Seriti Power (Pty) Ltd

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED NAUDESBANK COLLIERY

DMRE REF. NO.: MP 30/5/1/2/3/2/1 (10389) EM

August 2023

Project No.: A1284C

Report No.: ZC_1467

Client:

Seriti Power (Pty) Ltd

15 Chaplin Street, c/o Chaplin and Oxford Streets

Illovo

1039

OBJECTIVES OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The objective of the environmental impact assessment process is to, through a consultative process:

(a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;

(c) identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

(d) determine the:

  (i) nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and

  (ii) degree to which these impacts:

    (aa) can be reversed;

    (bb) may cause irreplaceable loss of resources, and

    (cc) can be avoided, managed or mitigated;

(e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the development footprint of the approved site as contemplated in the accepted scoping report through the life of the activity;

(g) identify suitable measures to avoid, manage or mitigate identified impacts; and

(h) identify residual risks that need to be managed and monitored.

PROJECT DETAILS

Client Details	
Name of Project:	Naudesbank Colliery
DMRE Reference:	MP 30/5/1/2/3/2/1 (10389) EM
Contact person:	Mr. SE Van der Weshuizen
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E-mail:	Etienne.vanderWesthuizen@seritiza.com
EAP Details	
Environmental Consultant (EAP):	Zyntha Consulting (Pty) Ltd
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Compiled by:	Christelle Swanepoel
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Expertise of EAP:	**Jaco Kleynhans –** Professional Engineer, registered with ECSA (Engineering Council of South Africa, No. 940108). Registered Environmental Assessment Practitioner, registered with EAPASA: 2020/2255. Jaco Kleynhans is a professional engineer and EAP whom conducted closure cost assessments and practised environmental management for more than 24 years. During that period, he worked as an environmental manager at two large mines for 10 years where after he has been an environmental consultant. As environmental consultant he compiles and reviews various closure cost assessments and conducted various due diligence assessments. Refer to **Annexure 1** for the Expertise and Curriculum Vitae of Jaco Kleynhans. **Christelle Swanepoel –** Registered Environmental Assessment Practitioner: Number 2020/2106 Christelle Swanepoel is a registered EAP and has practised environmental management for more than 5 years. During this period she worked on various S&EIA Projects. As an environmental consultant she compiles and reviews various assessments and also conducts various due diligence assessments.

EXECUTIVE SUMMARY

Seriti is in the process of converting the Prospecting Right (DMRE Ref. No.: **MP 30/5/1/1/2/1057 PR**) to a Mining Right, but an application for Environmental Authorisation to satisfy the requirements of the National Environmental Management Act, Act 107 of 1998 (as amended) (NEMA) is also required. An application for authorisation in terms of Section 24 of the NEMA was submitted to the Department of Mineral Resources and Energy (DMRE) on 10 February 2023. The Final Scoping Report was accepted on 26 May 2023.

Naudesbank is located approximately 8 km west-southwest of Carolina in the Mpumalanga Province of South Africa. The project is situated in the Chief Albert Luthuli Local Municipality within the Gert Sibande District Municipality. The project area extends over various portions of the farms Vaalbult 3 IT, Steynsdraai 46 IT, Jaglust 47 IT, Twyfelaar 171 IS, Naudesbank 172 IS, Kromkrans 208 IS and Vaalwater 173 IS.

Seriti intends to conduct opencast roll over mining using truck and shovel mining methods. Underground mining is also planned via bord-and-pillar mining methods utilising mechanised or conventional mining methods. Access to underground mining areas will be obtained via the opencast pits and possibly from adjacent opencast operations. Run of Mine (RoM) coal will be processed at the on-site crushing and screening plant. Coal products will be transported off-site to various clients. The Life-of-Mine (LoM) is estimated to be 23 years with an expected production of 51 million tonnes of RoM coal during the entire operational period. The project will have opencast areas totalling 487.71 ha and underground areas totalling 922.58 ha. Other infrastructure will include workshops, offices, change houses, water management infrastructure, access roads, sub-station, diesel bay, and stockpiles.

Sensitive Features Identified in Baseline

The baseline has been discussed in detail in **Section 8** of the report. The sensitivities identified included: -

- High potential agricultural soils.
- Sensitive hydropedological zones where interflow soils have been identified.
- Various wetland systems which are largely in a natural to moderately modified state. Ecological importance and sensitivity of these wetlands range from moderate to very high.
- Extensive network of boreholes and fountains have been identified during the hydrocensus. Groundwater is mainly used for potable use and livestock watering.
- The area is located within the Endangered Eastern Highveld Grassland Ecosystem. Irreplaceable and Optimal Critical Biodiversity Areas occur throughout the Mining Right

Area.

- Two threatened floral species have been observed on-site namely *Khadia carolinensis* (Vulnerable) and Sensitive Species 1200 (Endangered). Protected species in terms of the Mpumalanga Nature Conservation Act was also observed.
- There is a high probability that protected faunal species occur in the area. During the field assessments three protected avifauna species were identified:
  - Southern Bald Ibis, Vulnerable.
  - White-bellied Korhaan, Vulnerable.
  - Lesser Jacana, Vulnerable.
- The project is located within Quaternary Catchments X11A and X11B of the Inkomati Management Area.
- Surface water qualities in the area range from excellent to poor. Agricultural and surrounding mining activities have already impacted on the catchment to an extent.
- With Naudesbank being located in the Highveld Priority Area, air quality in this region have already been impacted to some extent.
- Twenty-three air quality sensitive receptors have been identified for the project.
- Noise measurements in the area is typical of a rural-sub urban area. Twenty noise sensitive receptors were identified.
- Historical sites were identified within the area and includes the following:
  - Two sites of stone age material of low significance.
  - 9 clusters of farm related structures. Cultural/heritage importance ranges from low to high.
  - Three farm worker dwellings of low importance, but caution should be applied to unmarked burials.
- No paleontological material has been identified.

Expected Impacts

The impacts associated with Naudesbank have been identified in **Section 9** of the report. Alternative site layouts were considered in **Section 6**. The major impacts that can be expected are: -

- Loss of soil potentially through contamination, compaction and erosion. The current land use will temporarily change while some land capability will change. High potential soils will be impacted and arable land use will not be regained upon rehabilitation. The original opencast area was reduced significantly to minimise this impact.
- Topography will be altered, but mitigation during rehabilitation can restore the topography

to resemble the pre-mining environment.

- The geology will be permanently altered and a non-renewable resource will be utilised.
- Hydropedological flow losses have been quantified and it was concluded that lateral flow will reduce by 5.221% while percolation will reduce with 5.784%.
- Critical biodiversity areas will be impacted and faunal species will be disturbed or potentially killed. Floral species will be lost through the removal of vegetation. The original opencast area was reduced significantly to minimise this impact.
- Portions of wetlands will be lost resulting in more significant impacts however with the implementation of the hierarchy of control, the wetlands to be mined was reduced by 95.18%. An opencast area was further eliminated not only to preserve the wetlands by to not impose on protected species identified within this wetland system. Even though wetland losses have been reduced, edge effects on freshwater systems can also be expected.
- Dewatering and drawdown is expected to have an impact on numerous boreholes until the mining areas has flooded. Decant is expected to materialise after 1 year in some instances and impacts can be expected on water quality.
- The sense of place will change and visual instructions will occur.
- Deterioration of air quality in the region due to dust fallout and Particulate Matter. Contribution to climate change through GHG emissions however the impact is expected to be 0.096% on a national level.
- Background noise levels will increase with the project with some noise sources being sudden and short term (blasting, etc.) while noises from vehicles as well as daily operations being more of a continual source of noise.
- Blasting will have an impact on surrounding communities and potentially an impact on structures within 2 000 m of blasting areas.
- Road networks surrounding Naudesbank will be able to handle the expected increase and no detrimental impacts are expected.
- Positive socio-economic impacts include employment opportunities, contribution to GDP and human resource development. While negative impacts include increase in crime, disruption of daily lives, loss of agricultural jobs and influx of job seekers.

A Public Participation Process (PPP) was initiated which included the distribution of the Draft Scoping Report and a Background Information Document (BID). Consultation continued by announcing the project in the Daily Sun and by placing site notes. This process will continue with the issuing of this draft document for comment on 1 August 2023 for a period of 30 days.

DOCUMENT STRUCTURE

Number	GNR 982 of NEMA - Appendix 3 Description	Report Reference
3 (1)	An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—	
(a)	details of—	
(iii)	the EAP who prepared the report; and	Project Details – EAP Details
(iv)	the expertise of the EAP, including a curriculum vitae;	
(b)	the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:	
(i)	the 21 digit Surveyor General code of each cadastral land parcel;	Section 2.2
(ii)	where available, the physical address and farm name; and	Section 2.1 Section 2.2
(iii)	where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	N/A
(c)	a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is—	Section 2.3
(i)	a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;	N/A
(ii)	on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	N/A
(d)	a description of the scope of the proposed activity, including—	
(i)	all listed and specified activities triggered and being applied for; and	Section 3
(ii)	a description of the associated structures and infrastructure related to the development;	Section 7
(e)	a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Section 4
(f)	a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Section 5
(g)	a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Section 6

Number	GNR 982 of NEMA - Appendix 3 Description	Report Reference
(h)	a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:	
(i)	details of the development footprint alternatives considered;	Section 6
(ii)	details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 12
(iii)	a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Section 12.5.3
(iv)	the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 8
(v)	the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—	
(aa)	can be reversed;	Section 9.4 Section 9.5
(bb)	may cause irreplaceable loss of resources; and	
(cc)	can be avoided, managed or mitigated;	
(vi)	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;	Section 9.1 Section 9.2
(vii)	positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 6.3
(viii)	the possible mitigation measures that could be applied and level of residual risk;	Section 9.4 Section 9.5
(ix)	if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	Section 6.4
(x)	a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Section 6.5
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including—	
(i)	a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	Section 9 Section 10
(ii)	an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 9

Number	GNR 982 of NEMA - Appendix 3 Description	Report Reference
(j)	an assessment of each identified potentially significant impact and risk, including—	
(i)	cumulative impacts;	Section 9.5
(ii)	the nature, significance and consequences of the impact and risk;	Section 9.4 Section 9.5
(iii)	the extent and duration of the impact and risk;	
(iv)	the probability of the impact and risk occurring;	
(v)	the degree to which the impact and risk can be reversed;	
(vi)	the degree to which the impact and risk may cause irreplaceable loss of resources; and	
(vii)	the degree to which the impact and risk can be mitigated;	
(k)	where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Section 11
(l)	an environmental impact statement which contains—	
(i)	a summary of the key findings of the environmental impact assessment:	Section 10
(ii)	a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	Section 10
(iii)	a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 6
(m)	based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Section 11
(n)	the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 6 onwards
(o)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 15
(p)	a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 13
(q)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 14

Number	GNR 982 of NEMA - Appendix 3 Description	Report Reference
(r)	where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Section 17
(s)	an undertaking under oath or affirmation by the EAP in relation to—	
(i)	the correctness of the information provided in the reports;	Section 21
(ii)	the inclusion of comments and inputs from stakeholders and I&APs;	
(iii)	the inclusion of inputs and recommendations from the specialist reports where relevant; and	
(iv)	any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(t)	*Item 3(1)(t) deleted by regulation 22 of GN 517 dated 11 June 2021*	Section 18
(u)	an indication of any deviation from the approved scoping report, including the plan of study, including—	
(i)	any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	Section 16
(ii)	a motivation for the deviation;	
(v)	any specific information that may be required by the competent authority; and	Section 19.1
(w)	any other matters required in terms of section 24(4)(a) and (b) of the Act.	Section 19.2

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LIST OF ABBREVIATIONS

AIP:	Alien Invasive Plants
AQSR:	Air Quality Sensitive Receptor
BAS:	Best Attainable State
B-BBEE:	Broad-based Black Economic Empowerment
BID:	Background Information Document
CBA:	Critical Biodiversity Area
CALLM:	Chief Albert Luthuli Local Municipality
cm:	Centimetre
DALRRD:	Department of Agriculture, Land Reform and Rural Development
dBA:	A-weighted Decibel
DEA:	Department of Environmental Affairs
DWS	Department of Water and Sanitation
DFFE:	Department of Forestry, Fisheries and the Environment
DMRE:	Department of Mineral Resources and Energy
EA:	Environmental Authorisation
ECO:	Environmental Control Officer
EIA:	Environmental Impact Assessment
EIAR:	Environmental Impact Assessment Report
EIS:	Ecological Importance and Sensitivity
EMPr:	Environmental Management Programme
EN:	Endangered
ESA:	Ecological Support Area
GA:	General Authorisation
GDP:	Gross Domestic Product
GenN:	General Notice
GHG:	Greenhouse Gases
GN:	Government Notice
GNR:	Government Notice Regulation
GSDM:	Gert Sibande District Municipality
GW^2:	Groundwater Square
ha:	Hectare
HDPE:	High-density polyethylene
HGM:	Hydrogeomorphic
HPA:	Highveld Priority Area
HIA:	Heritage Impact Assessment
I&AP:	Interested and Affected Party

I&APs:	Interested and Affected Parties
IBA:	Important Birding Area
IDP:	Integrated Development Plans
IFC:	International Finance Corporation
IUCMA:	Inkomati-Usuthu Catchment Management Agency
km:	Kilometre
km^2:	Square kilometre
L:	Litre
LC:	Least Concern
LCT:	Leachable Concentration Threshold
LED:	Local Economic Development
LoM:	Life of Mine
mamsl:	Metres above sea level
MAE:	Mean Annual Evaporation
MAP:	Mean Annual Precipitation
MAR:	Mean Annual Runoff
mbgl:	Metres below ground level
m:	Metre
mg:	Milligram
mm:	Millimetre
m^2:	Square metre
m^3:	Cubic metre
MNCA:	Mpumalanga Nature Conservation Act 10 of 1998
MPRDA:	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MRA:	Mining Right Application Area
MTPA:	Mpumalanga Tourism and Parks Agency
NDP:	National Development Plan
NEMA:	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA:	National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004)
NEMWA:	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NHRA:	National Heritage Resources Act, 1999 (Act 25 of 1999)
NOx:	Oxides of Nitrogen
NSR:	Noise Sensitive Receptor
NT:	Near-threatened
NWA:	National Water Act, 1998 (Act 36 of 1998)
OC:	Opencast
PCD:	Pollution Control Dam
PES:	Present Ecological State
PM:	Particulate matter
PM_{10}:	Thoracic particulate matter

$PM_{2.5}$:	Respirable particulate matter
POC:	Probability of Occurrence
PP:	Public Participation
PPE:	Personal Protective Equipment
PPP:	Public Participation Process
PPR:	Public Participation Report
REC:	Recommended Ecological Category
RMO:	Resource Management Objective
RoM:	Run of Mine
RQO:	Resource Quality Objectives
s:	Second
SAAQIS:	South African Air Quality Information System
SAHRA:	South African Heritage Resources Agency
SANBI:	South African National Biodiversity Institute
SANRAL:	South African National Roads Agency
SANS:	South African National Standards
SAWQG:	South African Water Quality Guidelines
SAWS:	South African Weather Service
SCC:	Species of Conservation Concern
S&EIR:	Scoping & Environmental Impact Reporting
SLP:	Social and Labour Plan
SMME:	Small, Medium and Micro-Sized Enterprises
SO_2:	Sulphur Dioxide
SO_4:	Sulphate
StatsSA:	Statistics South Africa
SWMP:	Surface Water Management Plan
TCT:	Total Concentration Threshold
UG:	Underground
VAT:	Value Added Tax
VU:	Vulnerable
WMA:	Water Management Agency
WML:	Waste Management Licence
WUL:	Water Use Licence
WULA:	Water Use Licence Application
µg:	Microgram

1 INTRODUCTION AND BACKGROUND

1.1 Background

Zyntha Consulting (Pty) Ltd ("Zyntha") has been appointed by Seriti Power (Pty) Ltd ("Seriti") to undertake the Scoping and Environmental Impact Reporting (S&EIR) process required in support of the Environmental Authorisation (EA) Application for the proposed Naudesbank Colliery. Seriti is in the process of converting the Prospecting Right (DMRE Ref. No.: **MP 30/5/1/1/2/1057 PR)** to a Mining Right, but an application for EA to satisfy the requirements of the National Environmental Management Act, Act 107 of 1998 (as amended) (NEMA) is also required. A Mining Right and EA Application was lodged on 10 February 2023 (DMRE Ref. No.: **MP 30/5/1/2/2/10389 MR).** The project will be known as Naudesbank Colliery.

Seriti intends to conduct opencast roll over mining using truck and shovel mining methods. Box-cuts will be developed and the topsoil will be stockpiled. During the development of the box-cut, the overburden material is removed and stockpiled. Once the coal is mined out, the next mining strip is stripped of topsoil and the overburden material is blasted. The materials are transported via trucks into the strip that was just mined out. This method of mining will continue until the final cut is mined.

Underground mining is also planned via bord-and-pillar mining methods utilising mechanised or conventional mining methods. Access to underground mining areas will be obtained via the opencast pits and possibly from adjacent opencast operations. In bord-and-pillar mining, parallel roadways are developed in the direction of advance. Perpendicular roads, called splits, are developed at predetermined intervals to parallel roads. These roads interlink, creating pillars. The underground panel widths are determined by the size of the pillars required to support the overburden above the coal seam and the length of the production equipment's trailing cables. In between mining panels are barrier pillars which carries the abutment stress and therefore breaks the span of the panels who assist with the overall mine stability. The road width design is approximately 6.0 – 7.2 m wide with an average mining height of 1.8 m. The pillar size determined by the safety factor formula results in the pillar strength divided by the pillar load. No pillar extraction is planned. Refuge bay boreholes and ventilation shaft will also be developed for the underground mining areas.

Run of Mine (RoM) coal will be processed at the on-site crushing and screening plant. Coal products will be transported off-site to various clients. The Life-of-Mine (LoM) is estimated to be 23 years with an expected production of 51 million tonnes of RoM coal during the entire operational period. The project will have opencast areas totalling 487.71 ha and underground areas totalling 922.58 ha. Other infrastructure will include workshops, offices, change houses, water management infrastructure, access roads, sub-stations, diesel bays, weighbridges, and stockpiles.

2 LOCALITY OF THE PROJECT

2.1 Location

Naudesbank is located approximately 8 km west-southwest of Carolina in the Mpumalanga Province of South Africa. The project is situated in the Chief Albert Luthuli Local Municipality (CALLM) within the Gert Sibande District Municipality (GSDM). Refer to **Figure 1** and **Figure 2** for more detail.

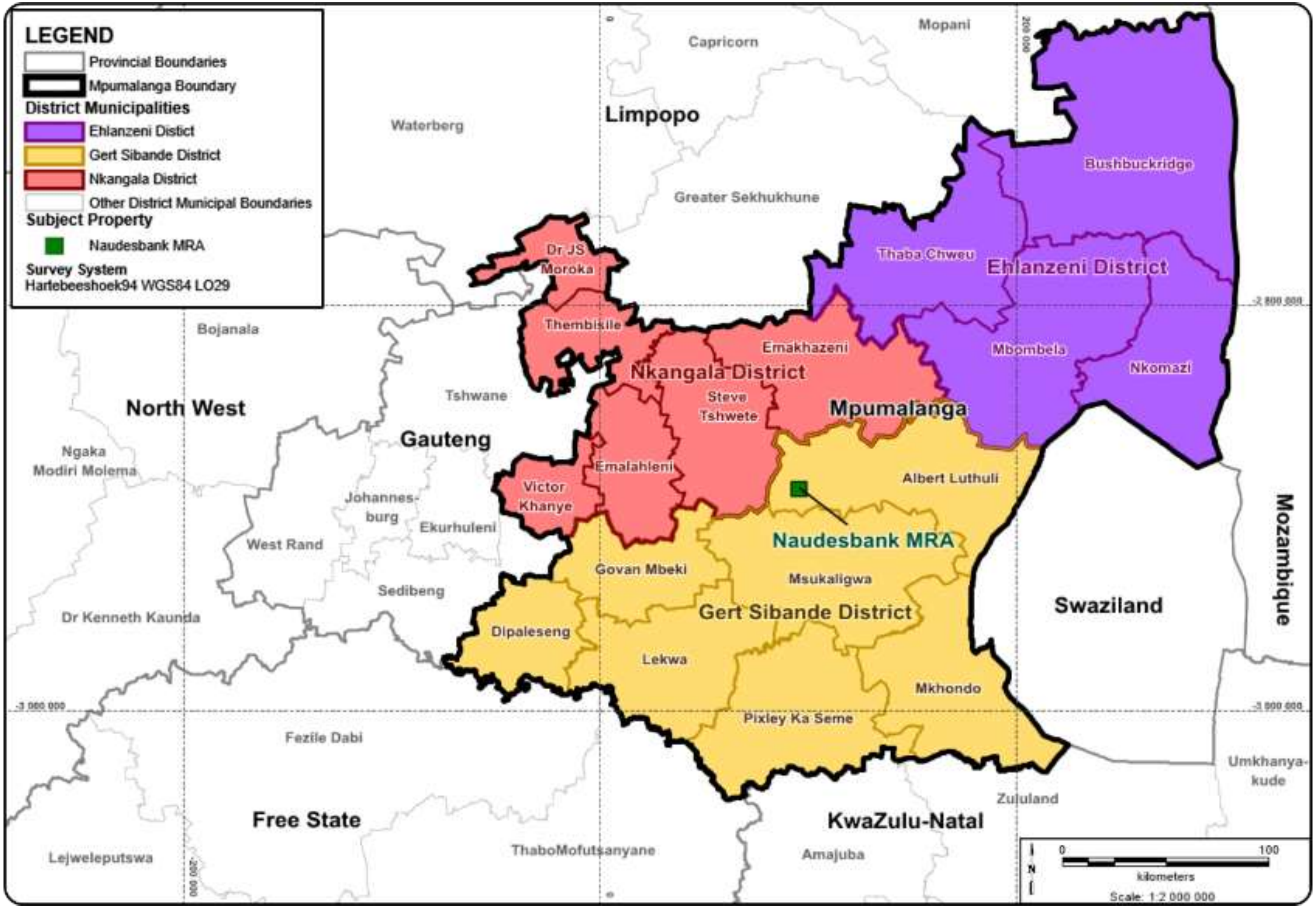


Figure 1: Locality Map of Naudesbank

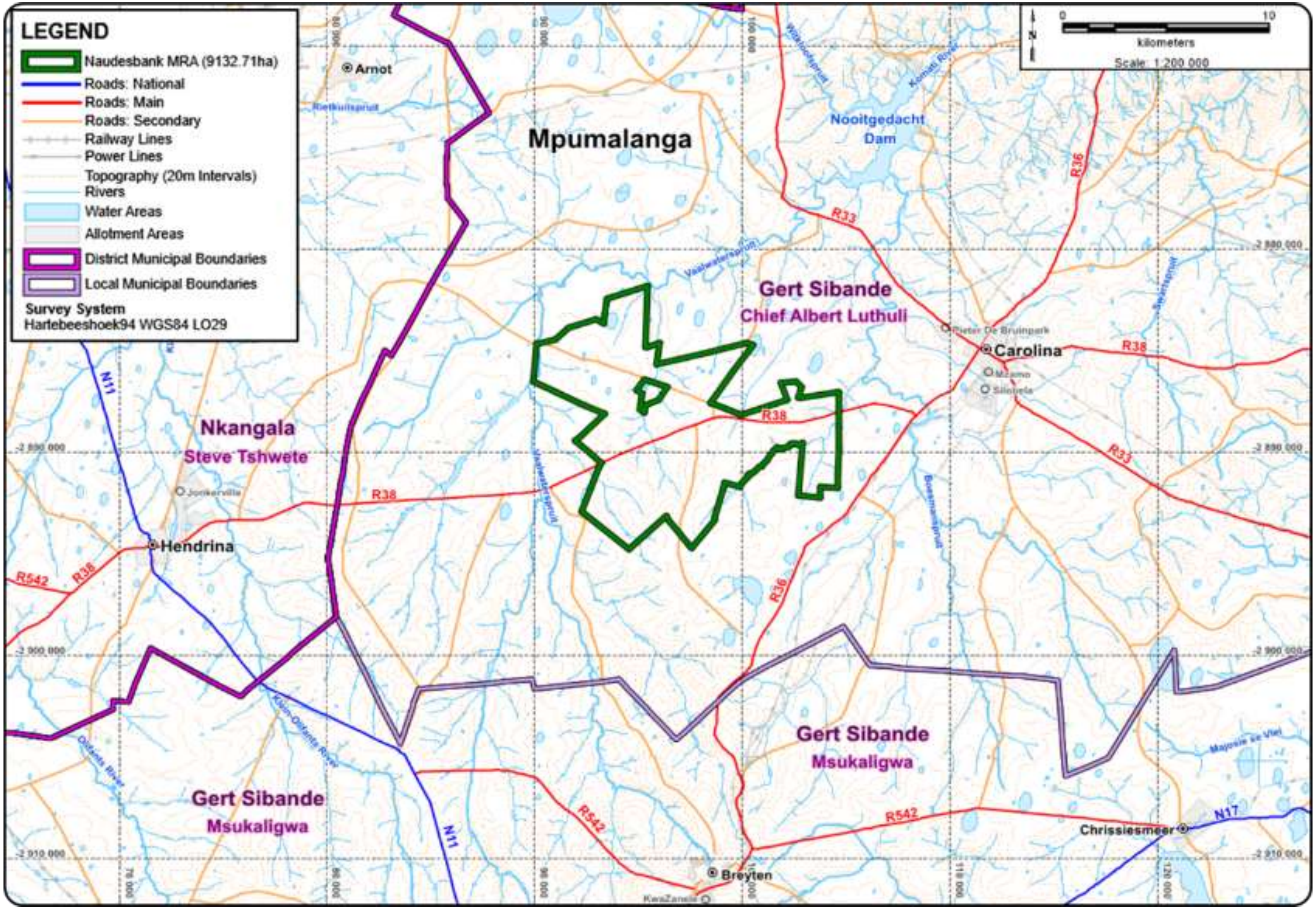


Figure 2: Regional Locality Map

2.2 Properties

Refer to **Table 1** and **Figure 3** for the property owners. The Windeed Property Reports are attached as **Annexure 2**.

Table 1: Landowners

Farm Name	Portion	Registered Owner	Title Deed	21 Digit Surveyor General Code
Vaalbult 3 IT	3	S J M Trust	T1256/2011	T0IT00000000000300003
Vaalbult 3 IT	4	S J M Trust	T1256/2011	T0IT00000000000300004
Vaalbult 3 IT	5	S J M Trust	T1256/2011	T0IT00000000000300005
Vaalbult 3 IT	6	S J M Trust	T12252/2016	T0IT00000000000300006
Vaalbult 3 IT	7	Charles Benjamin de Villiers	T1792/2020	T0IT00000000000300007
Vaalbult 3 IT	8	Barend Jacobus van der Merwe	T13017/2012	T0IT00000000000300008
Vaalbult 3 IT	11	S J M Trust	T1256/2011	T0IT00000000000300011
Vaalbult 3 IT	12	S J M Trust	T1256/2011	T0IT00000000000300012
Steynsdraai 46 IT	4	Christiaan Willem Adriaan Bierman	T48579/2002	T0IT00000000004600004
Steynsdraai 46 IT	11	Christiaan Willem Adriaan Bierman	T48580/2002	T0IT00000000004600011
Jagtlust 47 IT	2	Juanco Trust	T6634/2002	T0IT00000000004700002
Jagtlust 47 IT	3	Jan Hendrik Combrink	T6634/2002	T0IT00000000004700003
Jagtlust 47 IT	4	Jan Hendrik Combrink	T43065/1969	T0IT00000000004700004
Jagtlust 47 IT	5	Msobo Coal (Pty) Ltd	T5438/1979	T0IT00000000004700005
Jagtlust 47 IT	6	South African National Roads Agency SOC Ltd (SANRAL)	T6506/2013	T0IT00000000004700006
Jagtlust 47 IT	7	SANRAL	Not in Windeed (R38)	T0IT00000000004700007
Jagtlust 47 IT	8	SANRAL	Not in Windeed (R38)	T0IT00000000004700008
Twyfelaar 171 IS	3	Paula Frances Janse Van Rensburg	Not in Windeed (R38)	T0IS00000000017100003
Naudesbank 172 IS	1	Charles Benjamin de Villiers	T90942/1995	T0IS00000000017200001
Naudesbank 172 IS	2	Theodor Trust	T10148/2010	T0IS00000000017200002
Naudesbank 172 IS	3	Gertruida Jacomina Petronella Wright	T56650/1986	T0IS00000000017200003
Naudesbank 172 IS	4	Moeder Natuur Se Produkte (Pty) Ltd	T9330/2012	T0IS00000000017200004
Naudesbank 172 IS	5	D V Trust	T14571/2013	T0IS00000000017200005
Naudesbank 172 IS	6	Nova Trust	T58/2007	T0IS00000000017200006
Naudesbank 172 IS	7	Anna Magrieta Gebhardt	T152281/2001	T0IS00000000017200007
Naudesbank 172 IS	8	Gertruida Jacomina Petronella Wright	T56650/1986	T0IS00000000017200008

Farm Name	Portion	Registered Owner	Title Deed	21 Digit Surveyor General Code
Naudesbank 172 IS	9*	Charles Benjamin de Villiers	T142618/2004	T0IS00000000017200009
Naudesbank 172 IS	10	Ingwe Surface Holdings (Pty) Ltd	T76583/1999	T0IS00000000017200010
Naudesbank 172 IS	11	D V Trust	T14571/2013	T0IS00000000017200011
Naudesbank 172 IS	12	D V Trust	T14571/2013	T0IS00000000017200012
Naudesbank 172 IS	13	Anna Magrieta Gebhardt	T54887/1997	T0IS00000000017200013
Naudesbank 172 IS	14	Nova Trust	T58/2007	T0IS00000000017200014
Naudesbank 172 IS	15	Ingwe Surface Holdings (Pty) Ltd	T10532/2010	T0IS00000000017200015
Naudesbank 172 IS	16	Gideon Albertus Gebhardt	T43215/1987	T0IS00000000017200016
Naudesbank 172 IS	17	Theodor Trust	T8243/2010	T0IS00000000017200017
Naudesbank 172 IS	18	Theodor Trust	T10148/2010	T0IS00000000017200018
Naudesbank 172 IS	19	SANRAL	Not in Windeed (R38)	T0IS00000000017200019
Naudesbank 172 IS	20	SANRAL	Not in Windeed (R38)	T0IS00000000017200020
Naudesbank 172 IS	21	SANRAL	Not in Windeed (R38)	T0IS00000000017200021
Naudesbank 172 IS	23	SANRAL	Not in Windeed (R38)	T0IS00000000017200023
Naudesbank 172 IS	24	SANRAL	Not in Windeed (R38)	T0IS00000000017200024
Naudesbank 172 IS	25	SANRAL	Not in Windeed (R38)	T0IS00000000017200025
Vaalwater 173 IS	3	Muhanga Mines (Pty) Ltd	T6545/2019	T0IS00000000017300003
Vaalwater 173 IS	4	Vaalwaterspruit Trust	T82133/2003	T0IS00000000017300004
Vaalwater 173 IS	7	Paula Frances Janse Van Rensburg	T166741/2006	T0IS00000000017300007
Kromkrans 208 IS	2	South32 S A Coal Holdings (Pty) Ltd	T5661/2012	T0IS00000000020800002

*** A portion of Portion 9**

The adjacent properties are currently utilised for agriculture and mining. Refer to **Figure 3** and **Table 2** that indicates the adjacent landowners.

Table 2: Adjacent Landowners

Farm Name	Portion	Registered Owner	Title Deed
Vaalbult 3 IT	RE*	C M J Papenfus Trust	T134464/2001
Vaalbult 3 IT	1	Vaalbult Mining Co (Pty) Ltd	T14298/2016
Vaalbult 3 IT	9	Vaalbult Mining Co (Pty) Ltd	T14570/2013
Vaalbult 3 IT	10	Vaalbult Mining Co (Pty) Ltd	T14298/2016
Goedehoop 45 IT	20	Jubre June Combrink	T6936/2008
Steynsdraai 46 IT	RE*	Christiaan Willem Adriaan Bierman	T48581/2002
Jagtlust 47 IT	RE*	Northern Coal (Pty) Ltd	T436/2009

Farm Name	Portion	Registered Owner	Title Deed
Jagtlust 47 IT	1	Northern Coal (Pty) Ltd	T13289/2013
Kranspan 49 IT	4	Gysbert Samuel Kleyn	T16244/1996
Verkeerdepan 50 IT	RE*	Msobo Coal (Pty) Ltd	T6506/2013
Verkeerdepan 50 IT	4	Msobo Coal (Pty) Ltd	T6506/2013
Witrand 52 IT	5	Msobo Coal (Pty) Ltd	T6506/2013
Helpmakaar 168 IS	RE*	Sigegede Comm Prop Assoc	T10093/2014
Helpmakaar 168 IS	1	Vaalwaterspruit Trust	T82133/2003
Twyfelaar 171 IS	2	Deleyn Trust	T4607/2011
Twyfelaar 171 IS	8	Kareepoort Eiendomme (Pty) Ltd	T3215/2019
Naudesbank 172 IS	9	Charles Benjamin de Villiers	T142618/2004
Vaalwater 173 IS	1	National Government of the RSA	T4044/2012
Vaalwater 173 IS	5	Baruch Eiendomme (Pty) Ltd	T2283/2021
Vaalwater 173 IS	9	Baruch Eiendomme (Pty) Ltd	T2283/2021
Vaalwater 173 IS	18	Kromkrans Communal Prop Assoc	T12008/2019
Vaalwater 173 IS	22	Muhanga Mines (Pty) Ltd	T6544/2019
Kromkrans 208 IS	35	A Re Shomeng Holdings (Pty) Ltd	T1223/2019
Kromkrans 208 IS	44	Kromkrans Communal Prop Assoc	T12008/2019
Kromkrans 208 IS	45	Kromkrans Communal Prop Assoc	T12008/2019
Kromkrans 208 IS	46	Kromkrans Communal Prop Assoc	T12008/2019
Kromkrans 208 IS	57	Kromkrans Communal Prop Assoc	T12008/2019
Kromkrans 208 IS	59	Kromkrans Communal Prop Assoc	T12008/2019
Kromkrans 208 IS	62	SANRAL	Not in Windeed (R38)
Kromkrans 208 IS	63	SANRAL	Not in Windeed (R38)
Kromkrans 208 IS	65	SANRAL	Not in Windeed (R38)
Witbank 209 IS	RE*	C M J Papenfus Trust	T885/2007
Witbank 209 IS	3	C M J Papenfus Trust	T885/2007
Roetz 210 IS	RE*	Northern Coal (Pty) Ltd	T13289/2013

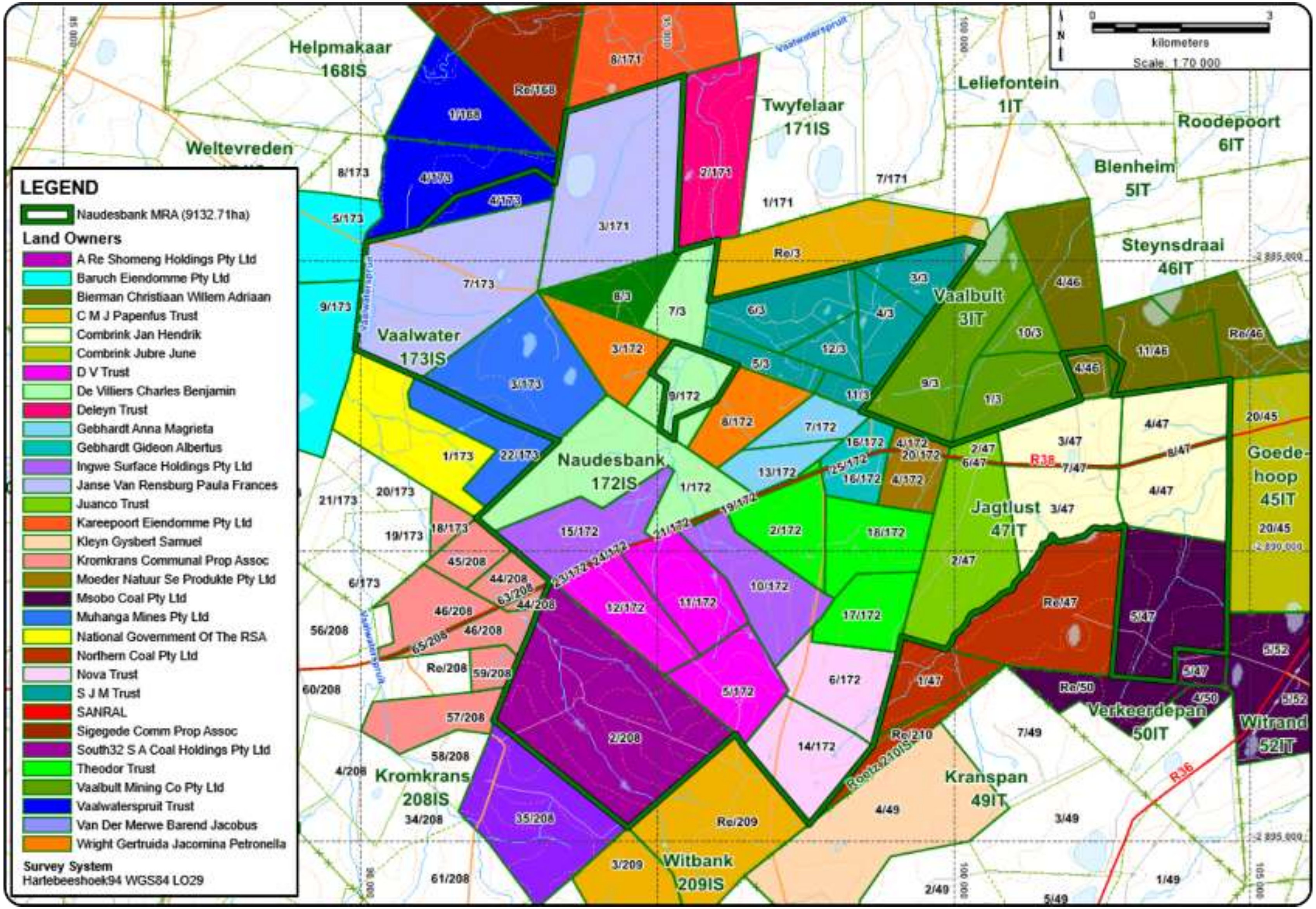


Figure 3: Landowners and Adjacent Landowners

2.3 Site Layout

The infrastructure layout is discussed in more detail in **Section 7** of this report. The final site layout is shown in **Figure 4**.

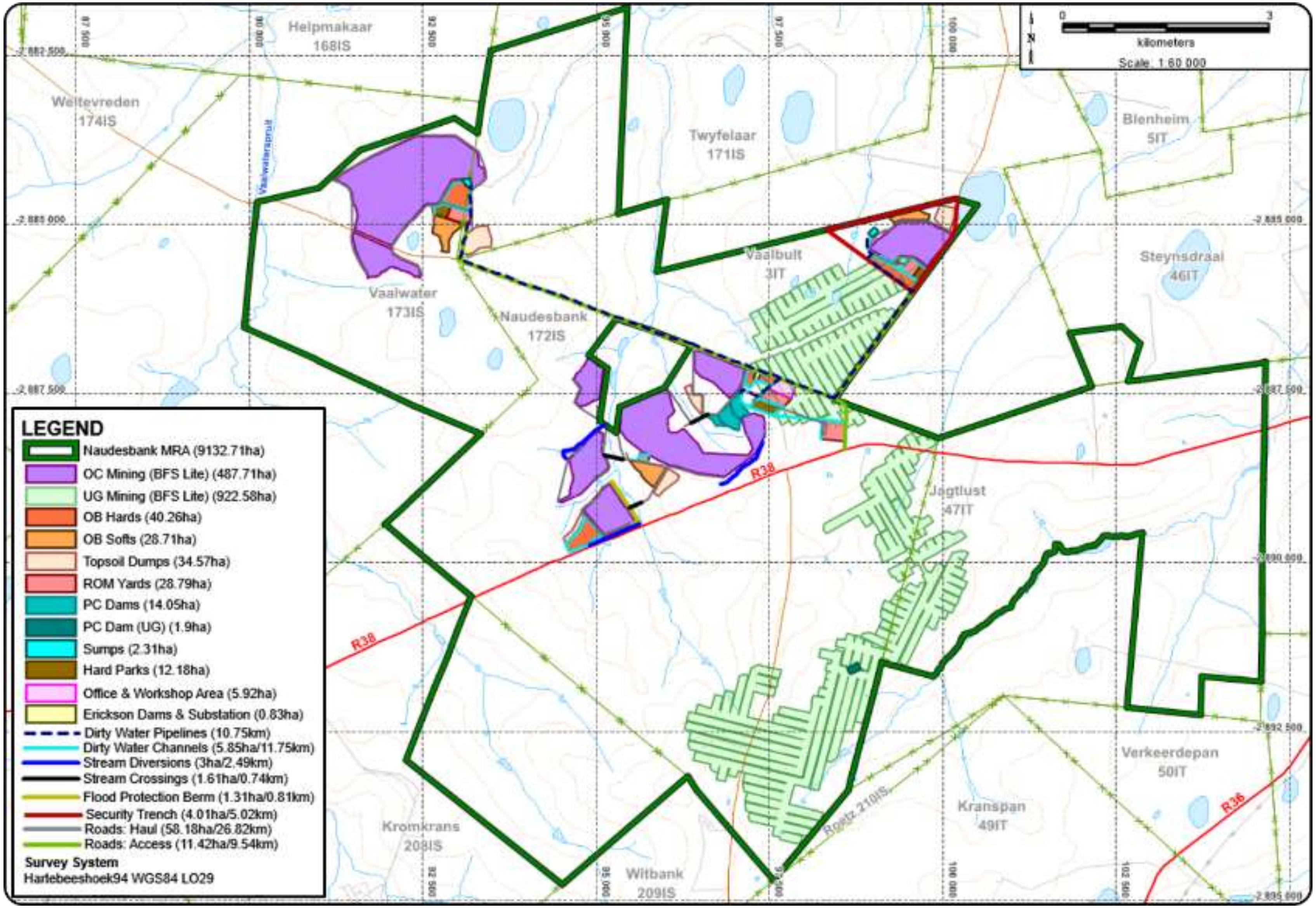


Figure 4: Naudesbank Site Layout

2.4 Servitudes

Limited information regarding servitudes was available, but two are shown in **Figure 5**.

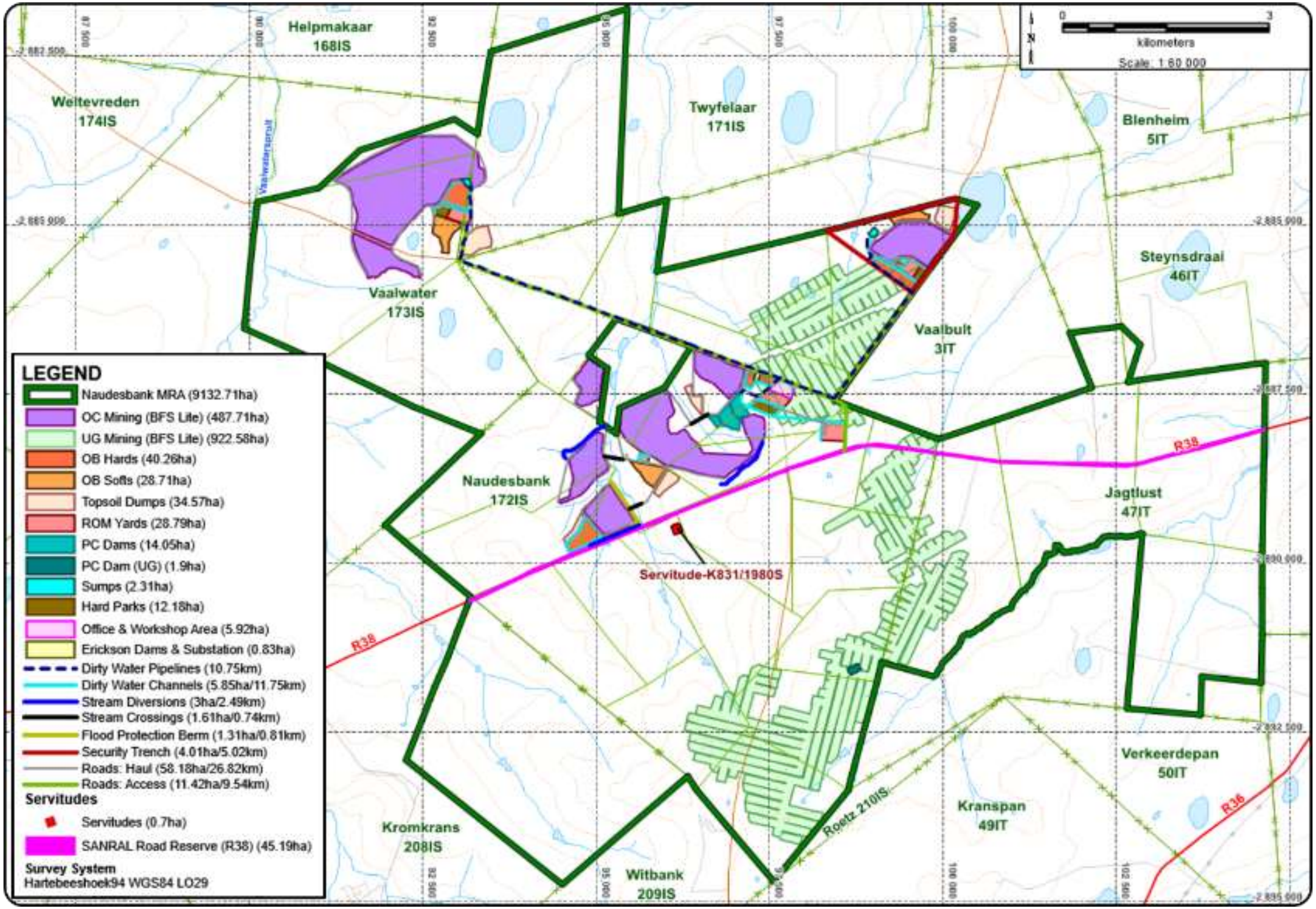


Figure 5: Servitudes

3 APPLICABLE LEGISLATION

3.1 Listed and Specified Activities

As mentioned, EA is required for the proposed activities at Naudesbank. Various listed activities, as defined in terms of Government Notice Regulation (GNR) 983, 984 and 985 of NEMA (as amended), were identified. Refer to **Table 3** below.

Table 3: Listed and Specified Activities

Name of Activity	Aerial Extent of the Activity ha or m^2	Applicable Listed Activity	Waste Management Authorisation
Opencast mining including removal of topsoil, stockpiling of topsoil, clearing of vegetation, drilling, blasting, removal of overburden, stockpiling of overburden and disposal of overburden back into the mined-out areas.	487.71 ha	Listing Notice 1 (GNR 983), Activities: 19 Listing Notice 2 (GNR 984), Activities: 6, 15, 17 Listing Notice 3 (GNR 985), Activities: 12 (f)(i), 12 (f)(ii), 14(ii)(a)(f)(i)(aa), 14(ii)(a)(f)(i)(ff), 14(c)(f)(i)(aa), 14(c)(f)(i)(ff)	
Underground mining.	922.58 ha	Listing Notice 2 (GNR 984), Activities: 6, 17	
Crushing and Screening Plant	Located within Naudesbank RoM Yards.	Listing Notice 1 (GNR 983), Activity: 27 Listing Notice 3 (GNR 985), Activity: 12 (f)(i), 12 (f)(ii)	
Access to underground mining areas obtained via opencast pits. Portal fans will be installed at the opencast pits. Ventilation will also be from the opencast pit areas, but provision is made for additional ventilation shafts should it be required.	No additional surface disturbance will take place except for additional ventilation shafts and refuge boreholes. Provision is made for a total disturbance area of 2 ha should any	Listing Notice 1 (GNR 983), Activity: 27 Listing Notice 3 (GNR 985), Activity: 12 (f)(i), 12 (f)(ii)	

Name of Activity	Aerial Extent of the Activity ha or m^2	Applicable Listed Activity	Waste Management Authorisation
Refuge Boreholes.	additional shafts be required.		
Electricity.	0.83 ha – Substation TBC - Overhead Powerlines	Listing Notice 1 (GNR 983), Activities: 11 (i) Listing Notice 3 (GNR 985), Activity: 12 (f)(i), 12 (f)(ii)	
Water management facilities including canals and PCDs.	14.05 ha – PCDs 1.9 ha – Underground PCD 2.31 ha – Sumps 5.85 ha – Dirty Water Canals 3 ha – Stream Diversions 1.61 ha - Stream Crossings 1.31 ha – Flood Protection Berm 3.42 ha – Berms 10.75 km – Dirty Water Pipelines	Listing Notice 1 (GNR 983), Activity: 10 (i), 13, 27 Listing Notice 2 (GNR 984), Activities: 6 Listing Notice 3 (GNR 985), Activities: 12 (f)(i), 12 (f)(ii), 14(ii)(a)(f)(i)(aa), 14(ii)(a)(f)(i)(ff), 14(c)(f)(i)(aa), 14(c)(f)(i)(ff)	
Topsoil, Overburden and RoM stockpiles.	28.79 ha – RoM Yards 34.57 ha – Topsoil 68.97 ha – Overburden (Hards and Softs)	Listing Notice 2 (GNR 984), Activities: 6, 15 Listing Notice 3 (GNR 985), Activities: 12 (f)(i), 12 (f)(ii), 14(ii)(a)(f)(i)(aa), 14(ii)(a)(f)(i)(ff), 14(c)(f)(i)(aa), 14(c)(f)(i)(ff)	Not Triggered.
Development of haul and access roads including stream crossings.	58.18 ha – Haul 11.42 ha – Access Road	Listing Notice 1 (GNR 983), Activity: 19, 24 (ii) Listing Notice 3 (GNR 985), Activities: 4 (f)(i)(aa), 4 (f)(i)(ee), 12 (f)(i), 12 (f)(ii), 14(ii)(a)(f)(i)(aa), 14(ii)(a)(f)(i)(ff),	

Name of Activity	Aerial Extent of the Activity ha or m^2	Applicable Listed Activity	Waste Management Authorisation
		14(c)(f)(i)(aa), 14(c)(f)(i)(ff)	
Surface infrastructure including hard parks and offices.	5.92 ha – Offices and Workshop Areas 12.18 ha – Hard Parks	Listing Notice 1 (GNR 983), Activity: 27 Listing Notice 3 (GNR 985), Activities: 12 (f)(i), 12 (f)(ii)	
Storage, and or handling of a dangerous good, such as diesel.	0.21 ha Combined capacity of than 80 m^3, but less than 500 m^3	Listing Notice 1 (GNR 983), Activity: 14 Listing Notice 3 (GNR 985), Activity: 12 (f)(i), 12 (f)(ii)	

4 POLICY AND LEGISLATIVE CONTEXT

This report presents the results of the first phase of the Environmental Impact Assessment (EIA) process. This report has been compiled in accordance with requirements from the NEMA and the applicable regulations, as well as some of the requirements as set by the Mineral and Petroleum Resources Development Act (No 28 of 2002, as amended) (MPRDA).

Various activities that require EA were identified. An application for authorisation in terms of Section 24 of the NEMA was submitted to the DMRE on 10 February 2023. The said activities as defined in terms of GNR 983, 984 and 985 of NEMA were published on 4 December 2014, as amended. This Final Scoping Report was submitted to the DMRE on 24 March 2023. The Final Scoping Report was accepted on 26 May 2023. An EIA was conducted and an EMPr formulated for the associated activities with the Naudesbank Project. The results of the EIA and the formulated EMPr was compiled in the format as outlined in GNR 982 of NEMA (as amended).

Applicable guidelines and legislation applicable to compiling this report:

- National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998).
- National Environmental Management: Air Quality Act, 2004 (Act 39 of 2004).
- Mpumalanga Nature Conservation Act, 1998 (Act No. 10 of 1998).
- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).

- Future application for a Water Use Licence (WUL) in terms of the National Water Act, 1998 (Act No. 36 of 1998):
  - GN 704 of 4 June 1999.
  - General Notice (GenN) 538 of 2 March 2017.
  - GN 1198 of 18 December 2009.
  - GNR 139 of 24 February 2012.
- National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA):
  - GNR 982 to 985 (4 December 2014, as amended).

The required Public Participation Process (PPP) will follow a single integrated process complying with the requirements of the above listed acts. **Table 4** provides a more detailed list of the applicable legislation and guidelines that have been or will be consulted throughout the entire project, as well as the applicability to the project.

Table 4: List of Applicable Legislation and Guidelines Consulted

	Legislation	Regulations / Guidelines	Description / Requirement	Project Implication
EIA Process and Listed Activities	National Environmental Management Act, Act 107 of 1998	Chapter 1 of NEMA	Sets out the principles of environmental management.	Chapter 1 principles have been considered during the environmental impact assessment process.
		Chapter 5 of NEMA	Integrated environmental management, provides information on environmental management tools that promote the implementation of principles set out in Chapter 1 of NEMA.	Environmental management tools have been considered and applied during the EIA process for the project.
		GNR 982 of 2014 (as amended)	Chapter 2: Timeframes Chapter 3: General requirements for applications Chapter 4: Application for environmental authorisation Chapter 5: Amendment, suspension, withdrawal and auditing of compliance with environmental authorisation and environmental management programme. Chapter 6: Public participation process Chapter 8: Transitional arrangements and commencement.	Scoping and Environmental Impact Assessment have been undertaken in accordance with GNR 982.
		GNR 983 of 2014 Listing Notice 1 (as amended)	Lists activities requiring a basic environmental assessment.	Listed activities identified in **Section 3**, an environmental authorisation application was submitted to the DMRE on 10 February 2023. Since Listing Notice 2 is triggered, a basic assessment process will not be undertaken.
		GNR 984 of 2014 Listing Notice 2 (as amended)	Lists Activities requiring an environmental impact assessment.	Listed activities identified in **Section 3**, an environmental authorisation application was submitted to the DMRE on 10 February 2023.
		GNR 985 of 2014 Listing Notice 3 (as amended)	Lists activities that require a basic environmental assessment at specific identified geographical areas only.	Listed activities identified in **Section 3**, an environmental authorisation application was submitted to the DMRE on 10 February 2023.
		GNR 805 of 2012	Integrated Environmental Management Guideline Series (Guideline 5) - Companion to the NEMA EIA Regulation, 2010.	Although based on the 2010 EIA regulations, the process was still followed.
		GNR 806 of 2012	Integrated Environmental Management Guideline Series (Guideline 6) – Environmental Management Framework Regulations, 2010.	Although based on the 2010 EIA regulations, the process was still followed.

	Legislation	Regulations / Guidelines	Description / Requirement	Project Implication
		GNR 807 of 2012	Integrated Environmental Management Guideline Series (Guideline 7) – Public Participation in the Environmental Impact Assessment Process, 2010.	Although based on the 2010 EIA regulations, the process was still followed.
Water Uses and protection of water resource	National Water Act, 36 of 1998	Section 21 of NWA	Lists water uses that require a licence prior to commencement.	A Water Use Licence (WUL) is required. An application for a WUL was initiated on the e-WULAAS system, Reference No.: WU26618.
		GN 704 of 4 June 1999	Regulations on use of water for mining and related activities aimed at the protection of water resources.	An application for a WUL was initiated on the e-WULAAS system, Reference No.: WU26618.
		General Notice 509 of 26 August 2016	General Authorisation (GA) in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for water uses as defined in section 21(c) or section 21(i).	None of the planned activities fall within the ambit of a GA application.
		Government Notice 1198 of 18 December 2009	General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No 36 of 1998) in terms of Section 21(c) and (i) for the purpose of rehabilitating a wetland for conservation purposes	None of the planned activities fall within the ambit of a GA application.
		General Notice 538 of 2 March 2017	Revision of General Authorisations (GA) in terms of Section 39 of the NWA.	None of the planned activities fall within the ambit of a GA application.
		GNR 139 of 24 February 2012	Regulations regarding the safety of dams in terms of Section 123(1) of the National Water Act, 1998 (Act No. 36 of 1998). Application for a licence to construct and impound for a dam with safety risk.	An application for a WUL was initiated on the e-WULAAS system, Reference No.: WU26618.

	Legislation	Regulations / Guidelines	Description / Requirement	Project Implication
Biodiversity	National Environmental Management: Biodiversity Act, Act 10 of 2004	GNR 151 published on 14 December 2007	Publication of critically endangered, vulnerable and protected species: No person may carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit.	A permit will be required for the removal of protected plants, if any are identified within the application area. Protected species have been identified and the necessary permits will be obtained if the identified species are located within the disturbance footprints
	National Forests Act, Act 84 of 1998	GenN 635 published on 6 December 2019	List of Protected tree species under the Act: No person may cut, disturb, damage destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a license granted by the Minister; on in terms of the exemption from the provisions of this subsection published by the Minister in the Gazette on the advice of Council.	A licence must be obtained prior to removing any protected trees on-site. No protected trees were identified to date. Permits will be obtained, if required.
	Mpumalanga Nature Conservation Act, Act 10 of 1998	Chapter 7	82 (1). No person shall remove an endangered species or rare species unless he or she is the holder of a permit which authorises him or her to do so.	A permit will be required for the removal of protected plants, if any are identified within the application area. Protected species have been identified and the necessary permits will be obtained if the identified species are located within the disturbance footprints.

	Legislation	Regulations / Guidelines	Description / Requirement	Project Implication
Waste Management	**National Environmental Management: Waste Act, Act 59 of 2008**	GN 921 of 29 November 2013 (as amended)	Lists waste management activities that require a waste management licence prior to construction and operation.	None of the activities require a Waste Management Licence (WML).
		GNR 632 of 24 July 2015 (as amended)	Regulations regarding the planning and management of residue stockpiles and residue deposits from prospecting, mining, exploration or production operation.	None of the activities require a WML.
Heritage Resources	**National Heritage Resources Act, Act No. 25 of 1999.**	Section 35 & 36	35. (4) No person may, without a permit issued by the responsible heritage resources authority - (a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite; (b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite; (c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or (d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. 36. (3)(a): No person may, without a permit issued by SAHRA or a provincial heritage resources authority: (a): destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves; (b): destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or	Permission to be obtained from the South African Heritage Resources Agency (SAHRA) for any proposed destruction, damaging, alteration, exhumation, or removal of graves. Various graves and heritage structures have been identified to date. Permits may be required for the demolition of structures. Permits will also be obtained should unmarked graves be unearthed.

	Legislation	Regulations / Guidelines	Description / Requirement	Project Implication
		Section 34	No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.	Permission to be obtained from the SAHRA for any proposed alteration or demolishing of any structure that is older than 60 years.
	Removal of Graves and Dead Bodies Ordinance (Ordinance No.7 of 1925)	Section 2(1)	Relocation of graves	Graves were identified during the field work. Permits will be obtained should unmarked graves be unearthed or should mining proceed in the area where a cemetery C3 was identified.
	MEC Local Government - Human Tissue Act 65 of 1983 and the Exhumation Ordinance 12 of 1980		Exhumation of graves	Graves were identified during the field work. Permits will be obtained should unmarked graves be unearthed or should mining proceed in the area where a cemetery C3 was identified.

	Legislation	Regulations / Guidelines	Description / Requirement	Project Implication
Air and Noise	National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)	Section 32, 33, 34 and 35	Measures for the control of dust in specified places or areas, either in general or by specified machinery or in specified instances; Steps that must be taken to prevent nuisance by dust; or Other measures aimed at the control of dust. If it is determined that a mine, having regard to its known ore reserves, is likely to cease mining operations within a period of five years, the owner of that mine must promptly notify the Minister in writing— (b) of any plans that are in place or in contemplation for— (i) the rehabilitation of the area where the mining operations were conducted after mining operations have stopped; and (ii) the prevention of pollution of the atmosphere by dust after those operations have stopped. Control noise in general, by specific machinery, activities or in specified places or areas; For determining definition for noise and maximum levels of noise. The Minister or MEC may prescribe measures for the control of offensive odours emanating from specified activities.	Applicant is to adhere to the national standards for dust, Particulate Matter (PM) and noise.
		General Notice 275 of 3 April 2017	National Greenhouse Gas Emissions Reporting Regulations, 2016.	Adhere to reporting conditions and national standards regarding greenhouse gas emissions.

	Legislation	Regulations / Guidelines	Description / Requirement	Project Implication
Veld Fires	National Veld and Forest Act , 1998 (Act No. 84 of 1998)	Chapter 4, Section 12	Places a duty on owners to prepare and maintain firebreaks. The procedure in this regard and the role of adjoining owners and the fire protection association are dealt with.	Fire break plan will be developed and maintained around the perimeter fence.
Land Use Management	Conservation of Agricultural Resources Act,1983 (Act No 43 of 1983)	GNR 1048 published on 25 May 1984 (as amended)	Requires the landowner to manage agricultural resources i.e. the removal of invasive species, protection of soils against water and wind erosion and the management of water resources.	An alien invasive species plan must be developed and implemented; and the land use and soil management plan must also be developed and implemented.
Traffic Management	Mpumalanga Roads Department & National Roads Agency / Roads Ordinance, 22 of 1957, and National Roads Act, 54 of 1972	Section 29	Permission (wayleave application) to establish new access road.	Not applicable.

5 NEED AND DESIRABILITY OF THE PROJECT

The Overview chapter of the National Development Plan 2030 (NDP) states 10 critical success factors for the road to a worthy future for South Africa. They are:

1. A social compact to reduce poverty and inequality, and raise employment and investment.
2. A strategy to address poverty and its impacts by broadening access to employment, strengthening the social wage, improving public transport and raising rural incomes.
3. Steps by the state to professionalise the public service, strengthen accountability, improve coordination and prosecute corruption.
4. Boost private investment in labour-intensive areas, competitiveness and exports, with adjustments to lower the risk of hiring younger workers.
5. An education accountability chain, with lines of responsibility from state to classroom.
6. Phase in national health insurance, with a focus on upgrading public health facilities, producing more health professionals and reducing the relative cost of private health care.
7. Public infrastructure investment at 10 percent of gross domestic product (GDP), financed through tariffs, public-private partnerships, taxes and loans and focused on transport, energy and water.
8. Interventions to ensure environmental sustainability and resilience to future shocks
9. New spatial norms and standards – densifying cities, improving transport, locating jobs where people live, upgrading informal settlements and fixing housing market gaps.
10. Reduce crime by strengthening criminal justice and improving community environments.

Seriti works closely with provincial government structures in support of the NDP, and is committed to the above actions in the form of:

- Creation of employment opportunities;
- Creation of short term employment opportunities during construction;
- Human resource development;
- Human and community development;
- Strategic infrastructure;
- Environmental sustainability;
- Governance and policy; and
- Spatial equity.

International Finance Corporation (IFC) Performance Standards Compliance

The International Finance Corporation (IFC) Performance Standards were also taking into account during the process. These standards were considered when compiling the Environmental Impact Assessment Report and the Environmental Management Programme.

The eight standards include the following aspects:

- Performance Standard 1 - Assessment and Management of Environmental and Social Risks and Impacts:
  - Identified potential social and environmental risk in **Section 9** of this report.
  - Recommended measure to avoid or mitigate potential impacts in **Section 9** of this report and *Section 5* of the EMPr.
  - Identified sensitive areas and identified alternatives to avoid these sensitivities in **Section 6** of this report.
  - Follow a proper public participation process by notifying all interested and affected parties of the project and provide equal opportunities to comment on the draft report. All parties are also encouraged to submit any comments or concerns regarding the development. These comments are incorporated in the Public Participation Report (**Annexure 19**).
- Performance Standard 2 - Labour and Working Conditions:
  - The Social and Labour Plan ensure that working conditions are acceptable and that equal opportunities are provided.
- Performance Standard 3 - Resource Efficiency and Pollution Prevention:
  - Measures are recommended to mitigate pollution in **Section 9** and *Section 5* of the EMPr.
- Performance Standard 4 - Community Health, Safety, and Security:
  - Measures are recommended in terms of air quality, noise and socio-economic aspects in **Section 9**.
  - Specialists were appointed to evaluate air and noise impacts on the community.
- Performance Standard 5 - Land Acquisition and Involuntary Resettlement:
  - Resettlement Plan will be followed should relocation be required, this will include detailed consultation.
  - Affected parties will be contacted and each case will be handled individually.
- Performance Standard 6 - Biodiversity Conservation and Sustainable Management of Living Natural Resources:
  - Identified sensitive areas and identified alternatives to avoid these areas in **Section 6** of this report.
  - Measures recommended in **Section 9** and *Section 5* of the EMPr.
  - Specialist assessed species of conservation concern, refer to **Section 8**.

- Performance Standard 7: Indigenous People
  - The Social and Labour Plan focus on employment of local people and historically disadvantages individuals. Mitigation measures are also recommended in **Section 9** and *Section 5* of the EMPr.
- Performance Standard 8: Cultural Heritage
  - A specialist was appointed to evaluate the cultural and heritage aspects within the study area.
  - The baseline conditions are provided in **Section 8**, potential impacts in **Section 9** and mitigation measures in **Section 9**. Mitigation measures are discussed in *Section 5* of the EMPr.

