Environmental Impact Assessment Report
And
Environmental Management Plan

for Listed Activities Associated with the proposed Mogale Tailings Retreatment Operation, situated in the West Rand

DMRE Reference Number GP30/5/1/2/2/ (206) MR

PART E

Environmental Authorisation in Support of the Mogale Tailings Retreatment Operation

SUBMITTED FOR ENVIRONMENTAL AUTHORISATIONS IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA) AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT, 2008 (ACT NO. 59 OF 2008) (NEM:WA) IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT NO. 28 OF 2002) (MPRDA) (AS AMENDED).

Appendix N: Environmental Noise Impact Assessment

DIGBY WELLS
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Mogale Tailings Retreatment Operations Environmental Application Process

Environmental Noise Impact Assessment

Prepared for:
Pan African Resources PLC (PAR)

Project Number:
PAR7273

July 2022

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2010/008577/07

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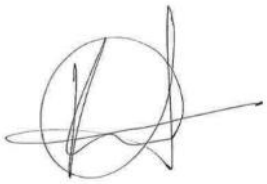
This document has been prepared by Digby Wells Environmental.

Report Type:	Environmental Noise Impact Assessment
Project Name:	Mogale Tailings Retreatment Operations Environmental Application Process
Project Code:	PAR7273

Name	Responsibility	Signature	Date
Keenan Terry (Cand.Sci.Nat)	Report Compiler		July 2022
Matthew Ojelede (Pr.Sci.Nat.)	Technical Reviewer		July 2022
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DETAILS AND DECLARATION OF THE SPECIALIST

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Experience (years):	6
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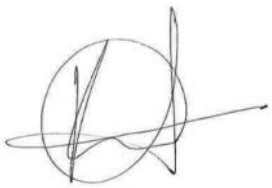
I, Keenan Terry, declare that: –

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

- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist *07/12/2021*

Date

Findings, recommendations and conclusions provided in this report are based on the best available scientific methods and the author's professional knowledge and information at the time of compilation. Digby Wells employees involved in the compilation of this report, however, accepts no liability for any actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, and by the use of the information contained in this document.

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Any recommendations, statements or conclusions drawn from or based on this report must clearly cite or make reference to this report. Whenever such recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety.

EXECUTIVE SUMMARY

Digby Wells Environmental (hereinafter Digby Wells) has been appointed to undertake an Environmental Application Process and associated specialist studies for the Mogale Gold Mining Right with reference number: (GP) 30/5/1/2/2 (206) (MR) and, more specifically for the proposed construction of a Mogale Tailings Retreatment Operations.

Mogale Tailings Retreatment (Pty) Ltd (MTR) a wholly owned subsidiary of Pan African Resources PLC (PAR) has entered into a Sale and Purchase Agreement for the acquisition of the shares in and claims against Mogale Gold (Pty) Ltd (Mogale Gold). The agreement was entered into between PAR and the liquidators of Mintails Mining SA (Pty) Ltd (in liquidation) (MMSA). MMSA is the holding company of Mogale Gold. The intended transaction is subject to a due diligence investigation to be completed by 30th September 2022. The proposed transaction has now been concluded and was announced on the 6th October 2022.

PAR has closed the transaction to acquire the total share capital and claims of Mogale Gold and Mintails SA Soweto Cluster Proprietary Limited (MSC), (collectively, the Sale Transaction). Both Mogale Gold and MSC are 100% owned by Mintails Mining SA Proprietary Limited (Mintails SA), which was placed in provisional liquidation during 2018. Based on this PAR has now acquired the assets associated with MR 206, based on the conclusion of the transaction noted above.

The project entails the reclamation of historical unlined Tailings Storage Facilities (TSFs). The reprocessed tailings will be first discarded into West Wit Pit and possibly other nearby small pits. Any extra processed tailings will be stored on a ground TSF (West Wits Pit TSF and 1L23-1L25 TSF). It is proposed that the footprint of 1L23-1L25 footprint will be lined and the footprint of West Wits Pit TSF will not be lined.

This Environmental Nosie Impact Assessment (ENIA) report forms part of the suite of specialist studies required as part of the Environmental Application Process.

The baseline characterisation of the Project Area encompasses a selection of Noise Sensitive Receivers (NSRs) on Google Earth® Imagery, followed by a site survey in October 2021 at two (2) locations to establish the existing ambient soundscape of the area. The approach used in determining the ambient noise level was based on the methodology described in the NEMA, 1998 (Act No. 107 of 1998) as amended (GN R320 of 20 March 2020) and the SANS 10103:2008 standard. A Cirrus Optimus Green, precision integrating Sound Level Meter (SLM) was used to conduct the measurements. The measurements were taken for a 48-hr period at each location, taking into account the daytime as well as night-time noise characteristics

The results from the field measurements show the LAeq recorded for both daytime and night-time. Based on the results, the LAeq daytime ambient noise levels at measurement monitoring location N1 was 44 dBA which was below the SANS 10103:2008 guidelines maximum limit rating of 50dBA for a daytime suburban environment. The LAeq for daytime ambient noise level at monitoring location N2 was 62 dBA which was above the SANS 10103:2008 guidelines

maximum limit rating of 50dBA for a daytime suburban environment. For night-time, The LAeq night-time ambient noise level at both monitoring locations (N1 – 42 dBA and N2 – 55 dBA) were above the above the SANS 10103:2008 guidelines maximum limit rating of 40 dBA for night-time suburban environment. The main noise sources impacting these measurement locations were similar to the daytime sources.

The main noise sources that impacted the monitoring locations were:

- Anthropogenic; Communication (people talking / shouting) and Vehicle activity (light and heavy vehicles); and
- Natural; birds (birdsong/chirping), poultry (chickens).

The following conclusions can be drawn for the ambient noise levels in the Project area and its immediate surroundings:

- The resulting overall ambient noise levels as determined by the noise monitoring survey show the area does not comply with the SANS 10103:2008 guidelines limits for day and night-time;
- The noise contributions of vehicular activity along the R28 and M13 represent a perennial contributor to the background. The background noise to a large extent will mask out the day and night-time emissions caused by the future mining operations at nearby sensitive receivers.

Noise dispersion modelling scenarios were conceptualized for the construction and operational phases, with the model predictions indicating negligible impacts on the ambient soundscape at the NSRs for construction and operational phases.

In summary:

- Sensitive receivers that fall within 0.5 km of the Project area for the daytime construction and operational phases are predicted to experience noise impacts above the SANS 10103:2008 regulatory limits.
- Sensitive receivers that fall within 1.0 km of the Project area for the night-time operational phase are predicted to experience noise impacts above the SANS 10103:2008 regulatory limits.
- Predicted future emissions from the daytime construction and operational phase, as well as the night-time operational phase, of the Project will not result in an increase in the ambient noise level at the NSRs located greater than 0.5 km and 1.0 km (Day and Night) radius of project reclamation activities.
- Hence, the development of the project will not lead community/group responses (as per the SANS 10103:2008 guidelines) to noise emissions, as the cumulative impact is categorized as “Little” (0-10 dBA), resulting in “Sporadic complaints” if any from the NSR.

The findings from the impact assessment ranking methodology for the operational phase have indicated minor impacts on the nearby sensitive receivers from Project related activities.

However, the implementation of mitigation measures during the different phases of the Project is recommended and is predicted to result in negligible impacts post-mitigation. The aforementioned will result in emission reduction and a further decrease in anticipated noise impacts onsite and at the receivers.

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LIST OF ACRONYMS, ABBREVIATIONS AND DEFINITIONS

A-weighting	The A-weighting filter covers the full audio range - 20 Hz to 20 kHz and the shape is similar to the response of the human ear at the lower levels
AEL	Air Emission Licence
Ambient Noise	Ambient noise is the noise from all sources combined − mining noise, traffic noise, birdsong, running water, etc.
CONCAWE	Conservation of Clean Air and Water in Europe
dB(A)	Decibels, 'A' Weighted is the most commonly used standard frequency weighting designed to reflect the response of the human ear to noise.
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ENIA	Environmental Noise Impact Assessment
ha	Hectare
km	Kilometre
LA_{90}	The noise level exceeded for 90% of the measurement, calculated by statistical analysis.
LA_{eq}	A-frequency weighted, equivalent sound level value for a specific period measured using Impulse – time weighting.
LAmax	The maximum Sound Level with 'A' Frequency weighting and Fast Time weighting during the measurement period.
LAmin	The maximum Sound Level with 'A' Frequency weighting and Fast Time weighting during the measurement period.
LReq,T	The equivalent continuous A-weighted sound pressure level, in decibels (dBA), determined over a specific time period.

m	Metre
MCLM	Mogale City Local Municipality
MR	Mining Right
Mt	Million tons
NCRs	Noise Control Regulations
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
Noise Level	Means the reading on an integrating impulse sound level meter taken at a measuring point in the presence of any alleged disturbing noise at the end of a total period of at least 10 minutes, after such meter had been put into operation, and, if the alleged disturbing noise has a discernible pitch, to which 5dBA has been added.
NSRs	Nearby Sensitive Receivers
PAR	Pan African Resources
SANS	South African National Standard
SLMs	Sound Level Meters
SPL	Sound Pressure Level
SPLs	Sound Power Levels
TSFs	Tailing Storage Facilities
WUL	Water Use Licence

CONTENT OF THIS REPORT IN ACCORDANCE WITH THE REGULATION GNR982 OF 2014, APPENDIX 6 (AS AMENDED)

Legal Requirement		**Section in Report**
(1)	A specialist report prepared in terms of these Regulations must contain-	
(a)	details of-	iii to iv, 5
	(i) the specialist who prepared the report; and	iii to iv, 5
	(ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;	iii to iv, 5
(b)	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Page iii to iv
(c)	an indication of the scope of, and the purpose for which, the report was prepared;	3

Legal Requirement		Section in Report
cA	And indication of the quality and age of the base data used for the specialist report;	7.1
cB	A description of existing impacts on site, cumulative impacts of the proposed development and levels of acceptable change;	8
(d)	The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	7.1.1.2
(e)	a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of the equipment and modelling used;	7
(f)	Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternatives;	2.2
(g)	an identification of any areas to be avoided, including buffers;	N/A
(h)	a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	2.1
(i)	a description of any assumptions made and any uncertainties or gaps in knowledge;	4
(j)	a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	8
(k)	any mitigation measures for inclusion in the EMPr;	11
(l)	any conditions/aspects for inclusion in the environmental authorisation;	N/A
(m)	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	12
(n)	a reasoned opinion (Environmental Impact Statement) -	13
	whether the proposed activity, activities or portions thereof should be authorised; and	13
	if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	11
(o)	a description of any consultation process that was undertaken during the course of preparing the specialist report;	N/A

Legal Requirement		Section in Report
(p)	a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	N/A
(q)	any other information requested by the competent authority.	N/A

1. Introduction

Digby Wells Environmental (hereinafter Digby Wells) has been appointed to undertake an Environmental Application Process and associated specialist studies for the Mogale Gold Mining Right with reference number: (GP) 30/5/1/2/2 (206) (MR) and, more specifically for the proposed construction of a Mogale Tailings Retreatment Operations.

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Mogale Gold owns the right to extract and process gold from tailings recourses by reprocessing old gold mine slimes dams and sandy mine dumps left by the extensive historic mining activities that have taken place in the area since 1888. MTR (PAR) is only interested in the surface operations associated with Mining Right (MR) 206 (i.e., Tailings Storage Facilities (TSFs) for reclamation, processing and deposition), and therefore the focus of this application process.

The Project consists of 120 Mt of tailings to be reprocessed and firstly deposited into the West Wits Pit (current authorisation in place for in-pit deposition) and then undertake deposition of the footprint of 1L23-1L25 footprint (New Tailings Facility) once capacity has been reached within the West Wits Pit.

Alternatives are being considered for potential deposition of tailings material into the other pits in the area.

It must be noted that once the West Wits Pits reaches capacity the surface deposition will extend in a northern direction from the pit onto surface, expanding the deposition footprint associated with West Wits Pit.

There are six dumps being considered to be reprocessed, the largest of which amounts to 57.9 Mt, while the smallest contains 0.57 Mt. The primary location of processed tailings storage has been earmarked for deposition in the West Wits Pit.

2. Project Description

Mogale plans to undertake activities relating to reclamation associated with gold-bearing TSFs through hydraulic reclamation. Digby Wells was appointed as the Independent Environmental Consultant to undertake the Environmental Impact Assessment (EIA) Application process which comprises an Air Emission Licence (AEL) and Water Use Licence (WUL) for the proposed gold-bearing TSFs.

The site comprises existing infrastructure such as sand dumps, Lancaster Dam and an open pit that will be used for the deposition of tailings materials. A process plant, overland pumping and piping inclusive of associated water management infrastructure will form part of the proposed infrastructure that will require an authorisation. Once the open pit is filled, a new TSF will potentially be constructed on the footprint area of one of the reclaimed TSF sites (1L23-1L25) (Figure 2-1). The footprint of the area is 2,923.3 ha which consists of MR 206 (referred to as the Project Area in this report) and its associated infrastructure which includes: Gl, G2 plant; North Sand; South Sand; 1L23; 1L28; 1L13; 1L8; 1L10; West Wits Pit and Lancaster Dam.

Ancillary infrastructure such as pipelines, powerlines and pumps will be required for the proposed reclamation activities and will be included in support of the Environmental Application Process, which will be undertaken.

2.1. Project Locality

The project is within the Mogale City Local Municipality (MCLM), which is located within the West Rand District Municipality. The MCLM is the regional services authority, and the area falls under the jurisdiction of the Krugersdorp Magisterial District.

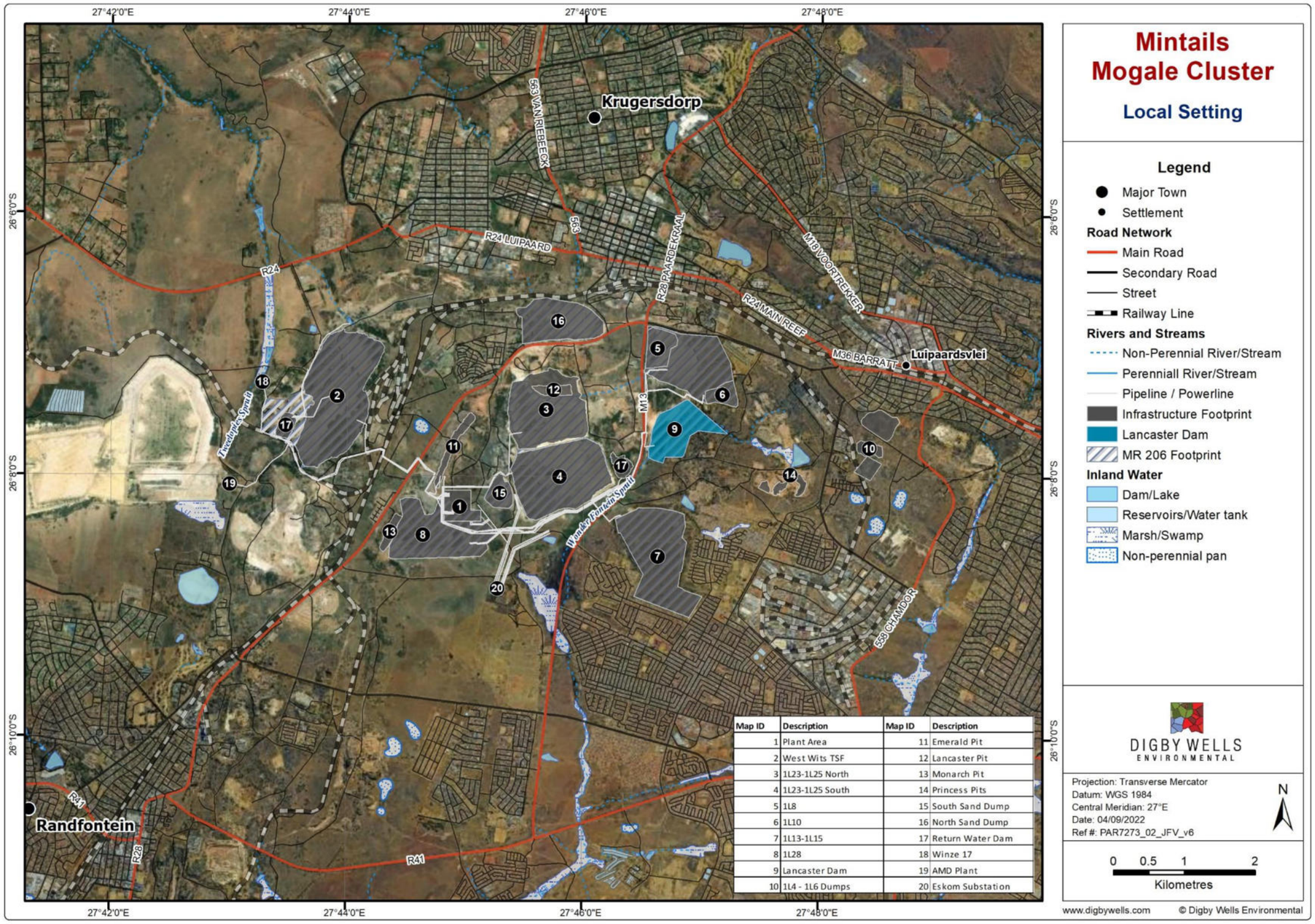
The project is about 4 km south of Krugersdorp and 4 km northeast of Randfontein, approximately 10 km off the N14 National Road in the Gauteng Province, in an area that has been transformed by past gold mining activities.

The project locality of the site is illustrated in Figure 2-1, the Project Locality Map.

Table 2-1: Summary of the Project Location Details

Province	Gauteng
District Municipality	West Rand District Municipality
Local Municipality	Mogale Local Municipality
Nearest Town	Krugersdorp (4 km), Randfontein (4 km)
GPS Co-ordinates	26°07'45.54"S

(Relative centre point of the study area)	27°45'40.85"E



Map ID	Description	Map ID	Description
1	Plant Area	11	Emerald Pit
2	West Wits TSF	12	Lancaster Pit
3	1L23-1L25 North	13	Monarch Pit
4	1L23-1L25 South	14	Princess Pits
5	1L8	15	South Sand Dump
6	1L10	16	North Sand Dump
7	1L13-1L15	17	Return Water Dam
8	1L28	18	Winze 17
9	Lancaster Dam	19	AMD Plant
10	1L4 - 1L6 Dumps	20	Eskom Substation

Figure 2-1 : Project Locality

2.2. Proposed Infrastructure and Activities

Table 2-2 below details the project phases and associated activities to be considered in this ENIA.

Table 2-2: Project Phases and Associated Activities

Project Phase	Associated Activities
Construction Phase	Site clearing for the construction of the new processing plant facility and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.
	Construction of the new processing plant and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.
Operational Phase	Hydraulic reclamation of the associated historic tailings facilities and sand dumps.
	Operation of pump stations during the operational phase.
	Maintenance of pipeline routes during the operational activities.
	Infilling of processed tailings material into the West Pits Pit and other potential pits.
	Surface tailings deposition within the West Wits Pit.
	Tailings deposition onto the historic footprint of 1L23-1L25 (lined).
	Production of Gold.
	Progressive rehabilitation of the new tailings facility footprints (West Pits TSF and 1L23-1L25 TSF.
Decommissioning Phase	Removal, decommissioning and rehabilitation of surface infrastructure such as pipelines, powerlines, pumps etc. footprints.
	Removal, decommissioning and rehabilitation of the processing plant footprint.
	Rehabilitation of the old TSF footprints.
	Rehabilitation of the old Mogale Processing Plant footprint.
	Final rehabilitation of the facility.
	General rehabilitation of the surrounding area, including wetland rehabilitation.

3. Scope of Work (SoW)

The ENIA aims to establish the current/existing soundscape of the receiving environment (Project area and immediate surroundings) and a noise dispersion modelling assessment to predict the future implications of mining on the ambient noise levels and exposure scenarios. The aforementioned applies to the Nearby Sensitive Receivers (NSRs) as a result of the construction and operational phases of the proposed Project.

Based on the above, the noise scope of work encompasses the following:

- Environmental noise baseline monitoring surveys;
- Assessment of the future noise impacts and comparison against regulatory standards for compliance; and
- Recommendations of management measures, including mitigation and monitoring requirements.

4. Assumptions, Limitations and/or Exclusions

Assumptions, limitations and exclusions pertaining to this Project are discussed in Table 4-1 and are included as part of this assessment.

Table 4-1: Assumptions, Limitations and Exclusions

Assumption, Limitation, or Exclusion	Consequence
The construction phase is assumed to be carried out during daytime hours only (06:00-18:00).	Only a daytime scenario was modelled.
It was assumed that reclamation activities will be carried out for both day and night-time.	A day and night-time scenario were modelled.
The modelling approach assumed that the reclamation mining method (hydraulic mining and sand mining) applied at a particular historic tailing and sand dumps would be applied across all the other tailings and dumps. i.e., all sand dumps will be reclaimed using the same methodology and machinery/equipment.	None, the approach represents a realistic day to day scenario.
Due to security issues, the baseline measurements had to be taken at only two (2) receivers.	None, the selected monitoring locations are a representative sample of the receiving environment.

5. Details of the Specialist(s)

Keenan Terry (Author) is the Noise Lead and Environmental GIS Specialist at Digby Wells & Associates (Pty) Ltd. He obtained a BSc. degree in Environmental Science as well as a BSc (Hons) degree in Environmental Science from the University of Kwa-Zulu Natal. He is a member of the South African Council for Natural Scientific Professions (SACNASP), the

International Association for Impact Assessment South Africa (IAIAsa), and the South African Geomatics Council (SAGC).

6. Relevant Legislation, Standards and Guidelines

The legislation, regulation, and guidelines considered in this noise report are tabulated and discussed briefly in Table 6-1. The applicable standards in terms of compliance are discussed in Section 5.1 below.

Table 6-1: Applicable Legislation, Regulations, Guidelines, and By-Laws

Legislation, Regulation, Guideline, or By-Law	Applicability
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) as Amended The NEMA is the statutory framework to enforce Section 24 of the Constitution of the Republic of South Africa …(Section 24: ***the right to a healthy environment and the right to have the environment protected).*** The NEMA is intended to promote cooperative governance and ensure that the rights of people are upheld, but also recognise the necessity of economic development.	Principles from NEMA relevant to noise pollution, Section 24(4) b(i) … "the investigation and assessment of the potential impacts of activities that require authorisation or permission.". Procedures for the Assessment and minimum Criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of The National Environmental Management Act, 1998, when applying for environmental authorisation.
National Noise Control Regulations, R.154 of 1992 (the Noise Regulations) promulgated in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989) The National Noise-Control Regulations (GN R154 in Government Gazette No. 13717 dated 10 January 1992) (NCRs) form part of the Environmental Conservation Act and these Regulations apply to external noise. The NCRs differentiates between Disturbing Noise levels (which is objective and scientifically measurable which are generally compared to existing ambient noise level) and Noise Nuisance (which is a subjective measure and is defined as noise that "*disturbs or impairs or may disturb or impair the convenience or peace of any person*"). Local Authorities use Controlled Areas to identify areas with high noise levels. Restrictions have been set out for development that occurs in these Controlled Areas. These regulations make provision for guidelines pertaining to noise control and measurements. The regulations make reference to the use of the South African National Standards 10103:2008 (SANS) guidelines for the	The purpose of these Regulations is to prescribe general measures for the control of noise. As such, a Noise Impact Assessment in accordance with the NCRs must be undertaken for submission to determine the potential disturbing and nuisance noise levels associated with a particular development.

Legislation, Regulation, Guideline, or By-Law	Applicability
Measurement and Rating of Environmental Noise with Respect to Land Use, Health, and Annoyance and to Speech Communication.	
Noise Control Regulations for the Gauteng Province, No.75 of 1999 promulgated in terms of Section 25 of the Environmental Conservation Act, 1989 (Act 73 of 1989) The control of noise in the Gauteng Province is legislated in the form of Noise Control Regulations specific to the Gauteng province and is promulgated in terms of section 25 of the Environment Conservation Act No. 73 of 1989. In 1996, Schedule 5 of the Constitution devolved responsibility to the provinces to administer these regulations themselves. Gauteng (GN 5479/PG 75/19990820) is one of three provinces that have done so. Subsequently, the NCRs have been repealed in these provinces. Also, various municipalities have their By-Laws regarding noise control.	The purpose of these Regulations is to prescribe general measures for the control of noise in the Gauteng province.
South African National Standard (SANS) 10103:2008 Edition 6: The measurement and rating of environmental noise with respect to annoyance and to speech communication The standard covers methods and gives guidelines to assess working and living environments with respect to acoustic comfort, excellence, and with respect to possible annoyance by noise (i.e., whether complaints can be expected). It also gives a method to predict speech communication efficiency	The purpose of this standard is to provide a guideline for the measurement and rating of environmental noise.
South African National Standard (SANS) 10328:2008 Edition 2: Methods for environmental noise impact assessments The standard covers procedures for environmental noise impact investigations and assessments.	The purpose of this standard is to provide a guideline for environmental noise impact investigations and assessments. Therefore, this ENIA has been prepared in compliance with this standard

6.1. Applicable South African Standards

NEMA (Act No. 107 of 1998) as amended provides a legislative framework for environmental management in South Africa. Pollution, as described in NEMA from a noise perspective, means any change in the environment caused by noise emitted from any activity, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or will have such an effect in the future. Principles from NEMA relevant to noise pollution include: Section 28(1) "*Every person who causes, has caused or*

may cause significant pollution, must take reasonable measures to prevent such pollution", Section 24(4) b(i) … "*the investigation and assessment of the potential impacts of activities that require authorisation or permission*." and Section 24(7) "*Procedures for the investigation, assessment, and communication of the potential impact of activities*". Principles from NEMA (GN R320 of 20 March 2020) provide the criteria for the specialist assessment and minimum report content requirements for the impacts of noise on the environment for activities requiring environmental authorisation.

The National NCRs is the primary law on noise in the Republic of South Africa (GN R154 of 10 January 1992) and is promulgated in terms of Section 25 of the Environment Conservation Act (ECA) No. 73 of 1989. The Regulations put in place various measures for the prevention of noise pollution and national norms as well as standards for the regulation/control of noise in South Africa. Schedule 5 of the Constitution, devolved responsibility to the provinces to administer these regulations themselves, subsequently, the NCRs were repealed in the Gauteng province. The control of noise in the Gauteng Province is now legislated in the form of Noise Control Regulations specific to the Gauteng (GN 5479/PG 75/19990820) province and is promulgated in terms of Section 25 of the Environment Conservation Act No. 73 of 1989. Based on the Gauteng NCRs, it is prohibited to make, produce, or cause a disturbing noise, or allow it to be made, produced, or caused by any person, animal, machine, device, or apparatus or any combination thereof. The Gauteng NCRs describes a "disturbing noise" as a noise level that rises above the designated zone level or if no zone level has been designated, the typical rating levels for ambient noise in districts. The ambient noise in different districts (residential and non-residential) are presented in Table 6-2.

The South African Bureau of Standards (SABS) is the National Standards Body in the Republic of South Africa that is responsible for the development, maintenance, and promotion of South African National Standards (SANS) as mandated by the Standards Act No.8 of 2008. The SANS 10103:2008 and SANS 10328:2008 have been identified in NEMA,1998 (Act No. 107 of 1998) (GN R320 of 20 March 2020) as the national standard for the assessment of noise impacts for residential and non-residential areas as defined in these standards. The acceptable rating levels according to SANS 10103:2008 for ambient noise in different districts (residential and non-residential) are presented in Table 6-2.

Table 6-2: Acceptable Rating Levels for Noise in Districts (SANS 10103, 2008)

Type of District	Equivalent continuous rating level ($L_{Reg.T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,DNA}$	$L_{Req,d}$[b]	$L_{Req,n}$[b]	$L_{R,dn}$[a]	$L_{Req,d}$[b]	$L_{Req,n}$[b]
RESIDENTIAL DISTRICTS						
a) Rural districts	45	45	35	35	35	25

Type of District	Equivalent continuous rating level ($L_{Reg.T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,DNA}$	$L_{Req,d}$[b]	$L_{Req,n}$[b]	$L_{R,dn}$[a]	$L_{Req,d}$[b]	$L_{Req,n}$[b]
b) Suburban districts with little road traffic	50	50	40	40	40	30
c) Urban districts	55	55	45	45	45	35
NON-RESIDENTIAL DISTRICTS						
d) Urban districts with some workshops, with business premises, and with main roads	60	60	50	50	50	40
e) Central business districts	65	65	55	55	55	45
f) Industrial districts	70	70	60	60	60	50

NOTE 1 If the measurement or calculation time interval is considerably shorter than the reference time intervals, significant deviations from the values given in the table might result.

NOTE 2 If the spectrum of the sound contains significant low frequency components, or when an unbalanced spectrum towards the low frequencies is suspected, special precautions should be taken and specialist advice should be obtained. In this case the indoor sound levels might significantly differ from the values given in columns 5 to 7

NOTE 3 In districts where outdoor $L_{R,dn}$ exceeds 55 dBA, residential buildings (e.g. dormitories, hotel accommodation and residences) should preferably be treated acoustically to obtain indoor $L_{Req,T}$ values in line with those given in table 1.

NOTE 4 For industrial districts, the $L_{R,dn}$ concept does not necessarily hold. For industries legitimately operating in an industrial district during the entire 24 h day/night cycle, LReq,d = LReq,n =70 dBA can be considered as typical and normal.

NOTE 5 The values given in columns 2 and 5 in this table are equivalent continuous rating levels and include corrections for tonal character, impulsiveness of the noise and the time of day.

NOTE 6 The noise from individual noise sources produced, or caused to be produced, by humans within natural quiet spaces such as nature reserves, private game farms, national parks, wilderness areas and bird sanctuaries, should not exceed a maximum Weighted sound pressure level of 50 dBA at a distance of 15 m from each individual source.

A - The values given in columns 2 and 5 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness of the noise and the time of day.

Type of District	Equivalent continuous rating level ($L_{Reg.T}$) for noise (dBA)					
	Outdoors			Indoors, with open windows		
	Day-night	Day-time	Night-time	Day-night	Day-time	Night-time
	$L_{R,DNA}$	$L_{Req,d}$[b]	$L_{Req,n}$[b]	$L_{R,dn}$[a]	$L_{Req,d}$[b]	$L_{Req,n}$[b]
B - The values given in columns 3, 4, 6 and 7 are equivalent continuous rating levels and include corrections for tonal character and impulsiveness.						
C – $L_{Req,T}$ is the equivalent continuous A-weighted sound pressure level (LAeq,T) during a specified time interval, plus specified adjustments for tonal character, impulsiveness of the sound and the time of day.						
D – dBA 'A-weighted' is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.						

The SANS10103:2008 also provides guidelines for addressing the issues concerning environmental noise and for estimating communities' responses to increases in the general ambient noise levels as a result of an intruding noise. The probable community/group response to levels over the acceptable rating levels are presented in Table 6-3, where LReq,T is the equivalent continuous A-weighted sound pressure level, in decibels (dBA), determined over a specific period. 'A-weighted' is a standard weighting of the audible frequencies designed to reflect the response of the human ear to noise.

Table 6-3: Categories of Community/Group Response (SANS 10103, 2008)

Excess ($\Delta L_{Req,T}$)[a]dBA	Estimated community/group response	
	Category	Description
0 – 10	Little	Sporadic complaints
5 – 15	Medium	Widespread complaints
10 - 20	Strong	Threats of action
>15	Very strong	Vigorous action
NOTE Overlapping ranges for the excess values are given because a spread in the community reaction might be anticipated.		
a ΔLReq,T should be calculated from the appropriate of the following:		
1) ΔLReq,T = LReq,T of ambient noise under investigation MINUS LReq,T of the residual noise (determined in the absence of the specific noise under investigation);		
2) ΔLReq,T = LReq,T of ambient noise under investigation MINUS the maximum rating level for the ambient noise given in table 1;		
3) ΔLReq,T = LReq,T of ambient noise under investigation MINUS the typical rating level for the applicable district as determined from table 2; or		
4) ΔLReq,T = Expected increase in LReq,T of ambient noise in an area because of a proposed development under investigation.		

7. Methodology

The approach used in investigating the baseline conditions of the proposed Project area and its immediate surroundings is covered in the section below.

7.1. Environmental Noise Baseline Assessment

The baseline characterisation encompassed a description of the existing soundscape using measurement data at pre-selected NSRs in the vicinity of the Project area. The locations served as suitable reference points for the measurement of ambient noise levels.

7.1.1. Existing Soundscape

The existing soundscape refers to the acoustic environment as perceived or experienced and/or understood by a person or people (Axelsson et al, 2019). The existing soundscape was determined based on the results of a noise monitoring survey that was conducted in October 2021, at two (2) pre-selected NSRs.

7.1.1.1. Sensitive Receivers

Noise sensitive receivers include, but are not limited to; industrial, educational, and residential facilities. These are areas where the occupants are more susceptible to the adverse effects of exposure to noise pollution. Google Earth® Imagery was used to identify the nearby sensitive receivers in the vicinity of the Project area. The locations of the potential sensitive receivers are displayed in Figure 7-1.

7.1.1.2. Measurement of Ambient Noise Levels

The noise monitoring survey was undertaken from 13th October – 18th October 2021 to determine ambient noise levels at sensitive receivers designated as receivers N1 and N2. The noise monitoring locations were chosen to be as relevant as possible to the Project design. It is anticipated that these monitoring locations would remain the same for the construction and operational phase monitoring. Table 7-1 and Figure 7-1 indicate the noise monitoring locations where the noise measurements was be conducted.

The approach used for the noise monitoring survey was based on NEMA (Act No. 107 of 1998) as amended (GN R320 of 20 March 2020) and the SANS 10103:2008 standard. Noise is often classified into roughly three (3) categories; Continuous, Intermittent, and Impulsive noise. According to Bruel and Kjaer, 2001 these noise types are defined as follows:

- Continuous noise refers to noise that occurs without interruption such as noise produced by machinery i.e., pumps or processing equipment when in operation;
- Intermittent noise refers to noise that operates in cycles or events such as noise produced by a passing vehicle or aircraft; and
- Impulsive noise refers to noise from impacts or explosions, e.g., from a pile driver, punch press or gunshot.

Table 7-1: Noise Measurement Location

Site ID	Location	Category of receiver	GPS coordinates
N1	Lindela Repatriation Centre	Suburban districts	26° 7.232'S & 27° 44.713'E
N2	Eleadah Estate	Suburban districts	26° 8'7.57"S & 27°44'24.01"E

During the site visit, long-term continuous measurement of forty-eight (48) hours was recorded at each monitoring location, with ambient noise levels collected every second for the duration of the measurement. The measurement took into account both daytime as well as night-time noise characteristics. According to the SANS 10103:2008 standard where 'Day – 6 am to 22 pm' and 'Night – 22 pm to 6 am'.

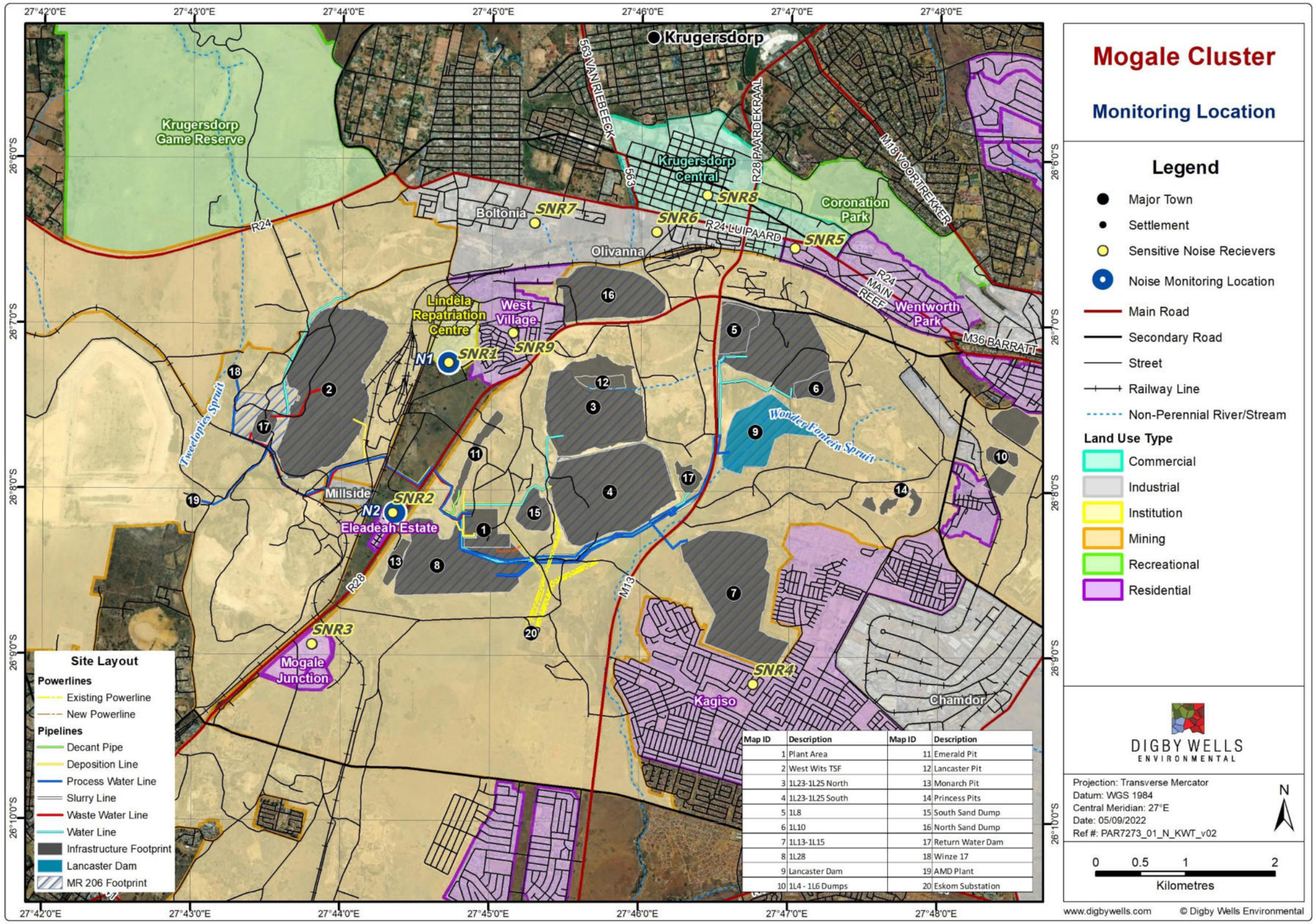


Figure 7-1: Noise Measurement and Sensitive Receivers Locations

A Cirrus, Optimus Green, 'Class 1, precision grade' Sound Level Meter (SLM), compliant with International Standards IEC 61672-1 was used for the measurements. The instrument was field calibrated with a Cirrus, sound level calibrator and 1/3 octave band logging were employed. Measurements were taken at a measurement height of 1.5 m above ground level and no closer than 3m to any reflecting surface (e.g., wall) in accordance with the SANS 10103:2008 standard (see Figure 7-2 and Figure 7-3).

Figure 7-2: Noise Monitoring at Location N1

Figure 7-3: Noise Monitoring at Location N2

The parameter measured at each measurement location included but was not limited to, the equivalent continuous sound pressure level (LAeq). It is a common practice to measure noise levels using the A-weighting setting built into all SLMs. The LAeq noise level data describes the average noise level for the measurement period taking into account all noise sources that were audible at the specific measurement location. The ambient noise measurements, including the A-weighted sound level parameters for minimum (LAmin), maximum (LAmax), 90th percentile (LA90) for the four measurement locations were also recorded and archived.

The meteorological conditions were also captured for the duration of the measuring period and are displayed in Table 7-2.

Table 7-2: Meteorological Conditions (World Weather Online, 13 - 18 October 2021)

	Air Pressure (mb)	Relative Humidity (%)	Temperature (°C)	Wind Speed (km/h)	Rain (mm)
Average	1013	12	24	10	0
Maximum	1018	19	34	18	0
Minimum	1008	7	17	4	0

7.2. Future Noise Sources and Sound Power Levels

This section describes various sources of noise associated with the construction and operational phases of the proposed project that can result in noise emissions audible to the NSRs in the area. Namely, noise from Industry and Traffic.

7.2.1. Industry Noise (Mining Infrastructure – Equipment and Machinery)

The mechanized industry creates serious noise problems for sensitive receivers. This noise is due to the machinery of all kinds and often increases with the power of the machine. Sound generation mechanisms of machinery are reasonably well understood, and the noise may contain predominantly low or high frequencies, tonal components, be impulsive or have unpleasant and disruptive temporal sound patterns.

7.2.1.1. Construction Noise

The noise from the construction phase will be highly variable as different activities (site clearing for the construction of the new processing plant facility and ancillary infrastructures such as pipelines, pump stations, electrical supply etc., and the construction of the new processing plant) will be taking place at different times, for different periods (operating cycles), in different combinations/sequences and on different parts of the construction site. Noise from the installation and construction of fixed installations such as the processing plant and relevant pipelines (slurry and water etc.) often result in noise emissions. Mobile equipment/machinery such as truck-mounted mobile cranes, Tractor-Loader-Backhoes (TLBs) etc, also result in noise emissions that may affect NSRs. Noise emissions from the proposed noise generating infrastructure associated with the construction phase will be assessed in this noise study.

7.2.1.2. Operational Noise

The noise from the operational phase will also be highly variable as different activities (hydraulic reclamation of the associated historic tailings and sand dumps as well as the processing plant) will be taking place at different times, for different periods (operating cycles), in different combinations/sequences and on different parts of the Project area. The hydraulic mining reclamation process involves the use of high-pressure water cannons (commonly referred to as water monitors) to break up the material and turn it into a slurry as it mixes with the runoff water. The slurry will be screened to remove vegetation and other material with the underflow directed to the slurry pipeline which will deliver the slurry to the processing plant. A slurry pump/pump station will be used to generate the pressure required to pump the slurry in the slurry pipeline to the plant and from the plant to the pit. For the sand dumps, sand material will be loaded onto a dump truck using a Front-End Loader (FEL). The dump truck will transport the sand to the processing plant where it will be screened to remove vegetation and other material. The plant will prepare the slurry and treat it for gold extraction and beneficiation. Noises from the water cannons, vibrating screens, slurry pump stations and the loading and off-loading of dump trucks will result in noise emissions that may affect NSRs. These emissions will be assessed in this noise study.

7.2.2. Electricity Generation (Transformers and Transmission Lines)

Noise generated from electricity generation (transformers and transmission lines) does not create serious noise problems for NSRs. Electrical service providers go to great lengths to minimise the noises associated with electricity generation and transmission. Transformer noise is generated when the sheet steel used in the core of the transformer deforms when being magnetized, this is known as magnetostriction (De Jager, 2018). Due to the transformer core being composed of many sheets of steel, the deformation in each sheet occurs erratically in comparison to its neighbour which results in the “low-frequency hum sound” frequently associated with transformers. This noise is relatively easy to mitigate with the use of acoustic shielding and the placement of the transformer in relation to the sensitive receivers therefore will not be considered further in this study.

