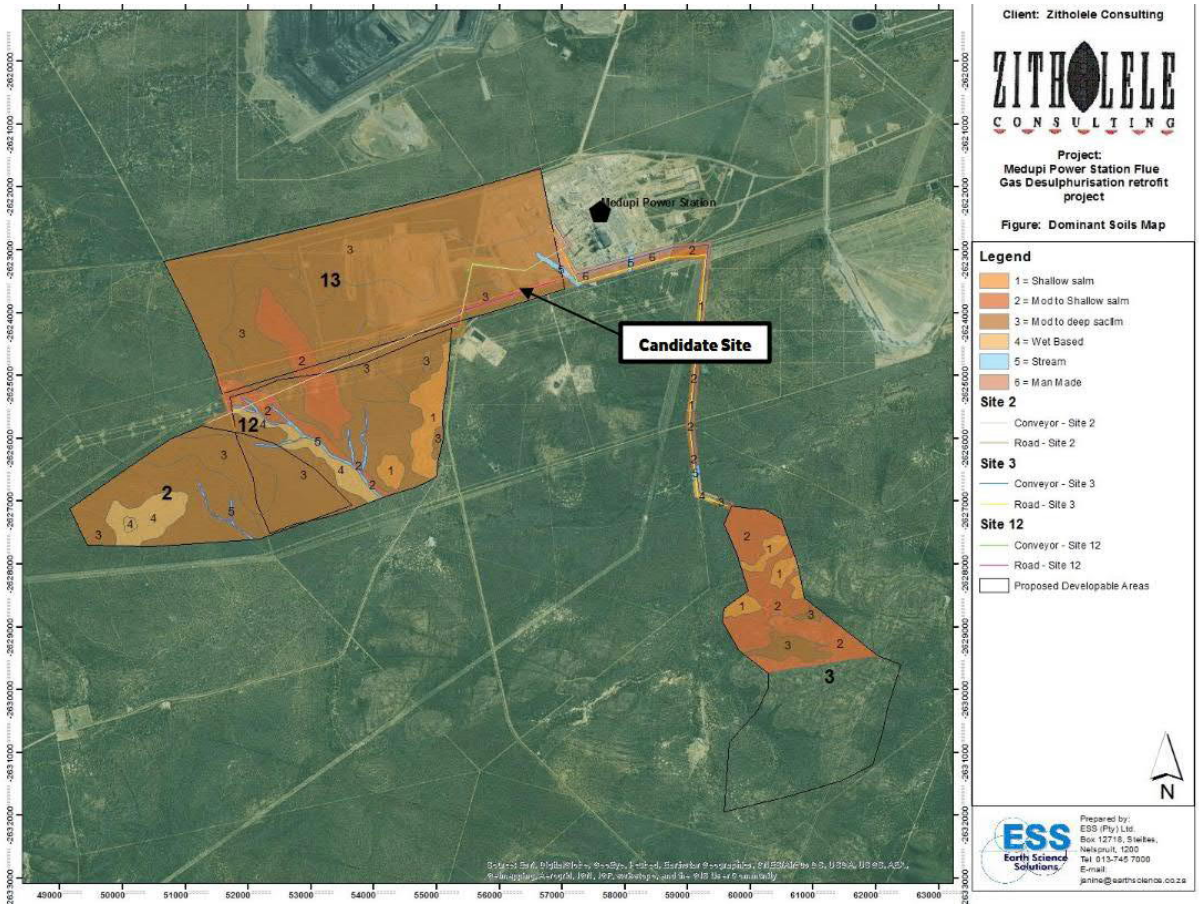


Figure 6-11: Dominant Soils Map

The shallower soils comprise for the most part fine to medium grained sandy top soils on lithocutanic subsoil (Glenrosa) or sandy loams on a hard rock base (Mispah). These soils are limited with, the majority of the area comprising deeper sandy loams and silty clay loams (800mm to 1.200mm) of the Hutton and Clovelly soil form. The shallower soils and wet based materials are considered to be more sensitive/vulnerable in terms of their biophysical and ecological functionality and although limited in extent on the area of concern, their presence downslope of the site is noted. Hydromorphic soils are often associated with wetlands or the transition to the wetlands, are generally found associated with either perched seep zones were the soils have been restricted within a concave land form, or in association with the moist grasslands and valley bottoms. Overall, the effective rooting depths (utilisable soil-to top of mottled horizon) vary from 500mm to over 800mm, the area of concern returning relatively much deeper and slightly more productive (better nutrient status, depth and water holding capabilities) land capability ratings than many of the other sites surveyed.

6.5.2 SOIL ERODIBILITY (E.I.)

The erosion indices for the dominant soil forms on the study sites classify as moderate to high. This is largely ascribed to the low, or at best moderate clay content of the "A" horizons, and the low organic carbon content. These factors are tempered somewhat by the relative flatness of the terrain for all but a few areas, and the generally well conserved vegetative cover (all but the shallow soils and over utilised valley bottoms). It should be noted however, that the vulnerability of the subsoil's to erosion once the vegetative cover and topsoil layer have been disturbed or removed is markedly higher than for undisturbed soils. Good management of these soils for erosion and compaction will be essential.

6.5.3 PRE-DEVELOPMENT LAND CAPABILITY

The land capability of the study area was classified according to the Canadian Land Inventory and Chamber of Mines Guidelines (1991). The criteria for this classification are set as;

1 Criteria for Wetland

- Land with organic soils or supporting hygrophilous vegetation where soil and vegetation processes are water dependant.

2 Criteria for Arable Land

- Land, which does not qualify as a wetland;
- The soil is readily permeable to a depth of 750 mm;
- The soil has a pH value of between 4.0 and 8.4;
- The soil has a low salinity and SAR;
- The soil has less than 10% (by volume) rocks or pedocrete fragments larger than 100 mm in the upper 750 mm;
- Has a slope (in %) and erodibility factor (K) such that their product is <2.0; and
- Occurs under a climate of crop yields that are at least equal to the current national average for these crops.

3 Criteria for Grazing Land

- Land, which does not qualify as wetland or arable land;
- Has soil, or soil-like material, permeable to roots of native plants, that is more than 250 mm thick and contains less than 50 % by volume of rocks or pedocrete fragments larger than 100 mm; and
- Supports, or is capable of supporting, a stand of native or introduced grass species, or other forage plants utilisable by domesticated livestock or game animals on a commercial basis.

4 Criteria for Wilderness Land

- Land, which does not qualify as wetland, arable land or grazing land.

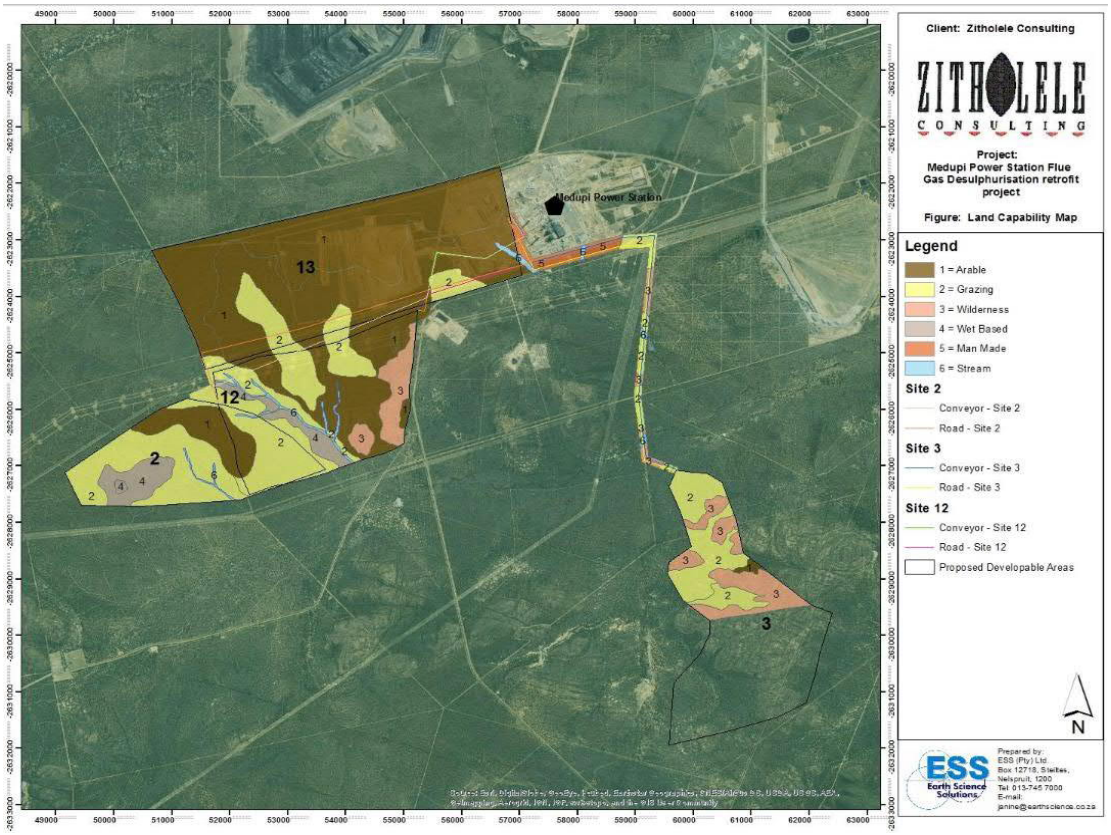


Figure 6-12: Land Capability Map

6.6 AIR QUALITY

Information relating to the air quality within the proposed study area was obtained from the Air Quality Specialist Report undertaken by Airshed Planning Professionals (von Gruenewaldt, et al., 2018), including literature sited within these study report.

In the evaluation of air emissions and ambient air quality impacts reference is made to National Ambient Air Quality Standards (NAAQS) for compliance. These standards generally apply only to a number of common air pollutants, collectively known as criteria pollutants. Criteria pollutants typically include SO_2, NO_2, carbon monoxide (CO), inhalable particulate matter, (including Thoracic particulate matter with an aerodynamic diameter of equal to or less than 10 µm (PM_{10}) and Inhalable particulate matter with an aerodynamic diameter equal to or less than 2.5 µm ($PM_{2.5}$), benzene, ozone and lead. For the proposed Project, pollutants of concern included SO_2, NO_2, PM_{10} and $PM_{2.5}$ (screened against NAAQS) and metals within the ash deposition facility (screened against international health effect screening levels).

6.6.1 REGIONAL AIR QUALITY

The DEA identified the potential of an airshed priority area in the vicinity of the Waterberg District Municipality (Government Gazette, Number 33600; 8 October 2010). This was later expanded to include the Bojanala Platinum District Municipality, North-West Province (Government Gazette, Number 34631; 30 September 2011) and the Waterberg-Bojanala Priority Area (WBPA) was officially declared on 15th June 2012 (Government Gazette, Number 35435). The Medupi Power Station therefore falls within the Waterberg-Bojanala Priority Area.

The WBPA Air Quality Management Plan: Baseline Characterisation was released for public comment on the 7th August 2014 (SAAQIS, 2014, access date: 2014-08-21). This Baseline Characterisation reported that power generation activities contribute 95% of SO_2, 93% of NO_2 and 68% of the particulate emissions across the Waterberg District Municipality.

6.6.2 LOCAL AIR QUALITY

Existing sources of atmospheric emissions which occur in the vicinity of the proposed development sites include:

- Matimba Power Station and its associated ash dump;
- Coal mining operations (such as Grootegeluk coal mine situated just north of the Medupi Power Station);
- Brickworks operating at Farm Hanglip;
- Household fuel combustion;
- Potential veld fires (infrequent);
- Sewage works (Farm Nelsonskop);
- Windblown dust from open areas and agricultural activities; and
- Vehicle exhaust releases and road dust entrainment along paved and unpaved roads in the area.