The need and desirability of this project needs to be considered in terms of the EIA Regulations, GNR 982 of 2014, Appendix 2 Section 2(f). Note that the need and desirability of a project must be considered throughout the project. Refer to **Annexure 3** for the Need and Desirability Assessment, which has been compiled in terms of the Guideline on Need and Desirability published by the Department of Environmental Affairs (DEA, 2017).

The need and desirability guidelines focus on two main aspects: -

- Ecological sustainable development. The following main aspects were evaluated:
  - Ecological impacts were identified; evaluated in **Section 9**;
  - Presence of sensitive, threatened and/or protected habitats were confirmed in **Section 8**;
  - The ecological integrity of the site was considered; and
  - Global and international responsibilities relating to the environment was identified.
- Promoting justifiable economic as well as social development. The following main aspects were evaluated:
  - The GSDM Local Economic Development (LED) initiatives were identified;
  - Socio-economic impacts were identified; evaluated in **Section 9**;
  - Identification of baseline socio-economic conditions were identified; evaluated in **Section 8**;
  - Measures to address socio-economic conditions and job creation; and
  - Factors related to employees such as transport and housing.

Both ecological and social aspects were assessed. Furthermore, the potential interaction with the relevant, decision-making government departments were also assessed. The need and desirability will be further enhanced during the EIA phase of the project since more pertinent and detailed information will be available then.

GNR 982, Appendix 3 of NEMA require the following:

"(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted scoping report;…"

In terms of the above requirement in NEMA, the sections below are a site specific discussion on the need and desirability of the Naudesbank Project.

Ecological Sustainable Development

The locality of viable coal resources is determined by prospecting within a defined area. It was determined that viable coal resources are available within the current Naudesbank Mining Right Area. Any development will have a likely impact on the natural environment, but with specialist assessments the most optimal plan can be determined. The specialist studies included soil, fauna, flora, wetlands, groundwater and surface water assessments. The current baseline description is depicted in **Section 8** of this report. Detailed risk assessments are also undertaken to determine the significance of impacts and provide site specific mitigation measures, this is discussed in detail in **Section 9** of the EIAR and *Section 5* of the EMPr.

The following highly sensitive ecological aspects were identified during the assessment process:

- Sensitive freshwater resources namely wetlands.
- Protected floral species.
- Biodiversity areas of very high significance for both faunal and floral species.
- Groundwater resources.
- High potential agricultural soils.

Taking the above-mentioned sensitivities into consideration, the mine plan was optimised to improve the ecological sustainability of the development:

- Reduction of opencast mining areas from 4 903.28 ha to 487.71 ha to reduce the significance of the following expected impacts:
    - Reduction of zone of influence area regarding potential groundwater drawdown.
    - Reduction in the losses of high potential agricultural soils.
    - Reduced contaminant migration impacting on groundwater and surface water resources.
    - Reduction in loss of floral species and disturbance to faunal species.
    - Reduction of opencast mining within scientific buffer from 1 779.04 ha to 85.76 ha. Refer to **Figure 6** and **Figure 9** in **Section 6**.

- Reduction of losses anticipated within very high faunal sensitivity areas from 805.55 ha to 62.58 ha. Refer to **Figure 7** and **Figure 10** in **Section 6**.
- Reduction of losses anticipated within very high floral sensitivity areas 616.25 ha to 25.1 ha. Refer to **Figure 8** and **Figure 11** in **Section 6**.
- Further reduction of mining area by removing Pit TW-01 (75.47 ha) planned on the Farm Twyfelaar which would have resulted in the destruction of a highly sensitive wetland system. Populations of the threatened Sensitive Species 1200 (EN) and *Khadia carolinensis* were identified within this wetland system. A decision was made to completely remove this pit to preserve the threatened species and their associated habitat.

The environmental aspects, including impacts on wetlands, biodiversity and high potential agriculture land were considered and the optimal site layout and mining methods were selected based on the outcome of the specialist reports. The amendments were made to reduce the ecological impacts of the project, however impacts will still materialise. This can be mitigated to acceptable significance ratings by implementing the measures recommended in *Section 5* of the EMPr. Important measures to note is:

- Implementation of water management strategy to prevent pollution and manage decant post-closure.
- Commitment to rehabilitate all disturbed areas to sustain grazing as a post-mining land use.

A financial guarantee must be provided to the DMRE and it must be updated annually. The financial guarantee needs to provide for post-closure rehabilitation, as well as the management of possible residual and latent impacts.

From an ecological perspective, all the necessary measures were undertaken to reduce anticipated impacts to acceptable levels. No fatal flaws were identified by the EAP or the respective specialists.

Justifiable Social and Economic Development

The following highly sensitive cultural/heritage aspects were identified during the assessment process:

- Graves.
- Structures of heritage/cultural significance.

Naudesbank's operations will have a negative impact from an agricultural perspective since ha of the area to be distributed is classified as high potential soils. The Agricultural Agro-ecosystem Specialist Assessment compiled by Rehab Green (2023, **Annexure 5**) made the following important conclusion pertaining to the impact on agriculture:

- The acceptability of the impact is conditionally to acceptance of the rehabilitation monitoring procedures, which are provided in *Section 9.2* of **Annexure 7** and subsections thereof.

Taking into consideration the conclusions made by Rehab Green above, no fatal flaws were identified in terms of negative economic impacts since mitigation is possible to an extent should proper rehabilitation be undertaken. It should also be noted that agricultural job losses can possibly result from the project and that measures be implemented to mitigation the expected socio-economic impact. Measures are recommended in Section 5 of the EMPr.

Positive economic contributions are also expected from Naudesbank which will include:

- Creation of temporary employment opportunities during the construction phase.
- Creation of 270 employment opportunities. This will ensure security of employment to 270 people for a duration of 23 years.
- The Social and Labour Plan (SLP) will focus on improving the following social and economic aspects:
  - Human Resource Development including but not limited to skill development, learnerships, mentorships, internships and bursaries.
  - Local Economic Development programmes which will benefit the local municipal area.
- Granting authorisation to Naudesbank will result in a positive contribution to the country's GDP for this sector for the next 23 years.
- Taxes and royalties will be paid to the government which in return will have a positive economic contribution.
- Significant revenue will be generated by the project at an average production rate of 165 000 tons of coal per month once the steady state is achieved.
- Coal produced may be supplied to various international markets. Currently there is a demand of coal both internationally, but opportunities may also arise from providing the coal mined to Eskom for the generation of electricity. This in turn will help ensure security of electricity to citizens.

It is important to also note that the employees will undergo the following to ensure that the development is undertaken in a socially responsible manner:

- Employees are trained and inducted to ensure that they understand all the risks associated with the work that they will be conducting.
- All employees are subjected to an annual medical examination.

All consultation documents have been distributed to the registered stakeholders for their comments. The comments and/or concerns raised have been taken into account in determining specific measures on how to manage the environmental and community impacts.

Based on the outcome of the risk assessments and input from the soils specialist, it can be concluded that the project will have positive economic and social contributions without any fatal flaws being identified during the assessment process.

6 PROJECT ALTERNATIVES

6.1 Alternatives Considered

6.1.1 Location Alternatives

The coal resource available for mining is located within the Naudesbank MRA. The areas identified have been selected as such because of geological and topographical parameters and are the most optimum methods for extracting the resource. There are no other alternatives with regards to the properties or location for these mining activities. The prospecting right determines the locality as this right is converted to a mining right based on the outcome of prospecting. Locality considerations will include the layout, which is discussed in **Section 6.1.3**.

6.1.2 The Type of Activity to be Undertaken

The proposed activities that will be applied for will relate to the mining of the coal resources situated on the specified properties (**Section 2**). All other activities that will be applied for is to support the main activity, namely coal mining.

6.1.3 The Design or Layout of the Activity

Two alternative site layouts were considered for the project:

Alternative 1

Alternative 1 (refer to **Figure 6**, **Figure 7** and **Figure 8**) included the mining of all the identified minable coal resources however, this included the mining of 1 779.04 ha wetlands and their respective scientific buffers. This option would have a significant impact on identified protected species, very high faunal sensitivity areas and very high floral sensitivity areas. After the evaluation of the specialist's reports and taking into consideration the impacts (positive and negative) in **Section 6.3**, it was concluded that this is not the preferred alternative.

Alternative 2

Alternative 2 (refer to **Figure 4, Figure 9, Figure 10** and **Figure 11**) included a combination of both underground and opencast mining. The opencast mining areas was reduced by 90.05% when compared to Alternative 1. Mining planned within the scientific buffer was reduced by 95.18%. Planned mining within very high faunal and floral sensitive areas were reduced by 92.23% and 95.93% respectively. Based on the aforementioned aspects as well as taking into consideration the positive and negative impacts in **Section 6.3**, it was concluded that this is the preferred alternative.

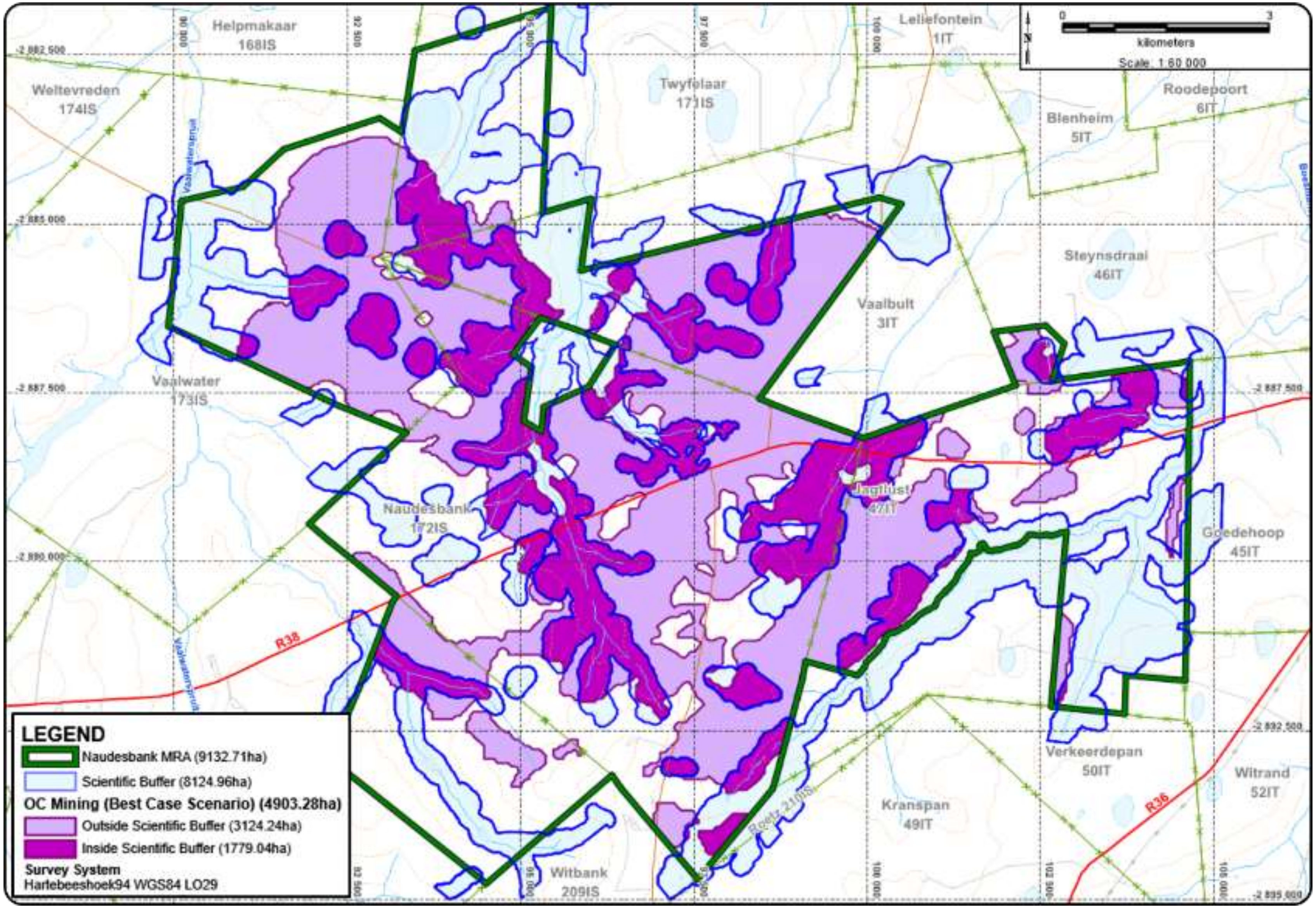


Figure 6: Alternative 1 – Layout and Scientific Buffers

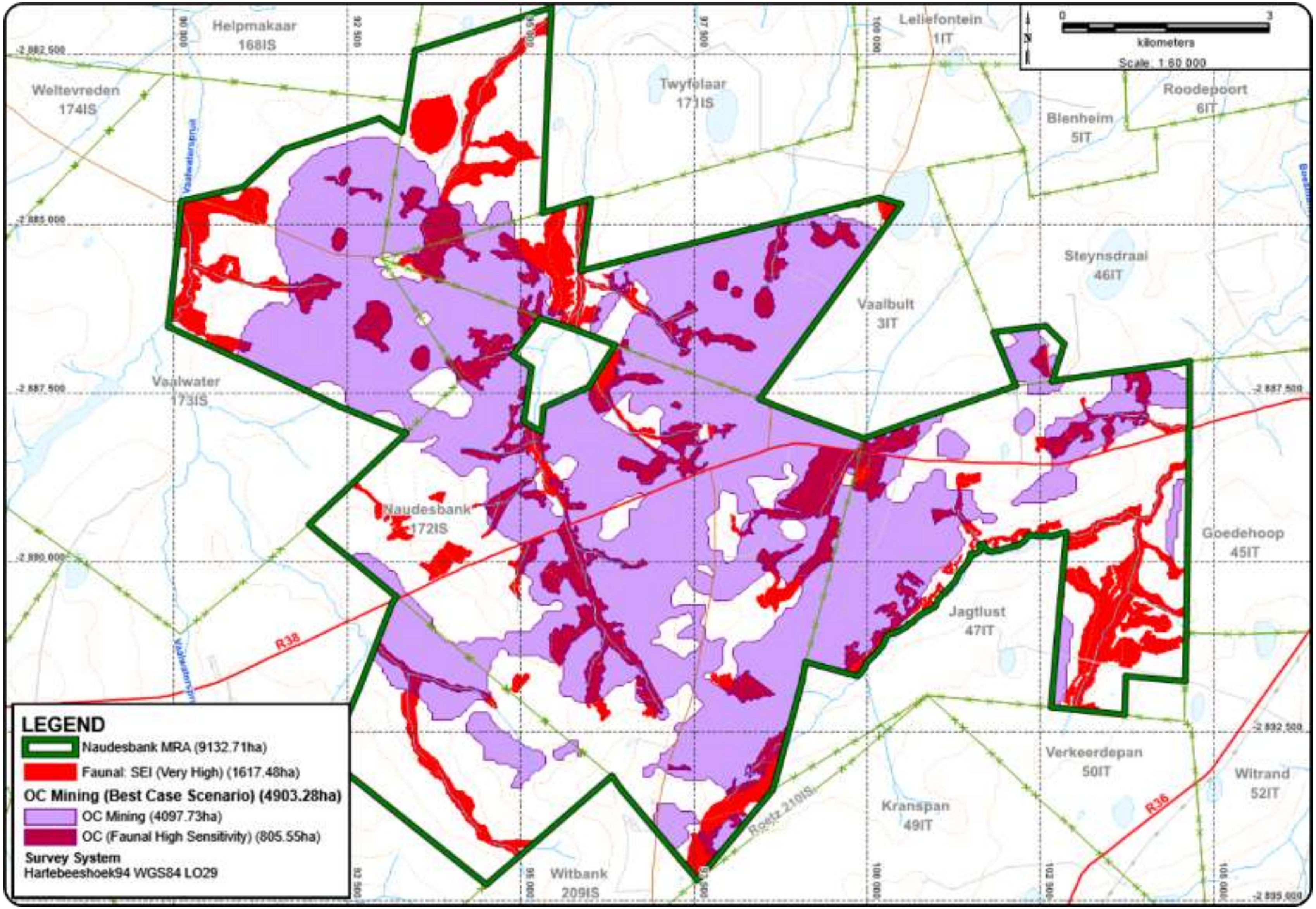


Figure 7: Alternative 1 – Layout and Faunal Sensitivity

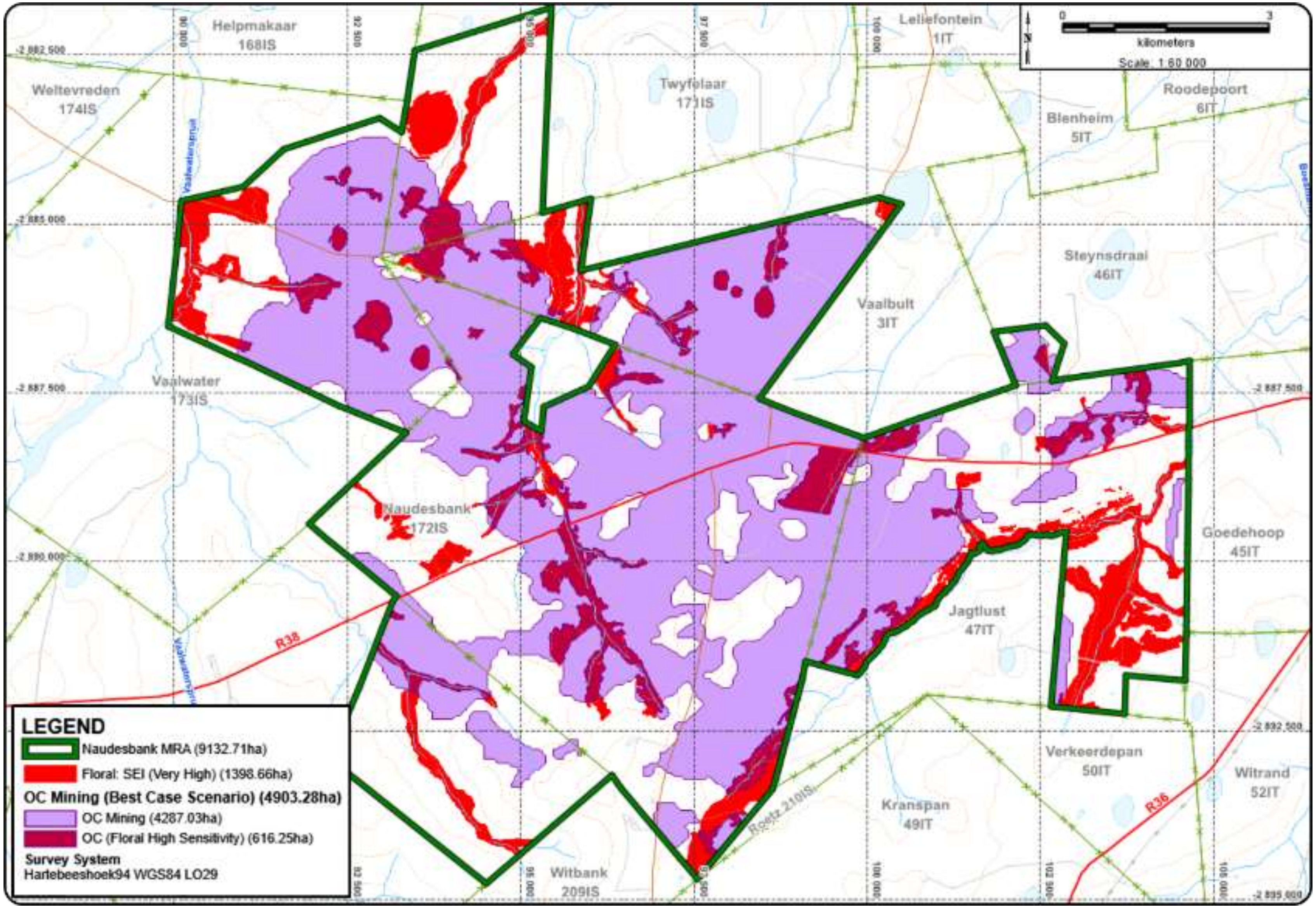


Figure 8: Alternative 1 – Layout and Floral Sensitivity

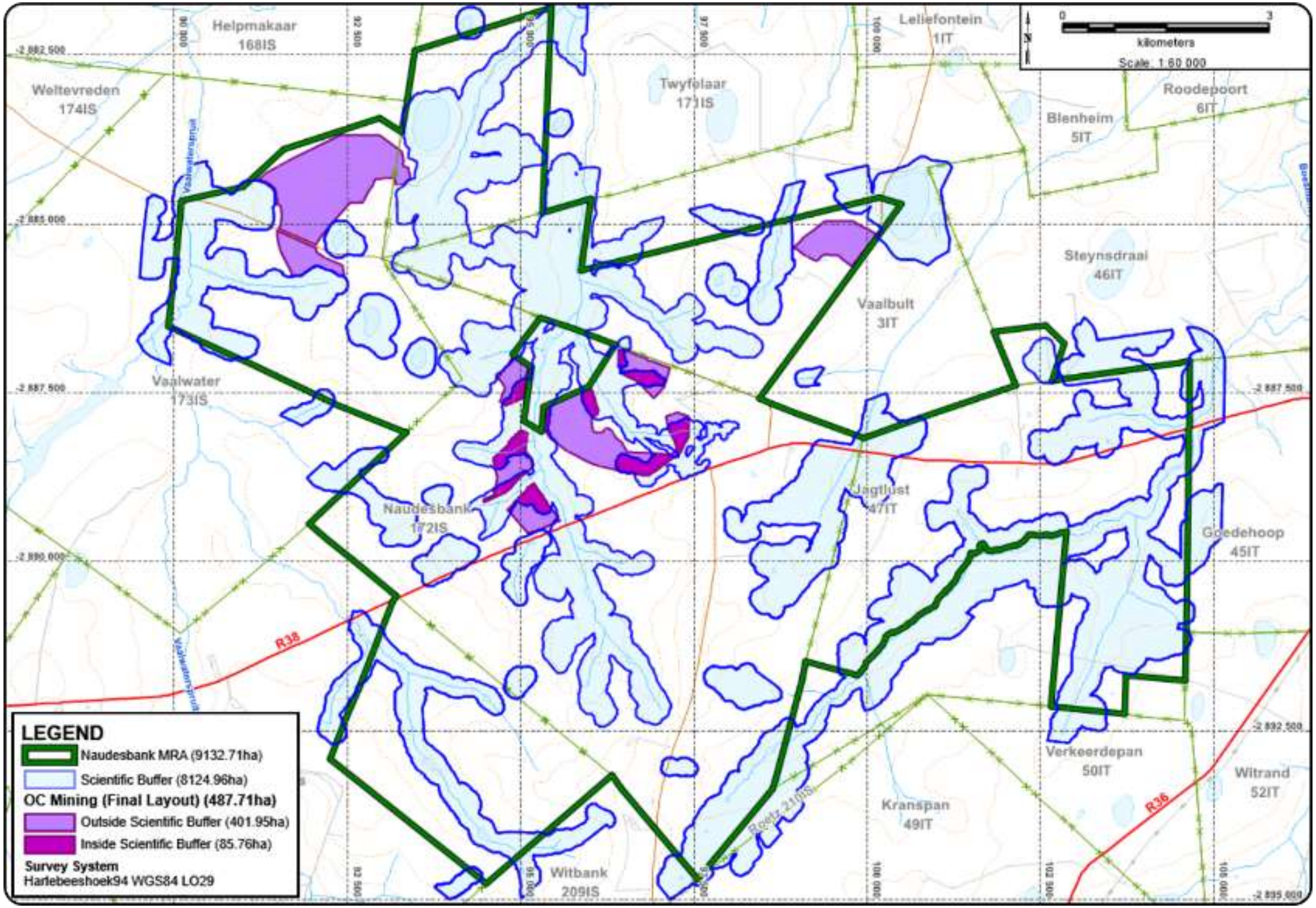


Figure 9: Alternative 2 – Layout (Preferred) and Scientific Buffers

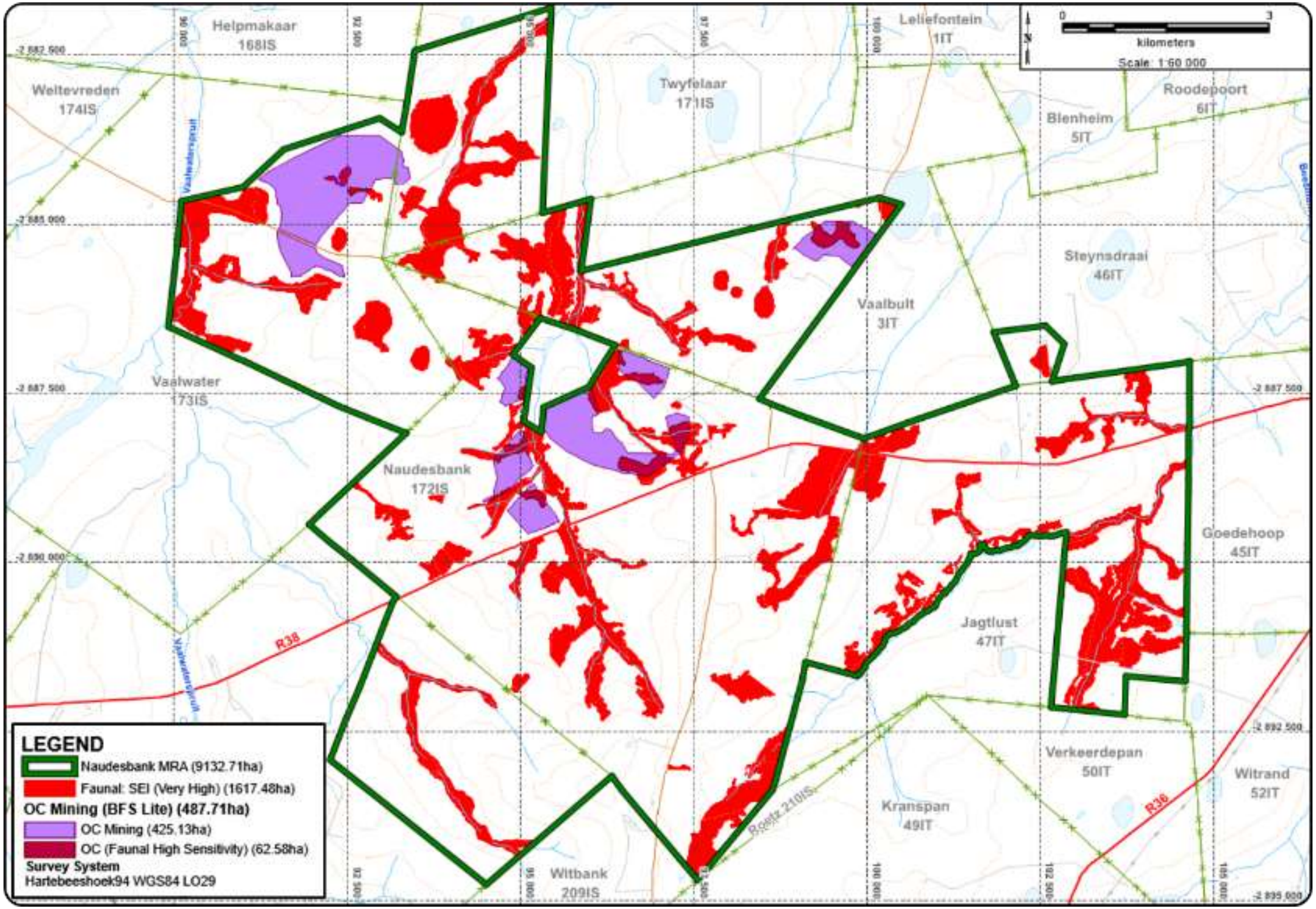


Figure 10: Alternative 2 – Layout (Preferred) and Faunal Sensitivity

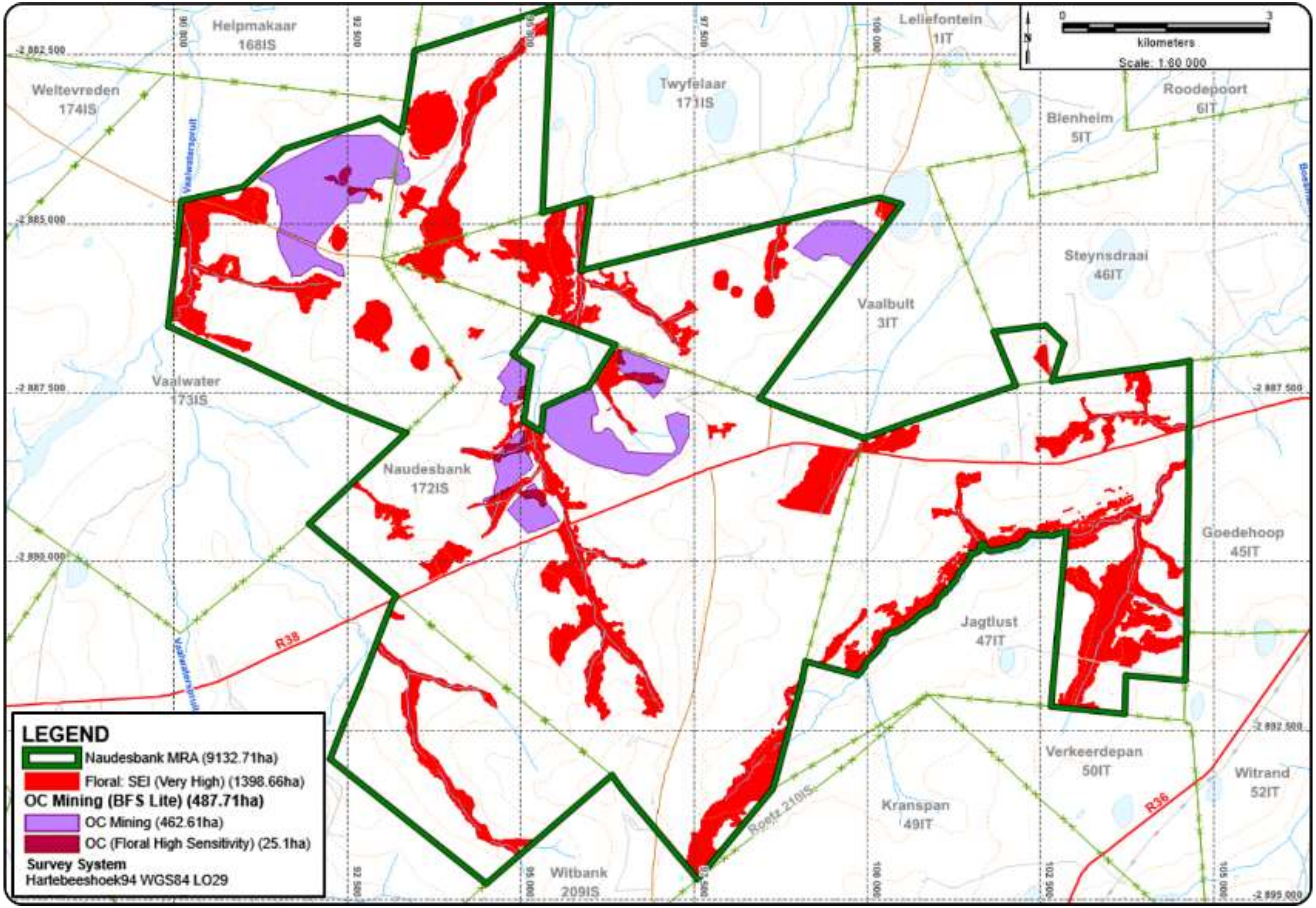


Figure 11: Alternative 2 – Layout (Preferred) and Floral Sensitivity

6.1.4 The Technology to be used in the Activity

6.1.4.1 Mining Method Alternative

The only economically viable option would be a combination of both opencast and underground mining.

6.1.4.2 Production Tonnage Alternatives

Pending market conditions and demand for coal, this can be increased or decreased.

6.1.4.3 Processing Alternatives

Three processing alternatives were considered namely:

- Off-site Coal Processing;
- Processing Plant (Only crushing and screening); and
- Processing Plant (Crushing, screening and washing).

Off-site coal processing was considered due to the high initial capital requirements of the project and coal qualities. Crushing and screening is however the current preferred alternative. Should coal washing be conducted, mine residue will be generated, and applications will be required to dispose of the residue in a responsible manner. This will result in additional surface disturbances and higher capital requirements which is not deemed feasible at this stage.

6.1.4.4 Coal Transport Alternatives

The coal will be transported via road hauling trucks for off-site processing.

6.1.5 Land Use Alternatives

The project alternatives listed below were considered by Naudesbank.

6.1.5.1 Tourism

The land is currently utilised for agricultural purposes therefore, no potential for tourism was identified. Wetlands were identified that could potentially attract tourist that are interested in birding.

6.1.5.2 Residential

Carolina is located relatively close to the Naudesbank and there is no requirement or potential to develop an additional residential area.

6.1.5.3 Agriculture

Agricultural practises are currently conducted in the area including cultivation and pastures. Agriculture is an alternative. Grazing as a land use will resume over the areas when operations have ceased and the area have been rehabilitated.

6.2 The Option of not Implementing the Activity

The “no-go” option means that no mining will be conducted and that no socio-economic opportunities associated with mining will be created during the LoM.

The no-go option will have socio-economic implications, which include:

- No new permanent employment opportunities will not be created.
- No temporary employment opportunities during construction.
- The loss of economically viable and mineable reserves.
- The no-go option will have impacts on the local economy, social benefits and the livelihoods of the local community.

6.3 Positive and Negative Impacts for Proposed Activity and Alternatives

The positive and negative impacts are identified and summarised in **Table 5** and **Table 6** below.

Table 5: Positive and Negative Impacts – Site Layout

Aspect	Alternative 1 – Site Layout	Alternative 2 – Site Layout
Topography	The topography will be altered but can be rehabilitated to resemble the pre-mining topography as close as possible. Alternative 1 will have a significantly higher impact than Alternative 2 considering that the opencast areas extent is 4 415.57 ha more than what is planned in Alternative 2.	The topography will be altered but can be rehabilitated to resemble the pre-mining topography as close as possible. This alternative will be more acceptable from a significance perspective since opencast mining areas will be reduced by 90.05%.
Geology	The geology of the area will be permanently altered. As indicated under topography, the disturbance area for this alternative will be larger by 4 415.57 ha thus the significance will be greater.	The geology of the area will be permanently altered.
Surface Water	Surface water quantity and quality will be impacted. Entire freshwater systems will be destroyed and it would be to such an extent that it can be considered a fatal flaw.	Surface water quantity and quality will be impacted. Stream diversions will be required and wetlands some wetlands will be destroyed. These impacts are not considered a fatal flaw and can be managed to an extent.
Groundwater	Groundwater quantity and quality will be impacted to a larger extent considering the areas that would be mined. It can be expected that the plume will have a more significant impact on external users than Alternative 2.	Groundwater quantity and quality will be impacted, it is expected that 42 boreholes be impacted of which 5 will be mined out.
Soils	Soils will be impacted and to a much greater extent than Alternative 2. Even though proper stripping, stockpiling and rehabilitation practises can mitigate these impacts, it is highly probable that this impact would have been deemed unacceptable by the soils specialist.	Soils will be impacted. Proper stripping, stockpiling and rehabilitation practises can mitigated these impacts.
Land Use	This option will have a very high significance impact on agricultural activities in the area and is deemed to be a fatal flaw.	The land use will change permanently. The area will be rehabilitated to sustain grazing.
Air Quality	Air quality impacts will be of higher significance since dust fallout will be greater than Alternative 2.	Air quality will be impacted upon by the proposed activities.
Fauna	Fauna will be impacted more severely for this option when considering species among wetlands.	Fauna will be impacted when considering species among wetlands, but it will be of less significance.
Flora	Protected species will have to be relocated and a significant area of ingenious vegetation will have to be removed. This impact can be considered a fatal flaw when considering the sensitivity of the area.	Alterations has been made to avoided identified threatened species. Mitigation measures will reduce the significance of the impact.
Wetlands (Aquatic)	1 779.04 ha of wetlands and their respective buffers will be mined out.	85.76 ha of wetlands and their respective buffers will be mined out.
Visual	Since the surface disturbance will be 4 415.57 ha more than Alternative 2 and considering the visual aesthetic of the area, this impact would be of very high significance.	The visual impacts will be of moderate significance after mitigation.
Noise	Noise will be of higher significance than Alternative 2.	Noise can be mitigated to an acceptable level.
Relocation of	Multiple communities will have to be relocated.	Relocation may be required.

Aspect	Alternative 1 – Site Layout	Alternative 2 – Site Layout
Communities		
Loss of employment	The loss of employment will be catastrophic for the local area and can be considered a fatal flaw.	Loss of employment may occur.
Creation of employment	It is possible that more employees would be required for this alternative and that the life of the operations may have significantly increased.	270 employment opportunities will be created.
Revenue	This operation would have resulted in significantly higher revenue since opencast mining would have been 90.05% more than Alternative 2.	Revenue will be generated by the project, but it would be less than Alternative 1.
Financially justifiable	Considered a fatal flaw considering the number of wetlands to be destroyed, agricultural activities ceasing, grave relocation required and number of communities that would require relocation.	This option would require wetland offsetting, water treatment, possible relocation of graves, potential relocation of communities and permits to demolish heritage structures, but it would be significantly lower than Alternative 1.
Destruction of heritage structures.	This option would have necessitated the relocation of multiple graves and demolishing of structures of high cultural significance.	Graves may potentially be impacted and some heritage structures.
Relocation of graves		

The colour coding explanations are provided at the end of **Table 6**.

Table 6: Positive and Negative Impacts Summary

Aspect	Alternative 1 – Site Layout	Alternative 2 – Site Layout
Topography	Y (-)	Y*(-)
Geology	Y (-)	Y*(-)
Surface Water	Y (-)	Y*(-)
Groundwater	Y (-)	Y*(-)
Soils	Y (-)	Y*(-)
Land Use	Y (-)	Y*(-)
Air Quality	Y (-)	Y*(-)
Fauna	Y (-)	Y*(-)
Flora	Y (-)	Y*(-)
Wetlands (Aquatic)	Y (-)	Y*(-)
Visual	Y (-)	Y*(-)
Noise	Y (-)	Y*(-)
Relocation of Communities	Y (-)	Y*(-)
Loss of employment	Y (-)	Y*(-)
Creation of employment	Y*(+)	Y (+)
Revenue	Y*(+)	Y (+)
Financially justifiable	PNI	Y*(+)
Destruction of heritage structures	Y (-)	Y*(-)
Relocation of graves	Y (-)	PNI
Positive Impact		
Positive Impact (Greater Value)(Y*(+))		
Negative Impact of Greater Significance		
No Impact (NI)		
Possible Negative Impact (PNI)		
Negative Impact (Can be mitigated to preferred impact significance) (Y*(-))		

6.4 Motivation for not Considering Alternatives

Alternatives were considered therefore, this section is not applicable.

6.5 Concluding Statement of Preferred Alternative

After careful consideration of the physical, biological and socio-economic impacts, as discussed above, it was concluded that Alternative 2 in terms of site layout (**Figure 4, Figure 9, Figure 10** and **Figure 11**) is the preferred option. This selection was based on the impacts on the environment, heritage features, graves and socio-economic environment.

7 PROJECT DESCRIPTION

Some of the information in the sections below were obtained from Onno Fortuin Consulting Concept SWMP Report (2023) attached as **Annexure 4**.

7.1 Overview of the Project

Opencast and underground mining is planned at Naudesbank. Only crushing and screening will be conducted on-site. Other infrastructure to be developed include workshop, offices, change houses, water management infrastructure, roads and diesel bay. More details pertaining to the planned activities are provided in **Sections 7.2 – 7.16**.

7.2 Activities

7.2.1 Activity 1: Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)

Underground mining is also planned via bord-and-pillar mining methods utilising mechanised and conventional mining methods. Access to underground mining areas are / will be obtained via opencast pits. In bord-and-pillar mining, parallel roadways are developed in the direction of advance. Perpendicular roads, called splits, are developed at predetermined intervals to parallel roads. These roads interlink, creating pillars. The underground panel widths are determined by the size of the pillars required to support the overburden above the coal seam and the length of the production equipment's trailing cables. In between mining panels are barrier pillars which carries the abutment stress and therefore breaks the span of the panels who assist with the overall mine stability. The road width design is approximately 6.0 – 7.2m wide with an average mining height of 1.8 m. The pillar size determined by the safety factor formula results in the pillar strength divided by the pillar load. No pillar extraction is planned. A schematic presentation of underground mining process is depicted in **Figure 12**. The localities of the refuge bay boreholes and the ventilation shaft is shown in **Figure 13**.

Figure 12: Underground Mining Process

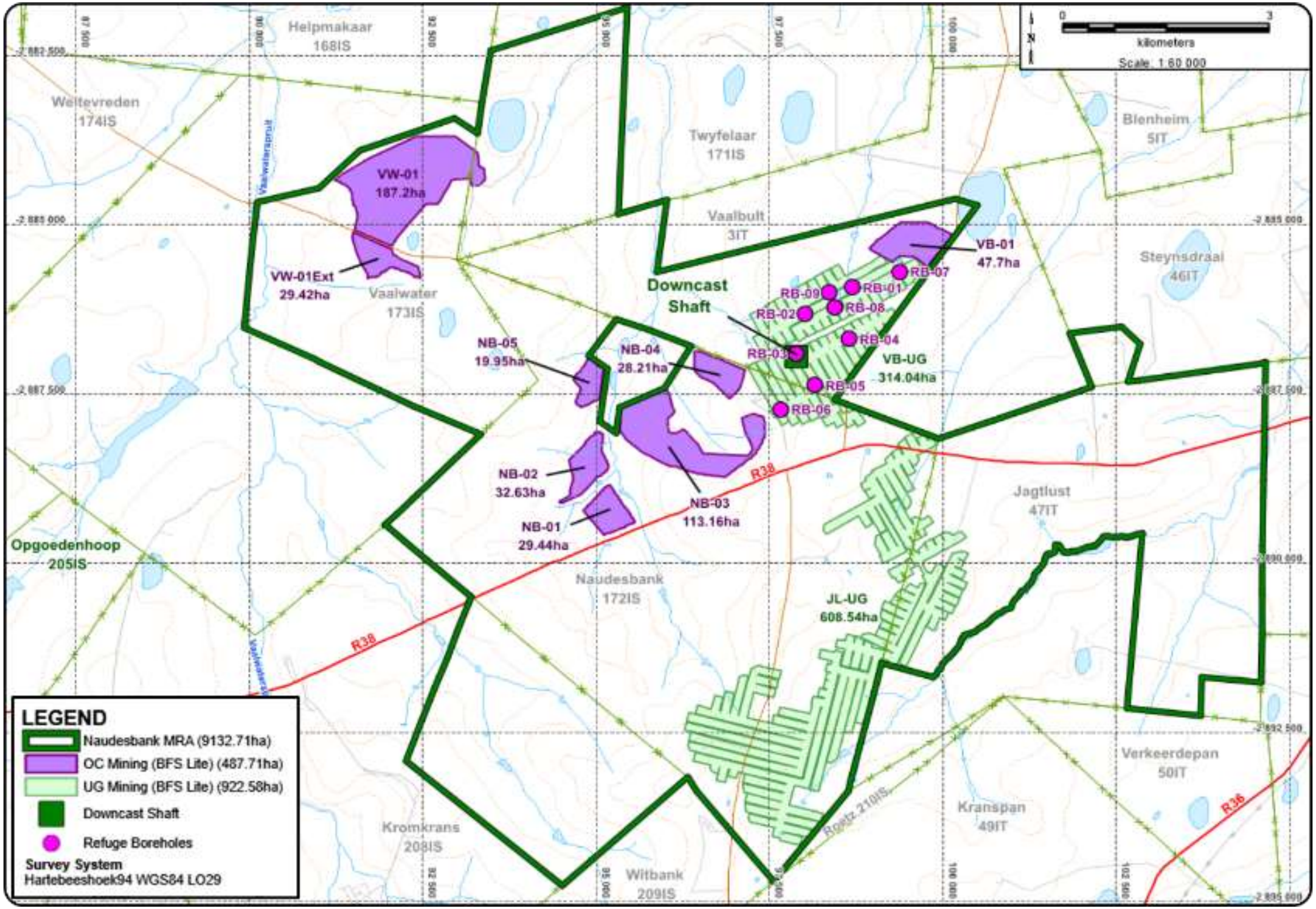


Figure 13: Refuge Bay Boreholes and Ventilation Shaft

7.2.2 Activity 2: Opencast Mining (including Stripping and Stockpiling of Topsoil)

Seriti plans to conduct opencast roll over mining using truck and shovel mining methods. Three main mining areas are planned namely Vaalwater, Vaalbult and Naudesbank. Box-cuts will be developed, and the topsoil will be stockpiled. During the development of the box-cut, the overburden material is removed and stockpiled. Once the coal is mined out, the next mining strip is stripped of topsoil and the overburden material is blasted. Concurrent rehabilitation will be undertaken at all the pits except the Vaalbult Pit which will be used to access underground section VB-UG. A schematic presentation of the opencast mining process is shown in **Figure 14** below.

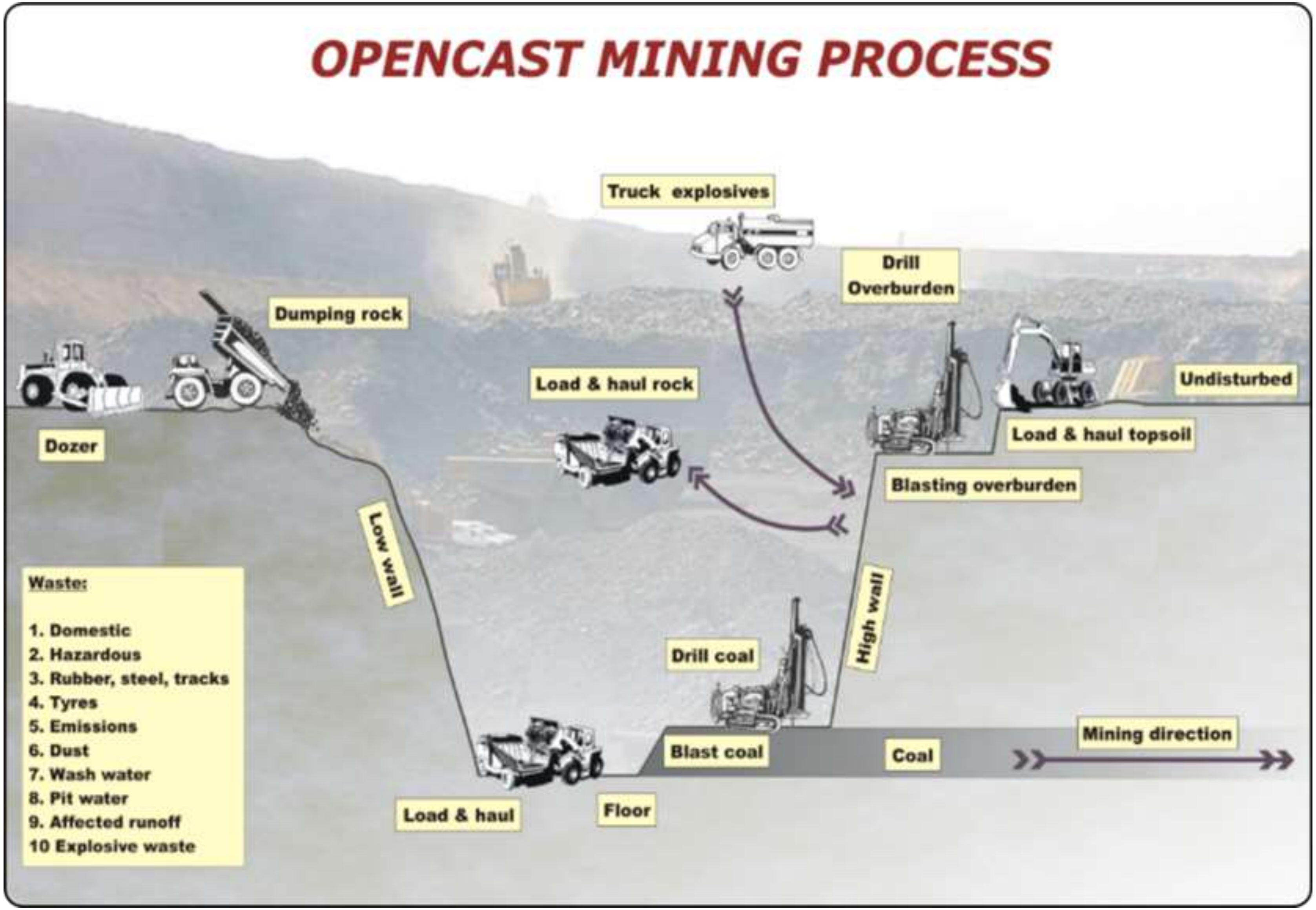


Figure 14: Opencast Mining Process

7.2.3 Activity 3: Overburden Stockpiles and RoM Yards

Overburden hards and softs will be stockpiled separately. The material will be used to backfill the opencast pits during rehabilitation. More detail is provided under **Section 7.8**.

7.2.4 Activity 4: Water Management Infrastructure

Water management facilities will be constructed which includes berms, canals (clean and dirty), sumps and Pollution Control Dams (PCDs). These water management facilities will be utilised throughout the life of the project. Details regarding the designs are discussed in more detail in the sections below. More detail is provided under **Section 7.14**.

7.2.5 Activity 5: Roads

An existing access road will be utilised. Haul roads will be required at the three opencast areas. Roads are discussed in more detail in **Section 7.9**.

7.2.6 Activity 6: Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)

Diesel tanks will be required for on-site storage. The tanks will be contained in a bunded area and comply with SABS standards. The total volume stored on-site will not exceed 500 m^3.

Surface infrastructure will be required and include (but are not limited to) offices, workshop, change houses, hard parks, etc. More detail is provided under **Sections 7.7** and **7.11**.

7.3 Mineral Resource and Expected Project Life

According to the newest geological information a total of 50.744 million tonnes of coal can be mined in the area.

Table 7: Expected Production Rate for RoM Coal

Aspect	Tonnes of RoM Coal
Average combined monthly production rate	165 000
Maximum combined monthly production rate	200 000
Total LoM Production	50 744 000

The Environmental Authorisation is required for the period equal to the operational period of the mine (+/- 23 years), as well as an additional 3-5 years for decommissioning and closure purposes.

7.4 Mineral Processing

Coal will be processed at the on-site mobile crushing and screening plant which will be placed at the Naudesbank RoM Stockpiles. A mine residue facility is not required since no washing is planned.

7.5 Rehabilitation

Surface rehabilitation of the infrastructure will be conducted after cessation of the mining activities. The mining related infrastructure will be removed, affected footprints will be rehabilitated and; the area will be restored, as close as possible, to pre-activity topography and environmental status.

The opencast pits will be rehabilitated according to a pre-determined profile. Concurrent rehabilitation will be conducted when possible. The remainder of the opencast rehabilitation will be conducted during the decommissioning phase.

7.6 Transport of Product

Coal products will be transported off-site via trucks to various clients.

7.7 Infrastructure

The following infrastructure will be developed for Naudesbank Colliery (Refer to **Figure 15**, **Figure 16** and **Figure 17**):

- Topsoil Stockpiles;
- Overburden Stockpiles;
- Mobile Crushing and Screening Plant;
- RoM Yards including RoM Stockpiles;
- Workshop;
- Offices including Change Houses, Lamp room, etc.;
- Water Management Infrastructure including PCDs;
- Access Road;
- Haul Roads;
- Security Trench;
- Diesel Bay; and
- Hard Parks.

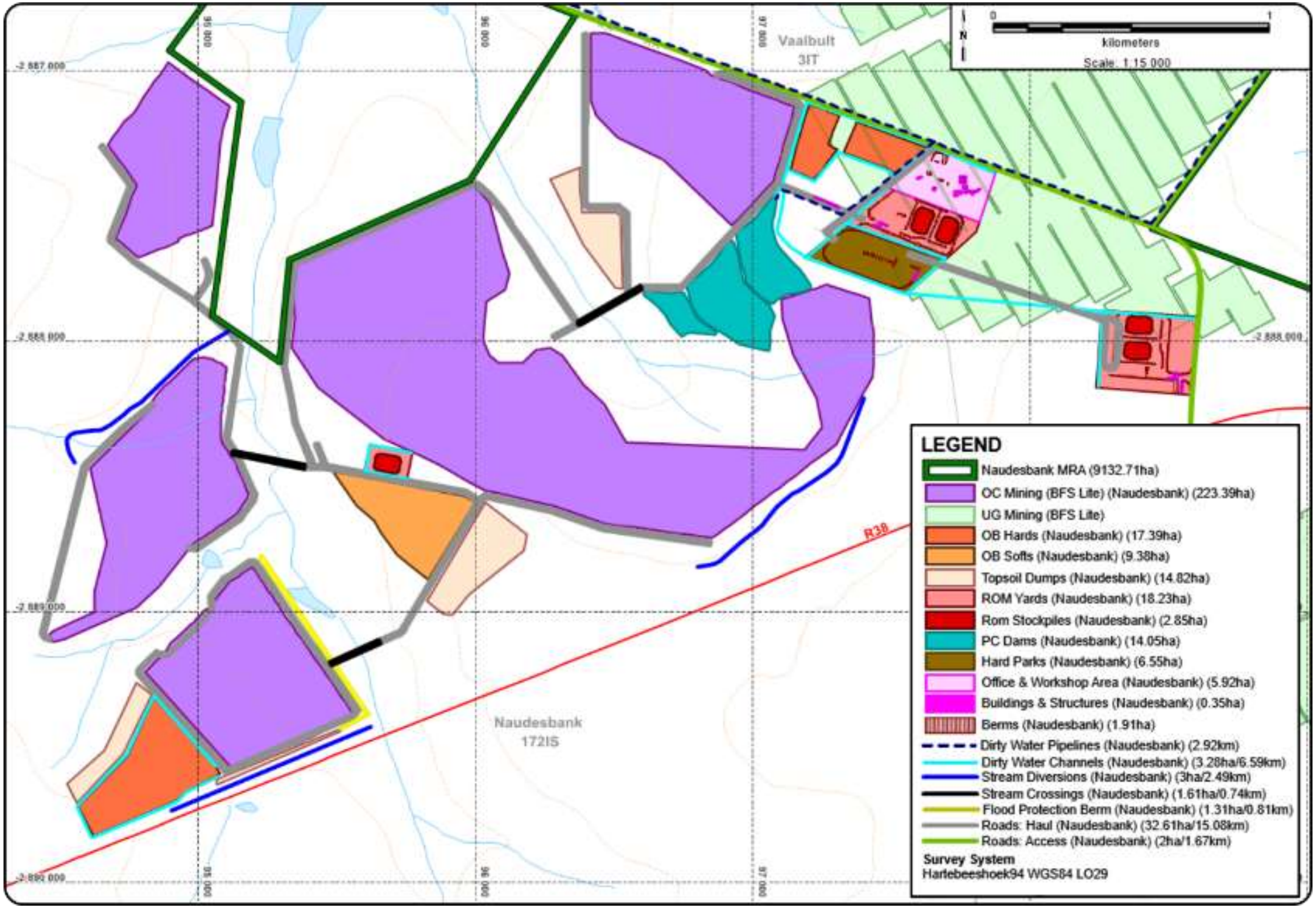


Figure 15: Infrastructure Layout – Naudesbank Section

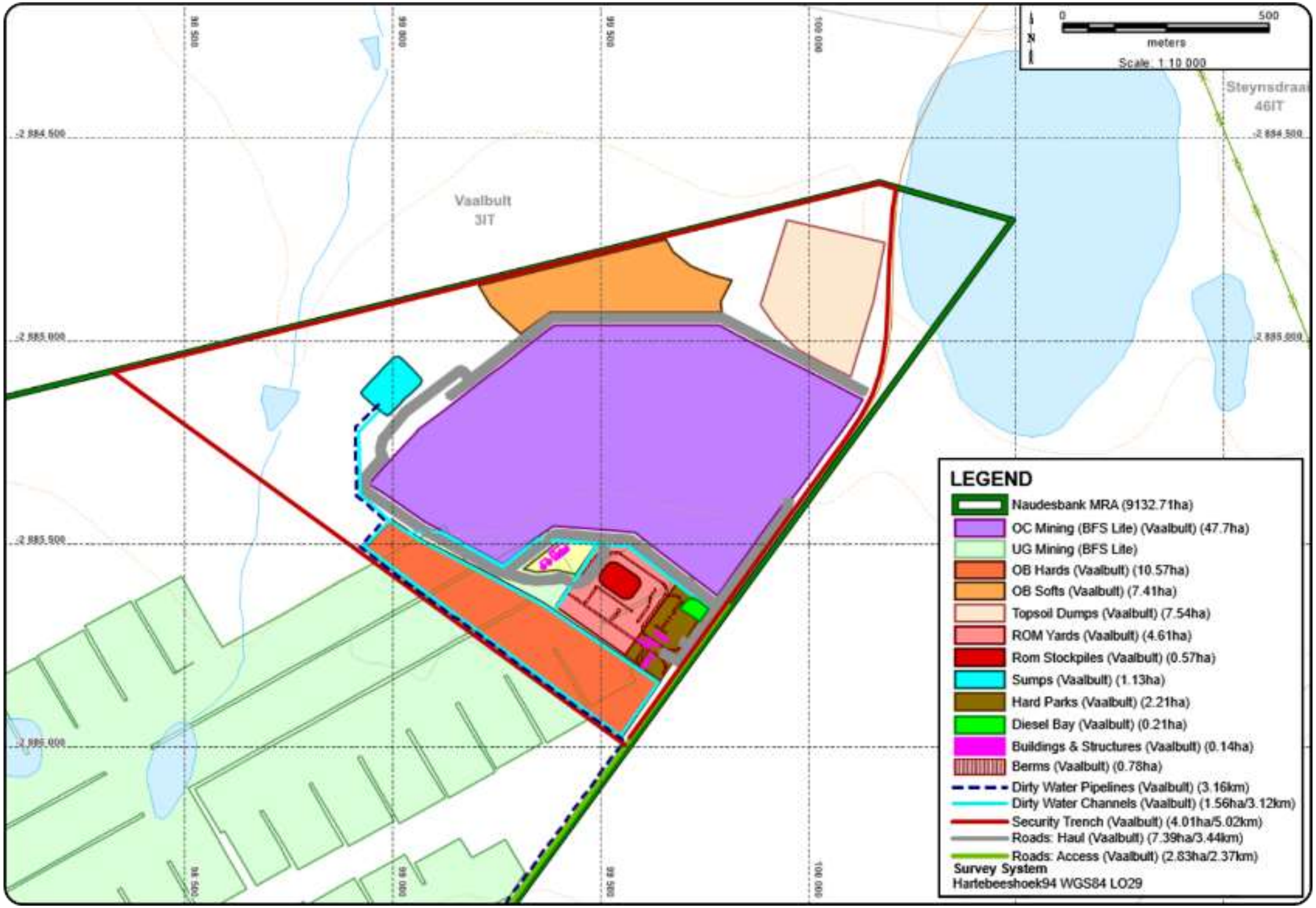


Figure 16: Infrastructure Layout – Vaalbult Section

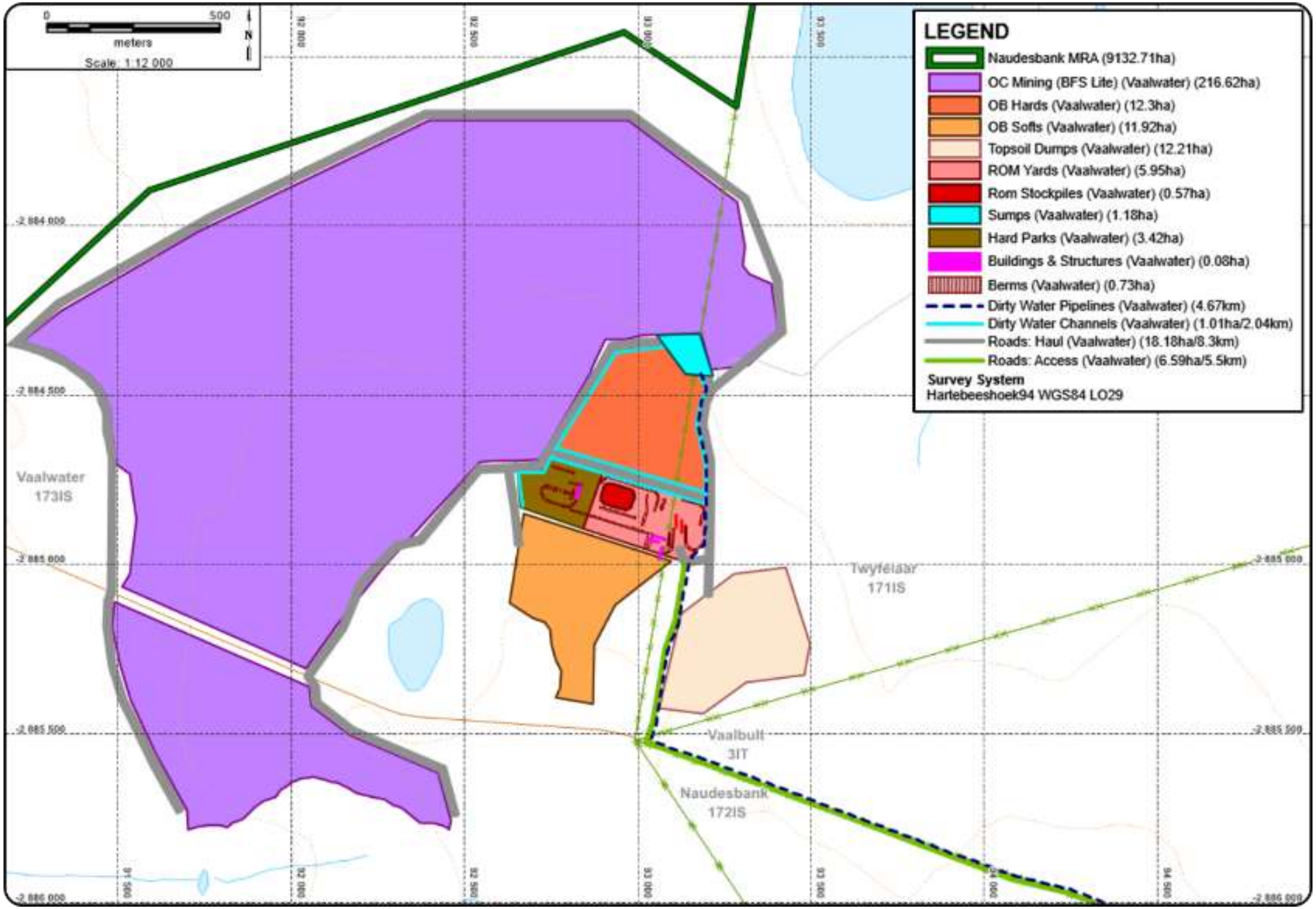


Figure 17: Infrastructure Layout – Vaalwater Section

7.8 Stockpiles

Overburden and RoM Stockpiles will be lined with a Type C liner. The design is shown in **Figure 18**.

Figure 18: Typical Class C Alternative Liner Design for Overburden and RoM Stockpiles

7.9 Roads

The access road is already existing, but the road may potentially be widened. Haul roads will be constructed throughout all three opencast areas. None of the roads will be paved, but dust-a-side type of product will be considered on the access roads to reduce dust fallout.

7.10 Fencing

Fences will be erected to manage access to the three opencast sites where practically possible. In addition, security trenches will be established where required around the perimeter.

7.11 Workshop, Administration and Other Buildings

A workshop area is planned at the Naudesbank opencast section. The platform area will be a sloped engineering platform and the workshop building and approach slabs will be concrete lined with drains towards a silt trap and oil separator which is linked to the main dirty canal system. Offices and change houses will be constructed.

Employees and construction workers will commute to the site daily. No housing or recreational facilities will be constructed on-site.

7.12 Water Supply

7.12.1 Potable Water

Potable water will be stored in a potable water tank with an estimated usage of 3 285 m^3 per annum. The water will be obtained from boreholes.

7.12.2 Process Water

The only process water needed will be for dust suppression. An estimated 1 496 938 m^3 per annum will be required for dust suppression. This water is obtained from the PCDs.

7.13 Disturbances of Watercourses

Portions of wetlands will be mined out and edge effects can be expected. Three stream crossings and three stream diversions are also planned and will cause a direct disturbance to watercourses. Refer to **Annexure 4** for detailed designs.

Mitigation measures will be implemented to manage and prevent any indirect disturbance to watercourses. These measures are included in the EMPr.

7.14 Water Management Infrastructure

7.14.1 Pollution Control Dams (PCDs) and Sumps

A summary of the PCD and sump designs are tabulated below. Refer to **Annexure 4** for detailed discussion and designs.