Corona noise is the most common noise associated with transmission lines and is heard as a crackling or hissing sound. Corona is the breakdown of air into charged particles caused by the electrical field at the surface of conductors. This type of noise varies with both weather and voltage of the line (70kV or higher) and most often occurs in conditions of heavy rain and high humidity (typically > 80%). An electric field surrounds power lines and causes the implosion of ionized water droplets in the air, which produces the sound. Since Corona noise is only a feature during fog or rain, transmission line noise will not be considered further in this study.

7.2.3. Transportation Noise (Haul/Access Road)

Transportation noise, including road traffic, rail traffic and air traffic noise creates serious noise problems for sensitive receivers. As a general rule, larger and heavier vehicles emit more noise than smaller and lighter vehicles. The noise of road vehicles is mainly generated from the engine and frictional contact between the vehicle and the ground and air. In general, road-contact noise exceeds engine noise at speeds higher than 60 km/h. The sound pressure level (SPL) from traffic can be predicted from the traffic flow rate, the speed of the vehicles, the proportion of heavy to light vehicles, and the nature of the road surface. The hauling of sand from the sand dumps to the processing plant will result in noise emissions that may affect the NSRs. These emissions will be assessed in this noise study.

Based on the aforementioned, an inventory of the noise generating equipment/machinery (point, line and area noise sources) including their octave band sound power levels (SPLs) was developed for the proposed Project based on industry experience and information gathered from similar operations as well as Mogale. The SPLs for noise generating equipment/machinery per project phase are presented in Table 7-3. The SPLs are given in the A-weighted scale, which is used to filter the sound levels according to the human ear's varying response to different frequencies.

Table 7-3: Sound Power Levels from Main Noise Generating Equipment / Machinery

Project Phase	Noise Source	Sound Power Level dBA
Construction Phase	General Noise	96.5
	Articulated Dump Truck	107
	Truck-Mounted Mobile Crane	109
	Tractor-Loader-Backhoes (TLB)	108.8
Operational Phase	Front End Loader	105
	Articulated Dump Truck	107
	Water Canyon	113.8
	Vibrating Screen	109.1
	Slurry pump	109
	Processing Plant	112.64

The total number of the noise generating equipment/machinery (point, line and area noise sources) including their octave band SPLs were imported into the SoundPlan Essential modelling software for noise dispersion modelling.

7.3. Noise Dispersion Modelling

The future noise impacts of the proposed development were estimated using the **CON**servation of **C**lean **A**ir and **W**ater in **E**urope (CONCAWE) calculation method for noise

dispersion modelling. Noise dispersion modelling simulates outdoor sound propagation and predicts the noise levels at the sensitive receivers. The SoundPlan Essential modelling software was used for carrying out the computational calculations of the noise dispersion model in accordance with the CONCAWE calculation method. The model is described in the sections below.

7.3.1. Model Description

The CONAWE method is a prescribed standard (SANS 10357:2004 'The calculation of sound propagation by the CONCAWE method') in South Africa for calculating the propagation of sound over distances of up to two kilometres, under a variety of meteorological and topographical conditions. In addition, the method accounts for:

- The attenuation of noise due to the geometrical spreading of the noise;
- The effect of the ground surface;
- Height of the source and receiver;
- Atmospheric attenuation/absorption; and
- The screening effect of the topography and other barriers (vegetation, walls, berms etc.).

The CONCAWE method calculates the octave band sound pressure levels at a receiver from the following information:

- The octave band power levels of the source;
- The pressure, temperature and the relative humidity of the air;
- The wind speed and the wind direction; and
- The nature of the ground surface between the source and the receiver.

The aforementioned information, including topography (elevation) data, is imported into the SoundPlan Essentials modelling software. The software generates corrections such as the correction for working hours of industrial noise sources etc. within the software using industry-accepted equations before calculating the predicted octave band sound pressure levels at a receiver. Traffic noise is also calculated within the software taking into account corrections for speed, the number of vehicles (light and heavy) gradient and the surface of the proposed road.

7.3.2. Predicted Future Noise Impact

The approach applied for determining the predicted future noise impacts associated with the proposed project were drawn from the guidelines provided by SANS 10103:2008 and the Gauteng NCRs. The future noise impacts were assessed by comparing the predicted propagating noise levels derived from the output of the noise dispersion model with the current ambient noise levels established during the baseline assessment survey.

8. Findings and Discussion

A summary of the ENIA findings as they relate to the baseline environment and the future impacts associated with the construction and operational phases of the proposed Project is provided below.

8.1. Baseline Environment

The receiving environment (project area and its immediate surroundings) is located within an urban environment and is characterised by high population density. The Project area and is close to two major towns (Krugersdorp and Randfontein) and is surrounded by several local communities (see Figure 7-1).

The identified land use of the receiving environment is predominantly residential (including institutions), commercial, industrial, recreational, and mining (Mogale complex). A regional (R28) and the main road (M13) runs through the Project area and is near the proposed plant area.

The activities associated with the baseline environment such as mining activity, traffic, industrial activity, and anthropogenic activities have the potential to influence the existing soundscape of the receiving environment. Results from the noise monitoring survey indicated that the activities mentioned above in addition to natural sources of noise in the area (birds etc.) had a significant (contributed to the exceedance of the regulatory limits for day and night) noise impact.

8.1.1. Sensitive Receivers

The identified NSRs were the communities surrounding the Project area (Figure 7-1), these include:

- Lindela Repatriation Centre (SNR1) is located west of North Sand and north-west of IL23-IL25 dumps. The centre is located 1.7 km from North Sand and 1.2 km from IL23-IL25 dumps.
- Eleadah Estate (SNR2) is located west of the IL28 dump. The estate is located approximately 200 m from the IL28 dump.
- Mogale Junction Estate (SNR3) is located to the south-west of the Project area (MR 206 – IL28 Dump). The estate is located approximately 0 – 1 km from the IL28 Dump.
- Kagiso (SNR4) suburban settlement is located to the south of the Project area (MR 206 – IL13-IL15 Dump). The settlement is developed and is directly adjacent to the IL13-IL15 Dump (0 - 250 m to dump boundary).
- Wentworth Park (SNR5) suburban settlement located to the north-northeast of the Project area (MR 206 – IL8 – IL10 Dump). The settlement is developed and is directly adjacent to the IL8 – IL10 Dump (50 – 800 m to dump boundary).

- Olivanna (SNR6) suburban settlement and industrial area are located to the north-northwest of the Project area (MR 206 – North Sand Dump). The settlement is developed and is directly adjacent to the North Sand Dump (0 – 1 km to dump boundary).
- Boltonia (SNR7) suburban settlement and industrial area are located to the north-northwest of the Project area (MR 206 – North Sand Dump). The settlement is developed and is directly adjacent to the North Sand Dump (0 – 1 km to dump boundary).
- Krugersdorp (SNR8) commercial area located to the north of the of Project area (MR 206 – IL8 – IL10 Dump). The commercial area is located approximately 900 m from the IL8 – IL10 Dump.
- West Village (SNR9) suburban settlement is located to the west of the Project area (MR 206 – North Sand Dump). The settlement is developed and is directly adjacent to the North Sand Dump (0 – 1 km to dump boundary).

The receivers were characterised as sensitive due to the proximity of the receivers to the Project area. The locations of the potential sensitive receivers are displayed in Figure 7-1.

8.1.2. Ambient Noise Levels

The results of the noise monitoring survey are presented in Table 8-1 and are discussed in the sections below. The ambient noise levels recorded on-site, the rating limits according to the SANS 10103:2008 guidelines, are presented side by side. The SPL (sound pressure level) is given in the A-weighted scale, which is used to filter the sound levels according to the human ear's varying response to different frequencies.

The time history graph per noise measurement location is displayed in Figure 8-1 and Figure 8-2. The graph shows the noise profile data as recorded in-field by the Cirrus SLM instrument and is presented in the A-weighted scale.

The noise sources that were audible during the noise monitoring survey, contributing to the existing soundscape are depicted in Table 8-2. The main noise sources that impacted the monitoring locations were:

- Anthropogenic; Communication (people talking / shouting) and Vehicle activity (light and heavy vehicles); and
- Natural; birds (birdsong/chirping), poultry (chickens).

Table 8-1: Baseline Noise Measurements

Sample ID	SANS 10103:2008 rating limit					
	Type of district	**Period**	**Acceptable Rating Level dBA**	**$L_{Aeq,T}$ dBA (Field Measurement)**	**Maximum / Minimum dBA**	**Date**
N1	Suburban	Daytime	50	44	73 / 33	13/10/2021 – 15/10/2021
		Night-time	40	42	79 / 32	
N2	Suburban	Daytime	50	62	92 / 39	16/10/2021 – 18/10/2021
		Night-time	40	55	82 / 36	
	Indicates current $L_{Aeq,T}$ levels above either the daytime rating limit or the night-time rating limit					

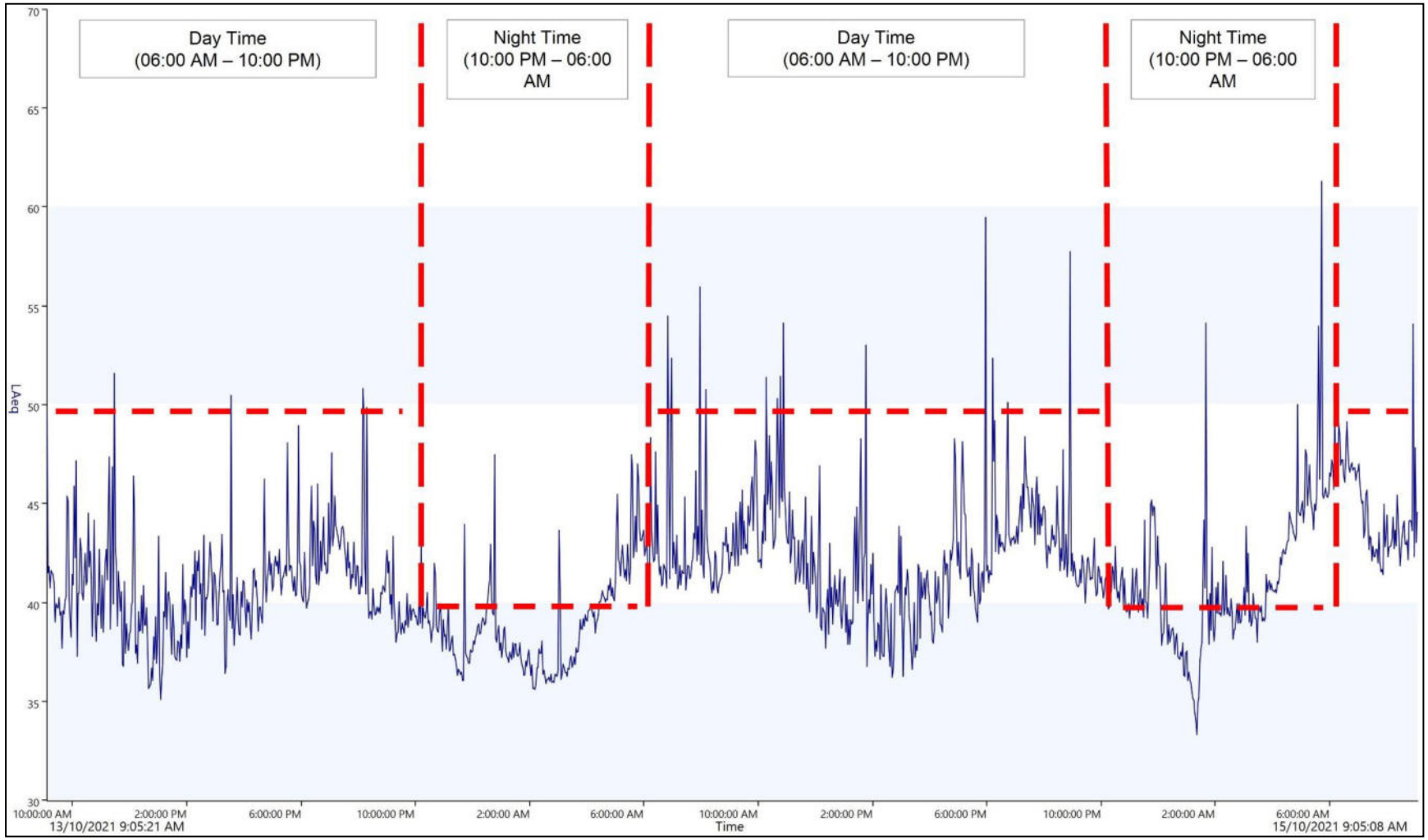


Figure 8-1: N1 Time Series Graph

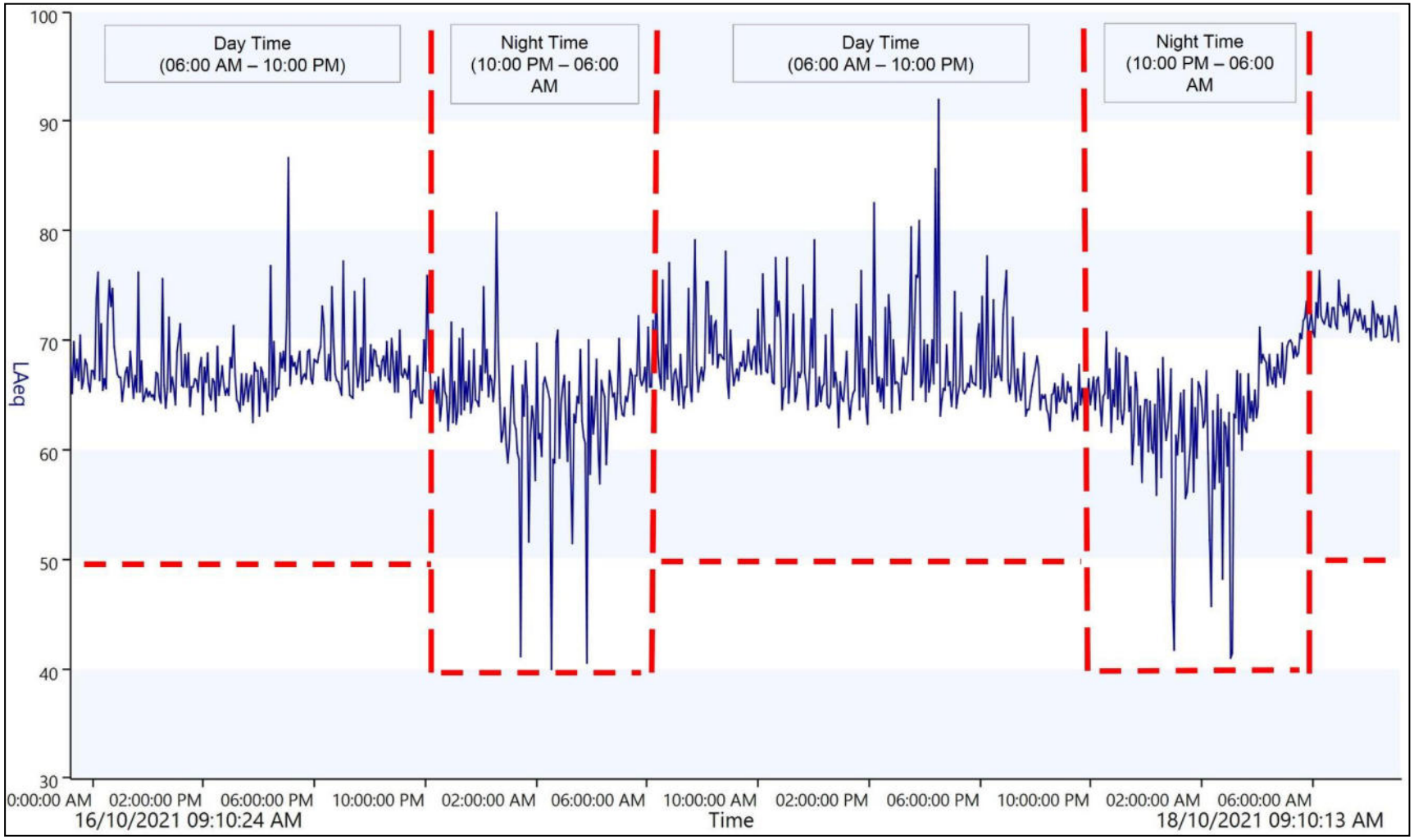


Figure 8-2: N2 Time Series Graph

Table 8-2: Noise Sources Identified

Location ID	Day	Noise Type	Night	Noise Type
N1	Birds (birdsong/chirping)	Intermittent	Birds (birdsong/chirping)	Intermittent
	Poultry (chickens)	Intermittent	Poultry (chickens)	Intermittent
	Vehicle activity (Light and heavy vehicles)	Intermittent	Vehicle activity (Light)	Intermittent
	Communication (People talking / shouting)	Intermittent		
N2	Birds (birdsong/chirping)	Intermittent	Birds (birdsong/chirping)	Intermittent
	Vehicle activity (Light and heavy vehicles) along the R28	Intermittent	Vehicle activity (Light and heavy vehicles) along the R28	Intermittent
	Communication (People talking / shouting)	Intermittent	Communication (People talking / shouting)	Intermittent
	Reverse alarm	Intermittent		
	Generator	Continuous		

8.1.2.1. Day-Time Results

The LAeq average for daytime ambient noise level measured throughout the measuring period for both monitoring locations was 53 dBA which is above the SANS 10103:2008 guidelines maximum limit rating of 50dBA allowable for outdoor daytime ambient noise in suburban districts. The LAeq for daytime ambient noise level at monitoring location N1 was 44 dBA which was below the SANS 10103:2008 guidelines maximum limit rating of 50dBA. The LAeq for daytime ambient noise level at monitoring location N2 was 62 dBA which was above the SANS 10103:2008 guidelines maximum limit rating of 50dBA.

The identified noise sources contributing to the daytime ambient noise levels at the various measurement locations are presented in Table 8-2.

The results from the measurements suggest that the overall ambient noise levels of the receiving environment do not comply with the acceptable standards for daytime noise in suburban districts.

8.1.2.2. Night-Time Results

The LAeq average for night-time ambient noise level measured throughout the measuring period for both monitoring locations was 48 dBA which is above the SANS 10103:2008 guidelines maximum limit rating of 40 dBA allowable for outdoor night-time ambient noise in suburban districts. The LAeq night-time ambient noise level at both monitoring locations (N1

– 42 dBA and N2 – 55 dBA) were above the SANS 10103:2008 guidelines maximum limit rating of 40 dBA.

The identified noise sources contributing to the night-time ambient noise levels at the various measurement locations are presented in Table 8-2.

The results from the measurements suggest that the overall ambient noise levels of the receiving environment do not comply with the acceptable standards for night-time noise in suburban districts.

8.2. Noise Model Simulations

The Project-related noise contour lines generated are reported and discussed for the construction phase (daytime only) and operational phase (daytime and night-time). Findings are presented in the sections below.

8.2.1. Construction Phase Model Results

The noise contour lines for the construction phase are depicted in Figure 8-3. The model results for the daytime construction phase indicates that the areas where the SANS 10103:2008 guidelines maximum daytime limit of 50dBA is predicted to be exceeded are mostly confined within 0.5 km of the noise generating activities associated with the construction of the plant and the relevant pump and pipeline routes (without mitigation measures). The noise impact that the construction phase (pre-mitigation) will have on the NSRs is varied due to the activities being undertaken. As construction activities progress along the pipeline routes, the impact on the NSRs will change based on the proximity of the NSRs to the noise generating source(s). The model results show that NSRs beyond a distance of 0.5 km will experience negligible impact (do not experience noise levels that exceed the daytime regulatory limits as per SANS 10103:2008) pre-mitigation. While NSRs within the 0.5km radius are likely to be exposed to noise levels that range between 50 dBA and 90.1 dBA (see Figure 8-3) depending on the NSRs proximity to the noise generating source(s) in operation during construction. As a result, these NSRs are likely to exceed the daytime regulatory limits (as per SANS 10103:2008) and result in a noise disturbance from a Gauteng NCR perspective.

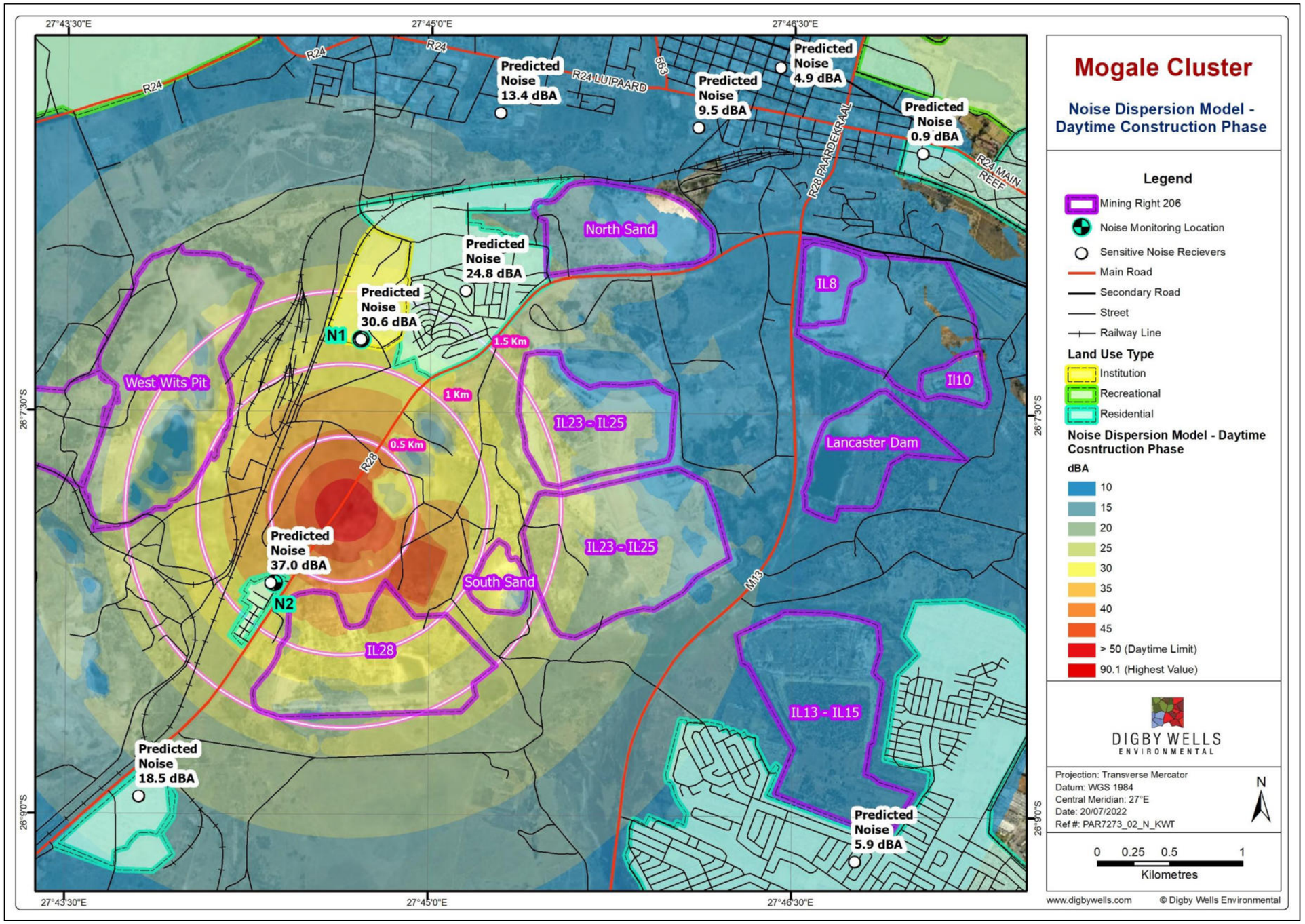


Figure 8-3: Predicted Noise at Selected Receivers for the Construction Phase (Daytime)

8.2.2. Operational Phase Model Results

The noise contour lines are displayed in Figure 8-4 to Figure 8-9 showing the predicted noise levels for day and night-time during the operational phase. Three (3) models were run for the operation phase. These include:

- Historic tailings reclamation – accounts for noise emissions associated with the hydraulic mining of the dumps;
- Sand dump reclamation – accounts for noise emissions associated with the excavation and hauling of the north and south sand dumps; and
- Processing plant – accounts for noise emissions associated with the operation of the processing plant.

The results of the models are displayed and discussed below.

8.2.2.1. Tailings Reclamation

The model results for the daytime and night-time operational phase – reclamation of the historic tailings without mitigation measures are presented in Figure 8-4 and Figure 8-5. Model results for the daytime (see Figure 8-4) indicates that sound propagation (without mitigation measures) is highest (exceeds the SANS 10103:2008 guidelines maximum daytime limit of 50dBA) within a 0.5 km radius of the noise generating source(s) used for the reclamation of the tailings. Therefore, receivers at a distance greater than the 0.5 km radius from the noise source, will experience levels below the limit.

Due to the mining methodology, the noise levels at the nearby NSRs will vary, due to the varying distances as hydraulic reclamation progresses across the tailings, as well as from one tailings to the other. The results from the model indicate that a distance of 0.5 km and beyond, the NSRs will experience negligible impacts (not exceeding SANS daytime regulatory limits of 50 dBA) pre-mitigation regardless of the progression of the reclamation activities.

For NSRs within the 0.5 km radius, the exposure levels can vary between 50 dBA and 97.4 dBA depending on the proximity to the noise generating source. These levels are in exceedance of the SANS daytime limit of 50 dBA and will result in a noise disturbance from a Gauteng NCR perspective.

The model results for the night-time operational phase (see Figure 8-5) indicates that emissions within a 1 km radius of the noise generating source(s) during reclamation will exceed the SANS night-time limit of 40 dBA. The NSRs at 1 km and beyond will experience limited noise disturbance based on model predictions The model results indicate that NSRs at a distance of 1.0 km and beyond, will experience negligible impacts (noise levels that are below the SANS guideline of 40 dBA) pre-mitigation regardless of the progression of the reclamation activities. For NSRs within the 0.5 km radius, exposures will range between 50 dBA and 96.5 dBA (see Figure 8-5) depending on the proximity to noise generating sources. As a result, exceedances are likely to occur, and this may result in a noise disturbance from a Gauteng NCR perspective.

8.2.2.2. Sand Dump Reclamation

The model results for the daytime and night-time operational phase surface reclamation of the sand dumps (north sand dump) without mitigation measures are presented in Figure 8-6 and Figure 8-7.

Model results for the daytime (see Figure 8-6) indicates that the areas were the noise emissions (without mitigation measures) will exceed the SANS guideline of 50 dBA are confined within a 0.5 km radius. The NSRs at 0.5 km and beyond will experience noise levels that are below the daytime guideline. The ambient noise levels at the NSRs will vary as reclamation progresses across each sand dump. For NSRs within the 0.5 km radius, the exposure levels will vary between 50 dBA and 87.7 dBA (see Figure 8-6) depending on their proximity to noise generating source. As a result, exceedance of the SANS guideline will occur, resulting in a noise disturbance from Gauteng NCR perspective.

The night-time results without mitigation measures, is depicted in Figure 8-7. The noise emissions show exceedances of the night-time SANS guideline of 40 dBA at a 0.7 km radius of the noise generating source. Any NSR within this zone will experience exposure level that will vary between 50 dBA and 89.8 dBA (see Figure 8-7) depending on their proximity to noise generating source. As a result, exceedance of the SANS guideline will occur, resulting in a noise disturbance from Gauteng NCR perspective.

For NSRs at 0.7 km and beyond, the noise exposure will be minimal (i.e., lower than the SANS guideline for night-time) pre-mitigation regardless of the progression of the reclamation activities.

8.2.2.3. Processing Plant

The model results for the daytime and night-time operational operation of the processing plant without mitigation measures are presented in Figure 8-8 and Figure 8-9. Model results for the daytime indicates that sound propagation resulting in exceedance of the daytime SANS guideline of 50 dBA will impact areas that are within a 0.5 km radius from the plant (especially in the north and southern axis). The model results indicate that emission from the daytime operation of the processing plant will not result in exposure levels above the SANS daytime limit of 50 dBA at the NSRs. The predicted noise exposure levels at the NSRs will not result in a noise disturbance from a Gauteng NCR perspective.

The predicted night-time emissions from the operation of the processing plant without mitigation measures show areas where exceedance of the SANS night-time guideline of 40 dBA are likely to occur (see Figure 8-9). These areas are confined to a 1.0 km radius from the plant (especially in the north and southern axis).

The model results indicate that emission from the daytime operation of the processing plant will not result in exposure levels above the SANS daytime limit of 50 dBA at the NSRs. The predicted noise exposure levels at the NSRs will not result in a noise disturbance from a Gauteng NCR perspective.

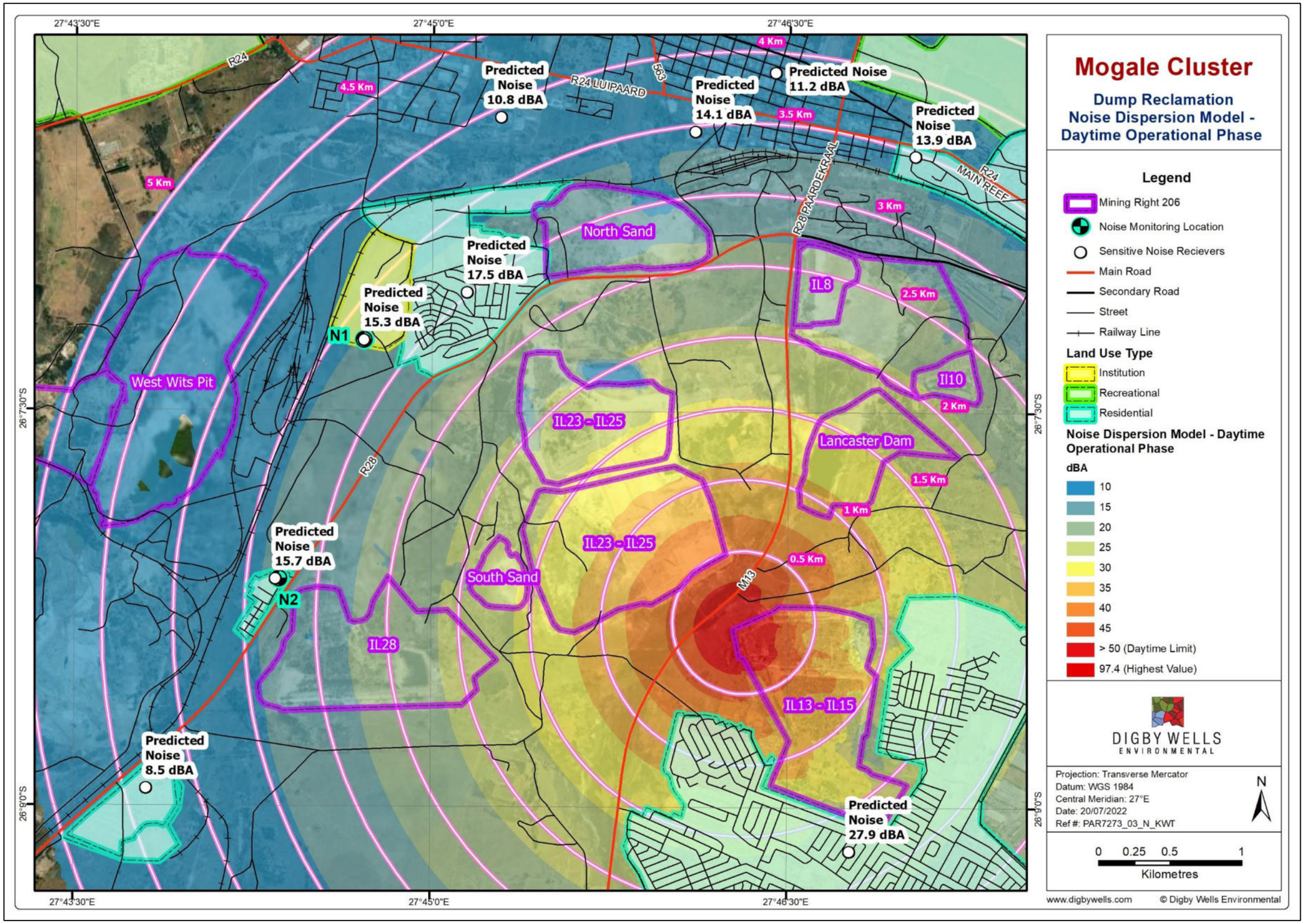


Figure 8-4: Predicted Noise at Selected Receivers for the Operational Phase (Daytime) at IL28 Dump

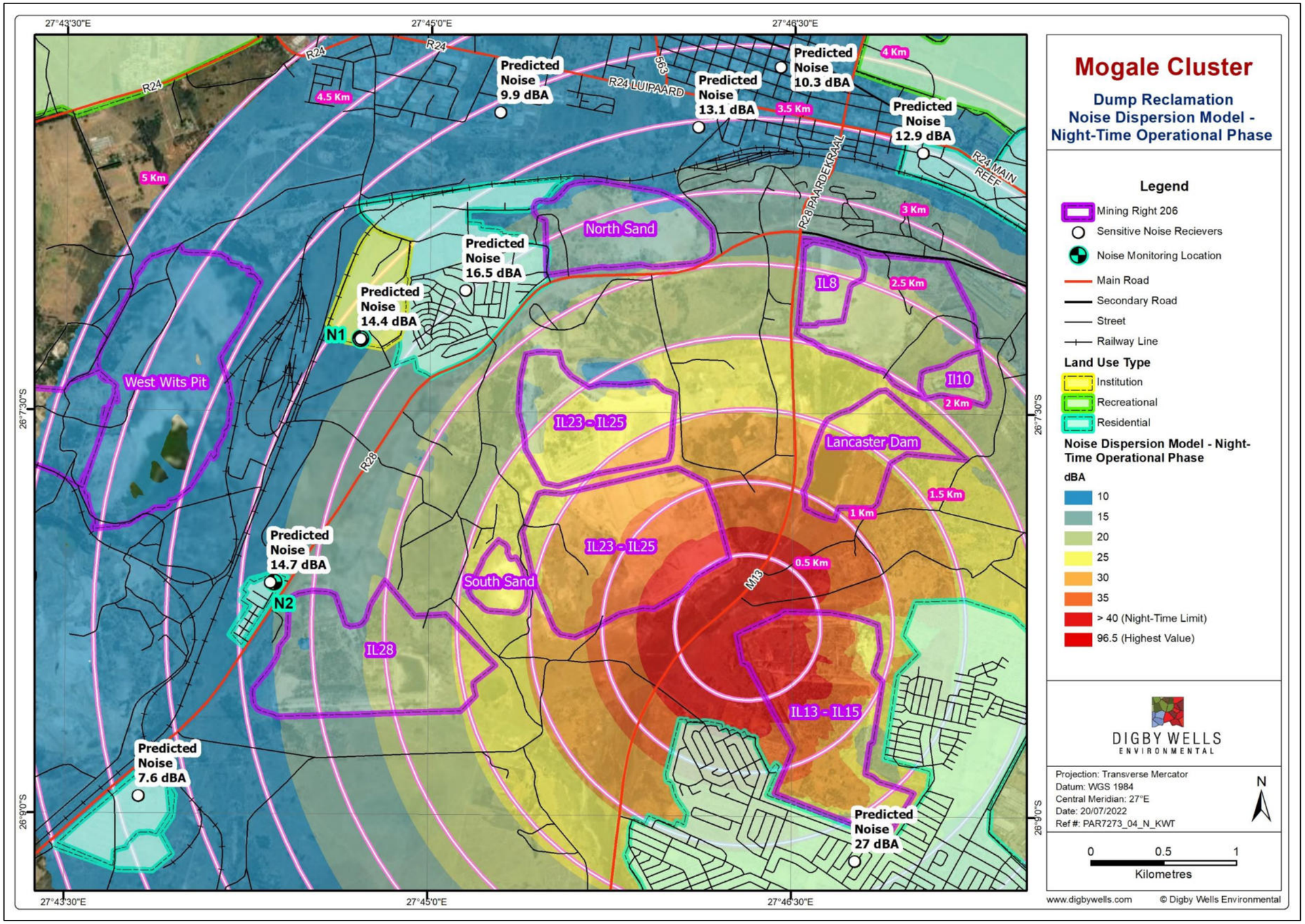


Figure 8-5: Predicted Noise at Selected Receivers for the Operational Phase (Night-time) at IL28 Dump

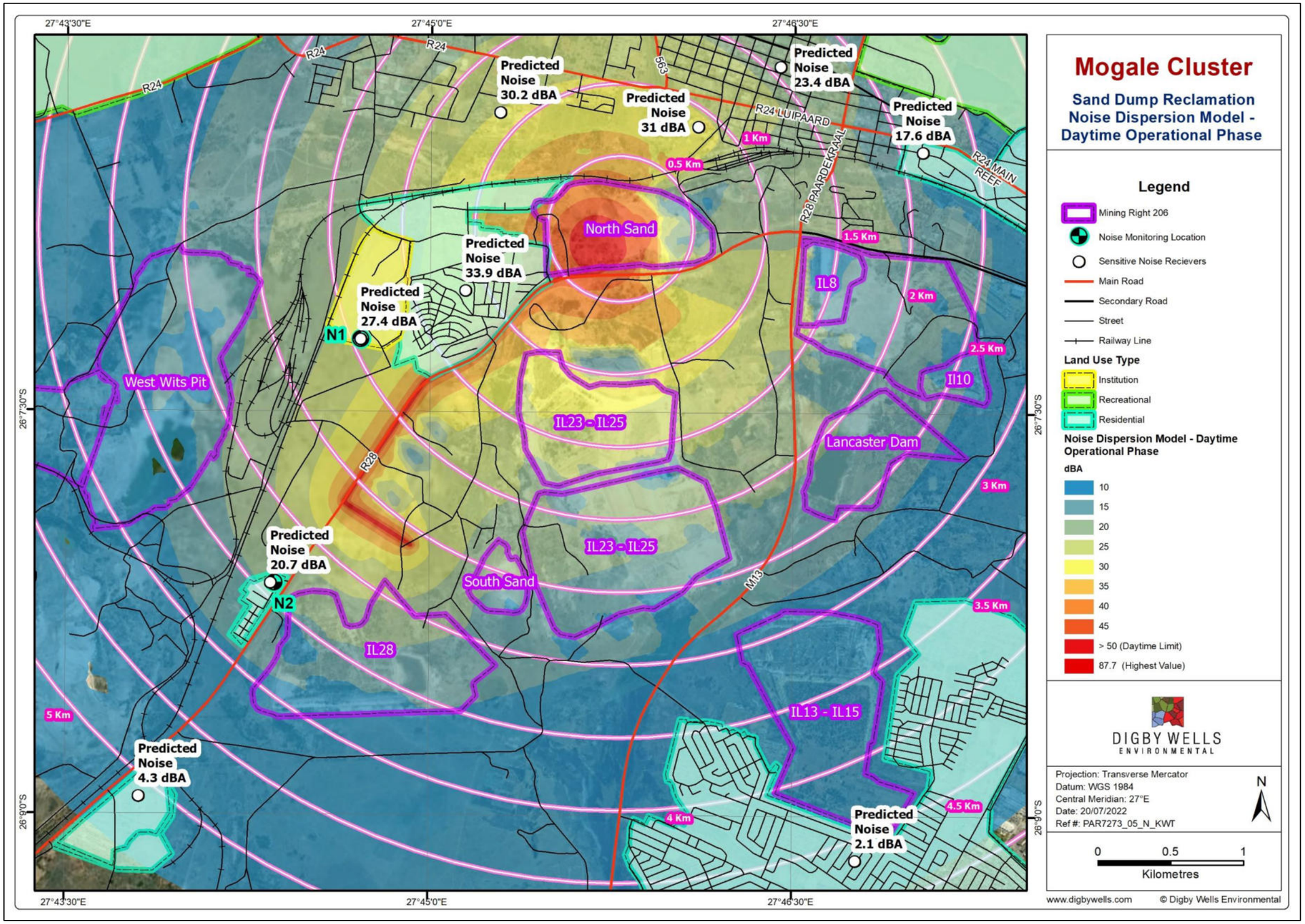


Figure 8-6: Predicted Noise at Selected Receivers for the Operational Phase (Daytime) at North Sand Dump

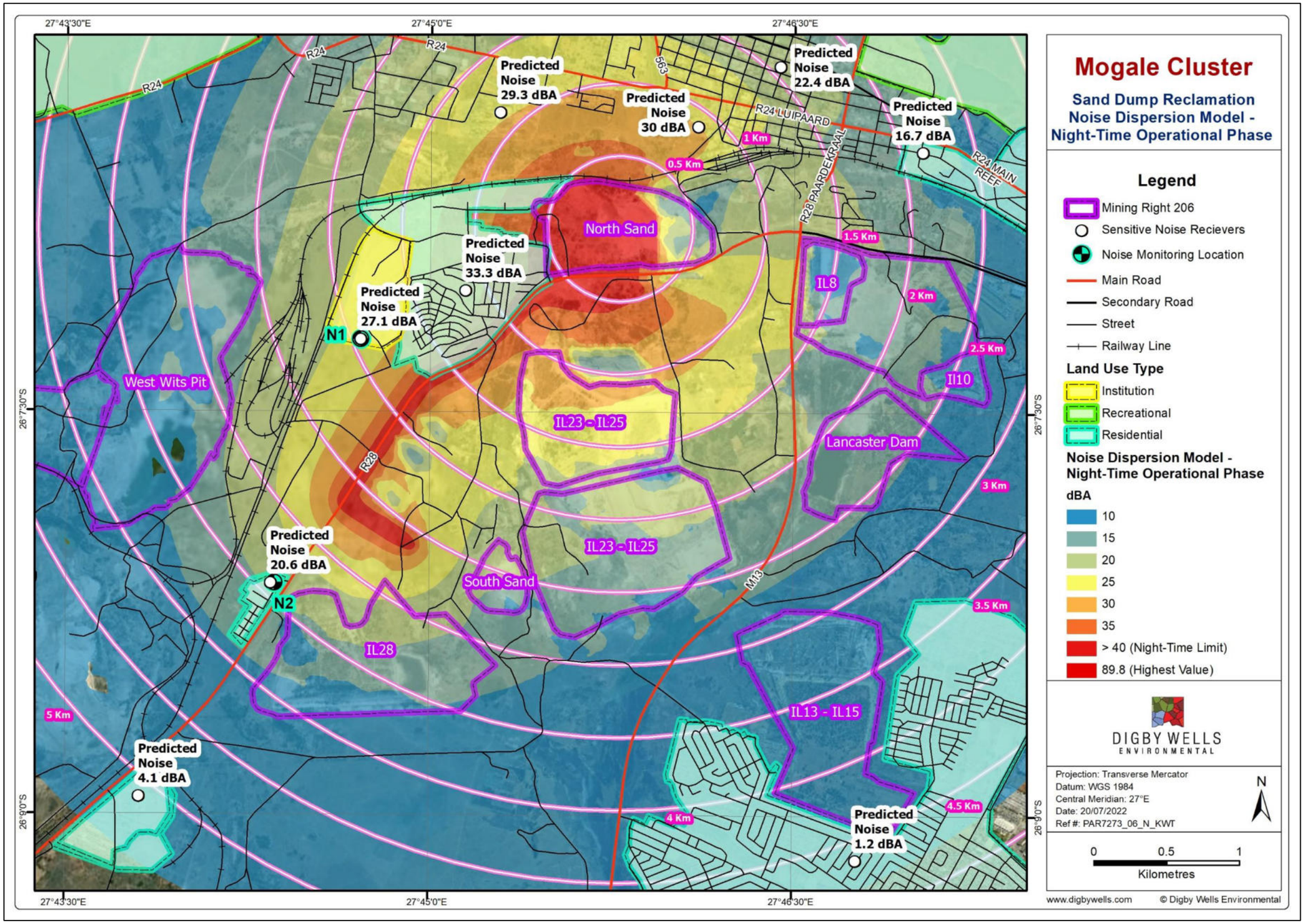


Figure 8-7: Predicted Noise at Selected Receivers for the Operational Phase (Night-time) at North Sand Dump