Ambient air quality monitoring data was obtained from two sources close to the study area, i.e. a DEA monitoring station located at Lephalale and an Eskom operated monitoring station located at Marapong. The DEA monitoring station located in Lephalale is the closest monitoring station with sufficient data relating to NO_2, PM_{10}, $PM_{2.5}$ and SO_2 short-term ground level concentrations.

Air quality sensitive receptors located around the study area include residential areas such as Marapong northeast of the existing Matimba Power Station, a residential settlement to the northwest of Matimba Power Station and Lephalale situated to the southeast and east of the existing power station respectively. Farm households are scattered through the area, with livestock farming (primarily cattle and game) representing the main agricultural land-use in the area.

6.7 NOISE

Information relating to noise within the proposed study area was obtained from the Noise Specialist Report undertaken by Airshed Planning Professionals (von Gruenewaldt & von Reiche, 2018), including literature sited within this report.

Since the perception of noise is subjective to the observer over a fairly short distance no regional description of noise levels is possible. The noise levels at the study site is however characterised by existing construction activities associated with the construction of the Medupi Power Station.

Noise Sensitive Receptors (NSRs) generally include private residences, community buildings such as schools, hospitals and any publicly accessible areas outside the industrial facility's property. Homesteads and residential areas which were included in the assessment as NSRs were identified from available maps and satellite imagery. The NSRs identified during the noise assessment study is shown geographically in **Figure 6-13** below.

Airshed conducted a baseline noise survey on 3 September 2015 at three locations around the Medupi Power Station. The survey consisted of 60-minute samples during the day and 30 minute samples during the. For noise measurements conducted in September, the equivalent day/night noise levels at 2 of the locations correspond to typical noise levels prevalent in suburban districts. The equivalent day/night noise levels at the third location correspond to typical noise levels prevalent in a central business district, which is as a result of fast travelling heavy vehicles on the road in the vicinity of the sampler.

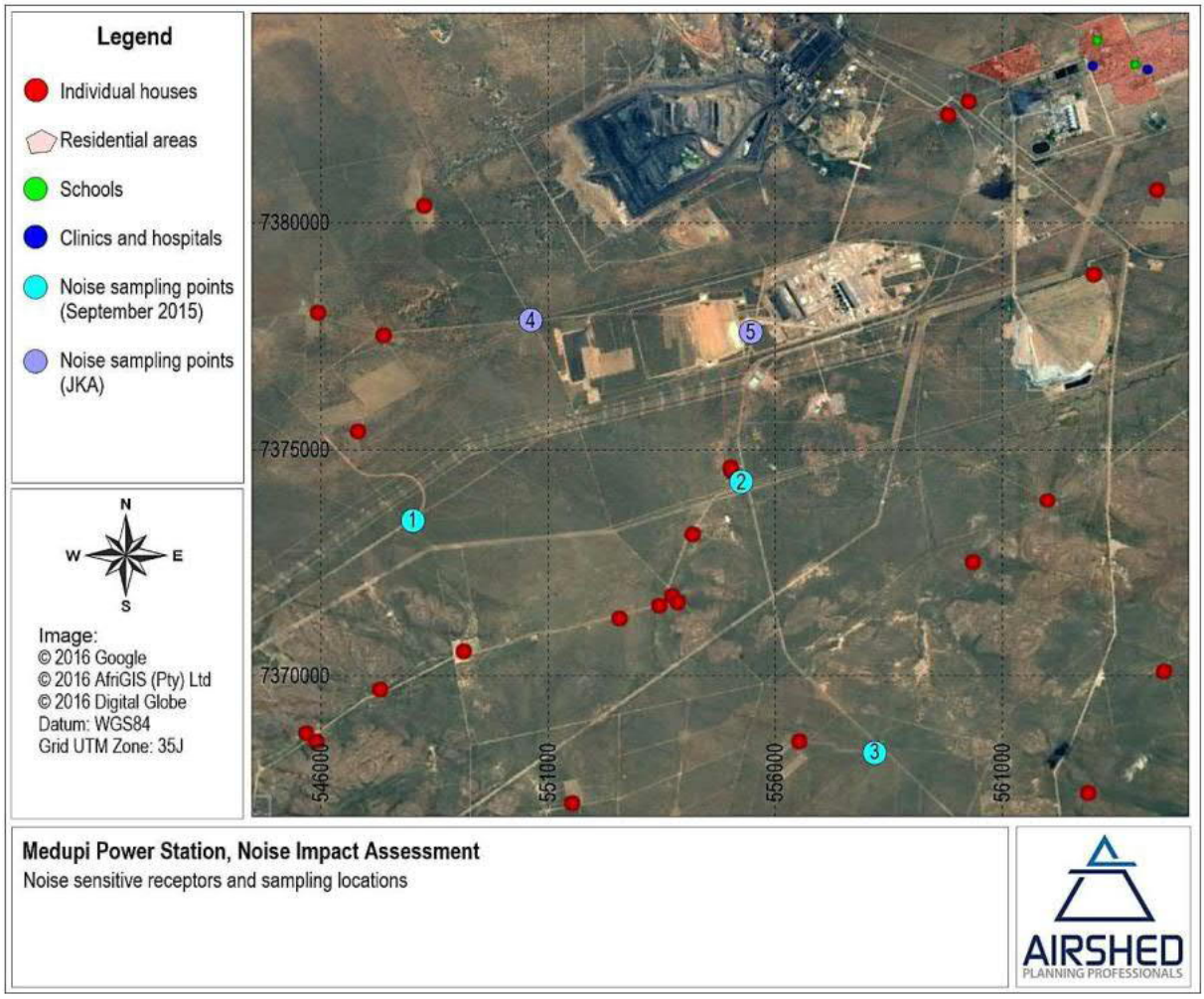


Figure 6-13: Noise Sensitive Receptors at Medupi Power Station

6.8 BIODIVERSITY

The Biodiversity Company was assigned to conduct the ecological component (fauna and flora) for the proposed makeup and raw water supply pipelines. Since extensive studies had been conducted on the site in support of the FGD project EIA process, the DEA, upon request from the EAP and Eskom during a pre-application meeting indicated that since the FGD studies were recent, a letter indicating their validity from a specialist would suffice (**Appendix F-3**).

From an ecological perspective, the Medupi Power Station (Medupi Power Station) premises has been extensively studied with results presented in several reports by Bathusi Environmental Consulting (BEC) and Natural Scientific Services (NSS). Specifically, with regards to the FGD project, the latest and most relevant report is the NSS (2018) report entitled "Biodiversity and Wetland Assessment for the FGD Project at Medupi Power Station, Lephalale, Limpopo". Initially this study focused on the Ash Disposal Facility and surrounding Medupi properties but in 2017 the scope was broadened to include all intact areas within the FGD footprint area as well as within a 500 m radius surrounding this area. This study also incorporated data from previous (BEC) studies as well studies from the nearby Matimba Power Station (NSS, 2013) and, in total, spanned a four year period from 2014 to 2018. The NSS study provided both a broad overview of the legislative (ecological) and biophysical environment as well as a more site-specific assessment. This involved a detailed account of the site's flora as well as its mammal, bird, reptile, amphibian and selected terrestrial macro-invertebrate communities. This was the study The Biodiversity Company reviewed and provided an opinion on in the letter.

The Biodiversity Company is of the opinion that the terrestrial work done to date within the FGD project area is up to date and of sufficient detail to adequately represent the terrestrial fauna and flora associated with the proposed FGD makeup and raw water supply pipelines although the pipelines were not part of the study.

6.8.1 FLORA

From a floral perspective, four main non-disturbed vegetation communities were identified namely *Senegalia erubescens - Grewia Thornveld, Senegalia nigrescens - Grewia* Open Veld, *Senegalia nigrescens - Combretum apiculatum* woodland and *Senegalia* Dominated Wetland Flats. Overall, however, the vegetation on site is described as having a low diversity. Although a number of protected tree species occur, in this case Maroela (*Sclerocarya birrea subsp africana*) and Shepard's Tree (*Boscia albitrunca*), no red data listed floral species were reported for the study area (although one Near-Threatened herbaceous species may occur). Nevertheless, a limited amount of intact habitat still remains (albeit somewhat degraded). In these areas the most noteworthy communities are the *Senegalia nigrescens –Combretum apiculatum* dominated woodland and the vegetation associated with the pans and ephemeral washes (particularly those associated with the Sandloop FEPA) which were afforded a Very High and Moderate -High sensitivity respectively.

The Biodiversity Company conducted a screening of the area during which the presence of flora species of conservation concern were assessed in March 2019. It must be noted that the proposed pipeline servitude traverses a much smaller footprint than the greater FGD study area and also traverses on already impacted areas. This limits the impact on flora. The Biodiversity Company is of the view that the project is likely to have a low impact significance on local flora.

6.8.2 FAUNA

From a faunal perspective, the report reveals a list of 43 mammal, 158 birds, 20 reptile, 16 frog, 9 butterfly, 2 dragonfly and 1 scorpion species for the greater study area. The report states that several noteworthy species (protected or red data listed) were recorded within greater study area. These included Serval (*Leptailurus serval*), Brown Hyaena (*Hyaena brunnea*), White-backed Vulture (*Gyps africa*nus), Tawny Eagle (*Aquila rapax*), Red-billed Oxpecker (*Buphagus erythrorhynchus*) and African Bullfrog (*Pyxicephalus adspersus*). Additionally, anecdotal reports suggest the presence of Leopard (*Panthera pardus*), Cheetah (*Acinonyx jubatus*), African Wild Dog (*Lycaon pictus*), Spotted Hyaena (*Crocuta crocuta*), Pangolin (*Manis temminckii*), Southern African Python (*Python sebae*) and Nile Crocodile (*Crocodylus niloticus*) within surrounding properties. However, as mentioned in the report, only a very limited number of these species are expected to occur within the fenced FGD footprint area and in turn, the proposed pipeline route. Here no suitable breeding habitat exists for the regions red-listed raptor species (lack of suitably high trees and disturbance levels likely preclude breeding). Of the various

noteworthy mammal species only Serval, Brown Hyaena may occur. Perhaps the most relevant and noteworthy species are African Bullfrog (Protected Species), which occur in notable abundance in the greater area and may potentially occur within some of the pans adjacent to the pipeline routes.

During their site survey in March 2019, The Biodiversity Company set camera traps to get a general idea of the fauna diversity currently found in the area (**Figure 6-14**) and to substantiate the previous studies.

It must be noted that the proposed pipeline servitude traverses a much smaller footprint than the greater FGD study area and also traverses on already impacted areas. This limits the impact on fauna. The Biodiversity Company is of the view that the project is likely to have a low impact significance on local fauna.

Figure 2: Some of the species observed in the project area during the screening of the area: A) Chacma Baboon (Papio ursinus), B) Steenbok (Raphicerus campestris), C) Domestic cat (it is recommended that a control plan be implemented) and D) Warthog (Phacochoerus africanus).

Figure 6-14: Fauna in Study Area

6.9 HERITAGE AND PALAEONTOLOGY

Information relating to the heritage, archaeological and palaeontological resources within the proposed study area was obtained from the Heritage Impact Assessment Specialist Report (Tomose & Sutton, 2018) and Palaeontological Impact Assessment Specialist Report (Tomose & Bamford, 2018) undertaken by NGT Holdings, including literature sited within this report.