Table 8: Design Details – PCDs and Sumps

Design Aspect	Main PCD	Underground PCD	Vaalwater Sump	Vaalbult Sump
Capacity	270 000 m^3	32 000 m^3	14 000 m^3	12 000 m^3
Footprint	14.05 ha	1.9 ha	1.34 ha	1.13 ha
Freeboard	0.8 m	0.8 m	NA	NA
Flood Event Accommodation	1:50	1:50	NA	NA
Liner System	Class C Liner.	Class C Liner.	NA	NA
Leakage Detection System	Yes.	Yes.	NA	NA
Silt Trap	Yes, double chamber.	Yes, double chamber.	NA	NA
Emergency Overflow Structures	Yes, concrete structure with a width of 5 m and a water overflow height of 0.8 m to allow for the 0.8m freeboard requirement of DWS.	Yes, concrete structure with a width of 5 m and a water overflow height of 0.8 m to allow for the 0.8m freeboard requirement of DWS.	NA	NA

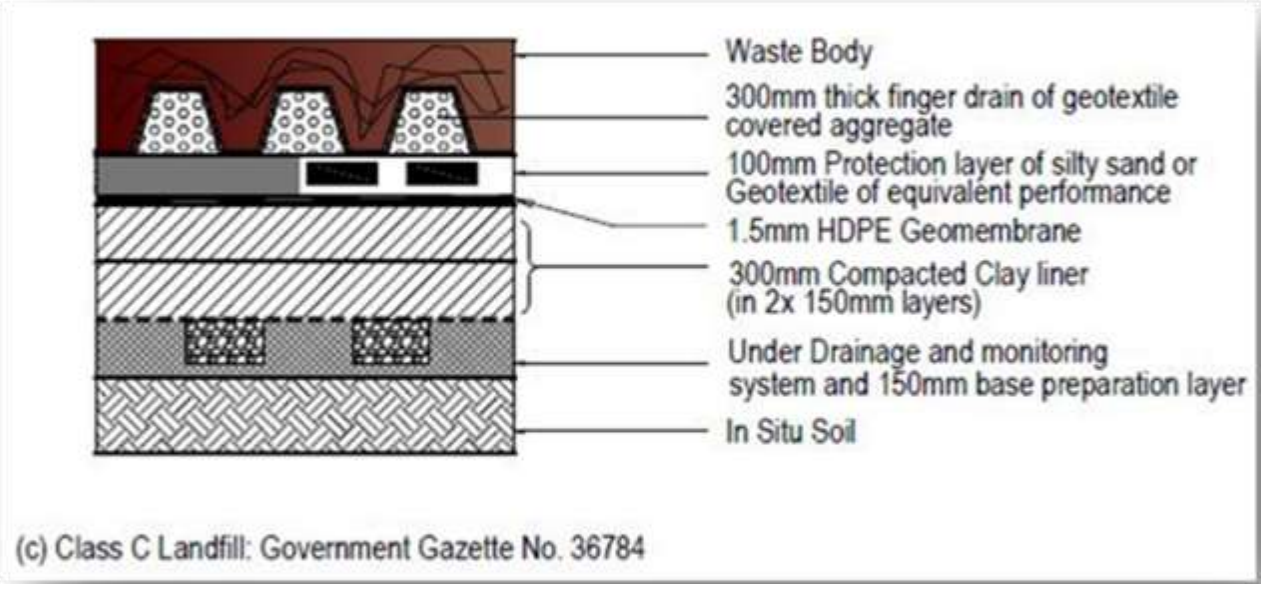


Figure 19: Class C Landfill Barrier

7.14.2 Clean Water Management System

Eleven (11) clean water canals will be required at Naudesbank to divert clean water runoff into the natural environment, refer to **Table 9** for the design details. Refer to **Figure 20** for the locality of the canals. Erosion outlet structures will be installed at each canal outlet. Detailed design information including drawings is included in **Annexure 4**.

Table 9: Design Details - Clean Water System

Canal	Lining	Bottom Width (m)	Depth (m)	Slope %	1:50 Peak Flow (m^3/s)	1:50 Velocity (m/s)	1:50 Flow Depth (m)
CC1	Grass	1	0.5	2.11	1.42	2.13	0.38
CC2	Grass	1	0.4	5.29	0.59	1.37	0.29
CC3	Grass	1	0.6	4.19	2.33	2.90	0.43
CC4	Grass	1	0.5	1.75	0.85	1.56	0.38
CC5	Grass	1	0.7	3.76	3.13	3.43	0.47
CC6	Grass	1	0.7	0.09	0.93	0.90	0.51
CC7	Grass	1	0.5	2.42	0.92	1.69	0.33
CC8	Grass	1	0.6	1.90	1.67	2.44	0.40
CC9	Grass	1	0.3	3.18	0.67	2.10	0.22
CC10	Grass	3	0.8	0.10	2.04	0.92	0.54
CC11	Grass	3	0.8	0.18	2.13	0.98	0.58

Figure 20: Clean Water Canals

7.14.3 Dirty Water Management System

Twenty three (23) dirty water canals are required at Naudesbank, ten (10) at Vaalwater and nine (9) at Vaalbult to manage contaminated runoff. Refer to **Table 10**, **Table 11** and **Table 12** for the design details. Refer to **Figure 21**, **Figure 22** and **Figure 23** for the locality of the canals. Detailed design information including drawings is included in **Annexure 4**.

Table 10: Design Details – Dirty Water Canal System Naudesbank

Name	Lining	Depth (m)	Bottom Width (m)	Slope	Flow (m^3/s)
N1	Concrete	0.5	1	1.53	1.25
N2	HDPE	0.6	1	2.15	3.24
N3	HDPE	0.6	1	0.77	3.58
N4	HDPE	0.7	1	2.71	4.40
N5	HDPE	0.7	1	2.83	11.67
N6	HDPE	0.4	1	2.47	0.98
N7	HDPE	0.4	1	4.48	1.06
N8	Concrete	0.5	1	0.75	1.04
N9	Concrete	0.5	1	0.57	1.07
N10	Concrete	0.6	1	4.46	2.35
N11	Concrete	0.8	1	5.47	7.91
N12	Concrete	0.6	1	3.39	0.35
N13	Concrete	0.8	1	1.19	5.61
N14	Concrete	0.7	1	0.47	1.95
N15	Concrete	0.6	1	1.46	2.00
N16	Concrete	0.8	1	2.08	3.80
N17	Concrete	0.2	1	4.19	0.36
N18	Concrete	0.2	1	1.02	0.36
N19	Concrete	0.2	1	5.15	0.39
N20	HDPE	0.3	1	1.04	0.51
N21	HDPE	0.5	1	3.71	2.42
N22	HDPE	0.7	1	0.65	3.35
N23	HDPE	0.5	1	0.48	1.98

Table 11: Design Details – Dirty Water Canal System Vaalwater

Name	Lining	Depth (m)	Bottom Width (m)	Slope	Flow (m^3/s)
V1	HDPE	0.3	1	0.86	0.69
V2	HDPE	0.3	1	2.37	0.69
V3	HDPE	0.5	1	2.35	3.40
V4	HDPE	0.6	1	2.54	3.77
V5	Concrete	0.3	1	2.83	0.95
V6	Concrete	0.5	1	1.67	0.94

Name	Lining	Depth (m)	Bottom Width (m)	Slope	Flow (m^3/s)
V7	HDPE	0.8	1	3.72	4.33
V8	HDPE	1.1	1	0.21	4.92
V9	HDPE	0.4	1	0.41	0.92
V10	Concrete	0.5	1	1.50	1.52

Table 12: Design Details – Dirty Water Canal System Vaalbult

Name	Lining	Depth (m)	Bottom Width (m)	Slope	Flow (m^3/s)
Vb1	HDPE	0.3	1	1.46	0.84
Vb2	HDPE	0.4	1	2.87	1.90
Vb3	HDPE	0.7	1	0.16	3.10
Vb4	HDPE	0.6	1	1.38	3.09
Vb5	HDPE	0.3	1	0.78	0.30
Vb6	HDPE	0.5	1	2.94	1.98
Vb7	HDPE	0.4	1	3.40	1.69
Vb8	HDPE	0.6	1	0.50	1.82
Vb9	HDPE	0.7	1	2.22	6.77

Figure 21: Dirty Water Canals - Naudesbank

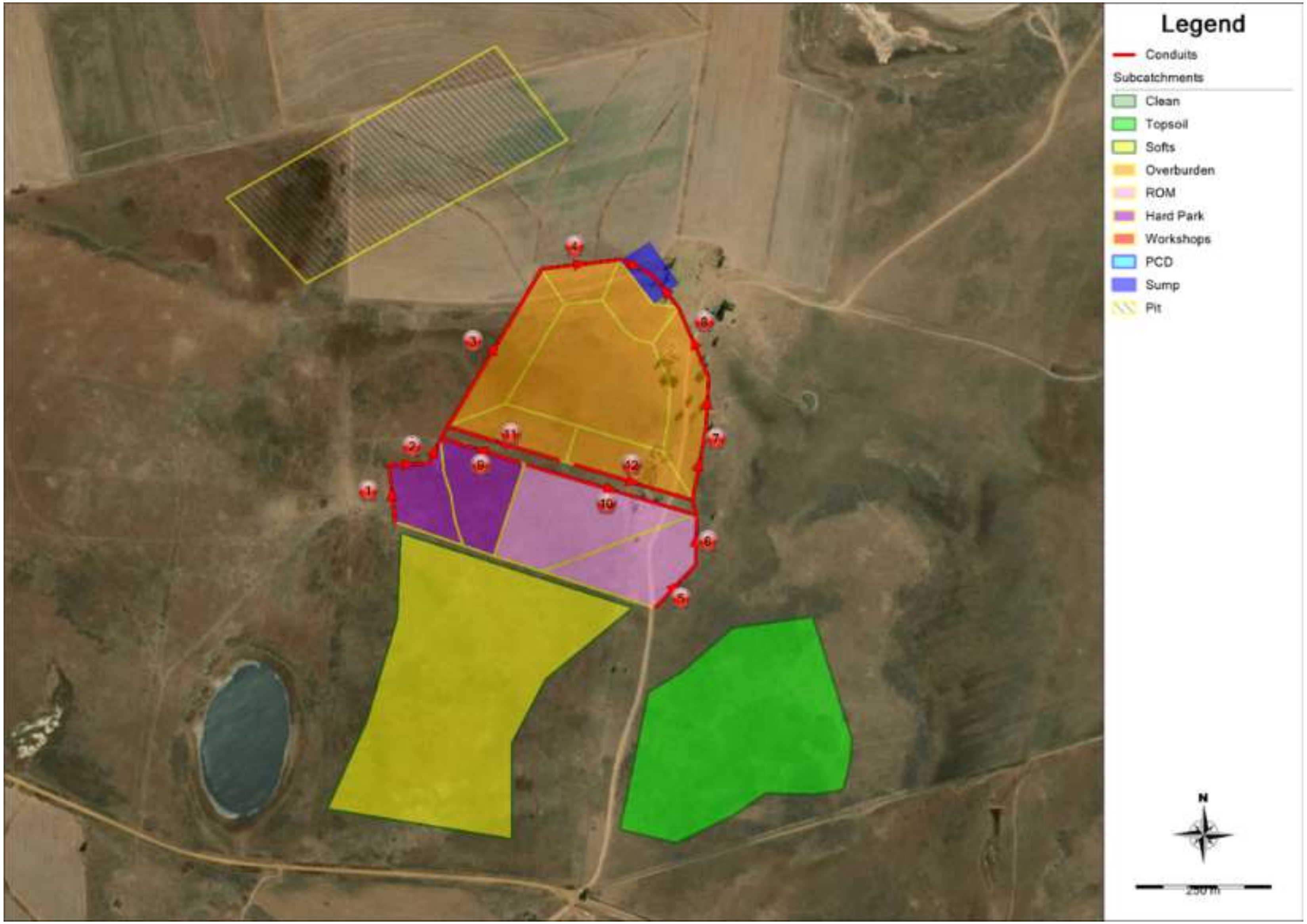


Figure 22: Dirty Water Canals – Vaalwater

Figure 23: Dirty Water Canals - Vaalbult

7.15 Waste Management

Management of waste must be the responsibility of each person on-site. Training on how waste is managed is included in the induction training of Naudesbank to ensure that everyone is aware of the type of waste as well as the various procedures associated with handling of various waste types.

Effective and responsible waste management cannot be done without proper training therefore, training during induction is vital to ensure that correct categorisation of waste is done at source. It will ensure that all salvageable material is separated from the other waste. Salvageable material can be sold and generate some income.

As part of awareness training, regular flyers can be distributed on-site to increase the waste management/separation/reduction awareness of the employees and contractors.

7.15.1 Hazardous Waste Disposal

Oil and grease waste generated during maintenance and services will be disposed of into sealed drums and collected regularly by an approved vendor. Any other contaminated waste (i.e. brake pads, filters, oil rags, etc.) must be disposed of into marked bins/skips for collection by a contractor for disposal at an approved hazardous waste facility. Most of the hazardous waste originates from operation, maintenance and servicing of vehicles and equipment. All the hazardous waste must be disposed of into marked hazardous waste bins.

7.15.2 Domestic Waste Disposal

All waste from the site will be managed as part of Naudesbank's overall domestic waste management system. Domestic waste (e.g. paper, cardboard, organic waste, etc.) generated must be collected by an appointed contractor and disposed of at an authorised site. A recycling initiative is recommended.

Categories of recycling include:

- Scrap metal;
- Glass;
- Cans/tins;
- Paper;
- Cardboard; and
- Plastic.

7.15.3 Non-hazardous Industrial Waste Disposal

Scrap metal will be temporarily stored before being sold to scrap dealers. Old tyres will be recycled by approved vendors.

7.15.4 Mine Residue Disposal

No coal washing will be undertaken at Naudesbank therefore, no mine residue will be generated.

7.15.5 Sewage

A bio-filter sewage treatment plant will be installed and the treated effluent will be disposed into the main PCD. Approximately 6 m^3 per day will be treated. Chemical toilets will be utilised during construction.

7.16 Energy Supply

Electricity will be obtained from Eskom. Backup diesel generators will be installed.

7.17 Motivation for the Project

The need and desirability of the project was discussed in detail in **Section 5**.

Socio-economic benefit:

Capital and operating benefits will be injected into the national economy through the development of the project throughout the 23-year operating life. Contributions to economic growth in the area will also occur through wages between local and national employees. Capital was also invested by exploration, specialist studies and the development of the EIAR.

The product from Naudesbank is earmarked for the following customers:

- Exports 6 000 kcal – Seaborne Market.

The development and operation of the mine will have a positive impact on the regional socio-economic structure.

In the relevant Social and Labour Plan key elements to basic skills development, educational support for tertiary studies, learnerships, internships and bursaries. Specific focus is placed in the skills development of local communities that is tied into Seriti's local economic development programmes. In addition, Seriti, whom owns 90% of Seriti Power, is a broad based, 91% black owned and controlled South African mining company.

Seriti will invest in the area's economy, greatly supplementing the existing local economy. Capital investments for the applications and authorisations have been made.

The mine will approximately have 6 full time employees and 264 contractors at maximum production levels. Security of employment and upholding the livelihood standards of the employees will be secured for the next 23 years, if authorisations are granted.

Benefits of the optimised mine plan will include:

- Creation of new employment opportunities; and
- Additional economic activities in the area.

Environment:

Any type of development will have an impact on the physical environment and the planned activities are expected to have impacts on the environment. Various legislation including NEMA, the Water Act and the associated regulations set principles, standards and norms depicting how developments should be conducted in a responsible manner. The aim of this process is to quantify and qualify measures and practices that can be implemented and maintained to ensure that the activity is conducted in such a manner that it will have the least possible impact on the environment. The management, implementation and measurement of those identified measures and practices throughout all the phases are crucial in achieving the aim/objectives that will be set. From an ecological perspective, all the necessary measures were undertaken to reduce anticipated impacts to acceptable levels. No fatal flaws were identified by the EAP or the respective specialists.

8 BASELINE ENVIRONMENT

8.1 Geology

The information in this section was obtained from the Groundwater Assessment conducted by Groundwater Square (GW^2, 2023). The report is attached as **Annexure 5**.

Naudesbank is underlain by residual and weathered sedimentary strata of the Vryheid Formation (Ecca Group, Karoo Supergroup), which comprises sandstone, shale and coal. Exploration drilling identified numerous dolerite & diabase sills and fault zones.

Of the five coal seams (A-Seam on top, B-Seam, C-Seam, D-Seam and E-Seam at the bottom) the B Seam and E-Seam are the thickest, at average thicknesses of 1.8 m and 2 m. However, the E-Seam has a much more consistent thickness, mostly 1.3 m to 2 m thick, while the B-Seam range from 0.1 m to 2 m thick and therefore difficult to mine. Although the E-Seam is the main targets, other seams might also be mined when encountered during opencast mining.

Vertically displaced coal seams through geological activity are a regular occurrence and influenced the mine design in several areas. Two small areas of dolerite outcrop, south-west of the planned mining area occur.

8.2 Climate

8.2.1 Regional Climate

Naudesbank is located in the summer rainfall region of southern Africa. The climate is temperate with hot summers and dry cold winters. Summer precipitation occurs in the form of mist, drizzle, hail and thunderstorms.

8.2.2 Mean Monthly Rainfall, Evaporation, Daily Temperatures and Maximum Rainfall Intensities

Naudesbank falls within Quaternary Catchments X11A and X11B, located within Evaporation Zone 5A. The Mean Annual Evaporation (MAE) for Quaternary Catchment X11A is 1 445.8 mm and the MAE for Quaternary Catchment X11B is 1 402.0 mm.

The Mean Annual Precipitation (MAP) of each Quaternary Catchment is as follow:

- X11A = 688 mm
- X11B = 716 mm

Table 13: Carolina (MUN) Rainfall Station Monthly Rainfall Distribution (Onno Fortuin Consulting, 2023)

Monthly	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average (mm)	80.32	135.86	120.12	124.72	84.52	77.34	43.09	16.53	9.70	7.18	10.71	28.71
Standard Deviation (mm)	42.88	59.33	44.21	54.21	42.83	39.71	33.76	17.87	16.56	14.64	15.62	30.05

Table 14: Monthly Evaporation Distribution for Catchment X11A (Onno Fortuin Consulting, 2023)

Monthly	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Average (mm)	150	148	160	151	123	124	99	88	67	80	114	137

Table 15: Temperatures (Silobela Station 01/01/2022 to 31/12/2022 – South African Air Quality Information System (SAAQIS))

Month	Average Daily (°C)	Minimum (°C)	Maximum (°C)
January	19.03	13.02	29.57
February	19.99	11.38	30.35
March	18.26	9.29	29.82
April	14.32	5.34	27.07
May	12.69	3.60	23.05
June	8.53	-4.15	21.86
July	6.72	-1.94	20.21
August	12.05	-2.73	26.12
September	16.62	0.00	30.66
October	19.97	9.04	34.17
November	17.71	9.62	29.62
December	18.88	8.24	30.52

8.2.3 Mean Monthly Wind Direction and Speed

The information in this section was obtained from the Air Quality Impact Assessment conducted by EHRCON (2023). The report is attached as **Annexure 6**.

The predominant wind directions within the District is from the east north-east and west. Wind speeds of between 5 and 18 km/h are generally observed.

Winds from the north north-eastern sector (40.4%) were mostly reported for the study area. Calm periods were the exception and wind speeds were most often moderate, between 2.1 and 3.6 m/s (37.8%). Brisk winds between 3.6 and 5.7 m/s were recorded 30.5%, light winds between 0.5 and 2.1 m/s were recorded 16.2%, and strong winds above 5.7 m/s, about 14.5% of the time.

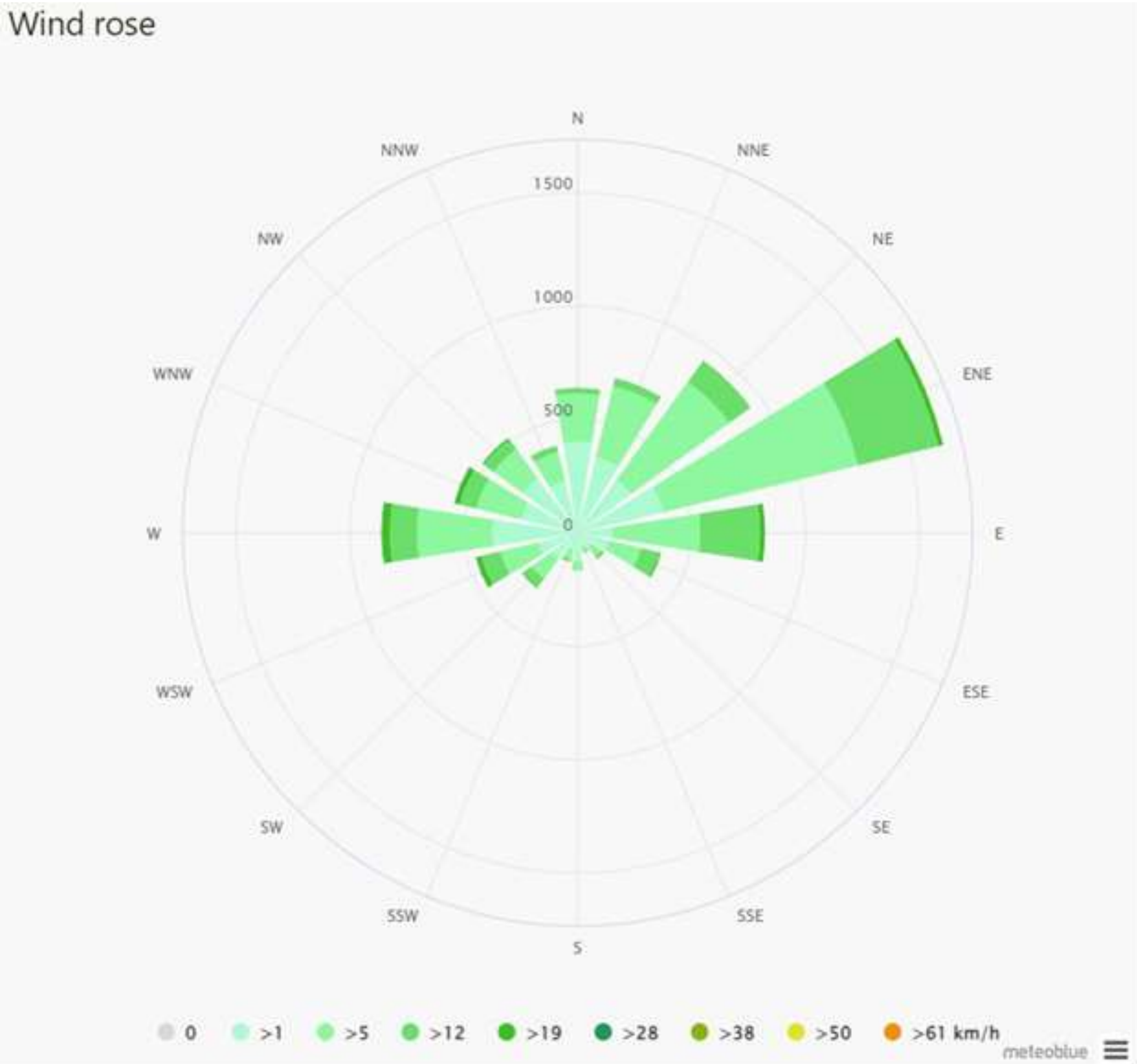


Figure 24: Carolina Wind Rose for the Period 1992 – 2022

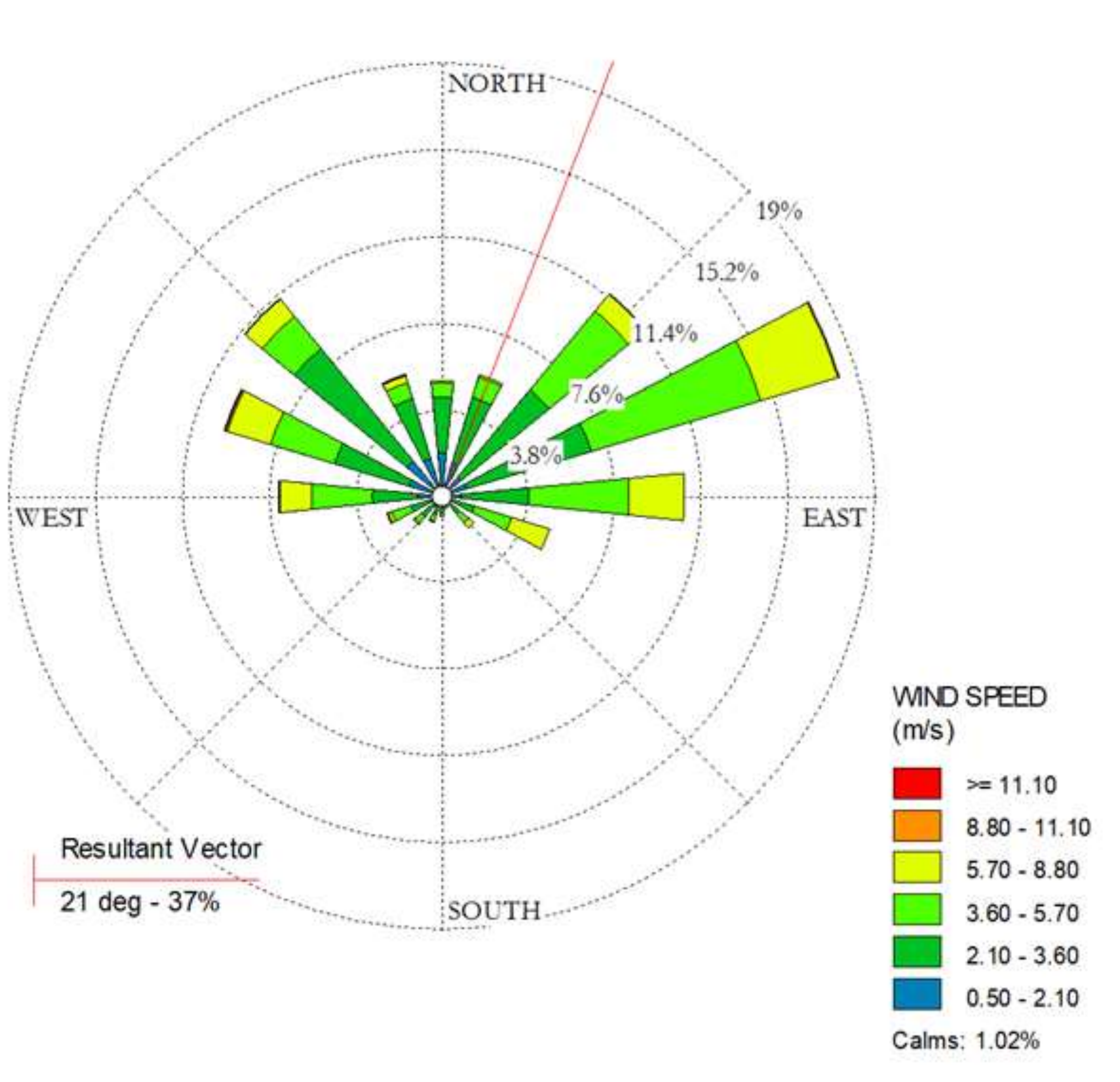


Figure 25: Carolina Period Wind Rose (2022)

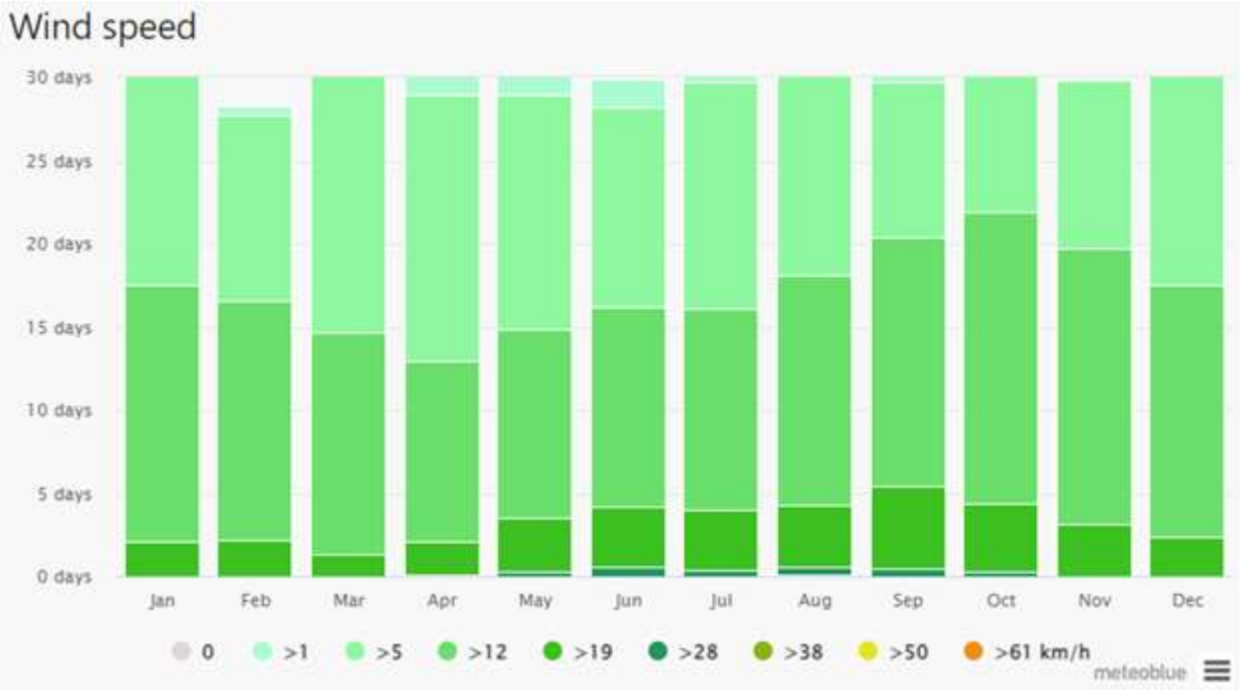


Figure 26: Carolina Average Wind Speed for the Period 1992 – 2022

8.2.4 Incidence of Extreme Weather Conditions

Being located on the Highveld, the area is prone to extreme weather on a regular basis. Thunderstorms occur often during the summer (rainy season), usually accompanied by lightning, heavy rain, strong winds and occasionally hail. Storms are localised and rainfall can vary markedly over short distances. Weather conditions include droughts, floods and strong gusty winds prior to and during thunderstorms. Frost occurs on an average of 120 to 150 days between April and September.

8.3 Topography

The topography of the development area varies between 1 600 mamsl to 1 720 mamsl. Refer to **Figure 27** for a visual representation of the topography.

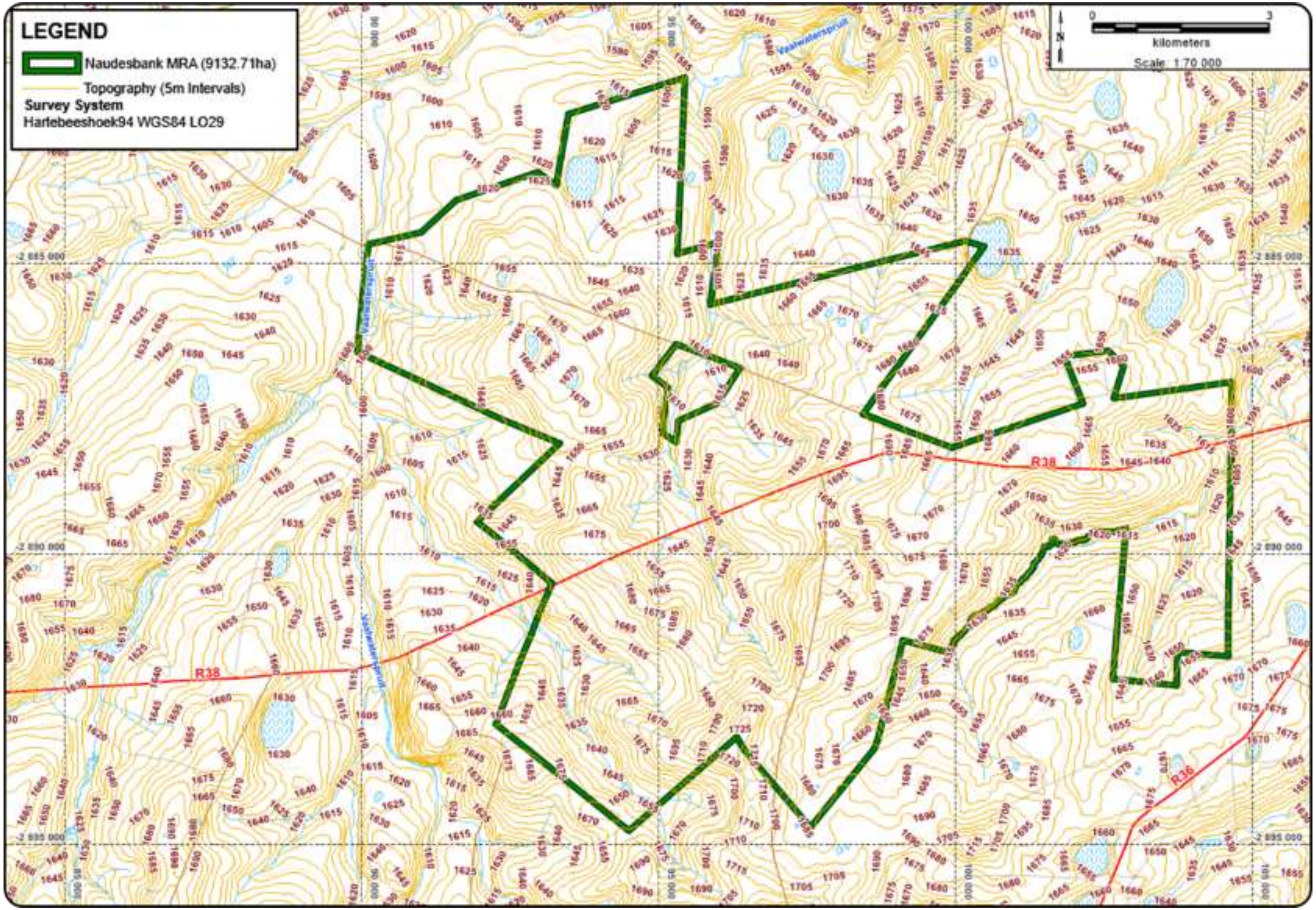


Figure 27: Topography of the Area

8.4 Soils

The information in the sections below was obtained from the Soil, Land Capability and Agricultural Agro-ecosystem Specialist Assessment conducted by Rehab Green (2023), refer to **Annexure 7**.

8.4.1 Dominant Soil Types

The dominant soil forms occurring within the study area is tabulated below and visually presented in **Figure 28**.

Table 16: Dominant soil forms

Soil Code	Dominant Soil Form and Family	Sub-dominant Soil Form and Family	Effective Soil Depth (mm)	Summarised Description	Land Capability	Agricultural Sensitivity
Hu1	Hutton 2100	Clovelly 2100, Griffen 2100, Bainsvlei 2100	800-1 200	Deep, well-drained, red, sandy loam soils underlain by saprolite (weathered rock; Situated on gently sloping crest and midslopes (2-4% slopes).	Arable	High
Cv1	Clovelly 2100	Glencoe 2100, Clovelly2100, Avalon 2100	900-1 200	Deep, well-drained, yellow brown, sandy loam soils underlain by saprolite (weathered rock); Situated on gentle midslopes (3% slopes).	Arable	High
Cv2	Clovelly 2100	Glencoe 2100, Avalon 2100	600-900	Moderately deep, well-drained, yellow brown, sandy loam soils underlain by saprolite (weathered rock); Situated on gently sloping crest and midslopes (3-6% slopes).	Arable	High
Cv3	Clovelly 1100	Glencoe 1100, Avalon 1100, Dresden 1000	450-600	Shallow, well-drained, yellow brown, sandy loam soils underlain by saprolite (weathered rock); Situated on gently sloping crest (1-3% slopes).	Grazing	Medium
Av1	Avalon 2100	Glencoe 2100, Clovelly 2100, Dresden 1000	600-900	Moderately deep, moderately well-drained, yellow brown, sandy loam soils underlain by soft plinthite; Situated on flat to gently sloping crest and midslopes (0-4% slopes).	Arable	High
Av2	Avalon 2100	Glencoe 2100, Longlands 2000, Wasbank 2000, Dresden 1000	450-600	Shallow, moderately well-drained, yellow brown, sandy loam soils underlain by soft plinthite; Situated on gentle midslopes (2-3% slopes).	Grazing	Medium
Gc1	Glencoe 2100	Avalon 2100, Dresden 1000	500-800	Moderately deep, moderately well-drained, yellow brown, sandy loam soils underlain by hardpan ferricrete; Situated on gentle to moderate midslopes (3-6% slopes).	Arable	High
Gc2	Glencoe 2100	Avalon 2100, Dresden 1000	400-600	Shallow, moderately well-drained, yellow brown, sandy loam soils underlain by hardpan ferricrete; Situated on gentle to moderate midslopes (2-6% slopes).	Grazing	Medium
Ms/R	Mispah 1100	Clovelly 1100, Glenrosa 1110	0-300	Very shallow, imperfectly to well-drained, yellowish brown, sandy loam soils underlain by hard rock; Occasional exposed hard rock; Situated on moderate midslopes (6-10% slopes).	Grazing	Low
Dr1	Dresden 2000	Wasbank 1000, Longlands 1000, Glencoe 1100	100-300	Very shallow, imperfectly drained, greyish brown, sandy loam soils underlain by hardpan ferricrete; Situated on gentle to moderate midslopes (2-6% slopes).	Grazing	Low
Dr2	Dresden 1000	Glencoe 1100, Dresden 2000, Hutton 2100	200-300	Very shallow, moderately well-drained, yellowish brown, sandy loam soils underlain by hardpan ferricrete; Situated on gentle midslopes (2-3% slopes).	Grazing	Low

Soil Code	Dominant Soil Form and Family	Sub-dominant Soil Form and Family	Effective Soil Depth (mm)	Summarised Description	Land Capability	Agricultural Sensitivity
Lo1	Longlands 1000	Longlands 2000, Wasbank 1000, Kroonstad 1000, Dresden 2000, Avalon 1100, Glencoe 1100	500-900	Moderately deep, yellowish grey to grey, imperfectly to poorly drained, sandy soils, subject to temporary and seasonal wetness, underlain by soft plinthite; Situated on gently sloping crests, midslopes and valley bottoms (2-5% slopes).	Wetland	Low
Ka	Katspruit 1000	Longlands 1000, Kroonstad 1000, Wasbank 1000, Longlands 2000	200-400	Shallow, grey, poorly drained soils, subject to permanent wetness, underlain by gleyed clay; Situated in gently sloping valley bottoms (2-3% slopes).	Wetland	Low

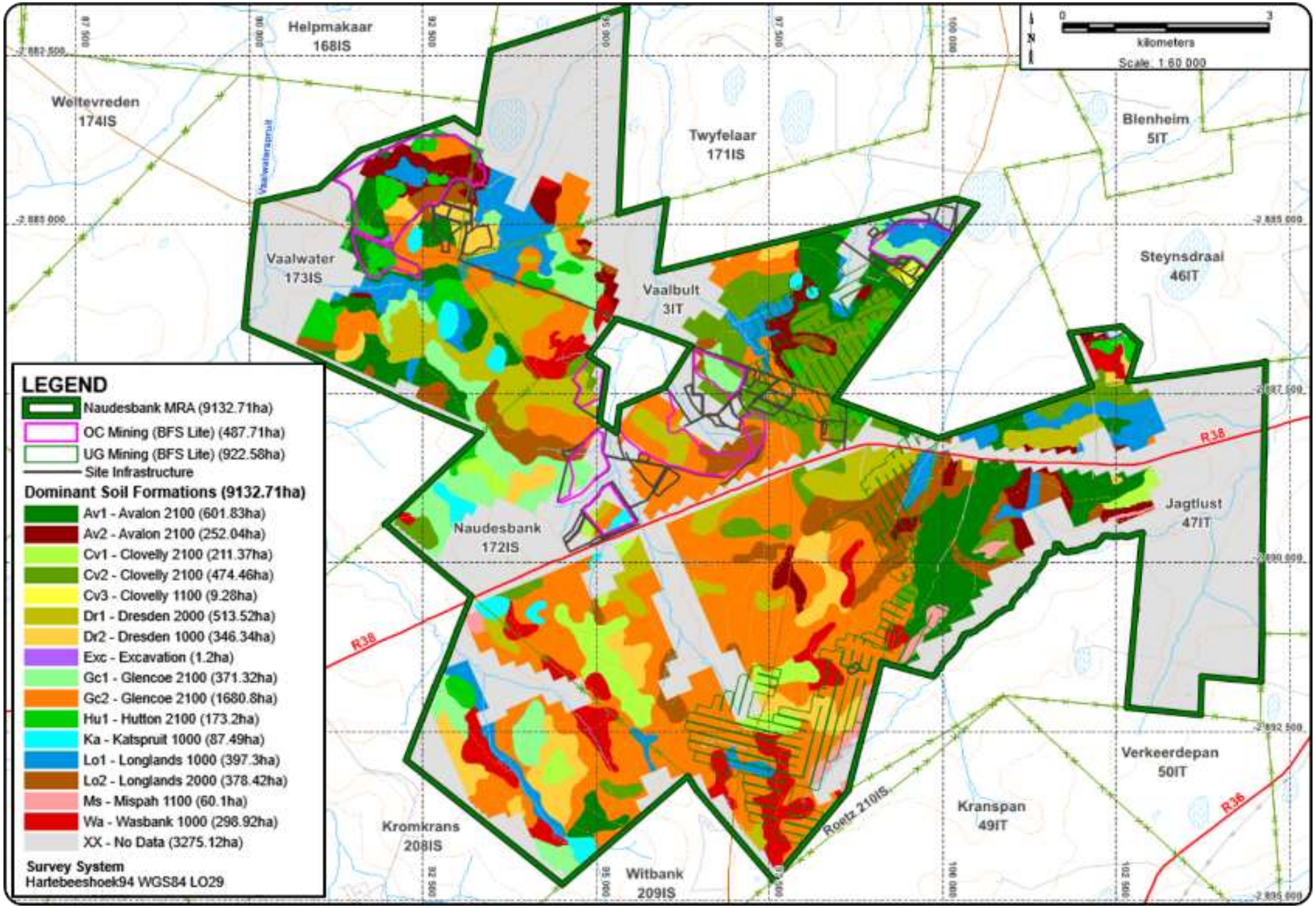


Figure 28: Dominant soil types

8.4.2 Land Use and Land Capability

Table 17: Land Use and Land Capability Summary

Aspect	Description
Current Land Use	The current land uses associated with Naudesbank: • Maize (Dry Land) – 32.80% of disturbance area. • Pastures – 14.46% of disturbance area. • Grazing – 51.91% of disturbance area. • Farmstead – 0.82% of disturbance area. • Road – 0.02% of disturbance area. Refer to **Figure 29**.
Land Capability	The land capability classes for Naudesbank: • Arable – 29.49% of disturbance area. • Grazing – 37.73% of disturbance area. • Wetland – 35.80% of disturbance area. Refer to **Figure 30** for the visual representative of the land capability.

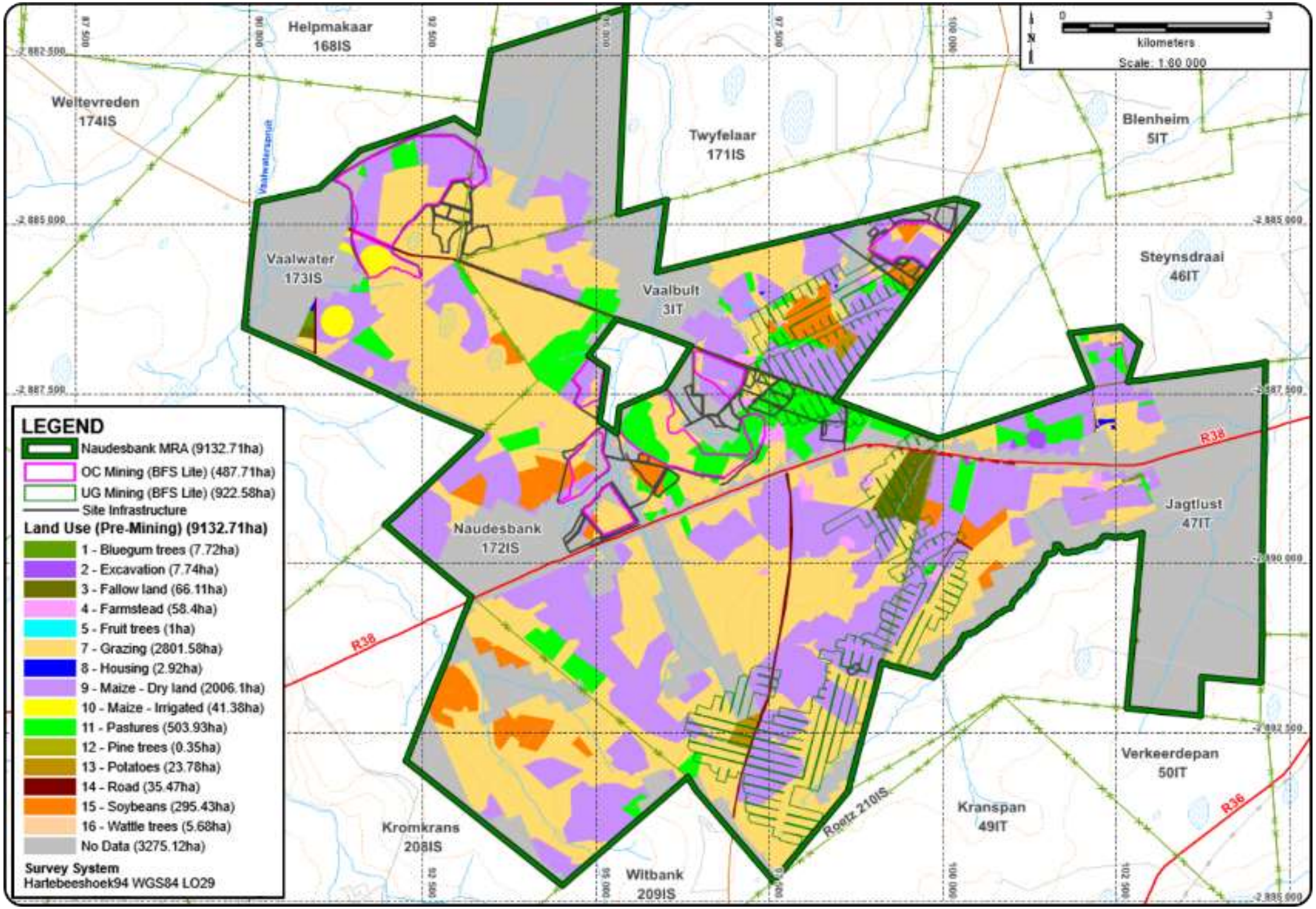


Figure 29: Pre-mining Land Use

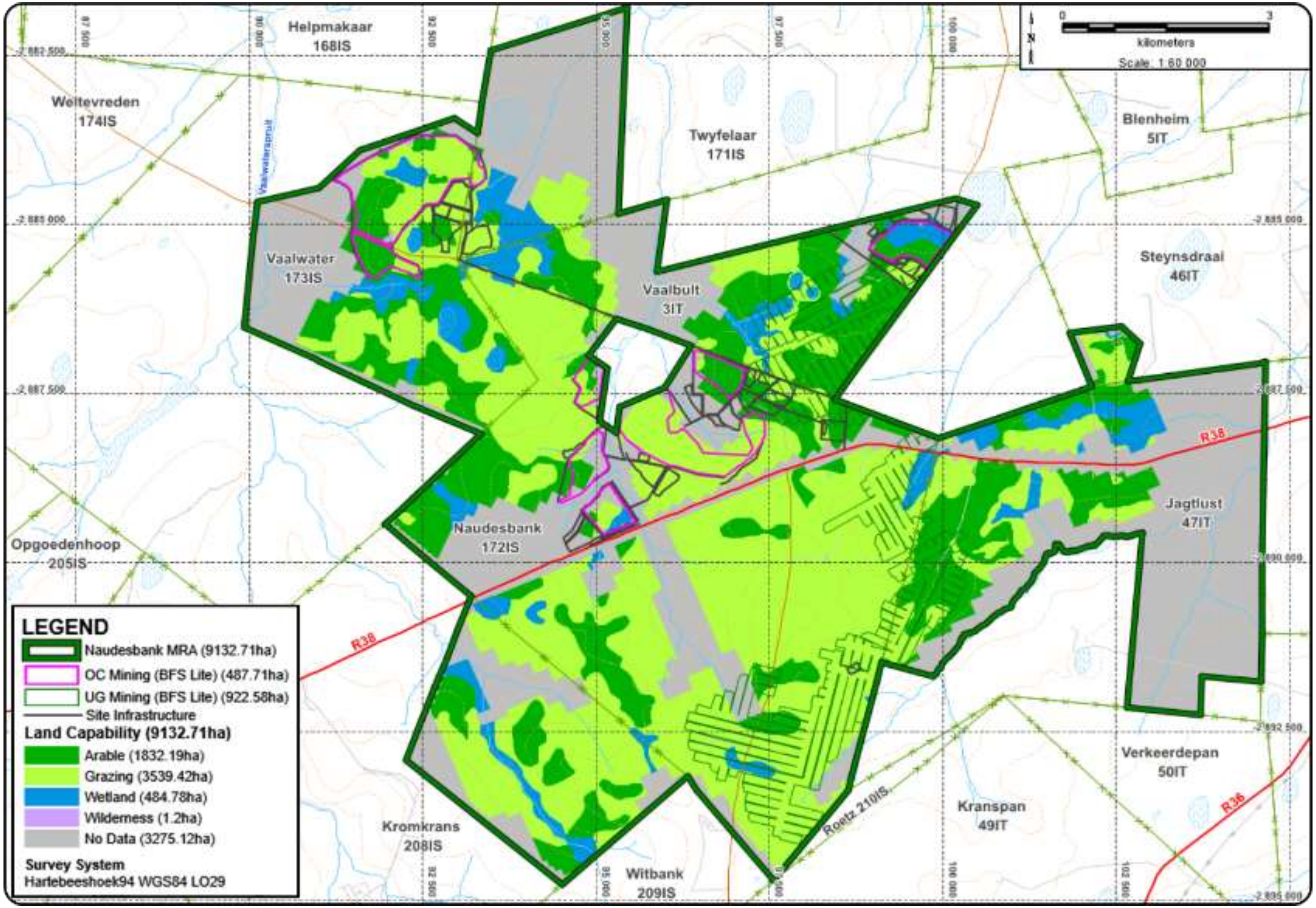


Figure 30: Land Capability

8.4.3 Agriculture Sensitivity

Table 18: Agricultural Sensitivity Summary

Aspect	Description
Agricultural Sensitivity	The current agricultural sensitivity associated with Naudesbank: • High – 38.73% of disturbance area. • Medium – 23.14% of disturbance area. • Low – 38.13% of disturbance area. Refer to **Figure 31**.
Annual Yields within Development Footprint	• Maize – 2 051 t/a • Soybeans – 586 t/a • Grazing and Pasture (Livestock Yield) – 119 Large Stock Units (LSU)

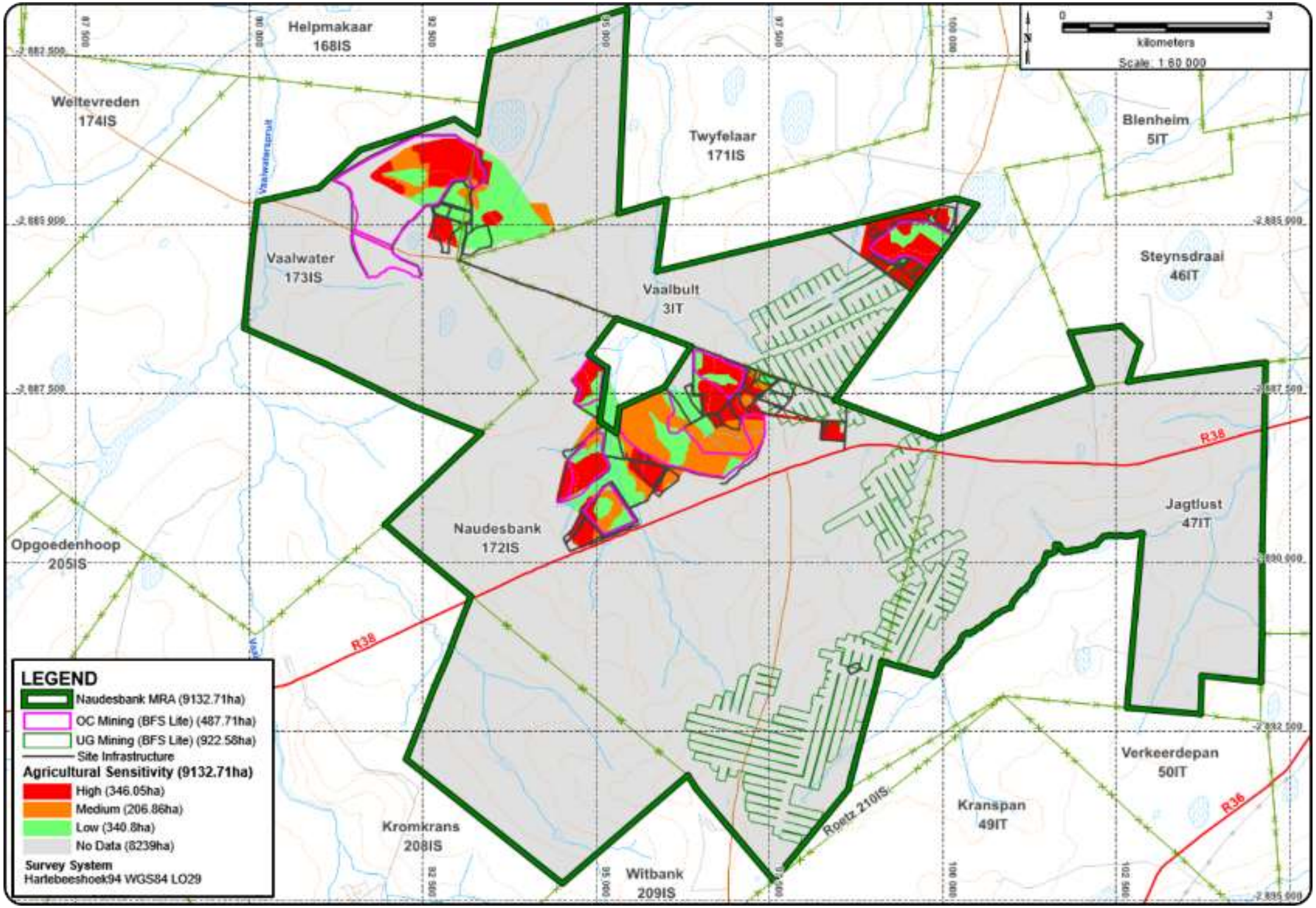


Figure 31: Agricultural Sensitivity

8.4.4 Hydropedology

The information in this section was obtained from the Hydropedological Assessment conducted by Zimpande Research Collaborative (2023), refer to **Annexure 8**.

Refer to **Figure 32** for the identified hydropedological zones. Also refer to **Table 19** for more details pertaining to the hydropedological soils.

Table 19: Hydropedological Soils

Recharge Mechanism	Soil Form	Diagnostic Horizons	Description
Recharge (Deep)	Clovelly (Cv)	-A: Orthic -B: Yellow Apedal	These soils are characterised by the absence of any morphological indication of saturation and are typically associated with deep, well aerated, and freely drained soils. The dominant hydrological pathway for these soils is vertical through and out the profile into the underlying bedrock. These soils are referred to as recharge soils, as they are likely to recharge groundwater, or lower lying positions in the regolith via bedrock.
	Hutton (Hu)	-A: Orthic -B: Red Apedal	
Interflow (A/B)	Longlands (Lo)	-A: Orthic -B1: Albic -B2: Soft Plinthic	Characterised by a bleached Albic horizon indicating soil mineral exports by the process of eluviation, underlain by a relatively impermeable soft plinthic and Gleyed material. When the water level reaches the more permeable surface horizons lateral flow occurs at much faster rates at the A/B horizon interface.
	Wasbank (Wa)	-A: Orthic -B1: Albic -G: Hard plinthic	
Interflow (Soil/Bedrock)	Avalon (Av)	- A: Orthic - B1: Yellow Brown Apedal - B2: Soft Plinthic	The horizons are indicative that the underlying bedrock is slowly permeable and periodic saturation in the rainy season is likely, which may lead to lateral flow at the soil bedrock interface. The drainage may be restricted by a shallow impermeable rock layer.
	Glencoe (Gc)	- A: Orthic - B1: Yellow Brown Apedal - B2: Hard Plinthic	
Responsive (Saturated)	Katspruit (Ka)	-A: Orthic -G: Gleyed	Very poor recharge potential due to severe internal drainage constraints. These soils are saturated with water for most of the year such that poor drainage conditions have induced the development of the Gleyed (G) horizon. The G-horizon is relatively impermeable, which impedes water movement (percolation) into the groundwater thereby retaining water in the wetlands.

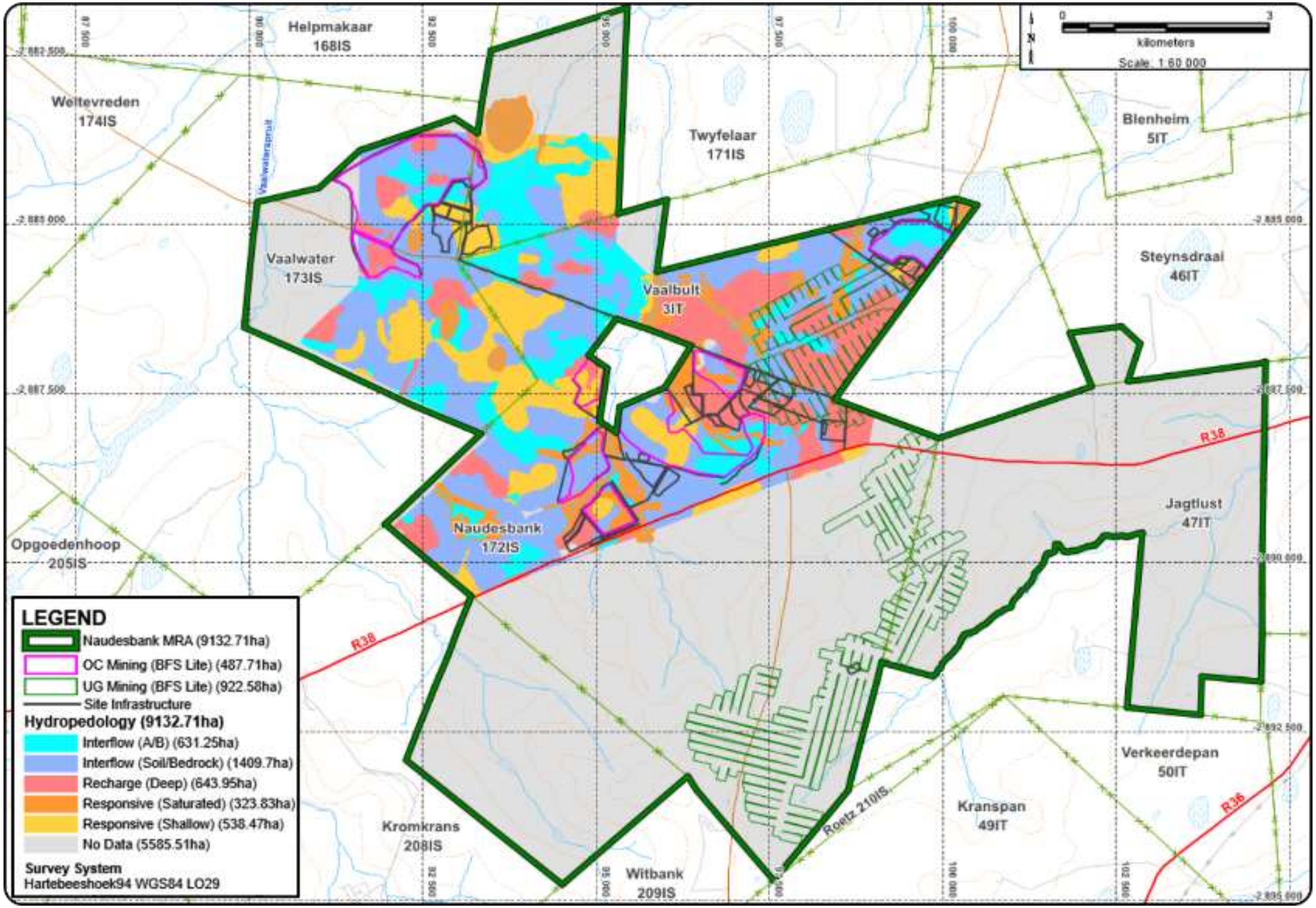


Figure 32: Hydropedological Zones

8.5 Ecology

A Biodiversity Assessment was conducted by Scientific Terrestrial Services (2023), refer to **Annexure 9**.

Table 20: Summary of Ecosystem Description

Aspect	Description
Ecosystem Type and Status	Eastern Highveld Grassland – Endangered
Biome	Grassland
Bioregion	Mesic Highveld Grassland
Vegetation Types	Eastern Highveld Grassland
Important Birding Area (IBA)	The south-eastern portion of the study area occurs in the Amersfoort-Bethal-Carolina IBA.
Protected Areas	No sites within MRA or adjacent. Nooitgedacht Dam Nature Reserve located within 8 km of MRA. Rentia Kritzinger Private Nature Reserve located within 10 km of MRA. Irreplaceable and Optimal Critical Biodiversity Areas (CBA) occur throughout the MRA.

A summary of the habitat units are provided in **Table 21** and visually presented in **Figure 33**. Refer to *Appendix C* (Part B) of **Annexure 9** for a list of species recorded.

Table 21: Summary of Habitat Units

Habitat Type	Description
Transformed	• Transformation mainly as a result of agricultural fields. Species Overview: • Low species diversity. • Floral communities that are present in this habitat unit typically include weedy, pioneer species or includes dense stands of alien trees. Unique Landscapes: • No unique landscapes identified. Species of Conservation Concern (SCC): • No threatened SCC. • Potential of provincially protected species from the Orchidaceae and Iridaceae families to occur in this habitat.
Freshwater – Pan Wetlands	• Integrity of floral community impacted by overgrazing by livestock and edge effects from adjacent agricultural activities. • Habitat integrity is largely intact, and the habitat is considered to be in a good ecological condition. Species Overview: • High diversity of graminoid and a moderate diversity of forbs were recorded.

Habitat Type	Description
	• Dominant graminoid species: *Eleocharis limosa, Hemarthria altissima, Juncus effusus, Juncus oxycarpus, Leersia hexandra, Schoenoplectus corymbosus, Cyperus denudatus*. • Forb and herb species: *Aristea torulosa, Monopsis decipiens, Persicaria madagascariensis, Persicaria senegalensis, Commelina subulate, Eriocaulon sonderianum*. • Common succulent species: Absent at the time of assessment, although the presence of succulents is anticipated to be rare for this habitat. • The woody layer: Mainly associated with encroaching *Seriphium plumosum*. • Alien Invasive Plants (AIPs) were prominent for some pans where these were in closer proximity to agricultural fields. Species recorded included *Centella asiatica, Hypochaeris radicata, Oxalis corniculate*, and *Rumex acetosella*.
Freshwater – Valley-bottom Wetlands	• Impacted by agricultural activities. • Significant features within the landscape which allow movement and dispersal of species and contribute to overall plant diversity within the study area • Habitat integrity is largely intact, and the habitat is considered to mostly be in a good ecological condition. Some sections have been degraded more than others and the habitat in those sections is instead considered to be in a fair ecological condition. Species Overview: • High diversity and abundance of graminoid species and forbs were less prominent. • Dominant graminoid species: *Agrostis lachnantha, Andropogon appendiculatus, Cynodon dactylon, Hyparrhenia tamba, Imperata cylindrica, Juncus cf. dregeanus subsp. dregeanus, Juncus effusus, Leersia hexandra, Miscanthus junceus, Panicum schinzii, Scirpoides burkei, Setaria sphacelate*. • Forb and herb species: *Cycnium tubulosum, Denekia capensis, Helichrysum nudifolium var. nudifolium, Persicaria madagascariensis, Plantago lanceolata, Pseudognaphalium oligandrum, Wahlenbergia sp*. • Common succulent species: Absent at the time of assessment, although the presence of succulents is anticipated to be rare for this habitat. • The woody layer: Mainly associated with encroaching *Seriphium plumosum*. • AIPs were prominent for more disturbed sections (especially in closer proximity to agricultural fields and livestock grazing). Species recorded included *Cirsium vulgare, Plantago major, Populus × canescens, Rumex acetosella, Salix babylonica, Solanum sisymbriifolium, Verbena bonariensis*.
Freshwater – Forb-rich Wetlands	• Habitat integrity depends largely on their proximity to agricultural fields and grazing pressures from livestock. • Habitat integrity is largely intact, and the habitat is considered to mostly be in a good ecological condition. Some sections have been degraded more than others and the habitat in those sections is instead considered to be in a fair ecological condition. Species Overview:

Habitat Type	Description
	• Moderately high diversity and abundance of graminoid species as well as forb species • Dominant graminoid species: *Agrostis lachnantha, Ascolepis capensis, Cyperus esculentus, Cyperus nitidus, Eragrostis capensis, Eragrostis trichophora, Festuca caprina, Helictotrichon turgidulum, Pycreus macranthus,Scirpoides burkei, Themeda triandra.* • Forb and herb species: *Aristea torulosa, Berkheya radulosa, Crinum bulbispermum (Mpumalanga Nature Conservation Act (MNCA)), Haplocarpha scapose, Helichrysum aureonitens, Hypericum aethiopicum, Hypoxis filiformis, Ledebouria cooperi, Lobelia flaccida, Monopsis decipiens, Oldenlandia herbacea, Pelargonium luridum, Scabiosa columbaria,Wahlenbergia sp.* • Common succulent species: Largely absent at the time of assessment, but *Delosperma cf. sutherlandii* occurred. • The woody layer: Mainly associated with encroaching *Seriphium plumosum*. • AIPs were prominent for more disturbed sections (especially in closer proximity to agricultural fields and livestock grazing). Species recorded included *Cirsium vulgare, Plantago major, Populus × canescens, Rumex acetosella, Solanum sisymbriifolium, Verbena bonariensis.*
Freshwater – Modified Wetlands	• Directly altered historically by agricultural activities. • Habitat integrity is considered to be in a fair ecological condition although some sections did display poor ecological conditions. Species Overview: • Intermediate to moderately-low species diversity.