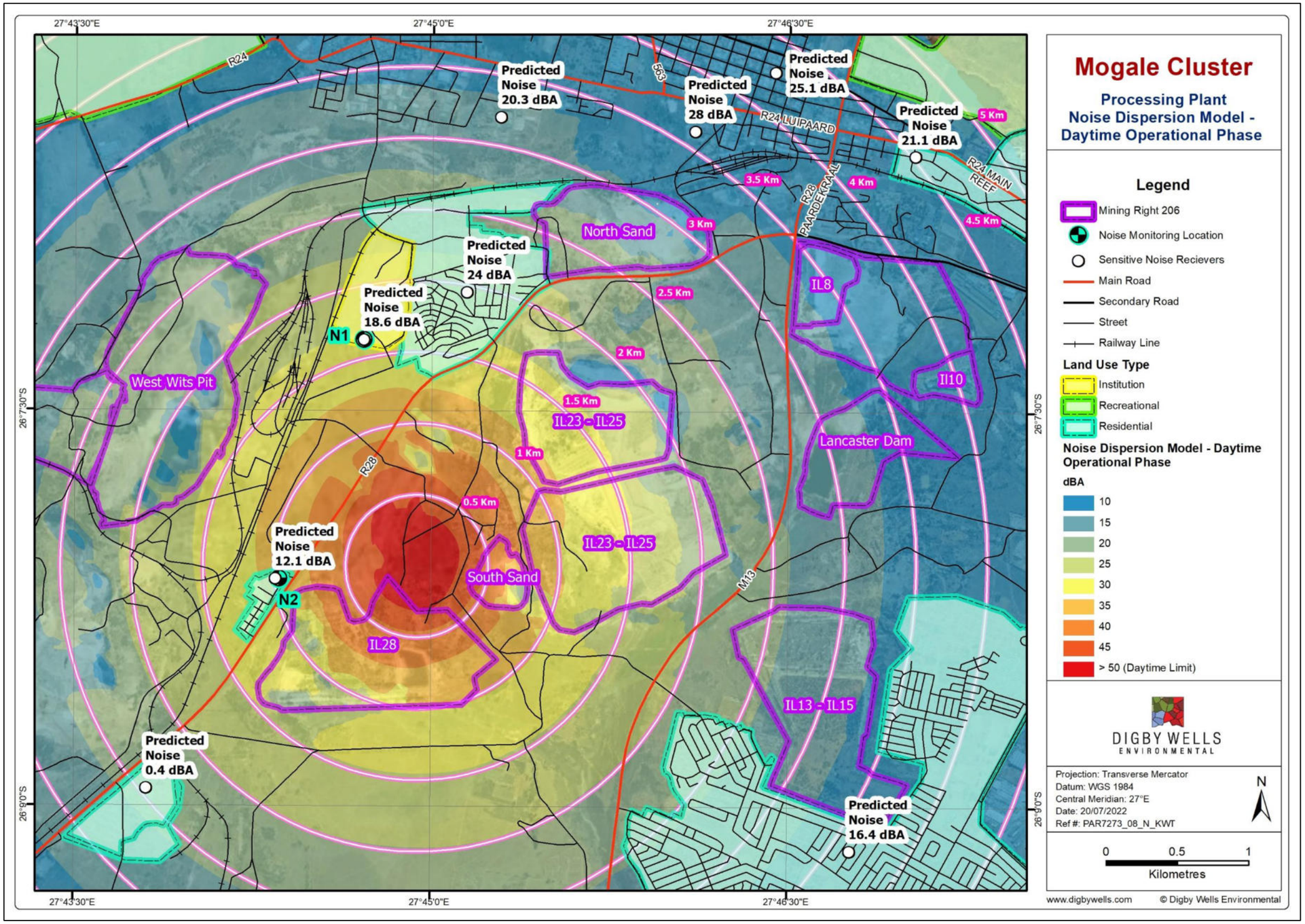


Figure 8-8: Predicted Noise at Selected Receivers for the Operational Phase (Daytime) at the Processing Plant

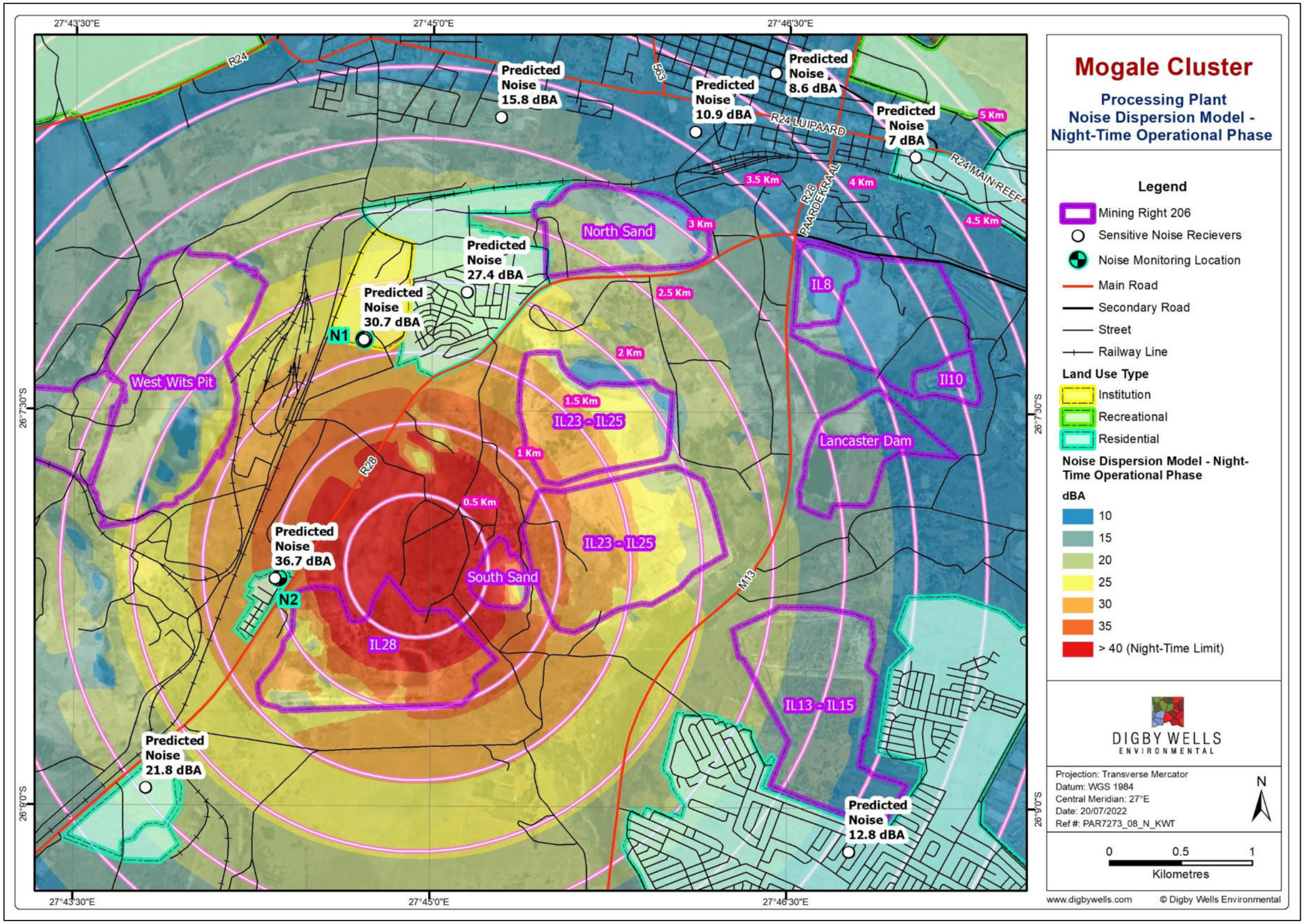


Figure 8-9: Predicted Noise at Selected Receivers for the Operational Phase (Night-time) at the Processing Plant

8.3. Predicted Future Noise Impacts Results

The cumulative future noise impacts at the NSRs for the construction and operational phase of the project are reported and discussed in the sections below.

8.3.1. Construction

Table 8-3 presents the cumulative daytime future ambient noise level that a NSR will experience as a result of the construction phase activities associated with the proposed project. The cumulative results indicate that no receiver will experience an increase in ambient noise levels. Therefore, the community/group response (as per SANS 10103:2008 guidelines) to noise emissions from the daytime construction phase can be categorized as “Little” (0-10 dBA), resulting in “Sporadic complaints” if any from the NSRs.

Table 8-3: Cumulative Future Impact for the Construction Phase (Daytime Only)

Receivers	Daytime ambient noise levels measured at the receivers (dBA)	Predicted (dispersion model) noise from construction activities (dBA)	Cumulative level (dBA)	Increase in ambient noise level dBA
Day Time (Limit 50dBA)				
N1	44	30.6	44	0
N2	62	37.0	62	0
SR3	53*	18.5	53	0
SR4	53*	5.9	53	0
SR5	53*	0.9	53	0
SR6	53*	9.5	53	0
SR7	53*	13.4	53	0
SR8	53*	4.9	53	0
SR9	53*	24.8	53	0
	Indicates predicted $L_{Aeq,T}$ levels above the daytime rating limit rating limit of 50dBA.			

8.3.2. Operational

Table 8-4 presents the cumulative noise level (both day and night) that a NSR will experience if all the noise generating equipment/machinery for the operational phase activities (hydraulic mining, sand dump mining and the operation of the processing plant) were operational at the same time. The results from Table 8-4 indicate that no receiver will experience noise levels that exceeds the day and night-time regulatory limits from a SANS 10103:2008 guidelines perspective. Therefore, the predicted noise levels during the operational phase will not result in a noise disturbance in terms of the Gauteng NCRs at NSRs.

* Overall daytime ambient noise level measured at the noise sensitive receivers.

Table 8-5 presents the cumulative future noise level (both day and night) that a NSR will experience as a result of the future reclamation activities associated with the proposed project. The results from Table 8-5 indicate that the cumulative future noise level for day and night-time operational phase at NSRs (excluding SNR1 - daytime) exceeds the day and night-time regulatory limits from a SANS 10103:2008 guidelines perspective. However, this is mainly due to the existing background noise level which exceeds (excluding SNR1 -daytime) regulatory limits for day and night and are non-compliant in terms of the SANS 10103:2008 guidelines. In addition, the model results presented in Table 8-5 also indicate that no receiver for day and night-time operational phase will experience an increase in ambient noise levels. Therefore, the community/group response (as per the SANS 10103:2008 guidelines) to noise emissions from the daytime operational phase can be categorized as “Little” (0-10 dBA), resulting in “Sporadic complaints” if any from the NSR.

Table 8-4: Cumulative Noise Levels at the Noise Sensitive Receivers for the Operational Phase (Day and Night-time)

Receivers	Predicted (Slime dispersion model) noise (dBA)	Predicted (Sand Dump dispersion model) noise (dBA	Predicted (Processing Plant dispersion model) noise (dBA	Cumulative noise level (dBA)
Operational Phase Daytime (Without Mitigation)				
N1	15.3	27.4	30.7	32
N2	15.7	20.7	36.3	36
SR3	8.5	4.3	21.2	22
SR4	27.9	2.1	12.2	28
SR5	13.9	17.6	6.6	19
SR6	14.1	31	10	31
SR7	10.8	30.2	15.9	30
SR8	11.2	23.4	8.4	24
SR9	17.5	33.9	27.2	35
Operational Phase Night-Time (Without Mitigation)				
N1	14.4	27.1	30.7	32
N2	14.7	20.6	36.7	37
SR3	7.6	4.1	21.8	22
SR4	27	1.2	12.8	27
SR5	12.9	16.7	7	19
SR6	13.1	30	10.9	30
SR7	9.9	29.3	15.8	30
SR8	10.3	22.4	8.6	23
SR9	16.5	33.3	27.4	34
	Indicates predicted $L_{Aeq,T}$ levels above either the daytime rating limit of 50dbA or the night-time rating limit of 40dBA.			

Table 8-5: Cumulative Future Impact for the Operational Phase (Day and Night-time)

Receivers	Ambient noise levels measured at the receivers (dBA)	Predicted (Dump dispersion model) noise (dBA)	Predicted (Sand Dump dispersion model) noise (dBA	Predicted (Processing Plant dispersion model) noise (dBA	Cumulative noise level (dBA)	Increase in ambient noise level (dBA)
Operational Phase Daytime (Without Mitigation)						
N1	44	15.3	27.4	30.7	44	0
N2	62	15.7	20.7	36.3	62	0
SR3	53*	8.5	4.3	21.2	53	0
SR4	53*	27.9	2.1	12.2	53	0
SR5	53*	13.9	17.6	6.6	53	0
SR6	53*	14.1	31	10	53	0
SR7	53*	10.8	30.2	15.9	53	0
SR8	53*	11.2	23.4	8.4	53	0
SR9	53*	17.5	33.9	27.2	53	0
Operational Phase Night-Time (Without Mitigation)						
N1	42	14.4	27.1	30.7	42	0
N2	55	14.7	20.6	36.7	55	0
SR3	48*	7.6	4.1	21.8	48	0
SR4	48*	27	1.2	12.8	48	0
SR5	48*	12.9	16.7	7	48	0
SR6	48*	13.1	30	10.9	48	0
SR7	48*	9.9	29.3	15.8	48	0
SR8	48*	10.3	22.4	8.6	48	0
SR9	48*	16.5	33.3	27.4	48	0
	Indicates predicted $L_{Aeq,T}$ levels above either the daytime rating limit of 50dbA or the night-time rating limit of 40dBA.					

* Overall day and night-time ambient noise level measured at the noise sensitive receivers excluding rain events.

9. Environmental Noise Impact Assessment

The impact assessment ranking methodology in Appendix A was applied in rating the implications of the different phases of the Project on the ambient noise levels of the receiving environment. The impact assessment approach has been formalised to comply with Regulation 31(2)(l) of the NEMA.

9.1. Construction Phase

Activities during the Construction Phase that may have potential impacts on the ambient noise levels in the area are indicated in Table 9-1.

Table 9-1: Interactions and Impacts of Activity

Interaction	Impact
Site clearing for the construction of the new processing plant facility and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.	Noise emissions from equipment/machinery during the construction phase may increase the noise levels at NSRs and may result in a noise disturbance.
Construction of the new processing plant and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.	

9.1.1. Impact Description

The activities associated with the daytime construction phase will lead to the emission of noise that will not exceed the SANS 10103:2008 daytime guideline limit of 50 dBA nor result in the increase in ambient noise levels at the NSRs. Existing noise levels at these sites are not compliant, but the non-compliance is not mining related.

Hence, the development of the project will not lead community/group response (as per the SANS 10103:2008 guidelines) to noise emissions, as the cumulative impact is categorized as “Little” (0-10 dBA), resulting in “Sporadic complaints” if any from the NSR. The construction phase activities will occur during daylight hours only therefore the anticipated noise emissions associated with these activities will be limited to daytime only. In addition, the construction phase will be short-term.

9.1.1.1. Management Objectives

The noise management objective is to minimise noise emissions and to ensure that the noise exposure levels at the nearby sensitive receivers do not exceed the SANS 10103:2008 guidelines. Also, to ensure that mitigation measures are implemented so noise levels are below limit values and in compliance with the guidelines.

9.1.1.2. Management Actions

The following management measures are recommended as good practice guidelines:

- Construction activities should be restricted to daylight hours;
- Construction activities should be carried out in phases;
- Construction machinery and vehicles should be switched off when not in use;
- Construction vehicles should be with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound;
- Machinery and construction vehicles to be serviced as per their design requirements to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and
- Regulate vehicle speeds on the main, access and haul roads.

9.1.1.3. Impact Ratings

The noise impact during the construction phase of the Project has been assessed and the rating is provided in Table 9-2.

Table 9-2: Significance Ratings for Construction Phase

Activity and Interaction: Construction phase activities as per Table 9-1			
Dimension	**Rating**	**Motivation**	**Significance**
Impact Description: Noise will emanate from the machinery and/or equipment, and vehicles operating during the construction activities.			
Prior to mitigation/ management			
Duration	Short Term (2)	Noise will be generated for the duration of each activity in the construction phase	Negligible (negative) – 18
Extent	Limited (2)	It is expected that the noise impact will be limited to the project site and its immediate surroundings.	
Intensity	Minor (2)	The predicted noise levels based on the noise dispersion model indicate that the impacts will not result in a noise disturbance. Therefore, noise impacts will be minor at the nearby receivers.	
Probability	Unlikely (3)	The predicted noise levels based on the noise dispersion model indicate that the impacts will not result in a noise disturbance. Therefore, noise impacts will be unlikely at the nearby receivers.	
Nature	Negative		
Mitigation/ Management actions			

Activity and Interaction: Construction phase activities as per Table 9-1			
Dimension	**Rating**	**Motivation**	**Significance**
• Construction activities should be restricted to daylight hours; • Construction activities should be carried out in phases; • Construction machinery and vehicles should be switched off when not in use; • Construction vehicles should be with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound; • Machinery and construction vehicles to be serviced as per their design requirements to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and • Regulate vehicle speeds on the main, access and haul roads.			
Post- mitigation			
Duration	Short Term (2)	Noise will be generated for the duration of each activity in the construction phase	Negligible (negative) – 15
Extent	Very Limited (1)	It is expected that the noise impact will be limited to the isolated parts of the Project area post-mitigation.	
Intensity	Minor (2)	Predicted noise impacts at the noise sensitive receivers will remain negligible post-mitigation.	
Probability	Unlikely (3)	Noise impacts are unlikely to occur post-mitigation.	
Nature	Negative		

9.2. Operational Phase

Activities during the Operational Phase that may have potential impacts on the ambient noise levels in the area are indicated in Table 9-3.

Table 9-3: Interactions and Impacts of Activity

Interaction	Impact
Hydraulic reclamation of the associated historic tailings facilities and sand dumps	Noise emissions from equipment/machinery during the operation phase may increase the noise levels at NSRs and may result in a noise disturbance.
Operation of pump stations during the operational phase	
Production of Gold	
Progressive rehabilitation of the new tailings facility footprints (West Pits TSF and 1L23-1L25 TSF	

9.2.1. Impact Description

The activities associated with the daytime operational phase will not lead to the emission of noise that will exceed the SANS 10103:2008 day time guidelines limit of 50 dBA at NSRs. Existing noise levels at these sites are not compliant, but the non-compliance is not mining related.

Hence, the development of the project will not lead community/group response (as per the SANS 10103:2008 guidelines) to noise emissions, as the cumulative impact is categorized as "Little" (0-10 dBA), resulting in "Sporadic complaints" if any from the NSR.

The same scenario applies to night-time cumulative noise levels, as the cumulative impact is categorized as "Little" (0-10 dBA). The operation phase activities will occur during both day and night-time and will be long-term in nature.

9.2.1.1. Management Objectives

The noise management objective is to minimise noise emissions and to ensure that the noise exposure levels at the nearby sensitive receivers do not exceed the SANS 10103:2008 guidelines. Also, to ensure that mitigation measures are implemented so noise levels are below limit values and in compliance with the guidelines.

9.2.1.2. Management Actions

The following management measures are recommended as good practice guidelines.

- Machinery and vehicles should be switched off when not in use;
- Vehicles should be equipped with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound;
- Acoustic enclosures for noise generating equipment such as the slurry pump station;
- Slurry pump station should be located as far as possible (ideally 0.5 - 1 km) from NSRs;
- Noise monitoring on a regular basis to identify problematic areas/areas of concern;
- Machinery and vehicles to be serviced as per their design requirements to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and
- Regulate vehicle speeds on the main, access and haul roads.

9.2.1.3. Impact Ratings

The noise impact during the Operational Phase of the Project has been assessed and is provided in Table 9-4.

Table 9-4: Significance Ratings for Operational Phase

Activity and Interaction: Operational phase activities as per Table 9-3			
Dimension	**Rating**	**Motivation**	**Significance**
Impact Description: Noise will emanate as a result of reclamation activities and the operation of the plant.			
Prior to mitigation/ management			
Duration	Project Life (5)	Noise emissions will be generated throughout the project life	Negligible (negative) – 27
Extent	Limited (2)	It is expected that the noise impact will be limited to the project site and its immediate surroundings.	
Intensity	Minor (2)	The predicted noise levels based on the noise dispersion model indicate that the impacts will not result in a noise disturbance. Therefore, noise impacts will be negligible at the nearby receivers.	
Probability	Likely (3)	The predicted noise levels based on the noise dispersion model indicate that the impacts will not result in a noise disturbance. Therefore, noise impacts will be unlikely at the nearby receivers.	
Nature	Negative		
Mitigation/ Management actions			
• Machinery and vehicles should be switched off when not in use; • Vehicles should be equipped with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound; • Acoustic enclosures for noise generating equipment such as the slurry pump station; • Slurry pump station and vibrating screener should be located as far as possible (ideally 0.5 - 1 km) from NSRs; • Noise monitoring on a regular basis to identify problematic areas/areas of concern; • Machinery and vehicles to be serviced as per their design requirements to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and • Regulate vehicle speeds on the main, access and haul roads.			
Post- mitigation			
Duration	Project Life (5)	Noise emissions will be generated throughout the project life	Negligible (negative) – 24
Extent	Very Limited (1)	It is expected that the noise impact will be limited to the isolated parts of the Project area post-mitigation.	

Activity and Interaction: Operational phase activities as per Table 9-3			
Dimension	**Rating**	**Motivation**	**Significance**
Intensity	Minor (2)	Predicted noise impacts at the noise sensitive receivers will remain negligible post-mitigation.	
Probability	Unlikely (3)	Noise impacts are unlikely to occur post-mitigation.	
Nature	Negative		

9.3. Decommissioning Phase

Activities during the Decommissioning Phase that may have potential impacts on the ambient noise levels in the area are indicated in Table 9-5.

Table 9-5: Interactions and Impacts of Activity

Interaction	Impact
Removal, decommissioning and rehabilitation of surface infrastructure such as pipelines, powerlines, pumps etc. footprints.	Noise emissions from equipment/machinery during the decommissioning phase may increase the noise levels at NSRs and may result in a noise disturbance.
Removal, decommissioning and rehabilitation of the processing plant footprint.	
Rehabilitation of the old TSF footprints.	
Rehabilitation of the old Mogale Processing Plant footprint.	
Final rehabilitation of this facility.	
General rehabilitation of the surrounding area, including wetland rehabilitation.	

9.3.1. Impact Description

The rehabilitation, demolition and removal of the infrastructure will involve the use of machinery and/or equipment, and vehicles similar to those used in the construction phase. This will lead to the emission of noise to the ambient environment, including the at NSRs. The decommissioning phase activities will occur during daylight hours only therefore the predicted noise emissions will be limited to daytime only. In addition, the decommissioning phase will be short-term in nature, therefore, the predicted noise impacts will also be short-term. The significance of the noise impact will be negligible due to the simultaneous reduction in the cumulative noise onsite and at NSRs.

9.3.1.1. Management Objectives

The noise management objective is to minimise noise emissions and to ensure that the noise exposure levels at the nearby sensitive receivers do not exceed the SANS 10103:2008 guidelines. Also, to ensure that mitigation measures are implemented so noise levels are below limit values and in compliance with the guidelines.

9.3.1.2. Management Actions

The following management measures are recommendations as good practice guidelines:

- Restrict decommissioning activities to daylight hours;
- Vehicles should be equipped with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound;
- Regularly service machines and vehicles to ensure noise suppression mechanisms are effective e.g., installed exhaust mufflers;
- Regulate speed limits on access roads; and
- Switch off equipment when not in use.

9.3.1.3. Impact Ratings

The noise impact during the Decommissioning Phase of the Project has been assessed and is provided in Table 9-6.

Table 9-6: Significance Ratings for Decommissioning Phase

Activity and Interaction: Decommissioning phase activities as per Table 9-5			
Dimension	**Rating**	**Motivation**	**Significance**
Impact Description: Noise will emanate from the machinery and/or equipment, and vehicles operating during the decommissioning phase activities.			
Prior to mitigation/ management			
Duration	Short term (2)	Noise will be generated for the duration of each activity in the decommissioning phase.	Negligible (negative) – 18
Extent	Limited (2)	It is expected that the noise impact will be limited to the project site and its immediate surroundings.	
Intensity	Minor (2)	Minor implications on the surrounding area are anticipated	
Probability	Unlikely (3)	Noise impacts at nearby receivers from decommissioning activities are unlikely to occur due to the simultaneous	

Activity and Interaction: Decommissioning phase activities as per Table 9-5			
Dimension	**Rating**	**Motivation**	**Significance**
		reduction in noise generating Project related sources.	
Nature	Negative		
Mitigation/ Management actions			
• Restrict decommissioning activities to daylight hours; • Vehicles should be equipped with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound; • Regularly service machines and vehicles to ensure noise suppression mechanisms are effective e.g., installed exhaust mufflers; • Regulate speed limits on access roads; and • Switch off equipment when not in use.			
Post- mitigation			
Duration	Short Term (2)	Noise will be generated for the duration of each activity in the decommissioning phase.	Negligible (negative) – 12
Extent	Site Specific (1)	Noise generated post-mitigation will be limited to specific isolated parts of the site.	
Intensity	Minimal (1)	Minimal implications on the surrounding area are anticipated post-mitigation	
Probability	Unlikely (3)	Noise impacts at nearby receivers from decommissioning activities are unlikely to occur due to the simultaneous reduction in noise generating Project related sources.	
Nature	Negative		

10. Cumulative Impacts

The findings of this noise survey show that the predicted future noise emissions from the operational phase activities (hydraulic mining, sand dump mining and processing plant) for day and night-time will result in negligible (do not exceed regulatory limits for day and night) noise impacts. This is corroborated by the calculated cumulative noise impacts (refer to Section: 8.3) which indicates that the proposed project activities for both construction and operational phases will not increase the ambient noise levels at the NSRs. Irrespective of the above mentioned, it is recommended that quarterly noise monitoring be conducted to ensure the cumulative impacts are monitored and stay the same throughout the project life.

11. Environmental Management Plan

Table 11-1 provides a summary of the proposed Project activities, environmental aspects and impacts on the receiving environment. Information on the mitigation measures, mitigation type and timing of implementation of the Environmental Management Plan (EMP) are specified.

Table 11-1: Environmental Management Plan

Activities	Potential Impacts	Aspects Affected	Phase	Mitigation Measure	Mitigation Type	Time period for implementation
• Site clearing for the construction of the new processing plant facility and ancillary infrastructure such as pipelines, pump stations, electrical supply etc. • Construction of the new processing plant and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.	Noise emission	Noise	Construction	• Construction activities should be restricted to daylight hours; • Construction activities should be carried out in phases; • Construction machinery and vehicles should be switched off when not in use; • Construction vehicles should be with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound; • Machinery and construction vehicles to be serviced as per their design requirements to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and • Regulate vehicle speeds on the main, access and haul roads.	Noise control measures; and Noise monitoring.	Upon commencement of the construction phase.
• Hydraulic reclamation of the associated historic slime and sand dumps • Operation of pump stations during the operational phase. • Progressive rehabilitation of the new tailings facility footprints (West Pits TSF and 1L23-1L25 TSF • Operation of the processing plant.	Noise emissions	Noise	Operational	• Machinery and vehicles should be switched off when not in use; • Vehicles should be equipped with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound; • Acoustic enclosures for noise generating equipment such as the slurry pump station; • Slurry pump station and vibrating screener should be located as far as possible (ideally 0.5 - 1 km) from NSRs; • Noise monitoring on a regular basis to identify problematic areas/areas of concern; • Machinery and vehicles to be serviced as per their design requirements to ensure noise suppression mechanisms are effective e.g. installed exhaust mufflers; and • Regulate vehicle speeds on the main, access and haul roads.	Noise control measures; and Noise monitoring.	Upon commencement of the operational phase.

Activities	Potential Impacts	Aspects Affected	Phase	Mitigation Measure	Mitigation Type	Time period for implementation
• Removal, decommissioning and rehabilitation of surface infrastructure such as pipelines, powerlines, pumps etc. footprints. • Removal, decommissioning and rehabilitation of the processing plant footprint. • Rehabilitation of the old TSF footprints. • Rehabilitation of the old Mogale Processing Plant footprint. • Final rehabilitation of this facility. • General rehabilitation of the surrounding area, including wetland rehabilitation.	Noise emission	Noise	Decommissioning	• Restrict decommissioning activities to daylight hours; • Vehicles should be equipped with a Brigade white noise reversing alarm, rather than the conventional beeping type reverse alarms. The white noise reversing alarm produces a buzzer sound instead of the conventional beeping sound; • Regularly service machines and vehicles to ensure noise suppression mechanisms are effective e.g., installed exhaust mufflers; • Regulate speed limits on access roads; and • Switch off equipment when not in use.	Noise control measures; and Noise monitoring.	Upon commencement of the decommissioning phase.

12. Monitoring Programme

The noise emissions/impacts from the operational phase of the Project on the sensitive nearby receivers based on the findings from the assessment ranking methodology are negligible. However, it is recommended that a monitoring plan be implemented to monitor background noise levels, while mining is ongoing (increases and/or decreases in noise levels) throughout the project's life. The components to be included in the proposed monitoring plan are discussed below:

- Noise monitoring is to be conducted for the operational phases of the Project's life; and
- Quarterly noise measurements must be conducted at the prescribed locations (SNR1, SNR2 and SNR4 where monitoring is currently being undertaken.

Table 12-1: Noise Monitoring Programme

Monitoring Element	Comment	Frequency	Responsibility
Noise Monitoring	Noise monitoring in line with the requirements of SANS 10103:2008 on-site, and at selected receivers	Quarterly Noise Monitoring	Mine Environmental Officer

13. Conclusion and Recommendations

The existing ambient noise levels was assessed and have been established at selected NSRs in the Project area and its immediate surroundings. The results from the noise monitoring survey indicate that the ambient soundscape (LAeq) for both day and night-time for all monitoring locations were in exceedance of the SANS 10103:2008 guidelines for day time (except at N1). For night-time, the measured levels were all in exceedance of the limit values for receptors within a suburban environment. The main noise sources that impacted the monitoring locations were:

- Anthropogenic; Communication (people talking / shouting) and Vehicle activity (light and heavy vehicles); and
- Natural; birds (birdsong/chirping), poultry (chickens).

The following conclusions can be drawn for the ambient noise levels in the Project area and its immediate surroundings:

- The resulting overall ambient noise levels as determined by the noise monitoring survey show the area does not comply with the SANS 10103:2008 guidelines limits for day and night-time;

- The noise contributions of vehicular activity along the R28 and M13 represent a perennial contributor to the background. The background noise to a large extent will mask out the day and night-time emissions caused by the future mining operations at nearby sensitive receivers.

Noise dispersion modelling scenarios were conceptualized for the construction and operational phases, with the model predictions indicating negligible impacts on the ambient soundscape at the NSRs for construction and operational phases. In summary:

- Sensitive receivers that fall within 0.5 km of the Project area for the daytime construction and operational phases are predicted to experience noise impacts above the SANS 10103:2008 regulatory limits.
- Sensitive receivers that fall within 1.0 km of the Project area for the night-time operational phase are predicted to experience noise impacts above the SANS 10103:2008 regulatory limits.
- Predicted future emissions from the daytime construction and operational phase as well as the night-time operational phase of the Project will not result in an increase in the ambient noise level at the NSRs located greater than 0.5 km and 1.0 km (Day and Night) radius of project reclamation activities.
- Hence, the development of the project will not lead community/group responses (as per the SANS 10103:2008 guidelines) to noise emissions, as the cumulative impact is categorized as “Little” (0-10 dBA), resulting in “Sporadic complaints” if any from the NSR.

The findings from the impact assessment ranking methodology for the operational phase have indicated minor impacts on the nearby sensitive receivers from Project related activities. However, the implementation of mitigation measures during the different phases of the Project is recommended and is predicted to result in negligible impacts post-mitigation. The aforementioned will result in emission reduction and a further decrease in anticipated noise impacts onsite and at the receivers.

Based on the findings detailed in this report and the appropriate implementation of noise mitigation, management and monitoring measures, it is therefore recommended that the proposed Project be authorized from a noise impact perspective.

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Appendix A: Impact Assessment Ranking

The potential impacts from the proposed Project have been assessed based on the severity predicted on-site and at sensitive receptor(s). This culminates in a significance rating which identifies the most important impacts that require mitigation and/or management.

Based on international guidelines and South African legislation, the following criteria were considered when examining potentially significant impacts:

- Nature of impacts (direct / indirect, positive / negative);
- Duration (short / medium / long-term, permanent (irreversible) / temporary (reversible), frequent / seldom);
- Extent (geographical area, size of affected population / habitat / species);
- Intensity (minimal, severe, replaceable / irreplaceable);
- Probability (high / medium / low probability); and
- Possibility to mitigate, avoid or offset significant adverse impacts.

Details of the impact assessment methodology used to determine the significance of physical, bio-physical and socio-economic impacts are provided below.

The significance rating process follows the established impact / risk assessment formula:

Significance = Consequence x Probability x Nature

Where

Consequence = Intensity + Extent + Duration

And

Probability = Likelihood of an impact occurring

And

Nature = Positive (+1) or negative (-1) impact

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 14-1. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts. Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in the Environmental Management Plan Report (EMPr).

The significance of an impact is then determined and categorised into one of eight categories, as indicated in Table 14-2, which is extracted from Table 14-1. The description of the significance ratings is discussed in Table 14-3.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

Table 14-1: Impact Assessment Parameter Ratings

RATING	INTENSITY/REPLACABILITY		EXTENT	DURATION/REVERSIBILITY	PROBABILITY
	Negative impacts	Positive impacts			
7	Irreplaceable damage to highly valued items of great natural or social significance or complete breakdown of natural and / or social order.	Noticeable, on-going natural and / or social benefits which have improved the overall conditions of the baseline.	International The effect will occur across international borders.	Permanent: The impact is irreversible, even with management, and will remain after the life of the project.	Definite: There are sound scientific reasons to expect that the impact will definitely occur. >80% probability.
6	Irreplaceable damage to highly valued items of natural or social significance or breakdown of natural and / or social order.	Great improvement to the overall conditions of a large percentage of the baseline.	National Will affect the entire country.	Beyond project life: The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost certain / Highly probable: It is most likely that the impact will occur. <80% probability.
5	Very serious widespread natural and / or social baseline changes. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	Province/ Region Will affect the entire province or region.	Project Life (>15 years): The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely: The impact may occur. <65% probability.

RATING	INTENSITY/REPLACABILITY		EXTENT	DURATION/REVERSIBILITY	PROBABILITY
	Negative impacts	Positive impacts			
4	On-going serious natural and / or social issues. Significant changes to structures / items of natural or social significance.	Average to intense natural and / or social benefits to some elements of the baseline.	Municipal Area Will affect the whole municipal area.	Long term: 6-15 years and impact can be reversed with management.	Probable: Has occurred here or elsewhere and could therefore occur. <50% probability.
3	On-going natural and / or social issues. Discernible changes to natural or social baseline.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	Local Local extending only as far as the development site area.	Medium term: 1-5 years and impact can be reversed with minimal management.	Unlikely: Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. <25% probability.
2	Minor natural and / or social impacts which are mostly replaceable. Very little change to the baseline.	Low positive impacts experience by a small percentage of the baseline.	Limited Limited to the site and its immediate surroundings.	Short term: Less than 1 year and is reversible.	Rare / improbable: Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. <10% probability.
1	Minimal natural and / or social impacts, low-level replaceable damage with no change to the baseline.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	Very limited Limited to specific isolated parts of the site.	Immediate: Less than 1 month and is completely reversible without management.	Highly unlikely / None: Expected never to happen. <1% probability.

Table 14-2: Probability/Consequence Matrix

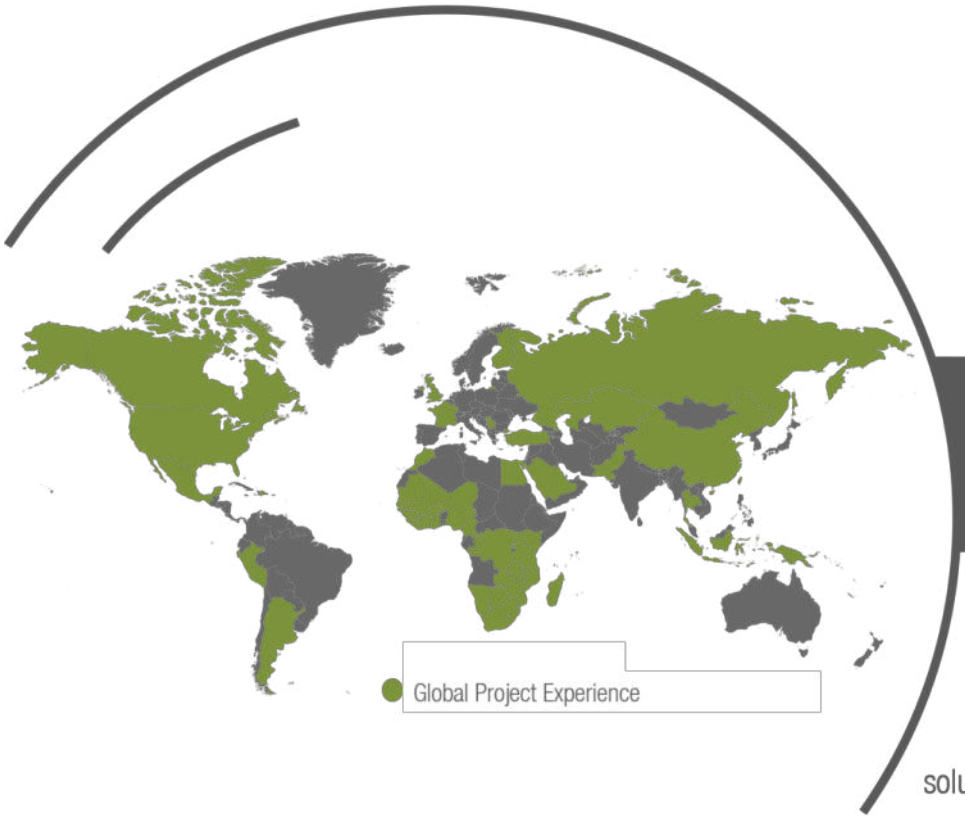
Probability \ Significance	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21

Consequence

Table 14-3: Significance Rating Description

Score	Description	Rating
109 to 147	A very beneficial impact that may be sufficient by itself to justify implementation of the project. The impact may result in permanent positive change	Substantial (positive)
73 to 108	A beneficial impact which may help to justify the implementation of the project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and / or social) environment	Major (positive)
36 to 72	An positive impact. These impacts will usually result in positive medium to long-term effect on the natural and / or social environment	Minor (positive)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and / or social environment	Negligible (positive)
-3 to -35	An acceptable negative impact for which mitigation is desirable. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural and / or social environment	Negligible (negative)
-36 to -72	A minor negative impact requires mitigation. The impact is insufficient by itself to prevent the implementation of the project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the natural and / or social environment	Minor (negative)
-73 to -108	A moderate negative impact may prevent the implementation of the project. These impacts would be considered as constituting a major and usually a long-term change to the (natural and / or social) environment and result in severe changes.	Major (negative)
-109 to -147	A major negative impact may be sufficient by itself to prevent implementation of the project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects. The impacts are likely to be irreversible and/or irreplaceable.	Substantial (negative)

Appendix O: Heritage Impact Assessment



DIGBY WELLS
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Mogale Tailings Retreatment Operations Environmental Application Process

Heritage Impact Assessment

Prepared for:
Pan African Resources PLC

Project Number:
PAR7273

August 2022

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Report Type:	Heritage Impact Assessment
Project Name:	Mogale Tailings Retreatment Operations Environmental Application Process
Project Code:	PAR7273

Name	Responsibility	Signature	Date
Shannon Hardwick HRM Consultant ASAPA Member: 451	Report Compilation Pre-disturbance Survey		December 2021
Johan Nel Manager: Heritage Services ASAPA Member 095	Technical Review		December 2021
Brett Coutts	Project Manager Review		July 2022

DETAILS AND DECLARATION OF THE SPECIALIST

Digby Wells and Associates (South Africa) (Pty) Ltd

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Title/ Position:	Heritage Resources Management Consultant
Qualification(s):	Master of Science (MSc) Archaeology
Experience (years):	5 years
Registration(s):	ASAPA, ICOMOS

I, Shannon Hardwick, declare that: –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
    - I declare that there are no circumstances that may compromise my objectivity in performing such work;
    - I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

July 2022

Signature of the Specialist *Date*

Findings, recommendations, and conclusions provided in this report are based on the best available scientific methods and the author's professional knowledge and information at the time of compilation. Digby Wells employees involved in the compilation of this report, however, accepts no liability for any actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with services rendered, and by the use of the information contained in this document.

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Any recommendations, statements or conclusions drawn from or based on this report must clearly cite or make reference to this report. Whenever such recommendations, statements or conclusions form part of a main report relating to the current investigation, this report must be included in its entirety.

EXECUTIVE SUMMARY

Digby Wells Environmental (hereinafter Digby Wells) has been appointed to undertake an Environmental Application Process and associated specialist studies for the Mogale Gold Mining Right with reference number: (GP) 30/5/1/2/2 (206) (MR) and, more specifically for the proposed construction of a Mogale Tailings Retreatment Operations.

Mogale Tailings Retreatment (Pty) Ltd (MTR) a wholly owned subsidiary of Pan African Resources PLC (PAR) has entered into a Sale and Purchase Agreement for the acquisition of the shares in and claims against Mogale Gold (Pty) Ltd (Mogale Gold). The agreement was entered into between PAR and the liquidators of Mintails Mining SA (Pty) Ltd (in liquidation) (MMSA). MMSA is the holding company of Mogale Gold. The intended transaction is subject to a due diligence investigation to be completed by 30th September 2022. The proposed transaction has now been concluded and was announced on the 6th October 2022.

PAR has closed the transaction to acquire the total share capital and claims of Mogale Gold and Mintails SA Soweto Cluster Proprietary Limited (MSC), (collectively, the Sale Transaction). Both Mogale Gold and MSC are 100% owned by Mintails Mining SA Proprietary Limited (Mintails SA), which was placed in provisional liquidation during 2018. Based on this PAR has now acquired the assets associated with MR 206, based on the conclusion of the transaction noted above.

The project entails the reclamation of historical unlined Tailings Storage Facilities (TSFs). The reprocessed tailings will be first discarded into West Wit Pit and possibly other nearby small pits. Any extra processed tailings will be stored on a ground TSF (West Wits Pit TSF and 1L23-1L25 TSF). It is proposed that the footprint of 1L23-1L25 footprint will be lined and the footprint of West Wits Pit TSF will not be lined.