6.9.1 HERITAGE AND PALAEONTOLOGICAL BASELINE AT STUDY AREA

Known archaeological resources within the Medupi Power Station footprint include Stone Age occurrences, Rock Art, Iron Age occupations and historical activity. The Phase II HIA study of the Medupi Power Station footprint conducted by Mbofho Consulting and Project Managers has resulted to information that has been used to construct the receiving environment showing areas known to have contained graves. These are graves that according to the local communities were destructed with the construction of Medupi Power Station and the associated infrastructure. Two sacred pools were identified close to the project area. The first one is to the south and outside

of the Medupi Power Station site boundary. This sacred pool was previously used by the community to hold baptism ceremonies as well as watering the community's stock (cattle). This pool was identified in previous surface water studies as Wetland SEW 2 identified in Section 6.3.4 of this report. This pool has a high significance rating but also has a good conservation status as it has not been disturbed. The second sacred pool is located within the Medupi Power Station site boundary and is a seasonal pool (a lake which collects water in the rainy season). It was also used by the by the community to hold baptism ceremonies as well as watering the community's stock (cattle). The second sacred pool has a medium significance rating and a fairly good conservation status as it has been previously partially destroyed during earthmoving / construction activities, however, it will not be impacted by the proposed project activities.

The proposed pipeline activities will not affect both sacred pools as they are not within the proposed 32 m corridor for operations. With regards to Sacred Pool 1, the closest point of the pipeline will be at least 260 m away. Furthermore, there is a tarred road (Kuipersbult Road) a railway line as well as the Medupi Power Station site boundary fence between the pool and the proposed make-up water pipeline. These act as a buffer and will ensure no impact on the pool. Sacred Pool 2 is approximately 50 m away from the closest point of the make-up water pipeline. There is also a tarred access road between the proposed pipeline and the pool which will act as a buffer and limit any potential impacts due to construction activities.

The location of the scared pools with respect to the proposed project route is indicated in **Figure 6-15** below.

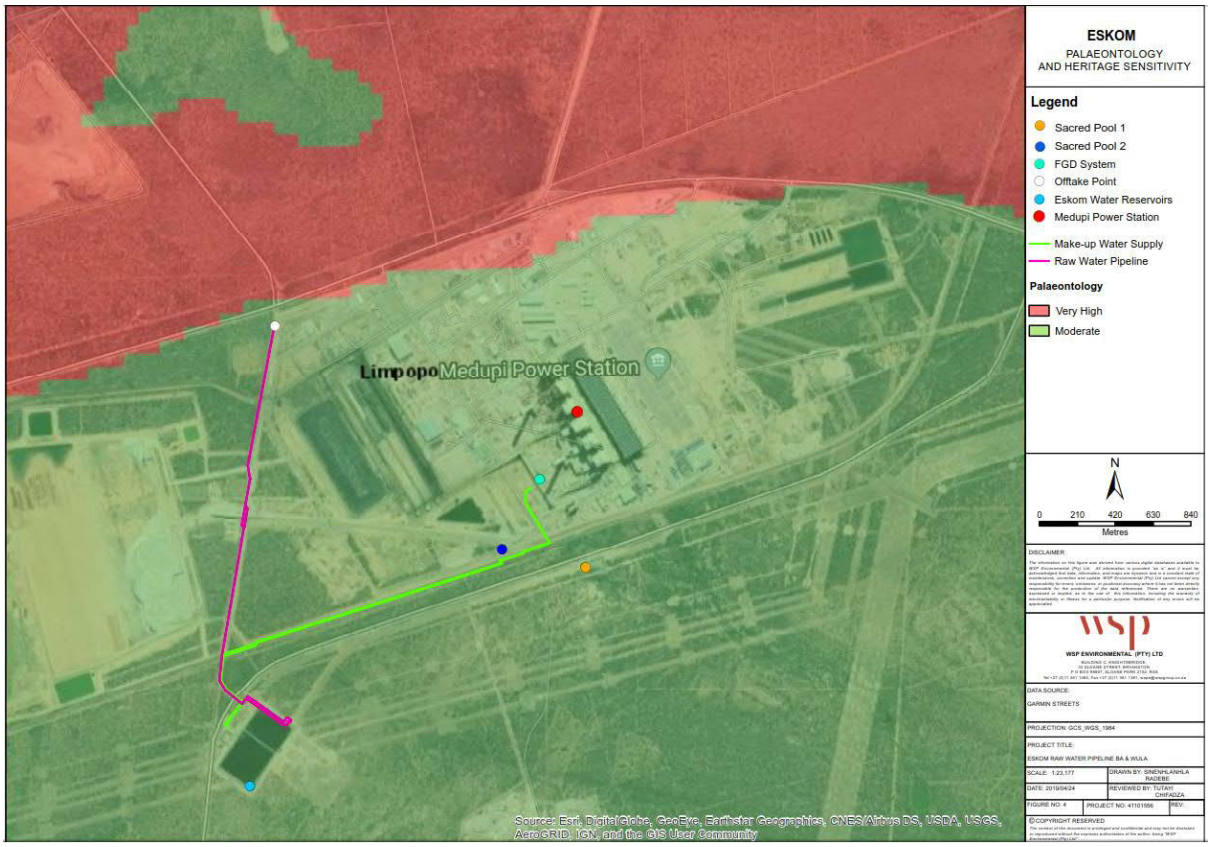


Figure 6-15: Location of Sacred Pools

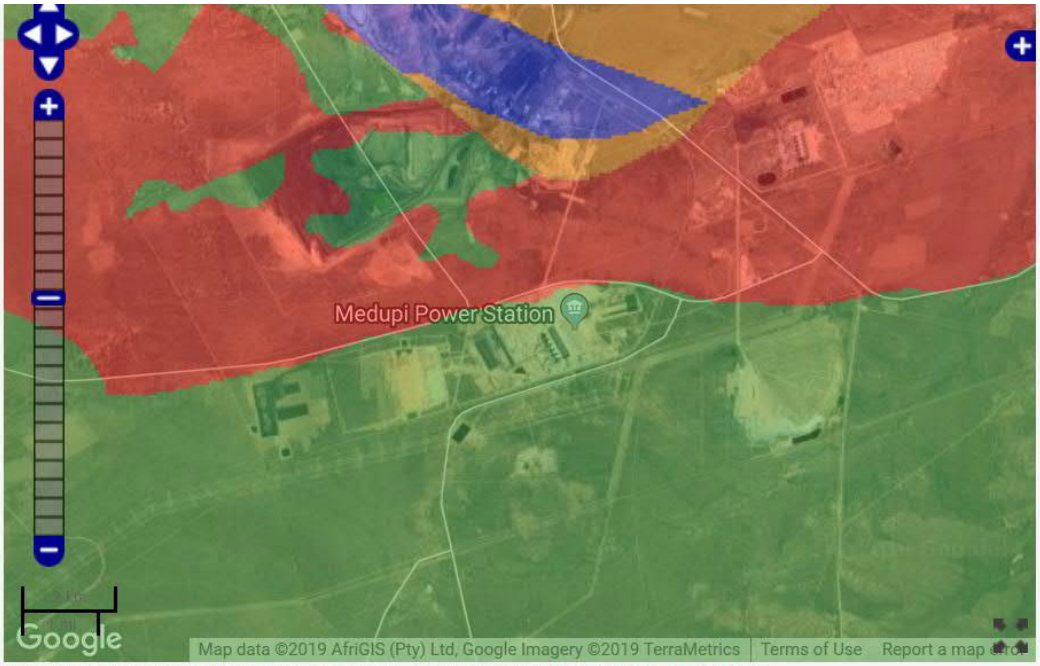
The study undertaken by Tomose & Sutton (2018) did not result to the identification of any heritage resources. A survey of the Medupi precinct in which the FGD technology and the proposed railway yard is to be constructed was undertaken by Nkosinathi Tomose in January 2018. The proposed development area for the construction of the FGD technology and the proposed railway yard has been significantly transformed through previous construction activities. For example, the foundations for the FGD technology are within an area that was deeply excavated during the construction of the Medupi Power Station six units. The proposed railway yard is within an area where there has been disturbances associated with Medupi Power Station associated infrastructure such as storm water management systems and site roads.

A potential grave site, however, was identified outside of the current project footprint for the railway yard and FGD infrastructure, but could potentially be impacted by additional construction and expansion of the area. This grave is situated between the Medupi Power Station. The possible grave site is located outside the proposed pipeline footprint.

Len van Schalkwyk of eThembeni Cultural Heritage drafted a Heritage Exemption Letter (**Appendix F-1**) based on previous report findings of the Medupi Power Station site. The letter indicated that the site is disturbed, has industrial nature of the receiving environment and hence has a low likelihood of in situ, primary context archaeological remains. Furthermore, HIAs conducted at Medupi Power Station over the last two decades have yielded little more than scattered middle stone age (MSA) miscellaneous flakes. Regarding the issue of graves, this has been extensively dealt with in previous HIA assessments in the immediate vicinity of the current activities. The specialist concluded that exemption be made for the proposed project from any further heritage assessment and mitigation, however, Eskom will follow the chance find procedure in the event of any potential discovery of heritage resources.

With regard to palaeontological resources (fossils), the area to be developed lies on the Sandriviersberg and Mokalakwena Formations, (Kransberg Subgroup, Waterberg Group) which are sandstones and conglomerates 1700 to 2000 million years old and so pre-date any large bodied fossil plant and any vertebrate fossil. Micro-organisms such as algae had evolved by this time but they do not preserve in conglomerates. Sandstones are usually too coarse to preserve such small fossils. The Palaeontological Desktop Study determined that there are no palaeontological fossils or material exists within the geology of the area.

The palaeontological sensitivity of the area is shown in **Figure 6-16** below.



1 in 250 000 geological formation layers are courtesy of the Council for GeoScience

For more information, go to How to Use the Palaeontological (fossil) Sensitivity Map

Colour	Sensitivity	Required Action
RED	VERY HIGH	field assessment and protocol for finds is required
ORANGE/YELLOW	HIGH	desktop study is required and based on the outcome of the desktop study, a field assessment is likely
GREEN	MODERATE	desktop study is required
BLUE	LOW	no palaeontological studies are required however a protocol for finds is required
GREY	INSIGNIFICANT/ZERO	no palaeontological studies are required
WHITE/CLEAR	UNKNOWN	these areas will require a minimum of a desktop study. As more information comes to light, SAHRA will continue to populate the map.

Figure 6-16: Palaeontological Sensitivity Map

6.10 TRAFFIC

Information relating to the traffic movements and impacts within the proposed study area was obtained from the Traffic Impact Assessment Specialist Report undertaken by Hatch Goba (Venter, 2017), including literature sited within this report.

6.10.1 REGIONAL CONTEXT

The major routes in the study area are the R518 and R510 which links Lephalale to the N1 and Nelson Mandela Drive connects Lephalale with Medupi and Marapong, while the minor routes surrounding Medupi Power Station are the D1675 and Afguns Road (**Figure 6-17**).