Freshwater (Combined)	SCC:
	• During the site assessment, only one species triggered by the Screening Tool was recorded within this habitat unit, namely Sensitive Species 1200 (EN). This species has a restricted known range: EOO of 4.15 km^2 and its identification was confirmed by Pieter Winter from SANBI. Sensitive Species 1200 (EN) was recorded in the Forb-rich Wetlands during the site assessment; however, previous records of this species further link it to edges of Pans and Valley-bottom Wetlands.
	• Red Data List (RDL) Species which may occur within this habitat unit:
	  ○ *Asclepias dissona* (POC = Low-Medium; Status = CR).
	  ○ *Kniphofia triangularis subsp. obtusiloba* (POC = Medium; Status = Rare).
	  ○ *Sensitive species 691.* (POC = High; Status = VU).
	• Three Schedule 11 Protected Species (MNCA) were recorded within this habitat unit, namely. *Brunsvigia radulosa, Crinum bulbispermum, and Eucomis autumnalis*.

Grassland – Rocky Outcrops	• Not many disturbances were noted for this habitat sub-unit apart from encroaching alien trees such as *Eucalyptus* and *Acacia* species. • Habitat integrity is largely intact and considered to be in a good ecological condition. Species Overview: • Dominant graminoid species: This habitat sub-unit supports a moderate diversity of graminoid species – mainly unpalatable grasses such as *Aristida junciformis, Eragrostis racemose, Melinis repens, Sporobolus pectinatus* and *Sporobolus stapfianus*, whereas sedges mainly included species such as *Bulbostylis sp.* and *Cyperus rupestris*. This collection of unpalatable graminoids have resulted in the Rocky

<table>
<tr><th>Habitat Type</th><th>Description</th></tr>
<tr><td></td><td>Outcrops being excluded from grazing pressures as cattle would rather seek food in adjacent Highveld Grassland;
<u>Forb and herb species:</u> A moderate diversity of forb species was observed of which Craterostigma wilmsii, Dipcadi gracillimum, Eriospermum porphyrovalve, Justicia anagalloides, Lindernia sp., Psammotropha myriantha, and Tulbaghia acutiloba were more prominent.
<u>Common succulent species:</u> A higher abundance of succulent species was noted in this sub-unit when compared to surrounding habitats. Dominant species included Crassula setulosa var. deminuta, Khadia carolinensis (VU), and Mossia intervallaris.
The woody layer was better represented in the Rocky Outcrops sub-unit than in the surrounding Grassland Habitat Unit communities, largely comprising of dwarf shrubs and geoxylic suffrutices such as Bridsonia chamaedendrum, Helichrysum cf. subglomeratum, and Ziziphus zeyheriana.
AIPs were not prominent within the habitat subunit. Occasional species recorded included clumps of Acacia mearnsii, Eucalyptus cinerea, and Eucalyptus grandis.</td></tr>
<tr><td>Highveld Grassland</td><td>Disturbances impacting on floral communities are related to edge effects resulting from agricultural practices within the study area and greater landscape, i.e., altering ecological processes and drivers through a) habitat fragmentation, b) introduction of alien vegetation, c) heavy grazing pressures from livestock (mainly cattle), and d) altered fire regimes.
Habitat integrity of the primary Highveld Grasslands is largely intact and considered to be in a good ecological condition. For the secondary Highveld Grasslands, habitat integrity has been compromised and the habitat is considered to be in a fair ecological condition.
Species Overview:
Primary and secondary Highveld Grasslands are closely related and share, to a degree, a similar species composition; however, the secondary Highveld Grasslands comprises a sub-set of the species recorded within the primary Highveld Grasslands. Moreover, the secondary Highveld Grasslands have a greater representation of AIPs
<u>Dominant graminoid species:</u> Typical graminoid species associated with these sub-units include Alloteropsis semialata, Brachiaria serrata (largely absent from the secondary Highveld Grasslands), Cyperus sphaerocephalus, Digitaria tricholaenoides, Elionurus muticus, Eragrostis racemose, Harpochloa falx (largely absent from the secondary Highveld Grasslands), Hyparrhenia hirta (largely absent from the primary Highveld Grasslands), Heteropogon contortus, Setaria sphacelate, Themeda triandra (more prominent in the primary Highveld Grasslands), and Tristachya leucothrix.
<u>Forb and herb species:</u> The forb component was under-represented in the secondary Highveld Grasslands sub-unit, whereas it was well-represented in the primary Highveld Grasslands sub-unit. Some of the species recorded in these Highveld Grasslands included Afroaster serrulatus, Albuca virens, Aspidoglossum sp., Boophone disticha, Dierama sp., Dimorphotheca jucunda, Helichrysum miconiifolium, Hilliardiella elaeagnoides, Hilliardiella hirsute, Silene burchellii, and Trachyandra saltii.
<u>Common succulent species:</u> A higher abundance of succulent species was noted in this sub-unit when compared to surrounding habitats.</td></tr>
</table>

Habitat Type	Description
	Dominant species included *Crassula setulosa var. deminuta, Khadia carolinensis* (VU), and *Mossia intervallaris*. • <u>The woody layer:</u> Woody species were largely absent. • AIPs were not prominent within the primary Highveld Grasslands but was often abundant in the secondary Highveld Grasslands. Species recorded in both sub-units *included Gomphrena celosioides, Hypochaeris radicata, Lactuca serriola, Richardia brasiliensis, Rumex acetosella,* and *Solanum elaeagnifolium*.
Moist Grassland	• Minimal disturbances and loss of integrity were observed. Grazing pressures were, however, evident in most of the sub-unit and this typically affected the structure of the grassland more than the species composition. • Habitat integrity is largely intact, and the habitat is considered to be in a good ecological condition. However, some sections of the Moist Grasslands have been degraded and is instead considered to be in a fair ecological condition. Species Overview: • Moderately high to moderate diversity. • <u>Dominant graminoid species:</u> *Agrostis lachnantha, Ascolepis capensis, Cyperus esculentus, Cyperus nitidus, Eragrostis capensis, Eragrostis trichophora, Festuca caprina, Helictotrichon turgidulum, Pycreus macranthus,Scirpoides burkei, Themeda triandra.* • <u>Forb and herb species:</u> *Aristea torulosa, Berkheya radulosa, Crinum bulbispermum (MNCA), Haplocarpha scapose, Helichrysum aureonitens, Hypericum aethiopicum, Hypoxis filiformis, Ledebouria cooperi, Lobelia flaccida, Monopsis decipiens, Oldenlandia herbacea, Pelargonium luridum, Scabiosa columbaria,Wahlenbergia sp*. • <u>Common succulent species:</u> Largely absent at the time of assessment, but *Delosperma cf. sutherlandii* occurred. • <u>The woody layer:</u> Mainly associated with encroaching *Seriphium plumosum*. • AIPs were prominent for more disturbed sections. Species recorded included *Cirsium vulgare, Plantago major, Populus × canescens, Rumex acetosella, Solanum sisymbriifolium, Verbena bonariensis*.
Degraded Grassland	• Habitat integrity is greatly diminished due to the removal of key grassland drivers and the exposure to edge effects from adjacent anthropogenic activities. • Habitat integrity in a fair ecological condition. Species Overview: • Moderately to low diversity and abundance of species. • <u>Graminoid species:</u> *Cyperus eragrostis, Cymbopogon pospischilii, Cynodon dactylon, Heteropogon contortus, Hyparrhenia hirta, Hyparrhenia tamba.* • <u>Forb and herb species:</u> *Commelina africana, Haplocarpha scapose, Helichrysum rugulosum, Hermannia transvaalensis, Nemesia fruticans, Plantago lanceolata*. • <u>Common succulent species:</u> Largely absent at the time of assessment. • <u>The woody and succulent layers:</u> Mainly associated with encroaching *Seriphium plumosum.* • AIPs were prominent (especially in closer proximity to agricultural fields and livestock grazing). Species recorded included *Bidens pilosa, Cosmos bipinnatus, Hypochaeris radicata, Oxalis corniculate, Richardia brasiliensis, Rumex acetosella, Verbena bonariensis*.

Habitat Type	Description
Grasslands (Combined)	SCC: • The site assessment confirmed the presence of several populations of *Khadia carolinensis* (VU) within the Rocky Outcrops. This species has a restricted known range: EOO of 28.43 km^2. • Additionally, Sensitive Species 1200 (EN) was recorded in the Moist Grasslands. This species has a restricted known range: EOO of 4.15 km^2. • Red Data List (RDL) Species which may occur within this habitat unit: o Sensitive species 691 (POC = High; Status = VU). o *Miraglossum davyi* (POC = Medium; Status = VU). • Two Schedule 11 Protected Species (MNCA) were recorded within this habitat unit, namely: *Aloe jeppeae, and Boophone disticha.*

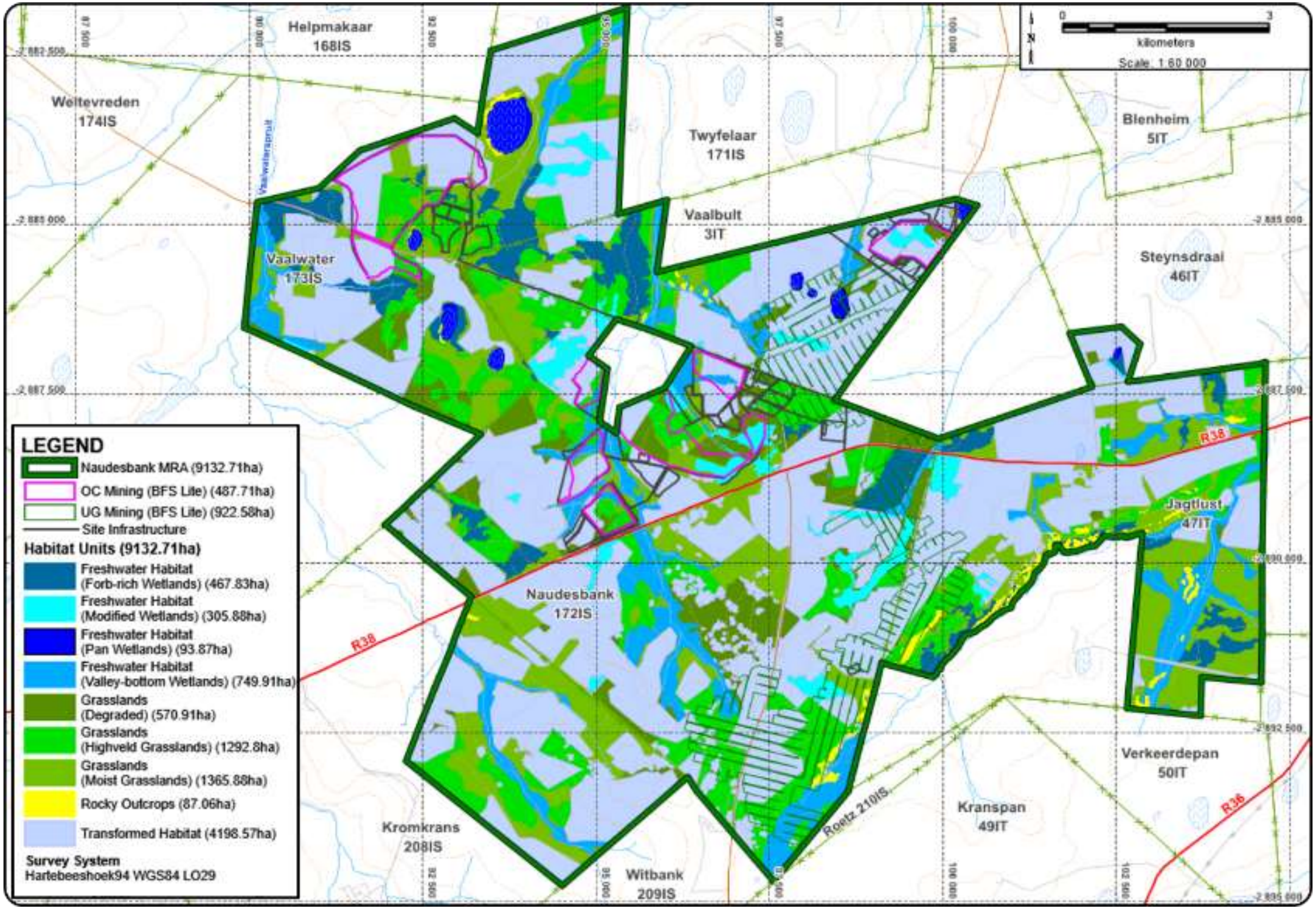


Figure 33: Habitats

During the floral assessment, dominant alien invasive floral species were identified and are listed in the table below.

Table 22: Alien and Invasive Species

Species	Common Name	NEMBA Status	Habitat Unit
Woody			
Acacia dealbata	Silver Wattle	2	Rocky Outcrops Transformed
Acacia mearnsii	Black Wattle	2	Rocky Outcrops Freshwater
Eucalyptus cinerea	Florist's Gum; Silver-dollar Tree	NL	Rocky Outcrops Freshwater
Eucalyptus camaldulensis	Red River Gum	Various*	Rocky Outcrops Freshwater
Eucalyptus grandis	Saligna Gum, Rose Gum	Various*	Freshwater Transformed
Populus × canescens	Grey Poplar	2	Freshwater Transformed
Salix babylonica	Weeping Willow	NL	Freshwater
Solanum sisymbriifolium	Dense-thorned Bitter Apple	1b	Rocky Outcrops Grassland Transformed
Forb Species			
Bidens pilosa	Common Blackjack	NL	Transformed
Centella asiatica	Asiatic Pennywort	NL	Freshwater
Cirsium vulgare	Spear Thistle, Scotch Thistle	1b	Grassland Transformed
Conyza canadensis	Horseweed Fleabane	NL	Grassland Freshwater Transformed
Conyza primulifolius	Chilean Fleabane	NL	Grassland Freshwater
Cosmos bipinnatus	Cosmos	NL	Grassland
Gomphrena celosioides	Fine-leaved Verbena	NL	Rocky Outcrops Grassland
Hypochaeris radicata	Hairy Wild Lettuce	NL	Grassland Freshwater Transformed
Lactuca serriola	Prickly Lettuce	NL	Grassland Transformed
Oxalis corniculata	Creeping Woodsorrel	NL	Freshwater Transformed
Plantago major	Broad-leaved Plantain	NL	Freshwater
Plantago tomentosa	Dwarf Plantain	NL	Grassland Freshwater Transformed
Richardia brasiliensis	Mexican Richardia	NL	Grassland Freshwater

Species	Common Name	NEMBA Status	Habitat Unit
			Transformed
Rumex acetosella	Sorrel - Sheep's Sorrel	NL	Rocky Outcrops Grassland Freshwater Transformed
Solanum elaeagnifolium	Silver-leaf Bitter Apple	1b	Rocky Outcrops Grassland Transformed
Solanum nigrum	Jerusalem Cherry	NL	Rocky Outcrops
Verbena bonariensis	Tall Verbena	1b	Freshwater Transformed
Verbena rigida	Veined Verbena	1b	Rocky Outcrops Grassland Freshwater Transformed
Graminoids			
Avena fatua	Common Wild Oat	NL	Grassland Transformed
Cyperus eragrostis	Tall Flatsedge	NL	Transformed
Paspalum urvillei	Vasey Grass	NL	Freshwater

1a: Category 1a – Invasive species that require compulsory control.
1b: Category 1b – Invasive species that require control by means of an invasive species management programme.
2: Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.
3: Category 3 – Ornamentally used plants that may no longer be planted; existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread (Bromilow, 2001).
4. NL – Not Listed
* a. Category 1b within-
(i) riparian areas;
(ii) a Protected Area declared in terms of the Protected Areas Act; or,
(iii) within a Listed Ecosystem or an ecosystem identified for conservation in terms of a Bioregional Plan or Biodiversity Management Plans published under the Act.
b. Not listed within Nama-Karoo, Succulent Karoo, and Desert biomes, excluding within any area mentioned in (a) above.
c. Category 1b in Fynbos, Grassland, Savanna, Albany Thicket, Forest, and Indian Ocean Coastal Belt biomes, but-
(i) Category 2 for plantations, woodlots, bee-forage areas, windrows, and the lining of avenues.
(ii) Not listed within cultivated land that is at least 50 metres away from untransformed land but excluding within any area in (a) above.
(iii) Not listed within 50 metres of the main house on a farm but excluding in (a) above.
(iv) Not listed in urban areas for trees with a diameter of more than 400 mm at 1000 mm height at the time of publishing of this Notice but excluding in (a) above.

Refer to **Table 23** and **Figure 34** for the floral sensitivity.

Table 23: Floral Sensitivity Summary

Habitat Unit	Site Ecological Importance
Forb-rich Wetlands	**Very High**

Habitat Unit	Site Ecological Importance
Modified Wetlands	Low
Pan Wetlands	Very High
Valley-bottom Wetlands	Very High
Degraded Grassland	Low
Highveld Grassland	Medium
Moist Grassland	High
Rocky Outcrops	Very High
Transformed Habitat	Very Low

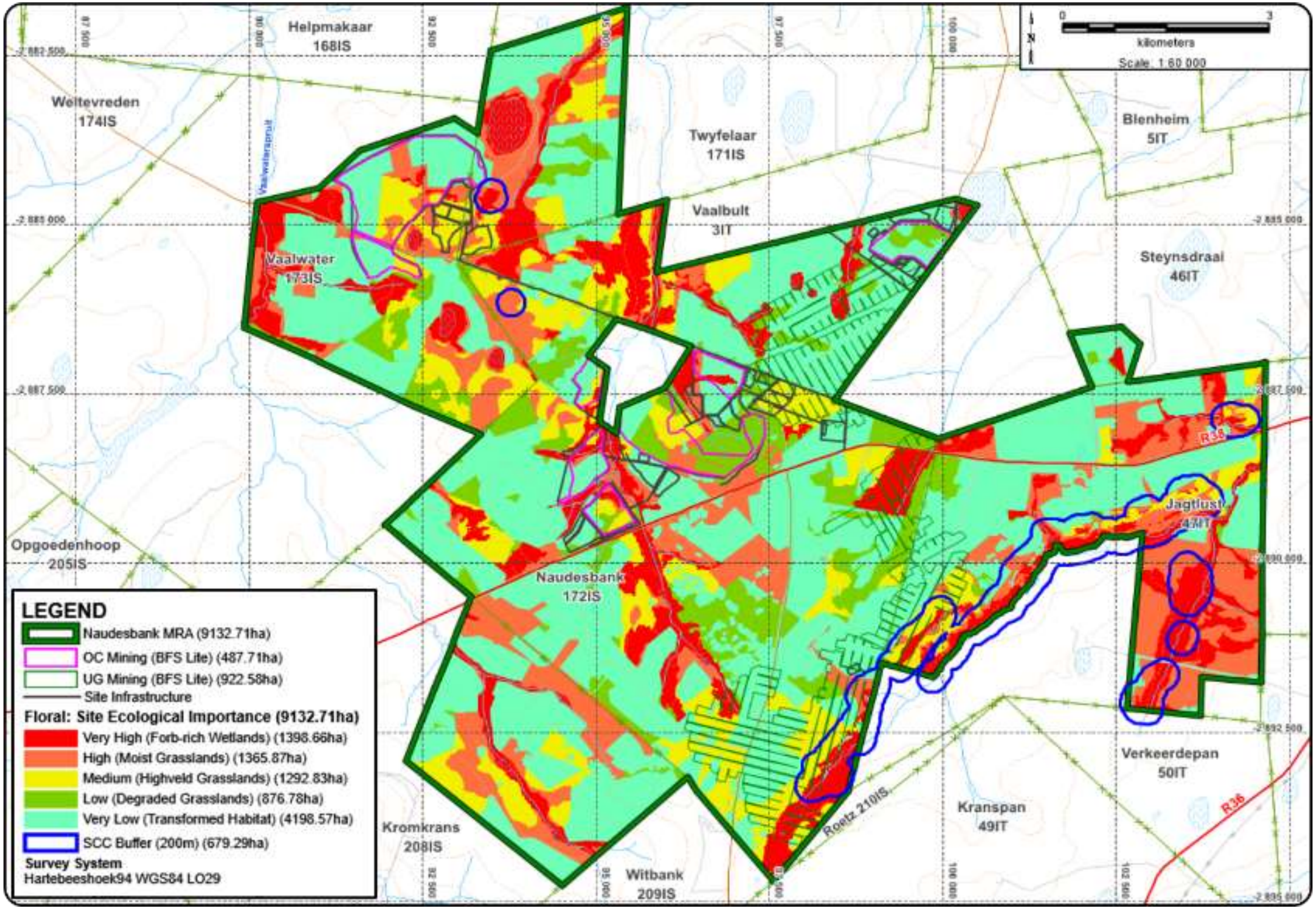


Figure 34: Floral Sensitivity and SCC

Table 24: Mammals

Aspect	Description
SCC	• No mammal SCC were observed during the field assessment, but the study area has the potential to support 13 mammals SCC. • The following SCC have a high POC: *Aonyx capensis* (Cape Clawless Otter, NT), *Ourebia ourebi ourebi* (Oribi, EN), *Leptailurus serval* (Serval, NT), *Crocidura mariquensis* (Swamp Musk Shrew, NT) and *Atelerix frontalis* (Southern African Hedgehog, NT). • The following SCC have a medium POC: *Crocidura maquassiensis* (Maquasie Musk Shrew, VU), *Amblysomus septentrionalis* (Highveld Golden Mole, NT), *Chrysospalax villosus* (Rough-haired Golden Mole, VU), *Hydrictis maculicollis* (Spotted-necked Otter, VU), *Pelea capreolus* (Grey Rhebok, NT), *Hyaena brunnea* (Brown Hyena, NT), *Felis nigripes* (Black-Footed / Small Spotted Cat, VU) and *Redunca fulvorufula* (Mountain Reedbuck, EN).
Diversity	• Mammal abundance and diversity is expected to be higher than observed during the field assessment due to the large expanse of the study area and the limited time on site. • The observed mammal assemblage and activity in the study area was intermediate, largely due to the moderately high availability of food and habitat. • Mammal species observed either directly or via spoor/scat/dung include, but are not limited to, *Sylvicapra grimmia* (Common Duiker), *Hystrix africaeaustralis* (Cape Porcupine), *Lepus saxatilis* (Scrub Hare), *Procavia capensis* (Rock Hyrax), *Atilax paludinosus* (Water Mongoose) and *Genetta* (Small-spotted Genet).
Habitat Integrity	• Intermediate.
Food and Habitat Availability	• Moderately high habitat and food availability for mammals with large wetland and grassland areas that is in relatively good condition with good vegetation cover.

Table 25: Avifauna

Aspect	Description
SCC	• During the field assessment three avifaunal SCC were encountered, namely: *Eupodotis senegalensis* (White-bellied Korhaan, VU), *Geronticus calvus* (Southern Bald Ibis, VU) and *Microparra capensis* (Lesser Jacana, VU). • The following SCC have a high POC: *Oxyura maccoa* (Maccoa Duck, VU), *Sagittarius serpentarius* (Secretarybird, VU), *Phoenicopterus roseus* (Greater Flamingo, NT), *Phoenicopterus minor* (Lesser Flamingo, NT), *Anthropoides paradiseus* (Blue Crane, VU), *Balearica regulorum* (Grey Crowned Crane, EN), *Circus ranivorus* (African Marsh Harrier, EN), *Neotis denhami* (Denham's Bustard, VU), *Eupodotis caerulescens* (Blue Korhaan, NT), *Grus carunculata* (Wattled Crane, CR), *Glareola nordmanni* (Black-winged Pratincole NT) and *Tyto capensis* (African Grass Owl). • The following SCC have a medium POC: *Hydroprogne caspia* (Caspian Tern, VU).
Diversity	• Avifaunal diversity is considered moderately high. • The Degraded Grassland habitat supported a relatively low diversity of birds largely due to grazing pressures. • The Highveld and Moist Grasslands supported a higher number of avifauna as these habitats were more intact. Grasses will supply food to seed eaters as well as provide habitat to an abundance of invertebrates for the insectivore species.

Aspect	Description
	• The Freshwater Habitat had a high abundance and diversity of bird species offering unique habitat for birds, especially the wetlands depressions/pans and artificial dams. • 41 Avifauna species were observed on-site which include Malachite Kingfisher, Egyptian Goose, Little Grebe, African Swamphen, Spotted Eagle-Owl and Black-chested Snake-eagle. Refer to *Appendix C* in **Annexure 9** for a full list of avifauna observed on-site.
Habitat Integrity	• Intermediate.
Habitat and Food Availability	• Large portions of the study area has been transformed through agriculture which has reduced the available natural habitat for birds, though this is countered by large portions of the freshwater habitat which are still in good condition including some of the grassland habitat which will support birds that thrive in these habitats. • During the summer months the overall food resource production of the vegetation layer does increase, and a higher abundance of avifauna can be supported. Insect abundances will increase in the summer which provide an energy rich source of food for avifaunal species. This increase is likely mimicked by small mammals as well as lizards, skinks and amphibians which are an important food resource for raptors and some smaller bird species.

Table 26: Herpetofauna

Aspect	Description
SCC	• No amphibian or Reptile SCC were observed during the assessment; however, *Pyxicephalus adspersus* (Bullfrog, NT) and *Homoroselaps lacteus* (Spotted Harlequin Snake, NT) both have a medium POC within the study area as fragments of suitable habitat are interspersed throughout and the study area falls within the distribution range of these species.
Diversity	• The Freshwater Habitat unit provides ample opportunities for amphibian species, most of whom require a temporary or permanent water sources for breeding. • *Amietia delalandii* (Common River Frog, LC) and *Cacosternum boettgeri* (Boettger's Dainty Frog, LC) was observed on-site. • Three species of reptiles were observed during our site visit including *Psammophylax rhombeatus* (Spotted Skaapsteker, LC) found on four different occasions with eggs, *Afrotyphlops bibronii* (Bibron's Blind Snake, LC) under a rock in the Transformed Habitat and *Pelomedusa subrufa* (Marsh Terrapin, LC) seen in one of the artificial dams. • It is likely that the study area will present a higher reptile diversity than that which was observed as reptiles are inherently secretive and shy, making their detection and identification in the field challenging. As such, based on the observed diversity and the available food resources and habitat, it is deemed likely that the study area will be able to support several common reptile species.
Habitat Integrity and Availability	• Habitat integrity and availability within the study area is considered to be intermediate as fragmentation of these habitats through agriculture limits movement of amphibians. • Reptiles are inherently adaptable and capable of surviving in transformed and degraded habitats and therefore they can be found throughout the study area in all the different habitats. The Rocky Habitat although limited creates an alternative that can support different reptile species increasing the potential diversity that can be found within the study area.

Aspect	Description
Food Availability	• Invertebrate abundances within the Freshwater and Grassland habitats will provide a consistent food source for amphibians. • The food resources for reptiles which consist mainly of invertebrates and rodents were considered high.

Table 27: Invertebrates (Insects and Arachnids)

Aspect	Description
SCC	• One species considered threatened/protected have a high POC: *Metisella meninx* (Marsh Sylph Butterfly, VU).
Diversity	• Invertebrate diversity and abundances are however still expected to be higher than observed. • The following species have been confirmed: Meadow White, Gaudy Commodore, Copper, Short Horned Grasshoppers, Shield Backed Grasshoppers, Sunflower Seed Bug, Common Green Mantid, Crane Flies, Swamp Bluet, Two-spotted Ground Beetle, Bumspot Chafer, Common Marbled Fruit Chafer, Darkling Beetles, Common Earwigs, Spitting Spiders, Velvet Spider and Highveld Lesser-Thicktail Scorpion.
Habitat Availability	• Habitat for invertebrates was largely limited to the Freshwater and Grassland Habitat which was less disturbed. • Insects can utilise a various number of different habitats and regularly inhabit transformed habitats, though diversity in these transformed areas is low. • Water dependant insects were dominant in the Freshwater Habitat with Orthopterans and Lepidopterans being abundant in the Grassland Habitat.
Food Availability	• Intermediate.

Refer to **Table 28** and **Figure 35** for the floral sensitivity.

Table 28: Faunal Sensitivity Summary

Habitat Unit	Site Ecological Importance
Rocky Habitat	**High**
Freshwater Habitat	**Very High**
Degraded Grasslands	**Low**
Highveld and Moist Grassland	**High**
Transformed	**Very Low**

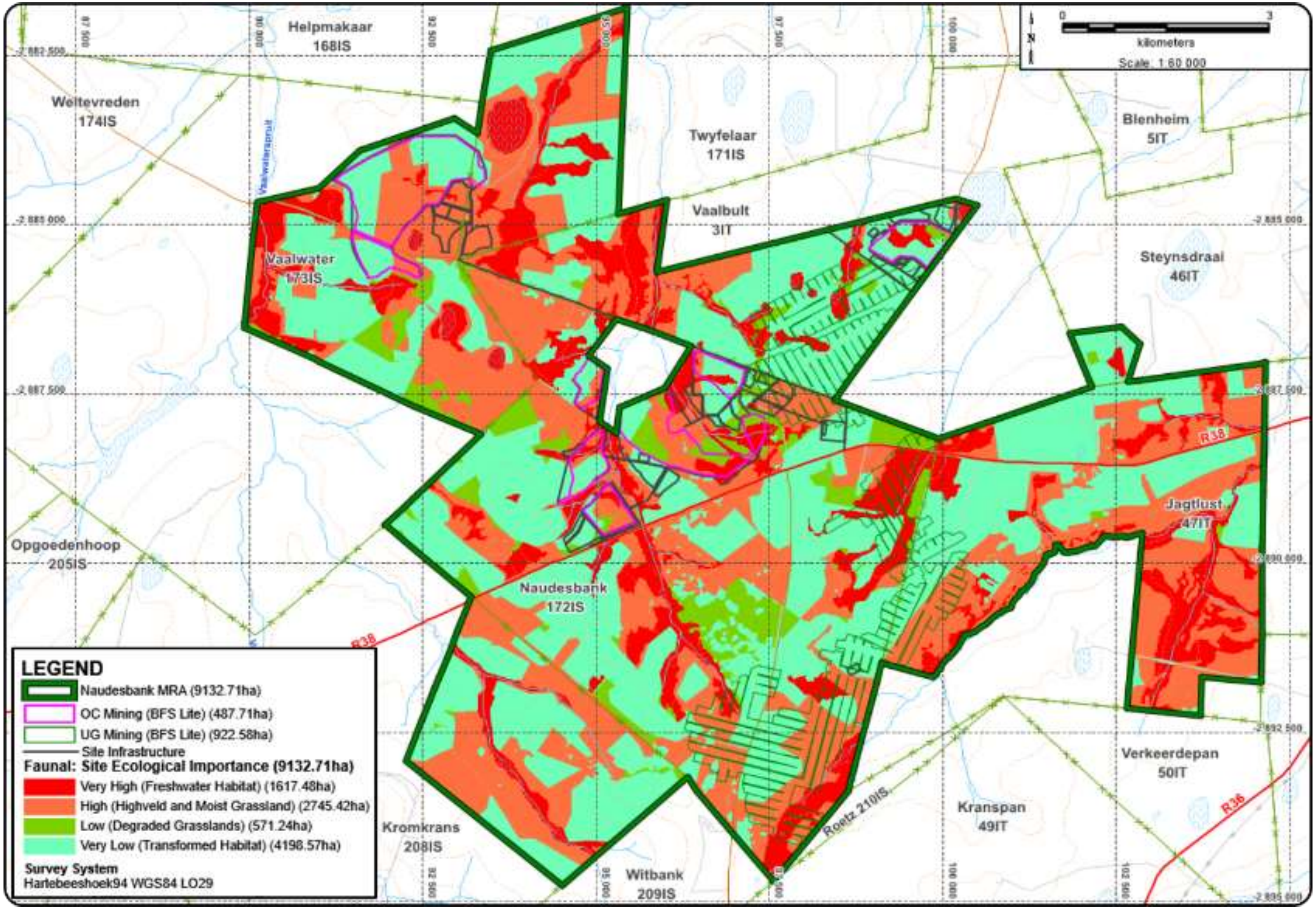


Figure 35: Faunal Sensitivity

8.6 Surface Water

8.6.1 Hydrological Characteristics

Naudesbank is located within Quaternary Catchments X11A and X11B of the Inkomati Management Area (WMA). Refer to **Figure 36**. The hydrology of the catchment is tabulated below.

Table 29: Hydrology of the catchment

Quaternary Catchment	Mean Annual Precipitation (MAP)	Mean Annual Runoff (MAR)	Mean Annual Evaporation (MAE)
X11A	688 mm	25.39 million m^3	1 445.8 mm
X11B	716 mm	28 88 million m^3	1 402.0 mm

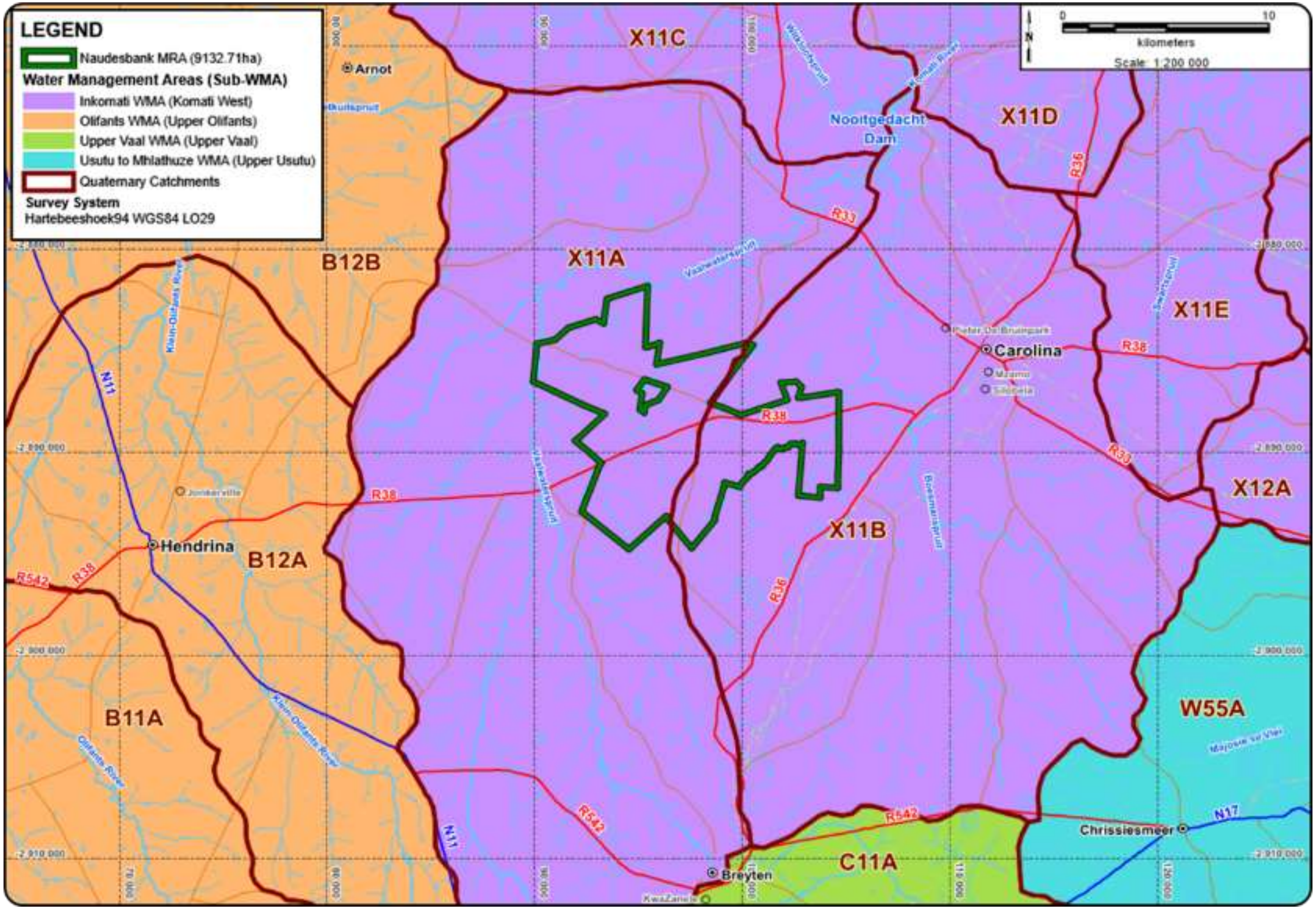


Figure 36: Quaternary Catchment

8.6.2 Flood-line Determination

The perennial Vaalwaterspruit flows on the Western extent of the project area and the streams in the Eastern portion of the project area flow into the perennial Boesmanspruit. The Vaalwaterspruit and Boesmanspruit have their confluence in the Nooitgedacht dam before it flows into the Komati River.

The Alternative Rational peak flows that were calculated for the various rivers and streams that flow into the project area is shown below in **Table 30**. The inflow points are shown above in **Figure 37**. The 1:100 year floodlines are shown in **Figure 38**.

Table 30: Alternative Rational Flood Peaks for Inflow Points

Inflow Point	Return Period Peak Flow (m³/s)						
	1:2	1:5	1:10	1:20	1:50	1:100	1:200
A	118.96	198.75	249.84	308.63	392.26	468.89	531.88
B	10.32	18.56	25.80	33.75	44.61	54.10	61.25
C	4.69	8.43	11.72	15.33	20.26	24.58	27.82
D	6.05	10.88	15.13	19.79	26.15	31.72	35.91
E	5.04	9.08	12.61	16.50	21.80	26.45	29.94
F	11.02	19.83	27.56	36.06	47.65	57.80	65.43
G	5.78	10.40	14.45	18.91	24.99	30.31	34.31
H	14.71	26.46	36.78	48.11	63.59	77.12	87.31
I	5.58	10.03	13.94	18.24	24.11	29.24	33.10

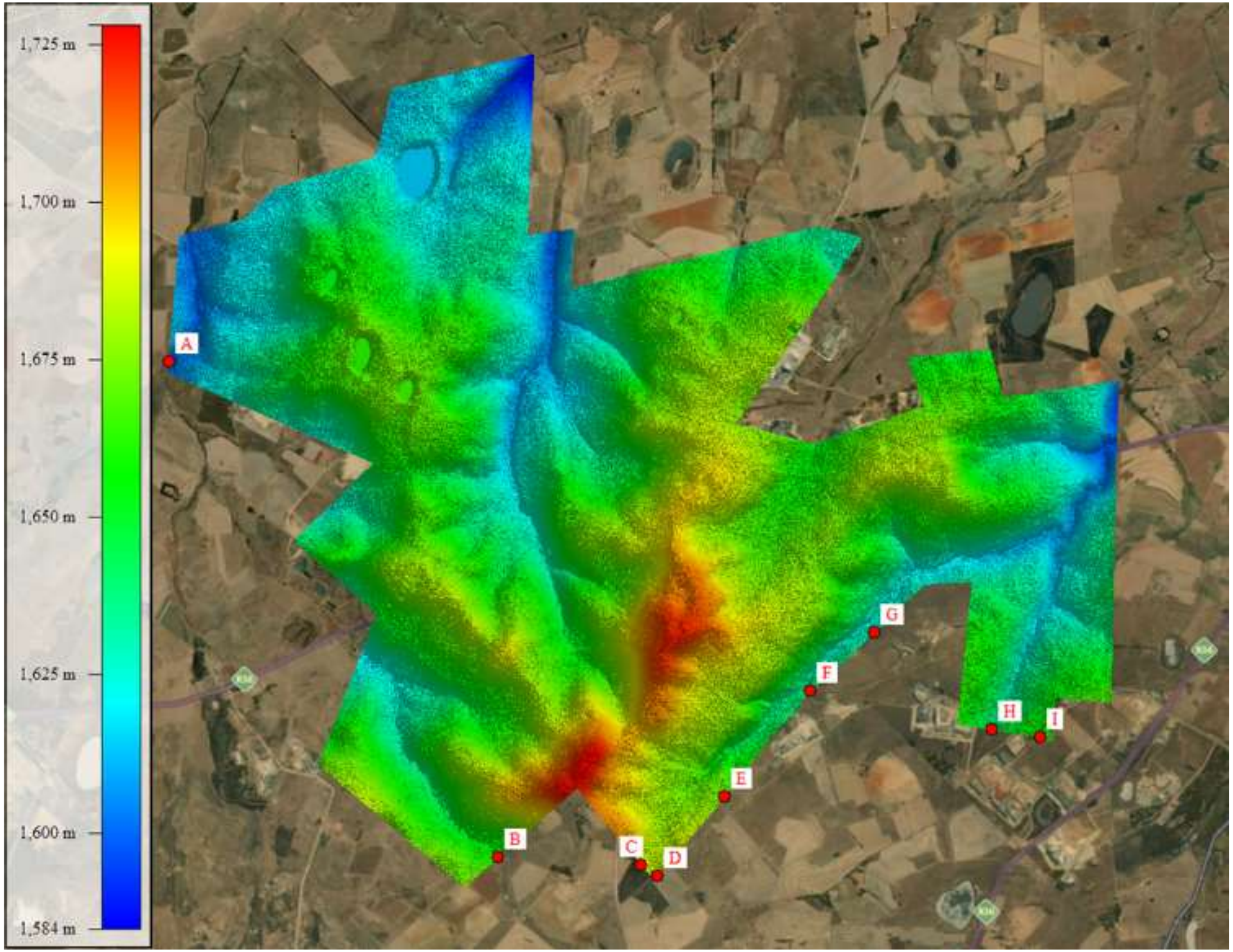


Figure 37: DEM of Project Area showing 1D catchment inflow points

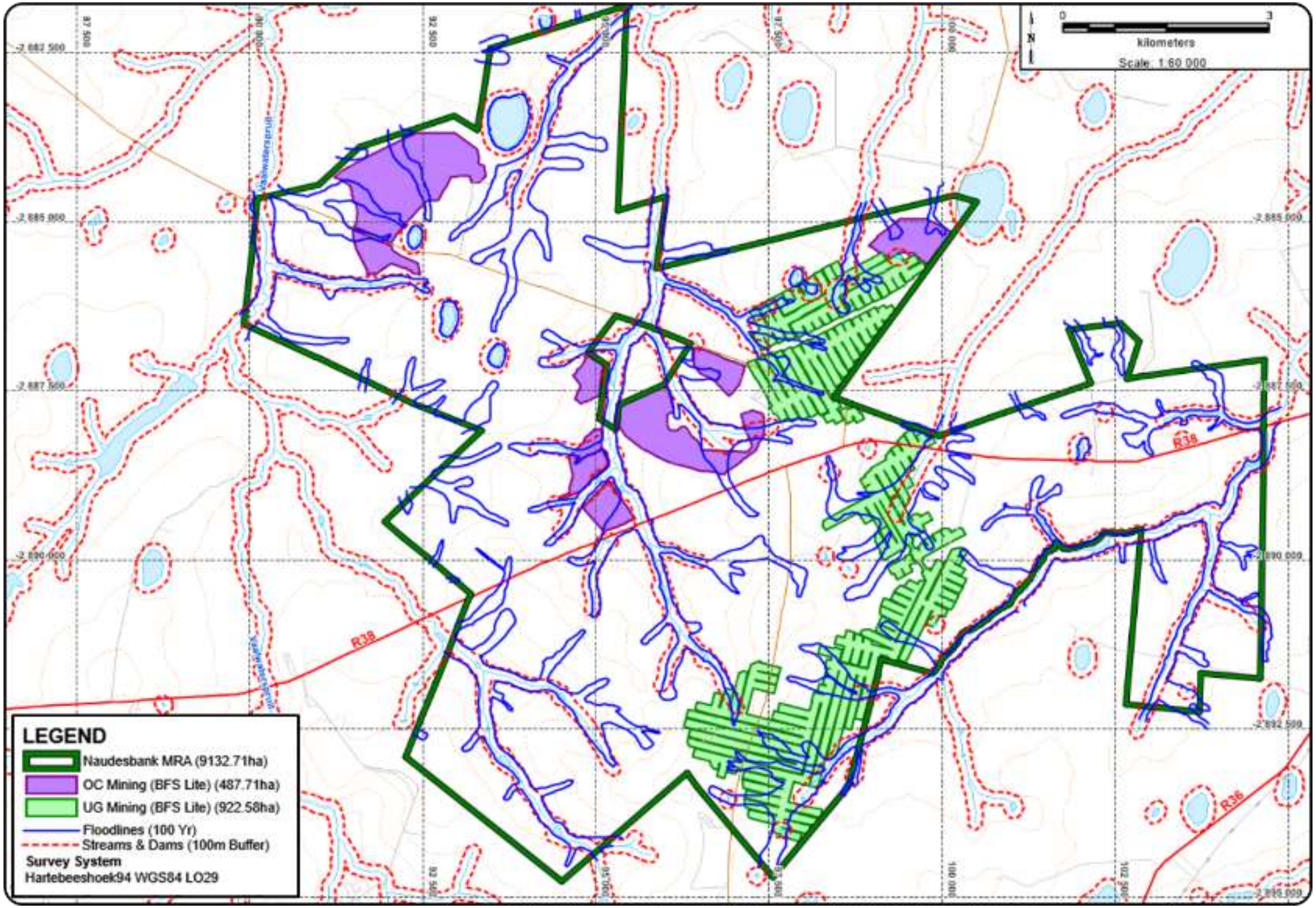


Figure 38: 1:100 Flood line

8.6.3 Surface Water Quality

The baseline surface water quality (95th Percentile for November 2022 – April 2023) is tabulated below for Naudesbank refer to **Table 31**. All the samples were taken by Regen Waters, refer to **Annexure 10**. The localities of these sampling points are shown in **Figure 39**.

The baseline qualities will be compared against the Inkomati-Usuthu Catchment Management Agency (IUCMA) Resource Quality Objectives (RQO). The South African Water Quality Guidelines (SAWQG) are used for parameters not listed in the RQO. Various exceedances of the guidelines can be noted and it indicated in red in the table below.

Table 31: Baseline surface water qualities (95th Percentile of November 2022 – April 2023)

Analysis	RQO IUCMA* &SAWQG	NBSW01	NBSW02	NBSW03	NBSW04	NBSW05	NBSW06	NBSW07	NBSW08	NBSW09
Total Dissolved Solids (mg/l)	≤ 450	346.00	410.50	326.50	152.00	119.50	**692.50**	**624.00**	159.00	76.80
Nitrate & Nitrite as N (mg/l)	≤ 6	**9.57**	0.13	0.24	0.10	0.17	**6.41**	1.25	0.13	1.00
Chlorides as Cl (mg/l)	≤ 100	37.73	21.80	19.55	25.08	21.63	10.18	24.75	21.20	16.06
Total Alkalinity as $CaCO_3$ (mg/l)	≤ 300	145.00	144.25	138.50	57.00	43.25	145.25	36.50	69.25	29.20
Fluoride as F (mg/l)	≤ 1	0.43	0.34	0.36	0.25	0.21	0.21	0.23	0.31	0.22
Sulphate as SO_4 (mg/l)	≤ 30*	**92.85**	**195.25**	**127.50**	**44.25**	**37.73**	**407.25**	**387.10**	**61.28**	15.02
Calcium as Ca (mg/l)	≤ 32	**41.40**	**59.80**	**43.03**	15.78	9.12	**104.53**	**64.21**	19.40	6.43
Magnesium as Mg (mg/l)	≤ 30	23.25	**31.13**	22.05	7.88	5.66	**55.85**	**34.79**	10.61	4.43
Sodium as Na (mg/l)	≤ 70	28.70	34.90	28.28	18.18	13.55	23.98	26.48	16.30	9.57
Potassium as K (mg/l)	≤ 50	5.33	6.37	5.30	3.15	3.53	9.58	4.48	5.83	3.43
Iron as Fe (mg/l)	≤ 0.1	**0.40**	**0.32**	**0.45**	**1.80**	**0.73**	**0.57**	**1.00**	**0.87**	**1.47**
Manganese as Mn (mg/l)	≤ 0.02	**1.65**	0.01	0.01	**0.23**	0.01	0.02	**3.38**	0.01	0.01
Conductivity at 25° C in mS/m	≤ 30*	**51.53**	**62.58**	**48.73**	22.43	18.18	**95.75**	**86.00**	26.45	12.60
pH-Value at 25 ° C	≥ 5.9* ≤ 8.8*	7.45	7.81	7.79	6.96	7.34	7.85	7.16	7.19	7.22
Aluminium as Al (mg/l)	≤ 0.15	**0.31**	**0.24**	**0.55**	**0.46**	**0.85**	**1.54**	**3.59**	**1.41**	**1.06**

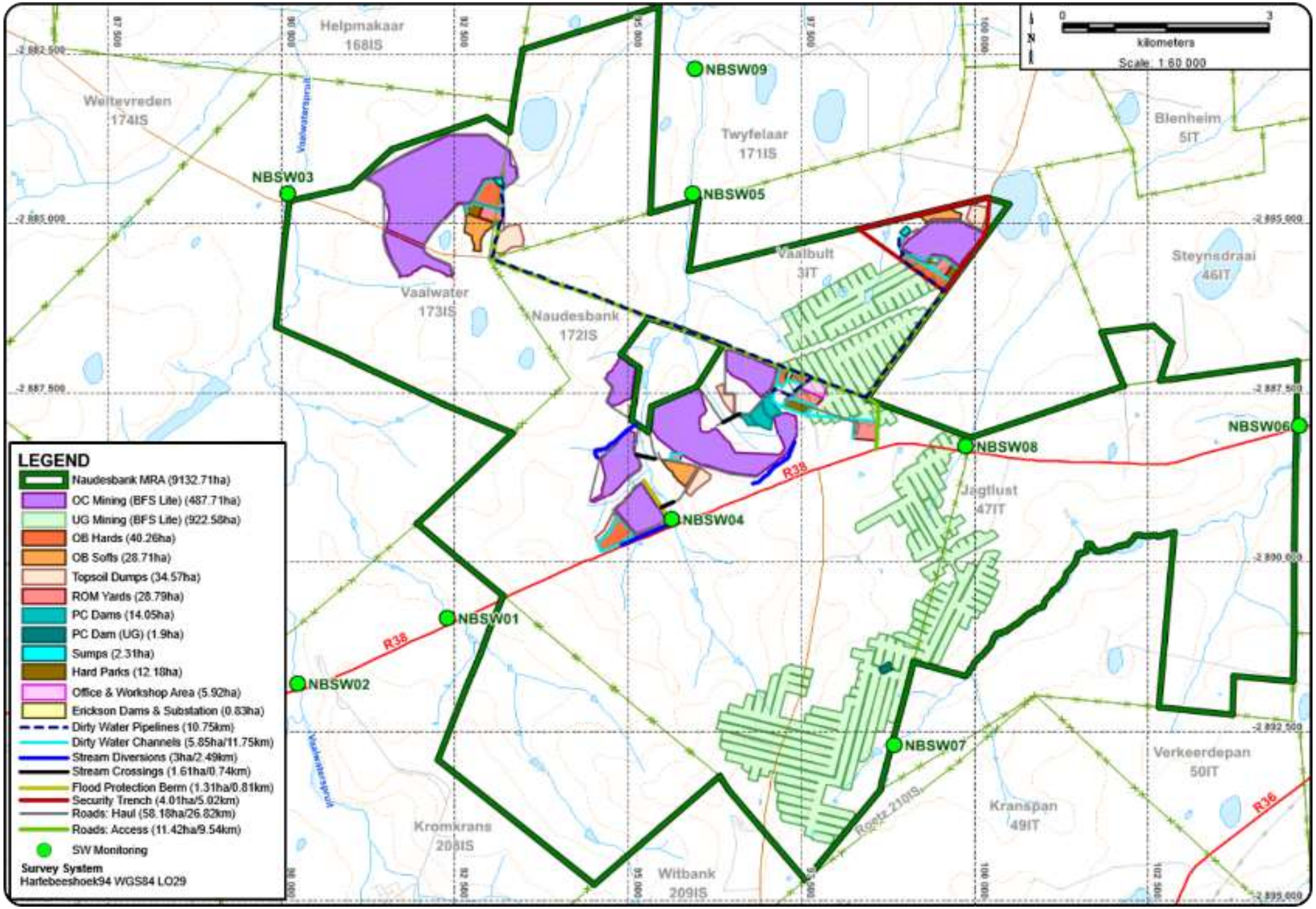


Figure 39: Surface Water Monitoring Localities

8.6.4 River Diversions

No river diversions are considered, but three (3) stream diversions are planned as part of the clean water management system of the mine. These diversions will prevent the influx of clean water into the mining areas. The locality of the diversions is shown below in **Table 32**. Detailed designs are included in **Annexure 4**.

Table 32: Diversion details

No.	Flow (m^3/s)	Bottom Width (m)	Depth (m)	Side Slope	Average Slope	Lining
1	49.74	5	2	1:2	1.5%	Gras
2	69.55	6	2	1:2	2%	Gras
3	47.06	10	2	1:2	0.333%	Gras

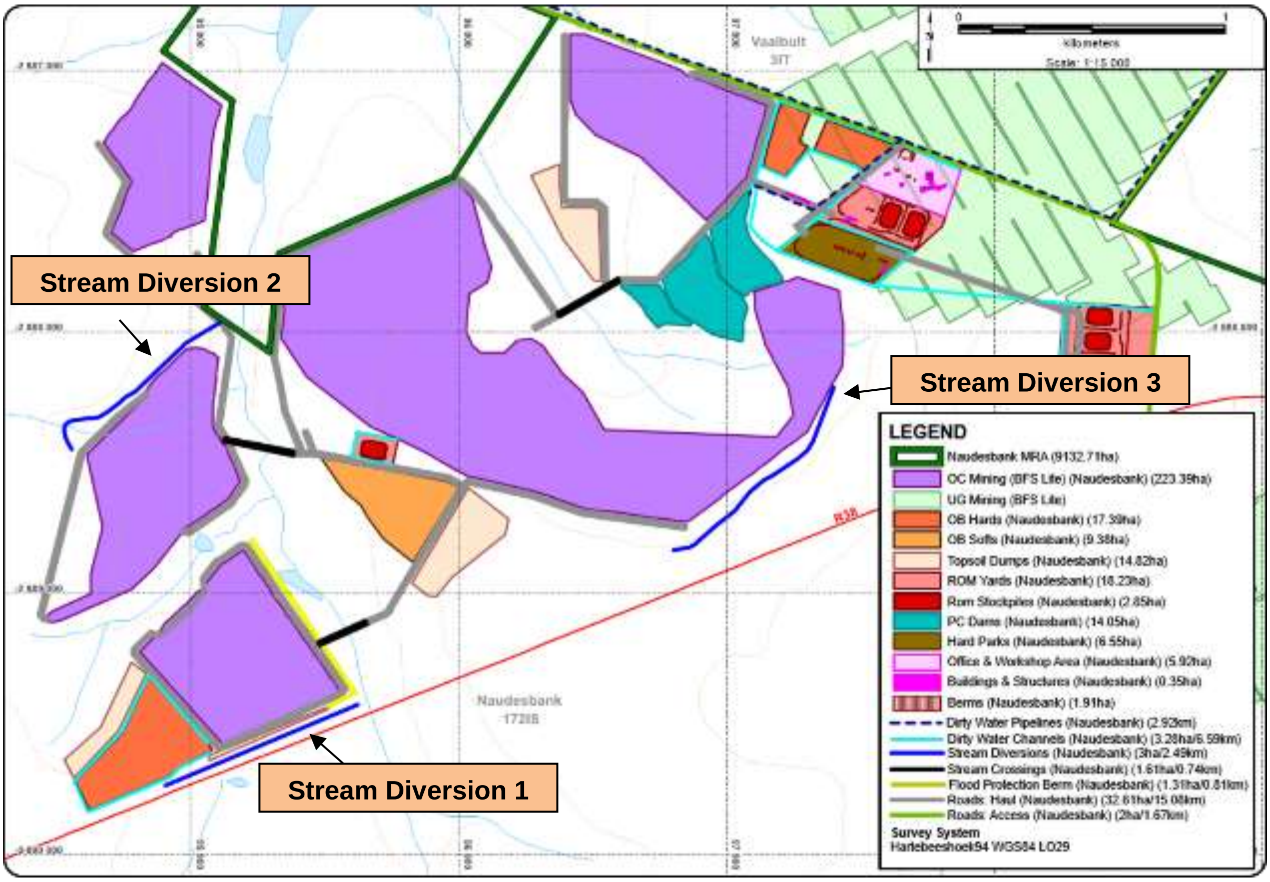


Figure 40: Stream Diversions

8.6.5 Water Authority

Inkomati-Usuthu Catchment Management Agency, Mbombela.

8.7 Wetlands

A Freshwater Assessment was conducted by Scientific Aquatic Services (2023), refer to **Annexure 11**.