The EIA process includes a Heritage Resources Management (HRM) process required in support of the EIA process and in compliance with the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA). This document constitutes the Heritage Impact Assessment (HIA) report and included the completion of the following activities:

- Description of the predominant cultural landscape supported through primary and secondary data collection;
- Assessment of the Cultural Significance of the identified heritage resources;
- Identification of potential impacts to heritage resources based on the Project description and Project activities;
- An evaluation of the potential impacts to heritage resources relative to the sustainable socio-economic benefits that may result from the Project;
- Recommending feasible management measures and/or mitigation strategies to avoid and/or minimise negative impacts and enhance potential benefits resulting from the Project; and

- Submission of the HIA report to the Heritage Resource Authorities (HRAs) for Statutory Comment as required under Section 38(8) of the NHRA.

Digby Wells undertook a pre-disturbance survey on 13 and 15 October 2021. During this assessment, Digby Wells identified five heritage resources within the proposed Project area – two burial grounds and graves, one layer of historical material which may comprise a historical landfill (or similar dump), one historical structure and one historical *werf*. These heritage resources have negligible to very high Cultural Significance. The table below presents a summary of the Cultural Significance of the identified heritage resources.

Summary of the Cultural Significance of Identified Heritage Resources

Resource ID	Description	INTEGRITY	Cultural Significance
BGG01 and BGG02	Burial grounds and graves	4	Very High
Historical Landfill	Concentrated layer of historical material that may represent a landfill	2	Low
STE01	Historical Structure	1	Negligible
Wf01	Historical werf	1	Negligible

Given their location relative to the proposed infrastructure and the preferred plant location, no heritage impacts are envisaged. However, there is the potential that the proposed Eskom and Plant Switch Yards and pipeline routes could impact on the Historical Landfill Site. The table below presents a summary of this assessment.

Summary of the Impact Assessment

	Duration	Extent	Intensity	Consequence	Probability	Significance
Impact	**Pre-mitigation:**					
Direct impact to Landfill	Permanent	Limited	Very low - Negative	Moderately detrimental	Likely	Minor - negative
Direct impact to BGG01	Permanent	International	Extremely high - Negative	Extremely detrimental	Probable	Moderate-negative
Impact	**Post-mitigation:**					
Direct impact to Landfill	Beyond project life	Local	Very low - positive	Moderately beneficial	Highly probable	Minor - positive

	Duration	Extent	Intensity	Consequence	Probability	Significance
Impact	**Pre-mitigation:**					
Direct impact to BGG01	Beyond project life	Local	High - positive	Highly beneficial	Likely	Minor - positive

Additionally, the proposed Project presents a risk of direct negative impact to heritage resources that may exist within the Project area and which have not been identified to date. The table below summarises the risk to these resources.

Summary of the potential risk to heritage resources

Unplanned event	Potential impact
Accidental exposure of fossil bearing material implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 35 of the NHRA.
Accidental exposure of *in situ* archaeological material during the implementation of the Project.	
Accidental exposure of *in situ* historical built environment sites during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 34 of the NHRA
Accidental exposure of *in situ* burial grounds or graves during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 36 of the NHRA.
Accidental exposure of human remains during the construction phase of the Project.	

Considering the nature, location and scope of the Project, Digby Wells recommends the following:

- PAR must develop and implement a Chance Find Procedure (CFP) as part of the Environmental Management Program (EMPr);
- Direct negative impacts to BGG01 must be avoided or managed. Digby Wells recommends that a 100 m no-go buffer zone be implemented around BGG01 to avoid heritage resource impacts. Should this not be feasible, Digby Wells recommends that PAR undertake consultations to explore whether a Grave Relocation Process (GRP) will be feasible. The GRP, should it go ahead, will be subject to a permit issued in terms of Section 36 of the NHRA; and
- Direct negative impacts to the Historical Landfill must be avoided or managed. Digby Wells recommends that a 50 m no-go buffer zone around the Historical Landfill Site be implemented to avoid heritage resource impacts. Should this not be feasible, Digby Wells recommends that PAR appoint a suitably-qualified archaeologist to undertake

test pits or excavations of this resource. This will be subject to a permit issued in terms of Section 35 of the NHRA.

Where these recommendations are implemented, Digby Wells does not object to the Project going forward from a heritage perspective.

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS

Abbreviation	Meaning
ASAPA	Association of Southern African Professional Archaeologists
BA	Bachelor of Arts, or Basic Assessment (*the applicable term will be defined in the report*)
BCE	Before Common Era (also: Before Christ or BC)
BID	Background Information Document
BSc	Bachelor of Science
c.	Circa, meaning approximately
CE	Common Era (also: *Anno Domini* or AD)
CFP	Chance Find Protocol
CRR	Comments and Response Report
Digby Wells	Digby Wells Environmental
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EFC	Early Farming Community (*also known as Early Iron Age, see below*)
EIA	Environmental Impact Assessment. *Please note that EIA can also refer to the 'Early Iron Age'; however, in this document, this time period is referred to as 'Early Farming Community'.*
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
ESA	Early Stone Age
GIS	Geographical Information System
GN R	Government Notice Regulation
GPS	Global Positioning System
HIA	Heritage Impact Assessment
Hons	Honours degree
HRAs	Heritage Resources Authorities
HRM	Heritage Resources Management
HSMP	Heritage Site Management Plan
ICOMOS	International Council on Monuments and Sites
ktpm	thousand tonnes per month

Abbreviation	Meaning
Kya	Thousand years ago
LED	Local Economic Development
LFC	Late Farming Community also known as Late Iron Age
LSA	Late Stone Age
MIA	Middle Iron Age
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MR	Mining Right (boundary)
MRA	Mining Right Application
MSA	Middle Stone Age
MSc	Master of Science
Mt	Million tonnes
Mtpa	Million tonnes per annum
Mya	Million years ago
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NID	Notification of Intent to Develop
PCD	Pollution Control Dam
PHRA	Provincial Heritage Resources Authority
PHRA-G	Provincial Heritage Resources Authority Gauteng
RoD	Record of Decision
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
SCF	Statutory Comment Feedback
SEP	Stakeholder Engagement Process
SoW	Scope of Work
ToR	Terms of Reference
Wits	University of the Witwatersrand
Werf	A farmstead or multiple outbuildings associated with a farmhouse or agricultural activities. Plural: *werwe* (Afrikaans).

Refer to Appendix A for a Glossary of Terms.

NHRA and GN R 326 Appendix 6 Legislated Requirements

Description	App. 6	NHRA	Section
Declaration that the report author(s) is (are) independent.	1(b)	-	Page iii-iv
An indication of the scope of, and the purpose for which, the report was prepared.	1(c)	-	1.2 2.1
Details of the person who prepared the report and their expertise to carry out the specialist study.	1(a)	-	**Error! Reference source not found.**
Outlines the legislative framework relevant to the specialist heritage study.	-	-	3
Identifies the specific constraints and limitations of the HIA, including any assumptions made and any uncertainties or gaps in knowledge.	1(i)	-	4
Describes the methodology employed in the compilation of this HIA.	1(e)	-	5
An indication of the quality and age of base data used for the specialist report.	1(cA)	-	5.4 15
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment.	1(d)	-	5.5
Provides the baseline cultural landscape.	-	38(3)(a)	6
Motivates for the defined Cultural Significance of the identified heritage resources and landscape.	-	38(3)(b)	7.1
A description of the potential impacts to heritage resources by project related activities, including: - Existing impacts on the site; - Possible risks to heritage resources; - Cumulative impacts of the proposed development; - Acceptable levels of change; and - Heritage-related risks to the project.	1(cB)	38(3)(c)-	7
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities.	1(j)	38(3)(c)	

Description	App. 6	NHRA	Section
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives.	1(f)	-	7 Plan 4
Considers the development context to assess the socio-economic benefits of the project in relation to the presented impacts and risks.	-	38(3)(d)	6.4 ●
A description of any consultation process that was undertaken during the course of preparing the specialist report and the results of such consultation.	1(o)	38(3)(e)	**Error! Reference source not found.**
A summary and copies of any comments received during any consultation process and where applicable all responses thereto.	1(p)	38(3)(e)	
Details the specific recommendations based on the contents of the HIA.	-	38(3)(g)	11
An identification of any areas to be avoided, including buffers.	1(g)		
Any mitigation measures for inclusion in the Environmental Management Programme (EMPr)	1(k)		8
Any conditions for inclusion in the environmental authorisation.	1(l)		11
Any monitoring requirements for inclusion in the EMPr or environmental authorisation.	1(m)		9
A reasoned opinion— (i) whether the proposed activity, activities or portions thereof should be authorised; (iA) regarding the acceptability of the proposed activity or activities; and (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	1(n)	38(3)(g)	13
Collates the most salient points of the HIA and concludes with the specific outcomes and recommendations of the study.	-	38(3)(f) 38(3)(g)	14
Lists the source material used in the development of the report.	1(cA)	-	15

Description	App. 6	NHRA	Section
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers	1(h)	-	Plan 4
Any other information requested by the competent authority.	1(q)	-	N/A

1. Introduction

Digby Wells Environmental (hereinafter Digby Wells) has been appointed to undertake an Environmental Application Process and associated specialist studies for the Mogale Gold Mining Right with reference number: (GP) 30/5/1/2/2 (206) (MR) and, more specifically for the proposed construction of a Mogale Tailings Retreatment Operations.

Mogale Tailings Retreatment (Pty) Ltd (MTR) a wholly owned subsidiary of Pan African Resources PLC (PAR) has entered into a Sale and Purchase Agreement for the acquisition of the shares in and claims against Mogale Gold (Pty) Ltd (Mogale Gold). The agreement was entered into between PAR and the liquidators of Mintails Mining SA (Pty) Ltd (in liquidation) (MMSA). MMSA is the holding company of Mogale Gold. The intended transaction is subject to a due diligence investigation to be completed by 30th September 2022. The proposed transaction has now been concluded and was announced on the 6th October 2022.

PAR has closed the transaction to acquire the total share capital and claims of Mogale Gold and Mintails SA Soweto Cluster Proprietary Limited (MSC), (collectively, the Sale Transaction). Both Mogale Gold and MSC are 100% owned by Mintails Mining SA Proprietary Limited (Mintails SA), which was placed in provisional liquidation during 2018. Based on this PAR has now acquired the assets associated with MR 206, based on the conclusion of the transaction noted above.

The project entails the reclamation of historical unlined Tailings Storage Facilities (TSFs). The reprocessed tailings will be first discarded into West Wit Pit and possibly other nearby small pits. Any extra processed tailings will be stored on a ground TSF (West Wits Pit TSF and 1L23-1L25 TSF). It is proposed that the footprint of 1L23-1L25 footprint will be lined and the footprint of West Wits Pit TSF will not be lined.

Mogale Gold owns the right to extract and process gold from tailings recourses by reprocessing old gold mine slimes dams and sandy mine dumps left by the extensive historic mining activities that have taken place in the area since 1888. MTR (PAR) is only interested in the surface operations associated with Mining Right (MR) 206 (i.e., Tailings Storage Facilities (TSFs) for reclamation, processing and deposition), and therefore the focus of this application process.

The Project consists of 120 Mt of tailings to be reprocessed and firstly deposited into the West Wits Pit (current authorisation in place for in-pit deposition) and then undertake deposition of the footprint of 1L23-1L25 footprint (New Tailings Facility) once capacity has been reached within the West Wits Pit.

Alternatives are being considered for potential deposition of tailings material into the other pits in the area.

1.1. Project Background

Mogale plan to undertake activities relating to reclamation associated with gold-bearing TSFs through hydraulic reclamation. Digby Wells were appointed as the Independent Environmental

Consultant to undertake the Environmental Impact Assessment (EIA) Application process which comprises of an Air Emission Licence (AEL) and Water Use Licence (WUL) for the proposed gold-bearing TSFs.

The project consists of 120 Mt of tailings to be reprocessed and firstly deposited into the West Wits Pit (current authorisation in place for in-pit deposition) and then undertake deposition of the footprint of 1L23-1L25 footprint (New Tailings Facility) once capacity has been reached within the West Wits Pit. Eventually there will be two TSFs: one at the current WWP and the other at the current 1L23-1L25 TSF.

Alternatives are being considered for potential deposition of tailings material into the other pits.

It must be noted that once the West Wits Pits reaches capacity the surface deposition will extend in a northern direction from the pit onto surface, expanding the deposition footprint associated with West Wits Pit.

There are six dumps being considered to be reprocessed, the largest of which amounts to 57.9 Mt, while the smallest contains 0.57 Mt. The primary location of processed tailings storage has been earmarked for deposition in the West Wits Pit.

1.2. Project Locality

The Mining Right Area of the Mogale Cluster includes: G1, G2 plant; Cams, North Sand; South Sand; 1L23-1L25; 1L28; 1L13-1L15; 1L8, 1L9; 1L10; West Wits Pit (WWP) and Lancaster Dam. The mining right is located on Portions 66 and 99 of the farm Waterval 174 IQ and portions 136 and 209 of the farm Luipaardsvlei 246 IQ. MR 206 and associated infrastructure covers an aerial extent of 2,923.3 ha.

The Project is located about 4 km south of Krugersdorp and 4 km northeast of Randfontein. The Project area is situated in the Mogale City Local Municipality (MCLM) and Rand West City Local Municipality (RWCLM), which is located within the West Rand District Municipality (WRDM) in the Gauteng Province. The Project area falls under the jurisdiction of the Krugersdorp Magisterial District. Table 1-1 provides a summary of these details and Plan 1 (Regional Setting) presents the geographical location within which the Project is located.

The area within which the Project is located has been transformed by past gold mining activities and much of the infrastructure for these operations remains.

Table 1-1: Summary of the Mogale Project Location Details

Province	Gauteng
District Municipality	WRDM
Local Municipality	MCLM and RWCLM
Nearest Town	Krugersdorp (4 km), Randfontein (4 km)
GPS Co-ordinates (relative centre point of study area)	26°07'45.54"S
	27°45'40.85"E

2. Project Description

2.1. Terms of Reference and Scope of Work

PAR appointed Digby Wells and Associates (South Africa) (Pty) Ltd (hereinafter Digby Wells) as the independent Environmental Assessment Practitioner (EAP) to undertake an Environmental Application Process to obtain Environmental Authorisation (EA) as outline above in respect of MR 2060.

PAR appointed Digby Wells to undertake the EIA process required through the triggering of activities listed in the EIA Regulations, 2014, as amended.

The Environmental Application Process includes a specialist Heritage Resources Management (HRM) process that complies with section 38 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA). This document comprises the specialist Heritage Impact Assessment (HIA) report in support of the EIA process for submission to the Heritage Resources Authorities (HRAs). In this case, the applicable HRAs include the South African Heritage Resources Agency (SAHRA) and the Provincial Heritage Resources Authority Gauteng (PHRA-G).

Table 2-1 presents a summary of the expertise of the specialists involved in the compilation of this report. Appendix B includes the full curriculum vitae (CVs) of these specialists.

Table 2-1: Expertise of the Specialists

Team Member	Bio Sketch
Shannon Hardwick ASAPA Member: 451 ICOMOS Member 38048 Years' Experience: 4	Shannon joined the Digby Wells team in May 2017 as a Heritage Management Intern and has most recently been appointed as a Heritage Resources Management Consultant. Shannon is an archaeologist who obtained a Master of Science (MSc) degree from the University of the Witwatersrand in 2013, specialising in historical archaeobotany in the Limpopo Province. She is a published co-author of one paper in *Journal of Ethnobiology*. Since joining Digby Wells, Shannon has gained generalist experience through the compilation of various heritage assessments, including Heritage Scoping Reports (HSRs), HIAs, Heritage Basic Assessment Reports (HBARs) and Section 34 permit applications. Her other experience includes compiling a Community Health, Safety and Security Management Plan (CHSSMP) and various social baselines. Shannon's experience in the field includes pre-disturbance surveys in South Africa, Malawi and the Democratic Republic of the Congo and other fieldwork in Malawi.

Team Member	Bio Sketch
Johan Nel ASAPA Member 095 ICOMOS Member Years' Experience: >20	Johan is a qualified archaeologist, heritage specialist and Manager of the Heritage Services department in Digby Wells. He obtained a BA Honours degree in Archaeology from the University of Pretoria in 2001. He also completed a Professional Development Certificate in Integrated Heritage Resources Management through Rhodes University in 2016. Johan is a professional and accredited member of the Association of Southern African Professional Archaeologists (ASAPA) and a member of the International Council on Monuments and Sites (ICOMOS) South Africa. He has more than 20 years' extensive and diverse experience in heritage resource management. Johan has worked in numerous African settings including South Africa, Botswana, the Democratic Republic of Congo, Liberia, and Sierra Leone. His current interests include ways to empower local communities to use, conserve, and manage heritage resources themselves, as well as integrating living and intangible heritage practices with the more traditional heritage approaches to heritage management. Key concepts he is exploring include cultural humility and so-called People-centred Approaches to conservation of both natural and cultural heritage.

The Scope of Work (SoW) for the specialist HRM process was to compile an HIA report to comply Section 38(3) of the NHRA. Findings from the following activities informed the HIA:

- Primary and secondary data collection to develop a baseline that describes the predominant cultural landscape and identify cultural heritage within the Project area of influence (AoI).
- A Statement of Cultural Significance of identified heritage resources, itself informed by the cultural heritage baseline referred to above.
- Review of the Project description and associated activities to identify potential sources of cultural heritage impacts.
- Assessment of potential impacts on identified cultural heritage in the AoI relative to the sustainable socio-economic benefits that may result from the Project;
- Recommendations to manage and mitigate possible cultural heritage impacts based on the Cultural Significance and impact assessment results, to avoid and/or minimise negative impacts and enhance potential benefits resulting from the Project; and
- Submission of the HIA (as well as the EIA report and supporting specialist reports) to the HRAs for Statutory Comment as required under Section 38(8) of the NHRA.

2.2. Proposed Infrastructure and Activities

Mogale currently owns the rights to extract and process gold from sub surface and tailings resources in respect of the underground resources, slimes, and sand tailings material. Commercially, Mogale holds three mining rights where it produces gold by reprocessing old

gold mine slimes dams and mine sand dumps, and by opencast hard rock mining of historically unmined shallow gold-bearing reefs, left unexploited by extensive historic mining activities since 1888.

PAR intends to acquire the surface operations associated with Mining Right (MR) 206 (i.e., the TSFs) for reclamation, processing and deposition. MR 206 is presented in Plan 1 (Regional Setting) and Plan 2 (Local Setting) and comprises the following existing infrastructure:

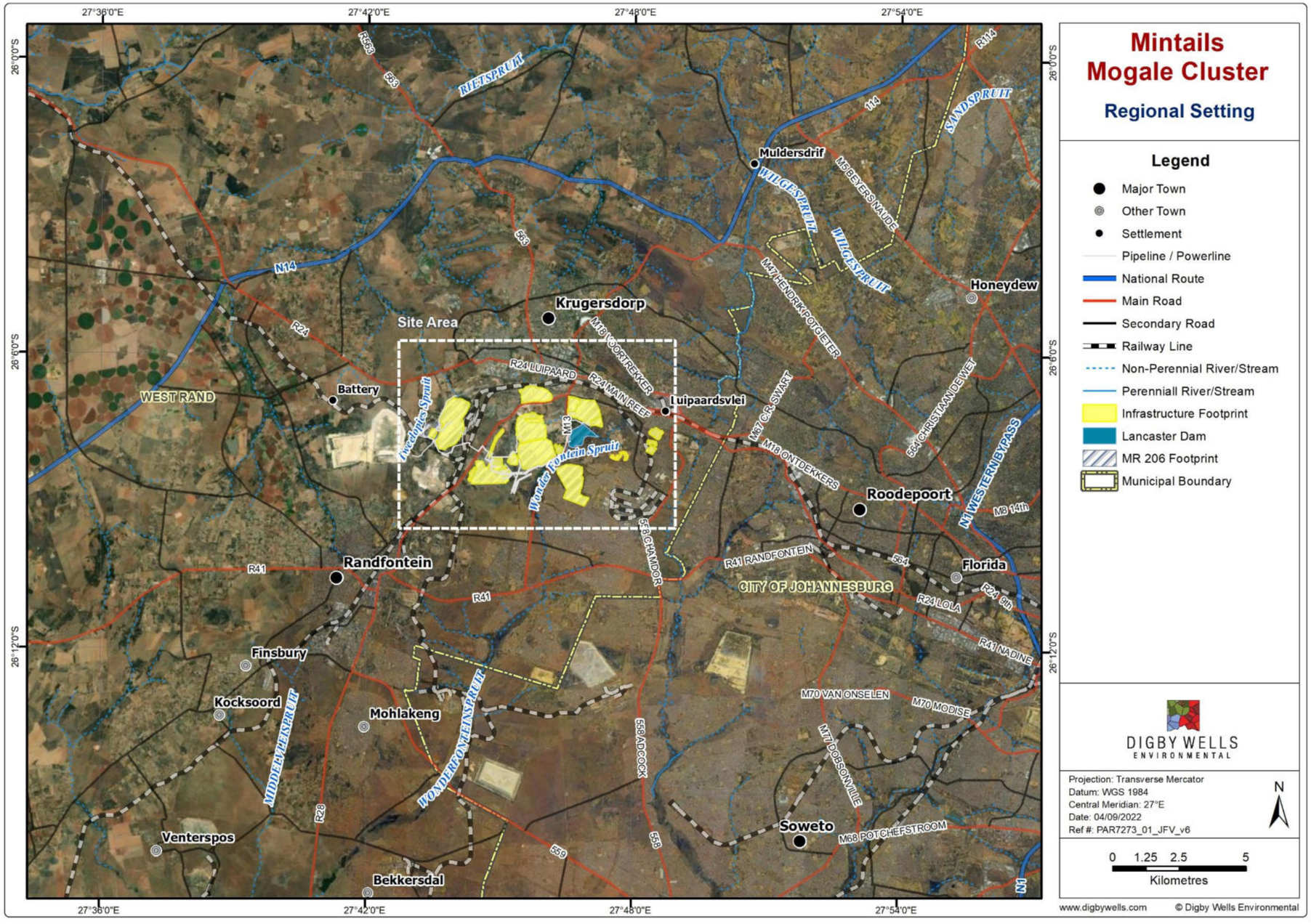
- The existing TSFs (IL8, ILl0, IL13-IL15, IL23-IL25 and IL28);
- Sand dumps (Cams North Sand and South Sand);
- Lancaster Dam; and
- An open pit (West Wits Pit) that will be used for the deposition of tailings materials.

PAR plan to reclaim gold-bearing tailings within the Mogale Cluster through hydraulic reclamation. PAR will require additional infrastructure to do so. A process plant, overland pumps, pipelines, and powerlines as well as the associated water management infrastructure will form part of the proposed infrastructure that will require an authorisation. Once the open pit is filled to capacity, a new TSF will potentially be constructed on the footprint area of IL23-IL25 once this has been reclaimed.

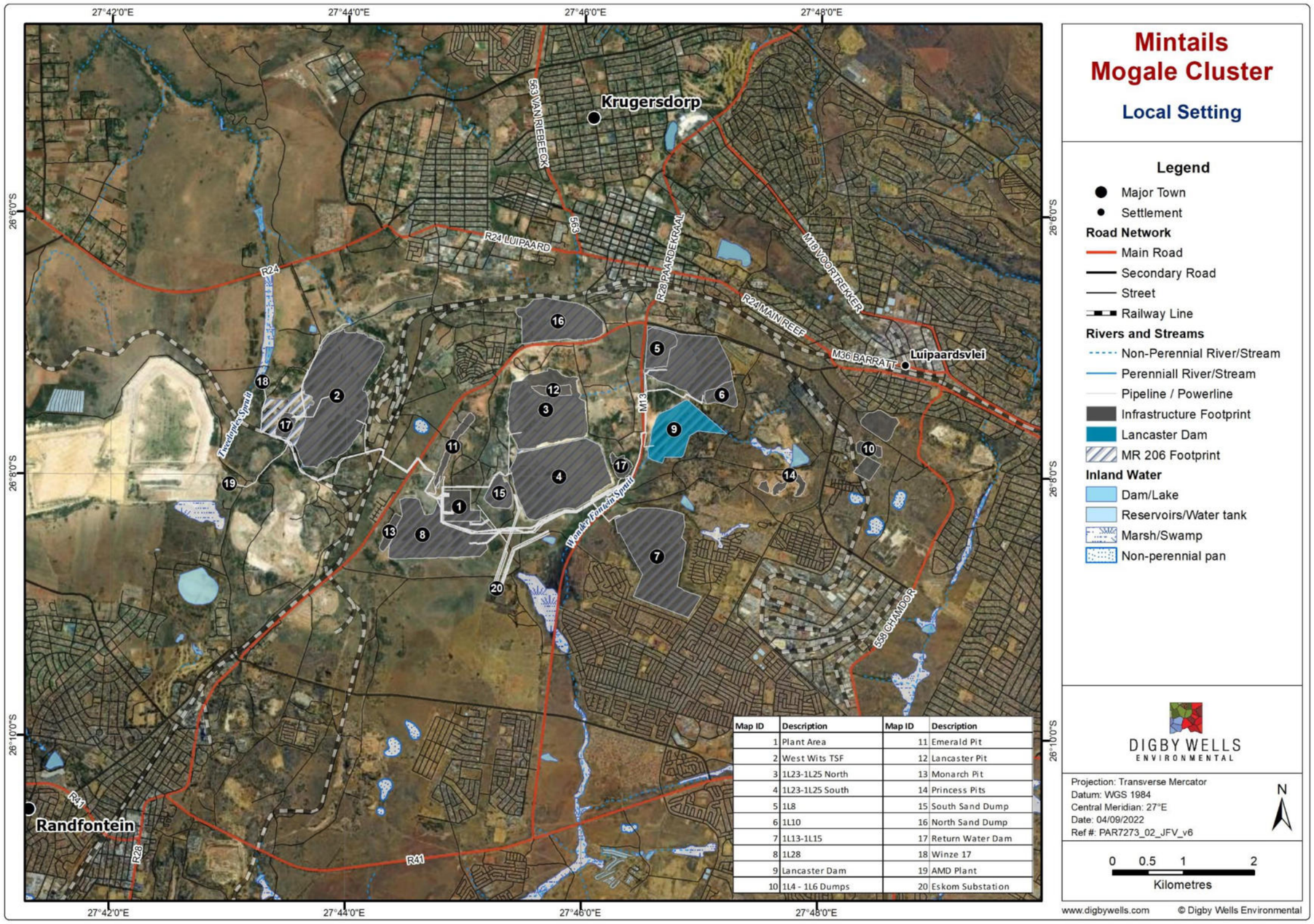
Table 2-2 presents the activities expected within the construction, operation and decommissioning phases of the Project. These Project activities will be used for the impact assessment. Plan 2 presents the proposed Project design and infrastructure layout.

Table 2-2: Project Phases and Associated Activities

Project Phase	Associated Activities
Construction Phase	Site clearing for the construction of the new processing plant facility and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.
	Construction of the new processing plant and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.
Operational Phase	Hydraulic reclamation of the associated historic tailings facilities and sand dumps.
	Operation of pump stations during the operational phase.
	Maintenance of pipeline routes during the operational activities.
	Infilling of processed tailings material into the West Pits Pit and other potential pits.
	Surface tailings deposition within the West Wits Pit.
	Tailings deposition onto the historic footprint of 1L23-1L25 (lined).
	Production of Gold.
	Progressive rehabilitation of the new tailings facility footprints (West Pits TSF and 1L23-1L25 TSF.
Decommissioning Phase	Removal, decommissioning and rehabilitation of surface infrastructure such as pipelines, powerlines, pumps etc. footprints.
	Removal, decommissioning and rehabilitation of the processing plant footprint.
	Rehabilitation of the old TSF footprints.
	Rehabilitation of the old Mogale Processing Plant footprint.
	Final rehabilitation of the facility.
	General rehabilitation of the surrounding area, including wetland rehabilitation.



Plan 1: Regional Setting of the Project



Plan 2: Local Setting

2.3. Alternatives Considered

Table 2-3 presents a summary of the alternatives considered for the proposed Project and describes the consequences of the various alternatives on the assessment of impacts posed to cultural heritage resources within the Project Area. The EIA report includes a more detailed discussion on the Project alternatives.

Table 2-3: Project Alternatives considered in this Assessment

Alternative	Description	Consequence for HRM Process
Technology Alternatives	The Project includes the hydraulic reprocessing of the existing TSFs. The tailings will be processed at a rate of 800 thousand tonnes per month (ktpm). PAR have developed a tailings deposition strategy and associated transportation strategy which combines pipelines and road transport. These components are subject to review during the Feasibility and EA studies and may be amended as these processes continue.	Changes to the preferred technology and/or transport alternatives may result in changes to the infrastructure layout. Only the layout shown in Plan 2 and alternatives have been considered. Where layout changes are proposed in areas not considered in the pre-disturbance survey, additional in-field assessments may be required.
'No-go' Alternative	Should the Project not obtain approval, or not go ahead for any reason, the potential negative environmental and social (including heritage) impacts associated with the development of the proposed Project would not occur. However, the potential socioeconomic benefits associated with the Project (described in Section ●) would also not occur.	The no-go alternative has been considered in this assessment.

3. Relevant Legislation, Standards and Guidelines

This section describes the international, national, and local legislative documents and policy documents that inform the legislative and policy framework of the HRM process. The objective is to ensure that the assessments meet all stipulated requirements to ensure legal compliance and successful integration into the regional planning context.

3.1. National Legislation and Policy

Table 3-1 presents a summary of the national legislation applicable to this HRM process and illustrates how it will be considered in the HIA. Table 3-2 below presents the applicable policies considered in the HRM process.

Table 3-1: Applicable Legislation considered in the HRM Process

Applicable legislation used to compile the report	Reference where applied
Commonwealth War Graves Act, 1992 (Act No. 8 of 1992) (CWGA) The CWGA seeks to prevent the desecration, damaging or destruction of Commonwealth war graves (CWG), regulate the disinterment, removal, reinterment or cremation of Commonwealth war burials, and the removal, alteration, repair or maintenance of Commonwealth war graves. This Act defines "Commonwealth war burial" as "a burial of any member of the naval, military or air forces of the Commonwealth who died as a result of injuries sustained or illnesses contracted in the course of active duty during the First World War (1914 to 1921) or the Second World War 15 (1939 to 1947)" and a "Commonwealth war grave" as "any grave, tombstone, monument or memorial connected with a Commonwealth war burial".	Burial grounds and graves that contain any grave that are or may be considered a CWG).
Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) Section 24 of the Constitution states that everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures, that – i. Prevent pollution and ecological degradation; ii. Promote conservation; and iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development	The HRM process was undertaken to identify heritage resources and determine heritage impacts associated with the Project. As part of the HRM process, applicable mitigation measures, monitoring plans and/or remediation were recommended to ensure that any potential impacts are managed to acceptable levels to support the rights as enshrined in the Constitution.
GN R. 982: Environmental Impact Assessment Regulations, 2014 (as amended by GN R 326 of 7 April 2017) These three listing notices set out a list of identified activities which may not commence without an Environmental Authorisation from the relevant	Refer to the Draft Scoping Report (DSR) for a full description of the Listed Activities triggered by the proposed Project. To comply with the regulations, an EIA process must be completed in support of EA in terms of the applicable Listing Notice. This HIA was completed to inform

Applicable legislation used to compile the report	Reference where applied
Competent Authority through one of the following processes: • Regulation GN R. 983 (as amended by GN R 327) - Listing Notice 1: This listing notice provides a list of various activities which require environmental authorisation, and which must follow a basic assessment process. • Regulation GN R. 984 (as amended by GN R 325) – Listing Notice 2: This listing notice provides a list of various activities which require environmental authorisation, and which must follow an environmental impact assessment process. • Regulation GN R. 985 (as amended by GN R 324) – Listing Notice 3: This notice provides a list of various environmental activities which have been identified by provincial governmental bodies which if undertaken within the stipulated provincial boundaries will require environmental authorisation. The basic assessment process will need to be followed.	the EIA process to comply with Section 24 of the NEMA.
National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) The NEMA, as amended, was set in place in accordance with Section 24 of the Constitution of the Republic of South Africa. Certain environmental principles under NEMA have to be adhered to, to inform decision making on issues affecting the environment. Section 24 (1)(a), (b) and (c) of NEMA state that: *The potential impact on the environment, socio-economic conditions and cultural heritage of activities that require authorisation or permission by law and which may significantly affect the environment, must be considered, investigated and assessed prior to their implementation and reported to the organ of state charged by law with authorizing, permitting, or otherwise allowing the implementation of an activity.* The Environmental Impact Assessment (EIA) Regulations, Government Notice Regulation (GN) R.982 were published on 04 December 2014 and promulgated on 08 December 2014. Together with the EIA Regulations, the Minister also published GN R.983 (Listing Notice No. 1), GN R.984 (Listing Notice No. 2)	The application process was undertaken in accordance with the principles of Section 24 of NEMA as well as with the EIA Regulations 2014 (as amended), promulgated in terms of NEMA.

Applicable legislation used to compile the report	Reference where applied
and GN R.985 (Listing Notice No. 3) in terms of Sections 24(2) and 24D of the NEMA, as amended.	
National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) The NHRA is the overarching legislation that protects and regulates the management of heritage resources in South Africa, with specific reference to the following Sections: • 5. General principles for HRM • 6. Principles for management of heritage resources • 7. Heritage assessment criteria and grading • 38. Heritage resources management The Act requires that Heritage Resources Authorities (HRAs), be notified as early as possible of any developments that may exceed certain minimum thresholds in terms of Section 38(1), or when assessments of impacts on heritage resources are required by other legislation in terms of Section 38(8) of the Act.	This report was compiled to comply with Section 5, 38(3), (4) and (8) of the NHRA. This report was submitted to the responsible HRAs, which in this instance is SAHRA and PHRA-G.
NHRA Regulations, 2000 (GN R 548) The NHRA Regulations regulate the general provisions and permit application process in respect of heritage resources included in the national estate. Applications must be made in accordance with these regulations. The following Chapters are applicable to this assessment: • II. Permit Applications and General Provisions for Permits; • III: Application for Permit: National Heritage Site, Provincial Heritage Site, Provisionally Protected Place or Structure older than 60 years; • IV: Application for Permit: Archaeological or Palaeontological or Meteorite; • IX: Application for Permit: Burial Grounds and Graves; • X: Procedure for Consultation regarding Protected Area;	The HRM process was undertaken with cognisance of the applicable regulations. The proposed mitigation strategies and management measures must comply with these requirements.

Applicable legislation used to compile the report	Reference where applied
• XI: Procedure for Consultation regarding Burial Grounds and Graves; and XII: Discovery of Previously Unknown Graves.	

Table 3-2: Applicable policies considered in the HRM process

Applicable policies used to compile the report	Reference where applied
SAHRA Archaeology, Palaeontology and Meteorites (APM) Guidelines: Minimum Standards for the Archaeological and Palaeontological Components of Impact Assessment Reports (2007) The guidelines provide the minimum standards that must be adhered to for the compilation of a HIA (2007). Chapter II Section 7 outlines the minimum requirements for inclusion in the heritage assessment as follows: • Background information on the Project; • Background information on the cultural baseline; • Description of the properties or affected environs; • Description of identified sites or resources; • Recommended field rating of the identified sites to comply with Section 38 of the NHRA; • A statement of Cultural Significance in terms of Section 3(3) of the NHRA; and • Recommendations for mitigation or management of identified heritage resources.	This report and the PIA report were compiled to adhere to the minimum standards as defined by Chapter II of the SAHRA Minimum Standards (2007 and 2012)

3.2. Local Regulatory Context

The HRM process was completed to comply with the requirements of the South African national legislative framework as described above. Provincial legislation and municipal by-laws are applicable to graves and cemeteries and are considered in our recommendations where a Grave Relocation Process (GRP) may be required.

4. Assumptions, Limitations and Exclusions

Digby Wells encountered constraints and limitations during the compilation of this report. Table 4-1 presents an overview of these limitations and the consequences.

Table 4-1: Constraints and Limitations

Constraint / Limitation Description	Consequence
Whilst every attempt was made to obtain the latest available information, the reviewed literature does not represent an exhaustive list of information sources for the various study areas.	The cultural heritage baseline presented in Section 6 below is considered accurate but may not include new data or information which may not have been made available to the public.
The infrastructure design layout available at the time of the pre-disturbance survey has been altered during the EIA process lifecycle and remains subject to minor changes during such processes.	Every effort was made to cover the extent of the study area[1]. The survey was focused on the proposed infrastructure layout current at the time of the survey; however, this has been altered since. Some heritage resources in the Project may therefore not have been identified. The infrastructure layout will be informed in part by the results of the heritage assessment.
Whilst every attempt was made to survey the extent of the site-specific study area, this report does not present an exhaustive list of identified heritage resources. Overgrown vegetation limited visibility at the time of the pre-disturbance survey.	Previously unidentified heritage resources may be encountered. Should this occur, Mogale must alert the HRAs of the find and may need to enlist the services of a suitably qualified archaeologist or palaeontologist to advise them on the way forward.
Archaeological and palaeontological resources commonly occur at subsurface levels. These types of resources cannot be adequately recorded or documented by assessors without destructive and intrusive methodologies and without the correct permits issued in terms of Section 35 of the NHRA.	The reviewed literature, previously-completed heritage assessments and the results of the field survey are in themselves limited to surface observations. Subsurface tangible heritage may be exposed during Project activities. Should this occur, Mogale must alert the HRAs of the find and may need to enlist the services of a suitably qualified archaeologist or palaeontologist to advise them on the way forward.

5. Methodology

The following section presents a summary of the methodologies employed in the HRM process. Appendix C includes a more detailed description of the methodologies employed during the HRM process.

[1] Refer to Section **Error! Reference source not found.** for a description of the study area.

5.1. Defining the Study Areas

Heritage resources do not exist in isolation to the greater natural and social environment (which includes the socio-economic, socio-political, and socio-cultural aspects). To develop an applicable cultural heritage baseline for the Project, Digby Wells defined three nested study areas to be considered. These include:

- The *site-specific study area*: the farm portions extent associated with the proposed Project and proposed infrastructure, including a 500 m buffer area. The site-specific study area may extend linearly, in which case the site-specific study area will include the linear development and a 200 m buffer on either side of the footprint;
- The *local study area:* the area most likely to be influenced by any changes to heritage resources in the Project area, or where project development could cause heritage impacts. The local study area is defined as the area bounded by the local municipality and includes particular reference to the immediate surrounding properties or farms. The local study area is specifically examined to offer a backdrop to the socio-economic conditions within which the proposed development will occur. The local study area furthermore provides the local development and planning context that may contribute to cumulative impacts. The Project area is situated within the MCLM; and
- The *regional study area:* the area bounded by the district municipality demarcation. In this case, the Project is located in the WRDM. Where necessary, the regional study area may be extended outside the boundaries of the district municipality to include areas closest to the Project area. The aim of this is to include much wider expressions of specific types of heritage resources and historical events. The regional study area also provides the regional development and planning context that may contribute to cumulative impacts.

5.2. Statement of Significance

Digby Wells designed the significance rating process to provide a numerical rating of the Cultural Significance of identified heritage resources. This process considers heritage resources assessment criteria set out in subsection 3(3) of the NHRA, which determines the intrinsic, comparative, and contextual significance of identified heritage resources. A resource's importance rating is based on information obtained through review of available credible sources and representativity or uniqueness (i.e., known examples of similar resources to exist).

The rationale behind the heritage value matrix takes into account that a heritage resource's value is a direct indication of its sensitivity to change (i.e., impacts). Value, therefore, was determined prior to completing any assessment of impacts.

The matrix rated the potential, or importance, of an identified resource relative to its contribution to certain values – aesthetic, historical, scientific and social. Resource significance is directly related to the impact on it that could result from Project activities, as it provided minimum accepted levels of change to the resource.

5.3. Definition of Heritage Impacts

Potential impacts to heritage resources may manifest differently across geographical areas or diverse communities when one considers the simultaneous effect to the tangible resource and social repercussions associated with the intangible aspects. Furthermore, potential impacts may concurrently influence the Cultural Significance of heritage resources. This assessment therefore considers three broad categories adapted from Winter & Baumann (2005, p. 36). Table 5-1 presents a summary of these impact categories.

Table 5-1: Impact Definition

Category	Description
Direct Impact	Affect the fabric or physical integrity of the heritage resource, for example destruction of an archaeological site or historical building. Direct impacts may be the most immediate and noticeable. Such impacts are usually ranked as the most intense but can often be erroneously assessed as high-ranking.
Indirect Impact	Occur later in time or at a different place from the causal activity, or as a result of a complex pathway. For example, restricted access to a heritage resource resulting in the gradual erosion of its Cultural Significance that may be dependent on ritual patterns of access. Although the physical fabric of the resource is not affected through any direct impact, its significance is affected to the extent that it can ultimately result in the loss of the resource itself.
Cumulative Impact	Result from in-combination effects on heritage resources acting within a host of processes that are insignificant when seen in isolation, but which collectively have a significant effect. Cumulative effects can be: • Additive: the simple sum of all the effects, e.g., the reclamation of a historical TSFs will minimise the sense of the historic mining landscape. • Synergistic: effects interact to produce a total effect greater than the sum of the individual effects, e.g., the removal of all historical TSFs will sterilise the historic mining landscape. • Time crowding: frequent, repetitive impacts on a particular resource at the same time, e.g., the effect of regular blasting activities on a nearby rock art site or protected historical building could be high. • Neutralizing: where the effects may counteract each other to reduce the overall effect, e.g., the effect of changes from a historic to modern mining landscape could reduce the overall impact on the sense-of-place of the study area. • Space crowding: high spatial density of impacts on a heritage resource, e.g., density of new buildings resulting in suburbanisation of a historical rural landscape.

5.4. Secondary Data Collection

Data collection assists in the development of a cultural heritage baseline profile of the study area under consideration. Qualitative data was collected to inform this HIA report and was primarily obtained through secondary information sources, i.e., desktop literature review and historical layering.

A survey of diverse information repositories was made to identify appropriate relevant information sources. These sources were analysed for credibility and relevance. These credible, relevant sources were then critically reviewed. The objectives of the literature review include:

- Gaining an understanding of the cultural landscape within which the proposed Project is located; and
- Identify any potential fatal flaws, sensitive areas, current social complexities and issues and known or possible tangible heritage.

Repositories that were consulted included the South African Heritage Resources Information System (SAHRIS), online/electronic journals and platforms and select internet sources. This report includes a summary and discussion of the most relevant findings. Table 5-2 lists the sources consulted in the literature review (refer to Section 15 for more detailed references).

Table 5-2: Qualitative Data Sources

Reviewed Qualitative Data		
Databases		
Genealogical Society of South Africa (GSSA) database (2011)	SAHRIS Palaeosensitivity Map (PSM)	
Statistics South Africa (2011)	Wazimap (2017)	
SAHRIS Cases		
Map ID: 00543 Case ID: 871	Case ID: 4700 Case ID: 6854	Case ID: 8430
Cited Text		
Clark, 1982	Deacon & Deacon, 1999	Esterhuysen & Smith, 2007
Fairbridge, 1918	Garstang, et al., 2014	Huffman, 2007
Maggs, 1974	Makhura, 2007	Mitchell, 2002
Mucina & Rutherford, 2010	Shorten, 1970	UNESCO, 2018
Winter & Baumann, 2005		

Historical layering is a process whereby diverse cartographic sources from various time periods are layered chronologically using Geographic Information Systems (GIS). The rationale behind historical layering is threefold, as it:

- Enables a virtual representation of changes in the land use of a particular area over time;
- Provides relative dates based on the presence or absence of visible features; and
- Identified potential locations where heritage resources may exist within an area.