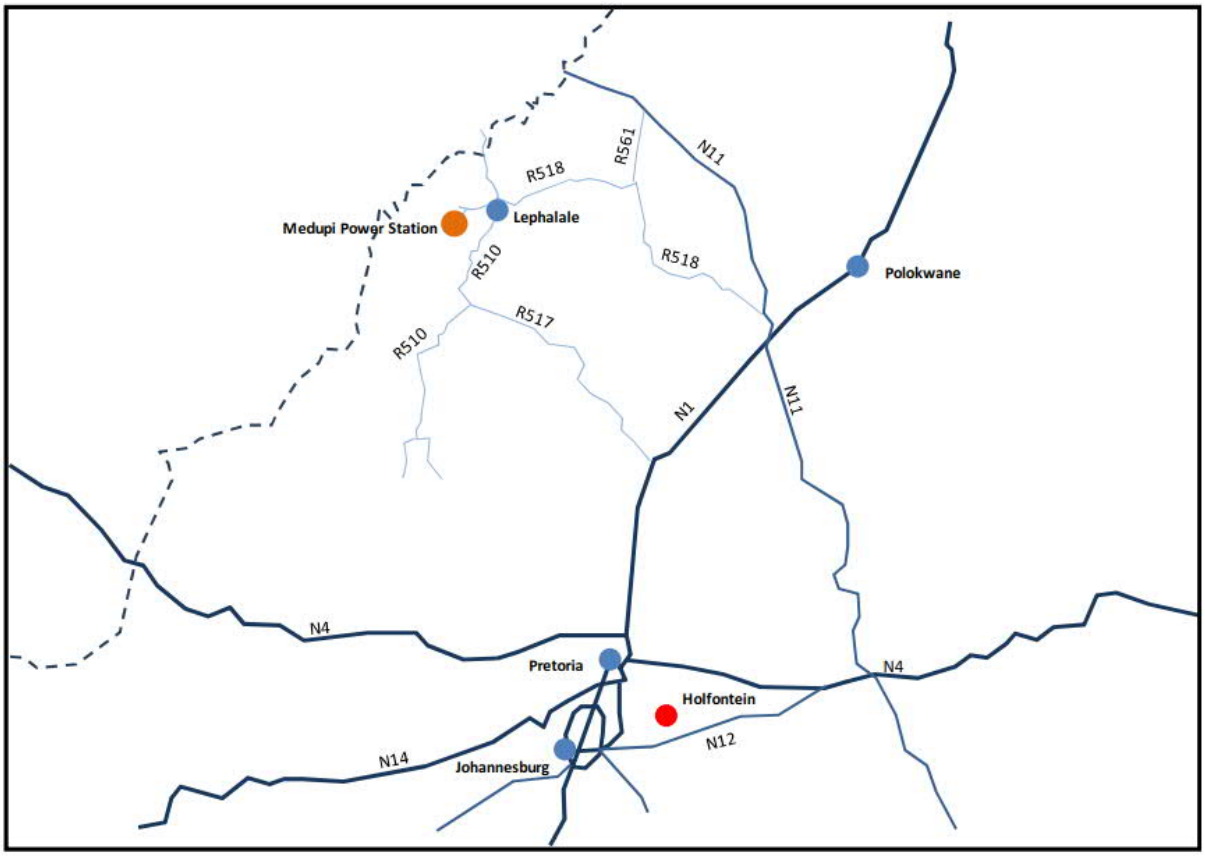


Figure 6-17: External road network to and from the Medupi Power Station (taken from Venter, 2017)

The most direct traffic route from Johannesburg uses the N1 to reach regional roadways R33, R517, and R510. A single rail line services the Exxaro Grootegeluk coal mine and Medupi Power Station, running approximately north/south adjacent to R510 highway. This line passes through the towns of Thabazimbi, Amandelbult, and Rustenburg.

6.10.2 TRAFFIC AT THE SITE

The first proposed pipeline segment route from the offtake point is to the west of the Medupi Power Station and can be accessed using a dirt road (west of Gate 4) outside the site fence between the Power Station and the Ash facility. Access to the reservoirs is gained via Kuipersbult Road and Gate 4 (**Figure 6-18**) is used for access to construct the second line segment once it is within the NKP fence.

Figure 6-18: Access Gates at Medupi Power Station

6.11 SOCIO-ECONOMIC

Information relating to the social environment within the proposed study area was obtained from the Social Impact Assessment Specialist Report undertaken by NGT Holdings (Tomose, et al., 2018), including literature sited within this report.

6.11.1 REGIONAL CONTEXT

The study area is situated approximately 15km west of Lephalale in the Limpopo Province. The Medupi Power Station is positioned in the area under the jurisdiction of Lephalale Local Municipality, which forms part of the Waterberg District Municipality. The Lephalale Local Municipality covers an area of 19 605km^2, and consists of 12 wards with 38 villages.

Lephalale Local Municipality is characterised by a mix of human settlements which vary from formal to informal in townships. Marapong is the closest human settlement to Medupi Power Station and is located approximately 8.6km north-east of the power station. The second closest location is Onverwacht at approximately 10.5km east of the power station. Lephalale Town is third human settlement situated in close proximity to the power station and it is located approximately 12.6km east of Medupi and east of Onverwacht. These three human settlements are located north and east of Medupi with prevailing winds blowing north-south and north-east to south-west towards Thabazimbi and the village of Steenbokpan (located some 27km west of Medupi). This means that Marapong, Onverwacht and Lephalale will likely not be directly significantly affected by emissions from Medupi as determined by the direction of winds and its variables.

Heavy industries include the newly built Medupi Power Station, the existing Matimba Power Station, Grootegeluk coal mine and Sasol. All these industries are located west of the town of Lephalale within close proximity to Marapong. A number of new mines are in the planning stages and some have already started operating, mining among other resources coal and platinum among other resources. Coal presents the dominant resources currently

being mined in Lephalale due to fact that the Waterberg coal reserves represent 40% of South African coal reserves and are mined to support two coal fired power stations in the area and the Sasol coal-to-liquid petrochemical industry. A third power station is planned in the area and is currently undergoing the approval process.

Land uses of Lephalale Local Municipality can be described as a mix of agricultural activities, game farming, cattle ranching, industrial activities such as mining, power generation, domestic and industrial water supply. These activities make up 87% of the total land use of Lephalale Local Municipality. Lephalale Local Municipality and the Waterberg District are characterised by a number of game farms and conservation areas, with the Waterberg Mountains boasting a national conservation status.

The study area is characterised by a number of secondary roads, with Nelson Mandela Drive cutting across the Town of Lephalale, past Onverwacht towards Medupi Power Station. In the east, it joins the R510, which links Lephalale to Thabazimbi in the south, west of Mokolo River. Other secondary roads that are linked to the R510 which provide access to Lephalale include the R518 and R33. A railway line from Grootegeluk mine passes east and south of Medupi Power Station, then south towards Thabazimbi. This is the only documented railway line within the study area.

6.11.2 LOCAL POPULATION DYNAMICS

The Local Economic Development Strategy for Lephalale Local Municipality indicate that the population in Lephalale has increased by 45% between 2001 and 2014 from 85 155 to 123 869 (**Figure 6-19**) (Local Municipality IDP, 2016-2017 statistics as cited in (Tomose, et al., 2018). Latest statistics reported in the Integrated Development Plan (IDP) for the Local Municipality indicate that total population size is around 140 240 residents (Lephalale LM, 2017).

Population growth in the Lephalale town node is among the highest in the Limpopo Province. The surge in population is also experienced south of Lephalale Local Municipality; for example, Thabazimbi has experienced a population increase of 35%, Mookgopong an increase of 13%, Modimolle an increase of 11%, Bela-Bela an increase of 36% and Mogalakwena recorded an increase 11% in the same period. In Lephalale Local Municipality the influx can be directly attributed to the construction of the Medupi built coal fired power station project and associated ancillary infrastructure. An assumption was also made that the overall increase in population in the region could be as a result of projected future projects associated with the Waterberg coal fields e.g. the expansion of the mining industry as well as coal-to-liquid petrochemical industry project such as Sasol Mafutha 1 in Lephalale (Tomose, et al., 2018).

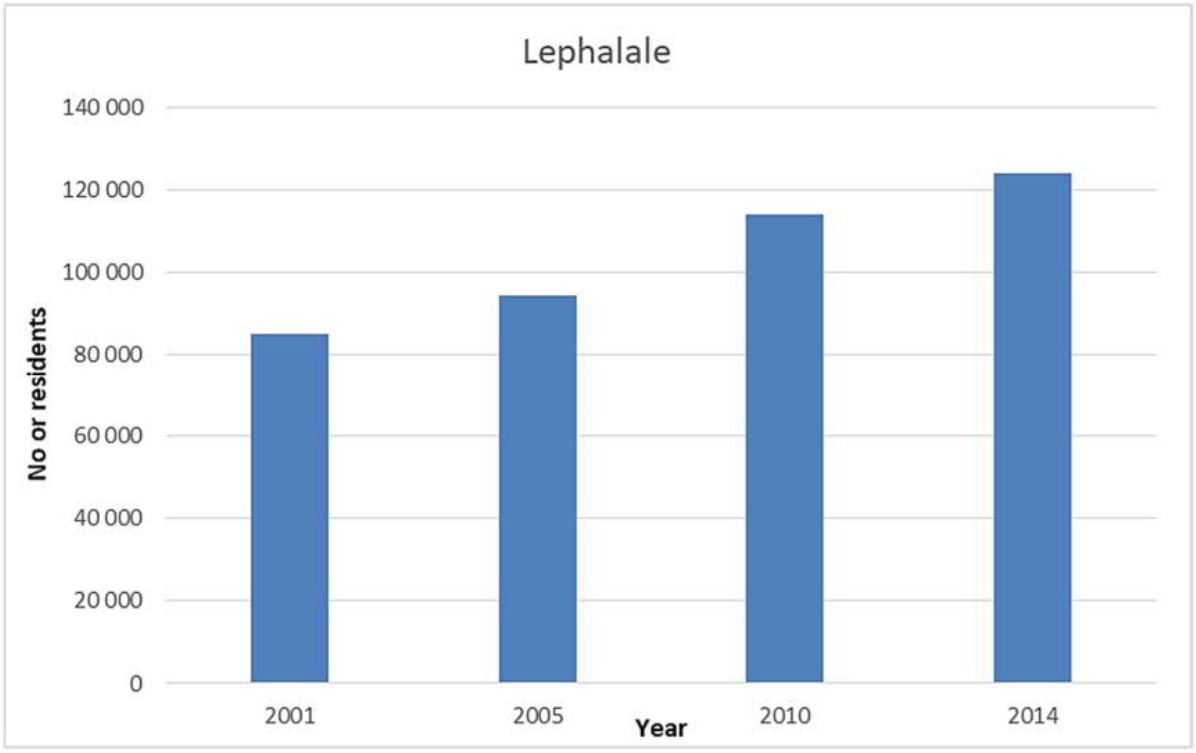


Figure 6-19: Total Population of Lephalale LM 2001-2014 (adapted from Tomose, et al., 2018)

The latest key population statistics was reported in the Lephalale Local Municipality IDP of 2017-2018 and is shown in **Figure 6-20** below.

Total Household	**43 002**	**100%**
Total Population	140 240	100%
Young (0 – 14)	40 358	29.20%
Working Age	95 103	54.80%
Elderly (65+)	5 403	3.50%
Dependency ratio	35 136	33.20%
Sex ratio	121 -5. 6	21-1
Growth rate	2011 - 2016	13.50%
Population density	8 person per km²	
Unemployment rate	2016	22.20%
Youth unemployment rate	2016	27%
No schooling aged 20+	3 769	6.20%
Higher education aged 20+	12 615	16.40%
Matric aged 20+	16 579	23.50%
Number of households	430 002	
Number of agricultural households	6 757	22.60%
Average household size	3.2	
Female headed households	16 443	39.10%
Formal dwellings	34 610	82.30%
Flush toilet connected to sewer	17 536	41.60%
Piped water inside dwelling	17 390	41.30%
Electricity for lighting	37 602	89.40%

Figure 6-20: Key Population Statistics in Lephalale Local Municipality

6.11.3 EDUCATION LEVELS AND SKILLS IN LEPHALALE

Lephalale Local Municipality has a total of 94 various educational facilities spread throughout the municipality. According to the Local Municipality's IDP report (2015-2016), more than 95% of the population is within 30 minutes walking distance to the nearest education facility. Accessibility to schools in the rural areas is relatively good particularly for primary schools. This is not the case with regards to secondary schools as there are still students who stay more than 10km away from the nearest education facility. Access to secondary education has resulted in low numbers of pupils proceeding to tertiary education. The assumption is made that this could be as the result of learners being despondent of traveling long distance to go to school and the cost of public transport resulting in absenteeism and poor learner performance at the end of the year prohibiting them to proceed further with their education.