8.7.1 Wetland Classification

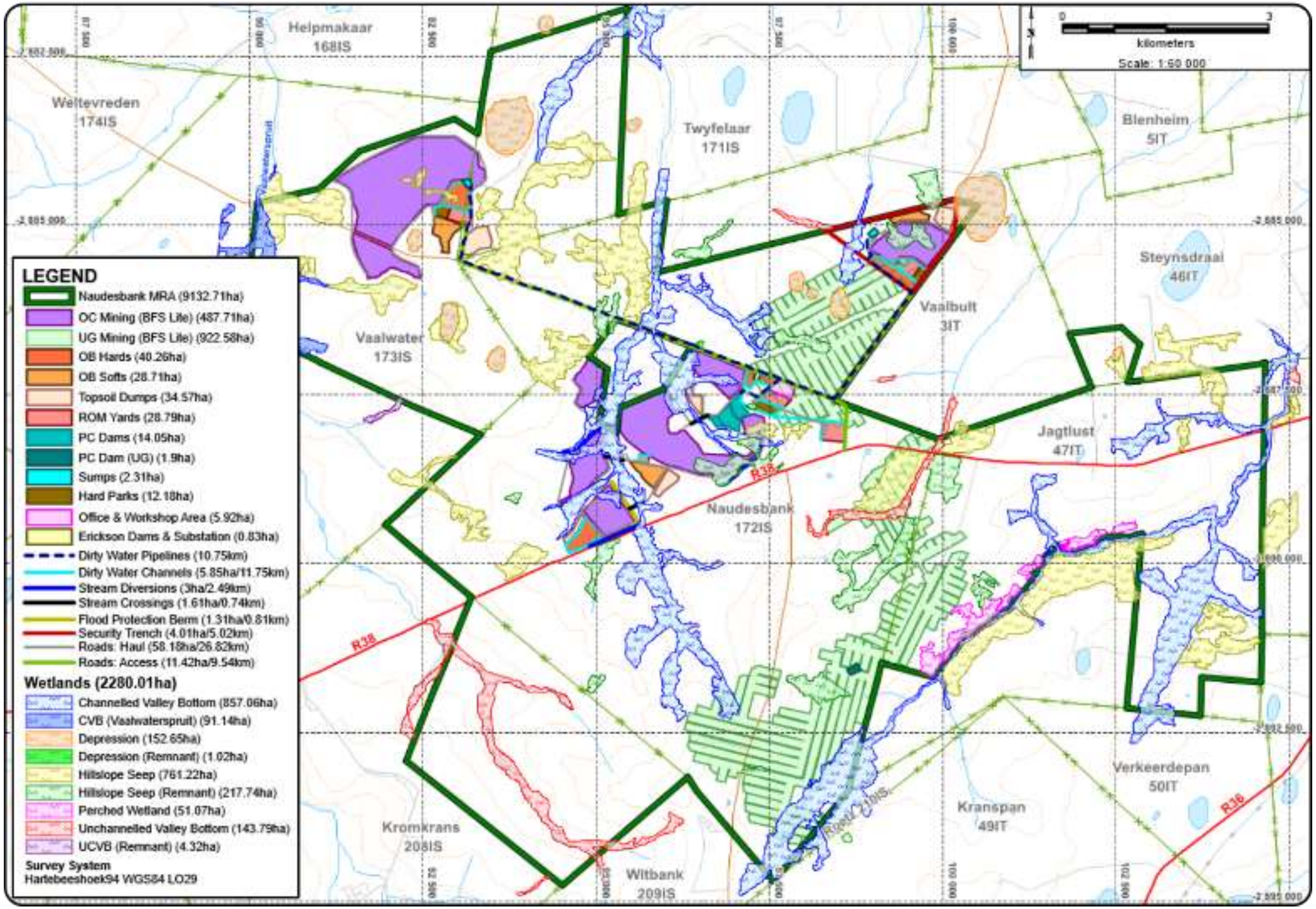
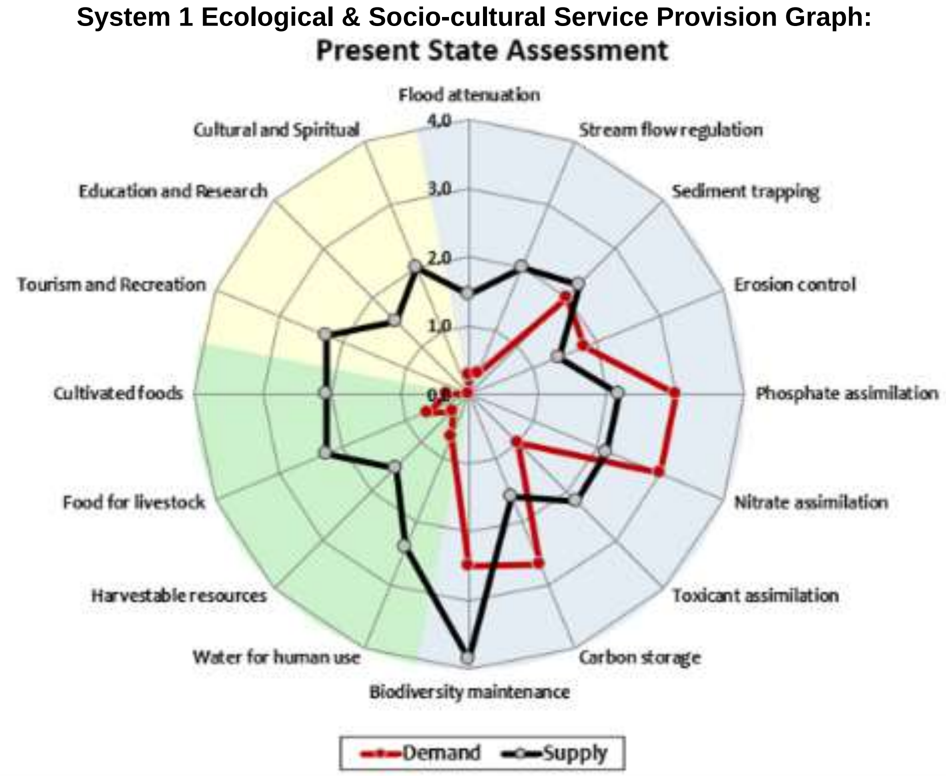
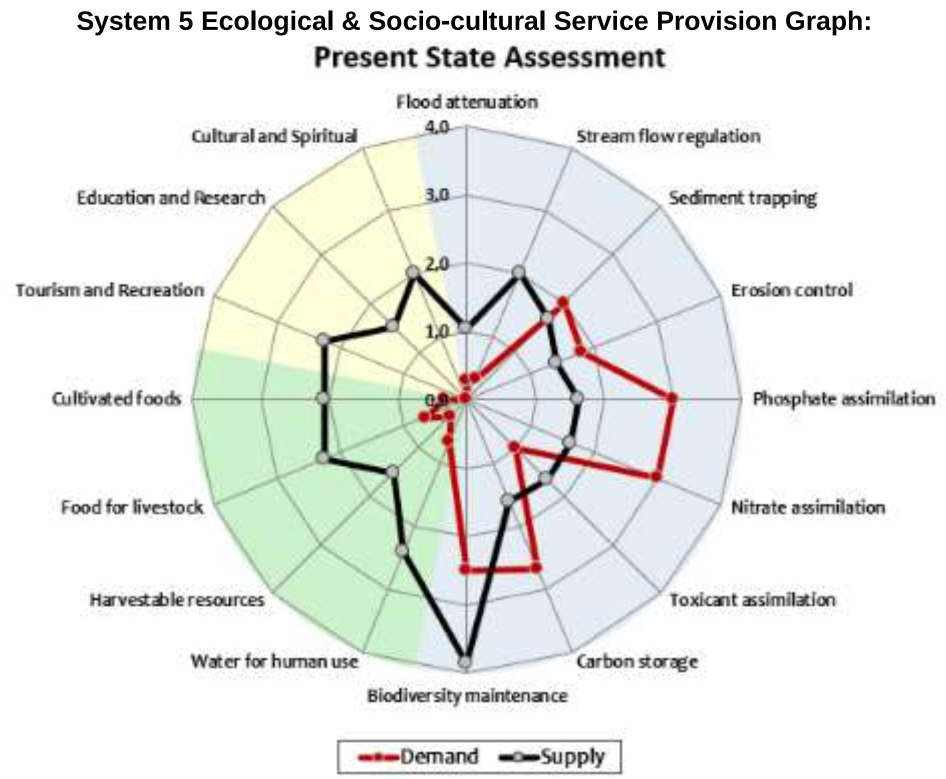


Figure 41: Wetlands within MRA

8.7.2 Summary of Wetland Assessment Results

Table 33: Summary of the Assessment of Systems 1 and 5

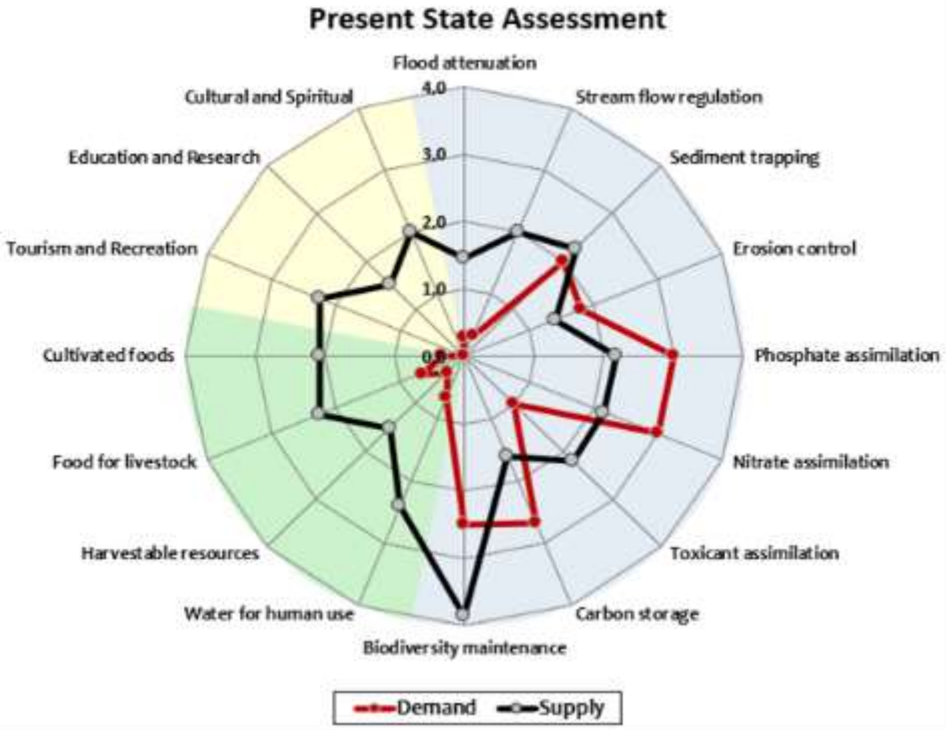




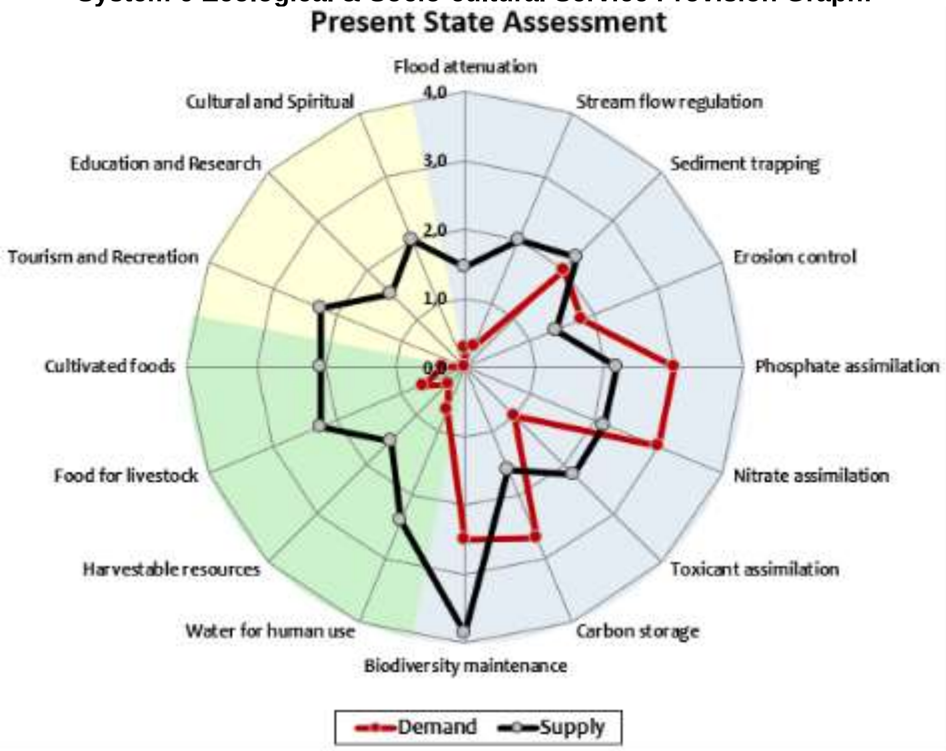
Present Ecological State (PES) Discussion	***PES Category: C*** • Both systems primarily comprise of a channelled valley bottom (CVB) wetland and several hillslope seep wetlands. • Limited erosion noted. • Ongoing trampling by livestock and sediment inputs from surrounding crop cultivation likely to exacerbate existing erosion.
Ecological Importance and Sensitivity (EIS) Discussion	***EIS Category: High*** • Contributing hydraulic functioning by means of recharge of the Vaalwaterspruit and Boesmanspruit. • Function as important faunal migratory corridors. • Suitable habitat for floral SCC such as Sensitive Species 1200 (EN) the occurrence of which was confirmed within System 4, is present within both Systems 1 and 5.
Ecoservice Provision	***Ecoservices: Moderate*** • Valuable for the provision of various ecological services, notably streamflow regulation. • Contributing to functioning of downstream systems by means of flood attenuation, sediment trapping and assimilation of nutrient and toxicants. • Some socio-cultural services is limited by accessibility, both systems are considered to have the potential to provide a suite of direct services such as harvestable goods (e.g. medicinal plants) and grazing for livestock.
Recommended Ecological Category (REC), Resource Management Objective (RMO) & Best Attainable State (BAS) Category	***REC Category: C*** ***BAS: C (Maintain)*** ***RMO: C (Maintain)*** The PES of both Systems 1 and 5 should not be permitted to deteriorate, and efforts must be made by the proponent to ensure that the proposed mining activities do not negatively impact on the wetland systems. Nonetheless, it is acknowledged that according to the proponent, a mining permit has been granted to another mining house within the centre of the study area, encompassing approximately 124 ha including approximately 38 ha of System 1, and that the activities therein may negatively impact the ecological integrity of System 1.
Freshwater Ecosystem Drivers and Receptors Discussion	• Hydraulic regime impacted by instream impoundments. • Increased water inputs due to agricultural return flow. • Geomorphological regimes impacts by edge effects from agricultural activities. • Largely dominated by indigenous wetland species with the exception of the remnant hillslope seep units which is dominated by AIPs. • Suitable habitat for variety wetland dependant fauna.

Table 34: Summary of Assessment of Systems 4 and 6

System 4 Ecological & Socio-cultural Service Provision Graph:



System 6 Ecological & Socio-cultural Service Provision Graph:

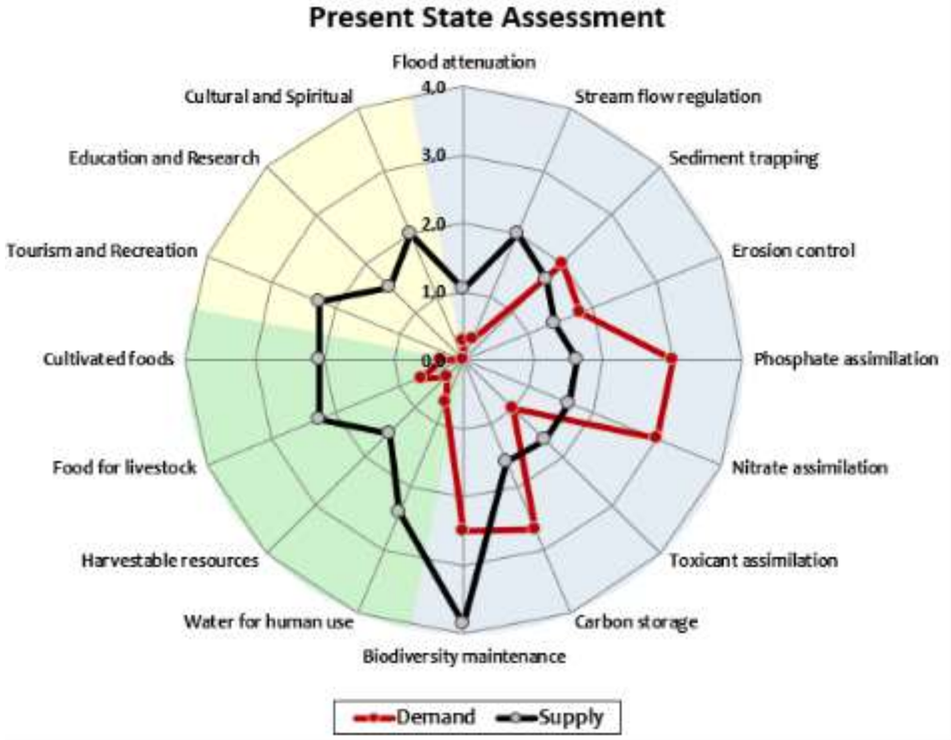


PES Discussion	***PES Category: C*** • Modified by direct and indirect impacts associated with agricultural activities.

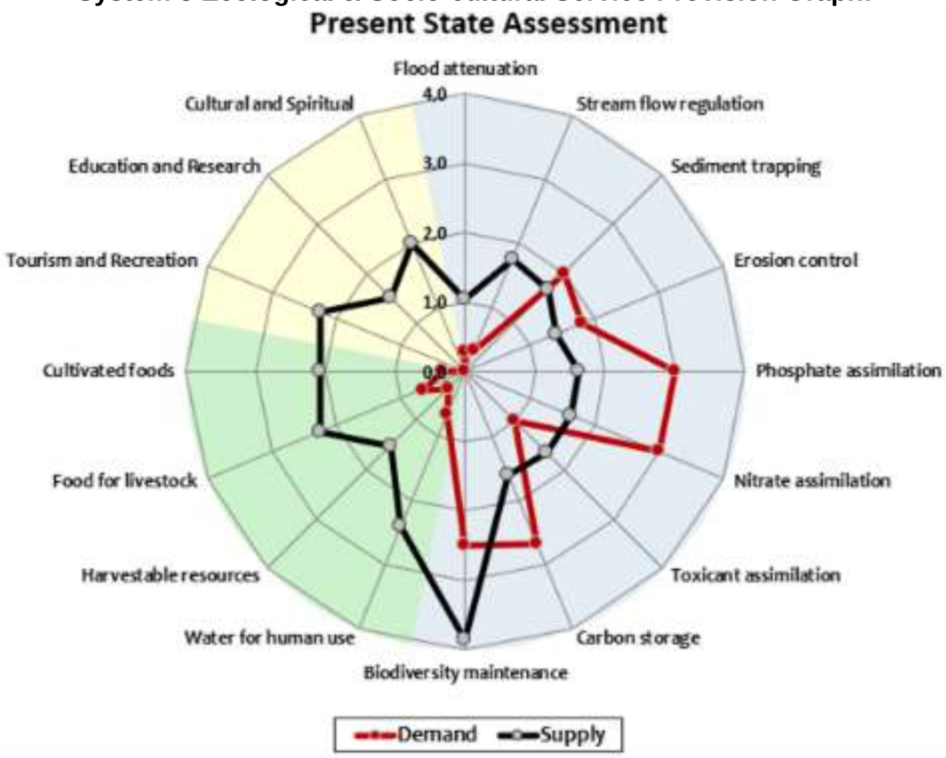
	• Mining activities impacted System 6 specifically which includes instream impoundments and crossings. • Crop cultivation is likely to exacerbate erosion. • Overall ecological integrity is deemed moderately modified.
EIS Discussion	***EIS Category: Very High*** • Considered very high largely due to the role of supporting and maintaining ecological processes. • Both system provide habitat for two threatened floral species. • Likely to provide fauna migratory corridors. • Considered important ecological corridors.
Ecoservice Provision	***Ecoservices: Moderate to Very High*** • Floral assemblages dominated by a diversity of indigenous facultative and obligate species which facilitate assimilation of nutrients, sediment trapping and flood attenuation. • Breeding and foraging habitat. • Good educational and tourism potential.
REC, RMO & BAS Category	***REC Category: C*** ***BAS: C (Maintain)*** ***RMO: C (Maintain)*** Mining activities on the southern boundary of the study area have likely contributed to the impact of decades worth of agricultural impacts on System 6, although at the time of assessment, System 4 has only been affected by agriculture.
Freshwater Ecosystem Drivers and Receptors Discussion	• Hydraulic and geomorphological processes have been altered by various activities, largely relating to historical and ongoing agriculture in the region such as instream impoundments, soil disturbances associated with tilling and trampling by livestock, and vegetation removal. • Floral assemblages associated with both wetland systems remain dominated by indigenous graminoid, sedge and forb species. • Populations of the threatened Sensitive Species 1200 (EN) and *Khadia carolinensis* were identified within System 4 and System 6 respectively. • Valuable faunal breeding and foraging habitat.

Table 35: Summary of Assessment of Systems 2 and 3 as well as Depressions 1 and 2

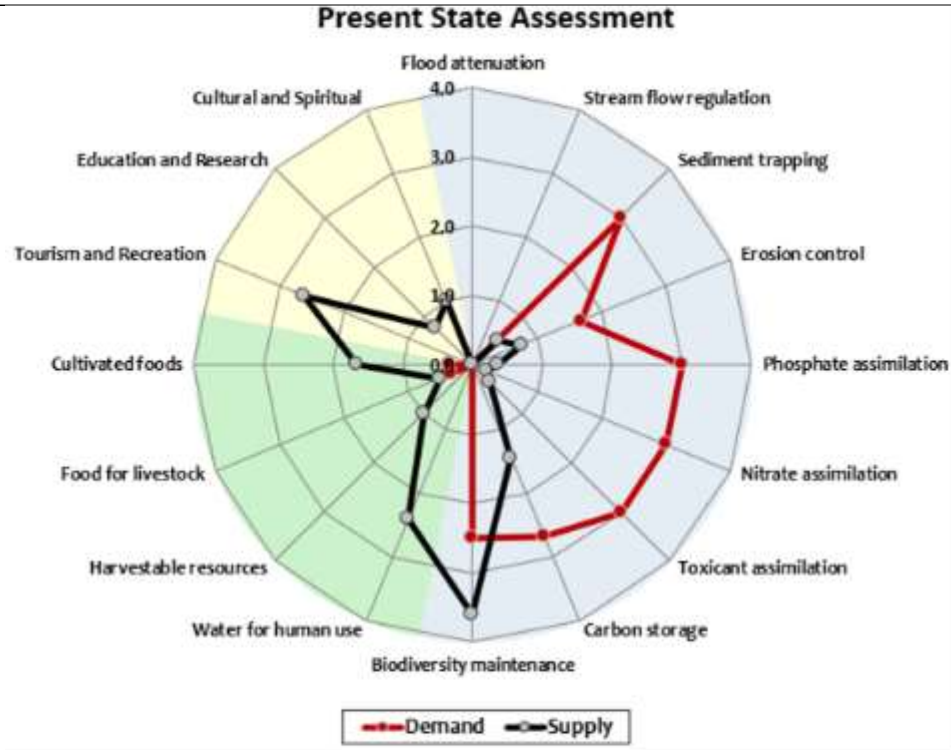
System 2 Ecological & Socio-cultural Service Provision Graph:



System 3 Ecological & Socio-cultural Service Provision Graph:



Depression 2 Ecological & Socio-cultural Service Provision Graph:

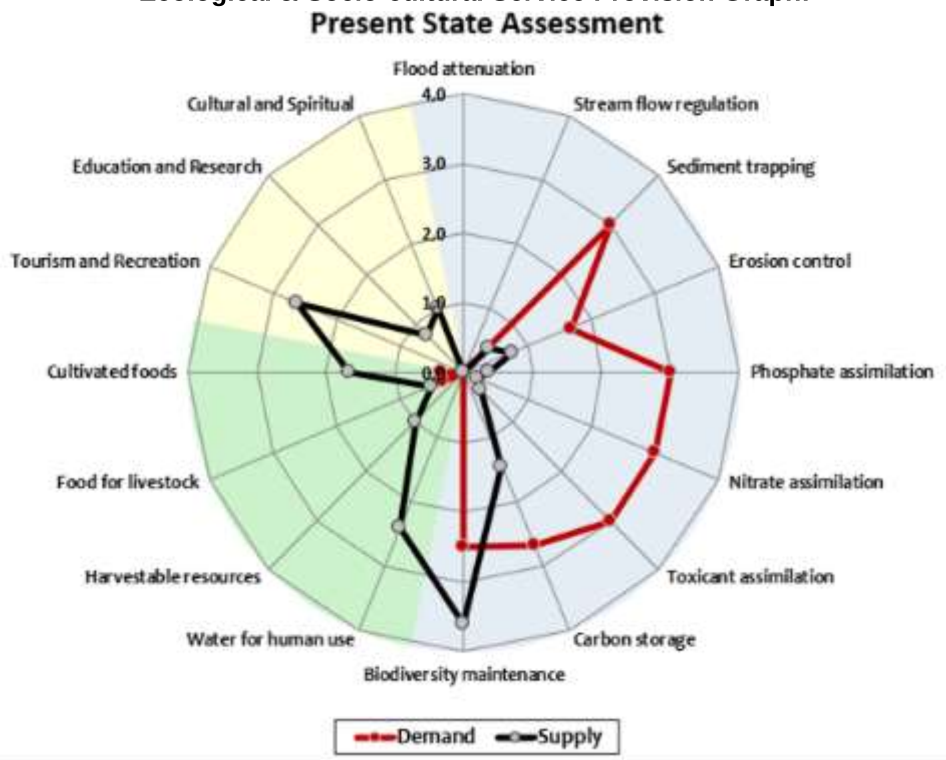


PES Discussion	***PES Category: B*** • Although the systems are impacted by agricultural activities to some degree, the wetlands remain largely natural.
EIS Discussion	***EIS Category: High*** • Contribution to the ecology of the surrounding area, capacity for biodiversity maintenance. • Systems 2 and 3 contribute to streamflow regulation and the recharge of the downstream systems, connectivity to surrounding natural areas and assimilation of excess nutrients in the landscape.
Ecoservice Provision	***Ecoservices: Moderate to High*** • Depression wetlands are considered to provide moderate levels of ecological services, largely in terms of biodiversity maintenance, water for human use (whilst abstraction was not observed on site, it is likely that both are used for watering livestock). • Depression 2 presents potential tourism opportunities in the form of birdwatching. • Systems 2 and 3 provide moderate to high levels of ecoservices, including flood attenuation, nutrient assimilation and sediment trapping and biodiversity maintenance.
REC, RMO & BAS Category	***REC Category: B*** ***BAS: B (Maintain)*** ***RMO: B (Maintain)*** The Vaalwaterspruit (System 2) is already threatened by mining activities in the catchment and therefore it is imperative that future mining activities be sensitive to this and mitigation measures must

	aim to protect the system, as well as System 3 and the depression wetlands.
Freshwater Ecosystem Drivers and Receptors Discussion	• Few modifiers of the hydraulic and geomorphological regimes of these wetlands were observed during the site assessment. • Vegetation community associated with all four of these wetlands is largely dominated by indigenous species, although isolated stands of alien invasive woody species were identified in association with System 2 and Depression 2. • Suitable faunal breeding and foraging habitat is present within all wetlands. • Systems 2 and 3 (especially the former) provide valuable migratory corridors, and both depression wetlands are considered important for wetland-dependent avifauna. • Systems 2 and 3 in particular provide suitable habitat for SCC.

Table 36: Summary of Assessment of Depressions 3, 4 and 5

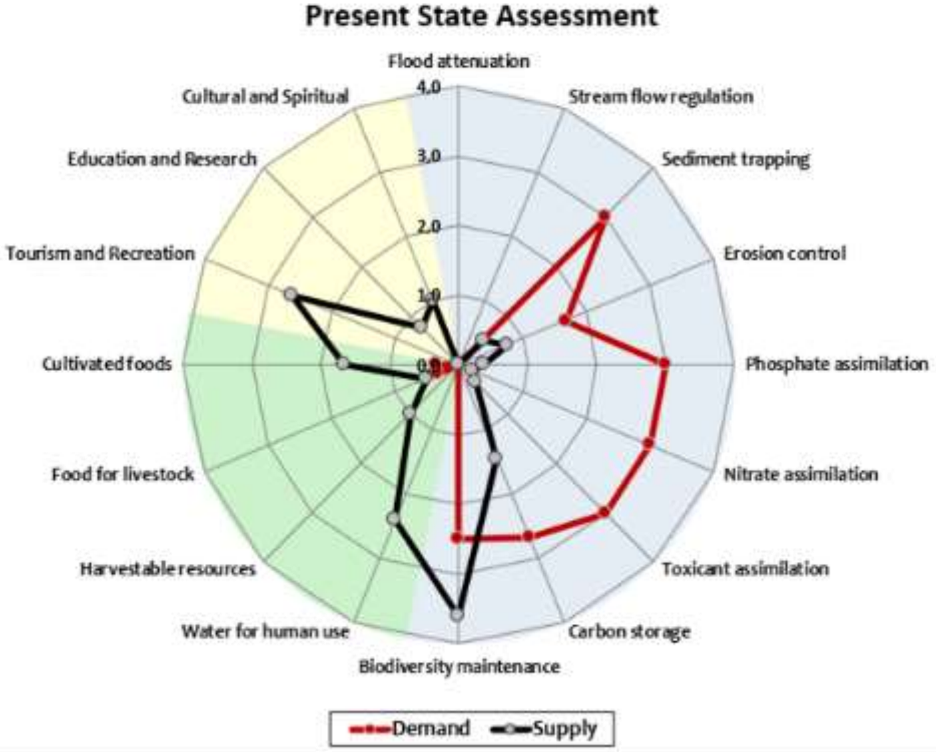
Ecological & Socio-cultural Service Provision Graph:



PES Discussion	***PES Category: B*** • Appear to have undergone minimal modification, although changes to the hydraulic and geomorphological processes are inevitable in view of the surrounding land use, as are alterations to the floral assemblages associated with the depression wetlands.
EIS Discussion	***EIS Category: Moderate*** • Relatively small in extent (when compared to Depressions 1 and 2) and as such their contribution to biodiversity maintenance may be slightly reduced, albeit nevertheless important within the immediate surrounds and their respective catchments.
Ecoservice Provision	***Ecoservices: Moderate***

	• Provide moderate ecological services, predominantly biodiversity maintenance (in particular, Depression 5), and all are considered important for wetland-dependent avifauna. • Evidence of regular use by domestic livestock was noted during the site assessment, indicating a degree of importance for grazing and water. • Whilst depression wetlands are generally not considered valuable for services such as flood attenuation and assimilation of nutrients and toxicants, they do perform these services to an extent.
REC, RMO & BAS Category	***REC Category: B*** ***BAS: B (Maintain)*** ***RMO: B (Maintain)*** The proposed mining activities should not be permitted to lead to the lowering of the PES or EIS of these depression wetlands.
Freshwater Ecosystem Drivers and Receptors Discussion	• Few discernible modifiers were noted, it is clear that agricultural activities have encroached on all three depression wetlands. • Hydraulic and geomorphological regimes are considered largely unimpacted. • Floral assemblages associated with all three wetlands are dominated by indigenous species, although the indigenous encroacher, *Seriphium plumosum* was noted around Depression wetland 5, indicating disturbance which is attributed to historical and ongoing agricultural activities. • Faunal utilisation was not observed during the site assessment, however it is likely that all three wetlands are utilised by wetland-dependent avifauna, as well as by migrating fauna, amphibians, reptiles and small mammals.

Table 37: Summary of Assessment of Depressions 6, 7, 8, 9, 10, 11 and 12

Ecological & Socio-cultural Service Provision Graph: 	
PES Discussion	***PES Category: C*** • Whilst modifications to the hydraulic and geomorphological regimes of the depression wetlands is not visually apparent. It is very likely that both have been negatively influenced by edge effects relating to the dominate land use within the catchments of all the wetlands.
EIS Discussion	***EIS Category: Moderate*** • Considered of moderate ecological importance in terms of biodiversity maintenance, but also in terms of the provision of water for human-related uses, including watering of domestic livestock, some harvestable resources (sedges and potentially some medicinal plants from Depression 8) and to a lesser degree, potential for education and possibly some tourism activities.
Ecoservice Provision	***Ecoservices: Moderate*** • Moderate levels of ecological service provisioning are expected, although Depression 8 may provide slightly increased services due to good vegetative cover. • Biodiversity maintenance is deemed one of the most important services provided by these wetlands, although the degree to which faunal utilisation occurs is likely to be influenced by the proximity and nature of anthropogenic activities.
REC, RMO & BAS Category	***REC Category: C*** ***BAS: C (Maintain)*** ***RMO: C (Maintain)***

	Despite the lowered ecological integrity of the depression wetlands, the proposed mining activities should not be permitted to contribute to further degradation thereof, in particular, Depressions 8, 9, 11 and 12 as these are considered of slightly increased ecological importance.
Freshwater Ecosystem Drivers and Receptors Discussion	• Surrounding agricultural activities are likely to have contributed to altered hydroperiods of some of the depression wetlands as a result of vegetation removal, in turn increasing the potential for increased volumes of stormwater and irrigation runoff. • Although the floral components of those depression wetlands which could be ground-truthed are transformed, that of Depression 8 was dominated by indigenous species, providing surface roughness and allowing for water filtration through the wetland. • All depression wetlands provide valuable faunal habitat, some – such as Depression 8 have increased capacity for this and are likely to be utilised by amphibians, reptiles, avifauna (such as owls) and small mammals for breeding and foraging, whilst the others may be more valuable in this regard in terms of providing bodies of water for aquatic species, migratory birds and as watering facilities for larger mammals.

8.7.3 PES and EIS

Table 38: Overview of wetlands

Wetland System	PES	EIS	Ecological Service Provision
System 1	C	High	Moderate
System 2	B	High	Moderate to High
System 3	B	High	Moderate to High
System 4	C	Very High	Moderate to Very High
System 5	C	High	Moderate
System 6	C	Very High	Moderate to Very High
Depression 1	B	High	Moderate
Depression 2	B	High	
Depressions 3, 4 and 5	B	Moderate	
Depression 6, 7 and 8	C	Moderate	
Depression 9	C	Moderate	
Depression 10	C	Moderate	
Depression 11	C	Moderate	
Depression 12	C	Moderate	

8.7.4 Wetland Delineation and Sensitivity Mapping

The delineated wetlands and their applicable 32 m zone of regulation in terms of NEMA are conceptually depicted in **Figure 42** below. The recommended scientific buffer is also shown as recommended by the freshwater ecologist.

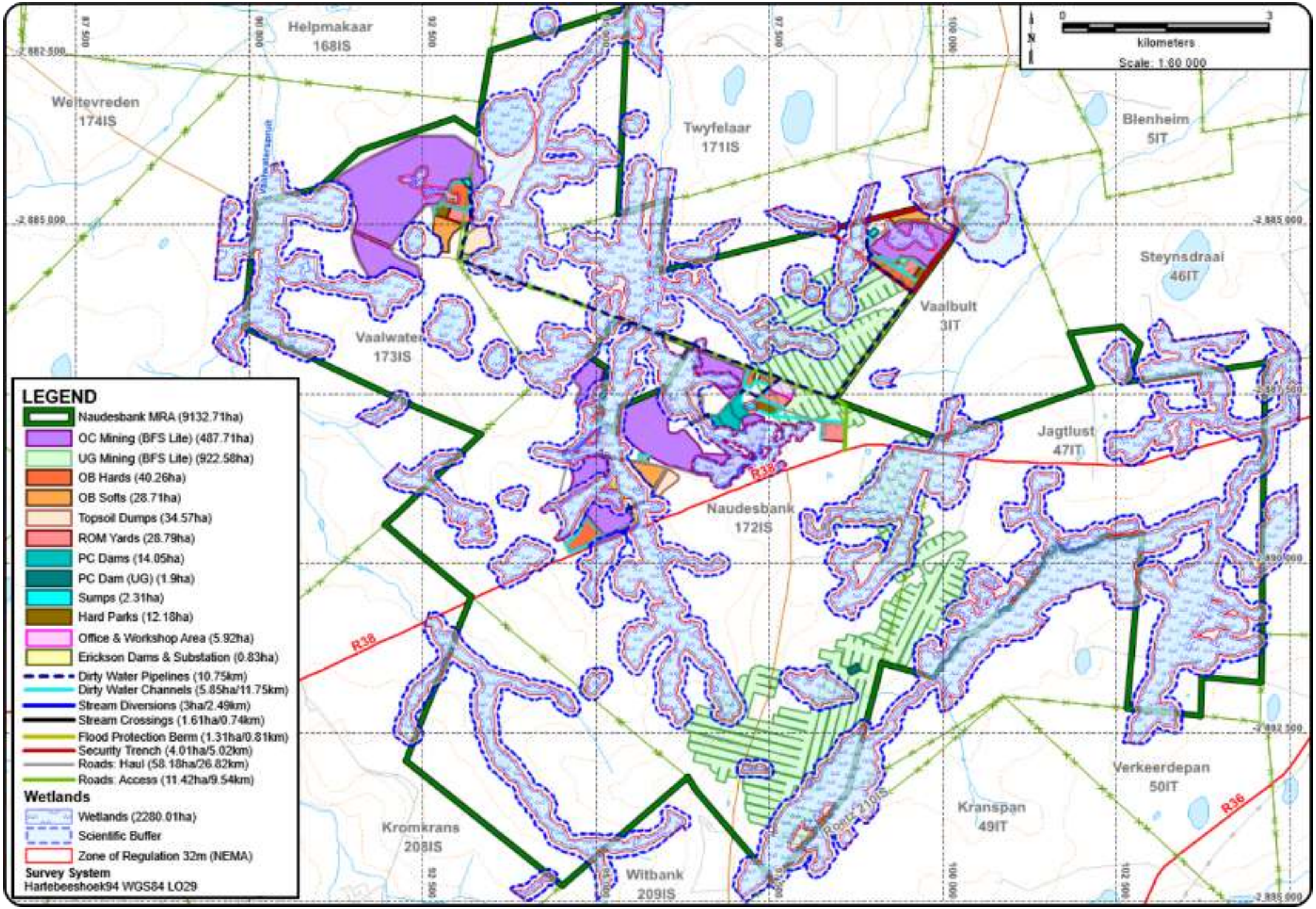


Figure 42: Delineated Wetlands

8.8 Groundwater

The information in the sections below were obtained from the Groundwater Assessment conducted by GW[2] (2023). The report is attached as **Annexure 5**.

8.8.1 Hydrogeology

The conceptual groundwater flow model identified the numerous aquifers listed in **Table 39** and **Table 40** to account for the many different geological formations of varying depths and hydrogeology.

Table 39: Aquifer Layers

Aquifer	Average Depth	Description	Comment
Aquifer-1	0-35 m (35 m thick)	Shallow weathered zone aquifer, which includes the overburden material.	Unconfined to semi-confined conditions. Deepest water strikes and depth of hydrogeological weathering used as indicator of zone bottom.
Aquifer-2	35-70 m (35 m thick)	Deep fractured aquifer.	Beyond boundaries of proposed mining. Observations have shown that the potential for the Karoo aquifer to transmit water is largely restricted at depths exceeding 60 m to 80 m below surface.
Aquifer-3	>70 m	Deep non-fractured aquifer.	Almost all fractures are believed closed.

Table 40: Aquifer Layer Parameters

Aquifer	Thickness (m)	Hydraulic conductivity (m/d) [m/s]	Storativity	Porosity	Longitudinal Dispersivity (m)#	Rainfall Recharge (m/d) {mm/a} [%of MAP]
Aquifer-1	35	(0.05) [5.8×10^{-7}]*	0.04	0.08**	40	(5.8×10^{-5}) {21} [3]
Aquifer-2	35	(0.001) [1.2×10^{-8}]	0.04	0.08	40	
Aquifer-3	-	(1×10^{-4}) [1.2×10^{-9}]	0.04	0.05	1	

* For soils (0.06) [6.9×10^{-7}] and beneath shallow weathered zone aquifer above E-Seam (0.005) [5.8×10^{-8}]
** 0.12 for soils
# Transversal dispersity is 10x smaller

8.8.2 Groundwater Levels and Flow

No groundwater level monitoring has been ongoing in the project area. The recent drilling of groundwater monitoring boreholes indicated that groundwater levels are generally shallow in low lying areas, deeper in the highest topographical elevations (except near local pans, where to surface topography is lower in a localised area) and following/mimicking the topographical elevations. Borehole depths ranged between 4.95 m and 180 m. The external users water levels ranged between 1.26 m and 24.12 m (average 9.765 m).

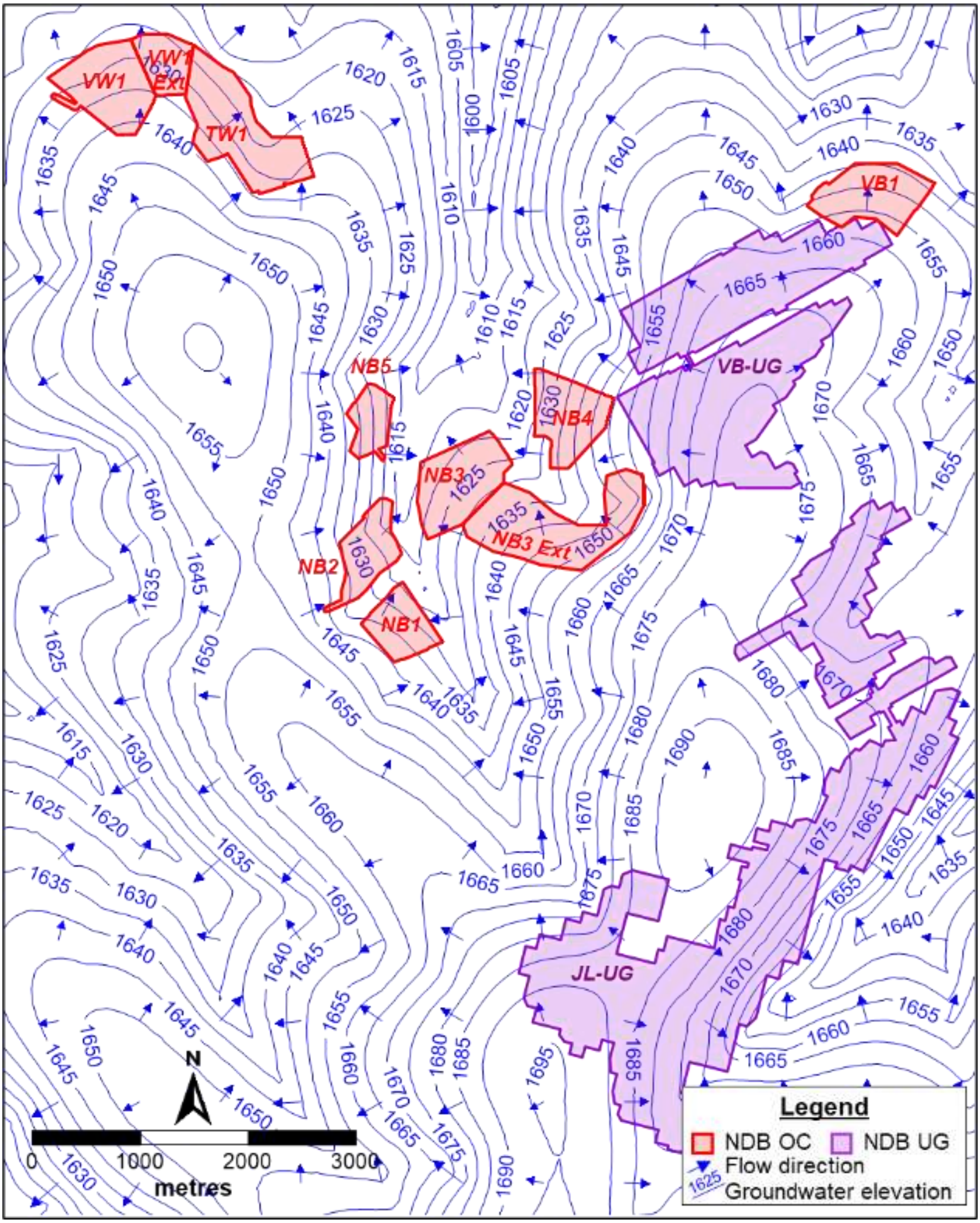


Figure 43: Numerically simulated pre-mining groundwater level elevations (mamsl)

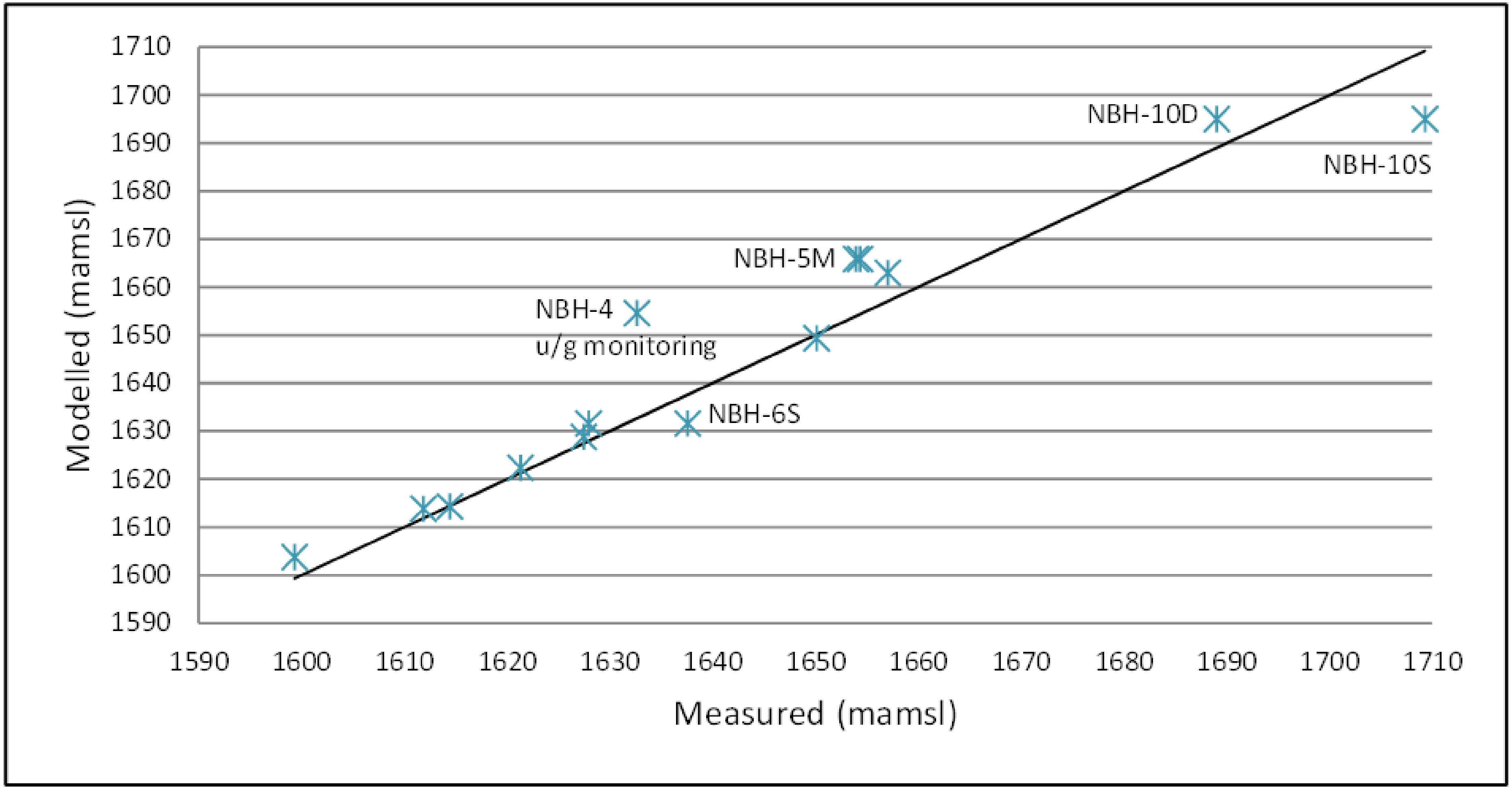


Figure 44: Simulated groundwater levels compared to measured levels (mamsl)

8.8.3 Hydrocensus

A total of seventy nine (79) points were identified near the study area. Refer to **Table 41** for the hydrocensus data. For more detailed information pertaining to the hydrocensus, refer to **Annexure 5**.

Table 41: Results of hydrocensus summary

Label	Type	Latitude	Longitude	Elevation (mamsl)	Borehole Diameter (mm)	Collar Height (m)	Depth (m)	Water Level (m)	Flow (L/s)	Use (m^3/d)
EUB-01	Borehole	26° 06' 19.26" S	29° 58' 46.06" E	1 695.00	165.00	0.13	50	9.27		
EUB-02	Borehole	26° 06' 21.49" S	29° 58' 49.44" E	1 691.50	165.00	0.11	60	8.68		8
EUB-03	Borehole	26° 06' 18.47" S	29° 59' 04.27" E	1 685.67	Core hole	0.05		2.05		
EUB-04	Borehole	26° 06' 09.36" S	29° 58' 49.69" E	1 692.50	150.00	0.07	60	8.37		
EUF-01	Fountain	26° 05' 48.70" S	29° 58' 34.61" E	1 666.00					0.3	
EUF-02	Fountain	26° 05' 57.30" S	29° 58' 34.86" E	1 665.60					0.5	
EUB-05	Fountain	26° 06' 21.56" S	29° 59' 14.50" E	1 676.50	165.00	0.1		16.25		
EUF-03	Fountain	26° 06' 18.61" S	29° 59' 19.68" E	1 676.20					0.05	
EUB-06	Borehole	26° 06' 20.09" S	29° 59' 20.36" E	1 671.75	165.00	0.42	30.00	10.59		6
EUB-07	Borehole	26° 06' 14.11" S	29° 59' 23.68" E	1 677.75						
EUB-08	Borehole	26° 06' 12.42" S	29° 59' 27.85" E	1 674.50	165.00	0.06	14.37	2.36	2	
EUB-09	Borehole	26° 06' 02.66" S	29° 59' 31.13" E	1 677.00						
EUF-04	Fountain	26° 06' 02.45" S	29° 59' 37.39" E	1 671.33					No flow	
EUF-05	Fountain	26° 05' 57.59" S	29° 59' 39.62" E	1 669.00					No flow	
EUF-06	Fountain	26° 06' 00.68" S	29° 59' 20.69" E	1 686.00					No flow	
EUB-10	Borehole	26° 06' 26.53" S	29° 57' 31.75" E	1 649.00	165	0.10		11.55		10
EUF-07	Fountain	26° 06' 28.40" S	29° 57' 33.55" E	1 652.00					0.4	
EUB-11	Borehole	26° 06' 47.12" S	29° 56' 20.26" E	1 676.00	165.00	0.07		7.32		
EUB-12	Borehole	26° 06' 17.10" S	29° 56' 01.18" E	1 649.20	150.00	0.28		9.38		
EUB-13	Borehole	26° 05' 59.71" S	29° 56' 45.31" E	1 638.00	165.00	0.56		6.28		
EUB-14	Borehole	26° 06' 20.77" S	29° 57' 38.66" E	1 660.25	165.00	0.18		17.42		10
EUB-15	Borehole	26° 07' 35.58" S	29° 56' 45.10" E	1 667.50	165.00	0.49		16.35		
EUB-16	Borehole	26° 07' 24.13" S	29° 57' 23.47" E	1 666.67	165.00	0.19		19.47		
EUB-17	Borehole	26° 08' 14.39" S	29° 58' 03.36" E	1 704.00	165.00	0.22		18.44		

Label	Type	Latitude	Longitude	Elevation (mamsl)	Borehole Diameter (mm)	Collar Height (m)	Depth (m)	Water Level (m)	Flow (L/s)	Use (m^3/d)
EUB-18	Borehole	26° 07' 00.73" S	29° 59' 59.17" E	1 676.00	165.00	0.31		3.98		
EUB-19	Borehole	26° 06' 59.26" S	29° 59' 57.77" E	1 676.33						
EUB-20	Borehole	26° 07' 00.19" S	29° 59' 52.98" E	1 677.00						
EUB-21	Borehole	26° 07' 05.20" S	30° 00' 04.14" E	1 673.00	165.00	0.19	42.12	10.26		
EUB-22	Borehole	26° 07' 05.41" S	30° 00' 05.72" E	1 671.50	140 PVC	0.24	100	16.34		35
EUB-23	Borehole	26° 06' 53.50" S	30° 00' 08.32" E	1 666.00	165.00	0.00		3.76		
EUB-24	Borehole	26° 06' 44.35" S	30° 00' 06.95" E	1 670.00	140.00	0.06	125	24.12		
EUB-25	Borehole	26° 06' 43.31" S	30° 00' 06.26" E	1 670.00						
EUF-08	Borehole	26° 07' 25.68" S	29° 59' 56.18" E	1 669.40					0.6	
EUB-26	Borehole	26° 08' 15.83" S	29° 58' 53.51" E	1 680.00						
EUB-27	Borehole	26° 07' 45.62" S	29° 58' 30.29" E	1 714.00	165.00	0.1		3.09		
EUB-28	Borehole	26° 10' 11.86" S	29° 58' 14.74" E	1 728.33	150.00	0.46				
EUB-29	Borehole	26° 10' 11.53" S	29° 58' 35.80" E	1 718.00	165.00	0		16.25		
EUB-30	Borehole	26° 09' 24.26" S	29° 59' 24.32" E	1 688.00	165.00	0.11		9.64		
EUB-31	Borehole	26° 08' 57.34" S	30° 00' 01.87" E	1 679.00	150.00	0.09		5.02		
EUB-32	Borehole	26° 05' 57.26" S	30° 00' 19.94" E	1 667.00	165.00	0.34		5.73		
EUF-09	Fountain	26° 05' 54.28" S	30° 03' 31.75" E	1 626.00					3.5	
EUF-10	Fountain	26° 06' 27.25" S	30° 02' 29.65" E	1 608.00					0.8	
EUF-11	Fountain	26° 05' 43.91" S	30° 01' 18.34" E	1 668.00					1.5	
EUB-33	Borehole	26° 05' 42.54" S	30° 01' 12.58" E	1 673.00	165.00	0.12	18	7.34		
EUB-34	Borehole	26° 06' 16.63" S	30° 01' 13.62" E	1 671.00	150.00	0.09	4.94	3.27		
EUB-35	Borehole	26° 07' 24.02" S	29° 58' 19.96" E	1 697.50	165.00	0.08		3.16		
EUB-36	Borehole	26° 06' 57.49" S	29° 58' 31.40" E	1 689.00	165.00	0.16		2.94		
EUB-37	Borehole	26° 06' 58.32" S	29° 59' 04.78" E	1 694.00	165.00	0		9.14		10
EUB-38	Borehole	26° 09' 27.25" S	29° 57' 53.21" E	1 708.00	165.00	0.64	70	10.25		5

Label	Type	Latitude	Longitude	Elevation (mamsl)	Borehole Diameter (mm)	Collar Height (m)	Depth (m)	Water Level (m)	Flow (L/s)	Use (m^3/d)
EUB-39	Borehole	26° 09' 42.88" S	29° 57' 40.25" E	1 710.00	165.00	0.05		9.79		5
EUF-12	Borehole	26° 04' 46.88" S	29° 54' 12.82" E	1 607.00					0.3	
EUB-40	Borehole	26° 04' 49.76" S	29° 54' 16.02" E	1 613.00	165.00	0.22	28.36	7.12		
EUB-41	Borehole	26° 04' 50.70" S	29° 54' 29.52" E	1 619.00						
EUB-42	Borehole	26° 03' 57.31" S	29° 55' 55.78" E	1 635.00	165.00	0.31		5.74		
EUB-43	Borehole	26° 05' 39.59" S	29° 58' 02.64" E	1 643.50	165.00	0.09	40	5.34		
EUB-44	Borehole	26° 05' 26.92" S	29° 58' 18.66" E	1 666.00			180			
EUF-13	Fountain	26° 05' 37.46" S	29° 58' 16.64" E	1 667.78					0.4	
EUB-45	Borehole	26° 05' 35.59" S	29° 58' 17.51" E	1 668.50						
EUB-46	Borehole	26° 05' 09.92" S	29° 55' 28.85" E	1 665.00						
EUB-47	Borehole	26° 04' 14.27" S	29° 58' 55.70" E	1 653.00						
EUB-48	Borehole	26° 03' 35.24" S	29° 58' 38.21" E	1 633.50	165.00	1.15	35	15.35		
EUB-49	Borehole	26° 03' 29.66" S	29° 58' 30.11" E	1 635.00			120			
EUB-50	Borehole	26° 03' 27.43" S	29° 58' 04.62" E	1 629.00	165.00	0	41	23.54		
EUB-51	Borehole	26° 05' 12.05" S	29° 56' 03.88" E	1 671.00						
EUB-52	Borehole	26° 05' 34.33" S	29° 54' 33.84" E	1 623.00	150.00	0.11	1.45			
EUB-53	Borehole	26° 06' 02.63" S	29° 55' 20.64" E	1 632.00	110.00	0.32		13.89		
NBH-11M	Borehole	26° 06' 13.54" S	29° 55' 34.36" E	1 628.00	140.00	0.73	18.39	1.26		
NBH-7M	Borehole	26° 05' 49.78" S	29° 54' 48.60" E	1 614.67	140.00	0.68	29.82	3.5		
EUB-57	Borehole	26° 04' 43.28" S	29° 58' 59.99" E	1 669.50						
EUB-54	Borehole	26° 04' 52.93" S	29° 58' 25.54" E	1 657.00						
EUF-14	Fountain	26° 04' 52.39" S	29° 58' 25.61" E	1 657.00					<0.01	
EUB-55	Borehole	26° 05' 16.98" S	29° 58' 16.07" E	1 656.00	165.00	0.27		16.78		
EUB-58	Borehole	26° 05' 16.48" S	29° 58' 12.04" E	1 653.00						

Label	Type	Latitude	Longitude	Elevation (mamsl)	Borehole Diameter (mm)	Collar Height (m)	Depth (m)	Water Level (m)	Flow (L/s)	Use (m^3/d)
EUB-56	Borehole	26° 05' 06.47" S	29° 56' 19.32" E	1 668.00						
EUF-15	Fountain	26° 05' 04.67" S	29° 56' 41.17" E	1 653.00					<0.01	
EUB-59	Borehole	26° 08' 38.29" S	29° 57' 22.28" E	1 702.50						
Decant	Mine	26° 06' 41.58" S	29° 57' 30.06" E	1 633.80						
NBH-4	Borehole	26° 06' 50.54" S	29° 57' 56.30" E	1 659.70	165.00	0.67	43.11	26.52		
OC-1	Mine	26° 07' 09.19" S	29° 55' 22.98" E	1 620.33						

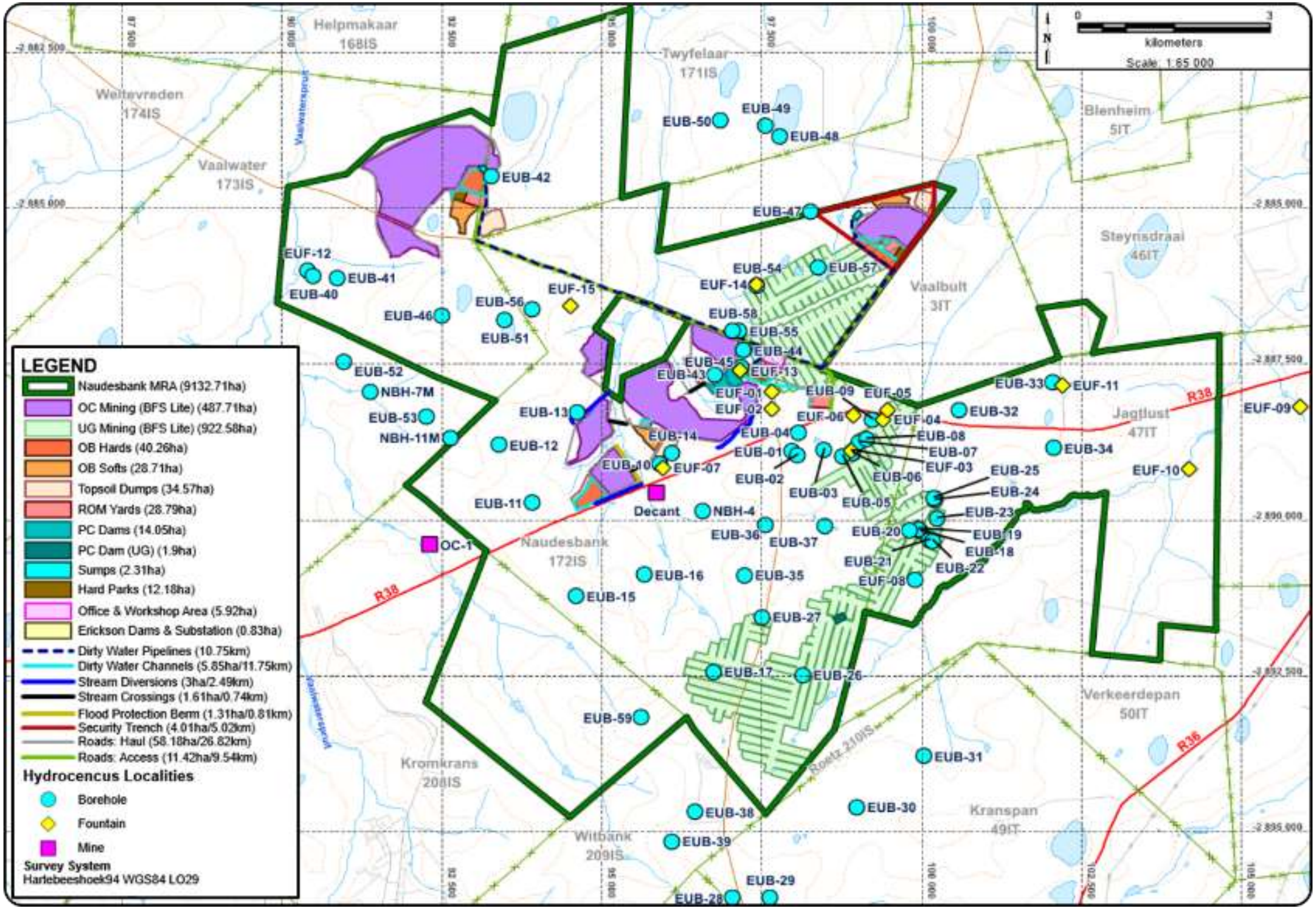


Figure 45: Hydrocensus Positions

8.8.4 Groundwater Quality

The background qualities are compared against the South African National Standards (SANS) 241-1: 2015 drinking water quality guidelines. Refer to **Table 42**.

The following was deduced from **Table 42**, **Figure 46** and **Figure 47**:

- As can be expected, unimpacted groundwater has a magnesium-alkalinity dominance, while impacted groundwater is expected to have a calcium/magnesium-sulphate (mining) or sodium/potassium-sulphate (mining and agriculture) character.
- Natural Fe, Mn and Al concentrations can exceed background concentrations.
- Although at good drinking water quality, drinking water indicates an agricultural impact of Na-Cl or Mg-Cl and some coal-related Na-SO_4.

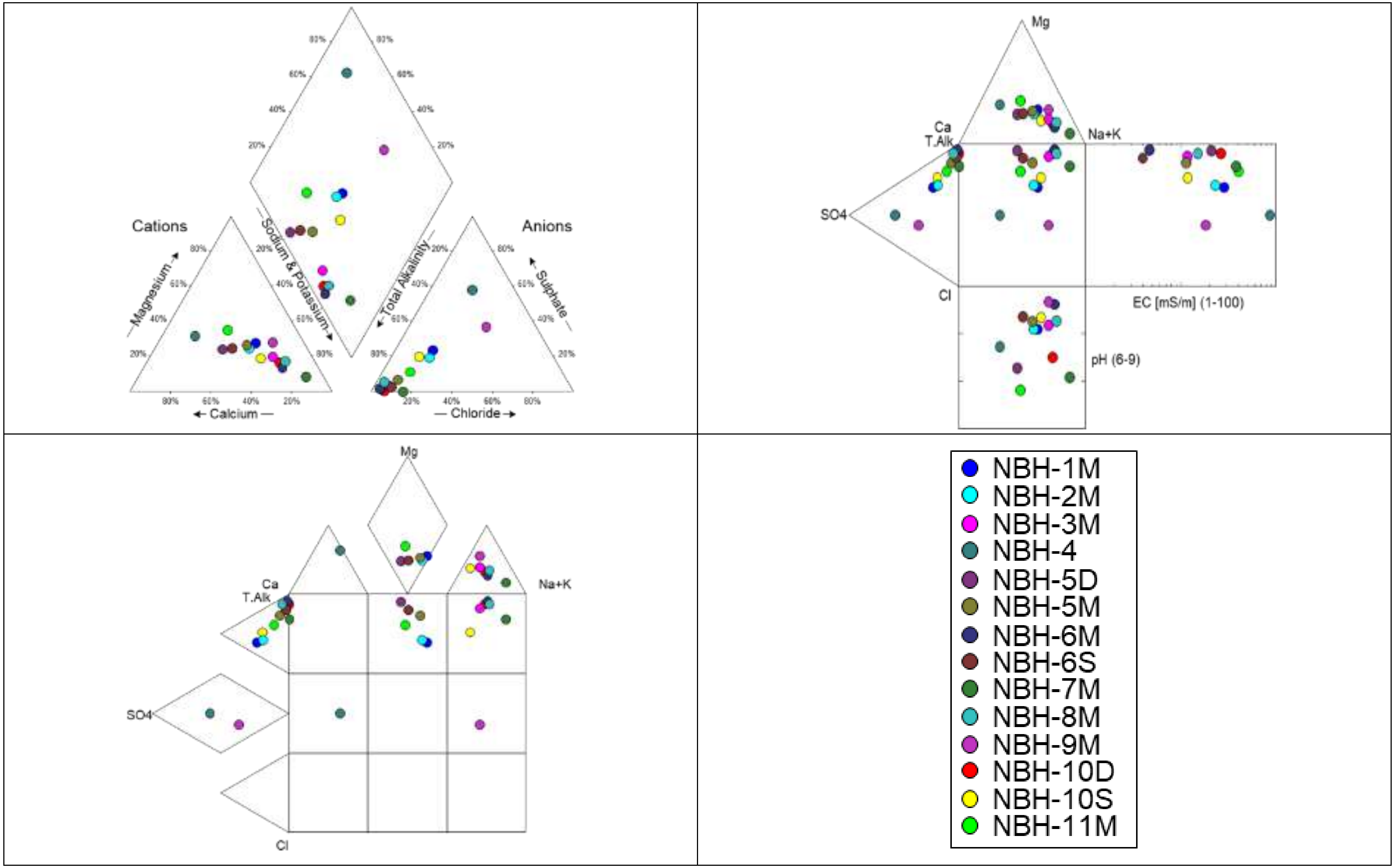


Figure 46: Piper, Durov & Expanded Durov Plots – Newly Drilled Boreholes

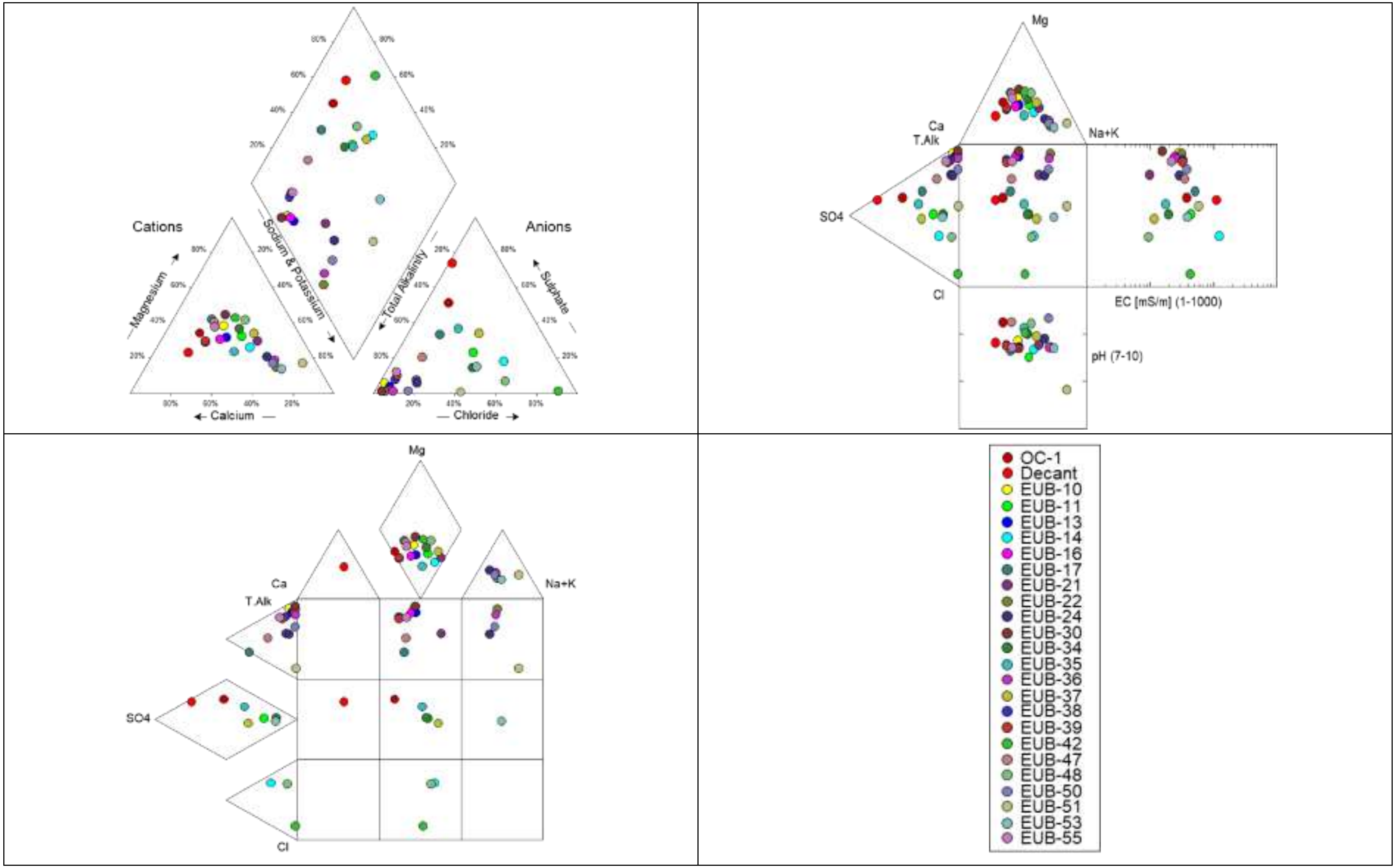


Figure 47: Piper, Durov & Expanded Durov Plots - Hydrocensus

Table 42: Background Groundwater Quality

	Background Water Quality Range	SANS 241-1:2015 [effect at higher concentration]	
		Target Water Quality Range	Critical Values
pH	6.5-8.1	(<5.5&>9.5) & (<6.0&>9.0)	<4 & >11
EC (mS/m)	7-40	70 [salty taste – no effect]	450
TDS (mg/L)	40-350	450 (= EC x 6.5)	3000
Ca (mg/L)	<35	32 [slight scaling problems]	80
Mg (mg/L)	<20	30 [slight scaling problems]	200
Na (mg/L)	<75	100 [slightly salty]	600
K (mg/L)	<15	50 [undesirable for infants or renal disease]	400
Total Alkalinity (mg/L)	5-220	No standard	No Standard
Cl (mg/L)	<40	100 [corrosion increase]	600 [objectionable salty taste, corrosion]
SO_4 (mg/L)	<30	200 [slight taste, tendency for diarrhoea]	600 [pronounced salty/bitter taste, diarrhoea
NO_3<N (mg/L)	<2.2	6 [rare instances of methemoglobinemia]	20
Fe (mg/L)	<0.05-0.5	0.1 [slight taste, slight plumbing deposits]	10
Mn (mg/L)	<0.01-1.0	0.05 [slight staining]	20
Al (mg/L)	<0.01-3.0	0.15 [slight colour effect in assoc. with iron or manganese]	0.5
F (mg/L)	<0.9	1 [slight mottling of dental enamel in sensitive individuals]	8

8.8.5 Geochemical Analysis

Waste classification was done on ten samples. All of the exceedances in **Table 43** were recorded well below the TCT1 limits (GNR635, 2013). None of the TC exceedances recorded in any of the waste streams were recorded in their respective distilled water leaches, indicating a very low environmental pollution/impact risk with leaching.