Table 5-3 below lists the sources of historical imagery.

Table 5-3: Aerial imagery considered

Aerial photographs							
Job no.	**Flight plan**	**Row/s**	**Photo no.**	**Map ref.**	**Area**	**Date**	**Ref.**
158	158_1 of 1	6; 7; 8	71 - 75	2627	Krugersdorp/Roodepoort	1941	CD: NGI
498/27	498_27_1 of 1	3	16 - 24	2627	Roodepoort	1973	CD: NGI
498/235	498_235_ 1 of 2	16	13 - 21	2627	Randfontein	1987	CD: NGI

5.5. Primary Data Collection

Shannon Hardwick undertook a pre-disturbance survey of the Project area on 13 and 15 October 2021. The survey was a combination of a vehicular and pedestrian survey, which was adapted to the terrain and the likelihood of heritage resources occurring in the area. The survey was non-intrusive (i.e., no sampling was undertaken).

The aim of the survey was to:

- Visually record the current state of the cultural landscape; and
- Record a representative sample of the visible, tangible heritage resources present within the development footprint area, site-specific study area and greater study area.

Identified heritage resources were recorded as waypoints using a handheld GPS device (see Plan 4). These heritage resources were also recorded through written notes and photographs.

5.6. Site Naming Convention

Heritage resources identified by Digby Wells during the field survey are prefixed by the SAHRIS case identification generated for this Project. Information on the relevant period or feature code and site number follows (e.g., 11829/BGG-001). The site name may be shortened on plans or figures to the period/feature code and site number (e.g., BGG-001). Table 5-4 presents a list of the relevant period and feature codes.

Table 5-4: Relevant Feature and Period Codes

Feature or Period Code	Reference
BGG	Burial Grounds and Graves
HLP	Historical Layering Point
HST	Historical Structure

Heritage resources identified through secondary data collection are prefixed by the relevant SAHRIS case or map identification number (*where applicable*) and the original site name as used by the author of that assessment (e.g., 00543/Structure 5).

6. Findings and Discussion

This section presents a description of the cultural heritage baseline informed through primary and secondary data collection. The section also includes a summary of the developmental context within which the Project is located and presents the potential socio-economic benefits anticipated to arise from the Project. As required by Section 38(3)(d) of the NHRA, the socio-economic benefits are compared to the heritage impacts is considered in Section ●.

6.1. Cultural Heritage Baseline Description

The cultural heritage landscape includes, but is not limited to palaeontology, archaeology, the built environment, history, burial grounds and graves, a sense of place and intangible heritage. Archaeological and built environmental resources, burial grounds and graves have been recorded in heritage assessments completed within the regional study area (refer to Section 5.1). Table 6-1 presents a summary of the various archaeological periods of South Africa.

Table 6-1: Archaeological periods in South Africa (adapted from Esterhuysen & Smith, 2007)

The Stone Age	Early Stone Age (ESA)	2 million years ago (mya) to 250 thousand years ago (kya)
	Middle Stone Age (MSA)	250 kya to 20 kya
	Later Stone Age (LSA)	20 kya to 500 Common Era (CE)[2]
Farming Communities[3]	Early Farming Communities (EFC)	500 to 1400 CE
	Late Farming Communities (LFC)	1100 to 1800 CE
Historical Period	-	1500 CE to 1994 (Behrens & Swanepoel, 2008)

Figure 6-1 presents a breakdown of the heritage resources identified within the regional study area, grouped into these periods. The cultural heritage landscape is predominantly characterised by the historical period through the built environment and burial grounds and graves. This notwithstanding, archaeological materials representing the Stone Age and the Farming Community periods have been identified within the regional study area.

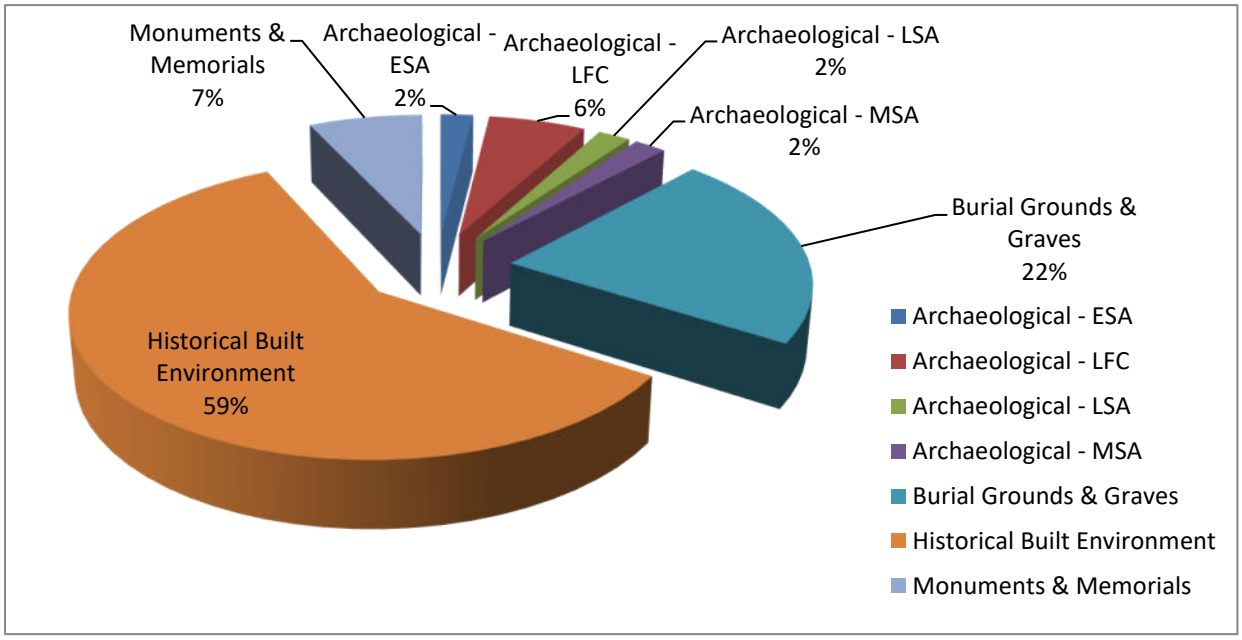


Figure 6-1: Breakdown of Identified Heritage Resources within the Regional Study Area

[2] Common Era (CE) refers to the same period as *Anno Domini* ("In the year of our Lord", referred to as AD): i.e. the time after the accepted year of the birth of Jesus Christ and which forms the basis of the Julian and Gregorian calendars. Years before this time are referred to as 'Before Christ' (BC) or, here, BCE (Before Common Era).

[3] The Farming Community Period is the more recent term used to refer to the Iron Age. These terms can be used interchangeably.

The Fossil Hominid Sites of South Africa World Heritage Site, which includes the colloquially known Cradle of Humankind (Sterkfontein, Swartkrans, Kromdraai and Environs), have contributed significantly to the fossil heritage of South Africa (UNESCO, 2018). The fossils found in these cave sites provide evidence for the occupation of the area for at least the last 2.3 mya. The fossils of the Cradle of Humankind represent some of the earliest hominid species of southern Africa, including *Australopithecus africanus*, *Paranthropus* species and *Homo habilis*. New species recently identified include *A. prometheus*, *A. sediba* and *H. naledi*. The Cradle of Humankind is located within the MCLM (UNESCO, 2018), less than 5 km from the Project area.

The Stone Age in southern Africa is divided into three broad phases, namely the ESA, the MSA and the LSA. These phases are determined according to the stone (lithic) tools and material cultural produced by the various hominid species through time (Deacon & Deacon, 1999; Mitchell, 2002). ESA stone tools are predominantly large handaxes and cleavers made of coarse-grained materials (Esterhuysen & Smith, 2007). This period from 2 mya to 250 kya and is associated with *Australopithecus* and early *Homo* species.

The MSA dates between approximately 300 kya and 20 kya. High proportions of minimally-modified blades, created using the Levallois technique, the use of good quality raw material and the use of bone tools, ochre and pendants characterise the early MSA stone tool industries (Clark, 1982; Deacon & Deacon, 1999). These tools were made and used by archaic *Homo sapiens.*

LSA lithics are specialised – specific tools were created for specific purposes (Mitchell, 2002). LSA assemblages commonly include diagnostic tools, such as scrapers and segments, and may also include bone points. The LSA is further defined by evidence of ritual practices and complex societies (Deacon & Deacon, 1999). This can be seen through rock art. Three rock art painting traditions occur within South Africa, each associated with specific groups.

In southern Africa, the LSA is commonly associated with hunter-gatherers. The San (including Basarwa, Bathwa and other hunter-gatherer groups) are generally accepted as the first inhabitants of present-day South Africa (Makhura, 2007). Later, various Farming Community groups, including the ancestors of the modern Sotho-Tswana and Nguni peoples, settled across the Highveld.

The Farming Community or Iron Age period correlates to the movements of Bantu-speaking agro-pastoralists into southern Africa. This period ranges from 500 to 1800 CE and is divided into Early and Late Farming Community periods (Early and Late Iron Age). Secondary tangible indicators such as ceramics and evidence for domestic animals, including dung deposits and faunal remains, are characteristic of both the EFC and LFC. The LFC is further characterised by stonewalling (Maggs, 1974; Huffman, 2007).

The historical period[4] is commonly regarded as the period characterised by contact between Europeans and Bantu-speaking African groups and the written records associated with this interaction. However, the division between the LFC and historical period is artificial, as there is generally a large amount of overlap between the two.

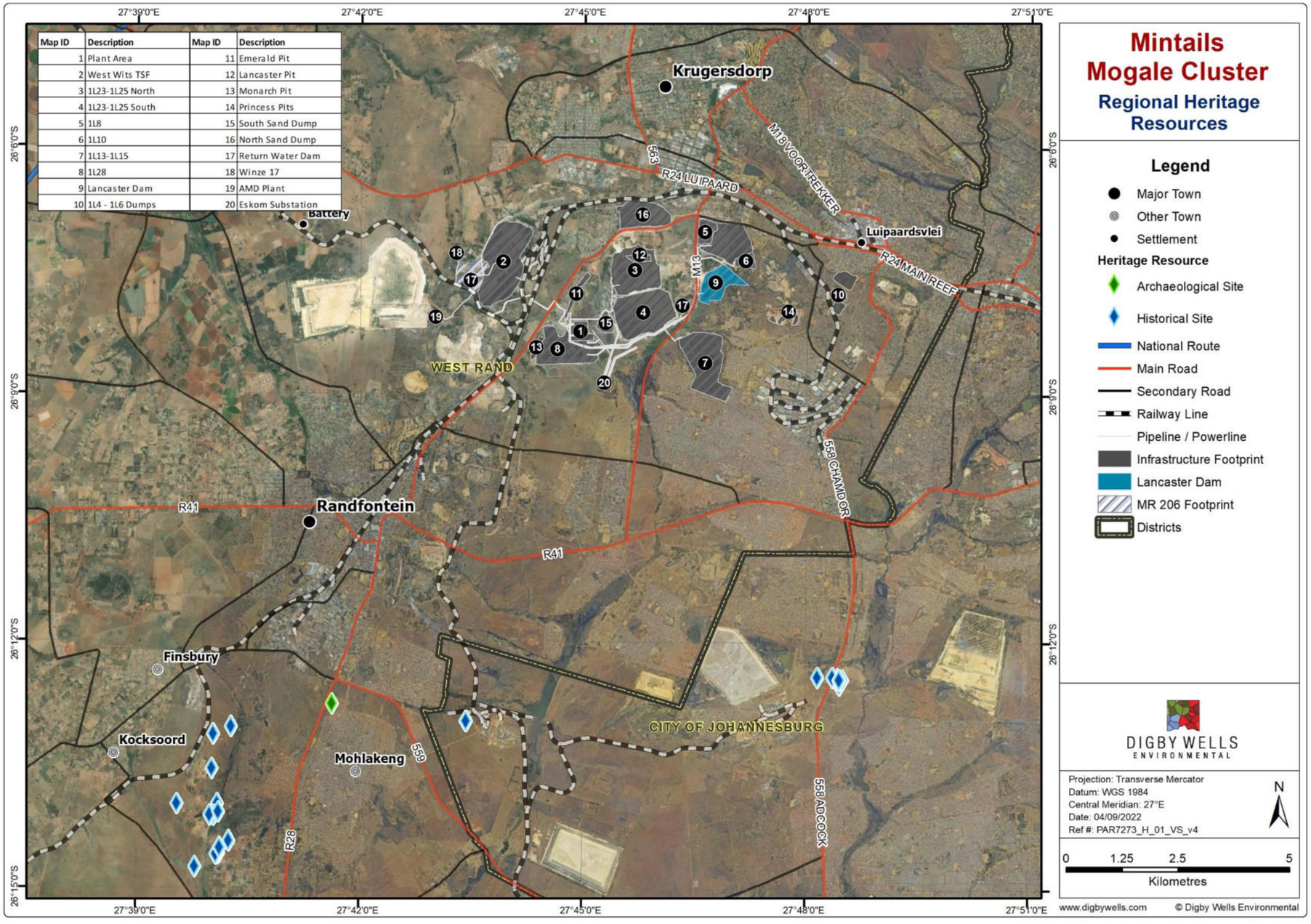
The *Mfecane* (or the SeSotho equivalent term *Difaqane* used north of the Orange River) characterised much of the history of the regional study area. This was the period of approximately 1817 to 1826 AD that was characterised by unprecedented social and political upheaval as Mzilikazi and his Ndebele group were pushed out of their territory by the Zulu group led by Shaka. This displacement had a knock-on effect, which was exacerbated by a drought at the same time. As a result of social and political upheaval, the Highveld region was vulnerable to intrusive groups including the Swazi and the *Voortrekkers* (Fairbridge, 1918; Garstang, et al., 2014).

Some of the 'empty lands' left behind from the Mfecane became host to the early white migrants who claimed large tracts of land and founded settlements and towns as they moved northwards during the 1830s. The Voortrekkers, who later became concretised as the so-called *Boers*, encountered resistance from inhabitants of these 'empty lands'. The British followed these early migrants into the South African interior almost immediately, from as early as the 1860s. They sought to establish British Imperial rule over the Boer republics which had recently been established. These building tensions culminated in the Transvaal War (also known as the First Anglo-Boer War and the First War of Independence) of 1880 to 1881.

Lieutenant Lys recovered a small amount of gold in 1856 from crushed conglomerate on the farm Driefontein (Shorten, 1970). The gold reef on the Witwatersrand was discovered in 1886, when George Harrison discovered gold on the farms Wilgespruit and Langlaagte in present-day Johannesburg. This discovery triggered the Transvaal gold rush. Shortly thereafter, Paul Kruger, the then president of the *Zuid Afrikaansche Republiek* (ZAR), declared the area around the informal tented mining settlement known as Ferreira's Camp as public diggings, exacerbating the rush. The gold rush led to the establishment of several large mining companies and towns, including Johannesburg (1886), Krugersdorp (1886) and Randfontein (1890).

The discovery of gold again exacerbated unresolved tensions between the British and the Boers following the Transvaal War. The British sought to bring the gold fields under their control, along with the ZAR settlements established there. These heightened tensions resulted in the Jameson Raid of 1895. Leander Jameson, a close ally of Cecil John Rhodes, led the raid, which was intended to cause an uprising amongst the British residents of the Witwatersrand. The Boers were warned of British plans and captured Jameson and his men at Doornkop, near Krugersdorp. The Jameson Raid was an important catalyst for the South African War (also known as the Second Anglo-Boer War) of 1899 to 1902.

[4] In southern Africa, the last 500 years represents a formative period that is marked by enormous internal economic invention and political experimentation that shaped the cultural contours and categories of modern identities outside of European contact. This period is currently not well documented but is being explored through the 500 year initiative (Swanepoel, et al., 2008).



Plan 3: Heritage Resources Identified Previously within the Regional Study Area

6.2. Results from the Pre-disturbance Survey

Shannon Hardwick undertook a pre-disturbance survey of the site-specific study area on 13 and 15 October 2021. This survey focused on areas covered by the proposed infrastructure as current at the time of the in-field assessment. The survey was recorded as GPS tracks and identified heritage resources were marked as waypoints. Identified heritage resources were also recorded through written notes and photographs.

The following sections discuss the survey findings.

6.2.1. Existing Environment

The natural vegetation of the site-specific study area has been disturbed in varying degrees by human activities. Table 6-2 presents a summary description of the natural environment within which the Project is situated. Figure 6-2 below presents an overview of the environment at the time of the pre-disturbance survey.

The environment at the time of the verification survey was disturbed through anthropogenic and animal activities. There is evidence that cattle graze on the land and burrowing animals were present within the Project area. Where noted, burrows were inspected for the presence of any archaeological materials.

Anthropogenic disturbances included the current infrastructure associated with the Mogale operations, and other mining and industrial. This infrastructure includes, but is not limited to, housing and dormitories, offices and other structures as well as formal roads. Other existing infrastructure includes informal roads, a sewage treatment plant, an old hospital that was operated by a previous mining operation, railway infrastructure and the Transnet depot, electrical infrastructure and underground pipelines, marked by warning signs. Parts of the Project area are located in an urban environment, characterised by business, residential and commercial areas.

The area is currently exploited by illegal miners (known colloquially as *zama-zamas*) and has been used for illegal dumping. Refuse dumped here includes building rubble and domestic or general waste. Figure 6-3 highlights the existing modern infrastructure present within the study area.

Table 6-2: Summary of the Vegetation Setting of the Project

Biome	Bio-region	Vegetation Type
Grassland	Mesic Highveld Grassland	Soweto Highveld Grassland (Gm8) Short to medium-high dense tufted grassland on gently to moderately undulating landscape on the Highveld plateau. In undisturbed areas, the continuous grass cover is broken only by small, scattered wetlands, narrow stream alluvia, plans and occasional ridges or rocky outcrops. This vegetation unit occurs on the shales, sandstones or mudstones of the Vryheid formation of the Karoo Supergroup, the lithologies of the Volksrust Formation or the intrusive Karoo Suite dolerites. This vegetation type is considered endangered and almost half of the area has been transformed by cultivation, urban sprawl, mining, roads and dams. Erosion is generally very low.

Adapted from Mucina & Rutherford (2010)

Figure 6-2: State of the Environment during the Pre-disturbance Survey

Figure 6-3: Existing Modern Infrastructure observed during the Pre-disturbance Survey

6.2.2. Identified Heritage Resources

During the pre-disturbance survey undertaken for the current HRM process, five additional heritage resource were identified. Table 6-3 includes a summary of these heritage resource and Figure 6-4 includes select photographs of the heritage resources. Table 6-3 includes the results of the pre-disturbance survey.

Table 6-3: Heritage Resources identified during the Survey

Heritage Resource	Description
BGG01	Burial ground containing approximately 20 visible graves. Of these graves, two are marked with crosses and one is marked by an upright stone. An additional two graves are marked by buried stones. The other graves are marked by stone and soil heaps. Two of the headstones have partially legible inscriptions and both belong to the Fakani family. The one grave might date to 1913 and the other does not have a visible date. The burial ground is not demarcated or fenced off.
BGG02	Burial ground with of three grounds, marked by one headstone and two white crosses. The headstone has a legible inscription which states that the grave is "sacred to the memory of troopers Beatty-Powell and Davies who fell in action". There is no date on this inscription. There is no date included in the inscription, but there is a date of 1896 in the burial ground. The two white crosses do not have inscriptions, and it is unclear if the inscription on the headstone refers to these white crosses, or if the white crosses indicate additional soldiers who fell in battle. The burial ground is demarcated by a raised platform of brick and cement bounded by a white fence. Important to note is that the graves of soldiers who were subjects of the British Empire at the time of their death are protected as Commonwealth War Graves (CWGs) under the Commonwealth War Graves Act, 1992 (Act No. 8 of 1992) (CWGA) in addition to the NHRA.
Historical Landfill	A concentration of historical cultural material which occurs in a distinct subsurface layer observed in the areas disturbed by illegal mining activities. Material culture observed in the disturbed areas included a brick (potentially historical), a ceramic shard (potentially historical) and historical glass in clear, brown and green. One observed glass bottle appears to be an ink bottle and a broken bottle had writing on it which reads […] & C^{o}. This style of writing is typical of the late 1800s and early 1900s. It is likely that this site represents a historical landfill.
STE01	Remains of a structure which appears to be older that 60 years. The fixtures and roof of the structure have been removed. Some window and door lintels are still in place. The structure appears to have three rooms or internal divisions. The structure appears to have multiple phases of construction and is made of stone with a thick mortar in places and brick, some of which is plastered. One section of the plaster is painted blue. The walls are in various stages of collapse.

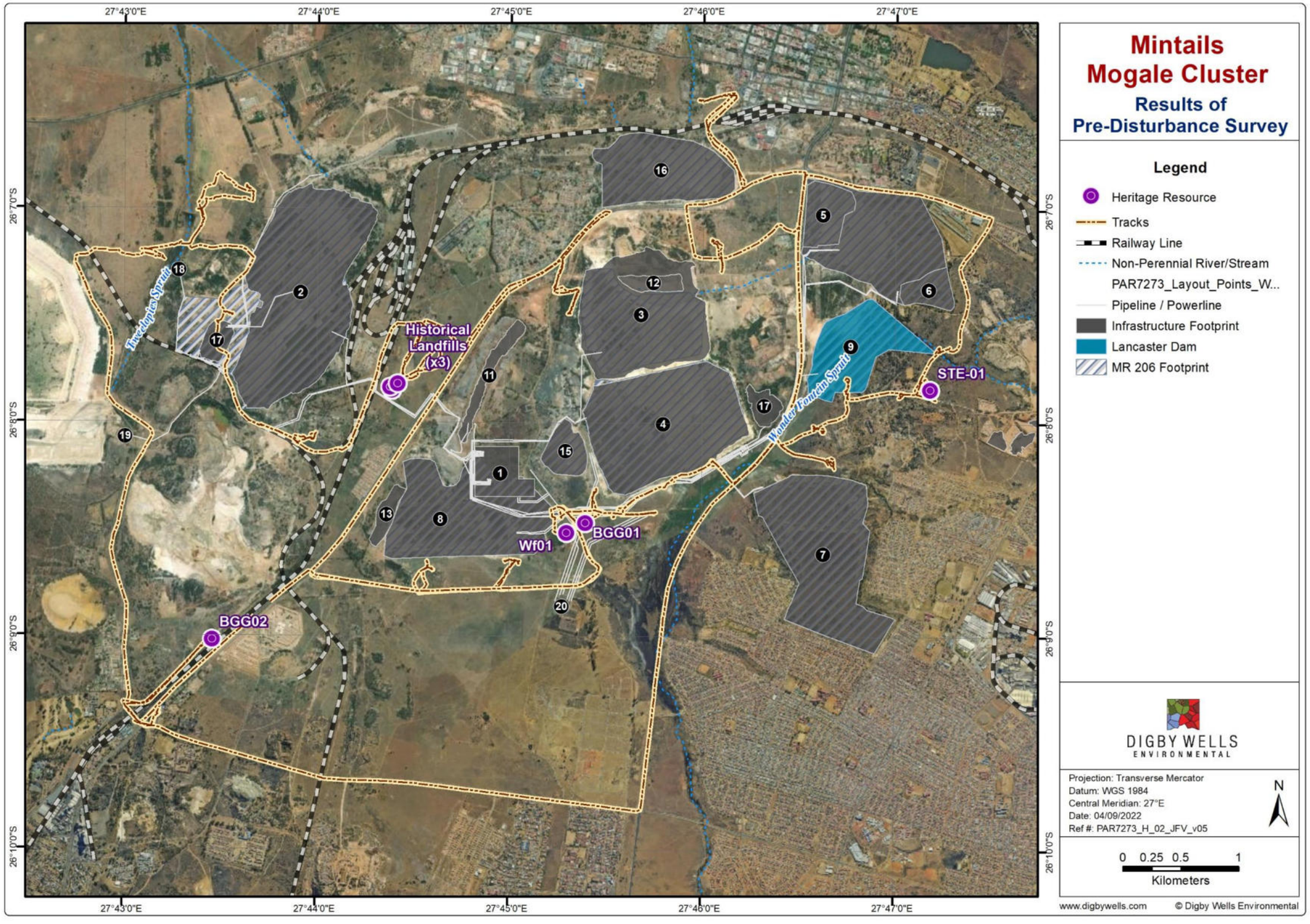
Heritage Resource	Description
Wf01	Three structures located in proximity to each other in a dense stand of trees. The layout of these structures is unclear and the purpose of these structures is equally unclear due to the dense vegetation. One set of steps was visible during the survey. On the historical imagery, potential structures are visible in 1941 but is not visible in later imagery due to dense vegetation. It is assumed these structures are those visible on the 1941 imagery. Photographs are not included in this report due to the thick vegetation.


Graves identified at BGG01 and BGG02 respectively (note the white crosses typically associated with CWGs)


Remains of the structure STE01


Material appearing in the historical landfill

Figure 6-4: Results of the Pre-disturbance Survey showing Newly Identified Heritage Resources



Plan 4: Results of the Pre-disturbance Survey

6.3. Results from Historical Layering

Figure 6-5 presents historical imagery showing the Project area in 1941. The landscape at that time is characterised by cultivated agricultural fields and established mining activities, including TSFs. Formal and informal roads have been established in the Project area at this time and the general layout of the West Village appears to have been established by 1941. The Project area has a long history of disturbance through mining and agricultural activities and associated settlement.

There are five points of interest highlighted in Figure 6-5. These represent structures which, if still remaining, would be older than 60 years and which will therefore be afforded general protection under Section 34 of the NHRA, as would structures original to the West Village layout. These points were not ground-truthed during the pre-disturbance survey.

In addition to the five highlighted points, existing mine dumps and tailings facilities date from at least 1941. Structures older than 60 years are, technically, protected in terms of Section 34 of the NHRA that defines a structure as “any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith”. Section 28 of the NHRA furthermore provides for “such area of land covered by a mine dump” to be designated as a protected area. The protection offered to structures by the these two sections, again technically, requires that dumps and tailings facilities are considered as tangible heritage resources in their own right. However, this report does not assess the reclamation of the dumps and tailings as heritage impacts as no precedent has yet been set to do so.

Figure 6-5: Historical Imagery showing the Project Area in 1941 with Points of Interest

6.4. Socio-economic Setting

The Project is located within Wards 14, 19 and 26 of the MCLM and Ward 9 of the RWLM both in the WRDM within the Gauteng Province. The Project area lies adjacent to several other wards. This section presents a brief summary of the demographic statistics relevant to the potential socio-economic benefit derived from the Project, informed by data collected during the 2011 Census (Statistics South Africa, 2011)[5]. These statistics include only those wards within which the Project is located.

As of the 2011 Census, the Gauteng province had a population of 12 272 263 people, which accounts for approximately 23.7% of the national population (Wazimap, 2017). The province includes five district municipalities, of which the WRDM is the smallest in terms of population. As of the 2011 census, the district included 820 994 residents (6.7% of the population of the province). WRDM is itself divided into three local municipalities. Of these, MCLM and RWCLM are the larger of the local municipalities in terms of population and they included 362 420 people (44.1% of the population in the WRDM) and 261 053 people (31.8%) respectively.

The MCLM includes 39 wards. Ward 14 includes a population of 8 806 people, Ward 19 has 6940 residents and Ward 26 includes a population of 13 442 (Wazimap, 2017). Ward 14 and Ward 26 are both characterised by a mix of rural and urban populations with a significant portion of the area covered by historic TSFs. Ward 14 covers a smaller aerial extent than Ward 26. Ward 19 covers a small aerial extent and is predominantly urban in nature. The area not settled by residents comprises the footprint for the 1L13-1L15 TSF.

The RWCLM includes 35 wards. Ward 9 includes a population of 9 450 residents and is characterised by a rural landscape, although it includes some urban settlement areas and some mining-related infrastructure, including TSFs. The land use appears to be predominantly agriculture and cultivated fields.

Unemployment is a challenge within the regional study area. Table 6-4 presents an overview of the employment status of the populations within the regional study area.

[5] Wazimap (2017) has adjusted these data to conform with the updated ward and municipality boundaries which were altered ahead of the 2016 Municipal Elections (Open Up, 2017).

Table 6-4: Employment Status of the Populations within the Study Area

Employment Statistics (Census 2011)	Ward 14		Ward 19		Ward 26		MCLM	
	No.	%	No.	%	No.	%	No.	%
Total Population	8 806	-	6 940	-	13 442	-	362 420	-
Working Age (18-64)	6 034	68.5	4 480	64.6	10 311	76.7	244 332	67.4
Employed	2 701	30.7	1 933	27.9	4 507	33.5	134 635	37.1
Discouraged Work Seeker	167	1.9	199	2.9	146	1.1	8 197	2.3
Unemployed	1 923	21.8	1 119	16.1	1 234	9.2	43 846	12.1
Other not economically active	1 637	18.6	1 532	22.1	4 816	35.	73 240	20.2
Employment Statistics (Census 2011)	**Ward 9**		**RWCLM**		**WRDM**		**Gauteng**	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Total Population	9 450	-	261 053	-	820 994	-	12 272 263	-
Working Age (18-64)	6 460	68.4	175 171	67.1	554 176	67.5	8 316 444	67.8
Employed	3 816	40.4	92 065	35.3	293 335	35.7	4 467 370	36.4
Discouraged Work Seeker	78	0.8	6 378	2.4	19 542	2.4	296 450	2.4
Unemployed	699	7.4	36 162	13.9	104 894	12.8	1 598 044	13
Other not economically active	2 265	24	52 170	20	172 199	21	2 468 859	20.1

Adapted from Wazimap (2017)

7. Impact Assessment

This section presents a description of the Cultural Significance of identified heritage resources informed through primary and secondary data collection. The Cultural Significance of the heritage resources informs the minimum required mitigation encapsulated in the NHRA and the SAHRA Minimum Standards.

7.1. Cultural Significance of the Identified Landscape

Heritage resources are intrinsic to the history and beliefs of communities. They characterise community identity and cultures and are finite, non-renewable and irreplaceable. Considering the innate value of heritage resources, HRM acknowledges that these have lasting worth as evidence of the origins of life, humanity and society. Notwithstanding the inherent value ascribed to heritage, it is incumbent on the assessor to determine the significance of these resources to allow for the implementation of appropriate management. This is achieved through assessing the value of heritage resources relative to the prescribed criteria encapsulated in policies and legal frameworks.

This section presents a statement of Cultural Significance as is relevant to newly identified heritage resources and the greater cultural landscape of the site-specific study area. The statement of significance considers the importance or the contribution of the identified heritage resources and the landscape to four broad value categories: aesthetic, historical, scientific and social, to summarise the Cultural Significance and other values described in Section 3(3) of the NHRA.

During the pre-disturbance survey, four categories of heritage resources was recorded – two burial grounds, one historical structure, a historical landfill and a historical werf.

The assessment of the Cultural Significance and Field Ratings demonstrated that the identified resources have negligible to very high significance. Table 7-1 presents a summary of this assessment. Sites of the same type that share the same Cultural Significance have been grouped together in terms of the impact assessment (refer to Sections 7.2 to 7.4 below).

Table 7-1: Cultural Significance and Field Ratings of Newly Identified Heritage Resources within the Project Area

Resource ID	Description	Aesthetic	Historic	Scientific	Social	INTEGRITY	Designation	Recommended Field Rating	Field Rating Description	Minimum Mitigation[6]
BGG01 BGG02	Burial Grounds & Graves	- Burial grounds and graves were not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA.	- Burial grounds and graves were not assessed against historic criteria as defined in Section 3(3) of the NHRA.	- Burial grounds and graves were not assessed against scientific criteria as defined in Section 3(3) of the NHRA.	5 Burial grounds and graves have specific connections to communities or groups for spiritual reasons. The significance is universally accepted.	4 The integrity of burial grounds is considered to be excellent with both tangible and intangible fabric preserved.	Very High 20	Grade I[7]	Heritage resources with qualities so exceptional that they are of special national significance.	Project design must change to avoid the resource completely and resources must be included in Heritage Site Management Plan (HSMP). A GRP may be necessary should the project design not be changed.
Historical Landfill	Concentrated layer of historical material that may represent a landfill	- The historical landfill was not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA.	- The historical landfill was not assessed against historic criteria as defined in Section 3(3) of the NHRA.	4 The historical landfill represents a very rare potential for scientific information from a historical period.	- The historical landfill was not assessed against social criteria as defined in Section 3(3) of the NHRA.	2 The integrity and information potential is preserved, although there has been some encroachment on the setting.	Low 8	General Protection IV B	Resources under general protection in terms of NHRA sections 34 to 37 with Low significance.	Resource must be recorded before destruction, including detailed site mapping, surface sampling may be required
STE01	Historical structure	- The historical structure was not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA.	- The historical structure was not assessed against historic criteria as defined in Section 3(3) of the NHRA.	1 The historical structure has information potential which is commonly represented in a variety of contexts.	- The historical structure was not assessed against social criteria as defined in Section 3(3) of the NHRA.	1 There is limited information potential from this heritage resource and the setting is heavily encroached upon.	Negligible 1	General Protection IV C	Resources under general protection in terms of NHRA sections 34 to 37 with Negligible significance.	Sufficiently recorded, no mitigation required.
Wf01	Historical *werf*	- The historical werf was not assessed against aesthetic criteria as defined in Section 3(3) of the NHRA.	- The historical werf was not assessed against historic criteria as defined in Section 3(3) of the NHRA.	1 The historical werf has information potential which is commonly represented in a variety of contexts.	- The historical werf was not assessed against social criteria as defined in Section 3(3) of the NHRA.	1 There is limited information potential from this heritage resource and the setting is heavily encroached upon.	Negligible 1	General Protection IV C	Resources under general protection in terms of NHRA sections 34 to 37 with Negligible significance.	Sufficiently recorded, no mitigation required.

[6] Please note, the recommended mitigation refers to the minimum mitigation requirements as encapsulated in the SAHRA Minimum Standards. Project-specific mitigation measures are presented in Section 11.

[7] The recommended field rating designates the level of governance associated with the resource. In this instance, the SAHRA Burial Grounds and Graves Unit is the designated competent authority responsible for the management of heritage resources contemplated in terms of Section 36 of the NHRA.

7.2. Construction Phase

Given their location relative to the proposed infrastructure and the preferred plant location, no heritage impacts are envisaged. However, there is the potential that the proposed Eskom and Plant Switch Yards and proposed pipelines could impact on the Historical Landfill Site.

Table 7-2 presents the activities expected to occur during the Construction Phase and the expected impacts to the cultural heritage landscape that may arise from these activities.

Table 7-2: Interactions and Impacts of Construction Phase Activities

Interaction	Impact
Site clearing for the construction of the new processing plant facility and ancillary infrastructure described in Section 2 above.	Potential negative impacts to the Historical Landfill site and BGG01.
Construction of the new processing plant and ancillary infrastructure described above.	
Employment and procurement for construction-related activities.	

The Historical Landfill is located in close proximity to the proposed footprint of one of the Eskom and Plant Switch Yards and proposed pipeline routes and, as such, it may be directly impacted through the clearing and construction within this area. Table 7-3 presents a summary of the potential direct impact to this heritage resource.

Table 7-3: Summary of the potential direct impact to Historical Landfill

IMPACT DESCRIPTION: Direct impact to Historical Landfill				
Dimension	**Rating**	**Motivation**		
PRE-MITIGATION				
Duration	Permanent (7)	Damage to or destruction of this resource will be permanent and cannot be undone.	Consequence: Moderately detrimental (-10)	Significance: Minor – negative (-50)
Extent	Limited (2)	This impact will affect the individual heritage resource.		
Intensity x type of impact	Very low - negative (-1)	Damage to or destruction of this heritage resource is considered a major change to a heritage resource of low significance.		

<table>
<tr><th colspan="6">IMPACT DESCRIPTION: Direct impact to Historical Landfill</th></tr>
<tr><th>Dimension</th><th>Rating</th><th colspan="4">Motivation</th></tr>
<tr><td>Probability</td><td>Likely (5)</td><td colspan="3">Should this option be implemented, it may cause damage to this heritage resource.</td><td></td></tr>
<tr><td colspan="6">MITIGATION:</td></tr>
<tr><td colspan="6">Digby Wells recommends that a 50 m no-go buffer zone around the Historical Landfill Site be implemented to avoid heritage resource impacts. Should this not be feasible, Digby Wells recommends that Mogale appoint a suitably-qualified archaeologist to undertake test pits or excavations of this resource. This will be subject to a permit issued in terms of Section 35 of the NHRA.
Digby Wells assumes this is the more likely mitigation strategy should the other alternatives not be feasible. The post-mitigation assessment considers this mitigation strategy.</td></tr>
<tr><td colspan="6">POST-MITIGATION</td></tr>
<tr><td>Duration</td><td>Beyond project life (6)</td><td colspan="2">Should the heritage resource be excavated and conserved through the record, this will last beyond the Project lifetime.</td><td rowspan="4">Consequence: Moderately beneficial
(10)</td><td rowspan="5">Significance: Minor – positive
(60)</td></tr>
<tr><td>Extent</td><td>Local (3)</td><td colspan="2">Should the heritage resource be excavated and conserved through the record, this will add to the local historical record and heritage.</td></tr>
<tr><td>Intensity x type of impact</td><td>Very low - positive (1)</td><td colspan="2">This impact will be considered a positive moderate change to a heritage resource of low significance.</td></tr>
<tr><td>Probability</td><td>Highly probable (6)</td><td colspan="3">Should this option be implemented, it is most likely to result in the positive impact described</td></tr>
</table>

BGG01 is located approximately 80 m from the proposed pipeline route. As such, it may be directly impacted through the clearing and construction within this area. Table 7-4 presents a summary of the potential direct impact to this heritage resource.

Table 7-4: Summary of the potential direct impact to BGG01

IMPACT DESCRIPTION: Direct impact to PEC7505-006, PEC7505-008 and PEC7505-009				
Dimension	**Rating**	**Motivation**		
PRE-MITIGATION				
Duration	Permanent (7)	Unmitigated change will result in permanent damage to the heritage resource.	Consequence: Extremely detrimental (-21)	Significance: Moderate – negative (-84)
Extent	International (7)	Damage to these resources could potentially have an international effect in terms of the reputation for Mogale, service providers and/or subcontractors working on the project. Next-of-Kin could potentially reside outside South Africa.		
Intensity x type of impact	Extremely high - negative (-7)	Destruction would constitute a major change to resource of Very High significance.		
Probability	Probable (4)	Given the location of these heritage resources in relation to the proposed Project footprint, it is possible that this risk will manifest during the construction phase.		
MITIGATION:				
The project related mitigation must aim to amend the project design to avoid the potential negative impact to the heritage resource and implement a 100 m no-go buffer zone around the heritage resource. Additionally, the heritage resource must be incorporated into an HSMP for implementation. Should Mogale have an existing HSMP, the affected heritage resources must be incorporated into the existing HSMP and be subject to the same requirements encapsulated therein. Where Project design (or redesign) and *in situ* conservation is not feasible based on the Project design and layout requirements, heritage related mitigations must be employed. Heritage related mitigations will need to be undertaken in accordance with the requirements of the NHRA and the associated regulations will be required. Such mitigations may include a Burial Grounds and Graves Consultation process to assess whether a GRP is feasible. A GRP must be undertaken in accordance with Section 36 of the NHRA and Chapter IX and XI of the NHRA Regulations. Digby Wells assumes that Project design amendment to include a buffer is the preferred alternative, and the post-mitigation impact assessment considers this mitigation strategy.				

IMPACT DESCRIPTION: Direct impact to PEC7505-006, PEC7505-008 and PEC7505-009				
Dimension	**Rating**	**Motivation**		
POST-MITIGATION				
Duration	Beyond project life (6)	If the mitigation measures are put into place, specifically the *in situ* conservation and management of the resource through an HSMP, the benefits may continue after the Project is complete.	Consequence: Highly beneficial (14)	Significance: Minor – positive (70)
Extent	Local (3)	The proposed mitigation measures will apply to the specific heritage resources.		
Intensity x type of impact	High - positive (5)	*In situ* conservation and management would constitute a minor change to a resource of Very High significance.		
Probability	Likely (5)	Should Mogale implement the mitigations effectively, it is highly probable that the anticipated positive impact will manifest.		

7.3. Operational Phase

Table 7-5 presents the activities expected to occur during the Operational Phase and the expected impacts to the cultural heritage landscape that may arise from these activities.

Table 7-5: Interactions and Impacts of Operational Phase Activities

Interaction	Impact
Hydraulic reclamation of the abovementioned existing TSFs and sand dumps.	Digby Wells envisages no impact to the cultural heritage landscape, given the nature of the proposed activities and the location of identified heritage resources in relation to the proposed Project infrastructure.
Operation of pump stations during the operational phase.	
Maintenance of pipeline routes during the operational activities.	
In-filling of processed tailings material into the West Pits Pit and other potential pits.	

Interaction	Impact
Surface tailings deposition within the West Wits Pit.	
Tailings deposition onto the footprint of 1L23-1L25 following its reclamation.	
Production of Gold.	
Progressive rehabilitation of the new TSFs (in the West Wits Pit and potentially 1L23-1L25 TSF).	
Employment and procurement for operation-related activities.	

Digby Wells does not envisage any impact to the identified heritage resources from the above-mentioned activities and has therefore not assessed these impacts further in this report.

7.4. Decommissioning Phase

Table 7-6 presents the activities expected to occur during the Decommissioning Phase and the expected impacts to the cultural heritage landscape that may arise from these activities.

Table 7-6: Interactions and Impacts of Decommissioning Phase Activities

Interaction	Impact
Removal, decommissioning and rehabilitation of surface infrastructure.	Digby Wells envisages no impact to the cultural heritage landscape, given the nature of the proposed activities and the location of identified heritage resources in relation to the proposed Project infrastructure.
Removal, decommissioning and rehabilitation of the processing plant footprint.	
Rehabilitation of the old TSF footprints.	
Rehabilitation of the old Mogale Processing Plant footprint.	
Final rehabilitation of the facility.	
General rehabilitation of the surrounding area, including wetland rehabilitation.	

Digby Wells does not envisage any impact to the identified heritage resources from the above-mentioned activities and has therefore not assessed these impacts further in this report.

There is potential for existing structures or proposed Project infrastructure to age past 60 years during the Construction and Operational stages of the Project lifecycle. Should this occur and, where these structures require demolition or alteration during the Decommissioning Phase,

such activities will be subject to one or more NHRA Section 34 permit application processes to acquire the correct permit(s) prior to implementing these activities.

7.5. Cumulative Impacts

Cumulative impacts occur from in-combination effects of various impacts on heritage resources acting within a host of processes that result in an incremental effect. The importance of identifying and assessing cumulative impacts is that the whole is often greater than the sum of its parts. This implies that the total effect of multiple stressors or change processes acting simultaneously on a system may be greater than the sum of their effects when acting in isolation.