In terms of overall performance, the Local Municipality seems to be slightly higher than the Waterberg District Municipality and Limpopo Province in terms of education levels but not sufficient to respond to the needs of the growing economy such as that of Lephalale. Statistics on level of education within the Lehpalale Local Municipality, Waterberg District Municipality and Limpopo Province is presented in **Figure 6-21**.

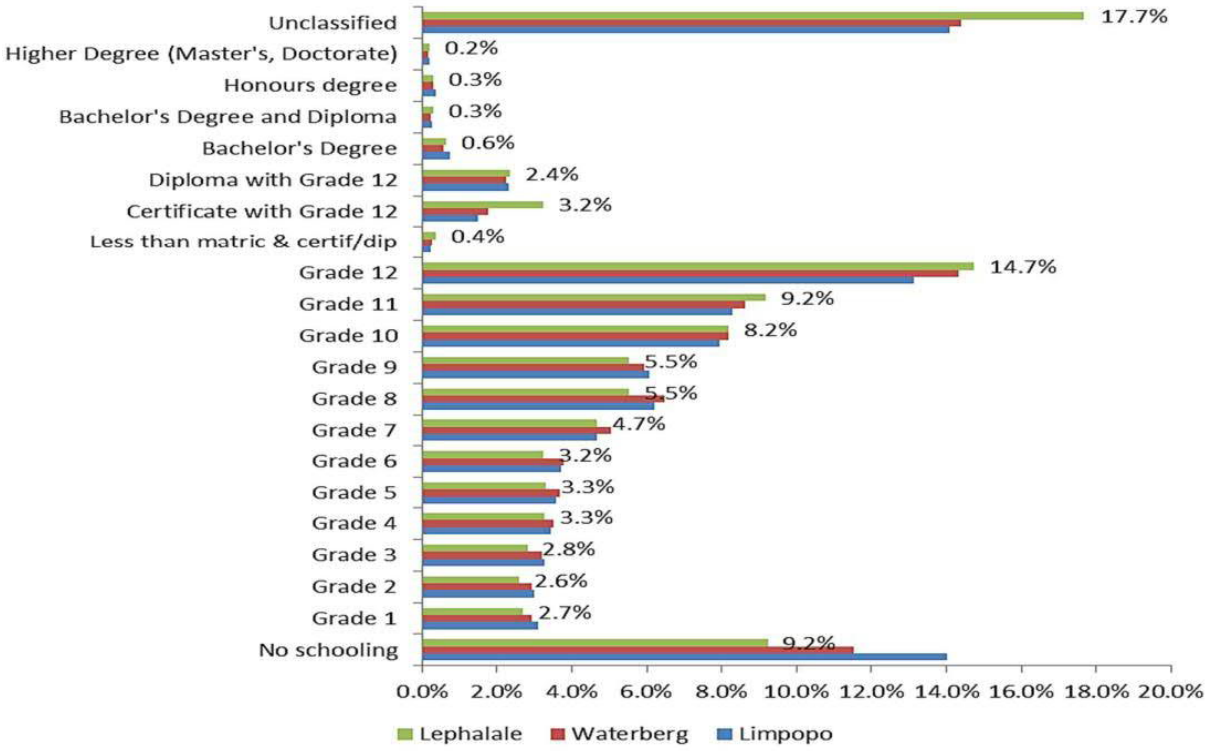


Figure 6-21: Education levels within the Lephalale LM, Waterberg DM and Limpopo Province (taken from Tomose, et al., 2018)

6.11.4 EMPLOYMENT RATE IN LEPHALALE

The rate of unemployment in Lephalale is at 22.2%, which is well below the provincial average of 32.4% as per the 2011 national census. Unemployment amongst the youth currently stands at 27%, also below the Limpopo provincial average of 42%. This is due in large measure to local developments associated with Medupi power station and the expansion of coal production from the mines which can be taken to have absorbed a lot of the latent labour force.

Sector employment has changed considerably over the last 2 decades with a noticeable drop in agriculture related employment, contrasted by a noticeable increase in mining related employment opportunities since the early 2000s. This is clearly indicated in **Figure 6-22** below.

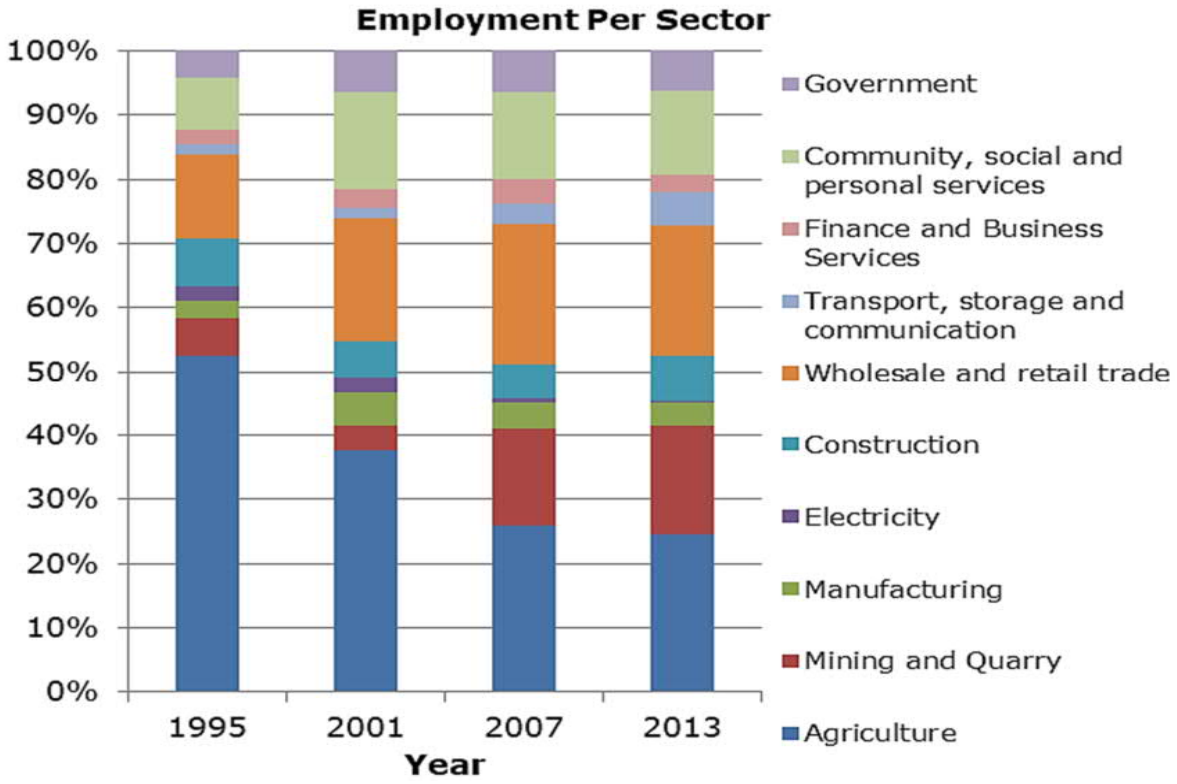


Figure 6-22: Sector Employment within Lephalale LM (taken from Tomose, et al., 2018)

7 IMPACT ASSESSMENT

This Chapter identifies the perceived environmental and social effects associated with the proposed Project. The assessment methodology is outlined in **Section 3.4**. The issues identified stem from those aspects presented in **Chapter 6** of this document as well as project description provided. The impact assessment will be based on the preferred alternative at all project phases. This section only assesses the preferred option along with the no-go section. The mitigation hierarchy criteria for each mitigation measure is indicated in brackets after each measure indicated. Furthermore, decommissioning will be considered as part of the decommissioning of the broader facility which will be subject to a separate authorisation and impact assessment process. Any decommissioning impacts will be assessed at this stage.

7.1 AIR QUALITY

7.1.1 CONSTRUCTION PHASE

DUST AND PARTICULATE MATTER

Air quality guidelines are provided by the ambient dust concentration limits prescribed by SANS 1929:2005. Whilst these guidelines are currently not enforceable they do serve as recommendations for good practice. SANS 1929:2005 sets out dust deposition rates, expressed in units of $mg.m^{-2}.day^{-1}$ over a typical 30-day averaging period.

During the construction phase, dust and vehicular emissions will be released as a result of excavations as well as earth moving machinery and trucks transporting construction material. The emissions will, however, have short term impacts on the immediate surrounding areas which can be easily mitigated and thus the authorisation of such emissions will not be required. All construction phase air quality impacts will be minimised with the implementation of dust control measures contained within the EMPr (**Appendix G**) and the dust impacts will be short term in nature.

The impact of the construction phase on the generation of dust and PM is shown in **Table 7-1** below.

Table 7-1: Construction Impact on Generation of Dust and PM

Potential Impact: Generation of Dust and PM	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	3	1	4	32	Medium	(-)	High
With Mitigation	1	1	3	1	3	18	Low	(-)	High
Mitigation and Management Measures	— Implement dust suppression methods during construction to minimise dust emissions from the site activities; — All stockpiles must be restricted to designated areas and may not exceed a height of two (2) metres; — Ensure that all vehicles and machines are adequately maintained to minimise emissions; — It is recommended that the clearing of vegetation from the site should be selective and done just before construction so as to minimise erosion and dust; — All materials transported to site must be transported in such a manner that they do not fly or fall off the vehicle. This may necessitate covering or wetting friable materials.								

	— No burning of waste, such as plastic bags, cement bags and litter is permitted; and — All issues/complaints must be recorded in the complaints register.

7.1.2 OPERATIONAL PHASE

There are no anticipated air quality impacts during the operational phase.

7.2 NOISE EMISSIONS

7.2.1 CONSTRUCTION PHASE

Elevated noise levels are likely to be generated by the construction activities (machinery and vehicles) and the workforce. It is important to note that noise impacts (nuisance factor) may vary in the different areas as a result of the surrounding land uses and will be temporary in nature. Given, that the site is in a remote area and the fact that the construction activities at the Medupi Power Station are still in progress, noise impacts associated with this project are not regarded as a significant impact, as the ambient noise regime is higher than the project specific noise levels. The construction impact on noise is indicated in **Table 7-2** below.

Table 7-2: Construction Impact on Noise

Potential Impact: Noise	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	1	4	28	Low	(-)	High
With Mitigation	2	1	1	1	3	15	Low	(-)	High
Mitigation and Management Measures	— The equipment must be in good working order, within service dates, and inspected before use; — Align working times with station related construction times; and — Install noise reducing fittings on machinery (if required).								

7.2.2 OPERATIONAL PHASE

There are no anticipated noise impacts during the operational phase.

7.3 SOIL EROSION AND CONTAMINATION

7.3.1 CONSTRUCTION PHASE

SOIL EROSION

During the construction phase, measures should be implemented to manage stormwater and water flow on the site. If the stormwater and water flow is not regulated and managed onsite, it could cause significant erosion of soil on the stockpiles, as well as the pollution and siltation of water bodies.

During the construction phase, the installation of services could leave soils exposed and susceptible to erosion. The construction impact on soil erosion is indicated in **Table 7-3** below.