According to the GNR 636 (2013), Section 5 (1), any waste stream with a pH level less than 6.0 or more than 12.0 is viewed as possessing an extreme risk and is prohibited from being disposed of. The waste streams 'NB01' and 'NB02' recorded acidic paste pH levels and should therefore be categorised into the Type 0 waste type category. However, these samples showed neutral pH levels in their respective distilled water leaches. It can consequently be motivated that they be classified on their remaining chemical profiles. Given the laboratory analyses, as summarised in **Table 43** and the preceding argument, all samples were overall classified as Type 3 (Low risk).

Table 43: Summary of Waste Classification Analysis and Overall Classification

<table>
<tr><th rowspan="2">Sample</th><th colspan="2">pH</th><th colspan="2">Exceedances</th><th rowspan="2">Overall Classification</th></tr>
<tr><th>Paste</th><th>Distilled Water Leach</th><th>Total Concentrations</th><th>Distilled Water Leach</th></tr>
<tr><td>NB01</td><td>4.41 **</td><td>6.24 *</td><td>Ba (90 mg/kg) – LCT0 limit = 62.5 mg/Kg
Cu (17.9 mg/kg) – TCT0 limit = 16 mg/Kg
F (295 mg/kg) – LCT0 limit = 100 mg/Kg</td><td rowspan="9">No exceedances</td><td rowspan="9">Type 3 (Low risk)</td></tr>
<tr><td>NB02</td><td>4.84 **</td><td>7.1 *</td><td>F 208 mg/kg) – LCT0 limit = 100 mg/Kg</td></tr>
<tr><td>NB03</td><td>7.79 *</td><td>8.68 #</td><td>Ba (153 mg/kg) – LCT0 limit = 62.5 mg/Kg
Cu (34.1 mg/kg) – TCT0 limit = 16 mg/Kg
Pb (24.7 mg/kg) – LCT0 limit = 20 mg/Kg
F (468 mg/kg) – LCT0 limit = 100 mg/Kg</td></tr>
<tr><td>NB04</td><td>7.09 *</td><td>8.09 *</td><td>Ba (134 mg/kg) – LCT0 limit = 62.5 mg/Kg
Cu (27.5 mg/kg) – TCT0 limit = 16 mg/Kg
F (316 mg/kg) – LCT0 limit = 100 mg/Kg</td></tr>
<tr><td>NB05</td><td>7.92 *</td><td>9.02 ##</td><td>F (314 mg/kg) – LCT0 limit = 100 mg/Kg</td></tr>
<tr><td>NB06</td><td>7.92 *</td><td>9.02 #</td><td>Ba (127 mg/kg) – LCT0 limit = 62.5 mg/Kg
Cu (36.4 mg/kg) – TCT0 limit = 16 mg/Kg
Pb (28.2 mg/kg) – LCT0 limit = 20 mg/Kg
F (424 mg/kg) – LCT0 limit = 100 mg/Kg</td></tr>
<tr><td>NB07</td><td>6.49 *</td><td>8.45 * ###</td><td>As (9.55 mg/kg) – LCT0 limit = 5.8 mg/Kg
Ba (130 mg/kg) – LCT0 limit = 62.5 mg/Kg</td></tr>
<tr><td>NB08</td><td>7.04 *</td><td>8.80 #</td><td>As (8.17 mg/kg) – LCT0 limit = 5.8 mg/kg
Ba (97 mg/kg) – LCT0 limit = 62.5 mg/kg
Cu (20.9 mg/kg) – TCT0 limit = 16 mg/kg
F (257 mg/kg) – LCT0 limit = 100 mg/kg</td></tr>
<tr><td>NB09</td><td>7.30 *</td><td>8.86 #</td><td>Ba (83.5 mg/kg) – LCT0 limit = 62.5 mg/kg
Cu (18.7 mg/kg) – TCT0 limit = 16 mg/kg
F (183 mg/Kg) – LCT0 limit = 100 mg/Kg</td></tr>
</table>

Sample	pH		Exceedances		Overall Classification
	Paste	Distilled Water Leach	Total Concentrations	Distilled Water Leach	
NB10	8.06 *	8.95 ##	Ba (228 mg/Kg) – LCT0 limit = 62.5 mg/Kg F (168 mg/Kg) – LCT0 limit = 100 mg/Kg		

* Neutral pH 6.0 to 8.5 ** below 6.0

slightly alkaline pH >8.5 ## very slightly alkaline ### just below alkaline range

The following general observations were made pertaining to acid generating potential:

- As can be seen in **Table 44**, 60% of the sampled material is indicated as having "no" potential for acidic drainage and will generate "very low to no" salt loads.
- 5% of samples had very low potential, with very low to low salt loads.
- 10% of samples had low potential, with low to medium salt loads.
- The likely/possibly acid-generating material, with high salt load generation, constitutes 25% of the sampled material.

Table 44: Summary - Potential to Generate Acidic Drainage (% of Samples)

	Number of Samples	%SS* >0.3 Type SS*(NP/AP) I or II	%SS* >0.3 Type SS*(NP/AP) III or IV	%SS* 0.1 - 0.3 Type SS*(NP/AP) I or II	%SS* 0.1 - 0.3 Type SS*(NP/AP) III or IV	%SS* <0.1 Type SS*(NP/AP) I or II	%SS* <0.1 Type SS*(NP/AP) III or IV
N1	1						100%
N2	1					100%	
N3	1					100%	
N4	1						100%
N5	1			100%			
N6	1			100%			
N7	1						100%
N8	1						100%
N9	1						100%
N10	1	100%					
N11	1	100%					
N12	1						100%
N13	1						100%
N14	1	100%					
N15	1						100%
N16	1						100%
N17	1	100%					
N18	1						100%
N19	1				100%		
N20	1	100%					
Potential for acid mine drainage		Likely/possibly acid-generating.	Low to medium potential for	Low potential for acid-generation.	Very low potential for	No potential for acidic drainage.	No potential for acidic drainage.

	Number of Samples	%SS* >0.3 Type SS*(NP/AP) I or II	%SS* >0.3 Type SS*(NP/AP) III or IV	%SS* 0.1 - 0.3 Type SS*(NP/AP) I or II	%SS* 0.1 - 0.3 Type SS*(NP/AP) III or IV	%SS* <0.1 Type SS*(NP/AP) I or II	%SS* <0.1 Type SS*(NP/AP) III or IV
		High salt load.	acid generation. Medium salt load.	Low to medium salt load.	acid generation. Very low to low salt load.	Very low/no salt load.	Very low/no salt load.
Percentage of samples (20)		25%		10%	5%	10%	50%

* Sulphate Sulphur

8.9 Air Quality

The information is the section below was obtained from the Ambient Air Quality Impact Assessment undertaken by EHRCON (2023), refer to **Annexure 6**.

8.9.1 Baseline Air Quality

The project is situated within the Highveld Priority Area (HPA). The poor air quality results from a combination of emissions from different industrial sectors, residential fuel burning, motor vehicle emissions, mining, and biomass burning amongst other emissions sources, as well as cross-boundary transport of pollutants into the GSDM adding to the base loading.

Only Particulate Matter will be discussed below, more ambient concentrations are discussed in *Section 3.7* of **Annexure 6**.

Particulate matter (PM) is a broad term used to describe the fine particles found in the atmosphere, including soil dust, dirt, soot, smoke, pollen, ash, aerosols and liquid droplets. The most distinguishing characteristic of PM is the particle size and the chemical composition. Particle size has the greatest influence on the behaviour of PM in the atmosphere with smaller particles tending to have longer residence times than larger ones. PM is categorised, according to particle size, into TSP, PM_{10} and $PM_{2.5}$.

PM_{10} describes all particulate matter in the atmosphere with a diameter equal to or less than 10 µm. Sometimes referred to simply as coarse particles, they are generally emitted from motor vehicles (primarily those using diesel engines), factory and utility smokestacks, construction sites, tilled fields, unpaved roads, stone crushing, and burning of wood. Natural sources include sea spray, windblown dust and volcanoes. Coarse particles tend to have relatively short residence times as they settle out rapidly and PM_{10} is generally found relatively close to the source except in strong winds. **Figure 48** shows the hourly average PM_{10} concentrations for the Hendrina SAWS monitoring station.

$PM_{2.5}$ describes all particulate matter in the atmosphere with a diameter equal or less than 2.5 µm. They are often called fine particles, and are mostly related to combustion (motor vehicles, smelting, incinerators), rather than mechanical processes as is the case with PM_{10}. **Figure 49** shows the hourly average $PM_{2.5}$ concentrations for the Hendrina SAWS monitoring station.

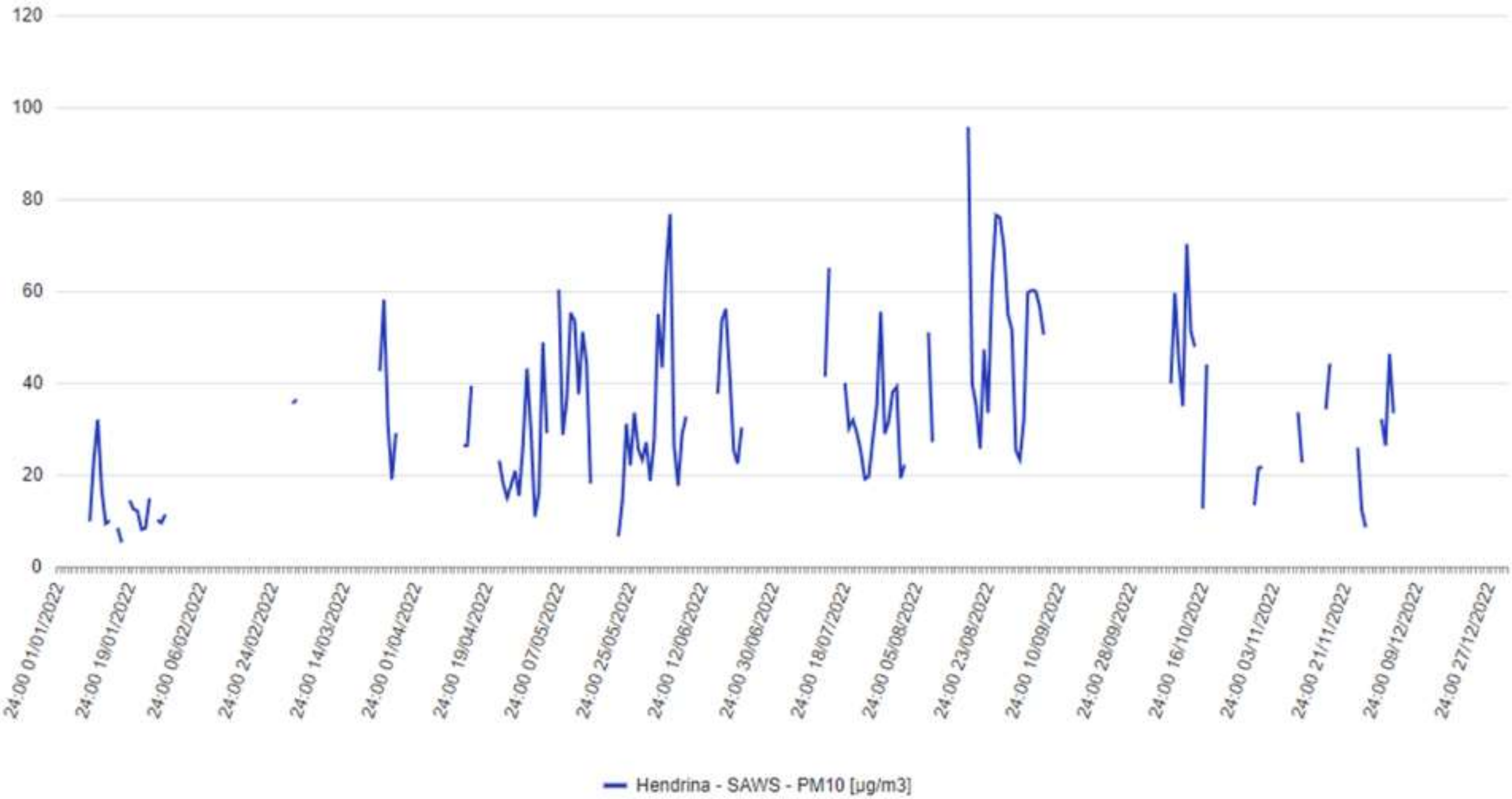


Figure 48: Hendrina Hourly Average PM_{10} Concentration (SAAQIS, 2023)

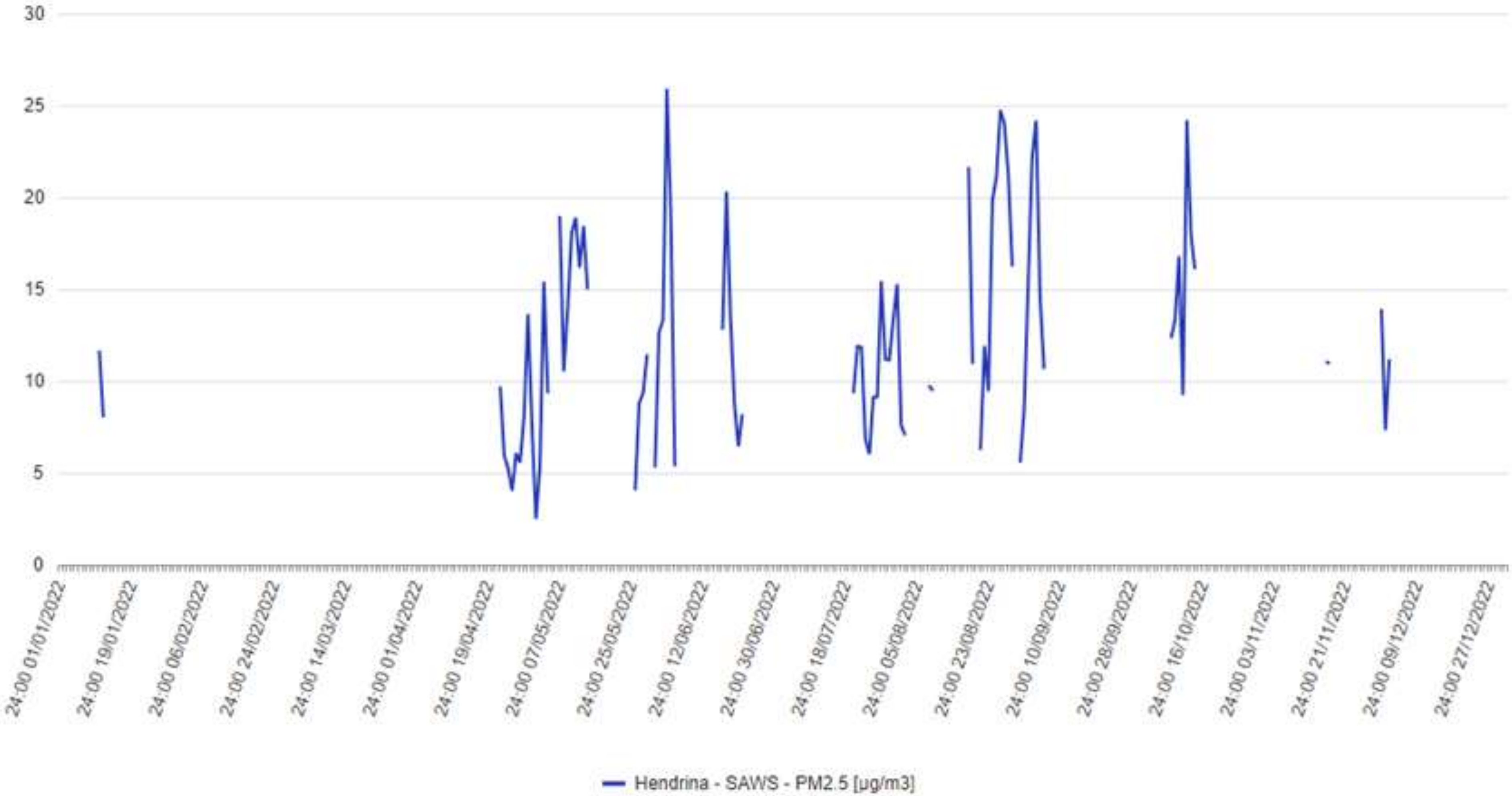


Figure 49: Hendrina Hourly Average $PM_{2.5}$ Concentration (SAAQIS, 2023)

8.9.2 Air Quality Sensitive Receptors

Receptors are sites/areas which may potentially be impacted by the process or activity. Twenty-three (23) Air Quality Sensitive Receptors (AQSR) were identified for the project. Sensitive receptors were selected on the basis of proximity to the project and mainly comprise of isolated farmsteads/residences, commercial establishments and industrial/mining processes up to a distance of 5 km from the mining operations. Refer to **Table 45** and **Figure 50**.

Table 45: Air Quality Sensitive Receptors

Label	Latitude	Longitude
AQSR1	26°03'35.63" S	29°58'34.54" E
AQSR2	26°04'46.42" S	30°01'41.75" E
AQSR3	26°05'23.94" S	30°03'18.75" E
AQSR4	26°06'42.18" S	30°04'04.46" E
AQSR5	26°09'28.84" S	30°00'28.42" E
AQSR6	26°09'00.26" S	29°57'55.85" E
AQSR7	26°09'54.36" S	29°55'25.68" E
AQSR8	26°08'44.11" S	29°55'22.20" E
AQSR9	26°06'13.35" S	29°53'52.65" E
AQSR10	26°03'46.24" S	29°52'26.77" E
AQSR11	26°02'27.83" S	29°54'00.68" E
AQSR12	26°04'49.73" S	29°58'00.85" E
AQSR13	26°05'19.59" S	29°58'17.68" E
AQSR14	26°05'38.13" S	29°58'16.53" E
AQSR15	26°04'44.12" S	29°59'01.89" E
AQSR16	26°05'49.89" S	30°01'21.66" E
AQSR17	26°06'16.56" S	30°01'17.07" E
AQSR18	26°06'59.86" S	29°59'57.72" E
AQSR19	26°06'30.39" S	29°59'01.99" E
AQSR20	26°06'28.33" S	29°57'36.18" E
AQSR21	26°08'21.26" S	29°57'56.91" E
AQSR22	26°04'36.14" S	29°56'34.51" E
AQSR23	26°04'47.67" S	29°54'16.65" E

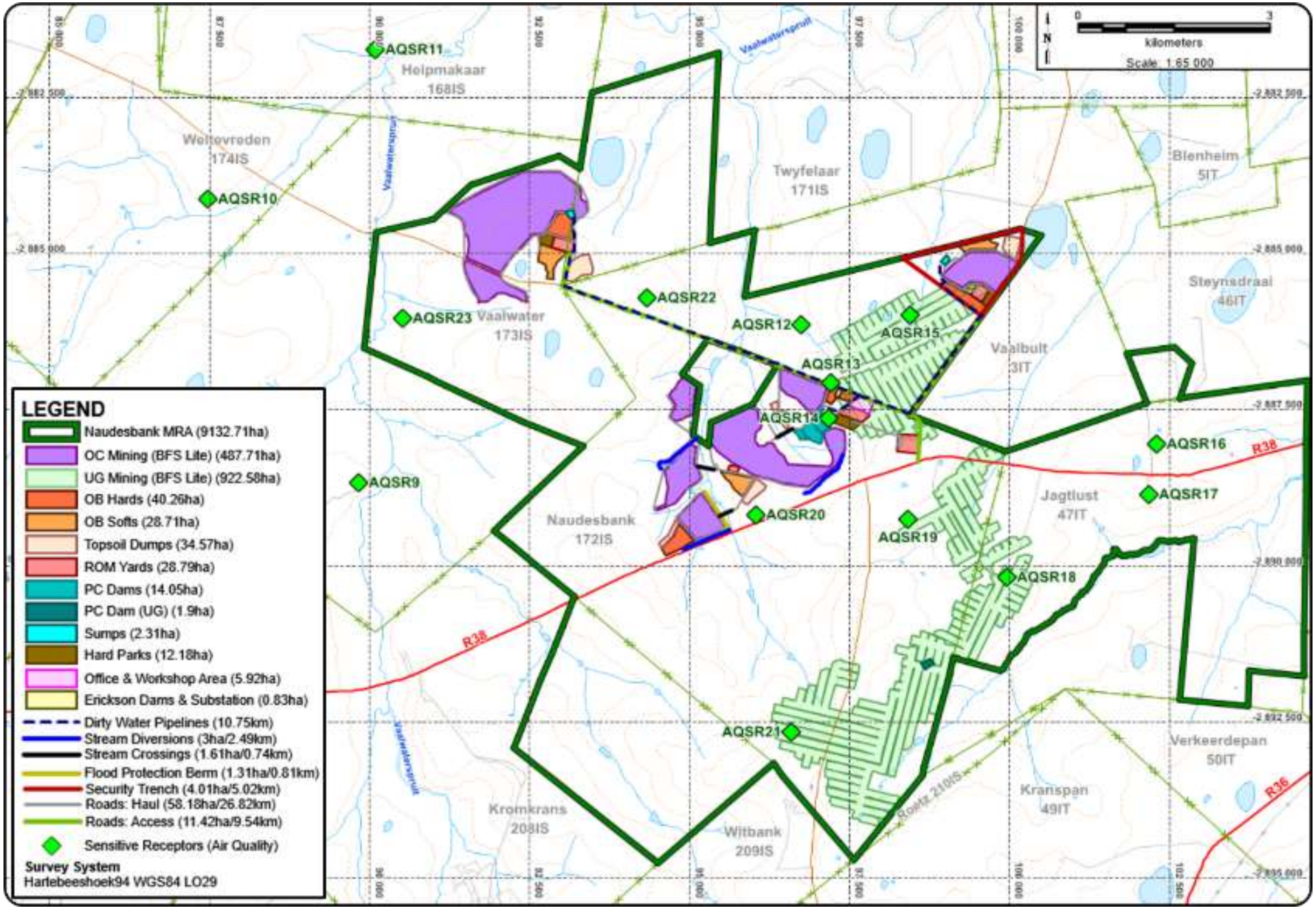


Figure 50: Air Quality Sensitive Receptors

8.10 Noise

The information is the section below was obtained from the Environmental Noise Impact Assessment undertaken by Enviro Acoustic Research (2023), refer to **Annexure 12**.

8.10.1 Baseline Noise Assessment

Ambient sound levels were measured from 19 – 21 January 2021 at two locations. Refer to **Figure 51** and **Table 46** for the measurement localities.

Table 46: Baseline Noise Sampling Localities

Description	Latitude	Longitude	Type
ZSNLTSL01	26° 06'26.93"S	29°57'37.12"E	Residential
ZSNLTSL02	26° 06'20.34"S	29°58'47.18"E	Residential
ZSNLTSL03	26° 04'53.12"S	29°54'16.71"E	Residential
ZSNLTSL04	26° 03'36.49"S	29°58'34.43"E	Residential

ZSNLTSL01:

The measurement location was deployed away from the main house, farm sheds, kraal area and significant vegetation. Though not audible during deployment and collection of instruments, there was an ESKOM transformer in the area that significantly influenced ambient noise levels (because ambient sound levels never dropped below 38.8 dBA).

Table 47: Noises/sounds heard during site visits at ZSNLTSL01

Magnitude Scale Code: 1. Barely Audible 2. Audible 3. Dominating	
During equipment deployment	
Faunal and natural	**Birds clearly audible and dominant.**
Sounds associated with the household	**Workers (voices and agricultural activities) working in area.**
Industrial & transportation	**Vehicles on the R38 during passing event (low number of vehicles).**
During equipment collection	
Faunal and natural	**Birds clearly audible and dominant.**
Sounds associated with the household	**Workers (voices and agricultural activities) working in area.**
Industrial & transportation	**Vehicles on the R38 during passing event (low number of vehicles).**

Table 48: Sound levels considering various sound level descriptors at ZSNLTSL01

Description	$L_{Amax,i}$ (dBA)	$L_{Aeq,i}$ (dBA)	$L_{Aeq,f}$ (dBA)	$L_{A90,f}$ (dBA90)	$L_{Amin,f}$ (dBA)
Day arithmetic average	-	[illegible]	46.2	42.7	-

Description	$L_{Amax,i}$ (dBA)	$L_{Aeq,i}$ (dBA)	$L_{Aeq,f}$ (dBA)	$L_{A90,f}$ (dBA90)	$L_{Amin,f}$ (dBA)
Night arithmetic average	-		42.6	40.5	-
Day equivalent	-		48.9	-	-
Night equivalent	-		43.5	-	-
Day minimum	-		40.7	-	39.0
Day maximum	89.5		63.0	-	-
Night minimum	-		39.3	-	38.8
Night maximum	73.7		50.0	-	-

ZSNLTSL02:

The microphone was deployed in an open area near a residential dwelling. There were a number of dogs in the area that would bark with movement, which would impact on measurements (likely the source of maximum noises) at times. There were various large trees located in the area that would increase ambient sound levels due to wind-induced noises.

Table 49: Noises/sounds heard during site visits at ZSNLTSL02

Magnitude Scale Code: 1. Barely Audible 2. Audible 3. Dominating	
During equipment deployment	
Faunal and natural	**Chicken and geese noises audible to significant at times. Birds audible during quieter periods.**
Sounds associated with the household	**Dogs barking significant during barking event. Some wind-induced noises audible at times with wind gusts.**
Industrial & transportation	**Vehicle noises from the R38 audible during passing.**
During equipment collection	
Faunal and natural	**Chicken and geese noises audible to significant at times. Birds audible during quieter periods.**
Sounds associated with the household	**Dogs barking significant during barking event (less barking than during the deployment of instrument).**
Industrial & transportation	**Vehicle noises from the R38 audible during passing.**

Table 50: Sound levels considering various sound level descriptors at ZSNLTSL02

Description	$L_{Amax,i}$ (dBA)	$L_{Aeq,i}$ (dBA)	$L_{Aeq,f}$ (dBA)	$L_{A90,f}$ (dBA90)	$L_{Amin,f}$ (dBA)
Day arithmetic average	-	53.5	49.6	42.2	-
Night arithmetic average	-	46.6	43.4	35.3	-
Day equivalent	-	62.5	54.0	-	-
Night equivalent	-	52.3	47.1	-	-
Day minimum	-	45.3	42.1	-	31.0
Day maximum	92.2	80.4	71.8	-	-
Night minimum	-	33.6	30.5	-	21.5
Night maximum	81.4	65.2	60.1	-	-

ZSNLTSL03:

The instrument was deployed at the gate to the farmyard, in a relatively open area. There were a number of significant trees within 50 m from the microphone which did increase wind-induced noises during higher wind speeds.

Table 51: Noises/sounds heard during site visits at ZSNLTSL03

Magnitude Scale Code: 1. Barely Audible 2. Audible 3. Dominating	
During equipment deployment	
Faunal and natural	**Sounds from birds dominant and significant.**
Sounds associated with the household	-
Industrial & transportation	-
During equipment collection	
Faunal and natural	**Bird noises audible and generally dominant. Wind-induced noises audible to significant at times.**
Sounds associated with the household	-
Industrial & transportation	-

Table 52: Sound levels considering various sound level descriptors at ZSNLTSL03

Description	$L_{Amax,i}$ (dBA)	$L_{Aeq,i}$ (dBA)	$L_{Aeq,f}$ (dBA)	$L_{A90,f}$ (dBA90)	$L_{Amin,f}$ (dBA)
Day arithmetic average	-	51.7	48.4	40.0	-
Night arithmetic average	-	41.8	36.0	27.9	-
Day equivalent	-	63.1	55.8	-	-
Night equivalent	-	45.5	39.4	-	-
Day minimum	-	38.9	35.6	-	25.6
Day maximum	95.5	76.3	67.2	-	-
Night minimum	-	30.8	26.0	-	19.5
Night maximum	68.1	57.0	49.4	-	-

ZSNLTSL04:

The instrument was deployed at the gate to the farmyard, in a relatively open area. There were a number of significant trees within 50 m from the microphone which did increase wind-induced noises during higher wind speeds.

Table 53: Noises/sounds heard during site visits at ZSNLTSL04

Magnitude Scale Code: 1. Barely Audible 2. Audible 3. Dominating	
During equipment deployment	
Faunal and natural	**Noises from birds were dominating. Some wind-induced**

Magnitude Scale Code: 1. Barely Audible 2. Audible 3. Dominating	
	noises at times.
Sounds associated with the household	Voices of children playing in the area. Barking of dogs at times.
Industrial & transportation	-
During equipment collection	
Faunal and natural	Noises from birds were dominating.
Sounds associated with the household	-
Industrial & transportation	A number of agricultural equipment operating in the area (forklift loading tractor near sheds).

Table 54: Sound levels considering various sound level descriptors at ZSNLTSL04

Description	$L_{Amax,i}$ (dBA)	$L_{Aeq,i}$ (dBA)	$L_{Aeq,f}$ (dBA)	$L_{A90,f}$ (dBA90)	$L_{Amin,f}$ (dBA)
Day arithmetic average	-	49.8	44.5	36.0	-
Night arithmetic average	-	42.4	39.1	34.9	-
Day equivalent	-	53.9	46.5	-	-
Night equivalent	-	46.8	41.6	-	-
Day minimum	-	38.1	36.5	-	25.6
Day maximum	90.4	65.7	55.8	-	-
Night minimum	-	37.9	34.8	-	25.8
Night maximum	84.3	59.9	52.0	-	-

Summary:

Excluding the data collected at ZSNLTSL01 (due to the ESKOM transformer potentially impacting on the measurements), considering the average fast-weighted sound level data collected in the area:

- Average daytime fast-weighted sound levels ranged from 35.6 to more than 70 dBA, with average sound levels being 47.5 dBA. This is typical of a rural to sub-urban noise district, setting a zone sound level of 50 dBA for the daytime period; and
- Average night-time fast-weighted sound levels ranged from 26.0 to just more than 60 dBA, with average sound levels being 39.5 dBA. This is typical of a sub-urban noise district, setting a zone sound level of 40 dBA for the night-time period.

Considering the requirements of the NCR, activities relating to the proposed project should not change the existing ambient sound levels with more than 7 dBA, nor exceed the WHO and IFC noise limits. Upper noise limits therefore would be:

- 55 dBA (as recommended by the WHO and IFC) for daytime residential use; and

- 45 dBA (as recommended by the WHO and IFC) for night-time residential use.

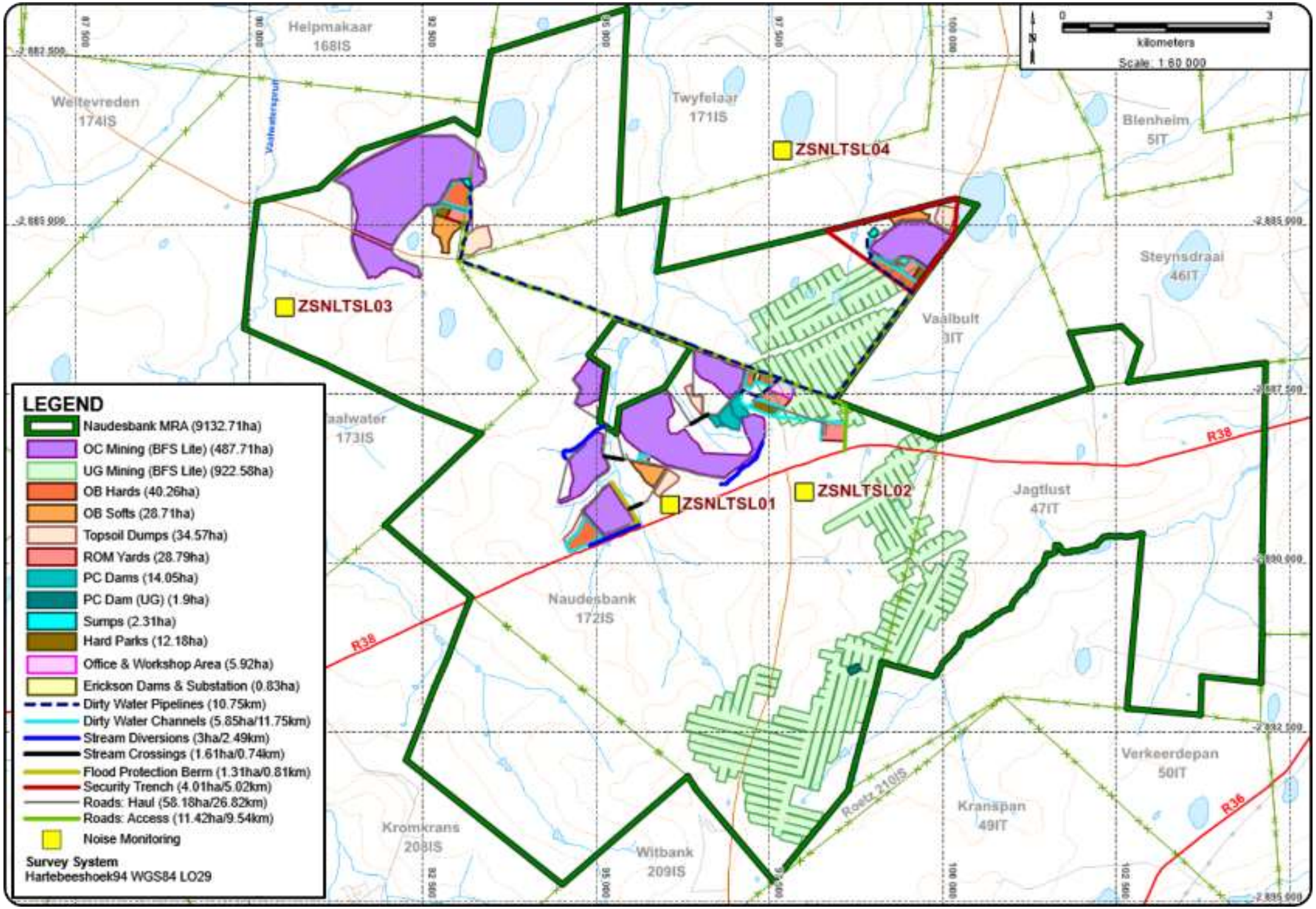


Figure 51: Ambient Noise Sampling Localities

8.10.2 Noise Senstive Receptors

Twenty Noise Sensitive Receptors (NSR) were identified for the project. Refer to **Table 55** and **Figure 52**.

Table 55: Noise Sensitive Receptors

Description	Latitude	Longitude	Type
NSR01	26°03'59.04" S	29°55'51.92" E	Residential
NSR02	26°03'56.52" S	29°55'54.55" E	Residential
NSR03	26°04'39.00" S	29°56'37.97" E	Residential
NSR04	26°05'03.12" S	29°56'40.96" E	Residential
NSR05	26°06'29.16" S	29°57'36.43" E	Residential
NSR06	26°06'16.56" S	29°57'42.41" E	Residential
NSR07	26°05'38.04" S	29°58'17.40" E	Residential
NSR08	26°05'31.20" S	29°58'24.78" E	Residential
NSR09	26°05'18.96" S	29°58'18.34" E	Residential
NSR10	26°05'16.44" S	29°58'11.28" E	Residential
NSR11	26°06'16.56" S	29°59'17.99" E	Residential
NSR12	26°03'34.92" S	29°58'33.71" E	Residential
NSR13	26°04'49.44" S	29°58'00.52" E	Residential
NSR14	26°04'40.44" S	29°58'59.84" E	Residential
NSR15	26°04'43.32" S	29°59'02.58" E	Residential
NSR16	26°04'44.76" S	29°59'00.74" E	Residential
NSR17	26°03'35.64" S	30°00'13.82" E	Residential
NSR18	26°03'32.04" S	30°00'10.55" E	Residential
NSR19	26°06'19.08" S	29°58'46.78" E	Residential
NSR20	26°03'33.48" S	29°54'31.64" E	Residential

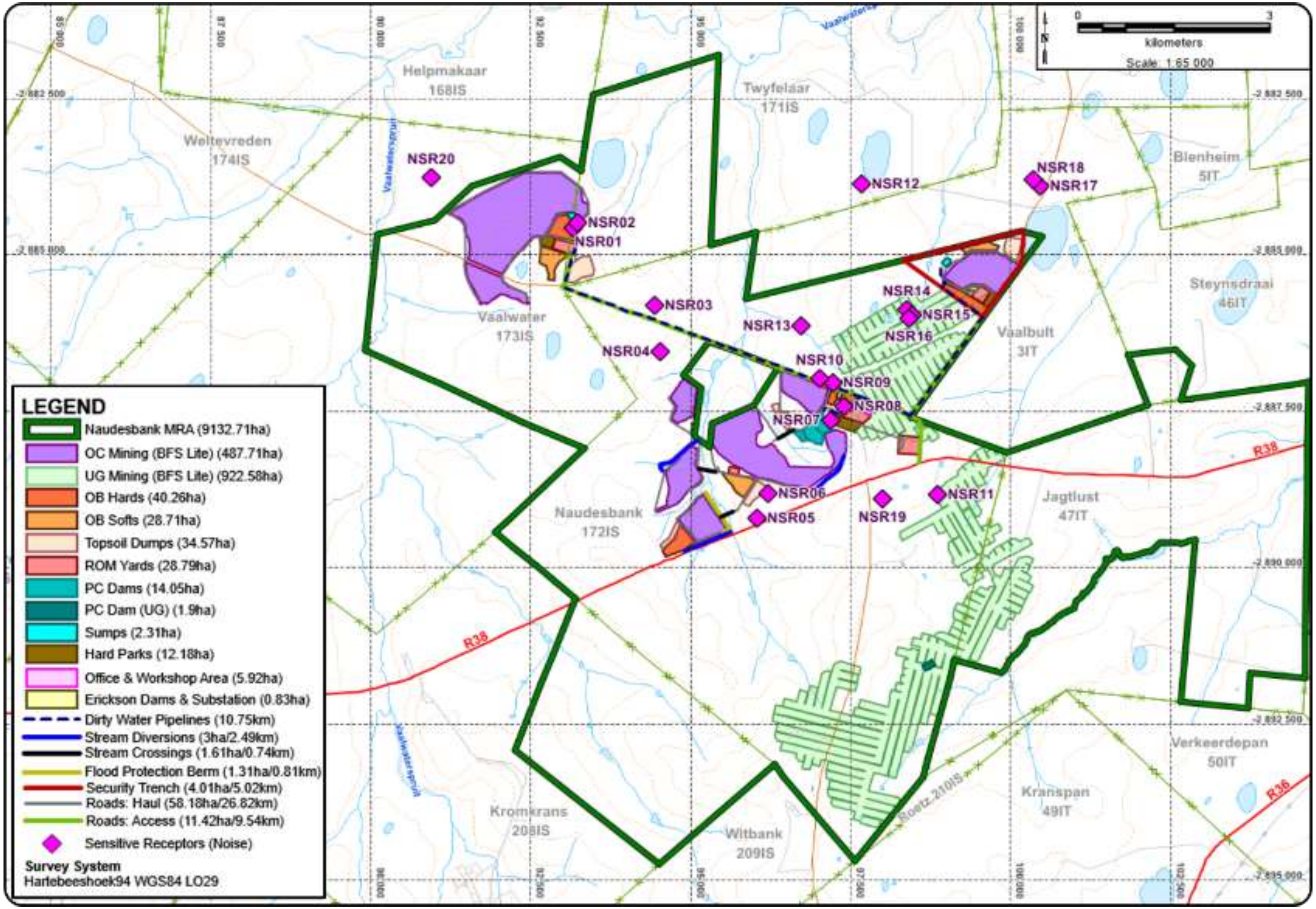


Figure 52: Noise Sensitive Receptors

8.11 Sites of Archaeological and Cultural Interest

A Heritage Impact Assessment was undertaken by A. Pelser Archaeological Consulting (APAC, 2023), refer to **Annexure 13**.

Nineteen sites of recent historical origin/graves were identified and recorded in the study area during the assessment. Refer to **Table 56** and **Figure 53**.

Table 56: Historical Sites

Site	Description	Coordinates
Stone Age Material Site 1	Individual tools and small scatters of MSA/LSA stone tools were identified. It is possible that more finds could be located in the area, but that they are not visible due to being covered by soils or grass cover. The finds are however not deemed as significant from an archaeological point of view as the scatters are of low density and not in any stratified deposits. If any more are to be identified in the larger area it is envisaged that it would also be in the form of either single or low-density scatters of material. No mitigation measures are required for the Stone Age sites and finds.	26°04'04.50" S 29°54'00.10" E
Stone Age Material Site 2		26°05'16.40" S 29°58'01.90" E
Site FS1	Old farmstead and related infrastructure. Some of the structures and foundations could be older than 60 years of age, and although in a largely dilapidated state should be assessed by an Architectural Historian to determine its cultural heritage significance and recommend on the way forward should the site be directly and negatively impacted by the proposed mining development.	26°04'39.65" S 29°56'37.79" E
Site FS2	Old sandstone homestead/farming-related structure. The structure is typical of the late 19th/early 20th century sandstone-built homesteads in the Highveld of the old Eastern Transvaal and is therefore fairly significant from a Cultural Heritage point of view. It is recommended that an Architectural Historian undertake a detailed assessment of it should it be impacted by the mining development, and before it is either earmarked for demolition, re-purposing or alteration.	26°07'00.64" S 29°58'28.41" E
Site FS3	An old sandstone enclosure and the remains of an old sandstone-built farmstead that probably originally dated to the late 19th/early 20th century. It had been altered and changed over the years as evident from the assessment, and as a result a large section could be less than 60 years of age, diminishing its cultural heritage significance. The structure is in a bad state of preservation, with it being largely vandalized for its roof sheeting, doors and window frames. What remains of the structure is largely foundations and some sections of walling. From this point of view its heritage significance is seen as Low and no further mitigation is required.	26°03'56.30" S 29°55'55.92" E
Site FS4	Consists of a number of structural remains and also dwellings used by former farm workers on Twyfelaar. The structures are most likely less than 60 years of age and of Low Heritage Significance. Care should be taken if these are to be demolished should the proposed mining activities impact on the site, as there is always the possibility of unmarked burials (of still-born infants or young children) in or close to the houses.	26°03'59.02" S 29°55'52.03" E
Site FS5	Various structures and farming-related infrastructure, including the homestead. The homestead and related structures are mostly modern brick constructions, and seemingly less than 60 years of age. The cultural heritage significance of the site is deemed as Low.	26°05'19.60" S 29°58'17.11" E
Site FS6	A number of farming-related structures and homestead. Many of the structures (including the homestead) are fairly modern brick constructions, although there are some earlier (early to mid-20th century) structures that have been altered and changed over the years. Although this diminishes their heritage significance, it is however recommended that should the proposed mining	26°05'37.78" S 29°58'16.19" E

Site	Description	Coordinates
	development negatively impact on this site and it needs to be demolished, that an Architectural Historian conduct a more detailed assessment.	
Site FS7	A number of farming-related structures including homestead. Access to the farmstead could not be obtained during the assessment. Although many of the related structures are more modern constructions, there is some (including the original homestead) that are older than 60 years of age. The homestead seems to have been originally constructed of the typical sandstone – reminiscent of the late 19th/early 20th century homesteads on the Highveld. As such its significance is fairly High from a cultural heritage perspective, and being in a good state of preservation it should be preserved if possible. If the proposed mining development is going to impact negatively on it, then it is again recommended that an Architectural Historical conduct a detailed assessment to determine its significance and the way forward before it is demolished or re-purposed.	26°06'26.93" S 29°57'33.70" E
Site FS8	Another farmstead that consists of a homestead and other related farming-related structures. Could be older than 60 years of age and of some heritage significance. If the proposed mining development is going to impact negatively on it, then it is again recommended that an Architectural Historian conduct a detailed assessment to determine its significance and the way forward before it is demolished or re-purposed.	26°06'18.31" S 29°58'46.27" E
Site FS9	A single structure (homestead). It is of sandstone and likely dates to between the late 19th and mid-20th centuries. Although it is fairly overgrown and abandoned, it is in a fair state of preservation. It is recommended that the structure be assessed in detail by an Architectural Historian should the proposed mining development negatively impact on it and it needs to be demolished as a result.	26°05'56.37" S 29°58'34.16" E
Site FWD1	Farm Workers Dwellings. It is mud/clay brick, cement and brick-built structures and more than likely younger than 60 years of age. A such its cultural heritage significance is Low, but as with the other Farm Worker Dwellings the possibility of the close proximity of burials should be kept in mind if the possibility exists that these structures have to be demolished as a result of the impact of proposed mining activities.	26°05'16.56" S 29°58'11.33" E
Site FWD2	A number of farmworker dwellings. More than likely less than 60 years of age and not of any cultural heritage significance, except for the possibility of unmarked burials located in close proximity.	26°05'31.70" S 29°58'25.80" E
Site FWD3	Farm workers settlement. Access to the site could not be gained during the June assessment, but it is assumed that it is similar in nature to the other farm worker settlements and the related dwellings in the study area. Again, if the mining development are to negatively impact on the site, then the possibility of unmarked burials in and close to the dwellings should be kept in mind.	26°06'16.78" S 29°57'43.22" E
Site C1*	Consists of around 8 graves, most of which are stone-packed without headstones.	26°03'34.80" S 29°55'59.50" E
Site C2*	Contains 3 graves.	26°04'02.50" S

Site	Description	Coordinates
		29°55'54.60" E
Site C3*	A fairly large informal cemetery containing more than 30 graves. The site is located in a Bluegum grove, and is fairly overgrown making recording and identifying all the graves at the site difficult. There could therefore be more unrecorded graves here. Most of the graves are stone-packed with no headstones, while there are some graves demarcated with cement and bricks. A few have metal name plaques at their heads, but none had any legible inscriptions. These graves are seen as older than 60 years of age until proven otherwise.	26°04'34.80" S 29°55'18.50" E
Site C4*	An informal cemetery located close to an informal farmworker settlement (FWD2) in the area. The site contains approximately 30 graves, with most of them stone-packed without formal headstones.	26°05'26.10" S 29°58'22.00" E
Site C5*	Contains at least 20 graves. Most of the graves here are stone-packed with no headstones, while one contains a granite headstone (it had fallen over and could not be lifted to read the inscription).	26°05'41.90" S 29°58'18.50" E

* Graves always carry a High Rating from a Cultural Heritage point of view, and care should be taken to avoid negatively impacting on them through any development actions. If possible grave sites and the graves on them should be left intact and protected. However, if this is not possible then the graves can be exhumed and relocated after all due processes had been followed.

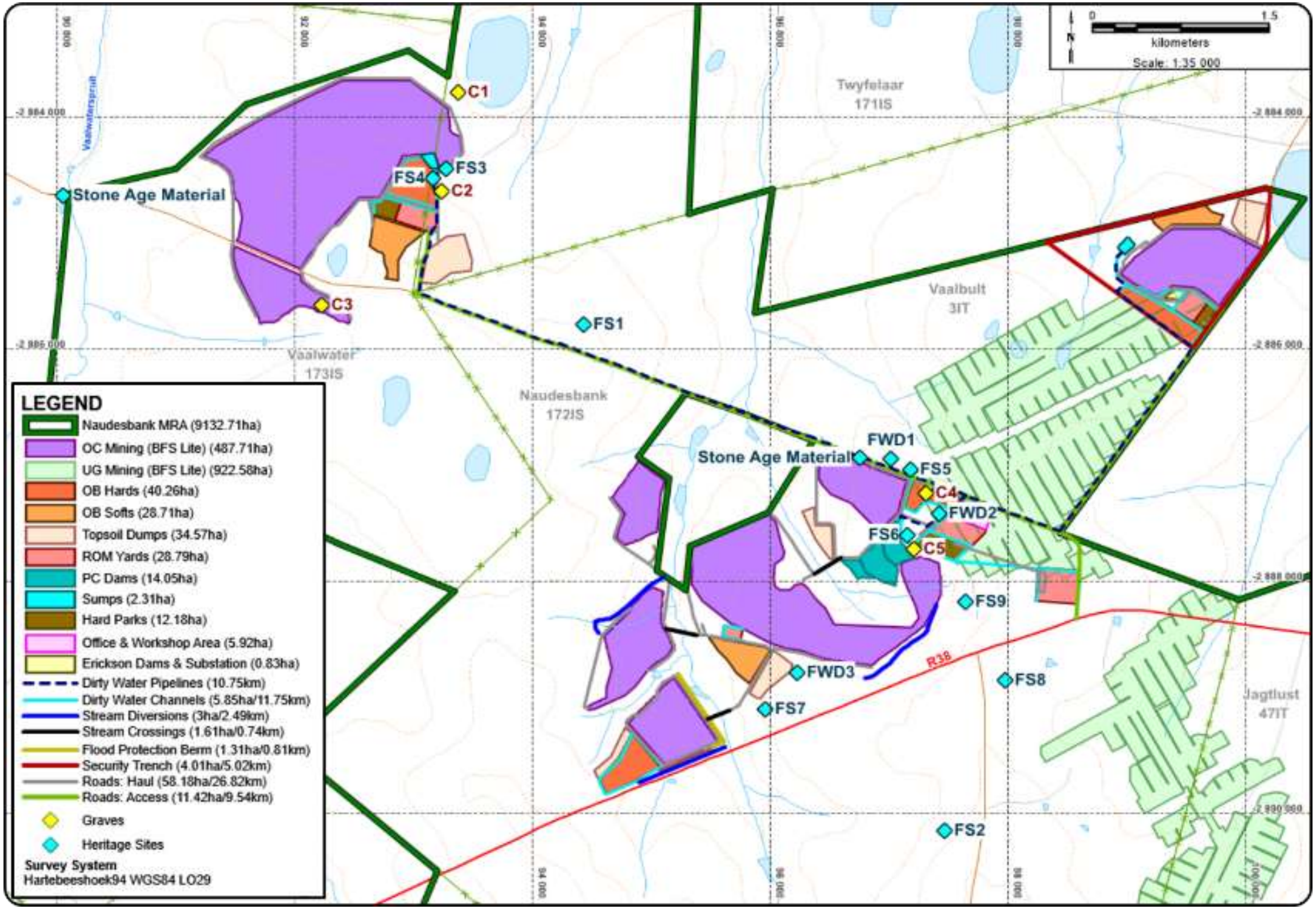


Figure 53: Historical Sites and Graves

8.12 Palaeontology

A Phase 1 Palaeontological Impact Assessment was undertaken by Dr. H Fourie (2023), refer to **Annexure 14**. The area is large and fully accessible as several roads are present. Vegetation, trees, crops, roads and fences are present. All areas could be viewed, but very few rocks or outcrops (mostly in the north) are present. Isolated sandstone outcrops were mainly identified. Fossils were not located.

8.13 Traffic

A Traffic Impact Assessment was conducted by AvzconS Transportation and Civil Engineers and Project Managers (2023), refer to **Annexure 15**. Only the roads expected to be directly impacted are included in **Table 57** (Roads to be used for both trucking and assumed daily commuting routes for employees/contractors).

Table 57: Current Traffic Information

Road Name	Description	Average Annual Daily Traffic Volume plus % Heavy Vehicles
R38	Under the jurisdiction of SANRAL, is a major road, running east-west between Carolina and Bethal, through the central section of the Naudesbank MRA.	1 937 (21%)
Road D1252+10	Provincial gravel road providing access to all the opencast sections planned at Naudesbank.	181 (14%)
Road D983+10 (North)	Provincial gravel road providing access to the planned opencast section on the Farm Vaalbult.	476 (58%)
Road D983+10 (South)	Provincial gravel road predominantly located towards the planned underground section south of the R38.	52 (7%)

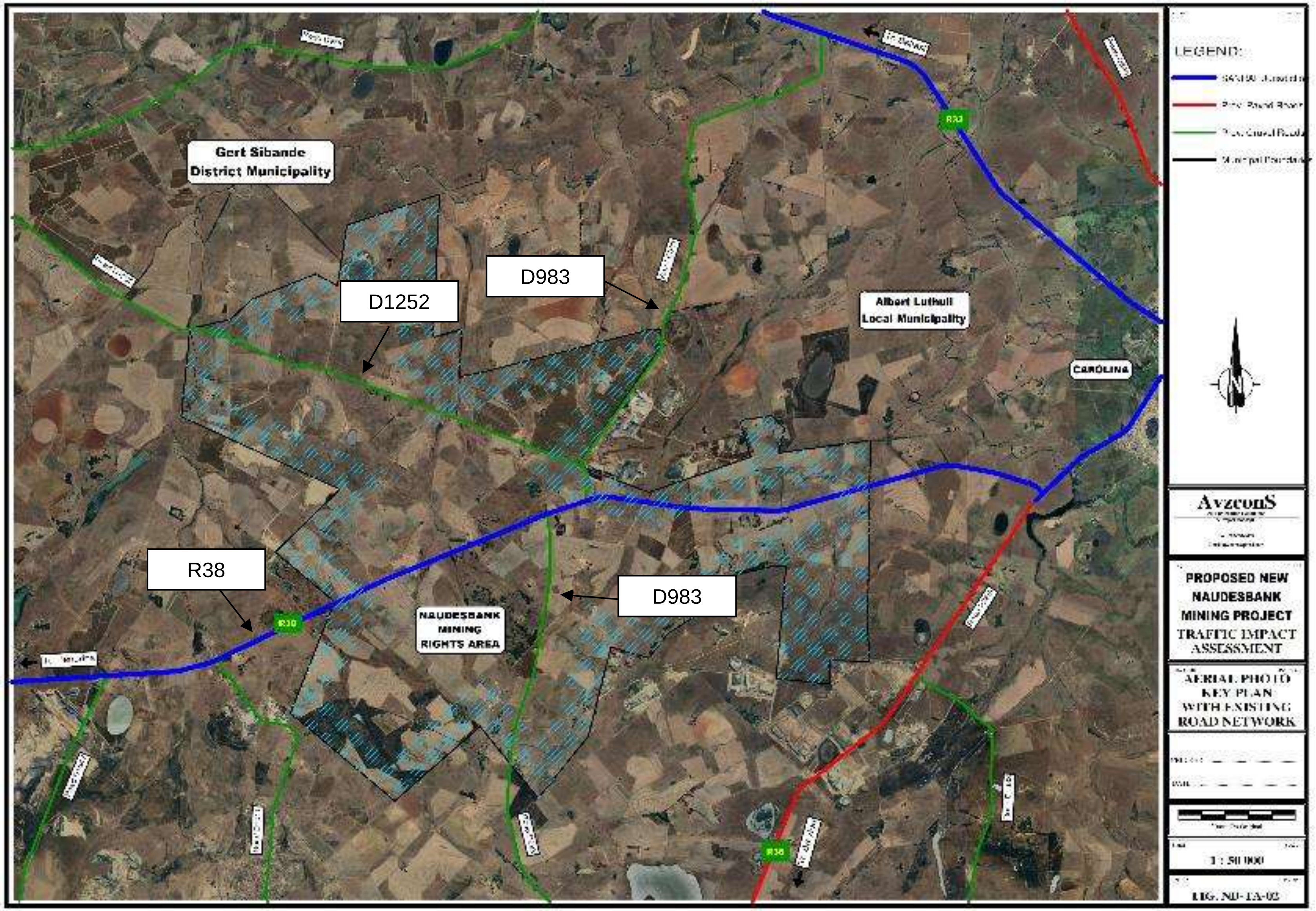


Figure 54: Roads (Refer to Annexure 15 for A3 Map)

8.14 Socio-economic Conditions

The following information was obtained from the CALLM Integrated Development Plan (IDP, 2023) and the Provincial profile: Mpumalanga Community Survey 2016 Plan Report 03-01-13 (StatsSA, 2018).

Table 58: CALLM Socio-economic Indicators

Demographic Indicators	**2016**
Total population	187 629
Number of households	53 480
Growth rate	0.2%
Average household size	3.5
Age Group (0-14)	34.1%
Age Group (15 - 34)	38.0%
Age Group (35 – 64)	22.3%
Age Group (65+)	5.7%
Black African	98.7%
Coloured	0.3%
Indian/Asian	0.2%
White	0.7%
Education Indicators	**2016**
No Schooling	15.8%
Some Primary Schooling	11.3%
Completed Primary Schooling	3.8%
Some Secondary Schooling	30.7%
Completed Secondary Schooling	32.4%
Higher Education	5.9%
Labour Indicators	**2020**
Expanded Unemployment Rate	43.6%
Expanded Youth Unemployment Rate	58.4%
Industries Percentage Contribution to Employment	Agriculture – 8.6% Mining – 7.0% Manufacturing – 13.0% Utilities – 1.6% Construction – 7.2% Trade – 24.7% Transport – 5.1% Finance – 10.2% Community Services – 16.3% Private Households – 6.2%

9 ENVIRONMENTAL IMPACT ASSESSMENT

9.1 Impact Assessment Method

The potential impacts of the Naudesbank Project on the environment was assessed in terms a formalised method. A typical risk assessment process was undertaken where the significance of the impacts was determined. Once the significance of the impacts was known it was then re-evaluated taking cognisance of the proposed mitigation/management measures. This enabled an understanding of the overall impact after the implementation of mitigation/management measures. The process that was undertaken is described in the section below.

According to the NEMA Regulations, *"significant impact means an impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment"*. In line with the Regulations, and based on the qualitative findings of the activities undertaken, each potentially significant impact has been assessed with regard to:

- the nature and status of the impact;
- the extent and duration of the impact;
- the probability of the impact occurring;
- the effect of significance on decision-makings;
- the weight of significance; and
- the mitigation efficiency.

9.2 Impact Significance

Nature and Status

The "nature" of the impact describes what is being affected and how. The "status" is based on whether the impact is positive (P), negative (N) or neutral (NT).

Spatial Extent

"Spatial Extent" defines the spatial or geographical scale of the impact.

Category	Rate	Descriptor
Site	1	Site of the proposed development
Local	2	Beyond immediate boundary.
Regional	3	Provincial region.
National	4	South Africa.
International	5	Beyond the boundaries of South Africa.

Duration

"Duration" gives the temporal scale of the impact.

Category	Rate	Descriptor
Temporary	1	Construction phase / 0-1 years
Short Term	2	1 – 5 years
Medium Term	3	5 – 15 years
Long Term	4	Where the impact will cease after the operational life of the activity either because of natural process or by human intervention
Permanent	5	Where mitigation either by natural processes or by human intervention will not occur in such a way or in such a time span that the impact can be considered as transient

Probability

The "probability" describes the likelihood of the impact actually occurring.

Category	Rate	Descriptor
Unlikely	1	Where the impact may occur in exceptional circumstances only.
Low	2	Where the possibility of the impact materialising is low.
Probable	3	Where there is a distinct possibility that the impact will occur.
Highly Probable	4	Where it is most likely that the impact will occur.
Definite	5	Where the impact will occur regardless of any prevention measures.

Magnitude

"Intensity" defines whether the impact is destructive or benign, in other words the level of impact on the environment.

Category	Rate	Descriptor
Low	1	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected. Localised impact and a small percentage of the population is affected.
Low to Moderate	2	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are affected to a limited extent.
Moderate	3	Where the affected environment is altered in terms of natural, cultural and social functions and processes continue albeit in a modified way.
High	4	Where natural, cultural or social functions or processes are altered to the extent that they will temporarily or permanently cease.
Very High	5	Where natural, cultural or social functions or processes are altered to the extent that they will permanently cease.

Reversibility

"Reversibility" defines whether the environment/aspect affected can be restored or recovered after activity has resulted in the impact.

Category	Rate	Descriptor
Very High	1	Intensity of the impact is low and the receiving environment has the capacity, resources and mechanisms to mitigate or optimize the impact.
High	2	Intensity of the impact is low to moderate and the receiving environment has the capacity, resources and mechanisms to mitigate or optimize the impact.
Moderate	3	Impact is moderate, and the receiving environment has some mechanisms to mitigate or optimize the impact, as well as resources that can be called upon.
Moderate to Low	4	Potential for mitigation/optimisation is limited because of the severity of the impact and a lack of capacity/resources and coping mechanisms in the receiving environment.
Low	5	Potential for mitigation/optimisation is highly / severely limited because of the severity of the impact and a lack of capacity/resources and coping mechanisms in the receiving environment.

Impact significance without mitigation (WOM)

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned weightings, resulting in a value for each impact (prior to the implementation of mitigation measures).

Equation 1:

Consequence = Extent + Duration + Magnitude + Reversibility

Equation 2:

Impact Significance = Probability x Consequence

Effect of significance on decision-makings

Significance is determined through a synthesis of impact characteristics as described in the above paragraphs. It provides an indication of the importance of the impact in terms of both tangible and intangible characteristics. The significance of the impact "without mitigation" is the prime determinant of the nature and degree of mitigation required.

Rating	Rate	Descriptor
Negligible	0	The impact is non-existent or insignificant, is of no or little importance to decision making.
Very Low	1-19	The impact is limited in extent, even if the intensity is major; the probability of occurrence is low, and the impact will not have a significant influence on decision making and is unlikely to require management intervention bearing significant costs.
Low	20 – 38	The impact is of importance. However, through the implementation of the correct mitigation measures such potential impacts can be reduced to acceptable levels. The impact and proposed mitigation measures can be considered in the decision-making process
Moderate	39 – 59	The impact is significant to one or more affected stakeholders, and its intensity will be medium or high; but can be avoided or mitigated and therefore reduced to acceptable levels. The impact and mitigation proposed should have an influence on the decision.
High	60 -79	The impact is of major importance but through the implementation of the correct mitigation measures, the negative impacts will be reduced to acceptable levels.
Very High	≥ 80	The impact could render development options controversial or the entire project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor and must influence decision-making.
Positive	-	Impact has a positive effect.

Mitigation

“Mitigation” is a broad term that covers all components of the "mitigation hierarchy" defined hereunder. It involves selecting and implementing measures, amongst others, to conserve biodiversity and to protect the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of mining or any other land use. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level. Offsetting of impacts is considered to be the last option in the mitigation hierarchy for any project.

The mitigation hierarchy in general consists of the following in order of which impacts should be mitigated:

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the “no project” option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels.
- **Minimise (reduce) impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and eco-services provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate (restore) impact:** is applicable to areas where impact avoidance and minimisation are unavoidable; where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use is needed, for example arable land. Rehabilitation can however not be considered as the primary mitigation toll, as even with significant resources and effort, rehabilitation usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:
    - *Structural rehabilitation*, which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long term sustainable ecological structure;
    - *Functional rehabilitation*, which focuses on ensuring that the ecological functionality of the ecological resources on the subject property supports the intended post closure

land use. In this regard special mention is made of the need to ensure the continued functioning and integrity of wetland and riverine areas throughout and after the rehabilitation phase;

- *Biodiversity reinstatement*, which focuses on ensuring that a reasonable level of biodiversity, that supports the local post-closure land uses, is re-instated. In this regard special mention is made of re-instating vegetation to levels which will allow the natural climax vegetation community to be suitable for supporting the intended post closure land use;
- *Species reinstatement* which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species re-instatement need only occur if deemed necessary;

- **Offset impact:** refers to compensating for latent or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets are considered to be a last resort to compensate for residual negative impacts on biodiversity.

According to the DMR (2013), "Closure" refers to the process for ensuring that mining operations are closed in an environmentally responsible manner, usually with the dual objectives of ensuring sustainable post-mining land uses and remedying negative impacts on biodiversity and ecosystem services.

The significance of *residual impacts* should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity, the residual impacts are considered to be of very high significance and when residual impacts are considered to be of very high significance, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have medium to high significance, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.

Impact significance with mitigation (WM) measures

In order to gain a comprehensive understanding of the overall significance of the impact after implementation of the mitigation measures, it is necessary to re-evaluate the impact.