This Project in conjunction with other planned developments in line with the strategic development plans for the Gauteng Province requires consideration to identify the possible in-combination effects of various impacts to known heritage resources. Table 7-7 presents a summary of the possible cumulative impacts of the Project.

Table 7-7: Summary of Potential Cumulative Impacts

Type	Cumulative Impact	Direction of Impact	Extent of Impact
Space-crowding	The proposed infrastructure will add to the existing infrastructure associated with activities characterising the area immediately surrounding the proposed Project area and further afield. Although the construction this infrastructure will result in a loss of the area within which heritage resources can exist, it adds to the existing mining-industrial cultural landscape. The area earmarked for the proposed infrastructure furthermore occurs within an area approved for mining activities.	Neutral	Site-specific study area

7.6. Unplanned and Low Risk Events

This section considers the potential risks to protected heritage resources, as well as the potential heritage risks that could arise for Mogale in terms of implementation of the Project. These two aspects are discussed separately in this section.

Section 6.2.2 describes the heritage resources identified during the pre-disturbance survey. This list is, however, not an exhaustive list of all heritage resources within the Project area. If heritage resources are subsequently identified, and where Mogale knowingly does not take proactive management measures, potential risks to Mogale may include litigation in terms of Section 51 of the NHRA and social or reputational repercussions. Table 7-8 presents a summary of the primary risks that may arise for Mogale.

Table 7-8: Identified Heritage Risks that may arise for Mogale

Description	Primary Risk
Heritage resources with a high Cultural Significance rating are inherently sensitive to any development in so far that the continued survival of the resource could be threatened. In addition to this, certain heritage resources are formally protected thereby restricting various development activities.	Negative Record of Decision (RoD) and/or development restrictions issued by PHRA-G and/or SAHRA in terms of Section 38(8) of the NHRA.
Impacting on heritage resources formally and generally protected by the NHRA without following due process. Due process may include social consultations and/or permit application processes to SAHRA and/or PHRA-G.	• Fines; • Penalties; • Seizure of Equipment; • Compulsory Repair / Cease Work Orders; and • Imprisonment.

If additional heritage resources are identified during decommissioning and dismantling of the proposed infrastructure and/or activities undertaken during the rehabilitation processes, potential risks to those heritage resources will need to be assessed. Table 7-9 provides an overview of these potential unplanned events, the subsequent impact that may occur and mitigation measures and management strategies to remove or reduce these risks.

Table 7-9: Identified Unplanned Events and Associated Impacts

Unplanned event	Potential impact	Mitigation / Management / Monitoring
Encountering unidentified in situ remnants of historical built environment resources during the implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 34 of the NHRA	Establish Project-specific Chance Find Procedures (CFPs) as a condition of authorisation. Refer to Section 11 for more detailed recommendations.
Accidental exposure of fossil bearing material implementation of the Project.	Damage or destruction of heritage resources generally protected under Section 35 of the NHRA	
Accidental exposure of *in situ* archaeological material during the implementation of the Project.		
Accidental exposure of *in situ* burial grounds or graves during the implementation of the Project.	Damage or destruction of heritage resources generally	

Unplanned event	Potential impact	Mitigation / Management / Monitoring
Accidental exposure of human remains during the decommissioning and rehabilitation and closure phases of the Project.	protected under Section 36 of the NHRA.	

8. Environmental Management Program

Table 8-1 below summarises the outcomes of the HRM process that must be included in the Environmental Management Program (EMPr).

Table 8-1: Environmental Management Program

Activity/Activities	Potential Impacts	Aspects Affected	Phase	Mitigation Measure	Mitigation Type	Time period for implementation
• All Activities outlined in Section 2.2 above	Damage to or destruction of Historical Landfill	Cultural Heritage	Construction	• Implement a 50 m buffer no-go buffer zone around the resource to avoid impacts to heritage resources. • Alternatively, Mogale must appoint a suitably-qualified archaeologist to undertake test pits or excavations of the resource.	***Avoid*** ***Control***	Before the commencement of the Project
• All Activities outlined in Section 2.2 above	Damage to or destruction of BGG01	Cultural Heritage	Construction	• Implement a 100 m buffer no-go buffer zone around the resource to avoid impacts to heritage resources. • Develop and implement an HSMP to conserve the resource *in situ*. • Alternatively, Mogale must undertake a Burial Grounds and Graves Consultation process to establish if a GRP is feasible.	***Avoid*** ***Control***	Before the commencement of the Project
• All Activities outlined in Section 2.2 above	Damage to or destruction of previously unidentified heritage resources.	Cultural Heritage	Construction	• Develop and implement CFP.	***Control***	Before the commencement of the Project

9. Monitoring Programme

Section 11 includes recommended mitigation measures and management strategies. These recommendations do not require a monitoring programme.

10. Consultation and Stakeholder Comments

The Public Participation Process (PPP) required in terms of the NEMA as a component of the EIA process has not been completed in part to date but will be completed as a process separate to the heritage specialist assessment. This consultation process affords Interested and Affected Parties (I&APs) opportunities to engage in the EIA process. The objectives of the PPP or Stakeholder Engagement Process (SEP) include the following:

- To ensure that I&APs are informed about the project;
- To provide I&APs with an opportunity to engage and provide comment on the project;
- To draw on local knowledge by identifying environmental and social concerns associated with the project;
- To involve I&APs in identifying methods in which concerns can be addressed;
- To verify that stakeholder comments have been accurately recorded; and
- To comply with the legal requirements.

No formal heritage-specific consultation was undertaken as part of the heritage assessment as this forms part of the PPP or SEP.

Please refer to the Comments and Response Report, attached as Appendix C of the EIA Report for comments raised and responses provided.

Site surveys can often present an opportunity for informal consultation with specific stakeholders (usually farm owners, managers, and employees). This consultation can result in the identification of burial grounds and graves – importantly, these could include formal burial grounds or graves, sometimes with no visible surface markers – or in the identification of sacred sites or other places of importance, which may not otherwise be identified. The in-field assessment team was accompanied by a security team. The security personnel present during the pre-disturbance survey were asked about their knowledge regarding heritage resources in the Project area and led the in-field assessment team to BGG01.

11. Recommendations

Considering the nature and the scope of the Project, Digby Wells recommends the following additional recommendations be implemented prior to the commencement of the Project:

- Mogale must develop and implement a CFP as part of the EMPr;
- Direct negative impacts to the Historical Landfill must be avoided or managed. Digby Wells recommends that a 50 m no-go buffer zone around the Historical Landfill Site be

implemented to avoid heritage resource impacts. Should this not be feasible, Digby Wells recommends that Mogale appoint a suitably-qualified archaeologist to undertake test pits or excavations of this resource. This will be subject to a permit issued in terms of Section 35 of the NHRA; and

- Direct negative impacts to BGG01 must be avoided or managed. Digby Wells recommends that a 100 m no-go buffer zone be implemented around BGG01 to avoid heritage resource impacts. Should this not be feasible, Digby Wells recommends that Mogale undertake consultations to explore whether a GRP will be feasible. The GRP, should it go ahead, will be subject to a permit issued in terms of Section 36 of the NHRA.

12. Socio-economic Benefit versus Heritage Impacts

Based on a review of the available socio-economic data detailed in Section 6.4 above, the potential socio-economic benefits that will arise from the Project outweigh the identified risks and impacts to the known heritage resources within the site-specific study area. This statement is supported by the following statements:

- The identified impacts to the heritage resources can be mitigated through the recommendations included in Section 11;
- The construction of additional infrastructure will create short-term employment opportunities and will generate revenue which will feed into the local economy; and
- The operation of the Project will create long-term employment opportunities and generate revenue feeding into the regional and national economies; and
- It is anticipated that the Project will have overall positive environmental impact. These are detailed in the EIA report.

13. Reasoned Opinion Whether Project Should Proceed

Based on the understanding of the Project while considering the results of this assessment, Digby Wells does not object to the Project provided the recommendations detailed in Section 11 above are adopted

14. Conclusion

The aim of the HRM process was to comply with regulatory requirements contained within Section 38 of the NHRA through the following:

- Defining the cultural landscape within which the Project is situated;
- Identifying, as far as is feasible, heritage resources that may be impacted upon by the project as well as define the Cultural Significance;
- Assessing the possible impacts to the identified heritage resources;

- Considering the socio-economic benefits of the Project; and
- Providing feasible mitigation and management measures to avoid, remove or reduce perceived impacts and risks.

These objectives were met as presented in Sections 6 through 13 above. Based on the understanding of the Project while considering the results of this assessment, Digby Wells does not object to the Project provided the recommendations detailed above are adopted.

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DIGBY WELLS
ENVIRONMENTAL

Appendix A: Glossary of Terms

GLOSSARY OF TERMS

Term	Definition
Archaeological	Material remains resulting from human activity that are in a state of disuse and older than 100 years, including artefacts, human and hominid remains and artificial features and structures. Rock art created through human agency older than 100 years, including any area within 10 m of such representation. Wrecks older than 60 years - either vessels or aircraft - or any part thereof that was wrecked in South Africa on land, internal or territorial waters, and any cargo, debris or artefacts found or associated therewith. Features, structures and artefacts associated with military history that are older than 75 years and the sites on which they are found, e.g. battlefields.
Archaeologist	A trained professional who uses scientific methods to excavate, record and study archaeological sites and deposits.
Artefact	Any object manufactured or modified by human beings.
Burial Grounds and Graves Consultation (BGGC)	The regulated consultation process required in terms of Section 36 of the NHRA and Regulation GNR 548 to the Act when burial grounds and graves are identified within a project area.
Ceramic (syn. pottery)	In an archaeological context any vessel or other object produced from natural clay that has been fired. Indigenous ceramics associated with Farming Communities are low-fired wares, typically found as potsherds. Imported and more historic ceramics generally include high-fired wares such as porcelain, stoneware, etc.
Ceramic facies / facies	Subgroups of a primary ceramic tradition or sequence. Typically used in ceramic analyses. Various facies are attributed to different temporal periods based of radiometric dates obtained from archaeological contexts. Facies are often used to infer cultural identity of archaeological groups. However, in context of this study identified ceramic facies merely provide a relative temporal context for archaeological sites in the landscape.
Ceramic tradition	The sequence of ceramic styles that develop out of each other and form a continuum. A tradition is the primary group to which subsequent ceramic facies belong. A ceramic tradition can be broadly associated with various linguistic and cultural groups, but do not represent any given ethnic identity, especially during the LFC period.
Conservation	In relation to heritage resources includes the protection, maintenance, preservation and sustainable use of places or objects so as to safeguard their cultural significance.

Term	Definition
Cultural significance	The aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. A heritage may have cultural significance or other special value because of its: • Importance in the community, or pattern of South Africa's history; • Possession of uncommon, rare or endangered aspects of South Africa's natural or cultural heritage; • Potential to yield information that will contribute to an understanding of South Africa's natural or cultural heritage; • Importance in demonstrating the principal characteristics of a particular class of South Africa's natural or cultural places or objects: • Importance in exhibiting particular aesthetic characteristics valued by a community or cultural group; • Importance in demonstrating a high degree of creative or technical achievement at a particular period; • Strong or special association with a particular community or cultural group for social, cultural or spiritual reasons; • Strong or special association with the life or work of a person, group or organisation of importance in the history of South Africa; and • Significance relating to the history of slavery in South Africa.
Development	Any physical intervention, excavation, or action, other than those caused by natural forces, which may in the opinion of a heritage authority in any way result in a change to the nature, appearance or physical nature of a place, or influence its stability and future well-being, including: • Construction, alteration, demolition, removal or change of use of a place or a structure at a place; • Carrying out any works on or over or under a place; • Subdivision or consolidation of land comprising, a place, including the structures or airspace of a place; • Constructing or putting up for display signs or hoardings; • Any change to the natural or existing condition or topography of land; and • Any removal or destruction of trees, or removal of vegetation or topsoil.
Early Farming Community/ies	The first Farming Communities (also known as Early Iron Age) that appear in the southern archaeological record during the early first millennium CE. The EFC period is generally dated from c. 200 CE to 1000 CE.

Term	Definition
Early Stone Age	The South African ESA dates from ~3 Mya to c. 250 Kya. This period is associated with later *Australopithecus and* early *Homo* species. The lithic industries that characterise the ESA include Oldowan and Early Acheulian, typically as simple core tools, choppers handaxes and cleavers.
Excavation	The scientific excavation, recording and retrieval of archaeological deposit and objects through the use of accepted archaeological procedures and methods, and excavate has a corresponding meaning.
Farming Community/ies	Term signifying the appearance in the southern African archaeological of Bantu-speaking agriculturally based societies from the early first millennium CE. The term replaces the *Iron Age* as a more accurate description for groups who practiced agriculture and animal husbandry, extensive manufacture and use of ceramics, and metalworking. The Farming Community period is divided into an Early and Late phase. The use of Later Farming Communities especially removes the artificial boundary between archaeology and history.
Field Rating	SAHRA requires heritage resources to be provisionally rated in accordance with Section 7 of the NHRA that provides a three-tier grading system of resources that form part of the national estate. The rating system distinguishes between four categories: • Grade I: Heritage resources with qualities so exceptional that they are of special national significance; • Grade II: Heritage resources which, although forming part of the national estate, can be considered to have special qualities which make them significant within the context of a province or a region; • Grade III: Other heritage resources worthy of conservation; and • General Protected: i.e., generally protected in terms of Sections 33 to 37 of the NHRA.
Formal protection	Places with qualities so exceptional that they are of special national significance as national heritage sites or that have special qualities as provincial heritage sites.
General protection	General protections are afforded to: • Objects protected in terms of laws of foreign states; • Structures older than 60 years; • Archaeological and palaeontological sites and material and meteorites; • Burial grounds and graves; and • Public monuments and memorials.

Term	Definition
Grave	A place of interment and includes the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
Heritage Impact Assessment (HIA)	An assessment of the cultural significance of, and possible impacts on, diverse heritage resources that may be affected by a proposed development. A HIA may include several specialist elements such as archaeological, built environment and palaeontological studies. The HIA must supply the heritage authority with sufficient information about the sites to assess, with confidence, whether or not it has any objection to a development, indicate the conditions upon which such development might proceed and assess which sites require permits for destruction, which sites require mitigation and what measures should be put in place to protect sites that should be conserved. The content of HIA reports are clearly outlined in Section 38(3) of the NHRA and SAHRA Minimum Standards.
Heritage resource	Any place or object of cultural significance.
Heritage resources management	Process required when development is intended categorised as: • Any linear development exceeding 300 m in length; • Construction of a bridge or similar structure exceeding 50 m in length; • Any activity which will change the character of a site exceeding 0.5 hectares in extent or involving three or more existing erven or subdivisions thereof or that have been consolidated within the past five years or costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority; • Re-zoning of a site exceeding one hectare in extent; and • Any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority.
Heritage site	Any place declared to be a national heritage site by SAHRA or a place declared to be a provincial heritage site by a provincial heritage resources authority.
Late Farming Community/ies	Farming Communities who either developed / evolved from EFC groups, or who migrated into southern African from the late first millennium / early second millennium CE. The LFC period evidences distinct changes in socio-political organisation, settlement patterns, trade and economic activities, including extensive trade routes. The LFC period is generally dated from c. 1000 CE well into the modern historical period of the nineteenth century.

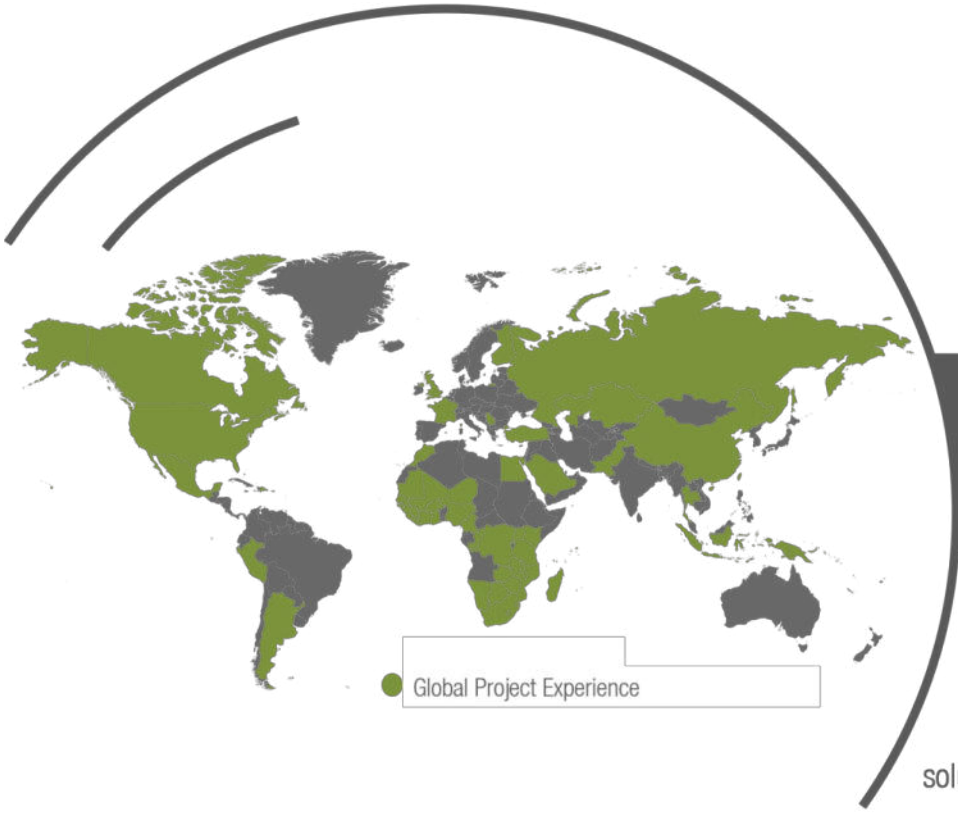
Term	Definition
Late Stone Age	The South African LSA dates from ~30 Kya. This period is associated with modern *Homo sapiens sapiens* and the complex hunter-gatherer societies, ancestral to the Bushmen / San and Khoi. The LSA lithic assemblage contains microlithic technology and composite tools such as arrows commonly produced from fine-grained cryptocrystalines, quarts and chert. The LSA is also associated with archaeological rock art including both paintings and engravings.
Living / intangible heritage	The intangible aspects of inherited culture that could include cultural tradition, oral history, performance, ritual, popular memory, skills and techniques, indigenous knowledge systems, the holistic approach to nature, society and social relationships.
Management	In relation to heritage resources, includes the conservation, presentation and improvement of a place protected in terms of the NHRA.
Middle Stone Age	The South African MSA dates from ~300 Kya to c. 30 Kya. This period is associated with the changing behavioural patterns and the emergence of modern cognitive abilities in early *Homo sapiens species.* The lithic industries that characterise the MSA are typically more complex tools with diagnostic identifiers, including convergent flake scars, multi-faceted platforms, retouch and backing. Assemblages are characterised as refined lithic technologies such as prepared core techniques, retouched blades and points manufactured from good quality raw material.

Term	Definition
National estate	The national estate as defined in Section 3 of the NHRA, i.e., heritage resources of South Africa which are of cultural significance or other special value for the present community and for future generations. The national estate may include: • Places, buildings, structures and equipment of cultural significance; • Places to which oral traditions are attached or which are associated with living heritage; • Historical settlements and townscapes; • Landscapes and natural features of cultural significance; • Geological sites of scientific or cultural importance; • Archaeological and palaeontological sites; • Graves and burial grounds, including ancestral graves, royal graves and graves of traditional leaders, graves of victims of conflict, graves of individuals designated by the Minister by notice in the Gazette, historical graves and cemeteries, and other human remains which are not covered in terms of the National Health Act, 2003; • Sites of significance relating to the history of slavery in South Africa; • Movable objects, including objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens; objects to which oral traditions are attached or which are associated with living heritage; ethnographic art and objects; military objects; objects of decorative or fine art; objects of scientific or technological interest; and • Books, records, documents, photographic positives and negatives, graphic, film or video material or sound recordings, excluding those that are public records as defined in section 1(xiv) of the National Archives of South Africa Act, 1996 (Act No. 43 of 1996).
Palaeontological	Any fossilised remains or fossil trace of animals or plants which lived in the geological past, other than fossil fuels or fossiliferous rock intended for industrial use, and any site which contains such fossilised remains or trance.
Palaeontologist	A trained professional who uses scientific methods to excavate, collect, record and study palaeontological sites and fossils.
Pedestrian survey	A method of examining a site in which surveyors, spaced at regular intervals, systematically walk over the area being investigated.

Term	Definition
Phase 1 Archaeological Impact Assessment (AIA)	Phase 1 AIAs generally involve the identification and assessment of sites during a field survey of a portion of land that is going to be affected by a potentially destructive or landscape-altering activity.
Phase 2 Archaeological Impact Assessment (AIA)	Phase 2 AIAs are primarily based on salvage or mitigation excavations preceding development that will destroy or impact on a site. This may involve collecting of artefacts from the surface and / or excavation of representative samples of the artefactual material to allow characterisation of the site and the collection of suitable materials for dating the sites. Phase 2 AIAs aim to obtain a general idea of the age, significance and meaning of the site that is to be lost and to store a sample that can be consulted at a later date for research purposes. Phase 2 excavations can only be done under a permit issued by SAHRA, or other appropriate heritage agency, to the appointed archaeologist.
Phase 3 Management Plan / Conservation Management Plan (CMP)	On occasion, a site may require a Phase 3 programme involving the modification of the site or the incorporation of the site into the development itself as a site museum, a special conservation area or a display. Alternatively it is often possible to relocate or plan the development in such a way as to conserve the archaeological site or any other special heritage significance the place may have. For example, in a wilderness area or open space when sites are of public interest the development of interpretative material is recommended and adds value to the development. Permission for the development to proceed can be given only once the heritage resources authority is satisfied that measures are in place to ensure that the archaeological sites will not be damaged by the impact of the development or that they have been adequately recorded and sampled. Careful planning can minimise the impact of archaeological surveys on development projects by selecting options that cause the least amount of inconvenience and delay. The process as explained above allows the rescue and preservation of information relating to our past heritage for future generations. It balances the requirements of developers and the conservation and protection of our cultural heritage as required of SAHRA and the provincial heritage resources authorities (ASAPA).
Pre-disturbance survey (syn. reconnaissance)	A survey to record a site as it exists, with all the topographical and other information that can be collected, without excavation or other disturbance of the site.

Term	Definition
Reconnaissance	A broad range of techniques involved in the location of archaeological sites, e.g. surface survey and the recording of surface artefacts and features, the sampling of natural and mineral resources, and sometimes testing of an area to assess the number and extent of archaeological resources. However, in terms of South African practice, reconnaissance during a so-called Phase 1 AIA never includes sampling as this is a permitted activity, usually undertaken during so-called Phase 2 AIAs (ASAPA).
Site	Any area of land, including land covered by water, and including any structures or objects thereon.
Structure	Any building, works, device or other facility made by people and which is fixed to land, and includes any fixtures, fittings and equipment associated therewith.
Tangible heritage	Physical heritage resources such as archaeological sites, historical buildings, burial grounds and graves, fossils, etc. Tangible heritage may be associated with intangible elements, e.g. the living cultural traditions, rituals and performances associated with burial grounds and graves and deceased persons.

Appendix P: Visual Impact Assessment



DIGBY WELLS
ENVIRONMENTAL

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Mogale Tailings Retreatment Operations Environmental Application Process

Visual Impact Assessment

Prepared for:
Pan African Resources

Project Number:
PAR7273

July 2022

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Report Type:	Visual Impact Assessment
Project Name:	Mogale Tailings Retreatment Operations Environmental Application Process
Project Code:	PAR7273

Name	Responsibility	Signature	Date
Johan Vermeulen	Reporting		July 2022
Prevlan Chetty	Technical Review		July 2022
Brett Coutts	Senior Review		July 2022

EXECUTIVE SUMMARY

Digby Wells Environmental (hereinafter Digby Wells) has been appointed to undertake an Environmental Application Process and associated specialist studies for the Mogale Gold Mining Right with reference number: (GP) 30/5/1/2/2 (206) (MR) and, more specifically for the proposed construction of a Mogale Tailings Retreatment Operations.

Mogale Tailings Retreatment (Pty) Ltd (MTR) a wholly owned subsidiary of Pan African Resources PLC (PAR) has entered into a Sale and Purchase Agreement for the acquisition of the shares in and claims against Mogale Gold (Pty) Ltd (Mogale Gold). The agreement was entered into between PAR and the liquidators of Mintails Mining SA (Pty) Ltd (in liquidation) (MMSA). MMSA is the holding company of Mogale Gold. The intended transaction is subject to a due diligence investigation to be completed by 30th September 2022. The proposed transaction has now been concluded and was announced on the 6th October 2022.

PAR has closed the transaction to acquire the total share capital and claims of Mogale Gold and Mintails SA Soweto Cluster Proprietary Limited (MSC), (collectively, the Sale Transaction). Both Mogale Gold and MSC are 100% owned by Mintails Mining SA Proprietary Limited (Mintails SA), which was placed in provisional liquidation during 2018. Based on this PAR has now acquired the assets associated with MR 206, based on the conclusion of the transaction noted above.

The project entails the reclamation of historical unlined Tailings Storage Facilities (TSFs). The reprocessed tailings will be first discarded into West Wit Pit and possibly other nearby small pits. Any extra processed tailings will be stored on a ground TSF (West Wits Pit TSF and 1L23-1L25 TSF). It is proposed that the footprint of 1L23-1L25 footprint will be lined and the footprint of West Wits Pit TSF will not be lined.

The project site is situated in the Mogale City Local Municipality (MCLM), Gauteng Province. The site comprises of existing infrastructure such as tailings dams and open pits that will be used for the deposition of tailings materials. A process plant, overland pumping and piping inclusive of associated water management infrastructure will form part of the proposed infrastructure that will require an authorisation. Once the open pit is filled to capacity, a new TSF will potentially be constructed on the footprint area of one of the reclaimed TSF sites (1L23-1L25) (Figure 2 3). The footprint of the area is 2,923.3 ha which considers MR 206 and associated infrastructure.

The project consists of 120 Mt of tailings to be reprocessed and firstly deposited into the West Wits Pit (current authorisation in place for in-pit deposition) and then undertake deposition of the footprint of 1L23-1L25 footprint (New Tailings Facility) once capacity has been reached within the West Wits Pit. The procedures followed in this assessment involved (i) the characterisation of the visual / aesthetic character in the surrounding environment, and (ii) a viewshed analysis to determine the level of visibility of the proposed infrastructure and activities throughout a 20km Zone of Visual Influence (ZVI).

Based on the review and interpretation of existing spatial datasets and additional information sources, the visual / aesthetic character of the environment surrounding the site location may be described as largely urban and highly modified. In addition, the MCLM has historically been a key focal point of South Africa's gold-mining sector with mine shafts and TSFs prominent throughout the municipality. It may be argued that mining-related landmarks form a key part of the visual / aesthetic character of the environment and contributes to its sense of place.

A series of viewsheds were run using individual infrastructure features which commonly have the largest visual prominence (i.e. the three proposed TSFs and proposed plant area). The resulting viewsheds were then overlain with key sensitive population, transport and protected area receptors that were extracted from existing spatial datasets. These receptors included (i) dwellings situated throughout the 20km ZVI (ii) major roads, and (iii) a number of protected areas (which includes the Cradle of Humankind World Heritage Site) found throughout the northern section of the 20km zone surrounding the site.

It was found that the overall visibility of the infrastructure elements to the potential sensitive receptors is largely determined by the visibility of the most prominent feature, in this case, the proposed West Wits TSF. The West Wits TSF is expected to be highly visible from the surrounding population, moderately visible from the N14 national highway and highly visible from three of the protected areas (including the Cradle of Humankind World Heritage Site). The 1L23 - 1L25 (North) TSF is expected to exhibit the second-highest visibility to potential sensitive receptors, with a very high expected visibility from the population receptors and a zero, low and very low expected visibility from the remaining ten receptors. The expected visibility associated with the remainder of the infrastructure elements is generally zero with the exception of the population surrounding the proposed operations.

Mainly driven by the duration and probability of the infrastructure elements considered in this assessment and the fact that neither of these components can be changed, the visual impact of the proposed operations during the operational phase is expected to be **minor-negative**.

The extent of the visual impacts of the proposed operations is significantly reduced throughout the impact assessment owing to the relatively low contribution (17.26%) of the proposed infrastructure elements to the cumulative visibility of the elements at the site. In all cases the extent was found to be limited.

Two key external mitigatory factors that play a role in reducing the expected visual impacts across all the infrastructure elements. These are as follows:

- The current visual / aesthetic character of the surrounding environment of which mining related infrastructure forms a significant part.
- The site itself is characterised by largely unrehabilitated surfaces and visually intrusive structural elements.

Taking into consideration the visual/aesthetic character of the surrounding environment and the baseline conditions at the site, it is expected that the measures proposed in DWE (2021a) (and included in this impact assessment as potential mitigation measures) would result in a **minor-positive** visual impact at the conclusion of the decommissioning and closure phase.

The mitigation measures proposed throughout the impact assessment section of this report are as follows:

- The establishment of visual screening mechanisms surrounding the infrastructure elements to reduce visibility from the immediately surrounding population;
- The use of neutral colours for plant-infrastructure to increase visual absorption by the surrounding environment;
- Limiting site clearing activities to the immediate footprints of the proposed infrastructure elements;
- The implementation of the following closure and rehabilitation measures outlined in the DWE (2021a):
    - Removal of buildings, concrete structures, and any other infrastructure;
    - Levelling and shaping of rehabilitated areas; and
    - In situ rehabilitation of TSFs and Sand Dumps.

ABBREVIATIONS

Abbreviation	Description
AW3D30	ALOS Global Digital Surface Model
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPFI	Equator Principles Financial Institution
HOTOSM	Humanitarian OpenStreetMap Team
ESIA	Environmental and Social Impact Assessment
IFC	International Finance Corporation
LiDAR	Light Detection And Ranging
LULC	Land Use / Land Cover
MAMSL	Meters Above Mean Sea Level
MCLM	Mogale City Local Municipality
NEMA	National Environmental Management Act
NEM: PAA	National Environmental Management: Protected Areas Act
NHRA	National Heritage Resources Act
NPAES	National Protected Areas Expansion Strategy
ToR	Terms of Reference
TSF	Tailings Storage Facility
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
WRL	Waste Rock Landform
ZVI	Zone of Visual Influence

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1. Introduction

Digby Wells Environmental (hereinafter Digby Wells) has been appointed to undertake an Environmental Application Process and associated specialist studies for the Mogale Gold Mining Right with reference number: (GP) 30/5/1/2/2 (206) (MR) and, more specifically for the proposed construction of a Mogale Tailings Retreatment Operations.

Mogale Tailings Retreatment (Pty) Ltd (MTR) a wholly owned subsidiary of Pan African Resources PLC (PAR) has entered into a Sale and Purchase Agreement for the acquisition of the shares in and claims against Mogale Gold (Pty) Ltd (Mogale Gold). The agreement was entered into between PAR and the liquidators of Mintails Mining SA (Pty) Ltd (in liquidation) (MMSA). MMSA is the holding company of Mogale Gold. The intended transaction is subject to a due diligence investigation to be completed by 30th September 2022. The proposed transaction has now been concluded and was announced on the 6th October 2022.

Mogale Gold owns the right to extract and process gold from tailings recourses by reprocessing old gold mine slimes dams and sandy mine dumps left by the extensive historic mining activities that have taken place in the area since 1888. (MTR) PAR is only interested in the surface operations associated with Mining Right (MR) 206 (i.e., Tailings Storage Facilities (TSFs) for reclamation, processing and deposition), and therefore the focus of this application process.

The project consists of 120 Mt of tailings to be reprocessed and firstly deposited into the West Wits Pit (current authorisation in place for in-pit deposition) and then undertake deposition of the footprint of 1L23-1L25 footprint (New Tailings Facility) once capacity has been reached within the West Wits Pit.

Alternatives are being considered for potential deposition of tailings material into the other pits.

It must be noted that once the West Wits Pits reaches capacity the surface deposition will extend in a northern direction from the pit onto surface, expanding the deposition footprint associated with West Wits Pit.

There are six dumps being considered for reprocessing, the largest of which amounts to 57.9 Mt, while the smallest contains 0.57 Mt. The primary location of processed tailings storage has been earmarked for deposition in the West Wits Pit.

2. Project Description

The site is situated in the Mogale City Local Municipality (MCLM), Gauteng Province. The site comprises of existing infrastructure such as tailings dams and open pits that will be used for the deposition of tailings materials. A process plant, overland pumping and piping inclusive of associated water management infrastructure will form part of the proposed infrastructure that will require an authorisation. Once the open pit is filled to capacity, a new TSF will potentially be constructed on the footprint area of one of the reclaimed TSF sites (1L23-1L25) (Figure 2-3). The footprint of the area is 2,923.3 ha which considers MR 206 and associated infrastructure.

Ancillary infrastructure such as pipelines, powerlines and pumps will be required for the proposed reclamation activities and will be included in support of the Environmental Application Process, which will be undertaken.

2.1. Project Locality

The Mining Right Area of the Mogale Cluster includes: G1, G2 plant; Cams, North Sand; South Sand; 1L23-1L25; 1L28; 1L13-1L15; 1L8, 1L9; 1L10; West Wits Pit (WWP) and Lancaster Dam. The mining right is located on Portions 66 and 99 of the farm Waterval 174 IQ and portions 136 and 209 of the farm Luipaardsvlei 246 IQ.

The project is within the Mogale City Local Municipality, which is located within the West Rand District Municipality (WRDM). MCLM is the regional services authority and the area falls under the jurisdiction of the Krugersdorp Magisterial District. The project is about 4 km south of Krugersdorp and north-east of Randfontein, approximately 10 km off the N14 National Road in the Gauteng Province, in an area that has been transformed by past gold mining activities.

Figure 2-1, Figure 2-2 and Figure 2-3 show the regional setting, local setting and proposed site layout respectively.

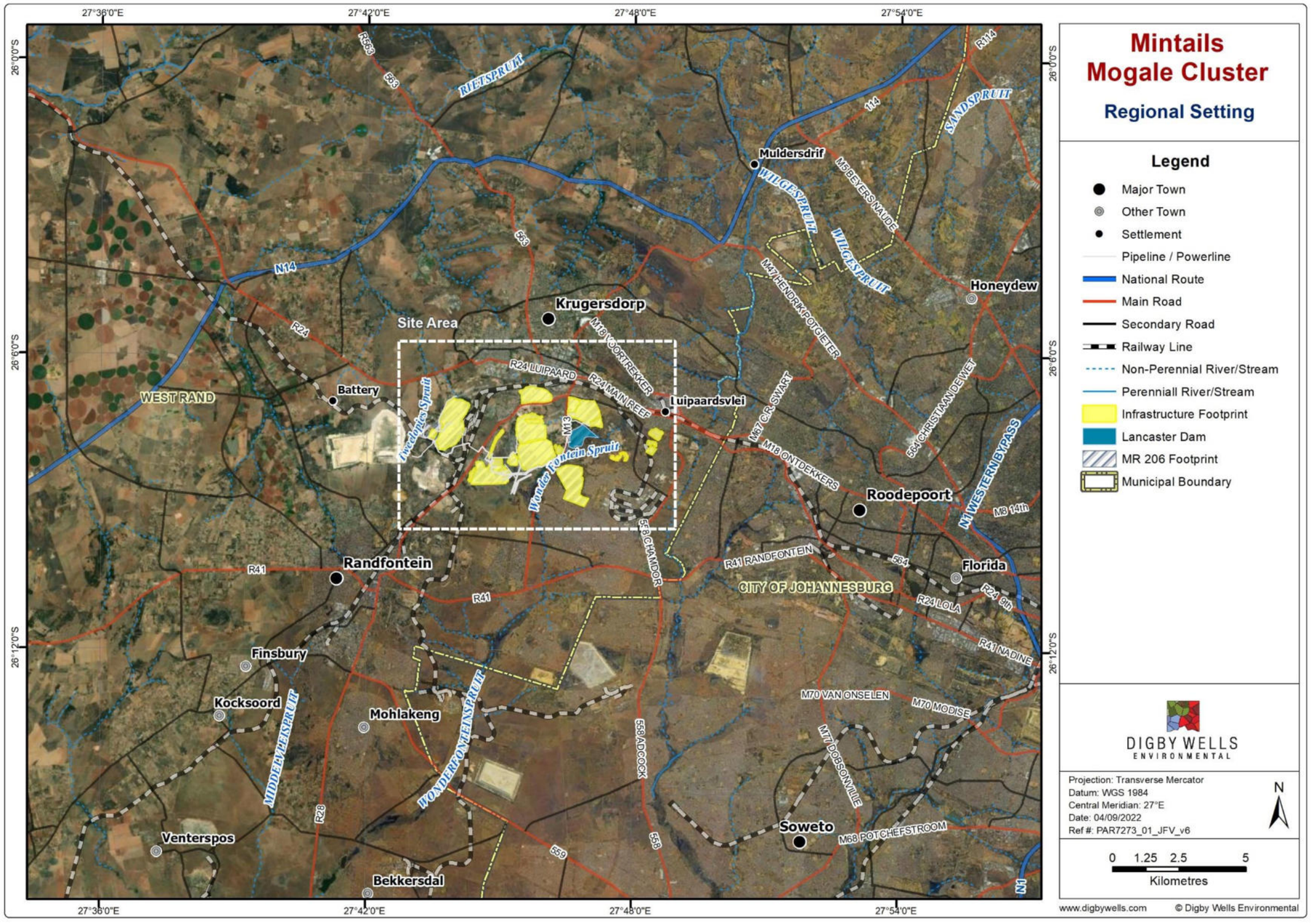

Figure 2-1: Regional Setting

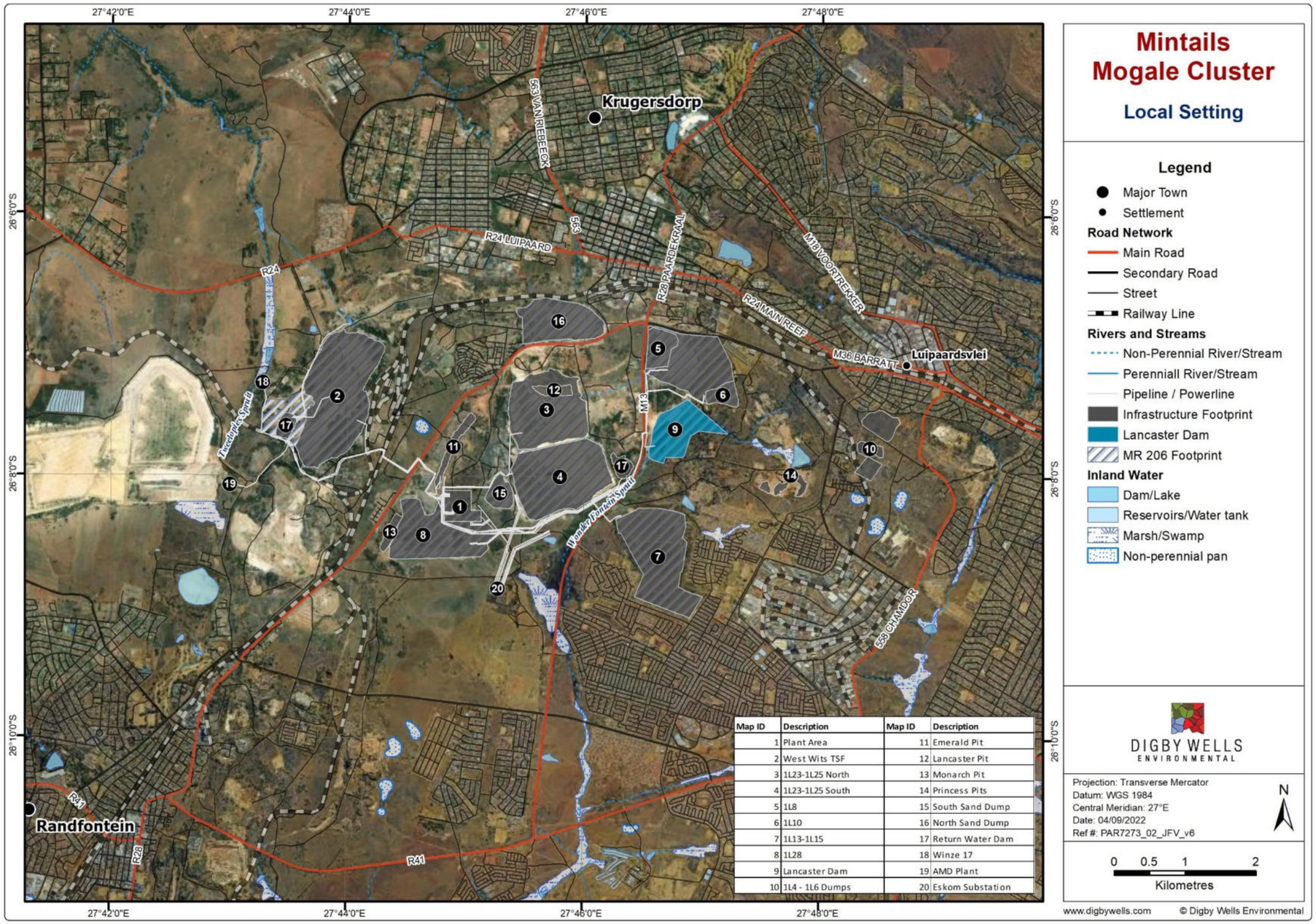

Figure 2-2: Local Setting

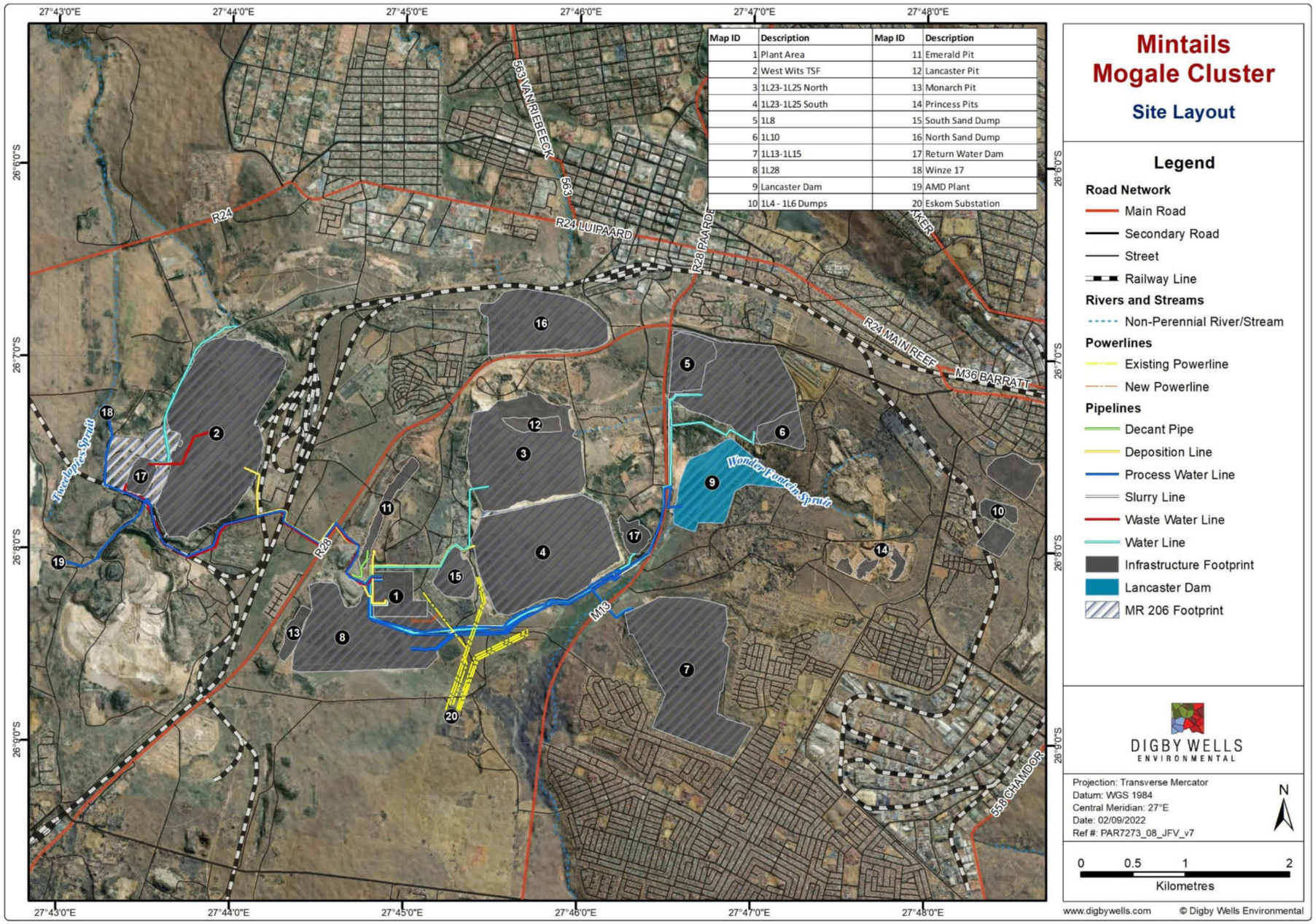

Figure 2-3: Proposed Layout

2.2. Proposed Infrastructure and Activities

Mogale plan to undertake activities relating to reclamation associated with gold-bearing TSFs through hydraulic reclamation (Table 2-1).