Table 7-3: Construction Impact on Soil Erosion

Potential Impact: Soil Erosion	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	2	4	32	Medium	(-)	High
With Mitigation	1	1	3	2	3	21	Low	(-)	High
Mitigation and Management Measures	— Where possible, consider conducting construction activities during winter where rainfall is minimal. Eskom must investigate the feasibility of construction activities being conducted during the dry season to avoid possible wetland contamination from storm water runoff (as well as soil erosion) that may be experienced during wet seasons, as much as possible; — Only the identified areas should be cleared of vegetation. This should be done in stages as construction works progress, if possible; — Implement stormwater management measures that will help to reduce the speed of the water. These measures must also assist with the prevention of water pollution, erosion and siltation; — Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching; — Any exposed earth should be rehabilitated promptly, and this could include planting suitable vegetation (vigorous indigenous grasses) that mimics the surrounding environment to protect the exposed soil; — If excavations or foundations fill up with stormwater, these areas should immediately be drained and measures to prevent access to these areas should be implemented; — Erosion control measures should be implemented during the construction phase on large exposed areas and where stormwater is temporarily channelled; and — Landscape the area so that there is a free flow of water, without being erosive, thus increasing the catchment area.								

SOIL CONTAMINATION

During construction activities, construction vehicles/trucks/machinery as well as hazardous substances stored on the site might spill and contaminate the soil. The impact of the construction phase on soil pollution is indicated in **Table 7-4** below.

Table 7-4: Construction Impact on Soil Contamination

Potential Impact: Soil Contamination	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	3	4	36	Medium	(-)	High
With Mitigation	1	1	3	2	3	21	Low	(-)	High
Mitigation and Management Measures	— All construction vehicles, plant, machinery and equipment must be properly maintained to prevent leaks (avoid or prevent and minimise); — Plant and vehicles are to be repaired immediately upon developing leaks (Avoid or prevent and Minimise); — Drip trays shall be supplied for all idle vehicles and machinery (Avoid or prevent and Minimise); — No repair work may be undertaken on machinery onsite or campsite area (Avoid or prevent); — Drip trays are to be utilised during daily greasing and re-fuelling of machinery and to catch incidental spills and pollutants (Avoid or prevent and Minimise); — Drip trays are to be inspected daily for leaks and effectiveness, and emptied when necessary. This is to be closely monitored during rain events to prevent overflow (Avoid or prevent and Minimise); — Ensure appropriate handling of hazardous substances (Avoid or prevent); — Keep spill kits onsite and train personnel to use them appropriately (Rehabilitate/Restore); — Fuels and chemicals must be stored in adequate storage facilities that are secure, enclosed and bunded (Avoid or prevent and Minimise); and — Implement stormwater management measures that will help to reduce the speed of the water flows. These measures must also assist with the prevention of wider range of the site.								

7.3.2 OPERATIONAL PHASE

SOIL EROSION

No operational soil erosion impacts are expected as the area will be rehabilitated. The vegetation will compact and hold the soil in place.

SOIL CONTAMINATION

The proposed pipeline carries water, therefore, no contamination is expected during the operational phase.

7.4 SURFACE WATER

7.4.1 CONSTRUCTION PHASE

CHANGE OF FLOW VOLUMES AND DRAINAGE PATTERNS

The construction activities which include onsite traffic, equipment, machinery and human presence results in hardening of surface areas due to compaction as well as alteration of the general terrain. This leads to alteration of the surface and sub-surface flow volumes and change of flow patterns, however, this is temporary as construction activities occur over a short period. This is perpetuated during construction from continuous vehicle activity, and the continued presence of personnel on the site office, laydown and storage areas. The construction phase impact is indicated in **Table 7-5** below.

Table 7-5: Construction Impact on Change in Flow Volumes and Drainage Patterns

Potential Impact: Change in Flow Volumes and Drainage Patterns	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	3	4	4	44	Medium	(-)	High
With Mitigation	1	2	3	3	3	27	Low	(-)	High
Mitigation and Management Measures	– Construction areas should be demarcated, and wetland areas marked as "restricted" in order to prevent the unnecessary impact to and loss of these systems; – The identified wetland (D1) must be demarcated as no-go areas during construction; – Construction method statements are to be adhered to. These method statements should consider the environmental facets associated with the wetland such as hydrological flow regimes, flora and fauna; – Laydown area within the vicinity of the Wetland D1 should be on the opposite side of the proposed pipeline route to where the wetland is located; – Stormwater channels and preferential flow paths should be delineated, filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion; and – Prevent uncontrolled access of vehicles through the wetlands that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas.								

DETERIORATION IN WATER QUALITY

There is a potential to affect the surface water quality in the area due to construction activities. This is influenced by spills and leaks, the storage of chemicals, mixes and fuel, location and protection of stockpiles, onsite waste management and the management of stormwater. The stormwater runoff will wash the potential contaminants to surface water resources. The impact of construction on deterioration in water quality is shown in **Table 7-6** below.

Table 7-6: Construction Impact on Deterioration in Water Quality

Potential Impact: Deterioration in Water Quality	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	3	30	Medium	(-)	High
With Mitigation	2	2	3	2	2	18	Low	(-)	High
Mitigation and Management Measures	— Construction areas should be demarcated, and wetland areas marked as "restricted" in order to prevent the unnecessary impact to and loss of these systems; — Construction method statements are to be adhered to. These method statements should consider the environmental facets associated with the wetland such as hydrological flow regimes, flora and fauna; — The identified wetland (D1) must be demarcated as no-go areas during construction; — Laydown area within the vicinity of the Wetland D1 should be on the opposite side of the proposed pipeline route to where the wetland is located; — Investigate feasibility of construction activities being conducted during the dry season to avoid possible wetland contamination from storm water runoff (as well as soil erosion) that may be experienced during wet seasons, as much as possible. — Stormwater channels and preferential flow paths should be delineated, filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion; — During construction, contractors used for the project must have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly; — A suitable stormwater management plan must for formulated for the project. The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the wetlands (where required) and that the discharge of water will not result in scouring and erosion of the receiving systems; — The stormwater management plan should incorporate "soft" engineering measures as much as possible, limiting the use of artificial materials; — As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site; — All chemicals and toxicants during construction and operation must be stored in bunded areas; — All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site; — 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", as well as an understanding of environmental risks in their various areas of work;								

	— 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); and — Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems.

7.4.2 OPERATIONAL PHASE

No operational phase impacts are expected as the pipeline will be mainly underground and any work on it limited.

7.5 GROUNDWATER

7.5.1 CONSTRUCTION PHASE

CHANGE OF GROUNDWATER FLOW VOLUMES

The construction activities which include onsite traffic, equipment, machinery and human presence results in hardening of surface areas due to compaction as well as alteration of the general terrain. This leads to alteration of the sub-surface flow and recharge volumes. This is perpetuated during construction from continuous vehicle activity, and the continued presence of personnel on the site office, laydown and storage areas. The construction phase impact is indicated in **Table 7-7** below.

Table 7-7: Construction Impact on Change in Flow Volumes

Potential Impact: Change in Flow Volumes	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	4	4	48	Medium	(-)	High
With Mitigation	2	1	3	3	3	27	Low	(-)	High
Mitigation and Management Measures	— Construction areas should be demarcated, and wetland areas marked as "restricted" in order to prevent creation of pathways to contaminating groundwater through these systems.								

DETERIORATION IN GROUNDWATER QUALITY

There is a potential to affect the groundwater quality in the area. This is influenced by spills and leaks, the storage of chemicals, mixes and fuel. Any contaminants that are not cleaned from the ground will seep into underground water resources. The impact of construction on change in water quality is shown in **Table 7-8** below.

Table 7-8: Construction Impact on Deterioration in Water Quality

Potential Impact: Deterioration in Water Quality	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	2	3	2	3	30	Medium	(-)	High
With Mitigation	2	2	3	2	2	18	Low	(-)	High

Mitigation and Management Measures	– Construction areas should be demarcated, and wetland areas marked as "restricted" in order to prevent the unnecessary impact to and loss of these systems; – Laydown yards, camps and storage areas must be beyond the wetland areas where applicable; – Stormwater channels and preferential flow paths should be delineated, filled with aggregate and/or logs (branches included) to dissipate and slow flows limiting erosion; – During construction contractors used for the project must have spill kits available to ensure that any fuel or oil spills are cleaned-up and discarded correctly; – A suitable storm water management plan must for formulated for the project. The plan must ensure that clean and dirty water are separated, that only clean water is diverted into the wetlands (where required) and that the discharge of water will not result in scouring and erosion of the receiving systems; – The storm water management plan should incorporate "soft" engineering measures as much as possible, limiting the use of artificial materials.; – As much material must be pre-fabricated and then transported to site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site; – All chemicals and toxicants during construction and operation must be stored in bunded areas; – All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site; – 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); and – Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems.

7.5.2 OPERATIONAL PHASE

There are no operational phase impacts envisaged for the proposed pipeline.

7.6 BIODIVERSITY

7.6.1 CONSTRUCTION PHASE

LOSS AND FRAGMENTATION OF FLORA

The construction phase involves the clearance of vegetation which leads to further loss and fragmentation of the vegetation community as well the destruction of a portion of an endangered vegetation type, however, this is limited due to the proposed servitude of 32m. The construction impact on loss and fragmentation of flora is indicated in **Table 7-9** below.

Table 7-9: Construction Impact on Loss and Fragmentation of Flora

Potential Impact: Loss and Fragmentation of Flora	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	3	3	4	40	Medium	(-)	High
With Mitigation	2	1	3	3	3	27	Low	(-)	High
Mitigation and Management Measures	— Reduce loss and fragmentation of vegetation community (listed as Vulnerable) within and adjacent to the project site, by keeping construction works within a limited footprint; — Prevent the loss of species of conservation concern which are known to occur within the project area, by relocating them if they are identified; — Eskom will appoint a botanist before the construction activities commence to perform a final walkthrough of the alignment to identify sensitive plant species, and assist in identifying the areas that require protection along the proposed pipeline servitude; — Eskom will ensure that a permit is obtained from the relevant authorities before any removal or disturbance of any TOPs, Red Data listed or Provincially protected species; — Limiting the construction area to the defined project areas and only impacting those areas where it is unavoidable to do so otherwise; — As far as possible, the proposed developments should be placed in areas that have already been disturbed (low sensitivity areas as defined in this report), and no further loss of secondary grassland or wetlands should be permitted; — It is recommended that areas to be developed be specifically demarcated so that during the construction phase and operational phase, only the demarcated areas are impacted upon. All work areas, offices and access roads must be clearly demarcated from surrounding natural areas and no persons should be allowed to enter these areas under any circumstances; — Dust-reducing mitigation measures must be put in place and must be strictly adhered to. This can include wetting of exposed soft soil surfaces and not conducting activities on windy days which will increase the likelihood of dust								

Potential Impact: Loss and Fragmentation of Flora	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
	being generated, as well as other measures deemed appropriate; — Any topsoil that is removed during construction must be appropriately removed and stored according to the national and provincial guidelines. This includes on-going maintenance of such topsoil piles so that they can be re-utilised; and — All disturbed, exposed earth and cleared areas will be rehabilitated with indigenous perennial shrubs and grasses from the local area as required.								

INCREASE IN ALIEN VEGETATION SPECIES

Construction activities have the potential to lead to an increase in alien invasive species in the area. These are brought by site personnel on their clothing or via the truck tyres or as a result of pioneer species following a construction activity. The construction impact on increase in alien species in the area is shown in **Table 7-10** below.

Table 7-10: Construction Impact on Increase in Alien Vegetation Species

Potential Impact: Increase in Alien Vegetation Species	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	2	3	4	4	44	Medium	(-)	High
With Mitigation	2	1	3	3	2	18	Low	(-)	High
Mitigation and Management Measures	— Limiting the construction area to the defined project areas and only impacting those areas where it is unavoidable to do so otherwise; — It is recommended that areas to be developed be specifically demarcated so that during the construction phase and operational phase, only the demarcated areas are impacted upon. All work areas, offices and access roads must be clearly demarcated from surrounding natural areas and no persons should be allowed to enter these areas under any circumstances; — It should be made an offence for any staff to bring any plant species into any portion of the project site, including offices. No plant species whether indigenous or exotic should be brought into the project area, to prevent the spread of exotic or invasive species; and — Compilation of and implementation of an alien vegetation management plan for the entire site, including the surrounding project area. — Rehabilitation and de-weeding of areas that have been disturbed by construction activities, to avoid occupation by alien species.								