Mitigation Efficiency (ME)

The most effective means of deriving a quantitative value of mitigated impacts is to assign each significance rating value without mitigation (WOM) a mitigation effectiveness (ME) rating. The allocation of such a rating is a measure of the efficiency and effectiveness, as identified through professional experience and empirical evidence of how effectively the proposed mitigation measures will manage the impact. Thus, the lower the assigned value the greater the effectiveness of the proposed mitigation measures and subsequently, the lower the impacts with mitigation.

Equation 2:

Significance Rating (WM) = Significance Rating (WOM) x Mitigation Efficiency (ME)

Mitigation Efficiency is rated out of 1 as follows:

Category	Rate	Descriptor
Very Low	1	Mitigation cannot make a difference to the impact
Low	0.8	Mitigation will minimize impact slightly
Moderate	0.6	Mitigation will minimize impact to such an extent that it becomes within acceptable standards
High	0.4	Mitigation will minimize impact to such an extent that it is below the maximum acceptable standards
Very High	0.2	Mitigation will minimize impact to such an extent that it becomes insignificant

It is important to note that, for positive impacts, the Mitigation Efficiency will change to be greater than 1. E.g. if the Mitigation Efficiency for a positive impact is Medium, the rate used will be 1.6 instead of 0.6 to indicate that the proposed measures will result in an even higher positive impact.

Summary of the significance rating methodology

Extent	Duration	Magnitude	Probability	Reversibility	Significance Rating (SR - WOM) Pre-mitigation	Mitigation Efficiency (ME)	Significance Rating (SR-WM) Post Mitigation
Site (1)	Temporary (1)	Low (1)	Unlikely (1)	Very High (1)	Very Low (0 – 19)	Very High (0.2)	Very Low (0 – 19)
Local (2)	Short Term (2)	Low to Moderate (2)	Low (2)	High (2)	Low (20 – 38)	High (0.4)	Low (20 – 39)
Regional (3)	Medium Term (3)	Moderate (3)	Probable (3)	Moderate (3)	Moderate (39 – 59)	Moderate (0.6)	Moderate (40 – 59)

Extent	Duration	Magnitude	Probability	Reversibility	Significance Rating (SR - WOM) Pre-mitigation	Mitigation Efficiency (ME)	Significance Rating (SR-WM) Post Mitigation
National (4)	Long Term (4)	High (4)	Highly Probable (4)	Moderate to Low (4)	High (60 – 79)	Low (0.8)	High (60 – 79)
International (5)	Permanent (5)	Very High (5)	Definite (5)	Low (5)	Very High (≥ 80)	Very Low (1.0)	Very High (≥ 80)

9.3 Water Balance

It will be noted that the inflow of groundwater into the opencast areas are substantial, as shown in **Table 59**. The critical years are 2027, 2029 and 2030. The water balances shown in **Table 61** and **Table 62** are for the year 2030. Surplus water can be present during those years, and it will be managed by storing 357 664 m^3 in VB-01 (storing capacity is 1.61 million m^3) and 786 002 m^3 in the Northern Underground (storing capacity is 4.26 million m^3).

Table 59: Groundwater inflow volumes into each mining area (m^3/day)

Year	VW1,VW1 Ext, TW1	NB1	NB2	NB3, NB3 Ext	NB4	NB5	VB1
2025				532			893
2026				934			1 241
2027		40		1 231			1 573
2028		430	50	1 481			
2029		433	1 081	1 919			
2030			1 085	2 059	774	400	
2031	560				907	444	
2032	1 353						
2033	1 113						
2034	1 476						
2035	1 585						

The typical inflows into the underground workings are shown in **Table 60**.

Table 60: Underground water-make for typical rainfall season

Year	Northern-UG (m^3/a)	Northern-UG (m^3/day)	Southern-UG (m^3/a)	Southern-UG (m^3/day)
2026			6 072	17
2027	35 094	96	27 083	74
2028	64 798	178	41 253	113
2029	82 592	226	48 102	132
2030	120 267	329	59 455	163
2031	150 450	412	59 195	162
2032	164 408	450	69 386	190
2033	186 247	510	80 345	220
2034	185 450	508	81 090	222
2035			81 791	224
2036			92 567	254
2037			100 109	274
2038			103 913	285

Year	Northern-UG (m^3/a)	Northern-UG (m^3/day)	Southern-UG (m^3/a)	Southern-UG (m^3/day)
2039			113 134	310
2040			114 384	313
2041			118 698	325
2042			120 636	331
2043			125 368	343
2044			129 675	355
2045			128 891	353
2046			130 621	358
2047			129 540	355
2048			129 727	355
2049			129 820	356
Total	**989 306**		**2 214 783**	

Provision is made for a PCD with a capacity of 32 000 m^3 but there is storage capacity of 4.26 million m^3 and 7.53 million m^3 at the Northern Underground and the Southern Underground respectively. There will be no need to dewater to surface, but if required provision was made for that. Note that the water will be used for underground machines, an amount of 350 m^3 per day will be required for each of the underground areas.

Table 61: Daily water balance

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	**Quantity (m^3/day)**	**Water Circuit/stream**	**Quantity (m^3/day)**	
PCD (270 000 m^3)	Runoff from OB dumps	119,39	Evaporation	539,67	
	Water from sewage treatment plant	6,00	Mechanical evaporation	854,85	
	Water from OC pits	4 711,20	Dust suppression haul roads	2 400,00	
	Direct rain water	275,61	Dust suppression access road	685,20	
	Runoff from ROM yard	143,04	Dust suppression stockpiles	1 016,00	
	Runoff from product stockpile	51,39			
	Runoff from workshop area	9,58			
	Water from UG north	179,50			
	Total	**5 495,72**		**5 495,72**	**-**
PCD UG (32 000m^3)	UG mining South	12,89	Evaporation	72,98	
		12,89		**72,98**	**(60,09)**
Underground Mining Areas	UG north GW inflow	329,50	Use by UG machines	300,00	
	UG south GW inflow	162,89	Pump UG south to PCD UG	12,89	
			Pump UG north to PCD	179,50	
		492,39		**492,39**	**-**
NB-02	Open pit area	109,58	Water pumped to PCD	1 173,71	
	OC spoils	22,86	Evaporation in pit	91,96	
	OC area topsoiled	16,33			
	Rehabilitated area	31,90			
	Groundwater inflow	1 085,00			
	Total	**1 265,67**		**1 265,67**	**-**
NB-03 Ext	Open pit area	94,61	Water pumped to PCD	2 259,64	
	OC spoils	19,70	Evaporation in pit	79,39	

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	Quantity (m^3/day)	Water Circuit/stream	Quantity (m^3/day)	
	OC area topsoiled	14,07			
	Rehabilitated area	151,64			
	Groundwater inflow	2 059,00			
		2 339,03		**2 339,03**	**-**
NB-04	Open pit area	100,38	Water pumped to PCD	830,33	
	OC spoils	20,94	Evaporation in pit	84,24	
	OC area topsoiled	14,96			
	Rehabilitated area	4,28			
	Groundwater inflow	774,00			
		914,56		**914,56**	**-**
NB-05	Open pit area	69,21	Water pumped to PCD	447,52	
	OC spoils	14,42	Evaporation in pit	58,08	
	OC area topsoiled	10,30			
	Rehabilitated area	11,68			
	Groundwater inflow	400,00			
	Total	**505,60**		**505,60**	**-**
Sewage	Sewage generated	6,00	Treatment plant effluent to PCD	6,00	
	Total	**6,00**		**6,00**	**-**
Potable water tank	Potable water supply	9,00	Potable use losses	3,00	
			Sewage generated	6,00	
	Total	**9,00**		**9,00**	**-**
Total Water Balance		**6 016,32**		**6 016,32**	**(60,09)**

Table 62: Annual water balance

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	**Quantity (m^3/annum)**	**Water Circuit/stream**	**Quantity (m^3/annum)**	
PCD (270 000 m^3)	Runoff from OB dumps	43 579	Evaporation	196 981	
	Water from sewage treatment plant	2 190	Mechanical evaporation	312 020	
	Water from OC pits	1 719 588	Dust suppression haul roads	876 000	
	Direct rain water	100 598	Dust suppression access road	250 098	
	Runoff from ROM yard	52 211	Dust suppression stockpiles	370 840	
	Runoff from product stockpile	18 759			
	Runoff from workshop area	3 497			
	Water from UG north	65 517			
	Total	**2 005 939**		**2 005 939**	**-**
PCD UG (32 000 m^3)	UG mining South	4 705,00	Evaporation	26 638	
		4 705,00		**26 638**	**(21 933,00)**
Underground Mining Areas	UG north GW inflow	120 267,00	Use by UG machines	109 500	
	UG south GW inflow	59 455,00	Pump UG south to PCD UG	4 705	
			Pump UG north to PCD	65 517	
		179 722,00		**179 722**	**-**
NB-02	Open pit area	39 996	Water pumped to PCD	428 405	
	OC spoils	8 345	Evaporation in pit	33 564	
	OC area topsoiled	5 961	Storage in pit	-	
	Rehabilitated area	11 642			
	Groundwater inflow	396 025			
		461 969		**461 969**	**-**
NB-03 Ext	Open pit area	34 533	Water pumped to PCD	824 768	
	OC spoils	7 192	Evaporation in pit	28 979	
	OC area topsoiled	5 137	Storage in pit		
	Rehabilitated area	55 350			

Facility Name	Water In		Water Out		Balance
	Water Circuit/stream	**Quantity (m³/annum)**	**Water Circuit/stream**	**Quantity (m³/annum)**	
	Groundwater inflow	751 535			
		853 747		**853 747**	**-**
NB-04	Open pit area	36 638	Water pumped to PCD	303 069	
	OC spoils	7 643	Evaporation in pit	30 746	
	OC area topsoiled	5 460	Storage in pit		
	Rehabilitated area	1 564			
	Groundwater inflow	282 510			
		333 815		**333 815**	**-**
NB-05	Open pit area	25 260	Water pumped to PCD	163 346	
	OC spoils	5 263	Evaporation in pit	21 198	
	OC area topsoiled	3 759	Storage in pit		
	Rehabilitated area	4 262			
	Groundwater inflow	146 000			
		184 544		**184 544**	**-**
Sewage	Sewage generated	2 190	Treatment plant effluent to PCD	2 190	
	Total	**2 190**		**2 190**	**-**
Potable Water Tank	Potable water supply	3 285	Potable use losses	1 095	
			Sewage generated	2 190	
	Total	**3 285**		**3 285**	**-**
Total Water Balance		**2 195 958**		**2 195 958**	**(21 933,00)**

9.4 Impacts and Risks Identified

Only a summary of mitigation measures is provided, a more comprehensive list of mitigation measures will be provided in the EMPr section.

The following process is followed in the sections below:

- An impact discussion and risk assessment are conducted per activity.
- Certain impacts are not limited to one activity, but to the majority or all of the activities. An all activity impact discussion and assessment is included in **Section 9.4.1**.
- Some impacts are only applicable to one activity during a particular phase of the project. These impacts are discussed per activity.
- In each individual section the following information is provided:
    - A table is provided where the activity to cause the impact is identified and a discussion is provided on the potential impacts that will result from the activity. In some instances, reference is made to modelled figures or tables.
    - After identifying the impact, a full impact assessment is conducted in tabular form. As mentioned, only a summary is provided for the mitigation measures. The full list of measures is provided in the EMPr.

9.4.1 All Activities Impacts

Certain impacts are applicable to all or the majority of activities, therefore an all activities impact assessment was compiled. It is not possible to always predict what activities will have an impact on the socio-economic environment or cultural/heritage aspects. As a result, the cultural and heritage- as well as socio economic impacts will not be discussed per activity, but in general.

Impact	Impact Discussion - All Activities
Groundwater – All Phases	
Deterioration of groundwater quality resulting from seeping contaminants due to spills or leakages.	➢ Oil, diesel and chemical spills from machinery and vehicles left to seep into soils. ➢ Diesels spills at diesel bay and cracked bunded facility leading to diesel seeping into soils. ➢ Sewage Package Treatment Plant malfunctioning. ➢ Oil separators and wash bays not properly maintained leading to spills.
Freshwater – Construction	
Alteration and deterioration of freshwater resources due to site clearance.	➢ Runoff with high sediment loads entering into the wetlands, smothering the vegetation and thus altering the habitat of the wetlands. ➢ Compaction of soil due to vehicular movement leading to alterations of runoff patterns into the wetlands. ➢ Soil and stormwater contamination from oils and hydrocarbons. ➢ Vegetation degradation, and the subsequent loss of habitat for wetland species. ➢ Proliferation of AIPs as a result of disturbances. ➢ Decreased ecoservice provision. ➢ Soil compaction. ➢ Impacts on the hydrological processes supporting the wetlands locally and downstream.
Alteration and deterioration of freshwater resources due to construction of infrastructure.	➢ Disturbances of soils leading to increased Alien Invasive Plant (AIP) proliferation, and in turn to further alteration of surrounding wetland and terrestrial habitat, with potential to affect the downgradient wetland habitat. ➢ Altered runoff patterns, leading to increased erosion and sedimentation of the downgradient wetlands. ➢ Erosion of the exposed areas. ➢ Potential impacts on the water quality of runoff which may potentially enter the downgradient wetlands. ➢ Potential contamination of wetland soils due to concrete being cast. ➢ Potential of backfill material to enter the downgradient wetlands, increasing the sediment load of the wetlands.
Freshwater – Decommissioning	
Alteration and deterioration of freshwater resources due to rehabilitation activities.	➢ Incorrect rehabilitation methods with specific mention of soils used soil sequencing and backfilling processes and changes to the topography of the area. ➢ Compaction of soils due to vehicular movement. ➢ Compacted soils underneath the overburden stockpiles which have been removed. ➢ Latent impacts of vegetation losses; ➢ Increased runoff volumes and formation of preferential surface flow paths as a result of compacted soils, leading to alteration of hydrological recharge paths. ➢ Increased sedimentation and erosion.
Fauna and Flora – Construction	
Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat, Grassland Habitat and Habitat Connectivity).	➢ Inconsiderate planning, infrastructure placement and design, leading to the fragmented landscapes (and associated ecological processes), loss of potential sensitive faunal species and/or habitat for such species, as well as avoidable edge effect impacts on areas outside of the proposed project footprint. ➢ Long-term or permanent degradation and modification of the receiving environment. ➢ Loss of favourable faunal habitat beyond the authorised footprint. ➢ Loss of species abundances and diversity beyond that of the footprint areas, impacting long term rehabilitation and affecting potential species populations resilience. ➢ Loss of faunal habitat displacing species including potential SCC. ➢ Loss of suitable food resources, breeding grounds.
Loss/alteration of Faunal Habitat and Diversity (Rocky Outcrop, Degraded Grassland and Transformed).	
Loss/alteration of Faunal SCC including their Habitats (Freshwater Habitat,	

Impact	Impact Discussion - All Activities
Grassland Habitat and Habitat Connectivity).	➢ Habitat fragmentation within the landscape. ➢ Loss or alteration of faunal habitat and species diversity. ➢ Fauna including potential SCC may not be able to escape ahead of clearance activities and may be killed by machinery and construction activities. ➢ Isolation of faunal species and smaller populations thereof with limited movement ability, reducing overall movement of fauna within the landscape. ➢ Increased size of planned footprints leading to the further loss of faunal habitat and SCC.
Loss/alteration of Faunal SCC including their Habitats (Rocky Outcrop, Degraded Grassland and Transformed).	
Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands, Highveld Grasslands, Moist Grasslands, Pan Wetlands, Rocky Outcrops and Valley-bottom Wetlands).	➢ Potential avoidable degradation of sensitive floral habitat. ➢ Potential for project to be rejected by competent authorities or requests for additional data collecting and layout optimisation within less sensitive habitat. ➢ Long-term or permanent degradation and modification of the receiving environment. ➢ Loss of favourable floral habitat beyond the authorised footprint. ➢ Avoidable loss of floral SCC from the study area with potential to impact on their population numbers and dynamics in the larger region. Rescue and relocation of SCC from their natural habitat can result in (SANBI, 2020): o A net habitat and biodiversity loss within the study area; o Low success rates due to the difficulties of locating and translocating all individuals of an SCC (flowering periods often short and doesn't align with all SCC in a site); o Potential for eroding the genetic integrity of the targeted species; and o Substantial increased risk to the receiving populations (where the 'rescued' species are being translocated to), through deleterious genes, parasite and pathogen introduction, and excessive competition for resources.
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland, Modified Wetlands and Transformed Habitat).	
Loss/alteration of Floral SCC and their Habitat (*Khadia carolinensis*, Sensitive species 1200, Forb-rich Wetland, Moist Grassland, Rocky Outcrops and Valley-bottom Wetlands).	
Loss/alteration of Floral SCC and their Habitat (MNCA Protected Species, Provincially Important Species and Highveld Grassland).	
Fauna and Flora – Operational	
Loss/alteration of Faunal SCC including their Habitats.	➢ Loss of faunal habitat displacing species including potential SCC. ➢ Loss of suitable food resources, breeding grounds. ➢ Habitat fragmentation within the landscape. ➢ Loss or degradation of faunal habitat, diversity, and potential SCC within the direct footprint and adjacent areas of the proposed development. ➢ Fauna including potential SCC may not be able to escape ahead of clearance activities and may be killed by machinery. ➢ Isolation of faunal species and smaller populations thereof with limited movement ability, reducing overall movement of fauna within the landscape. ➢ Inability for faunal species populations to recover or re-establish within the disturbed footprint areas. ➢ Impact on food resource suitability for herbivores, potentially leading to displacement of fauna as move out of the surrounding areas in order to find suitable food resources.
Fauna and Flora – Decommissioning and Closure	

<table>
<tr><th>Impact</th><th>Impact Discussion - All Activities</th></tr>
<tr><td>Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat and Habitat Connectivity).</td><td rowspan="6">➢ Loss of favourable growing conditions for plant species reducing re-establishment of suitable habitat for faunal species.
➢ Permanent degradation of faunal habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation and faunal communities.
➢ Loss of faunal species diversity and habitat including several SCC reliant on these habitats.</td></tr>
<tr><td>Loss/alteration of Faunal Habitat and Diversity (Rocky Outcrop, Degraded Grassland and Transformed).</td></tr>
<tr><td>Loss/alteration of Faunal Habitat and Diversity (Grassland Habitat).</td></tr>
<tr><td>Loss/alteration of Faunal SCC including their Habitats (Freshwater Habitat, Grassland Habitat and Habitat Connectivity).</td></tr>
<tr><td>Loss/alteration of Faunal SCC including their Habitats (Rocky Outcrop and Degraded Grassland).</td></tr>
<tr><td>Loss/alteration of Faunal SCC including their Habitats (Transformed).</td></tr>
<tr><td>Impacts on Floral Habitat and Diversity (Forb-rich Wetlands and Valley-bottom Wetlands).</td><td rowspan="5">➢ Loss of favourable growing conditions for floral communities.
➢ Permanent degradation of floral habitat, diversity and SCC, and a higher likelihood of edge effect impacts on adjacent and nearby natural vegetation.
➢ Long-term (or permanent) loss of floral habitat, diversity, and SCC.
➢ Permanent impact on floral habitat.</td></tr>
<tr><td>Loss/alteration of Floral Habitat and Diversity (Highveld Grasslands and Moist Grasslands).</td></tr>
<tr><td>Loss/alteration of Floral Habitat and Diversity (Degraded Grassland, Modified Wetlands, Pan Wetlands, Rocky Outcrops and Transformed Habitat).</td></tr>
<tr><td>Loss/alteration of Floral SCC and their Habitat (Forb-rich Wetland, Moist Grassland and Valley-bottom Wetlands).</td></tr>
<tr><td>Loss/alteration of Floral SCC and their Habitat (Khadia carolinensis, MNCA Protected Species, Provincially Important Species and Rocky Outcrops).</td></tr>
</table>

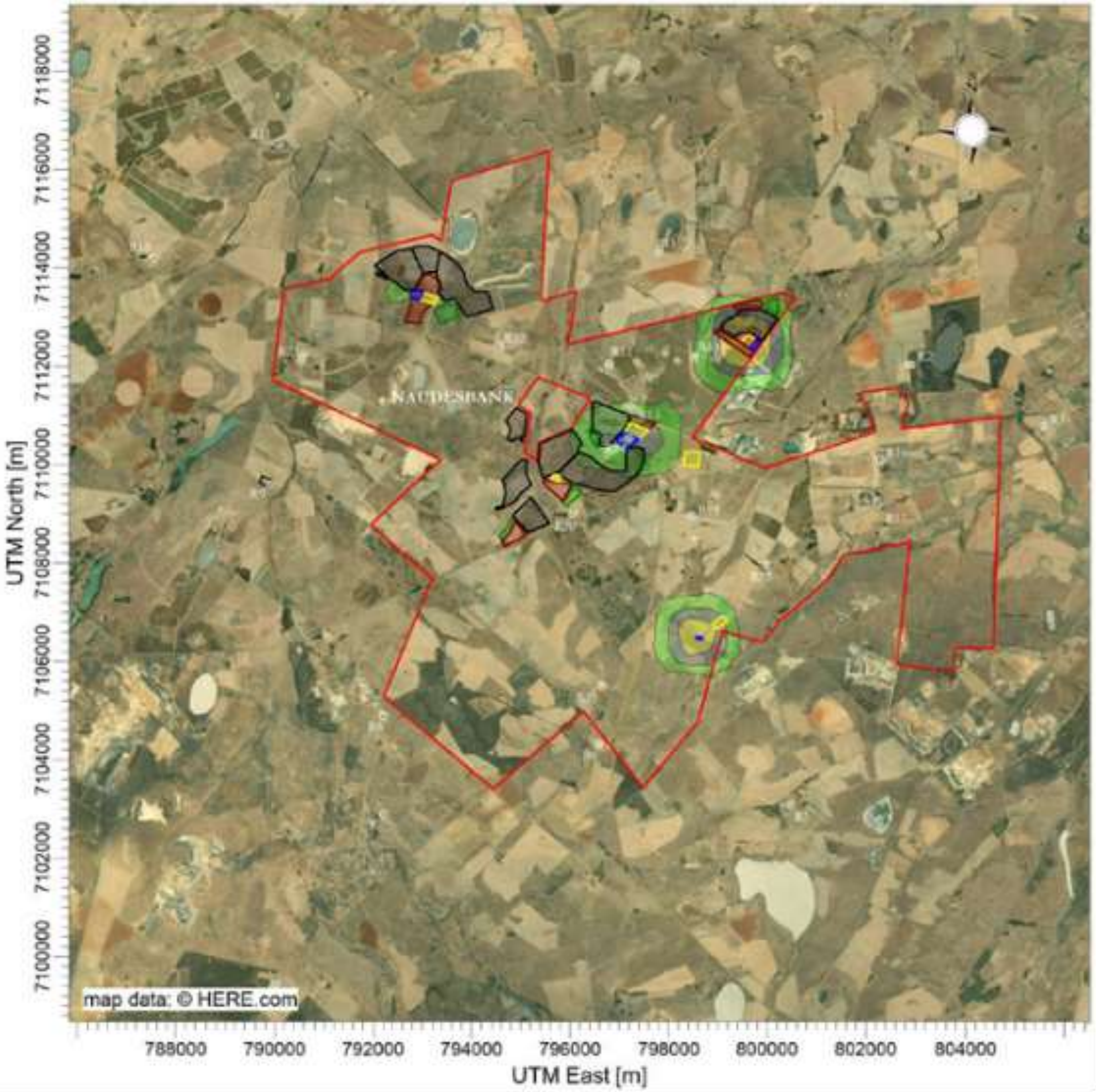
Impact	Impact Discussion - All Activities
Loss/alteration of Floral SCC and their Habitat (Sensitive species 1200 and Highveld Grassland).	
Hydropedology – All Phases	
Hydropedological losses.	➢ The basin scale results indicates that the streamflow and surface runoff components will likely increase by 31% while accounting for less than 1% of the water balance. The percolation component of the water balance decreased by less than 1% while also accounting for less than 1% of the water balance as well. The major driver of the water balance at this scale is evapotranspiration which accounts for 95.8% of the water balance and will experience a change less than 1% post-development. The profile water increases by 0.3 at this scale. ➢ The LSU scale which is equivalent to the hillslope scale depicted an increase in both streamflow and surface runoff by 27% while accounting for less than 1% of the water balance. The lateral flow and percolation decrease by 1.2% and 2.6% respectively, however they both account for less than 1% of the water balance. The major losses occur through evapotranspiration which accounts for 92% of the water balance. The profile available water increased by 1.4 % at this scale. ➢ If the Hydrological Response Unit scale (finer scale) is considered, The streamflow and surface runoff components depict an increase of 39% in the post-development scenario. The lateral flow and percolation decrease by 5.2% and 5.7% respectively, however they both account for less than 1% of the water balance. The is a 4.5% increase in the profile water content and thus the model predicts an increase in moisture as a result of the proposed development and this should be taken into consideration during the design and planning phase of the proposed development. ➢ Underground mining within the study area is not anticipated to pose a risk on the hydropedological processes, however this risk of subsidence must be confirmed by a suitably qualified rock engineer to ensure that the wetlands and hydropedologically important soils remain unimpacted during all phases of development.
Soil, Land Use and Land Capability – All Phases	
Deterioration/alteration/loss of soils though erosion, contamination, compaction as well as loss of agricultural land capability.	➢ Soil stripping will cause a complete cease of agricultural production and food supply. ➢ Mixing of the soils A and B-horizons during stripping and stockpiling or via direct replacement will constitute a fair degree of unavoidable deterioration of the soil's productive ability. ➢ The potential risk of stripping too deep will cause low quality subsoil to be mixed with high quality A and B-horizons and cause a reduction in soil quality and productive ability. ➢ The potential risk of stripping too shallow will cause a reduction of the original effective soil depth and a reduction in water holding capacity and subsequently productive ability. ➢ Severe compaction of topsoil during replacement and levelling due to the use of heavy mechanical equipment will negatively impact on the soil's water infiltration rates, waterholding capacity and will restrict root development and distribution of plants. ➢ Planned activities will cover the soil surface and cause a complete cease of agricultural production and food supply. ➢ The upper soil horizon will be disturbed for roads. It will probably be removed and placed as a berm along the edges. ➢ The remaining soil horizons will be compacted severely during construction and placement of base materials for the haul road. ➢ The topsoil will be disturbed and will probably be used to crated embankments. ➢ The remaining soil horizons will be compacted severely prior to placement of the liner. ➢ The upper natural soil horizons will be compacted severely by the weight of the topsoil and overburden material. ➢ All vegetation and animal life at the footprint will be destroyed. All natural soil processes and microbial activities will cease to a large extent or completely. ➢ The natural soil horizons underneath the base material will be compacted during construction of the base layer and during operation thereafter. ➢ Spilled, low quality water or stormwater that leave the structure footprint may impact negatively on the surrounding soil chemical

Impact	Impact Discussion - All Activities
	status. ➢ The natural soil horizons underneath the structure will be compacted during construction. ➢ Site clearing, removal of vegetation, and associated disturbances to soils, leading to, increased runoff, erosion and consequent loss of land capability in cleared areas. ➢ Potential frequent movement of earth moving machinery within lose and exposed soils, leading to excessive erosion. ➢ Spillage of petroleum hydrocarbons during construction of associated infrastructure. ➢ Potential disposal of hazardous and non-hazardous waste, including waste material spills and refuse deposits into the soil. ➢ Leaching of hydrocarbons chemicals into the soils from maintenance equipment, leading to alteration of the soil chemical status as well as contamination.
Air Quality – Construction and Decommissioning	
Deterioration of air quality in the region.	➢ NO_2, SO_2 and CO emissions (vehicle tailpipe emissions) were not quantified for these phases of the project due to the relatively low expected risk and since an acceptable construction vehicle inventory cannot be established at this stage. ➢ Predicted incremental dust deposition rates during construction and rehabilitation are expected to remain at current levels beyond the mining boundary and at all the closest receivers identified as shown in **Figure 55**. ➢ Predicted incremental daily and annual average $PM_{10/2.5}$ concentrations as a result of construction/rehabilitation will likely remain below 10% of the relevant standards at the closest sensitive receivers (**Figure 56** and **Figure 57**).
Air Quality – Operational	
Deterioration of air quality in the region.	➢ NO_2, SO_2 and CO emissions (vehicle tailpipe emissions) were quantified for this phase of the project, but the modelling outcomes are not reflected due to insignificant impact (<10% of the standard). ➢ Predicted incremental dust deposition rates during the operational phase are expected to contravene the non-residential standard up to 300 m downwind of mining operations at Naudesbank and Vaalbank during periods of maximum opencast and underground production as shown in **Figure 58, Figure 59,** and **Figure 60**. Dust deposition rates are expected to remain at background levels at all sensitive receivers beyond the mining right boundary. The residual impact at the closest receivers is expected to remain at current background levels. ➢ PM_{10} concentrations, as a result of operations, are likely to cause maximum daily average PM_{10} concentrations above the standard up to 500 m downwind of mining activities (see **Figure 61, Figure 62, Figure 63** and **Figure 64**). Incremental annual PM_{10} concentrations are predicted to be insignificant beyond 500 m from the mining activities. ➢ Predicted incremental maximum daily and annual average $PM_{2.5}$ concentrations will likely be insignificant at nearest sensitive receivers (**Figure 65, Figure 66, Figure 67** and **Figure 68**).
Noise – Construction	
Elevated noise levels during daytime disrupting surrounding communities.	➢ Increased noise from movement of vehicles and machinery. ➢ Temporary noise disturbance resulting from blasting. ➢ Noise disturbance resulting from construction activities.
Elevated noise levels during night-time disrupting surrounding communities.	➢ Increased noise from movement of vehicles and machinery.
Noise – Operational and Decommissioning	
Elevated noise levels during daytime disrupting surrounding communities.	➢ Increased noise from movement of vehicles and machinery. ➢ Temporary noise disturbance resulting from blasting.

Impact	Impact Discussion - All Activities
Elevated noise levels during night-time disrupting surrounding communities.	➢ Increased noise from movement of vehicles and machinery.
Visual – All Phases	
Visual Intrusion, Change of Character and Sense of Place.	➢ The project is located within an area with a generally flat slope, next to the R38 Regional Road and various communities reside in the area. Visual impacts will include the following: o Potential light pollution. o Obstructive and unpleasant views such as stockpiles. o Removal of remaining natural vegetation. o Dust generation.
Climate Change (Annexure 16) – All Phases	
Greenhouse Gas (GHG) Emissions.	➢ Naudesbank Colliery's annual calculated GHG emissions inventory amounts to 14 582.07 tCO_2e. Scope 1 GHG emissions amounted to 2 560.61 tCO_2e (17.56%). Scope 2 GHG emissions were calculated at 2 789.05 tCO_2e (19.13%). Scope 3 GHG emissions totalled 9 232.42 tCO_2e (63.31%). ➢ Naudesbank Colliery's total GHG emission rate was calculated at 492 868.98 tCO_2e for the LOM. Scope 1 GHG emissions amounted to 73 385.60 tCO_2e (14.89%). Scope 2 emissions were 105 581.20 tCO_2e (21.42%). Scope 3 GHG emissions totalled 313 902.18 tCO_2e (63.69%). ➢ Witbank South Coal Mine's total GHG emission rate was calculated at 78 259.53 tCO_2e for the LoM. Scope 1 GHG emissions amounted to 16 972.76 tCO_2e (21.69%). Scope 3 GHG emissions totalled 61 286.76 tCO_2e (78.31%). ➢ Calculated GHG emissions inventory for the mine amounts to 0.096% of South Africa's carbon budget (510 Mt CO_2e). The magnitude of GHG emissions from the Naudesbank Colliery's operations is considered minor, as GHG emissions are between 5 000 and 25 000 tCO_2e annually (14 582.07 tCO_2e).
Increased temperatures posing potential health risk to employees.	➢ Higher temperatures can place employees at risk by means of heatwaves and wildfire risk. ➢ Possibly also influence employee productivity.
Increased wildfires resulting in damages.	➢ Higher temperatures can result in dryer conditions increasing the risk of wildfires. This can potentially result in structural damages.
Water scarcity and drought constraining operations, increasing conflict with communities and exacerbating dust deposition.	➢ The supply of water to be utilised at the mine will be constrained in events of droughts. This will pose a significant challenge in terms of dust suppression and result in excessive dust generation.
Water scarcity and drought further exacerbating water quality.	➢ Dryer conditions normally lead to poorer water quality and if there are long sustained droughts water quality can be affected.
Extreme weather events (flooding) may occur resulting in damage to infrastructure, contaminated water entering natural environment and accessibility.	➢ Extreme flood events will impact the operations by potentially leading to overflow of pollution containment facilities, damage to infrastructure and reduced accessibility due to flooding.

Impact	Impact Discussion - All Activities
Increased wind speed and gusts may result in infrastructure damage or excessive dust generation.	➢ Wind speed is a critical factor in generating dust. The potential of structures being damaged by extreme events is also possible.
Palaeontology, Heritage and Cultural – Construction and Operational	
Damage to or the destruction of archaeological artefacts, structures and/or graves during earthworks and blasting	➢ Blasting and earthworks can damage or destroy artefacts or graves not visible on the surface. ➢ Blasting and development in proximity to structures and graves. ➢ Demolition of buildings. ➢ Potential relocation of graves.
Damage to or the destruction of paleontological materials during earthworks.	➢ Blasting and earthworks can damage or destroy palaeontological material located below surface.
Socio-economic – All Phases	
Creation of temporary construction employment.	Positive impact: ➢ Contractors will be appointed to construct the planned infrastructure on-site. This will create employment opportunities for these companies, indirectly contributing to the livelihoods and employment security of those employed for a short period of time.
Employment and the generation of household income for the duration of the mining activities, including indirect and induced impacts within the local and regional economies.	Positive impact: ➢ New employment opportunities will be created - 6 full time employees and 264 contractors. ➢ The opportunities will automatically have a positive effect on the livelihoods of the employees. ➢ Salaries earned will facilitate indirect economic impacts by expenditure.
Generation of revenue and contribution towards the local, regional and national economies.	Positive impact: ➢ Stimulation of domestic production, job creation, and government revenue. ➢ Contribute to the GDP of the region and province and will create both direct and indirect employment opportunities. ➢ The Government will receive royalty and tax payments for the permanent extraction of non-renewable commodities.
Contribution to human resource and socio-economic development programmes.	Positive impact: Corporate social investments and SLP contributing towards the local economic development in the area.
Impact on agricultural land use and employment.	➢ Currently some areas are leased for agricultural purposes. Agricultural land use areas will be directly impacted by mining and the associated infrastructure. It is also expected that displacement of agricultural households and job losses result from the development of the mine.
Disruption of day-to-day life and safety of road users.	➢ There will be a disruption of the daily lives of communities and farmers living in the vicinity of the mine resulting from mining activities. Road users will also be impacted by increased vehicles accessing, crossing and using roads. Impacts may range from minor such as frustration to more serious consequences such as accidents or delays.
Damage to Infrastructure.	➢ Blasting may cause damage to surrounding farm and residential properties. This was deemed possible by the Blasting Assessment.

Impact	Impact Discussion - All Activities
Influx of job seekers.	➢ The potential influx of job seekers and their anticipated settlement in the uncontrolled or low-income areas are likely to lead to social impacts such as conflict amongst local communities, social disintegration, pressures on existing infrastructure and services, housing, etc.
Increase in social pathologies and crime.	➢ A central change processes associated with mine development is the continuous presence of contracting firms, construction workers and employees. This may include workers as well as opportunists and burglars/robbers posing as workers. ➢ Typical crimes linked with mining development include: o Local sex workers and prostitution; o Substance (drugs, alcohol) abuse; o Livestock poaching; o Opportunistic theft; o Vandalism; and o Burglary and/or armed robbery.
Loss of job opportunities due to downscaling of the mine employment.	➢ At the end of the LoM, downscaling and retrenchment will follow that will reduce employment and have a negative economic impact.



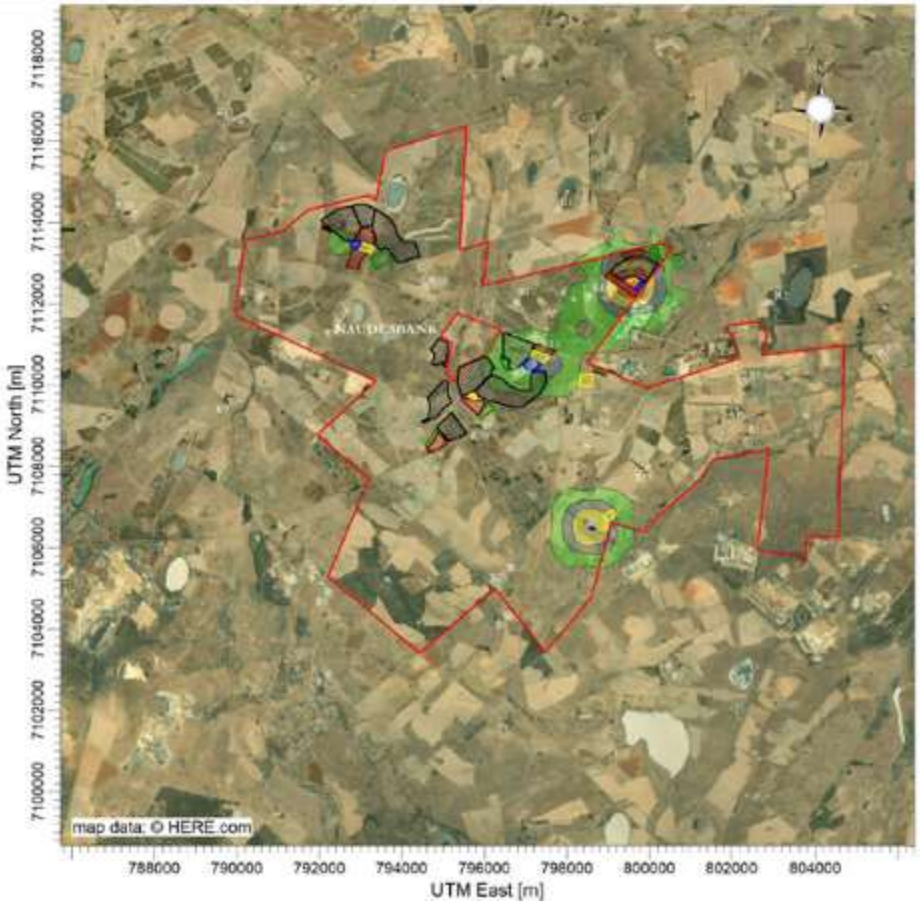
Red >1 200 mg/m^2/day (Non-residential Standard)

Yellow >600 mg/m^2/day (Residential Standard)

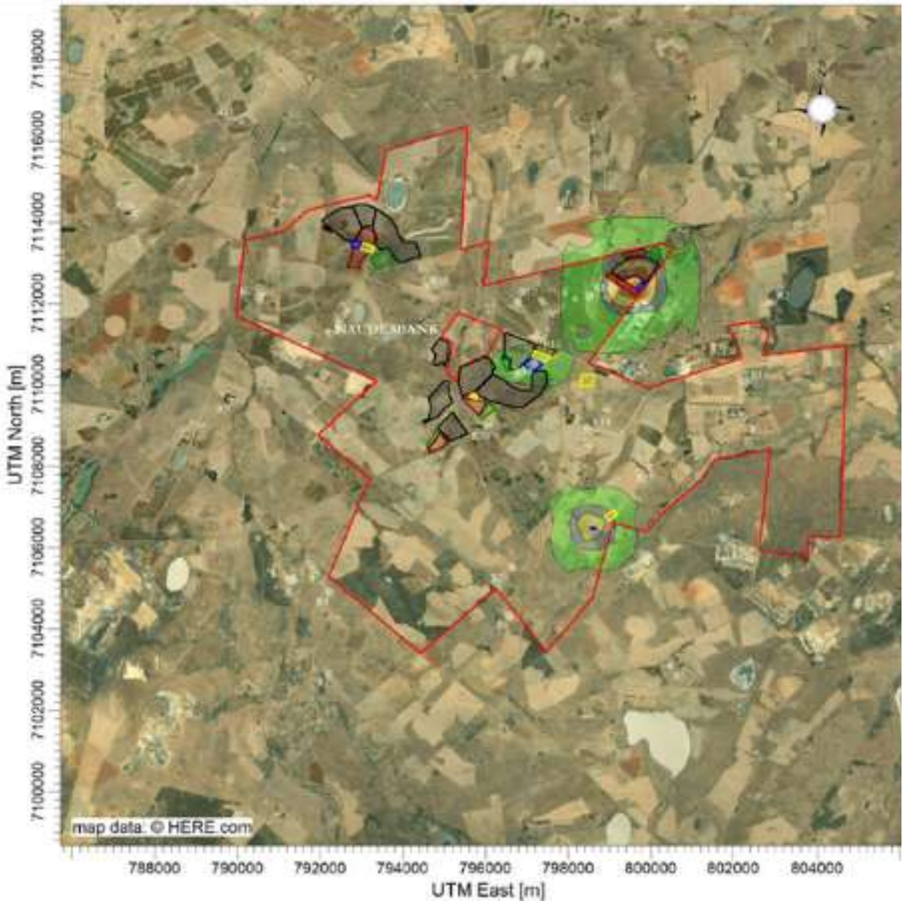
Blue >300 mg/m^2/day

Green >150 mg/m^2/day

Figure 55: Daily Average Dust Deposition Rate – Construction and Rehabilitation Phases

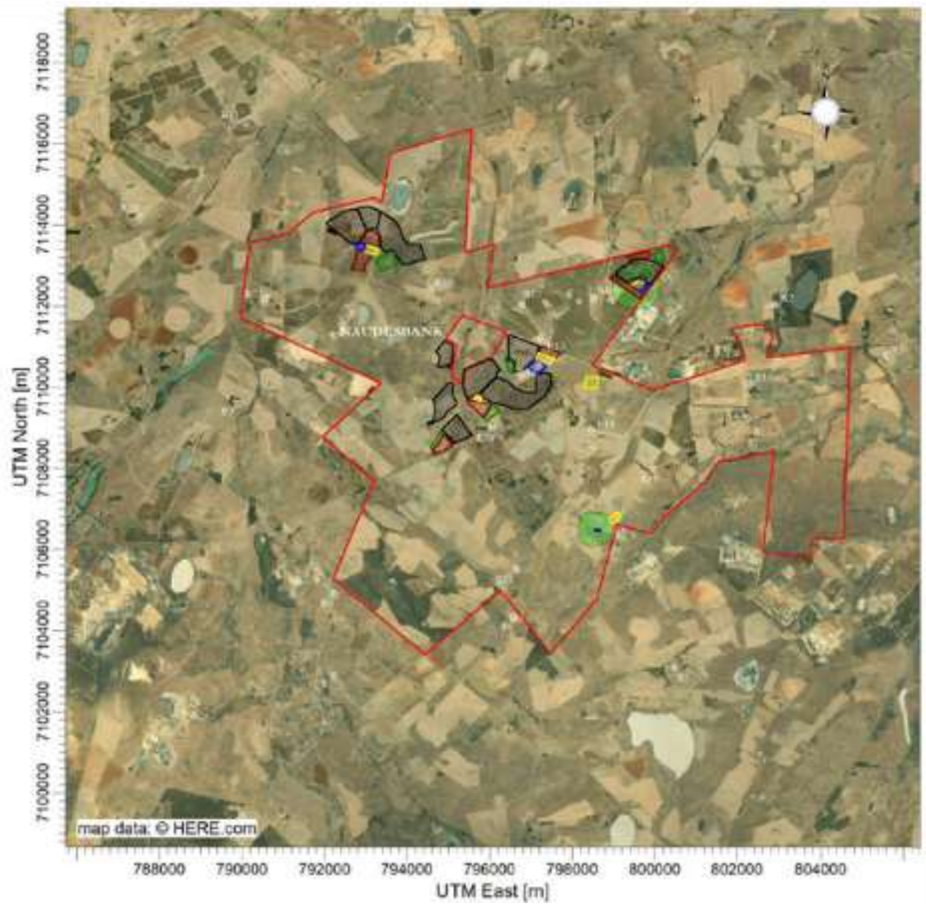


Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Daily Standard – 75 µg/m^3

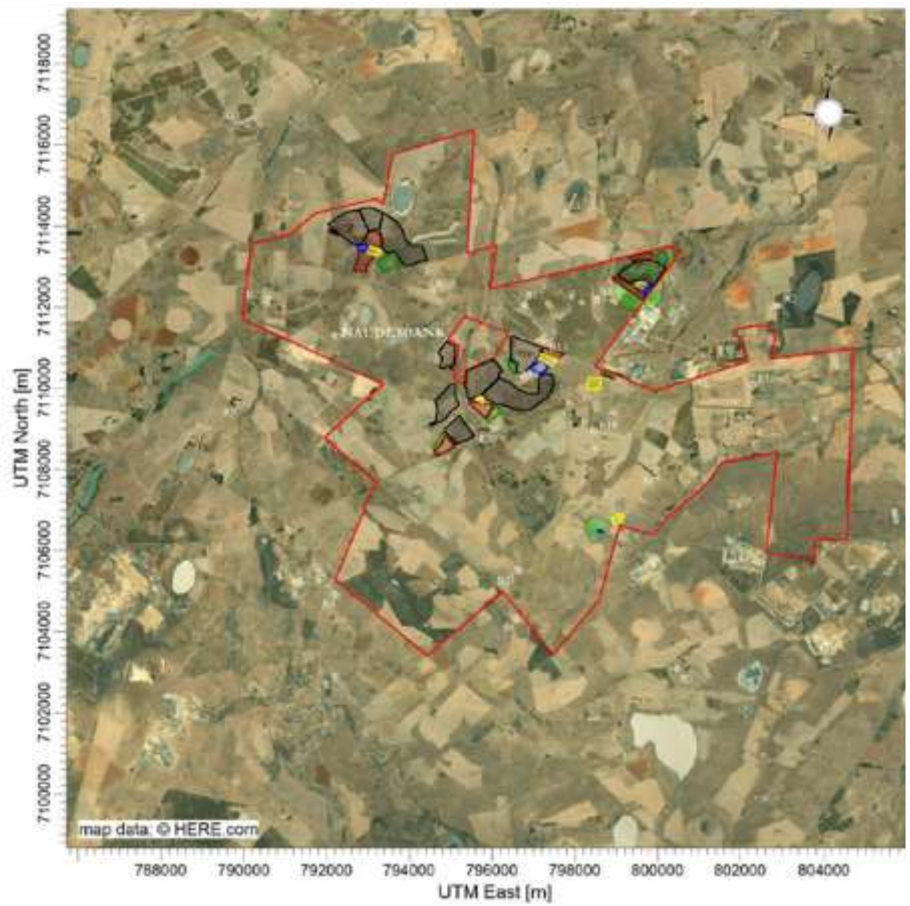


Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Annual Standard – 40 µg/m^3

Figure 56: Maximum Daily (Left) and Annual (Right) Average PM_{10} Concentration – Construction and Rehabilitation

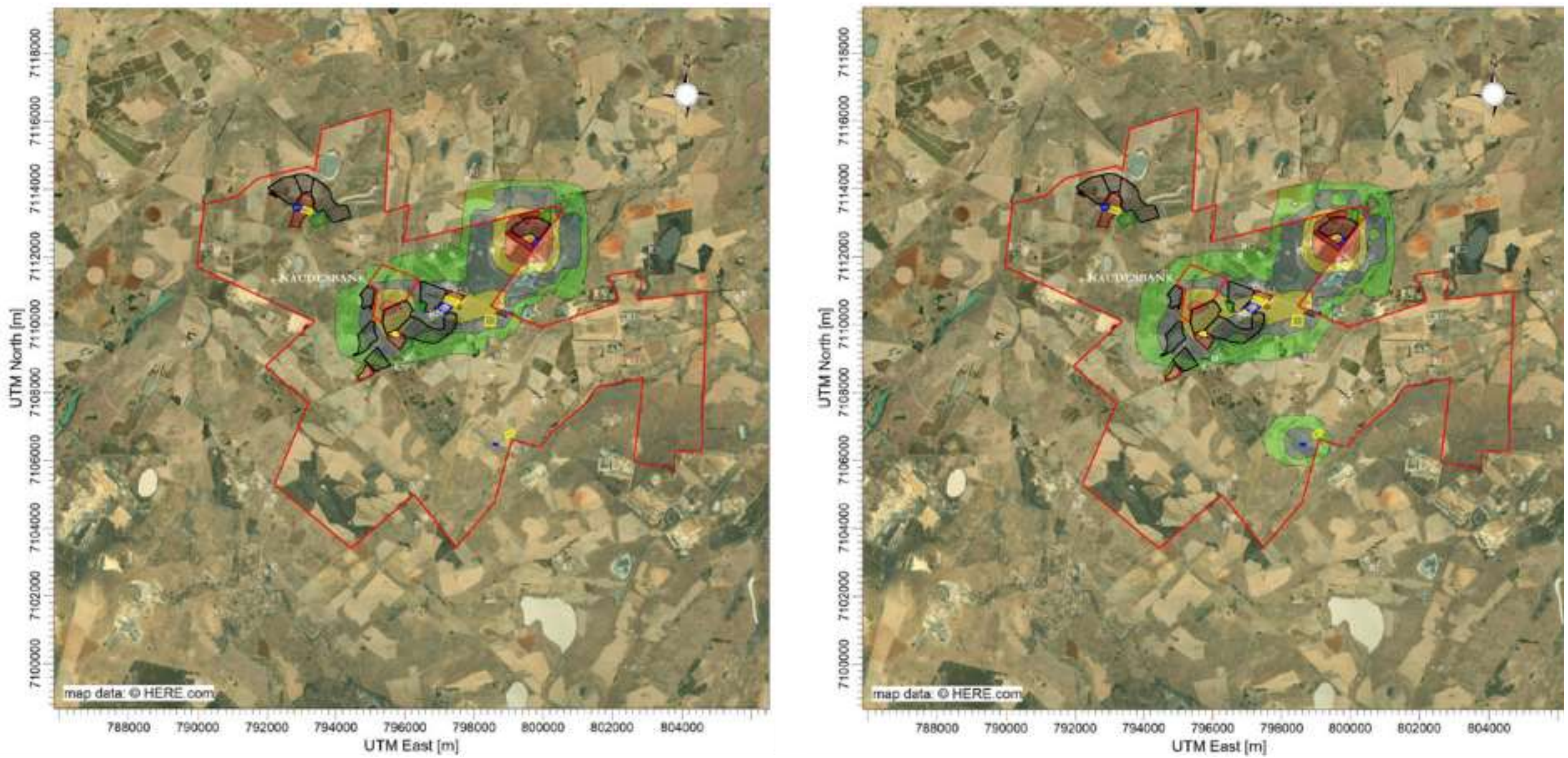


Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Daily Standard – 40 µg/m^3



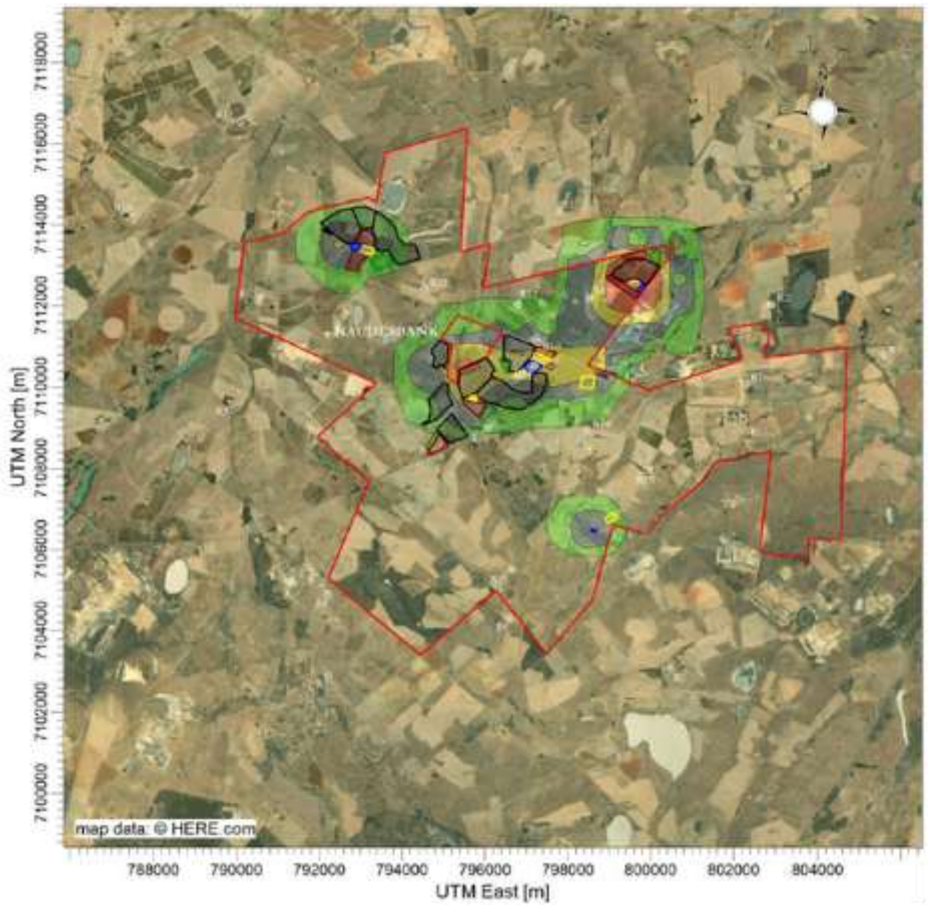
Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Annual Standard – 20 µg/m^3

Figure 57: Maximum Daily (Left) and Annual (Right) Average $PM_{2.5}$ Concentration – Construction and Rehabilitation

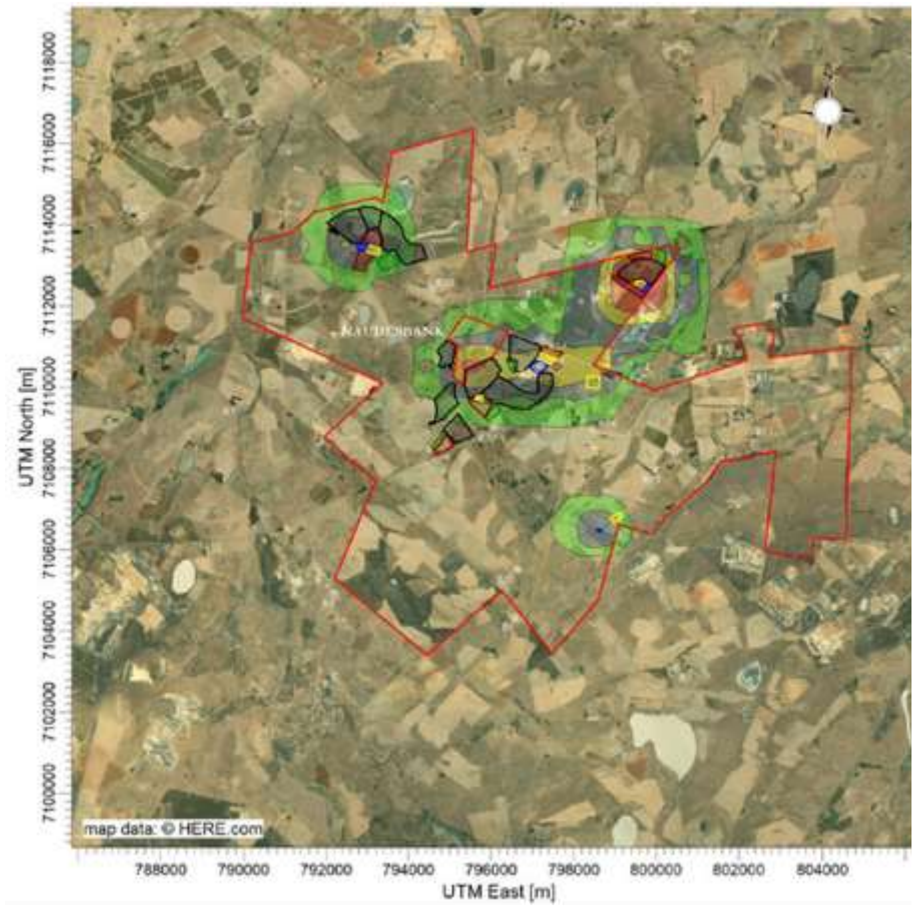


Red >1 200 mg/m²/day (Non-residential Standard)	**Red >1 200 mg/m²/day (Non-residential Standard)**
Yellow >600 mg/m²/day (Residential Standard)	**Yellow >600 mg/m²/day (Residential Standard)**
Blue >300 mg/m²/day	**Blue >300 mg/m²/day**
Green >150 mg/m²/day	**Green >150 mg/m²/day**

Figure 58: Daily Average Dust Deposition Rate – Year 2025 (Left) and Year 2030 (Right) Operational

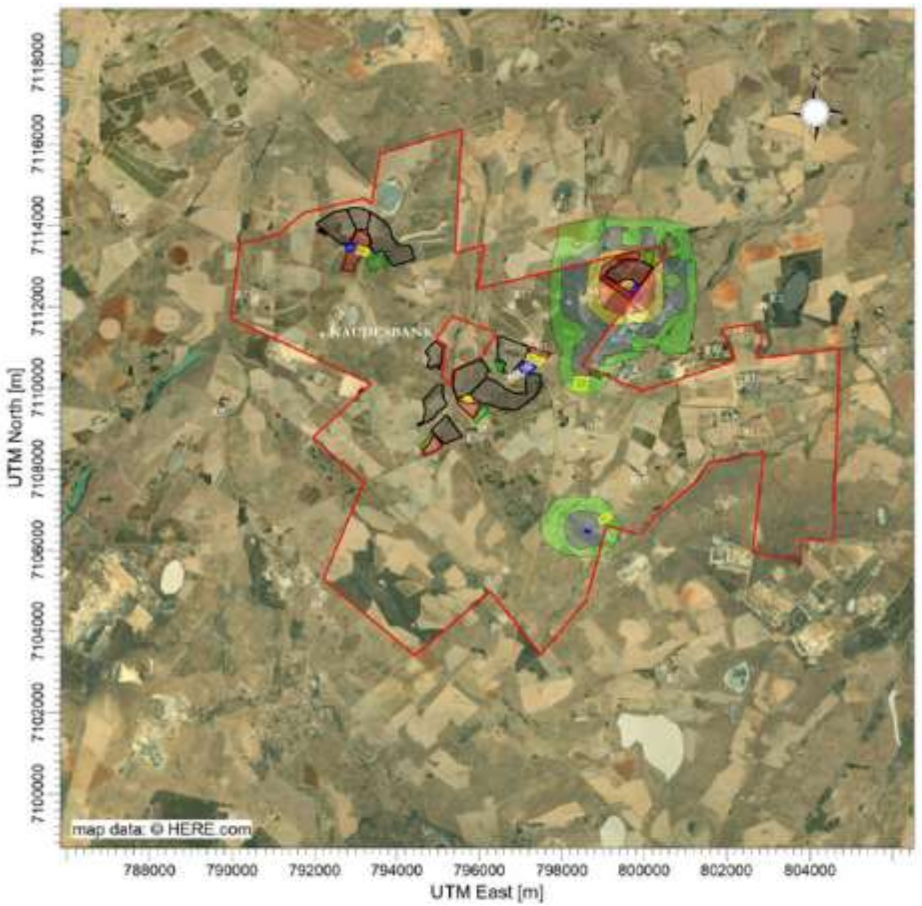


Red >1 200 mg/m²/day (Non-residential Standard)
Yellow >600 mg/m²/day (Residential Standard)
Blue >300 mg/m²/day
Green >150 mg/m²/day



Red >1 200 mg/m²/day (Non-residential Standard)
Yellow >600 mg/m²/day (Residential Standard)
Blue >300 mg/m²/day
Green >150 mg/m²/day

Figure 59: Daily Average Dust Deposition Rate – Year 2031 (Left) and Year 2033 (Right) Operational



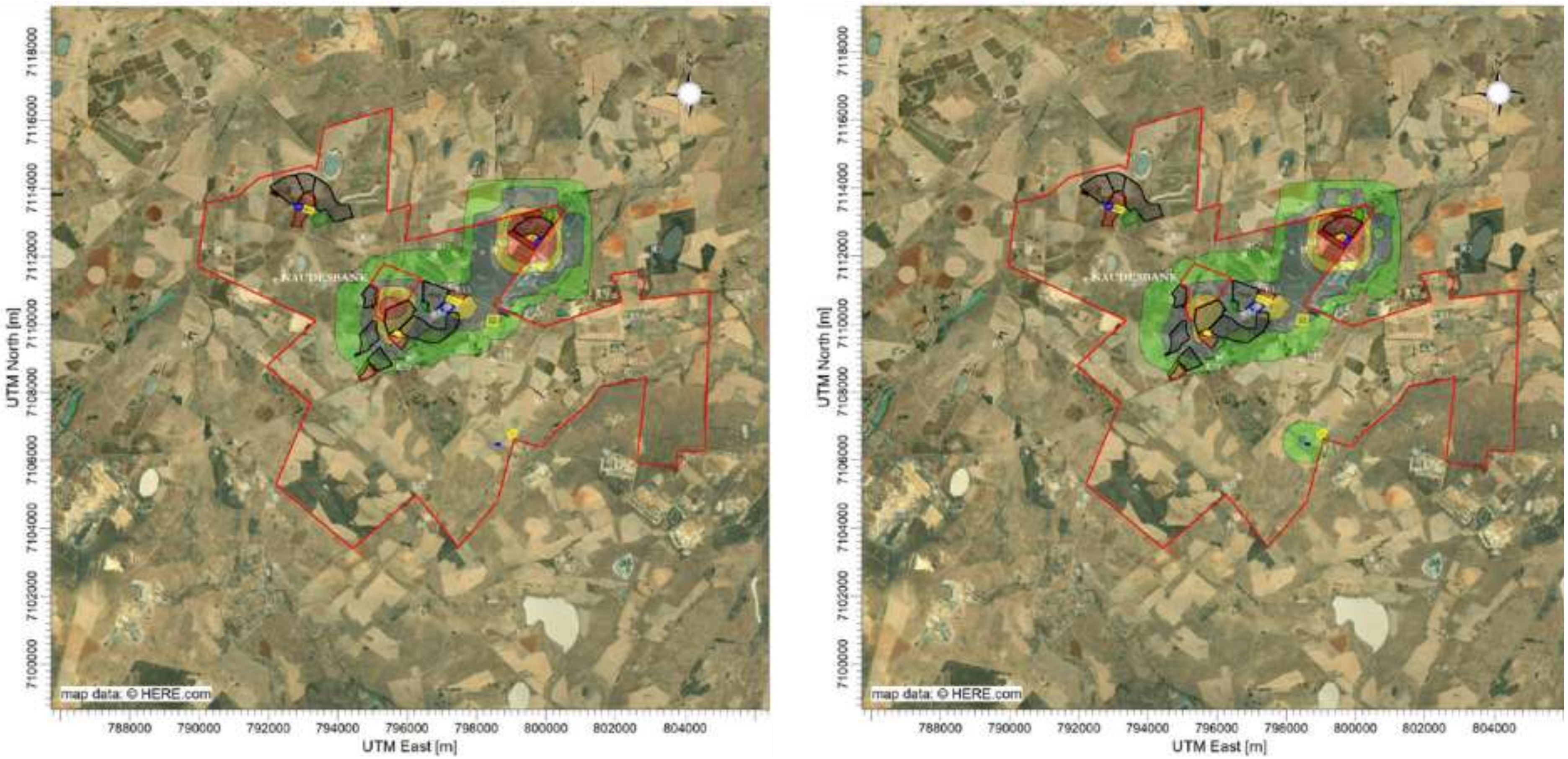
Red >1 200 mg/m²/day (Non-residential Standard)

Yellow >600 mg/m²/day (Residential Standard)