Table 2-1: Project Phases and Associated Activities

Project Phase	Associated Activities
Construction Phase	Site clearing for the construction of the new processing plant facility and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.
	Construction of the new processing plant and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.
Operational Phase	Hydraulic reclamation of the associated historic tailings facilities and sand dumps.
	Operation of pump stations during the operational phase.
	Maintenance of pipeline routes during the operational activities.
	Infilling of processed tailings material into the West Pits Pit and other potential pits.
	Surface tailings deposition within the West Wits Pit.
	Tailings deposition onto the historic footprint of 1L23-1L25 (lined).
	Production of Gold.
	Progressive rehabilitation of the new tailings facility footprints (West Pits TSF and 1L23-1L25 TSF.
Decommissioning Phase	Removal, decommissioning and rehabilitation of surface infrastructure such as pipelines, powerlines, pumps etc. footprints.
	Removal, decommissioning and rehabilitation of the processing plant footprint.
	Rehabilitation of the old TSF footprints.
	Rehabilitation of the old Mogale Processing Plant footprint.
	Final rehabilitation of the facility.
	General rehabilitation of the surrounding area, including wetland rehabilitation.

3. Terms of Reference

The Terms of Reference (ToR) for the VIA are to:

- Describe the baseline visual characteristics of the proposed Project site and surrounding area.

- Identify, describe, and assess the expected significance of potential visual impacts that may arise due to the implementation of the project.
- Recommend appropriate mitigation measures and management actions to avoid or minimise potential negative impacts with the proposed project.

4. Data & Sources

The datasets used in this assessment are listed in Table 4-1 below.

Table 4-1: Data Sources

Dataset	Source	Date
Digital Surface Model (Regional)	ALOS Global Digital Surface Model (AW3D30)	2021
Digital Terrain Model (Site Specific)	Client Provided LiDAR-derived Digital Terrain Model	2020
Land Cover*	ESRI 10m Global Land Cover	2020
Population Distribution	Eskom SPOT Building Count (2006 - 2012) dataset of classified built-up structure distribution.	2006 - 2012
Proposed TSF Designs	Client Provided	2021
Proposed Plant Height	Client Provided	2022
Protected Areas	National Protected Areas Expansion Strategy (NPAES) Formal Protected Areas of South Africa	2016
Roads	Humanitarian OpenStreetMap (HOTOSM) South Africa Roads database	2020
Vegetation	Mucina & Rutherford: Vegetation Map of South Africa, Lesotho and Swaziland.	2012

*Land Cover Dataset enhanced through validation and class-additions using Satellite Image Backdrop.

5. Relevant Legislation, Standards and Guidelines

The following international, national and regional documents form part of the legislative and policy framework of the visual assessment.

5.1. International Finance Corporation Performance Standards and Equator Principles

Visual assessments are required by the International Finance Corporation (IFC) Performance Standards (IFC, 2012) and the Equator Principles (EPFI, 2013). These standards will be treated as a best practice guideline.

Equator Principle 3: Applicable Environmental and Social Standards states that "the Equator Principles Financial Institution (EPFI) will require that the Assessment process evaluates the compliance with the applicable standards as follows:

- For Projects located in Non-Designated Countries, the Assessment process evaluates compliance with the then applicable IFC Performance Standards on Environmental and Social Sustainability (Performance Standards) and the World Bank Group (WBG) Environmental, Health and Safety Guidelines (EHS Guidelines); and
- For Projects located in Designated Countries, the Assessment process evaluates compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. Host country laws meet the requirements of environmental and/or social assessments (Principle 2), management systems (Principle 4), Stakeholder Engagement (Principle 5) and, grievance mechanisms (Principle 6)."

The Equator Principles Association defines Designated Countries as "those countries deemed to have robust environmental and social governance, legislation and institutional capacity designed to protect their people and the natural environment." South Africa is not on the Equator Principles Association's list of Designated Countries and therefore the IFC Performance Standards are applicable to this Project (EPFI, 2013).

IFC Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts is applicable to the EIA and all specialist studies including the visual assessment. Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. The objectives of this Performance Standard are:

- To identify and evaluate environmental and social risks and impacts of the project;
- To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimise impacts, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities and the environment;
- To promote improved environmental and social performance of clients through the effective use of management systems;
- To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately; and
- To promote and provide means for adequate engagement with Affected Communities throughout the project cycle issues that could potentially affect them and to ensure that

the relevant environmental and social information is disclosed and disseminated (IFC, 2012).

IFC Performance Standard 3: Resource Efficiency and Pollution Prevention is applicable to the visual assessment. Performance Standard 3 recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional and global levels. For the purposes of this Performance Standard, the term 'pollution' is used to refer to both hazardous and non-hazardous chemical pollutants in the solid, liquid, or gaseous phases, and includes other components such as pests, pathogens, thermal discharge to water, Greenhouse Gas (GHG) emissions, nuisance odours, noise, vibration, radiation, electromagnetic energy and the creation of potential visual impacts including light (IFC, 2012).

IFC Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources is applicable to the visual assessment. Performance Standard 6 recognises that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development. Ecosystem services are the benefits that people, including businesses, derive from ecosystem services. Ecosystem services are organised into four types:

- Provisioning services, which are the products people obtain from ecosystems;
- Regulating services, which are the benefits people obtain from the regulation of ecosystem processes;
- Cultural services, which are the nonmaterial benefits people obtain from ecosystems; and
- Supporting services, which are the natural processes that maintain the other services.

Examples of cultural services include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment (IFC, 2012).

IFC Performance Standard 8: Cultural Heritage applies to the visual assessment. Performance Standard 8 recognises the importance of cultural heritage for current and future generations. For the purposes of this Performance Standard, cultural heritage refers to:

- Tangible forms of cultural heritage, such as tangible movable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic and religious values;
- Unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and
- Certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles.

Tangible cultural heritage is considered a unique and often non-renewable resource that possesses cultural, scientific, spiritual, or religious value and includes moveable or immovable objects, sites, structures, groups of structures, natural features, or landscapes that have archaeological, paleontological, historical, architectural, religious, aesthetic, or other cultural value. The requirements of Performance Standard 8 do not apply to the cultural heritage of Indigenous Peoples which is covered under Performance Standard 7 (IFC 2012).

5.2. National Legislation and Policy

At a national level, the following legislative documents potentially apply to the visual assessment:

- Regulations in Chapter 5 (Integrated Environmental Management) of the NEMA, 1998 (Act No. 107 of 1998) (NEMA) and the Act in its entirety. The Act states that "the State must respect, protect, promote and fulfil the social, economic and environmental right of everyone…" Landscape is both moulded by, and moulds, social and environmental features;
- The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and related provincial regulations – in some instances there are policies or legislative documents that give rise to the protection of listed sites. The NHRA states that it aims to promote "good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed for future generations". A holistic landscape whose character is a result of the action and interaction and/or human factors has strong cultural associations as societies and the landscape in which they live are affected by one another in many ways; and
- Section 17 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM: PAA) sets out the purposes of the declaration of areas as protected areas which includes the protection of natural landscapes. Landscapes are defined by the natural, visual and subjectively perceived landscape; these aspects of a landscape are intertwined to form a holistic landscape context.

5.3. Guidelines

The "Guideline for involving visual and aesthetic specialists in EIA processes" document by Oberholzer (2005) has been used as a best practice guideline for this Visual Impact VIA. Although these guidelines were developed for the Western Cape province of South Africa they are relevant for this VIA as "the guidelines promote the principles of EIA best practice without being tied to specific legislated national or provincial EIA terms and requirements" (Oberholzer, 2005).

6. Methodology

6.1. Determining the Baseline Environment

Determinations of the baseline environment are critical in characterising the existing sense of place for the study area. The sense of place is composed of the topography, the regional vegetation and the existing environment.

6.2. Receptor Identification

Potential receptors were identified using the following datasets listed in Table 4-1:

- Eskom SPOT Building Count;
- National Protected Areas Expansion Strategy (NPAES) Formal Protected Areas of South Africa;
- Humanitarian OpenStreetMap Team (HOTOSM) South Africa Roads database.

Where necessary satellite backdrop imagery was used to validate and/or enhance the data to ensure the highest possible level of accuracy. The receptors identified are discussed in more detail in Section 8.2 below.

6.3. Viewshed Modelling

The topographical representation of the project area was derived using a combination of the ALOS Global Digital Surface Model (AWD3D30) and client provided Light Detection And Ranging (LiDAR) datasets which were merged to represent a continuous raster surface. Using geospatial modelling techniques, a series of viewsheds were then run using individual infrastructure features which commonly have the largest visual prominence. The viewshed modelling techniques applied utilise a combination of ArcGIS and GlobalMapper software environments to identify areas from which the proposed development will be potentially visible. The procedure then also categorises the magnitude of visual impact which is determined by the distance from the development and how much of the infrastructure is visible to the receptor area. Visual exposure and the visual impact of a development diminish exponentially with distance (Oberholzer, 2005).

The concept of viewshed modelling is depicted in Figure 6-1. The topography denotes whether a development will be visible from a receptor. In Figure 6-1 the development is only visible from the receptors within the valley and on the slopes of the hills facing it. The development will be hidden from all receptors beyond the first hills.

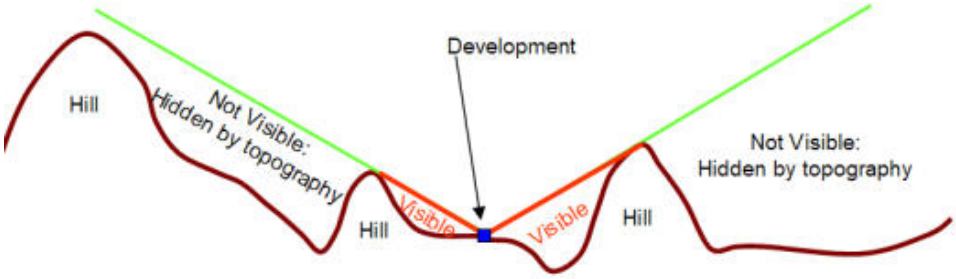

Figure 6-1: Theoretical background of viewshed modelling

Viewshed models were created for daytime conditions only. These viewshed models are based on the topography only and do not take the screening effect of vegetation into account. The viewshed models depict worst case scenarios and show the areas from which the Project may potentially be visible.

Based on findings from the field work, along with the sense of place categorisation for this project, the Zone of Visual Influence (ZVI) was determined to be within 20-kilometre. Table 6-1 below lists the various infrastructure elements that were run as part of the assessment.

Table 6-1: Veiwshed Transmitter Parameters

Proposed Infrastructure	Modelled Height (m)
West Wits TSF	48
1L3 - 1L5 North TSF	40
1L3 - 1L5 South TSF	30
Preferred Plant Location	30

6.4. Impact Assessment Methodology

Impacts and risks have been identified based on a description of the activities to be undertaken. Once impacts have been identified, a numerical environmental significance rating process will be undertaken that utilises the probability of an event occurring and the severity of the impact as factors to determine the significance of a particular environmental impact.

The severity of an impact is determined by taking the spatial extent, the duration and the severity of the impacts into consideration. The probability of an impact is then determined by the frequency at which the activity takes place or is likely to take place and by how often the type of impact in question has taken place in similar circumstances.

Following the identification and significance ratings of potential impacts, mitigation and management measures will be incorporated into the Environmental Management Plan (EMP).

Details of the impact assessment methodology used to determine the significance of physical, biophysical and socio-economic impacts are provided below.

The significance rating process follows the established impact/risk assessment formula:

Significance = Consequence x Probability x Nature

Where

Consequence = Intensity + Extent + Duration

And

Probability = Likelihood of an impact occurring

And

Nature = Positive (+1) or negative (-1) impact

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts.

The matrix calculates the rating out of 147, whereby intensity, extent, duration and probability are each rated out of seven. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated prior to mitigation and again after consideration of the mitigation has been applied; post-mitigation is referred to as the residual impact. The significance of an impact is determined and categorised into one of eight categories (Table 6-2). The descriptions of the significance ratings are presented in Table 6-3.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, (i.e., there may already be some mitigation included in the engineering design). If the specialist determines the potential impact is still too high, additional mitigation measures are proposed.

Table 6-2: Impact Assessment Parameter Ratings

Rating	Intensity/ Replaceability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural/social resources.	Noticeable, on-going natural and/or social benefits which have improved the overall conditions of the baseline.	International The effect will occur across international borders.	Permanent The impact is irreversible, even with management, and will remain after the life of the project.	Definite There are sound scientific reasons to expect that the impact will definitely occur. > 80% probability
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural/social resources of moderate to high sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	National Will affect the entire country.	Beyond Project Life The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost Certain/Highly Probable It is most likely that the impact will occur. < 80% probability
5	Serious loss and/or damage to biological or physical resources or highly sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	Province/Region Will affect the entire province of region.	Project Life (> 15 years) The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely The impact may occur. < 65% probability

Rating	Intensity/ Replaceability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
4	Serious loss and/or damage to biological or physical resources or moderately sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures/items of cultural significance.	Average to intense natural and/or social benefits to some elements of the baseline.	Municipal Area Will affect the whole municipal area.	Long Term 6-15 years and the impact can be reversed with management.	Probable Has occurred here or elsewhere and could therefore occur. < 50% probability
3	Moderate loss and/or damage to biological or physical resources or low to moderately sensitive environments, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	Local Local extending only as far as the development site area.	Medium Term 1-5 years and the impact can be reversed with minimal management.	Unlikely Has not happened yet but could happen once in the lifetime of the project, therefore there is a possibility that the impact will occur. < 25% probability
2	Minor loss and/or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experienced by a small percentage of the baseline.	Limited Limited to the site and its immediate surroundings.	Short Term Less than 1 year and is reversible.	Rare/Improbable Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. < 10% probability

Rating	Intensity/ Replaceability		Extent	Duration/Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
1	Minimal to no loss and/or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to common place structures.	Some low-level natural and/or social benefits felt by a very small percentage of the baseline.	Site Specific Limited to specific isolated parts of the site.	Immediate Less than 1 month and is completely reversible without management.	Highly Unlikely/None Expected never to happen. < 1% probability

Table 6-3: Probability/Consequence Matrix

Probability	Significance																																						
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	-21	**-20**	**-19**	**-18**	**-17**	**-16**	**-15**	**-14**	**-13**	**-12**	**-11**	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Consequence																																							

7. Baseline Environment Description

7.1. Biophysical Environment

The regional topography of the project locality can be described as low relief plains to the south and moderate relief hills & mountainous terrain to the north. The regional elevation ranges from approximately 1 250 mamsl in the valleys to the far north and 1 850 mamsl in the immediate vicinity of the project site. Figure 8-1 provides an overview of the topography surrounding the project site.

The Project Area falls within the Soweto Highveld Grassland vegetation type. The region surrounding the project site is also dominated by grassland vegetation types characteristic of the Grassland Biome which covers the central plateau of South Africa (DWE, 2021b). Figure 8-2 provides an overview of the vegetation types surrounding the project site.

Figure 8-3 provides an overview of the Land Use and Cover (LULC) surrounding the project site. The LULC of the surrounding environment is dominated by agricultural activities to the west and built up (urban, industrial and residential) areas to the east with naturally occurring grassland and shrubland scattered throughout the region. Significant areas of mining-related land cover (TSFs, pits and dumps) can be found towards the south of the project site. Based on a visual interpretation of the LULC in region it may be concluded that the natural environment surrounding the project site has been significantly altered through agricultural activities, urban / residential / industrial development and mining activities.

7.2. Socio-Economic Environment

Based on a 2016 community survey, the MCLM has a population of 838 864 people with the majority of residents (93%) living in urban areas. Situated directly adjacent to the City of Johannesburg Metropolitan Municipality (and financial hub of South Africa), the MCLM economy is well diversified with the largest shares being government and personal services, and manufacturing (Dept. Cooperative Governance, 2019).

The sectors contributing the most to employment in the MCLM are (in order of importance) trade, finance, manufacturing and community services with mining and agriculture being the two smallest employment sectors in the municipality (Dept. Cooperative Governance, 2019). Taking into consideration the high presence of mining activities in the environment surrounding the project site, it is expected that mining would play a slightly more prominent role in the employment in local communities.

7.3. Visual / Aesthetic Character

Based on the information presented in sections 7.1 and 7.2 the visual / aesthetic character of the environment surrounding the site location may be described as largely urban and highly modified. Two key characteristics of the project site and surrounding environment that contribute significantly to its Visual Absorption Capacity (VAC) (i.e. the ability of a landscape

to absorb new elements, without any loss in its visual integrity) in relation to the proposed operations are as follows:

- The MCLM has historically been a key focal point of South Africa's gold-mining sector with mine shafts and TSFs prominent throughout the municipality. It may be argued that mining-related landmarks form a key part of the visual / aesthetic character of the environment.
- At present the site itself is characterised by largely unrehabilitated surfaces and visually intrusive structural elements.

These characteristics should be considered as external mitigatory factors when it comes to the expected intensity of the visual impact of the proposed operations on the surrounding environment.

8. Results

8.1. Categorisation of Visual Impacts

The expected visual impact of the Project was categorised based on the type of receiving environment and the type of development as detailed in Table 8-1 (Oberholzer, 2005). The table provides an indication of the visual impacts that can be expected for different types of developments in relation to the nature of the receiving environment. Following this classification system, the Project is classed as a **Category 5 development**. The receiving environment is best described as an area **of low scenic, cultural or historical significance**. While it may be argued that the immediate mining region could be classified as a disturbed urban area, it must be acknowledged that the zone of influence for the visual impact is expected to extend beyond the immediate mining area, and that the legacy of tailings and dumps across the Mogale region has characterised the area and adds to its sense of place. It is expected that the Project will potentially have a **moderate to high visual impact** on the receiving environment as shown in Table 8-2.

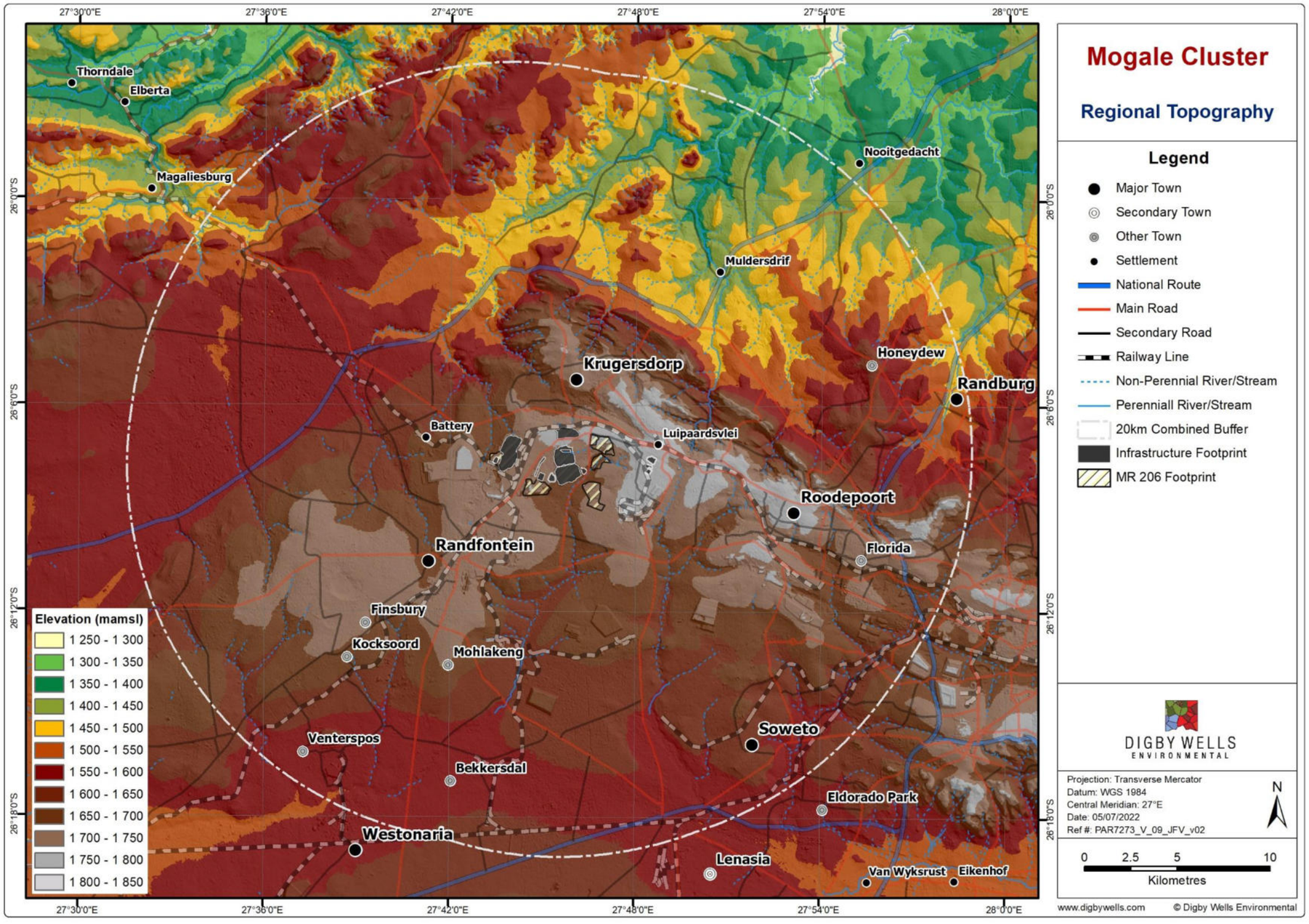

Figure 8-1: Regional Topography

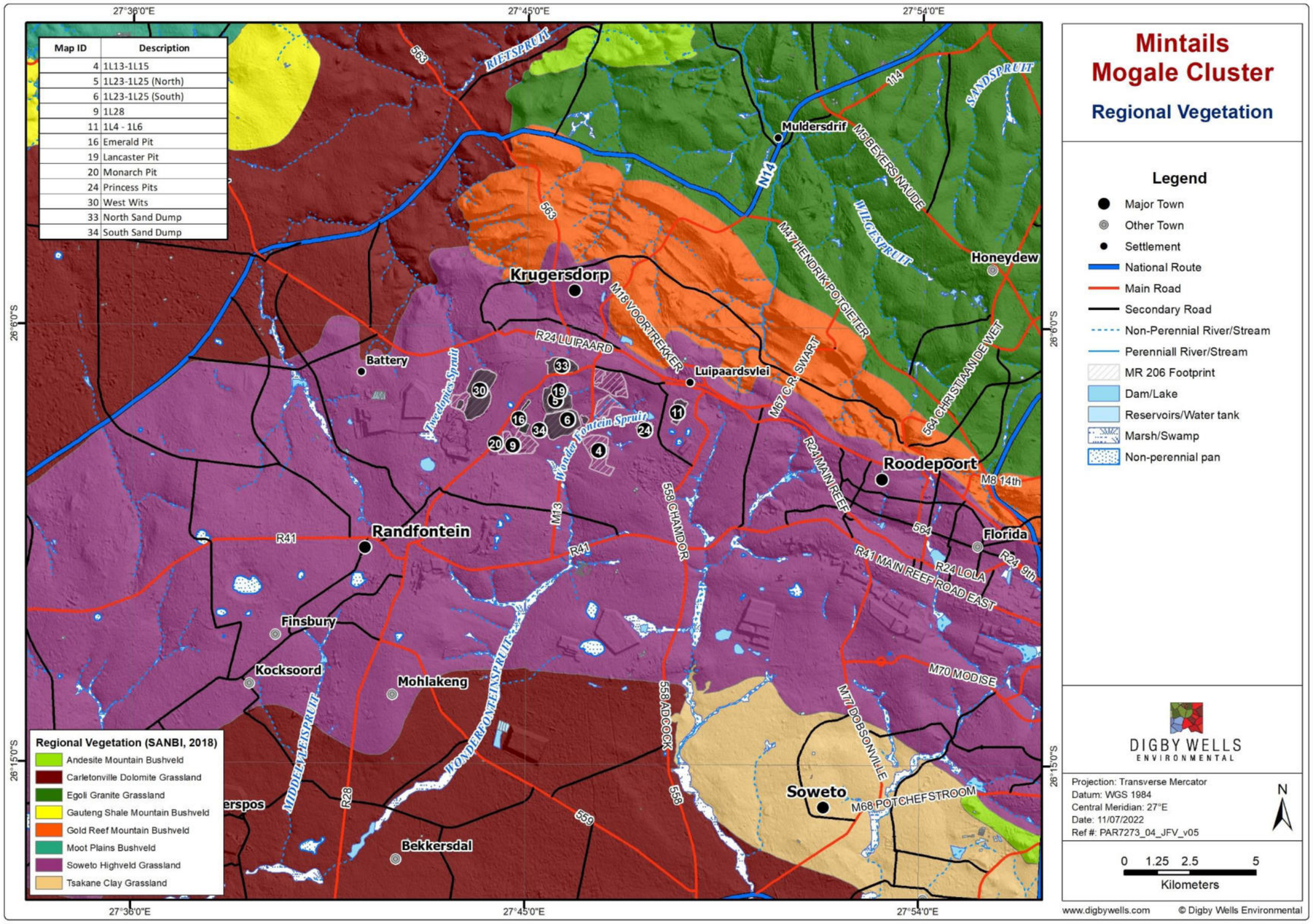

Figure 8-2: Regional Vegetation

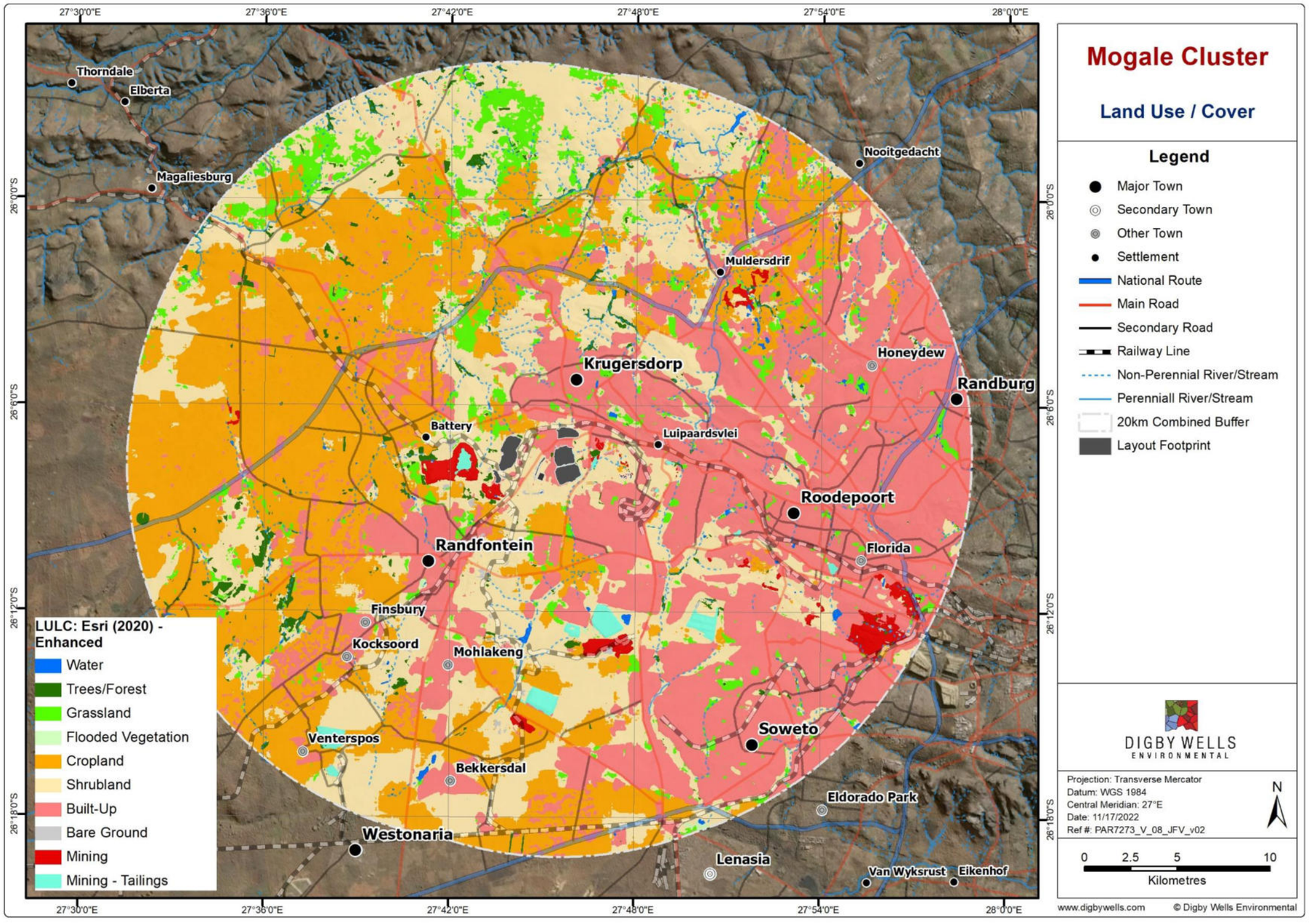

Figure 8-3: Regional Land Use / Cover

Table 8-1: Key to Categorisation of Development (adapted from Oberholzer, 2005)

Type of Development	Examples of Development
Category 1	Nature reserves, nature related recreation, camping, picnicking, trails and minimal visitor facilities.
Category 2	Low-key recreation/resort/residential type development, small-scale agriculture/nurseries, narrow roads and small-scale infrastructure.
Category 3	Low density resort/residential type development, golf or polo estates, low to medium-scale infrastructure.
Category 4	Medium density residential development, sports facilities, small-scale commercial facilities/office parks, one-stop petrol stations, light industry, medium-scale infrastructure.
Category 5	High density township/residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations. Quarrying and mining activities with related processing plants.

Table 8-2: Categorisation of Expected Visual Impact (adapted from Oberholzer, 2005)

Type of Environment	Type of Development (Low to High Intensity)				
	Category 1 Development	Category 2 Development	Category 3 Development	Category 4 Development	Category 5 Development
Protected/wild areas of international, national or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high, scenic, cultural or historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected

Type of Environment	Type of Development (Low to High Intensity)				
	Category 1 Development	Category 2 Development	Category 3 Development	Category 4 Development	Category 5 Development
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural or historical significance	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected
Disturbed or degraded sites/run down urban areas/wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

8.2. Receptor Identification

The main objective of the receptor identification component of this assessment was to identify key locations relating to the local communities and visitors from neighbouring municipalities, provinces and abroad - taking into consideration sites such as the Cradle of Humankind World Heritage site and key routes connecting such sites with metropolitan areas such as the City of Johannesburg or Tshwane. These locations were included in the viewshed analysis as receptors. Potential receptors were extracted from a 20km ZVI surrounding the proposed facilities and broken down into (i) population, (ii) transport, and (iii) protected area receptors. The receptors identified through a review of available datasets are listed in Table 8-3 and shown in Figure 8-4.

Table 8-3: Viewshed Receptors

Receptor Category	Receptor	Description
Population	Dwellings (SBC)	379 516 Dwellings within the 20km Buffer Zone
Transport	N14 National Road	48.9km of road running through the north-west of the 20km Buffer Zone
	N1 National Road	17.3km of road running through the east of the 20km Buffer Zone
	N12 National Road	11.4km of road running through the south of the 20km Buffer Zone
Protected Areas	Boschkop Municipal Nature Reserve	4.06 Ha Within 20km Buffer Zone
	Ruimsig Municipal Nature Reserve	13.23 Ha Within 20km Buffer Zone
	Kloofendal Municipal Nature Reserve	120.09 Ha Within 20km Buffer Zone
	Blougat Municipal Nature Reserve	152.90 Ha Within 20km Buffer Zone
	Walter Sisulu National Botanical Garden	286.30 Ha Within 20km Buffer Zone
	Krugersdorp Municipal Nature Reserve	1 351.59 Ha Within 20km Buffer Zone
	Cradle of Humankind World Heritage Site	20 962.57 Ha Within 20km Buffer Zone

8.3. Viewshed Analysis

The results from the viewshed modelling process are presented in this section where individual viewsheds were run to model the potential impact of the most significant infrastructure features.

The viewshed outputs for each of the infrastructure features were overlain with each individual receptor to calculate the percentage visibility and determine its visibility qualification (very low, low, moderate, high, and very high). Tables showing the visibility qualifications relating to each receptor are presented in this section along with the corresponding viewshed maps. More detailed tables containing individual visibility percentages are available in APPENDIX A.

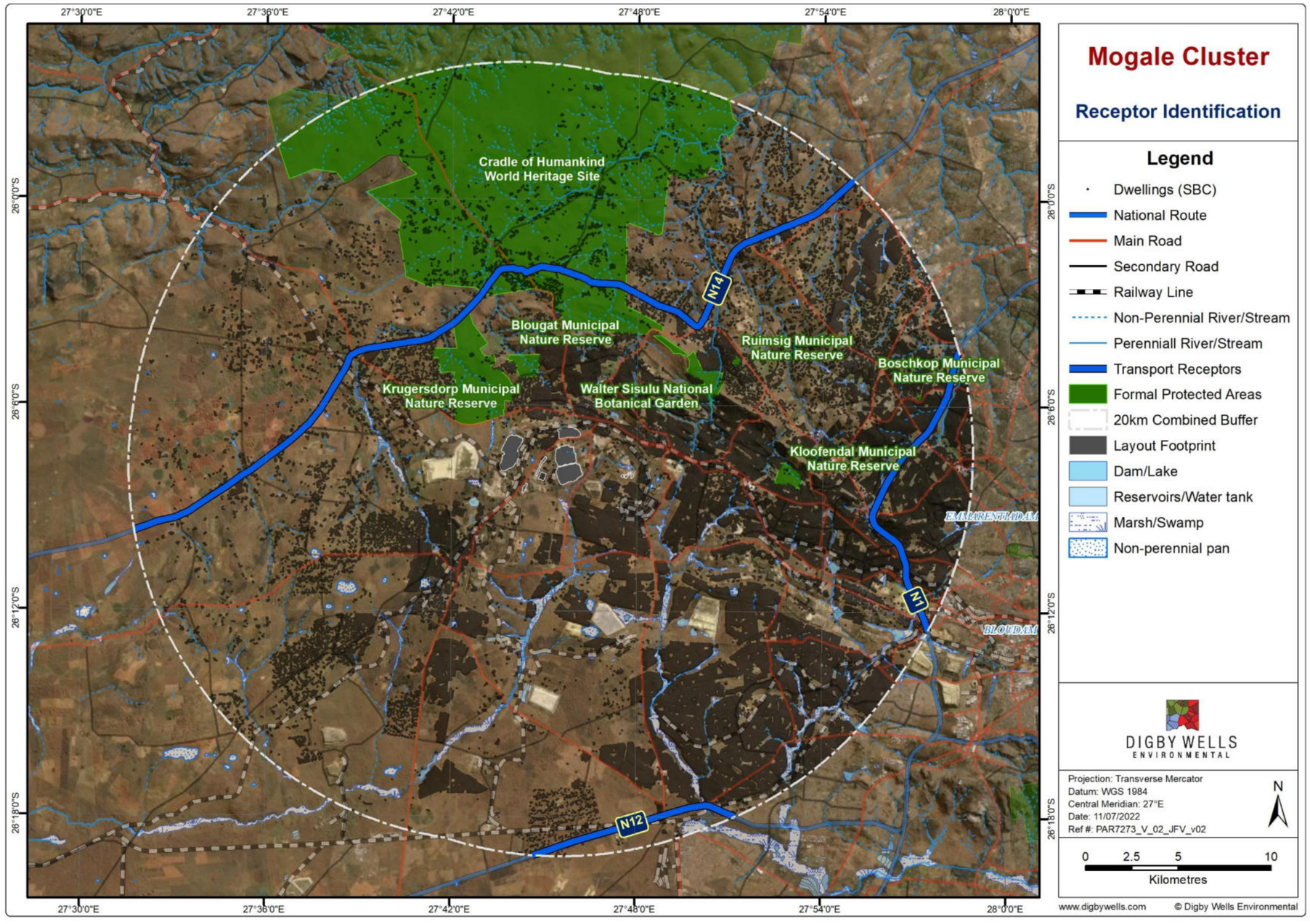

Figure 8-4: Receptor Identification

8.3.1. Viewshed Results: West Wits TSF

The results from the Viewshed Analysis for the proposed West Wits TSF are summarised and presented in Table 8-4 and Figure 8-5.

Table 8-4: West Wits TSF Viewshed Results

West Wits TSF		
Receptor Category	**Receptor**	**Visibility Qualification**
Population	Dwellings (SBC)	High
Transport	N14 National Road	Moderate
	N1 National Road	Zero
	N12 National Road	Zero
Protected Areas	Boschkop Municipal Nature Reserve	Zero
	Ruimsig Municipal Nature Reserve	Zero
	Kloofendal Municipal Nature Reserve	Low
	Blougat Municipal Nature Reserve	Very High
	Walter Sisulu National Botanical Garden	Zero
	Krugersdorp Municipal Nature Reserve	Very High
	Cradle of Humankind World Heritage Site	High

8.3.2. Viewshed Results: 1L23 - 1L25 North

The results from the Viewshed Analysis for the proposed 1L23 - 1L25 (North) TSF are summarised and presented in Table 8-5 and Figure 8-6.

Table 8-5: 1L23 - 1L25 (North) TSF Viewshed Results

1L23 - 1L25 North		
Receptor Category	**Receptor**	**Visibility Qualification**
Population	Dwellings (SBC)	Very High
Transport	N14 National Road	Very Low
	N1 National Road	Zero
	N12 National Road	Low
Protected Areas	Boschkop Municipal Nature Reserve	Zero
	Ruimsig Municipal Nature Reserve	Zero
	Kloofendal Municipal Nature Reserve	Very Low
	Blougat Municipal Nature Reserve	Zero
	Walter Sisulu National Botanical Garden	Zero
	Krugersdorp Municipal Nature Reserve	Very Low
	Cradle of Humankind World Heritage Site	Low

8.3.3. South Viewshed Results: 1L23 - 1L25

The results from the Viewshed Analysis for the proposed 1L23 - 1L25 (South) TSF are summarised and presented in Table 8-6 and Figure 8-7.

Table 8-6: 1L23 - 1L25 (South) TSF Viewshed Results

1L23 - 1L25 South		
Receptor Category	**Receptor**	**Visibility Qualification**
Population	Dwellings (SBC)	Very High
Transport	N14 National Road	Zero
	N1 National Road	Zero
	N12 National Road	Low
Protected Areas	Boschkop Municipal Nature Reserve	Zero
	Ruimsig Municipal Nature Reserve	Zero
	Kloofendal Municipal Nature Reserve	Zero
	Blougat Municipal Nature Reserve	Zero
	Walter Sisulu National Botanical Garden	Zero
	Krugersdorp Municipal Nature Reserve	Zero
	Cradle of Humankind World Heritage Site	Zero

8.3.4. Viewshed Results: Preferred Plant Area

The results from the Viewshed Analysis for the proposed Preferred Plant Area are summarised and presented in Table 8-7 and Figure 8-8.

Table 8-7: Preferred Plant Area Viewshed Results

Preferred Plant Area		
Receptor Category	**Receptor**	**Visibility Qualification**
Population	Dwellings (SBC)	Very High
Transport	N14 National Road	Zero
	N1 National Road	Zero
	N12 National Road	Zero
Protected Areas	Boschkop Municipal Nature Reserve	Zero
	Ruimsig Municipal Nature Reserve	Zero
	Kloofendal Municipal Nature Reserve	Zero
	Blougat Municipal Nature Reserve	Zero
	Walter Sisulu National Botanical Garden	Zero
	Krugersdorp Municipal Nature Reserve	Zero
	Cradle of Humankind World Heritage Site	Zero

8.3.5. Viewshed Results: Combined

The results from the combined Viewshed Analysis are summarised and presented in Table 8-8 and Figure 8-9. It should be noted that the overall visibility of the most significant infrastructure elements (i.e. the West Wits and 1L-25 (North) TSFs) associated with the operation cannot be mitigated by the lower visibility of less prominent features. The viewshed shown in Figure 8-9 should therefore be interpreted as a “worst case scenario” as opposed to an average across all the viewshed results.

The combined viewshed results show that, in general, the proposed activities are expected to have a very high visibility to the surrounding population, a low visibility from the identified transport receptors and a high visibility from the identified protected area-receptors.

The proposed West Wits TSF is expected to have the highest visibility across all the different receptors and, thereby, the highest expected visual impact. This is likely due to the lack of topographic screening to the north-east. The 1L23 – 1L25 (North) TSF is expected to have the second highest visibility of the proposed infrastructure due to its height (in comparison with

its southern counterpart and the preferred plant area), however, with more topographical screening to the north-east. The 1L23 – 1L25 TSF (South) and Preferred Plant area are expected to have a low-to-zero visibility to transport and protected area receptors and are expected to be highly visible to the population in the immediate surroundings of the project site (as is the case for all the proposed infrastructure).