DISPLACEMENT OF FAUNA AND LOSS OF HABITAT

The construction activities will lead to the displacement, direct mortalities and disturbance of faunal community due to habitat loss and disturbances (such as dust and noise). The construction impact on displacement of fauna is indicated in **Table 7-11** below.

Table 7-11: Construction Impact on Displacement of Fauna and Loss of Habitat

Potential Impact: Displacement of Fauna	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	3	3	2	5	4	52	Medium	(-)	High
With Mitigation	2	2	2	5	2	22	Low	(-)	High
Mitigation and Management Measures	— Prevent the loss of species of conservation concern which are known to occur within the project area; — Limiting the construction area to the defined project areas and only impacting those areas where it is unavoidable to do so otherwise; — Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, lizards, birds or other animals should be strictly prohibited; — The areas outside the defined project area, should be declared a 'no-go' areas during the construction phase and operational phase and all efforts must be made to prevent access to this area from construction workers and machinery; and — All snakes encountered must be reported so that they are taken away through the existing snake catching program.								

7.6.2 OPERATIONAL PHASE

There are no operational phase impacts envisaged for the proposed pipeline.

7.7 TRAFFIC

7.7.1 CONSTRUCTION PHASE

The impact of additional traffic during construction is expected to be minimal and short term. The proposed site is within the Medupi Power Station site boundary, which is away from the public road. The construction impact on traffic is indicated in **Table 7-12** below.

Table 7-12: Construction Impact on Increased Local Traffic

Potential Impact: Increased Local Traffic	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence

Without Mitigation	2	1	3	1	4	28	Low	(-)	High
With Mitigation	2	1	1	1	3	15	Low	(-)	High
Mitigation and Management Measures	— Ensure deliveries are done as and when required; — The road network which surrounds the proposed development will have to be correctly maintained in order to support additional movement of vehicles. Transport should be limited to non-peak hours; — Since the access road is narrow, ensure that all vehicles do not park along the road but within the farm boundary; and — All site vehicles must limit the idle time on the access road.								

7.7.2 OPERATION PHASE

No operational phase impacts are expected as the pipeline will operate uninterrupted and any work on it limited.

7.8 HEALTH AND SAFETY

7.8.1 CONSTRUCTION PHASE

During construction, the employees are exposed to health and safety hazards from the mechanical machines and equipment used on the site. Furthermore, there is a potential for snakes and other dangerous animals in the area, to which the employees must be warned about and trained on how to handle situations if any encounters occur. The construction impact on health and safety is indicated in **Table 7-13** below.

Table 7-13: Construction Impact on Employee Health and Safety

Potential Impact: Employee Health and Safety	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	4	2	3	4	4	52	Medium	(-)	High
With Mitigation	2	1	3	4	2	20	Low	(-)	High
Mitigation and Management Measures	— An HSE officer is to be appointed who will monitor safety conditions during construction activities; — Ensure employees are properly trained to use specific equipment or machinery; — Train personnel on how to deal with snake encounters, as well as encounters with other dangerous animals known to occur in the area; — Provide suitable personal protective equipment (PPE); — Conduct site and safety induction to raise awareness of the risks associated with the site; — Conduct regular toolbox talks as refreshers to improve health and safety; — Develop safe work instruction method statements that should be used by employees in completing their tasks; — Train all relevant personnel on handling, use and storage of hazardous substances;								

Potential Impact: Employee Health and Safety	Magnitude	Extent	Reversibility	Duration	Probability	Significance	Character	Confidence
	— Provide MSDS for all hazardous substances kept onsite; and — All visitors should undergo site induction and be made aware of the risks associated with the site.							

7.8.2 OPERATIONAL PHASE

No operational phase impacts are expected as the pipeline will operate uninterrupted and any work on it limited.

7.9 SOCIO-ECONOMIC

7.9.1 CONSTRUCTION PHASE

EMPLOYMENT OPPORTUNITIES

The proposed development will create a limited number of employment opportunities for individuals in the surrounding area. The positive impact of this phase is limited as it is temporary as well. The construction impact on employment opportunities is indicated in **Table 7-14** below.

Table 7-14: Construction Impact on Employment Opportunities

Potential Impact: Employment Opportunities	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	1	3	24	Low	(+)	High
With Mitigation	2	2	3	2	3	36	Medium	(+)	High
Mitigation and Management Measures	— The project must aim to use local labour in order to benefit the local community, where possible and applicable for the project; and — Consult with local communities to boost local business.								

7.9.2 OPERATIONAL PHASE

No operational phase impacts are expected as the pipeline will operate uninterrupted and any work on it limited.

7.10 HERITAGE AND PALAEONTOLOGICAL

7.10.1 CONSTRUCTION PHASE

Based on the specialist study conducted, natural vegetation is present on the proposed pipeline servitude and the chances of finding any heritage and palaeontological related features are extremely slim. The specialist provided

an opinion to exempt the project from undergoing a HIA and has submitted an application to SAHRA in this regard (exemption letter as **Appendix F-1**). As such, there are no impacts expected with regards to heritage resources.

Construction activities should be conducted carefully and all activities ceased if any archaeological, cultural and heritage resources are discovered. The SAHRA should be notified and investigation conducted before any activities can commence. The potential for any heritage and palaeontological impacts is indicated in **Table 7-15** below.

Table 7-15: Construction Impact on Damage to Heritage and Palaeontological Resources

Potential Impact: Damage to Heritage and Palaeontological Resources	Magnitude	Extent	Reversibility	Duration	Probability	Significance		Character	Confidence
Without Mitigation	2	1	3	5	2	22	Low	(-)	High
With Mitigation	1	1	3	1	2	12	Low	(-)	High
Mitigation and Management Measures	— Conduct site excavations carefully to avoid damaging any potential palaeontological resources; — If any palaeontological resources are discovered, the South African Heritage Resource Agency (SAHRA) should be notified and investigation conducted before any activities can commence; and — Use the Medupi Power Station palaeontological specialists during groundworks so as to report to the supervisor on discovery of any palaeontological resources in order to notify SAHRA.								

7.10.2 OPERATIONAL PHASE

There are no anticipated heritage and palaeontological impacts during the operational phase as any existing resources would have been discovered during excavations and other intrusive construction activities.

7.11 NO-GO ALTERNATIVE

The no-go alternative will mean none of the negative and positive impacts described above will come into effect.

8 ENVIRONMENTAL IMPACT STATEMENT

The essence of any impact assessment process is aimed at ensuring informed decision-making, environmental accountability, and to assist in achieving environmentally sound and sustainable development. In terms of NEMA, the commitment to sustainable development is evident in the provision that "*development must be socially, environmentally and economically sustainable…. and requires the consideration of all relevant factors…*" NEMA also imposes a duty of care, which places an obligation on any person who has caused, is causing, or is likely to cause damage to the environment to take reasonable steps to prevent such damage. In terms of NEMA's preventative principle, potentially negative impacts on the environment and on people's environmental rights (in terms of the Constitution of the Republic of South Africa, Act No. 108 of 1996) should be anticipated and prevented, and where they cannot be prevented altogether, they must be minimised and remedied in terms of "reasonable measures".

In assessing the environmental feasibility of the proposed construction of the raw water and make-up water pipeline segments, the requirements of all relevant legislation have been considered. The identification and development of appropriate mitigation measures that should be implemented in order to minimise potentially significant impacts associated with the project, has been informed by best practice principles, past experience and the relevant legislation (where applicable).

The conclusions of this BA are the result of comprehensive assessments. These assessments were based on issues identified through the BA process and the parallel process of public participation that will be conducted when submitting for public review. The public consultation process will be undertaken according to the requirements of NEMA and every effort was made to include representatives of all stakeholders within the process.

8.1 ENVIRONMENTAL SENSITIVITIES

The following environmental sensitivities were identified on the site and will require specific applications or measures for mitigation to minimise impact. The proposed project site is located in the following sensitive environments:

- Biodiversity - Flora and Fauna: The *Senegalia nigrescens –Combretum apiculatum* dominated woodland may occur which were afforded a Very High and Moderate -High sensitivity respectively;
- Heritage and palaeontological resources are in the Medupi Power Station site boundary, however, none exist in the proposed pipeline servitude. As mentioned before, two sacred pools were identified close to the project area and both were used by the community to hold baptism ceremonies as well as watering the community's stock (cattle). The first one is to the south and outside of the Medupi Power Station site boundary. This pool was identified in previous surface water studies as Wetland SEW 2 identified in Section 6.3.4 of this report. This pool has a high significance rating but also has a good conservation status as it has not been disturbed. The second sacred pool is located within the Medupi Power Station site boundary and is a seasonal pool (a lake which collects water in the rainy season) This sacred pool has a medium significance rating and a fairly good conservation status as it has been previously partially destroyed during earthmoving / construction activities, however, it will not be impacted by the proposed project activities. The proposed pipeline activities will not affect both sacred pools as they are not within the proposed 32 m corridor for operations. With regards to Sacred Pool 1, the closest point of the pipeline will be at least 260 m away. Furthermore, there is a tarred road (Kuipersbult Road) a railway line as well as the Medupi Power Station site boundary fence between the pool and the proposed make-up water pipeline. These act as a buffer and will ensure no impact on the pool. Sacred Pool 2 is approximately 50 m away from the closest point of the make-up water pipeline. There is also a tarred access road between the proposed pipeline and the pool which will act as a buffer and limit any potential impacts due to construction activities; and
- Wetland areas.

The environmental sensitivities are identified in **Figure 8-1** below.