Table 8-8: Combined Viewshed Results

Combined		
Receptor Category	**Receptor**	**Visibility Qualification**
Population	Dwellings (SBC)	Very High
Transport	N14 National Road	Moderate
	N1 National Road	Zero
	N12 National Road	Very Low
Protected Areas	Boschkop Municipal Nature Reserve	Zero
	Ruimsig Municipal Nature Reserve	Zero
	Kloofendal Municipal Nature Reserve	Very Low
	Blougat Municipal Nature Reserve	High
	Walter Sisulu National Botanical Garden	Zero
	Krugersdorp Municipal Nature Reserve	Very High
	Cradle of Humankind World Heritage Site	High

8.3.6. Cumulative Visibility

Figure 8-10 below shows the binary (visible vs not visible) viewsheds for:

- The most prominent features at the site at baseline conditions (i.e. the existing 1L23-25 TSF, sand dumps and waste rock dumps surrounding the current West Wits Pit)
- The proposed infrastructure elements.

A comparison of these viewshed outputs indicate that the infrastructure elements present at baseline conditions are visible from 82.74% (32,411 ha) of the area from which the proposed

infrastructure elements would be visible. The increase in the cumulative visibility resulting from the proposed operations is therefore 17.26% (6,761 ha).

The cumulative visibility described here should be taken into consideration when it comes to the extent-component of the visual impact of the proposed operations.

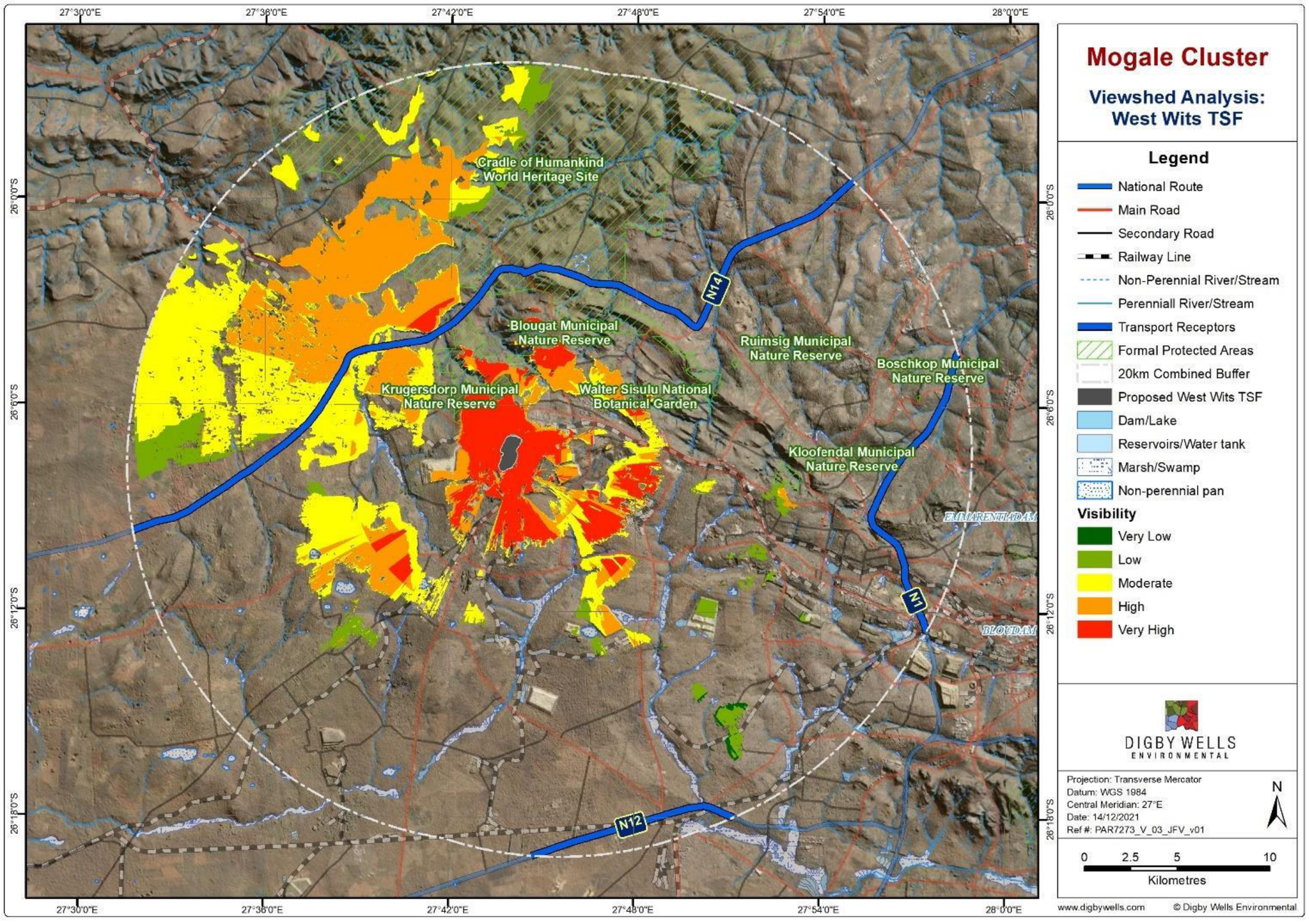

Figure 8-5: Viewshed Results: West Wits TSF

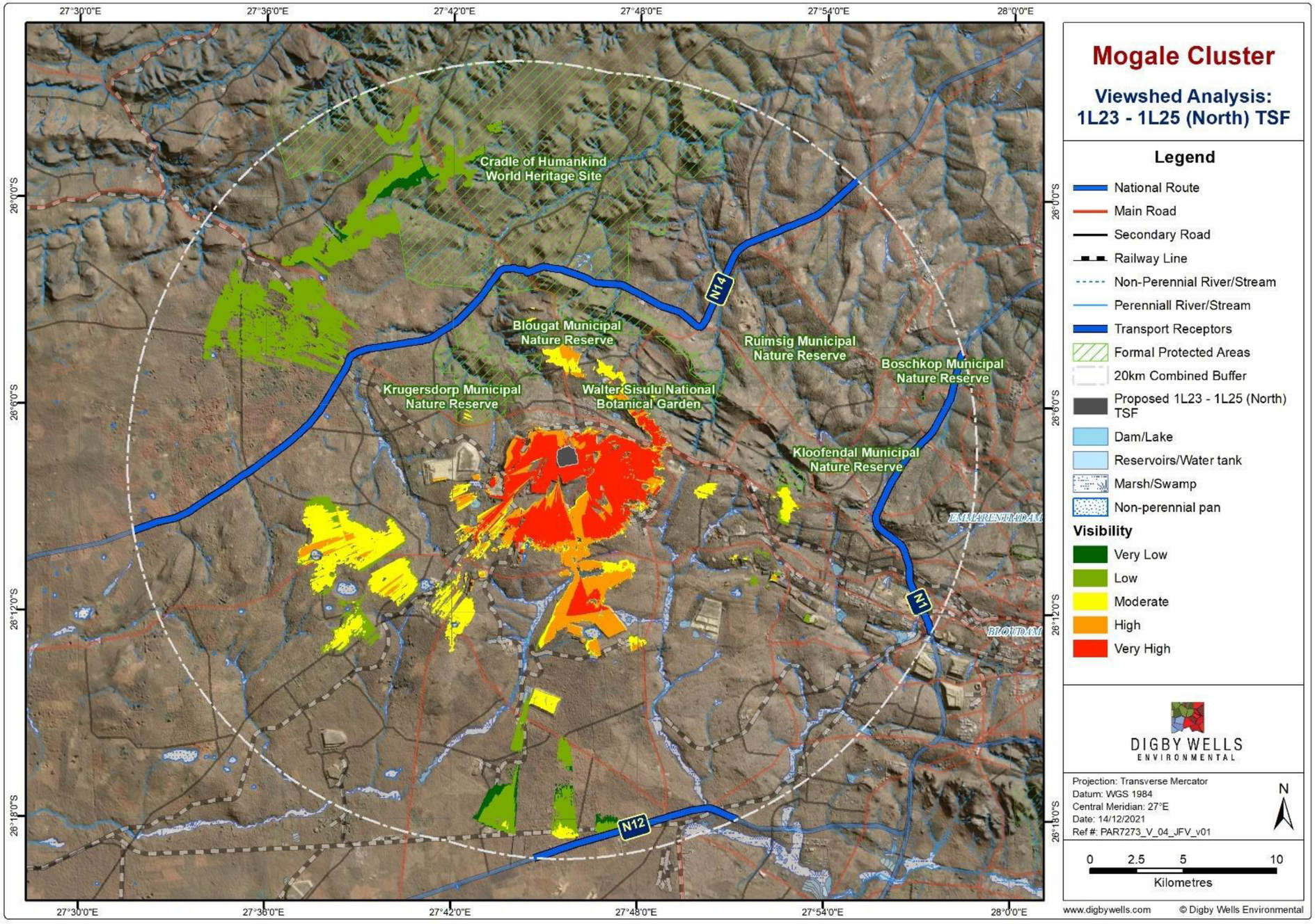

Figure 8-6: Viewshed Results: 1L23 - 1L25 (North) TSF

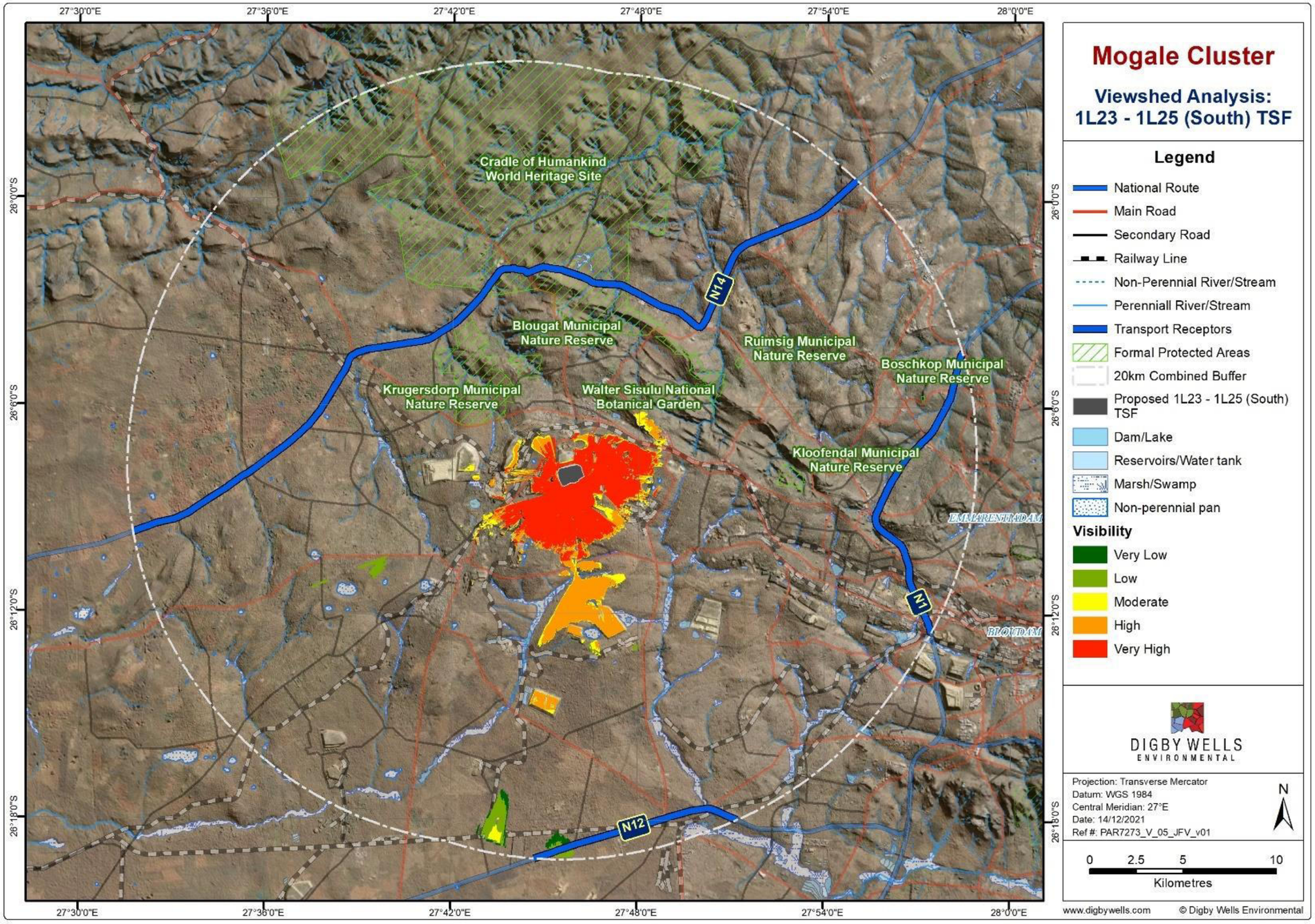

Figure 8-7: Viewshed Results: 1L23 - 1L25 (South) TSF

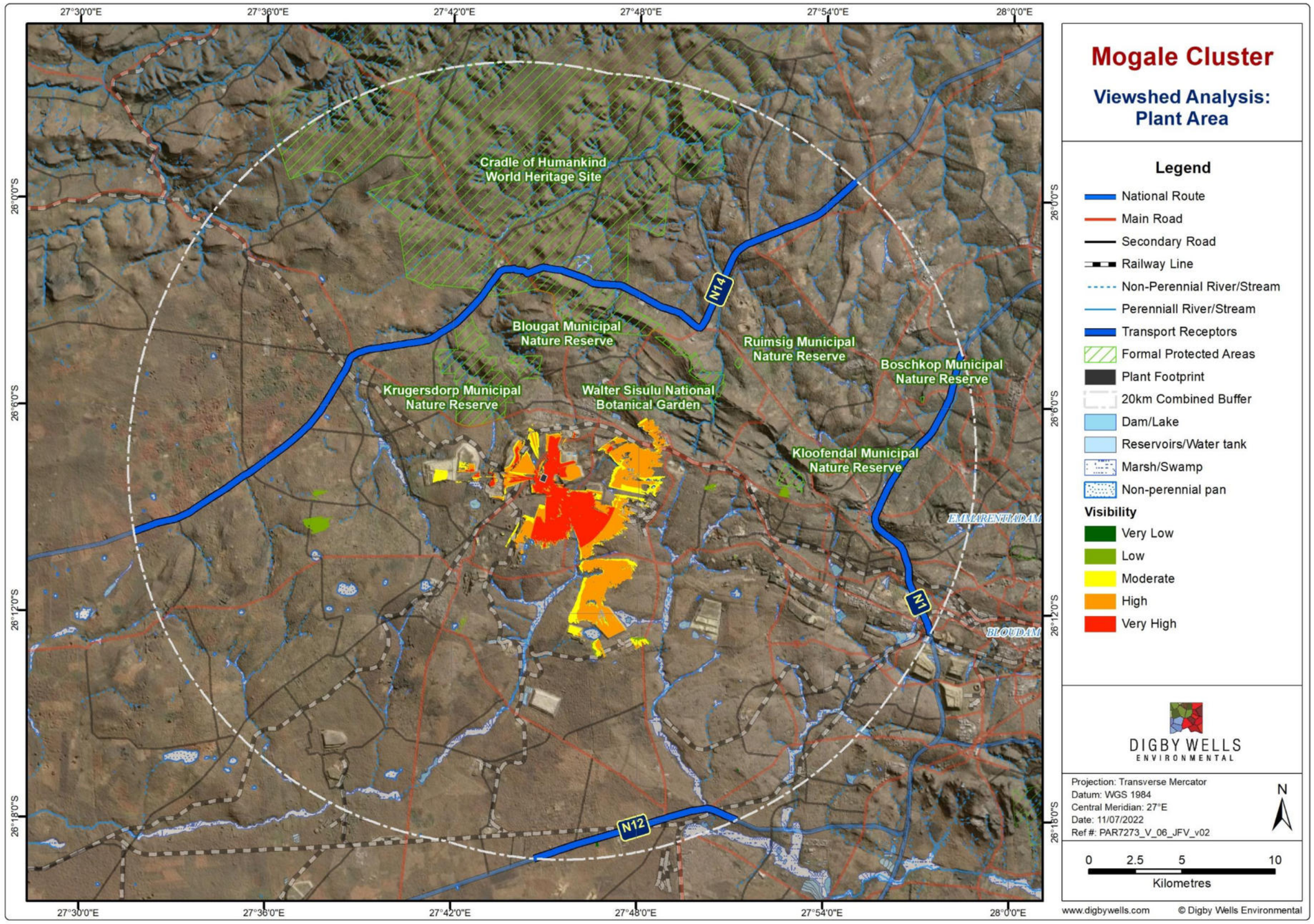

Figure 8-8: Viewshed Results: Plant

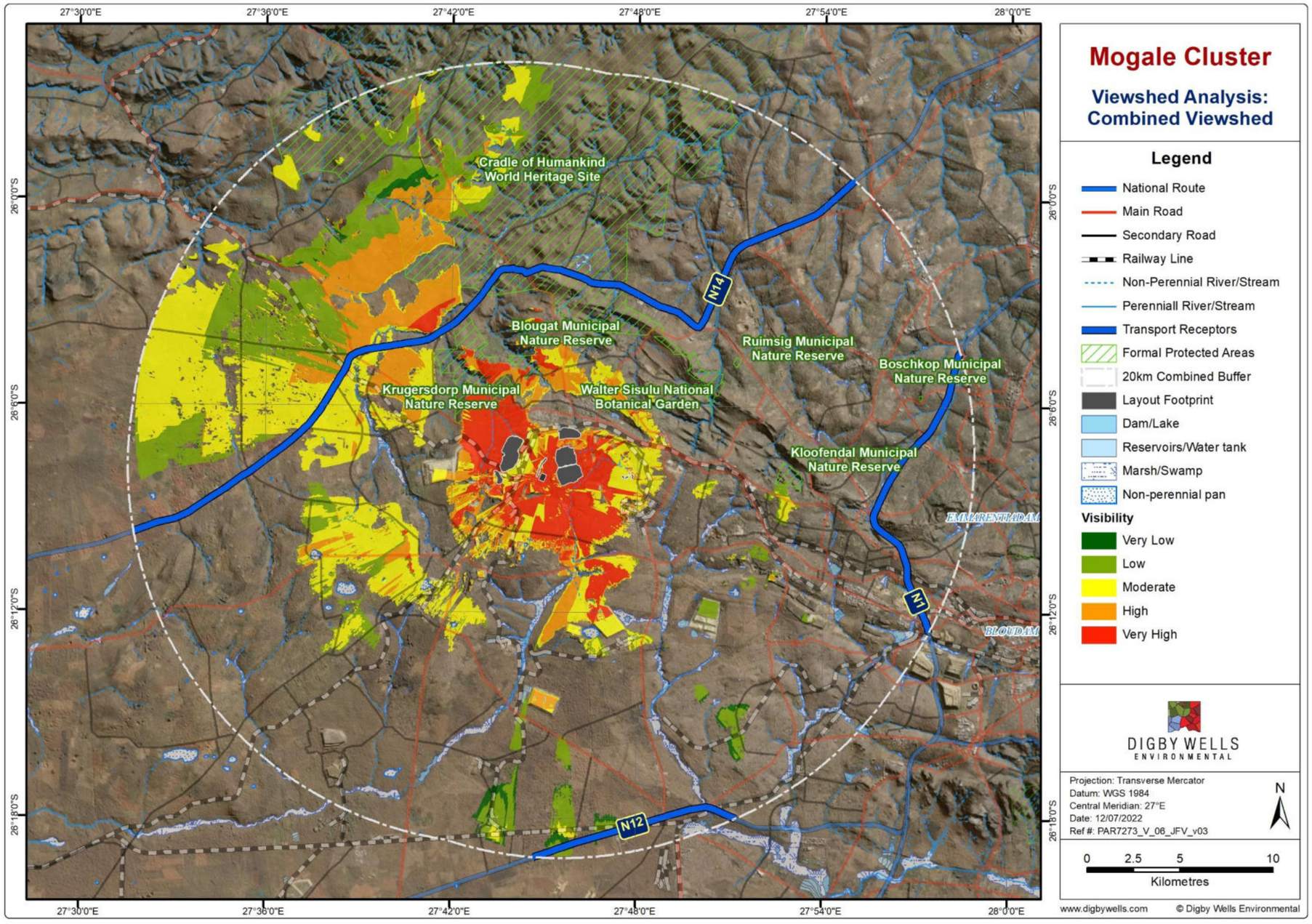

Figure 8-9: Viewshed Results: Combined

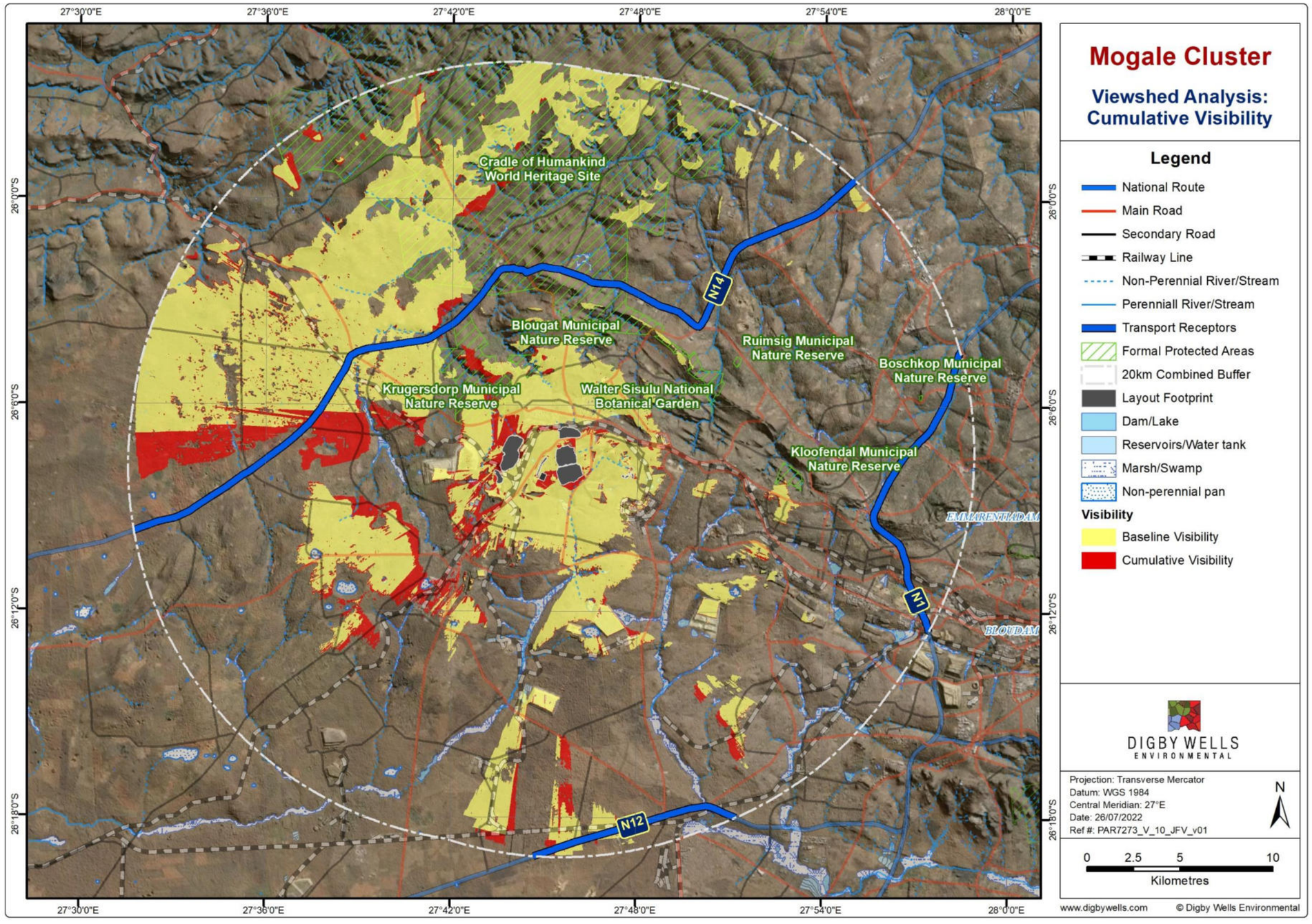

Figure 8-10: Cumulative Visibility

9. Impact Assessment

The Project activities and infrastructure will be rated according to the visual impact they will have on the receiving environment, i.e. the environment before potential development. Negative visual impacts decrease the visual character of the pre-development environment. Neutral visual impacts assist to minimise the negative visual impacts of a development but do not result in a positive visual impact. A positive visual impact only occurs when an area is rehabilitated to a state that is better than the state of the pre-development environment, e.g. an infrastructure project area on previously agricultural land is rehabilitated to an area of natural vegetation and all visible signs of agriculture and infrastructure are removed. Positive visual impacts may only occur during the decommissioning and closure phase.

Although not specifically mentioned in the sections to follow, the following factors will be taken into consideration throughout the impact assessment:

- The external mitigatory factors relating to the baseline environment and outlined in Section 7.3;
- The relatively low increase in cumulative visibility from baseline conditions to the establishment of proposed infrastructures described in Section 8.3.6.

9.1. Construction Phase

Activities during the construction phase that may have potential visual impacts are as follows:

- Site clearing for the construction of the new TSF, plant and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.
- Construction of the new TSF, plant and abovementioned ancillary infrastructure.

The anticipated visual impacts of both site-clearing and construction activities are aimed at minimising the extent to which these activities will be visible towards receptors within the ZVI by (i) limiting activities do the immediate footprints of the various infrastructure types, and (ii) using a phased approach to minimise visibility at given points in time throughout the construction phase. Given that site clearing and construction activities are expected to have similar visual impacts with the same mitigation measures proposed, these impacts are addressed together and presented in Table 9-1 below.

Table 9-1: Impact Ratings - Construction Phase

Dimension	Rating	Motivation	Significance
Site Clearing for Proposed Infrastructure Development			
Impact Description: Visuals impacts associated with the construction of the new TSF, plant and ancillary infrastructure such as pipelines, pump stations, electrical supply etc.			
Prior to Mitigation/Management			

Dimension	Rating	Motivation	Significance
Site Clearing for Proposed Infrastructure Development			
Duration	3	Site clearing activities and the construction of the proposed plant (and ancillary infrastructure), the West Wits TSF and additional TSF alternative sites is expected to take place during the first six years of the proposed development.	Minor (negative) -49
Extent	2	Although the visual impact of site clearing and construction activities is likely extend beyond the site, the extent of the impact is limited when taking into consideration the effect of cumulative visibility.	
Intensity	2	Minor impact on the visual aesthetic character within the visible region of the receiving environment due to the locations already-altered state.	
Probability	7	The development of the mine infrastructure is necessary in order to operate the mining operation.	
Nature	*Negative*		
Mitigation/Management Actions			
Ensure that any site clearing activities are limited to the immediate footprints of the proposed infrastructure to minimise visual impacts (dust generation, high-contrasting surfaces, etc).			
Consider a phased construction approach to various infrastructure areas to minimise the visibility of the different infrastructure developments at specific points in time. It must be noted that a phased construction approach is likely to impact on the duration of the development.			
Post-Mitigation			
Duration	3	The duration cannot be mitigated - This is an operational requirement.	Minor (negative) -42

Dimension	Rating	Motivation	Significance
Site Clearing for Proposed Infrastructure Development			
Extent	1	The mitigation measures proposed above are likely to result in the lowering of the visual impact by reducing the extent of the activities.	
Intensity	2	By adopting a phased construction approach, the intensity can be reduced.	
Probability	7	While mitigation measures are suggested, the probability remains unchanged with site clearing and infrastructure construction are essential for the operation of the mine.	
Nature	*Negative*		

9.2. Operational Phase

Activities during the operational phase that may have potential visual impacts are as follows:

- Operations relating to the proposed plant and ancillary infrastructure:
  - Operation of pump stations during the operational phase;
  - Maintenance of pipeline routes during the operational activities;
  - Production of Gold;
  - Employment and procurement for operational related activities.
- West Wits TSF:
  - Tailings Deposition into the existing West Wits Pit;
  - Development and Operation of the proposed TSF.
- 1L23-1L25 TSF (North and South):
  - Hydraulic reclamation of the associated historic tailings facilities and sand dumps;
  - Tailings deposition onto the historic footprint of 1L23-1L25.

The visual impacts expected to arise from the operational phase activities are presented in Tables 9-2 to 9-5 below.

Table 9-2: Impact Ratings (Operational Phase) - Plant Area and Ancillary Infrastructure

Dimension	Rating	Motivation	Significance
Operations surrounding to the proposed plant and ancillary infrastructure			
Operation of pump stations during the operational phase; *Maintenance of pipeline routes during the operational activities;* *Production of Gold;* *General Operational activities.*			
Prior to Mitigation/Management			
Duration	6	The plant is an operational requirement and will exist throughout the operation of the mine.	Minor (negative) -70
Extent	2	The visual impact of the plant area and general operations is mostly limited to the immediate surroundings of the site where there is a high density of population receptors. The overall visibility through the zone of visual influence, however, is very low and limited to the south of the site due to visual screening by other proposed facilities. Taking into consideration the effect of cumulative visibility the extent of the impact is limited.	
Intensity	2	The expected visibility of the plant and ancillary infrastructure is expected to be significantly lower than the proposed TSFs and therefore result in a significantly lower relative intensity.	
Probability	7	The development of the mine infrastructure is necessary in order to operate the mining operation.	
Nature	*Negative*		
Mitigation/Management Actions			
The effective usage and placement of berms or vegetated screens around the plant infrastructure will mitigate some of the visual impact to the surrounding community.			

Dimension	Rating	Motivation	Significance
The intensity of the plant's visual impact can be reduced slightly by utilising neutral colours that allow for more effective visual absorption.			
Post-Mitigation			
Duration	6	The duration cannot be mitigated - This is an operational requirement.	Minor (negative) -56
Extent	1	The mitigation measures proposed above are likely to result in the lowering of the extent of the visual impact by reducing the visibility of plant infrastructure to the surrounding community.	
Intensity	1	The mitigation measures proposed above are likely to result in a lowering of the intensity of the visual impact by improving the visual absorption associated with plant infrastructure.	
Probability	7	While mitigation measures are suggested, the probability remains unchanged with general operational activities described above remaining essential for the functioning of the mine.	
Nature	*Negative*		

Table 9-3: Impact Ratings (Operational Phase) - Proposed West Wits TSF

Dimension	Rating	Motivation	Significance
Operational Aspects of the Proposed West Wits TSF			
Development and Operation of the proposed TSF; *Tailings Deposition into the existing West Wits Pit.*			
Prior to Mitigation/Management			
Duration	6	The TSF is an operational requirement and will exist throughout the operation of the mine.	Moderate (negative) -77

Dimension	Rating	Motivation	Significance
Extent	2	Although The West Wits TSF is expected to have a moderate -to-high visibility from all identified receptors and the highest overall visibility of all the proposed infrastructure, the extent of the impact is limited when taking into consideration the effect of cumulative visibility.	
Intensity	3	As the most prominent features in the mine design, the TSF would typically have a high intensity visual impact. The high presence of TSF and other mining-related landforms within the immediate environment, however, may be considered a major mitigatory factor..	
Probability	7	The development of the TSF is necessary for the operation of the mine.	
Nature	*Negative*		
Mitigation/Management Actions			
The application of planned in-situ rehabilitation on the West Wits TSF.			
Ensuring that any operational phase site clearing activities are limited to the immediate footprints of the proposed infrastructure to minimise visual impacts (dust generation, high-contrasting surfaces, etc).			
The effective use of on-site screening mechanisms (e.g. berms) may act in reducing the visibility of the TSF to local communities in the immediate surroundings. It should be noted that such mechanisms would not reduce visibility to road and protected area receptors and would arguably have a minimal mitigatory impact on the visual character of the immediate surroundings due to the high presence of existing mining-related landforms that form part of the local visual character.			
Post-Mitigation			

Dimension	Rating	Motivation	Significance
Duration	6	The duration cannot be mitigated - This is an operational requirement.	Minor (negative) -63
Extent	1	Although the effective use of screening mechanisms are not expected to reduce the visibility of the TSF to Road and Protected Area receptors, it is likely to reduce the visibility thereof to immediately surrounding communities.	
Intensity	2	The expected intensity of the visual impact of the TSF is already reduced due to the current visual character if the surrounding environment and the planned progressive rehabilitation activities. The effective use of screening mechanisms may reduce direct visibility to the population receptors in the immediate environment..	
Probability	7	While mitigation measures are suggested, the development of the TSF remains necessary for the operation of the mine.	
Nature	*Negative*		

Table 9-4: Impact Ratings (Operational Phase) - Proposed 1L23-1L25 (North) TSF

Dimension	Rating	Motivation	Significance
Operational Aspects of the Proposed 1L23-1L25 (North) TSF			
Development and Operation of the proposed TSF; *Tailings Deposition into the existing 1L23 – 1L25 (North).*			
Prior to Mitigation/Management			

Dimension	Rating	Motivation	Significance
Duration	6	The TSF is an operational requirement and will exist throughout the operation of the mine	Moderate (negative) -77
Extent	2	Although the 1L23 – 1L25 (North) TSF is expected to be moderately visible from identified receptors and the second highest overall visibility of all the proposed infrastructure, the extent of the impact is limited when taking into consideration the effect of cumulative visibility.	
Intensity	3	As one of the one of the most prominent features in the mine design, the TSF would typically have a high intensity visual impact. The high presence of TSF and other mining-related landforms within the immediate environment, however, may be considered a major mitigatory factor.	
Probability	7	The development of the TSF is necessary for the operation of the mine.	
Nature	*Negative*		
Mitigation/Management Actions			
The application of planned in-situ rehabilitation on the 1L23 – 1L25 (North) TSF.			
Ensuring that any operational phase site clearing activities are limited to the immediate footprints of the proposed infrastructure to minimise visual impacts (dust generation, high-contrasting surfaces, etc).			
The effective use of on-site screening mechanisms (e.g. berms) may act in reducing the visibility of the TSF to local communities in the immediate surroundings. It should be noted that such mechanisms would not reduce visibility to road and protected area receptors and would arguably have a minimal mitigatory impact on the visual character of the immediate surroundings due to the high presence of existing mining-related landforms that form part of the local visual character.			

Dimension	Rating	Motivation	Significance
Post-Mitigation			
Duration	6	The duration cannot be mitigated - This is an operational requirement.	Moderate (negative) -63
Extent	1	Although the effective use of screening mechanisms are not expected to reduce the visibility of the TSF to Road and Protected Area receptors, it is likely to reduce the visibility thereof to immediately surrounding communities.	
Intensity	2	The expected intensity of the visual impact of the TSF is already reduced due to the current visual character if the surrounding environment and the planned progressive rehabilitation activities. The effective use of screening mechanisms may reduce direct visibility to the population receptors in the immediate environment. .	
Probability	7	While mitigation measures are suggested, the development of the TSF remains necessary for the operation of the mine.	
Nature	*Negative*		

Table 9-5: Impact Ratings (Operational Phase) - Proposed 1L23-1L25 (South) TSF

Dimension	Rating	Motivation	Significance
Operational Aspects of the Proposed 1L23-1L25 (South) TSF			
Development and Operation of the proposed TSF; *Tailings Deposition into the existing 1L23 – 1L25 (South).*			
Prior to Mitigation/Management			

Dimension	Rating	Motivation	Significance
Duration	6	The TSF is an operational requirement and will exist throughout the operation of the mine	Minor (negative) -70
Extent	2	The 1L23 – 1L25 (South) TSF is expected to have a low-to-very low visibility to identified receptors except for population receptors in the immediate vicinity.	
Intensity	2	The proposed 1L23-1L25 (South) TSF is one of the less prominent features within the planned layout. Almost completely screened to the north and not being visible to the majority of receptors, the TSF is expected to have a minor intensity impact. In addition, factors such as the low expected visual intrusion on the existing landscape and planned progressive rehabilitation approach is expected to further reduce the intensity of its visual impact.	
Probability	7	The development of the TSF is necessary for the operation of the mine.	
Nature	*Negative*		
Mitigation/Management Actions			
The application of planned in-situ rehabilitation on the 1L23 – 1L25 (North) TSF.			
Ensuring that any operational phase site clearing activities are limited to the immediate footprints of the proposed infrastructure to minimise visual impacts (dust generation, high-contrasting surfaces, etc).			
The effective use of on-site screening mechanisms (e.g. berms) may act in reducing the visibility of the TSF to local communities in the immediate surroundings. It should be noted that such mechanisms would not reduce visibility to road and protected area receptors and would arguably have a minimal mitigatory impact on the visual character of the immediate surroundings due to the high presence of existing mining-related landforms that form part of the local visual character.			

Dimension	Rating	Motivation	Significance
Post-Mitigation			
Duration	6	The duration cannot be mitigated - This is an operational requirement.	Minor (negative) -63
Extent	1	The extent of the visibility of the 1L23-1L25 (South) TSF is already relatively low compared to other proposed infrastructure. Effective visual screening mechanisms would reduce the extent of visibility even further.	
Intensity	2	The expected intensity of the visual impact of the TSF is already reduced due to the current visual character of the surrounding environment and the planned progressive rehabilitation activities. The effective use of screening mechanisms may reduce direct visibility to the population receptors in the immediate environment.	
Probability	7	While mitigation measures are suggested, the development of the TSF remains necessary for the operation of the mine.	
Nature	*Negative*		

9.3. Decommissioning and Closure

Visual Impacts associated with decommissioning and closure activities are assessed by comparing the visual impacts at baseline conditions with the expected visual impacts thereof after the implementation of recommended closure and rehabilitation measures as outlined in DWE (2021a).

The expected visual impacts at baseline conditions result from the visibility of existing unvegetated TSFs, Waste Rock Dumps, and visually intrusive Infrastructure Elements.

The closure and rehabilitation measures outlined in the DWE (2021a) have been developed to meet a stable and sustainable end state post-mining and may be summarised as follows:

- Removal of buildings, concrete structures and any other infrastructure;

- Levelling and shaping of rehabilitated areas; and
- *In situ* rehabilitation of TSFs and Sand Dumps.

The expected visual impacts associated with the Decommissioning and Closure phase are presented in Table 9-6.

Table 9-6: Impact Ratings: Decommissioning and Closure

Dimension	Rating	Motivation	Significance
Visual Impacts: Baseline Conditions			
Visibility of existing unvegetated TSFs, Waste Rock Dumps, and visually intrusive Infrastructure Elements.			
Prior to Mitigation/Management			
Duration	6	TSFs, Sand Dumps, Waste Rock Dumps are present at baseline conditions as well as the commencement of closure & rehabilitation activities and are expected to be permanent landscape fixtures indefinitely.	Moderate (negative) -77
Extent	3	The extent of prominent features at baseline conditions is moderate-to-relatively high throughout the ZVI.	
Intensity	2	The intensity of visual impacts at baseline conditions is minor considering the current visual & aesthetic character of the surrounding environment.	
Probability	7	Baseline conditions refer to the current characteristics of the site and receiving environment. Probability remains unchanged.	
Nature	*Negative*		
Mitigation/Management Actions			

Dimension	Rating	Motivation	Significance
Removal of buildings, concrete structures, and any other infrastructure;			
Levelling and shaping of rehabilitated areas;			
In situ rehabilitation of TSFs and Sand Dumps;			
Decommissioning & Closure: *Post-Mitigation*			
Duration	6	The duration cannot be mitigated - The TSFs are expected to be permanent landscape features post - decommissioning and closure.	Minor (Positive) 63
Extent	1	The removal of buildings and concrete structures are expected to result in a slight reduction in overall visibility and an improvement to visual absorption. Taking into consideration the effect of cumulative visibility, the extent of the visual impact is very limited.	
Intensity	1	Considering the characteristics of the site under baseline conditions, the implementation of the above mitigation/management actions is expected to result in a positive visual impact..	
Probability	7	The probability remains unchanged.	
Nature	*Positive*		

10. Conclusions & Recommendations

10.1. Visual/Aesthetic Character

The visual / aesthetic character of the environment surrounding the proposed operation may be described as largely urban and highly modified. In addition, the MCLM has historically been a key focal point of South Africa's gold-mining sector with mine shafts and TSFs prominent throughout the municipality. It may be argued that mining-related landmarks form a key part

of the visual / aesthetic character of the environment and that the area has a very high visual absorption capacity for the proposed operation.

10.2. Visibility

Potential sensitive receptors within the 20km ZVI surrounding the proposed facilities were identified based on available data. The receptors identified include: (i) population receptors comprised of dwellings contained within the Eskom Spot Building count, (ii) transport receptors, i.e. the N1, N12 and N14 national highways, and a number of (iii) protected area receptors including the Walter Sisulu National Botanical Gardens and the Cradle of Humankind World Heritage Site.

The overall visibility of the infrastructure elements to the potential sensitive receptors is largely determined by the visibility of the most prominent feature, in this case, the proposed West Wits TSF. The West Wits TSF is expected to be highly visible from the surrounding population, moderately visible from the N14 national highway and highly visible from three of the protected areas (including the Cradle of Humankind World Heritage Site). The 1L23 - 1L25 (North) TSF is expected to exhibit the second-highest visibility to potential sensitive receptors, with a very high expected visibility from the population receptors and a zero, low and very low expected visibility from the remaining ten receptors. The expected visibility associated with the remainder of the infrastructure elements is generally zero with the exception of the population surrounding the proposed operations.

A comparison of the modelled visibility of the site under baseline conditions and the overall visibility footprint of the proposed infrastructure elements indicate that the infrastructure elements present at baseline conditions are visible from 82.74% of the area from which the proposed infrastructure elements would be visible. The increase in the cumulative visibility resulting from the proposed operations is therefore 17.26%.

10.3. Visual Impact

Mainly driven by the duration and probability of the infrastructure elements considered in this assessment and the fact that neither of these components can be changed, the visual impact of the proposed operations during the operational phase is expected to be **minor-negative**.

The extent of the visual impacts of the proposed operations is significantly reduced throughout the impact assessment owing to the relatively low contribution of the proposed infrastructure elements to the cumulative visibility of the elements at the site. In all cases the extent was found to be limited.

Two key external mitigatory factors that play a role in reducing the expected visual impacts across all the infrastructure elements. These are as follows:

- The current visual / aesthetic character of the surrounding environment of which mining related infrastructure forms a significant part.

- The site itself is characterised by largely unrehabilitated surfaces and visually intrusive structural elements.

Taking into consideration the visual/aesthetic character of the surrounding environment and the baseline conditions at the site it is expected that the measures proposed in DWE (2021a) (and included in this impact assessment as potential mitigation measures) would result in a **minor-positive** visual impact at the conclusion of the decommissioning and closure phase.

10.4. Recommendations

Mitigation measures are proposed throughout the impact assessment section of this report. These are as follows:

- The establishment of visual screening mechanisms surrounding the infrastructure elements to reduce visibility from the immediately surrounding population;
- The use of neutral colours for plant-infrastructure to increase visual absorption by the surrounding environment;
- Limiting site clearing activities to the immediate footprints of the proposed infrastructure elements;
- The implementation of the following closure and rehabilitation measures outlined in the DWE (2021a):
    - Removal of buildings, concrete structures, and any other infrastructure;
    - Levelling and shaping of rehabilitated areas; and
    - In situ rehabilitation of TSFs and Sand Dumps.

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