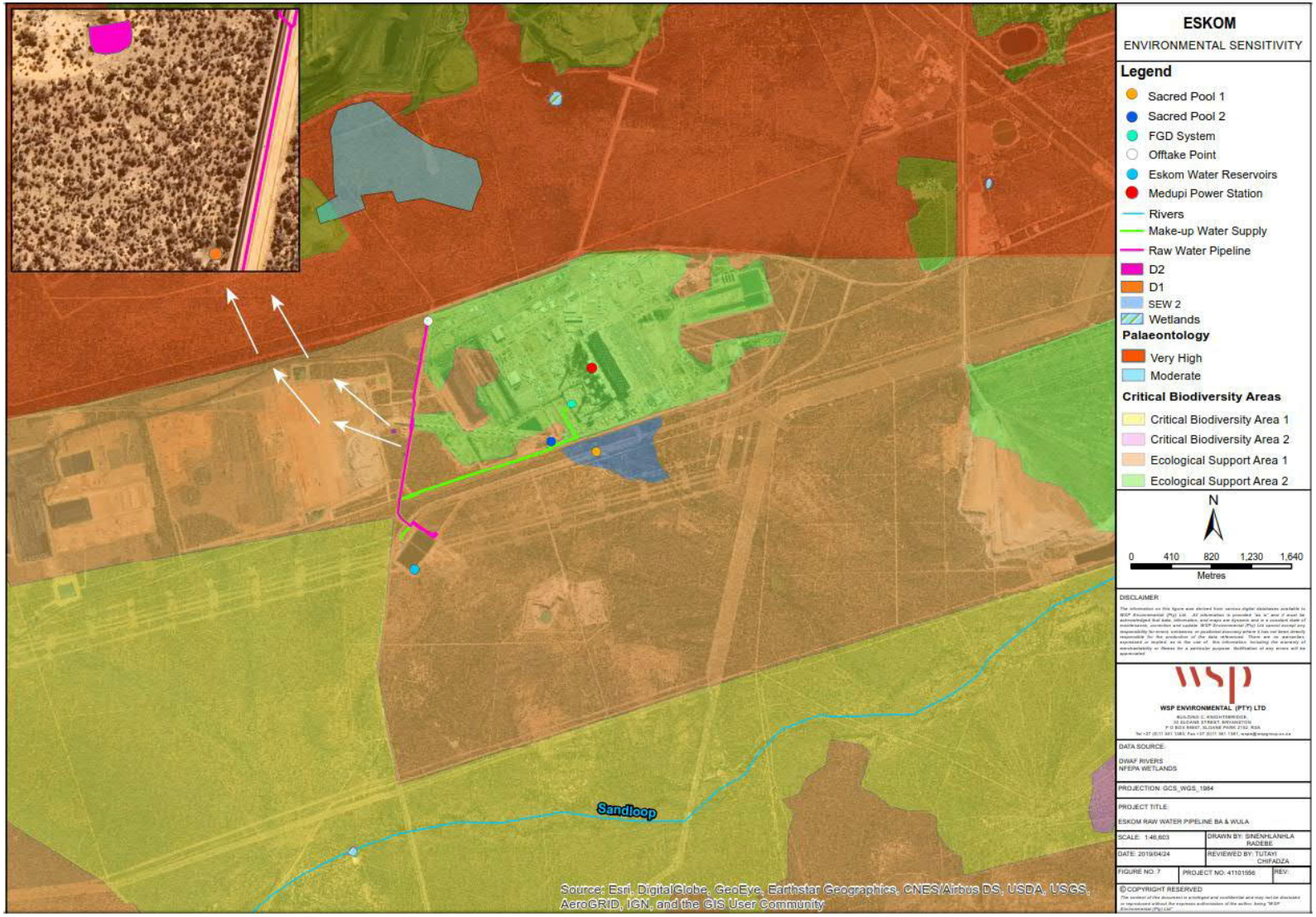


Figure 8-1: Environmental Sensitivities Map

8.2 SPECIALIST CONCLUSIONS

8.2.1 WETLAND ASSESSMENT

A total of three HGM units were identified within 500m of the proposed raw water pipelines, namely:

- D1- Depression;
- D2- Depression; and,
- SEW2- Semi-Ephemeral Washes.

Depressions D1 and D2 are located within 500m of pipeline segment 1, transferring water from an offtake point to the holding reservoir, whilst SEW2 is located adjacent to pipeline segment 2, transferring water from the holding reservoir to the FGD Process Water Tanks and Wastewater Treatment Plant.

The wetland habitat risk assessment determined that the proposed construction and operation of the pipelines may have the potential to impact the identified D1 (depression) wetland. The D1 wetland was assessed to have a PES of C (Moderately Modified) owing to the transformed nature of the surrounding land use and its influence on the D1 wetland. The EIS of the D1wetland was assessed as being moderate, driven by the hydrological functional importance, i.e. erosion control, water quality enhancement and maintenance of biodiversity.

The proposed pipelines are not anticipated to contribute to the direct loss of wetland habitat or biota. This is however dependant on construction plans and protocols in place during these phases.

The potential impacts to the identified wetlands would be from incorrect construction methods and operational activities of the proposed construction activities. If the stipulated mitigative measures, including adherence to the DWS Environmental Best Practice Guidelines and the Work Method Statement, then the impacts are deemed to be of low significance.

Prior to undertaking the proposed activities, construction method statements and emergency response plans must be developed, with specific consideration given to the environment, including wetland habitats. It is envisaged that the implementation of these would provide sufficient mitigation measures in order to reduce the environmental impact.

It is the specialist opinion then that the proposed pipeline may then be registered with the DWS under a General Authorisation (GA) in terms of Section 21(c) and 21(i). However as per GN 509 of 2016, it must be noted that a GA is not applicable “in instances where an application must be made for a Water Use Licence for authorisation of any other water use as defined in Section 21 of the Act.”

8.2.2 BIODIVERSITY ASSESSMENT

FLORA

From a floral perspective, four main non-disturbed vegetation communities were identified, however, the vegetation onsite is described as having a low diversity. Although a number of protected tree species occur, in this case Maroela (*Sclerocarya birrea* subsp *africana*) and Shepard’s Tree (*Boscia albitrunca*), no red data listed floral species were reported for the study area (although one Near-Threatened herbaceous species may occur). A limited amount of intact habitat still remains (albeit somewhat degraded). In these areas the most noteworthy communities are the *Senegalia nigrescens –Combretum apiculatum* dominated woodland and the vegetation associated with the pans and ephemeral washes (particularly those associated with the Sandloop FEPA) which were afforded a Very High and Moderate -High sensitivity respectively.

The Biodiversity Company is of the view that the project is likely to have a low impact significance on local flora.

FAUNA

From a faunal perspective, a list of 43 mammal, 158 birds, 20 reptile, 16 frog, 9 butterfly, 2 dragonfly and 1 scorpion species for the greater study area (Medupi Power Station site boundary). Several noteworthy species (protected or red data listed) were recorded within greater study area as identified in Section **6.8.2**. However, only a very limited number of these species are expected to occur within the fenced FGD footprint area and in turn, the proposed pipeline route. Here no suitable breeding habitat exists for the region's red-listed raptor species (lack of suitably high trees and disturbance levels likely preclude breeding). Of the various noteworthy mammal species only Serval, Brown Hyaena may occur. Perhaps the most relevant and noteworthy species are African Bullfrog (Protected Species), which occur in notable abundance in the greater area and may potentially occur within some of the pans adjacent to the pipeline routes.

The Biodiversity Company is of the view that the project is likely to have a low impact significance on local fauna.

8.2.3 HERITAGE ASSESSMENT

The specialist's exemption letter indicated that the site is disturbed, has industrial nature of the receiving environment and hence has a low likelihood of in situ, primary context archaeological remains. Furthermore, HIAs conducted at Medupi Power Station over the last two decades have yielded little more than scattered middle stone age (MSA) miscellaneous flakes. Regarding the issue of graves, this has been extensively dealt with in previous HIA assessments in the immediate vicinity of the current activities. The specialist concluded that exemption be made for the proposed project from any further heritage assessment and mitigation, however, Eskom will follow the chance find procedure in the event of any potential discovery of heritage resources.

8.3 IMPACT SUMMARY

A summary of the identified impacts and corresponding significance ratings for the proposed flood berm is provided in **Table 8-1** below.

Table 8-1: Impact Summary

NO.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION		WITH MITIGATION	
			SIGNIFICANCE	STATUS	SIGNIFICANCE	STATUS
C1	Generation of Dust and PM	Construction	Medium	(-)	Low	(-)
C2	Noise	Construction	Low	(-)	Low	(-)
C3	Soil Erosion	Construction	Medium	(-)	Low	(-)
C4	Soil Contamination	Construction	Medium	(-)	Low	(-)
C5	Change of Flow Volumes and Drainage Patterns (Surface Water)	Construction	Medium	(-)	Low	(-)
C6	Deterioration in Water Quality (Surface Water)	Construction	Medium	(-)	Low	(-)

NO.	IMPACT DESCRIPTION	PHASE	WITHOUT MITIGATION		WITH MITIGATION	
			SIGNIFICANCE	STATUS	SIGNIFICANCE	STATUS
C7	Change of Flow Volumes and Drainage Patterns (Groundwater)	Construction	Medium	(-)	Low	(-)
C8	Deterioration in Water Quality (Groundwater)	Construction	Medium	(-)	Low	(-)
C9	Loss and fragmentation of flora	Construction	Medium	(-)	Low	(-)
C10	Increased alien vegetation species	Construction	Medium	(-)	Low	(-)
C11	Displacement of Fauna and Loss of Habitat	Construction	Medium	(-)	Low	(-)
C12	Increase in Local Traffic	Construction	Low	(-)	Low	(-)
C13	Employee Health and Safety	Construction	Medium	(-)	Low	(-)
C14	Employment Opportunities	Construction	Low	(+)	Medium	(+)
C15	Damage to Heritage and Palaeontological Resources	Construction	Low	(-)	Low	(-)

8.4 IMPACT STATEMENT

The overall objective of the BA is to provide sufficient information to enable informed decision-making by the authorities. This was undertaken through consideration of the proposed project components, identification of the aspects and sources of potential impacts and subsequent provision of mitigation measures.

It is the opinion of WSP that the information contained in this document (read in conjunction the EMPr) is sufficient for the DEA to make an informed decision for the environmental authorisation being applied for in respect of this project.

Mitigation measures have been developed, where applicable, for the above aspects and are presented within the EMPr (**Appendix G**). It is imperative that all impact mitigation recommendations contained in the EMPr, of which the environmental impact assessment took cognisance, are legally enforced.

9 CONCLUSION

Eskom proposes to construct a make-up and raw water supply pipeline, for the FGD plant, at the Medupi Coal Fired Power Station.

This report provides a description of the proposed project and details the aspects associated with the construction and operation. The report also includes the methodology followed to undertake the BA process. A detailed description on the existing environment (bio-physical as well as socio-economic) is provided based on findings from the specialist surveys and existing information. Stakeholder engagement was undertaken from the onset of the project in a transparent and comprehensive manner. Outcomes of all comments received from the public review period has been recorded and responded to in this Final BAR. Based on the environmental description, specialist surveys as well as the stakeholder engagement, a detailed impact assessment was undertaken and, where relevant, the necessary management measures have been recommended.

In summary, the BA process assessed both biophysical and socio-economic environments and identified appropriate management and mitigation measures. The biophysical impact assessment revealed that there are no environmental fatal flaws and no significant negative impacts associated with the proposed project should mitigation and management measures be implemented. In addition, it should be noted that the socio-economic impacts associated with the project are positive but limited.

The Draft BAR was made available for public review from **13 May 2019** to **18 June 2019**. All issues and comments submitted to WSP were incorporated in the CRR attached as **Appendix E-5** of this Final BAR. This Final BAR will be made available for public perusal from **21 June 2019**.

This Final BAR has also been submitted to the competent and commenting authorities. It is the opinion of WSP that the information contained in this document is sufficient for the DEA to make an informed decision for the EA being applied for in respect of this project.

If you have any further enquiries, please feel free to contact:

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APPENDIX

A EAP AND SPECIALIST CV

APPENDIX

A-1 ASHLEA STRONG

A-2 TUTAYI CHIFADZA

APPENDIX

A-3 ZAKARIYA NAKHOODA

APPENDIX

A-4 ANDREW HUSTED

A-5 LEN VAN SCHALKWYK

APPENDIX

B EAP AND SPECIALIST DECLARATIONS

APPENDIX

B-1 *TUTAYI CHIFADZA (EAP)*

APPENDIX

B-2 ZAKARIYA NAKHOODA

APPENDIX

B-3 ANDREW HUSTED

APPENDIX

B-4 LEN VAN SCHALKWYK

APPENDIX

C STAKEHOLDER DATABASE

APPENDIX

D MAPS

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D-2 LAYOUT MAP

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D-3 TOPOGRAPHY AND LANDUSE MAP

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D-4 RIVERS AND WETLANDS MAP

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D-5 PALAEOSENSITIVITY MAP

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D-6 ENVIRONMENTAL SUMMARY MAP

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E PUBLIC PARTICIPATION

E-1 ADVERT

E-2 SITE NOTICES

E-3 EMAIL NOTIFICATIONS

E-4 SMS NOTIFICATION

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E-5 COMMENTS AND RESPONSES REPORT

APPENDIX

F SPECIALIST STUDIES

APPENDIX

F-1 *HERITAGE EXEMPTON LETTER*

APPENDIX

F-2 WETLAND ASSESSMENT

APPENDIX

F-3 BIODIVERSITY ASSESSMENT LETTER

APPENDIX

G EMPR