Blue >300 mg/m²/day

Green >150 mg/m²/day

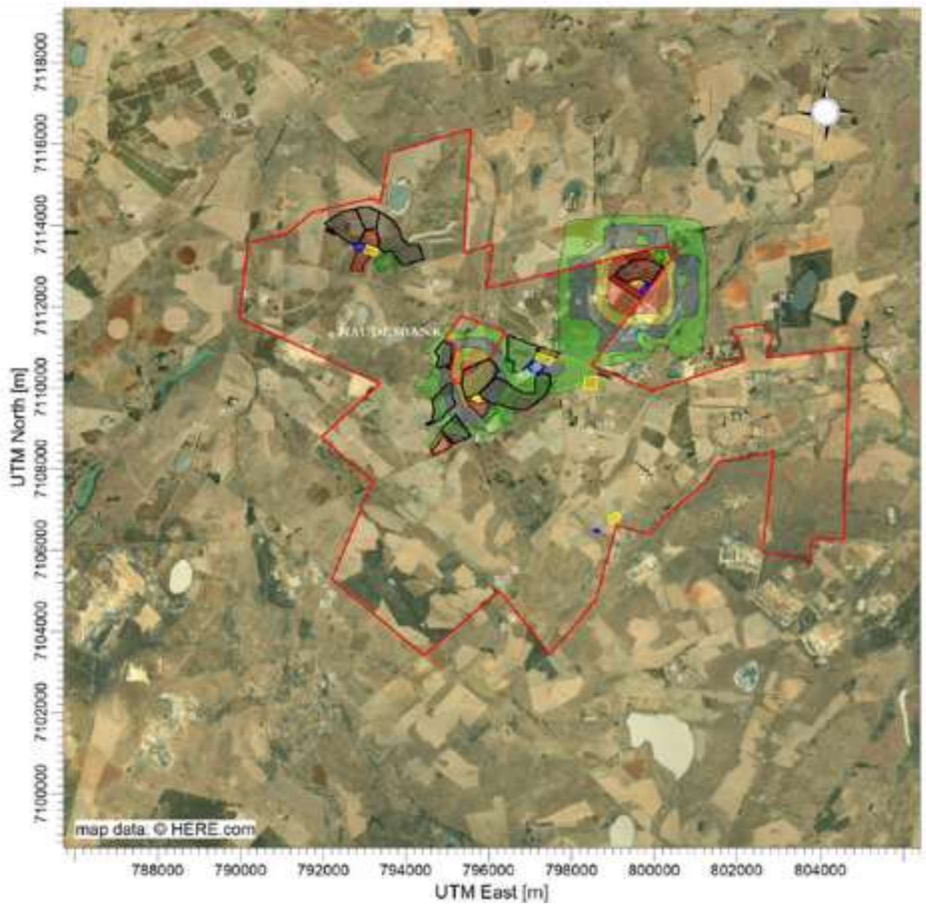
Figure 60: Daily Average Dust Deposition Rate – Year 2054 Operational



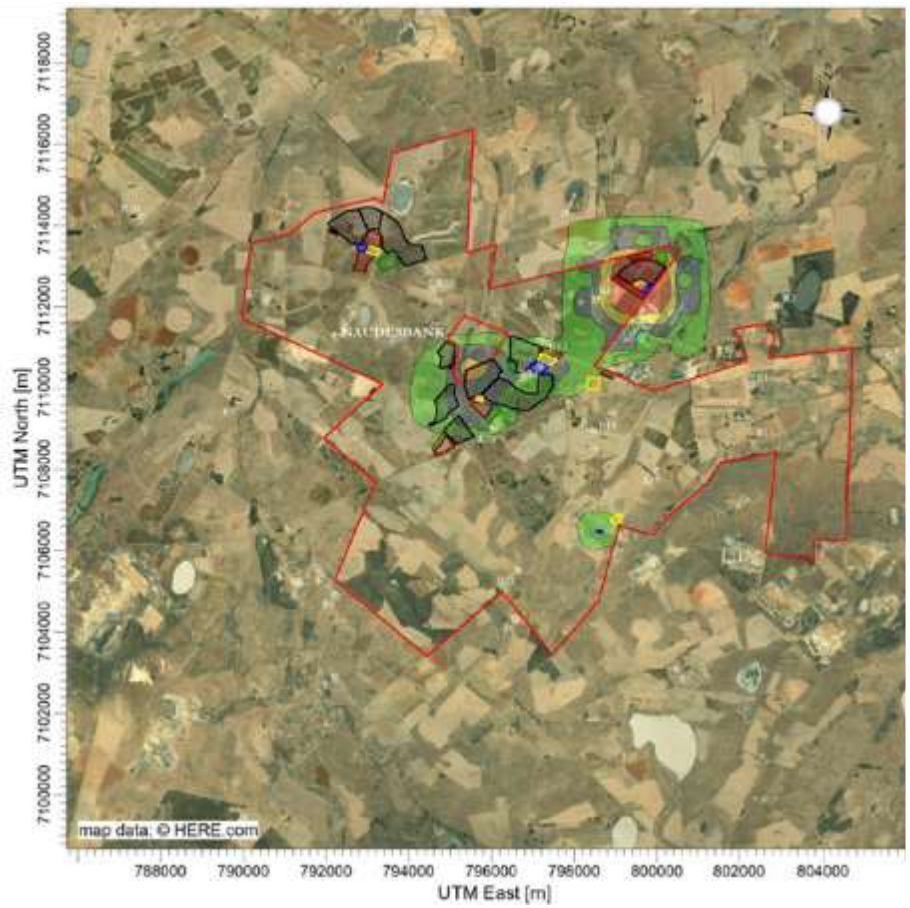
Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Daily Standard – 75 µg/m^3

Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Daily Standard – 75 µg/m^3

Figure 61: Maximum Daily Average PM_{10} Concentration – Year 2025 (Left) and Year 2030 (Right) Operational Phase

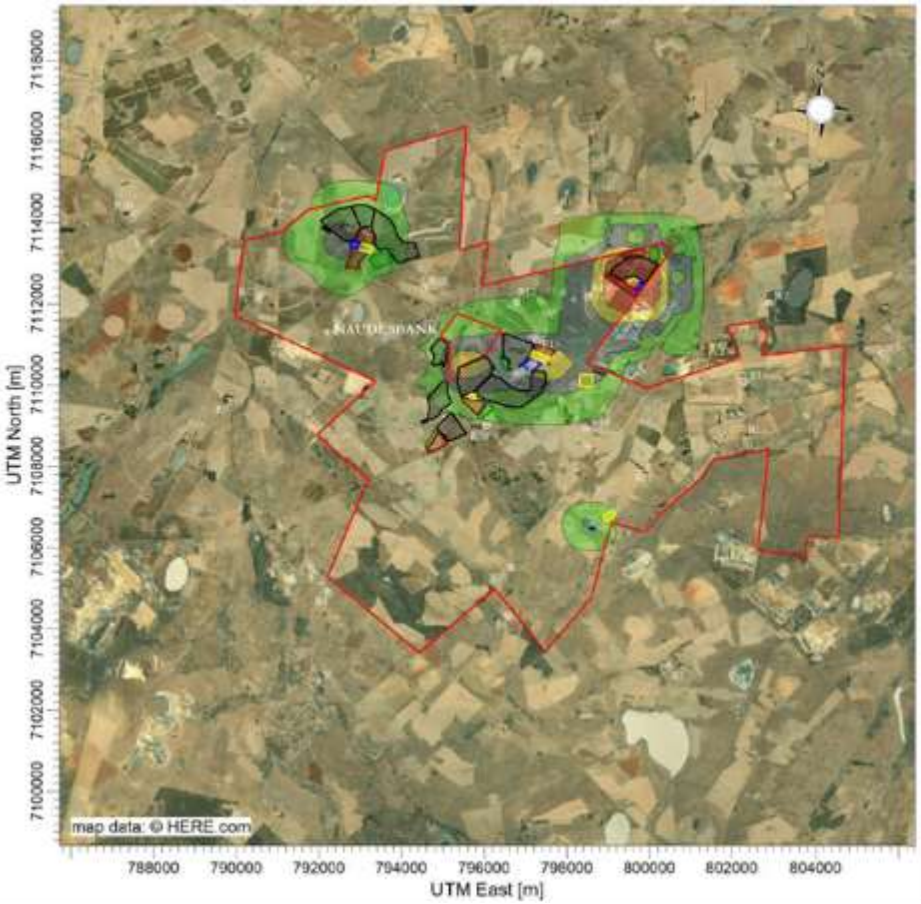


Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Annual Standard – 40 µg/m^3



Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Annual Standard – 40 µg/m^3

Figure 62: Annual Average PM_{10} Concentration – Year 2025 (Left) and Year 2030 (Right) Operational Phase



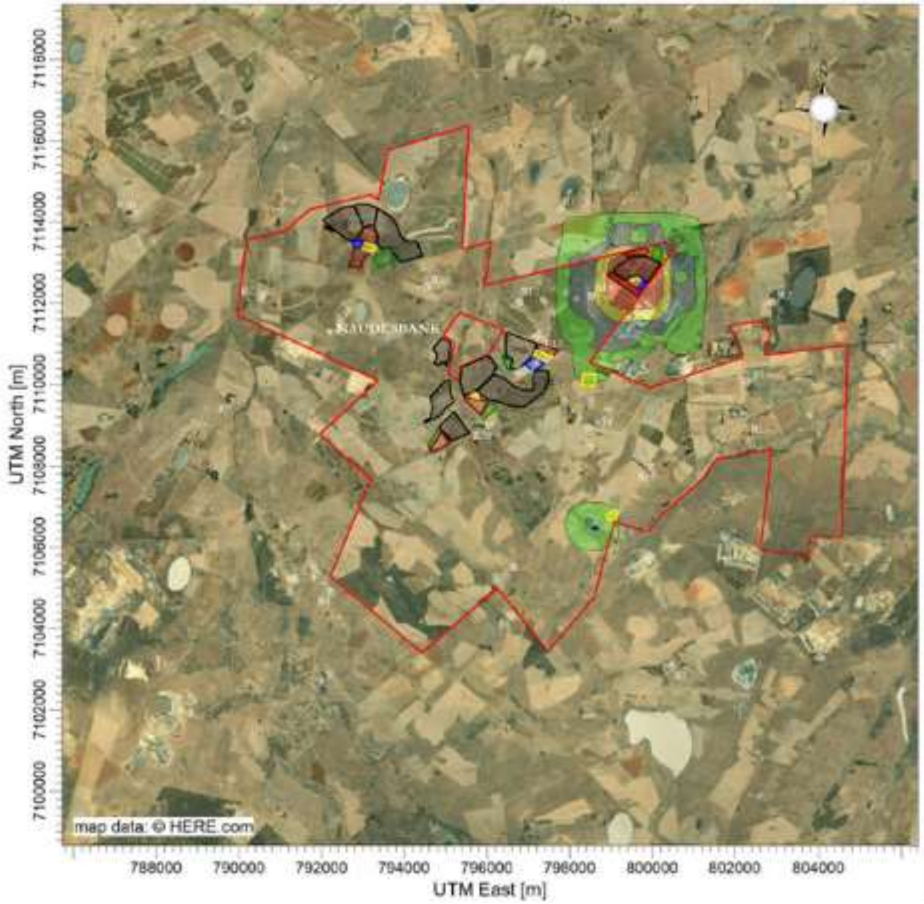
Red >Standard*

Yellow >50% of the Standard*

Blue >25% of the Standard*

Green >10% of the Standard*

* Daily Standard – 75 µg/m^3



Red >Standard*

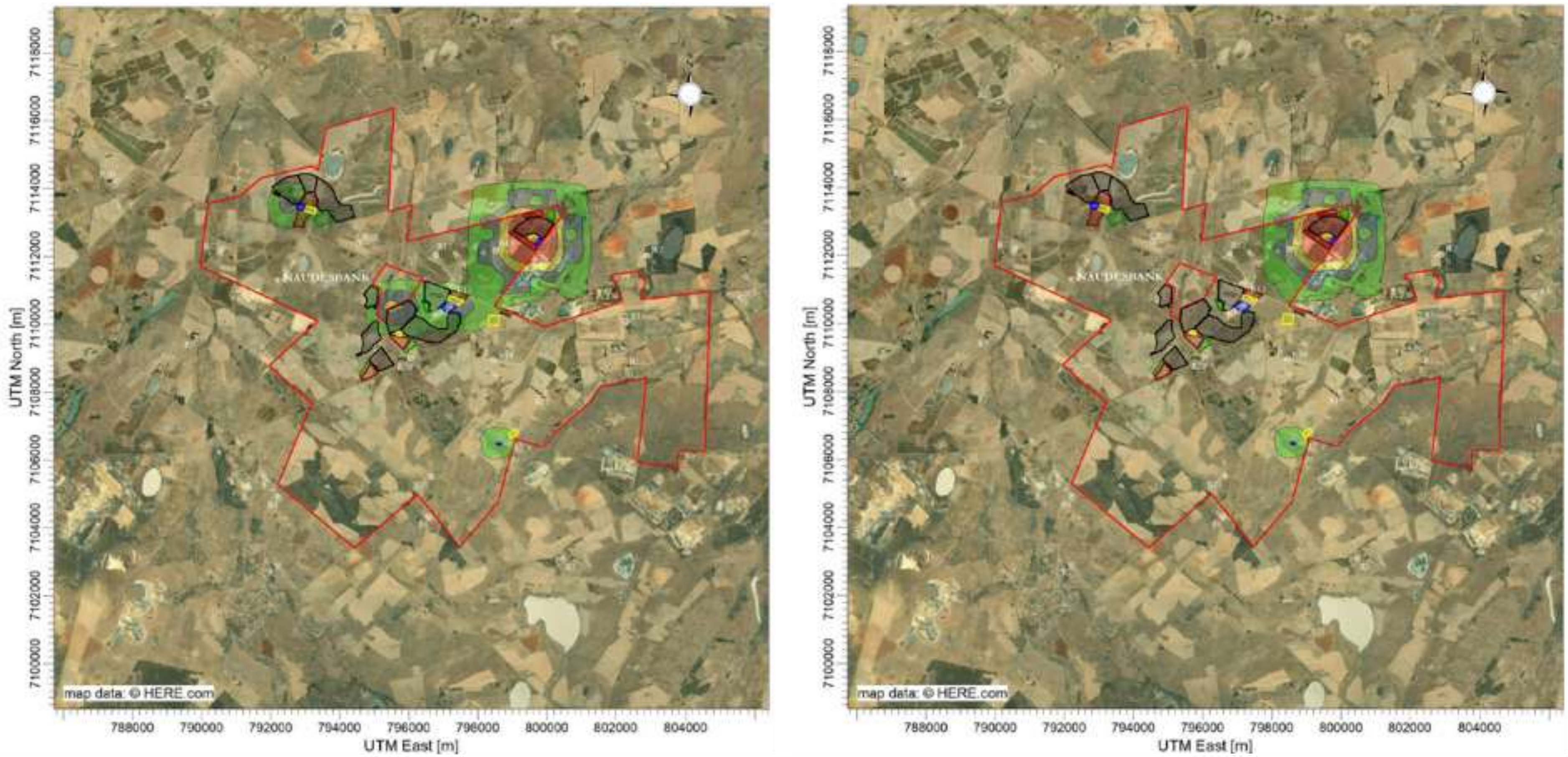
Yellow >50% of the Standard*

Blue >25% of the Standard*

Green >10% of the Standard*

* Daily Standard – 75 µg/m^3

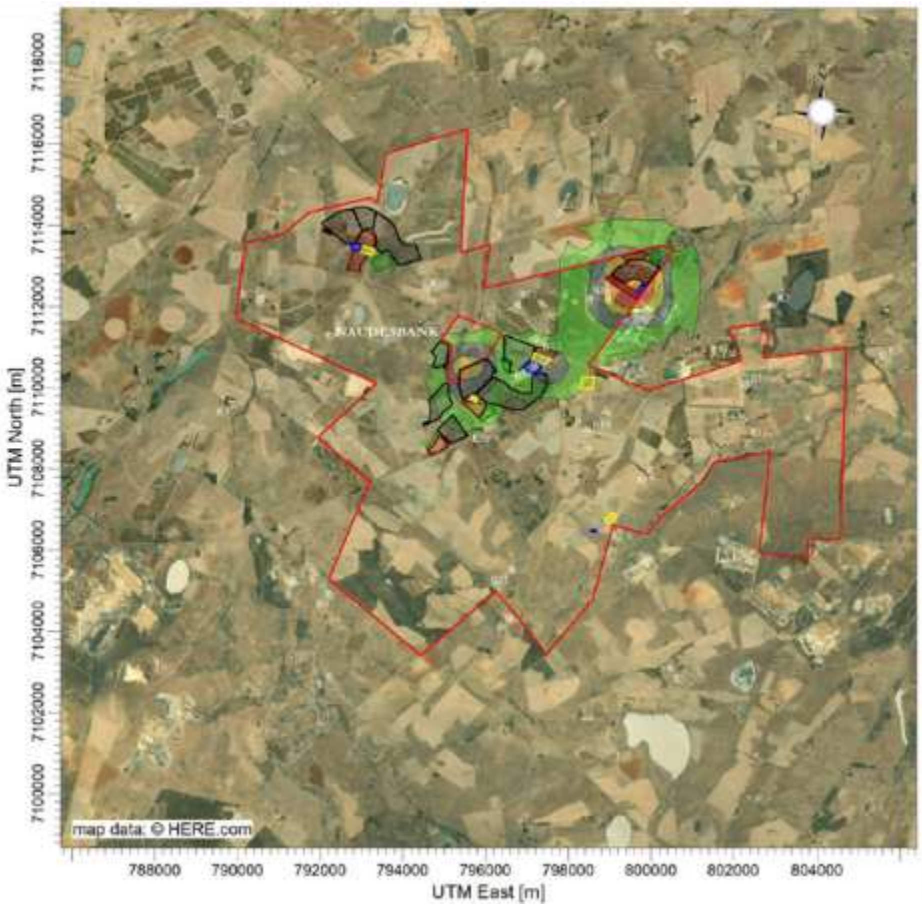
Figure 63: Maximum Daily Average PM_{10} Concentration – Year 2033 (Left) and Year 2054 (Right) Operational Phase

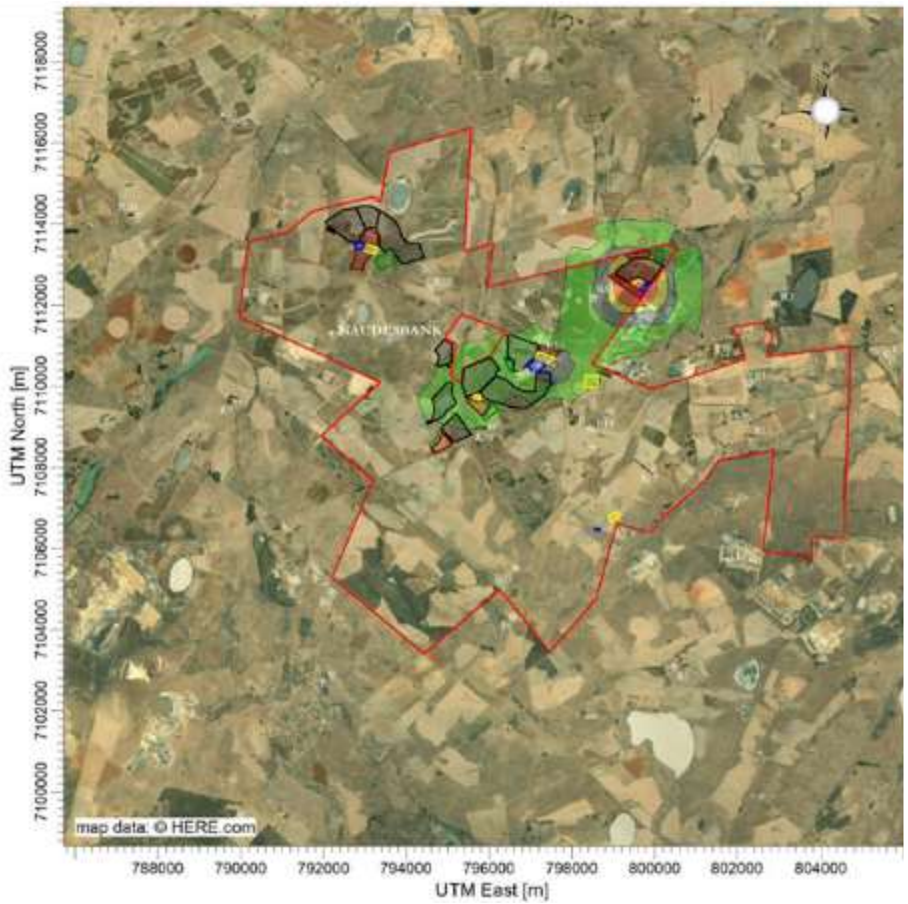


Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Annual Standard – 40 µg/m^3

Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
* Annual Standard – 40 µg/m^3

Figure 64: Annual Average PM_{10} Concentration – Year 2033 (Left) and Year 2054 (Right) Operational Phase

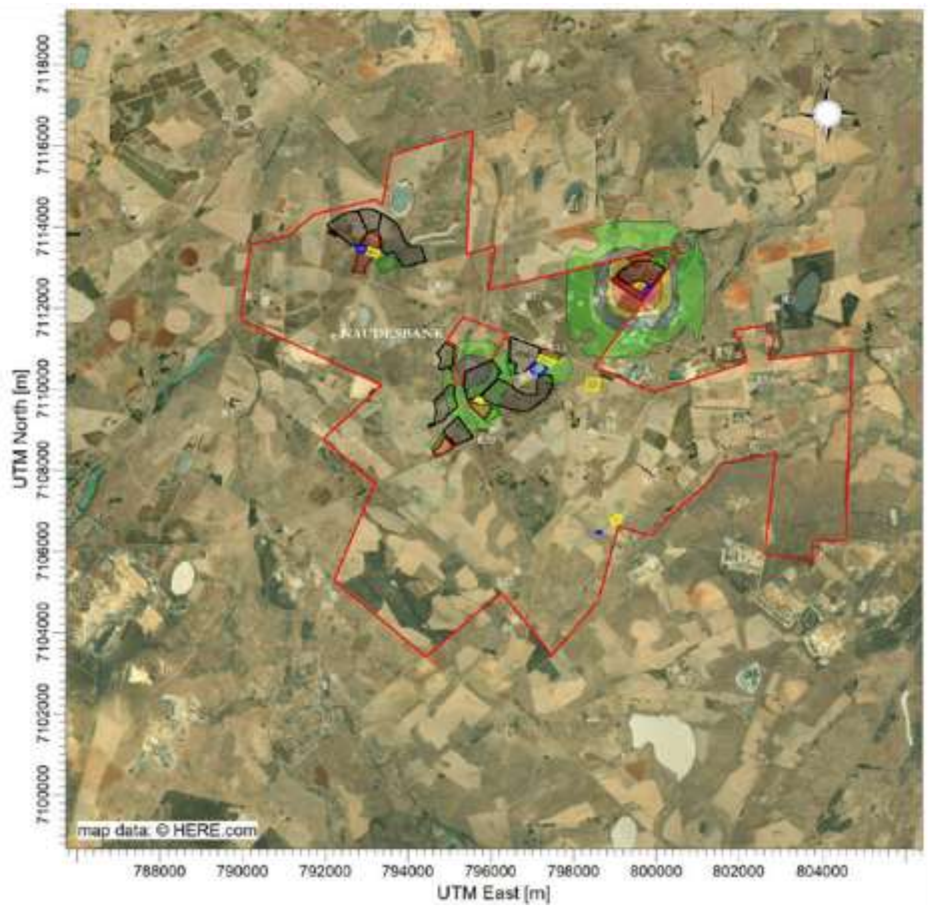




Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
*** Daily Standard – 40 µg/m^3**

Red >Standard*
Yellow >50% of the Standard*
Blue >25% of the Standard*
Green >10% of the Standard*
*** Daily Standard – 40 µg/m^3**

Figure 65: Maximum Daily Average PM$_{2.5}$ Concentration – Year 2025 (Left) and Year 2030 (Right) Operational Phase



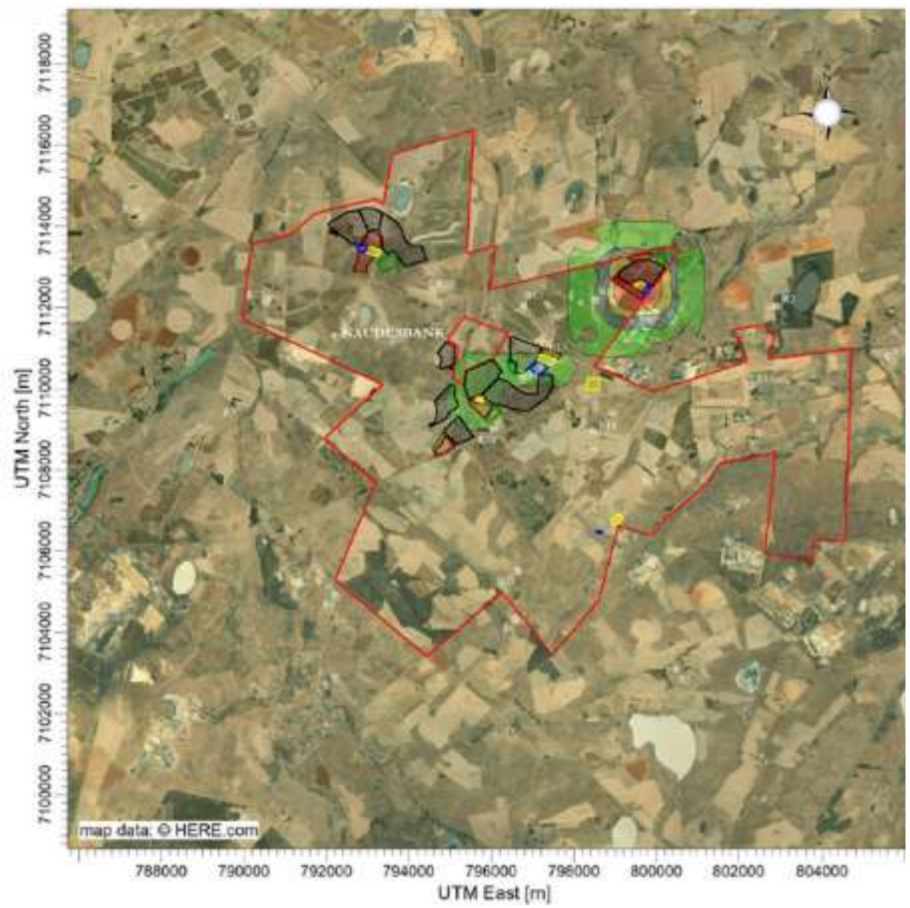
Red >Standard*

Yellow >50% of the Standard*

Blue >25% of the Standard*

Green >10% of the Standard*

*** Annual Standard – 20 µg/m^3**



Red >Standard*

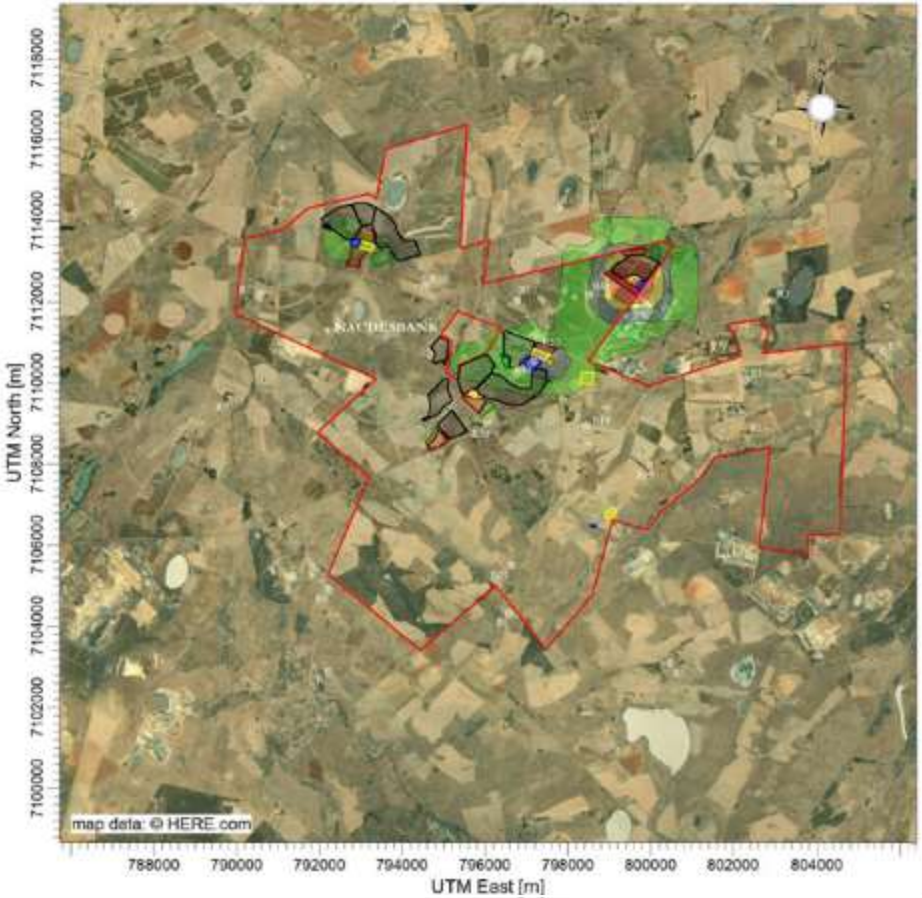
Yellow >50% of the Standard*

Blue >25% of the Standard*

Green >10% of the Standard*

*** Annual Standard – 20 µg/m^3**

Figure 66: Annual Average PM$_{2.5}$ Concentration – Year 2025 (Left) and Year 2030 (Right) Operational Phase



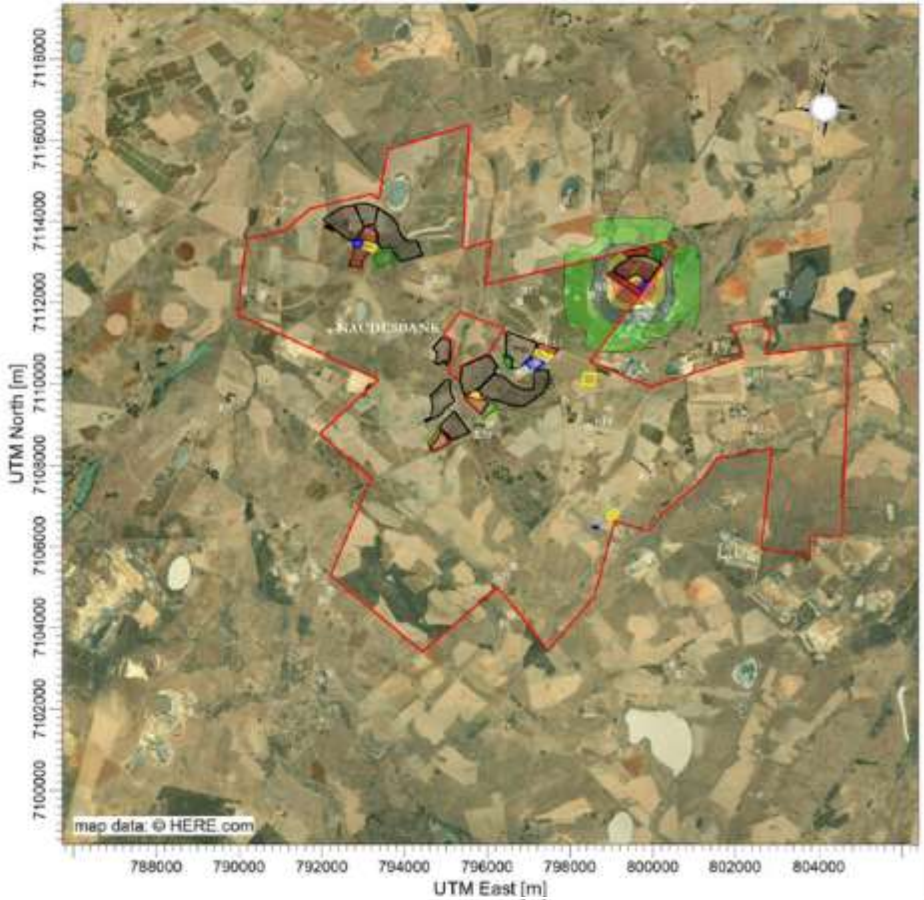
Red >Standard*

Yellow >50% of the Standard*

Blue >25% of the Standard*

Green >10% of the Standard*

*** Daily Standard – 40 µg/m³**



Red >Standard*

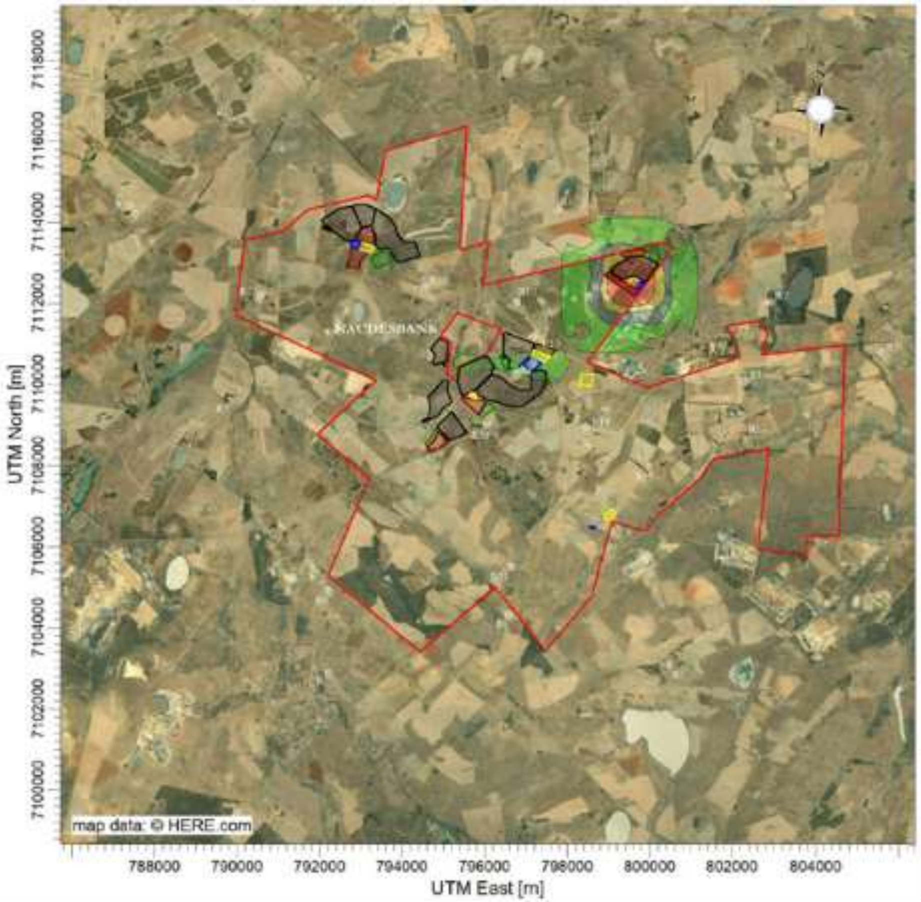
Yellow >50% of the Standard*

Blue >25% of the Standard*

Green >10% of the Standard*

*** Daily Standard – 40 µg/m³**

Figure 67: Maximum Daily Average $PM_{2.5}$ Concentration – Year 2033 (Left) and Year 2054 (Right) Operational Phase



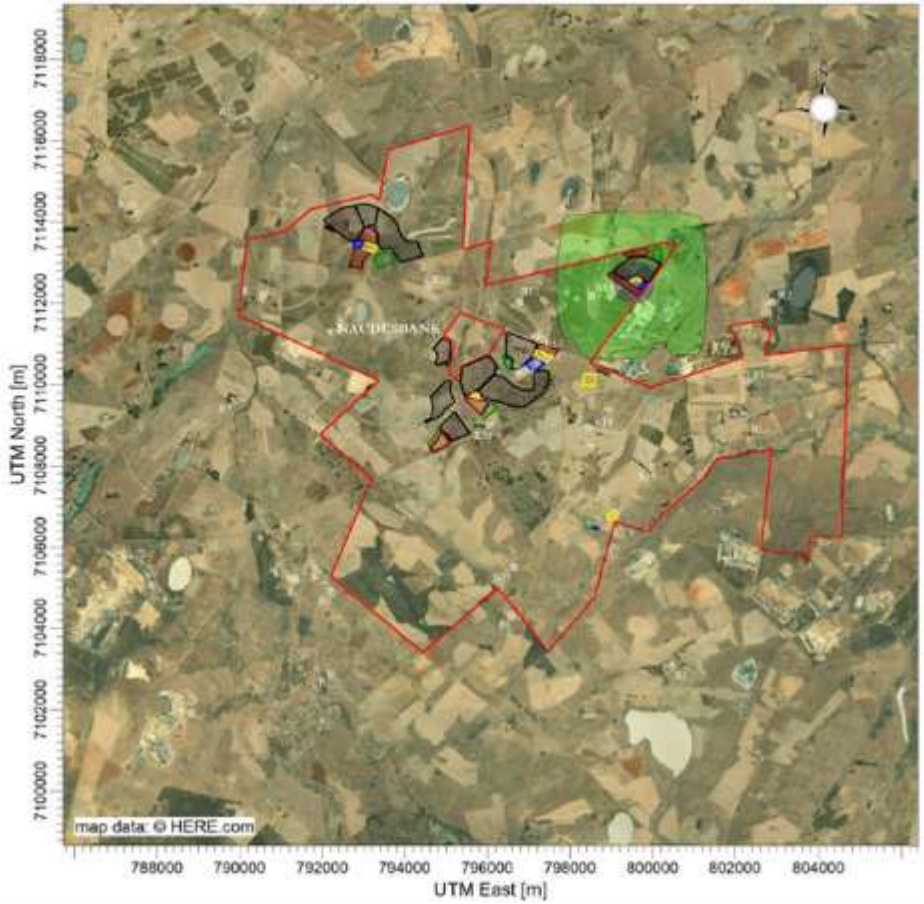
Red >Standard*

Yellow >50% of the Standard*

Blue >25% of the Standard*

Green >10% of the Standard*

* Annual Standard – 20 µg/m³



Red >Standard*

Yellow >50% of the Standard*

Blue >25% of the Standard*

Green >10% of the Standard*

* Annual Standard – 20 µg/m³

Figure 68: Annual Average $PM_{2.5}$ Concentration – Year 2033 (Left) and Year 2054 (Right) Operational Phase

As mentioned under **Section 9.4**, certain activities are applicable to all or the majority of the impacts. These impacts are tabulated below and if the impact is applicable to the activity, it is marked with a check mark.

Table 63: All Activities Impact Identification

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-Closure/Closure	Activity 1: Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)	Activity 2: Opencast Mining (including Stripping and Stockpiling of Topsoil)	Activity 3: Overburden Stockpiles and RoM Yards	Activity 4: Water Management Infrastructure	Activity 5: Roads	Activity 6: Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)
Deterioration of groundwater quality resulting from seeping contaminants due to spills or leakages (C, O, D).		✔	✔	✔	✔	✔
Alteration and deterioration of freshwater resources due to site clearance (C).		✔	✔	✔	✔	✔
Alteration and deterioration of freshwater resources due to construction of infrastructure (C).		✔	✔	✔	✔	✔
Alteration and deterioration of freshwater resources due to rehabilitation activities (D).		✔	✔	✔	✔	✔
Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat, Grassland Habitat and Habitat Connectivity)(C).		✔	✔	✔	✔	✔
Loss/alteration of Faunal Habitat and Diversity (Rocky Outcrop, Degraded Grassland and Transformed)(C).		✔	✔	✔	✔	✔
Loss/alteration of Faunal SCC including their Habitats (Freshwater Habitat, Grassland Habitat and Habitat Connectivity)(C).		✔	✔	✔	✔	✔
Loss/alteration of Faunal SCC including their Habitats (Rocky Outcrop, Degraded Grassland and Transformed)(C).		✔	✔	✔	✔	✔
Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands, Highveld Grasslands, Moist Grasslands, Pan Wetlands, Rocky Outcrops and Valley-bottom Wetlands)(C).		✔	✔	✔	✔	✔
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland, Modified Wetlands and Transformed Habitat)(C).		✔	✔	✔	✔	✔
Loss/alteration of Floral SCC and their Habitat (*Khadia carolinensis*, Sensitive species 1200, Forb-rich Wetland, Moist Grassland, Rocky Outcrops and Valley-bottom Wetlands)(C).		✔	✔	✔	✔	✔
Loss/alteration of Floral SCC and their Habitat (MNCA Protected Species, Provincially Important Species and Highveld Grassland)(C).		✔	✔	✔	✔	✔
Loss/alteration of Faunal SCC including their Habitats (Freshwater, Highveld and Moist Grassland Habitats)(O).		✔	✔	✔	✔	✔

Impact **Phase:** **C = Construction,** **O = Operational,** **D = Decommissioning,** **Clo = Post-Closure/Closure**	**Activity 1: Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)**	**Activity 2: Opencast Mining (including Stripping and Stockpiling of Topsoil)**	**Activity 3: Overburden Stockpiles and RoM Yards**	**Activity 4: Water Management Infrastructure**	**Activity 5: Roads**	**Activity 6: Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)**
Loss/alteration of Faunal SCC including their Habitats (Habitat Connectivity)(O).		✔	✔	✔	✔	✔
Loss/alteration of Faunal SCC including their Habitats (Rocky and Degraded Grassland Habitat)(O).		✔	✔	✔	✔	✔
Loss/alteration of Faunal SCC including their Habitats (Transformed)(O).		✔	✔	✔	✔	✔
Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat and Habitat Connectivity)(D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Faunal Habitat and Diversity (Rocky Outcrop, Degraded Grassland and Transformed)(D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Faunal Habitat and Diversity (Grassland Habitat)(D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Faunal SCC including their Habitats (Freshwater Habitat, Grassland Habitat and Habitat Connectivity)(D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Faunal SCC including their Habitats (Rocky Outcrop and Degraded Grassland)(D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Faunal SCC including their Habitats (Transformed)(D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands and Valley-bottom Wetlands) (D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Floral Habitat and Diversity (Highveld Grasslands and Moist Grasslands) (D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland, Modified Wetlands, Pan Wetlands, Rocky Outcrops and Transformed Habitat) (D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Floral SCC and their Habitat (Forb-rich Wetland, Moist Grassland and Valley-bottom Wetlands) (D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Floral SCC and their Habitat (*Khadia carolinensis*, MNCA Protected Species, Provincially Important Species and Rocky Outcrops) (D, Clo).		✔	✔	✔	✔	✔
Loss/alteration of Floral SCC and their Habitat (Sensitive species 1200 and Highveld Grassland) (D, Clo).		✔	✔	✔	✔	✔
Hydropedological losses (C, O, D).		✔	✔	✔	✔	✔
Deterioration/alteration/loss of soils though erosion, contamination, compaction as well as loss of agricultural land capability (C, O, D).		✔	✔	✔	✔	✔
Deterioration of air quality in the region (C, D).	✔	✔	✔	✔	✔	✔

Impact **Phase:** **C = Construction,** **O = Operational,** **D = Decommissioning,** **Clo = Post-Closure/Closure**	**Activity 1: Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)**	**Activity 2: Opencast Mining (including Stripping and Stockpiling of Topsoil)**	**Activity 3: Overburden Stockpiles and RoM Yards**	**Activity 4: Water Management Infrastructure**	**Activity 5: Roads**	**Activity 6: Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)**
Deterioration of air quality in the region (O).	✔	✔	✔	✔	✔	✔
Elevated noise levels during daytime disrupting surrounding communities (C).		✔	✔	✔	✔	✔
Elevated noise levels during night-time disrupting surrounding communities (C).		✔	✔	✔	✔	✔
Elevated noise levels during daytime and night-time disrupting surrounding communities (O, D).		✔	✔		✔	✔
Visual Intrusion, Change of Character and Sense of Place (C, O).		✔	✔	✔	✔	✔
Greenhouse Gas (GHG) Emissions (C, O, D).	✔	✔	✔	✔	✔	✔
Increased temperatures posing potential health risk to employees (C, O, D).	✔	✔	✔	✔	✔	✔
Increased wildfires resulting in damages (C, O, D).		✔	✔	✔	✔	✔
Water scarcity and drought constraining operations, increasing conflict with communities, and exacerbating dust deposition (C, O, D).	✔	✔	✔	✔	✔	✔
Water scarcity and drought further exacerbating water quality (C, O, D).	✔	✔	✔	✔	✔	✔
Extreme weather events (flooding) may occur resulting in damage to infrastructure, contaminated water entering natural environment and accessibility (C, O, D).	✔	✔	✔	✔	✔	✔
Increased wind speed and gusts may result in infrastructure damage or excessive dust generation (C, O, D).		✔	✔	✔	✔	✔
Damage to or the destruction of archaeological artefacts, structures and/or graves during earthworks and blasting (C, O).		✔	✔	✔	✔	✔
Damage to or the destruction of paleontological materials during earthworks (C, O).	✔	✔	✔	✔	✔	✔
Creation of temporary construction employment (C).	✔	✔	✔	✔	✔	✔
Employment and the generation of household income for the duration of the mining activities, including indirect and induced impacts within the local and regional economies (C, O).	✔	✔	✔	✔	✔	✔
Generation of revenue and contribution towards the local, regional and national economies (C, O, D).	✔	✔	✔	✔	✔	✔
Contribution to human resource and socio-economic development programmes (C, O).	✔	✔	✔	✔	✔	✔
Impact on agricultural land use and employment (C, O, D).	✔	✔	✔	✔	✔	✔
Disruption of day-to-day life and safety of road users (C, O, D).	✔	✔	✔	✔	✔	✔

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-Closure/Closure	Activity 1: Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)	Activity 2: Opencast Mining (including Stripping and Stockpiling of Topsoil)	Activity 3: Overburden Stockpiles and RoM Yards	Activity 4: Water Management Infrastructure	Activity 5: Roads	Activity 6: Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)
Damage to Infrastructure (O).	✔	✔	✔	✔	✔	✔
Influx of job seekers (C, O).	✔	✔	✔	✔	✔	✔
Increase in social pathologies and crime (C, O, D).	✔	✔	✔	✔	✔	✔
Loss of job opportunities due to downscaling of the mine employment (D).	✔	✔	✔	✔	✔	✔

Table 64: All Activities Impacts

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Groundwater											
Deterioration of groundwater quality resulting from seeping contaminants due to spills or leakages (C, O, D).	N	Long Term	Local	Moderate	Moderate	Highly Probable	Moderate	Moderate	Low	Low	Spill prevention and management plan must be developed and implemented.
Freshwater											
Alteration and deterioration of freshwater resources due to site clearance (C).	N	Short Term	Regional	High	Moderate	Definite	High	Low	Moderate	Low	All development footprint areas to remain within the approved footprint thereof, and vegetation clearing to be limited to what is essential within that footprint.
Alteration and deterioration of freshwater resources due to construction of infrastructure (C).	N	Short Term	Local	Moderate	Moderate	Highly Probable	Moderate	Moderate	Low	Low	No mixed concrete may be deposited outside of the designated construction footprint.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Alteration and deterioration of freshwater resources due to rehabilitation activities (D).	N	Short Term	Local	Moderate	Moderate	Definite	Moderate	Low	Moderate	Low	Ensure that soils are replaced in the correct layers, ripped and re-profiled post-closure, and that vegetation is restored to a point where succession will lead to the same conditions as the pre-mining state as a minimum.
Fauna and Flora											
Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat, Grassland Habitat and Habitat Connectivity)(C).	N	Short Term	Local	Moderate	Moderate	Definite	Moderate	Low	Moderate	Low	Prior to the commencement of proposed activities an alien vegetation management plan should be developed.
Loss/alteration of Faunal Habitat and Diversity (Rocky Outcrop, Degraded Grassland and Transformed)(C).	N	Short Term	Local	Low to Moderate	Moderate	Probable	Low	Low	Low	Low	Migratory corridors for faunal species movement between the sensitive areas must be planned for to limit habitat and species population fragmentation in the study area.
Loss/alteration of Faunal SCC including their Habitats (Freshwater Habitat, Grassland Habitat and Habitat Connectivity)(C).	N	Short Term	Local	Moderate	Moderate	Highly Probable	Moderate	Low	Low	Low	A walkdown of areas of increased sensitivity should be undertaken to search for potential SCC. Should any protected faunal species be noted within the proposed mining footprint, these species should be rescued and relocated, should they not move off on their own. In instances where such species require capture and relocation, a permit will have to be obtained from the relevant provincial or national authority for their translocation.
Loss/alteration of Faunal SCC including their Habitats (Rocky Outcrop, Degraded Grassland and Transformed)(C).	N	Short Term	Local	Moderate to Low	Moderate	Probable	Low	Low	Low	Low	
Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands, Highveld Grasslands, Moist Grasslands, Pan Wetlands, Rocky Outcrops and Valley-bottom Wetlands)(C).	N	Short Term	Local	Moderate	Moderate	Definite	Moderate	Moderate	Low	Low	It is recommended that prior to the commencement of construction activities that the construction servitude be clearly demarcated to prevent footprint creep into areas beyond the authorised footprints.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland, Modified Wetlands and Transformed Habitat)(C).	N	Short Term	Local	Low to Moderate	Moderate	Highly Probable	Low	Moderate	Low	Low	AIP management plans should be in place before the mining phase commences and AIP management should continue throughout all project phases.
Loss/alteration of Floral SCC and their Habitat (*Khadia carolinensis*, Sensitive species 1200, Forb-rich Wetland, Moist Grassland, Rocky Outcrops and Valley-bottom Wetlands)(C).	N	Short Term	Local	Moderate	Moderate	Highly Probable	Moderate	Moderate	Low	Low	Where feasible, all RDL plant species that will be lost due to clearing of vegetation must be replaced either during rehabilitation initiatives or through translocation to suitable habitat surrounding the disturbance footprint. The relocation site will need to be fenced-off (or somehow barricaded) and monitoring of relocated / transplanted species will be essential until it is evident that the species have successfully established.
Loss/alteration of Floral SCC and their Habitat (MNCA Protected Species, Provincially Important Species and Highveld Grassland)(C).	N	Short Term	Local	Low to Moderate	Moderate	Highly Probable	Low	Moderate	Low	Low	
Loss/alteration of Faunal SCC including their Habitats (Freshwater, Highveld and Moist Grassland Habitats)(O).	N	Permanent	Regional	Very High	Moderate	Definite	Very High	Low	High	Low	Should any faunal SCC be found on site, a suitably qualified specialist must be consulted as to the best way forward. Permits for relocation should be obtained from the relevant authorities.
Loss/alteration of Faunal SCC including their Habitats (Habitat Connectivity)(O).	N	Long Term	Regional	High	Moderate	Definite	High	Moderate	Moderate	Low	Bird diverters/visual markers to be place on upper strands of fences that are located within or adjacent to wetlands.
Loss/alteration of Faunal SCC including their Habitats (Rocky and Degraded Grassland Habitat)(O).	N	Long Term	Regional	High	Moderate	Probable	Moderate	Low	Low	Low	Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habit.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Faunal SCC including their Habitats (Transformed)(O).	N	Long Term	Regional	Low to Moderate	Moderate	Low	Low	Low	Low	Low	No on-site open fires are allowed.
Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat and Habitat Connectivity)(D, Clo).	N	Medium Term	Regional	High	Moderate	Highly Probable	Moderate	Low	Moderate	Low	All infrastructure and footprint areas should be rehabilitated in accordance with the rehabilitation plan.
Loss/alteration of Faunal Habitat and Diversity (Rocky Outcrop, Degraded Grassland and Transformed)(D, Clo).	N	Medium Term	Local	Low to Moderate	Moderate	Low	Low	Moderate	Very Low	Low	Edge effects such as erosion and AIP proliferation, which may affect adjacent or sensitive habitat, need to be strictly managed adjacent to the footprint areas as part of the rehabilitation phase.
Loss/alteration of Faunal Habitat and Diversity (Grassland Habitat)(D, Clo).	N	Medium Term	Local	Moderate	Moderate	Highly Probable	Moderate	Moderate	Low	Low	No hunting, trapping or setting of snares by operational or contract personnel is to be allowed.
Loss/alteration of Faunal SCC including their Habitats (Freshwater Habitat, Grassland Habitat and Habitat Connectivity)(D, Clo).	N	Medium Term	Regional	High	Moderate	Highly Probable	Moderate	Low	Moderate	Low	Habitat connectivity to be re-established within the landscape.
Loss/alteration of Faunal SCC including their Habitats (Rocky Outcrop and Degraded Grassland)(D, Clo).	N	Medium Term	Local	Moderate	Moderate	Highly Probable	Moderate	Moderate	Low	Low	
Loss/alteration of Faunal SCC including their Habitats (Transformed)(D, Clo).	N	Medium Term	Local	Low to Moderate	Moderate	Low	Low	Moderate	Very Low	Low	

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands and Valley-bottom Wetlands) (D, Clo).	N	Medium Term	Regional	High	Moderate	Highly Probable	Moderate	Low	Moderate	Low	All temporary structures, waste, rubble, AIPs etc. must be removed from the site before re-vegetating can commence.
Loss/alteration of Floral Habitat and Diversity (Highveld Grasslands and Moist Grasslands) (D, Clo).	N	Medium Term	Local	Moderate	Moderate	Highly Probable	Moderate	Moderate	Low	Low	Ongoing AIP monitoring and control should take place throughout the rehabilitation phase of the project.
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland, Modified Wetlands, Pan Wetlands, Rocky Outcrops and Transformed Habitat) (D, Clo).	N	Medium Term	Local	Low to Moderate	Moderate	Low	Low	Moderate	Very Low	Low	Any natural areas beyond the direct authorised footprint, which have been affected by the decommissioning activities, must be rehabilitated using indigenous species.
Loss/alteration of Floral SCC and their Habitat (Forb-rich Wetland, Moist Grassland and Valley-bottom Wetlands) (D, Clo).	N	Medium Term	Regional	High	Moderate	Highly Probable	Moderate	Moderate	Low	Low	Ensure sound implementation of AIP Management / Control Plan. AIP management must continue throughout the closure phase to ensure that AIPs don't spread into adjacent natural areas where floral SCC and protected species numbers (and habitat) may be displaced.
Loss/alteration of Floral SCC and their Habitat (*Khadia carolinensis*, MNCA Protected Species, Provincially Important Species and Rocky Outcrops) (D, Clo).	N	Medium Term	Local	Low to Moderate	Moderate	Low	Low	Moderate	Very Low	Low	Collection of floral SCC and protected flora by operational and maintenance teams must be prohibited.
Loss/alteration of Floral SCC and their Habitat (Sensitive species 1200 and Highveld Grassland) (D, Clo).	N	Medium Term	Regional	High	Moderate	Highly Probable	Moderate	Low	Moderate	Low	The rehabilitated areas must be able to sustain floral SCC, especially if such species are relocated into rehabilitated sites.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Hydropedology											
Hydropedological losses (C, O, D).	N	Long Term	Local	Moderate	Moderate	Definite	High	Moderate	Low	Low	Limit footprint disturbance and ensure that proper stormwater control measures are constructed.
Soil, Land Use and Land Capability											
Deterioration/alteration/loss of soils though erosion, contamination, compaction as well as loss of agricultural land capability (C, O, D).	N	Long Term	Site	Very High	Moderate	Definite	High	Moderate	Moderate	Low	Overburden should all be removed precisely up to the original natural surface. The surface should be thoroughly cross-ripped to a minimum depth of 400 mm to alleviate all compaction caused by the weight of the dumped material. The surface should then be smoothed with a disc-implement.
Air Quality											
Deterioration of air quality in the region (C, D).	N	Short Term	Regional	Low	Moderate	Highly Probable	Low	Moderate	Low	Low	Set speed limits of 40 km/h or less for site traffic.
Deterioration of air quality in the region (O).	N	Long Term	Regional	Moderate	Moderate	Highly Probable	Moderate	Moderate	Low	Low	Wet suppression of unpaved areas should be applied during dry windy periods, using a water car and/or sprinklers at a rate of more than 2.01 l/m^2/hour.
Noise											
Elevated noise levels during daytime disrupting surrounding communities (C).	N	Short term	Local	Very High	Moderate	Definite	High	Moderate	Low	Low	The mine must use available material (such as available topsoil) to construct a berm between the active mining areas (including the Vaalbult RoM area and eastern RoM area at Naudesbank) and the verified receptors. This berm should be as high as possible (at least 8 m recommended). This barrier/berm should only be constructed during the day-time period.
Elevated noise levels during night-time disrupting surrounding communities (C).	N	Short Term	Regional	Very High	Moderate	Definite	High	Moderate	Low	Low	The mine must implement a noise monitoring programme at residential dwellings in the area.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Elevated noise levels during daytime and night-time disrupting surrounding communities (O, D).	N	Long Term	Local	Very High	Moderate	Definite	High	High	Low	Low	Consider the use of white-noise reverse alarms on all mobile equipment.
Visual											
Visual Intrusion, Change of Character and Sense of Place (C, O).	N	Long Term	Regional	High	Moderate	Definite	High	Moderate	Moderate	Low	Concurrent/ progressive rehabilitation must be implemented and disturbed areas must be revegetated with indigenous vegetation as per the applicable vegetation rehabilitation and management plan as soon as areas become available.
Climate Change											
Greenhouse Gas (GHG) Emissions (C, O, D).	N	Long Term	International	Low	Low to Moderate	Highly Probable	Moderate	Very Low	Moderate	Low	Implementing of a fuel management strategy, which encourages more efficient use of plant and vehicles, planning, logistics, driver education and maintenance.
Increased temperatures posing potential health risk to employees (C, O, D).	N	Long Term	Regional	Low to Moderate	Moderate to Low	Highly Probable	Moderate	Low	Moderate	Low	Providing adequate cooling and ventilation.
Increased wildfires resulting in damages (C, O, D).	N	Long Term	Local	Low to Moderate	Moderate to Low	Highly Probable	Moderate	Very Low	Moderate	Low	Implementing adequate monitoring, fire detection and suppression systems.
Water scarcity and drought constraining operations, increasing conflict with communities, and exacerbating dust deposition (C, O, D).	N	Long Term	Local	High	Moderate	Highly Probable	Moderate	Low	Moderate	Low	Developing a water policy as to manage and minimise water usage. Setting clear objectives and targets to improve efficiency.
Water scarcity and drought further exacerbating water quality (C, O, D).	N	Long Term	Local	Low to Moderate	Moderate to Low	Highly Probable	Moderate	Very Low	Moderate	Low	Developing a contingency response plan in the event of short, medium, or long-term water shortages.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Extreme weather events (flooding) may occur resulting in damage to infrastructure, contaminated water entering natural environment and accessibility (C, O, D).	N	Long Term	Local	Moderate	Moderate to Low	Highly Probable	Moderate	Low	Moderate	Low	Conducting a site-specific flood risk assessment to identify areas vulnerable to flooding.
Increased wind speed and gusts may result in infrastructure damage or excessive dust generation (C, O, D).	N	Long Term	Local	Low to Moderate	Moderate to Low	Highly Probable	Moderate	Very Low	Moderate	Low	Performing regular maintenance checks for wind-related damage.
Heritage/Cultural & Socio-economic											
Damage to or the destruction of archaeological artefacts, structures and/or graves during earthworks and blasting (C, O).	N	Permanent	Site	Moderate	Low	Highly Probable	Moderate	Moderate	Low	Low	Obtain permits for structures to be demolished/refurbished that is deemed of cultural/heritage importance.
Damage to or the destruction of paleontological materials during earthworks (C, O).	N	Permanent	Site	Moderate	Low	Probable	Moderate	Low	Low	Low	If any palaeontological material is exposed during clearing, digging, excavating, drilling, or blasting SAHRA must be notified. All construction activities must be stopped, a 30 m no-go barrier constructed and a palaeontologist should be called in to determine proper mitigation measures.
Creation of temporary construction employment (C).	P	Temporary	Regional	Low to Moderate	Low	Definite	Moderate	-	-	-	Mitigation not required, positive impact should be enhanced by recommended measures in EMPr.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Employment and the generation of household income for the duration of the mining activities, including indirect and induced impacts within the local and regional economies (C, O).	P	Long Term	Regional	High	Low	Definite	Very High	-	-	-	Mitigation not required, positive impact should be enhanced by recommended measures in EMPr.
Generation of revenue and contribution towards the local, regional and national economies (C, O, D).	P	Long Term	National	High	Low	Definite	Very High	-	-	-	Mitigation not required, positive impact should be enhanced by recommended measures in EMPr.
Contribution to human resource and socio-economic development programmes (C, O).	P	Long Term	National	High	Low	Definite	Very High	-	-	-	Mitigation not required, positive impact should be enhanced by recommended measures in EMPr.
Impact on agricultural land use and employment (C, O, D).	N	Long Term	Site	High	Low	Definite	High	Low	Moderate	Low	Prioritise employment from local communities with the development of recruitment procedures and utilising the existing skills available from the local communities.
Disruption of day-to-day life and safety of road users (C, O, D).	N	Long Term	Local	Moderate	Moderate	Definite	High	Moderate	Low	Low	The blasting schedule must be circulated to all adjacent landowners, land occupiers and communities.
Damage to Infrastructure (O).	N	Long Term	Site	High	Moderate	Probable	Low	Moderate	Low	Low	Fair compensation must be agreed upon if structures are damaged as a result of mining activities at Naudesbank.
Influx of job seekers (C, O).	N	Long Term	Local	High	Moderate	Highly Probable	Moderate	Moderate	Low	Low	Prioritise employment from local communities with the development of recruitment procedures.
Increase in social pathologies and crime (C, O, D).	N	Long Term	Local	High	Moderate	Highly Probable	Moderate	Moderate	Low	Low	Employees and contractors should be identifiable by wearing clear marked identifiable clothing.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss of job opportunities due to downscaling of the mine employment (D).	N	Short Term	Local	High	Moderate	Definite	Moderate	Moderate	Low	Low	Implement portable skills development programmes to enable retrenched employees to find alternative employment.

9.4.2 Activity 1: Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)

Impact	Impact Discussion - Activity 1
Groundwater – Operational	
Deterioration of groundwater quality resulting from mining activities.	➢ It is unlikely that groundwater contamination plumes will develop during the operational phase. Groundwater seeping into the underground areas, should reflect background conditions.
Groundwater level drawdown impacting availability of water.	➢ Given the shallow depth of underground mining, shallow aquifers over almost the entire area above the underground will be impacted within the delineation shown in **Figure 69**.
Drawdown resulting from underground operations impacting surface water levels.	➢ Several wetlands are located within the dewatering zone. 11 ha Channelled Valley Bottom Wetlands, a 2 ha Depression Wetland and a 0.5 ha Hillslope Seep Wetland are located within 100 m from the VB-UG where the E-Seam coal floor is <35 m deep (borderline depth for having an influence). In the case of the JL-UG, 8 ha Channelled Valley Bottom Wetlands are located within these borderline zones. Local aquifer conditions and the wetland water mechanisms should be studied before definite conclusions can be reached.
Groundwater – Decommissioning and Closure	
Drawdown impacting groundwater and surface water levels. Recovery of groundwater and surface water levels once underground mining areas have flooded.	➢ The underground mining area will take many years to flood. Consequently, impacts on groundwater levels will continue. ➢ Monitoring boreholes and hydrocensus boreholes that fall within the impact zones are indicated in **Table 65** and **Figure 71**.
Deterioration of groundwater quality including decant potential resulting from underground operations.	➢ **Figure 70** shows the maximum extent of the contamination plumes which will extend from both the opencast pits and the underground sections (monitoring boreholes and hydrocensus boreholes that fall within the impact zones are indicated in **Table 65** and **Figure 71**). Plumes will overlap in near neighbouring pits (NB4 and VB1). ➢ If the underground adits are sealed, the eventual decant mechanism will be as summarised in **Table 66** and **Figure 72**. It will take a minimum of 25 years to decant, likely longer to flood, because the rate of infiltration may slow where the mine has already flooded in the lowest areas. If the underground sections were deeper, it would take longer to flood.
Deterioration of surface water quality including decant potential resulting from underground operations.	➢ Although several wetlands are located within the groundwater quality impact zone, these should not be impacted, because the contamination plumes should not be that shallow in these areas. ➢ If the underground adits are sealed, the eventual decant mechanism will be as summarised in **Table 66** and **Figure 72**. It will take a minimum of 25 years to decant, likely longer to flood, because the rate of infiltration may slow where the mine has already flooded in the lowest areas. If the underground sections were deeper, it would take longer to flood. ➢ Should decant materialise, impacts on surface water can be expected at decant localities.
Freshwater – Construction	
Alteration and deterioration of freshwater resources due	➢ Potential subsidence of surrounding environment if pillars are insufficient to support the ground. ➢ Water entering the underground mining area as a result of ingress into underground mine workings may necessitate dewatering of the underground mining area, which may result in the discharge of dirty water into the surrounding wetland environment.

Impact	Impact Discussion - Activity 1
to underground mining preparation and construction of associated infrastructure.	➢ Containment of water from dewatering has potential for creation of a cone of depression, which may drain water from surrounding wetland habitats, thus resulting in desiccation of the wetlands. ➢ Potential spillage of oils/hydrocarbons from construction vehicles.
Freshwater – Operational	
Alteration and deterioration of freshwater resources due to underground mining.	➢ Potential destabilisation of surrounding environment through the further excavation of underground mining corridors and subsequent potential subsidence of the land.
Freshwater – Decommissioning and Closure	
Alteration and deterioration of freshwater resources due to decant.	➢ Contamination of water within the receiving environment, and subsequent reduction in water quality (increase in salts and specific contaminants of concern including trace heavy metals associated with reduced pH). ➢ Subsequent negative impacts on biota and vegetation. ➢ Altered flow regimes (increased hydroperiod). ➢ Habitat degradation.
Geology – All Phases	
Disturbance of natural geology.	➢ Drilling and blasting of the proposed mine areas will permanently destroy the geological strata located in these areas.
Loss of non-renewable coal resource.	➢ Mining of the coal resource will result in the usage and permanent removal of a non-renewable resource. No mitigation is possible. However, it will be to the benefit of the local, regional and national economy of South Africa.

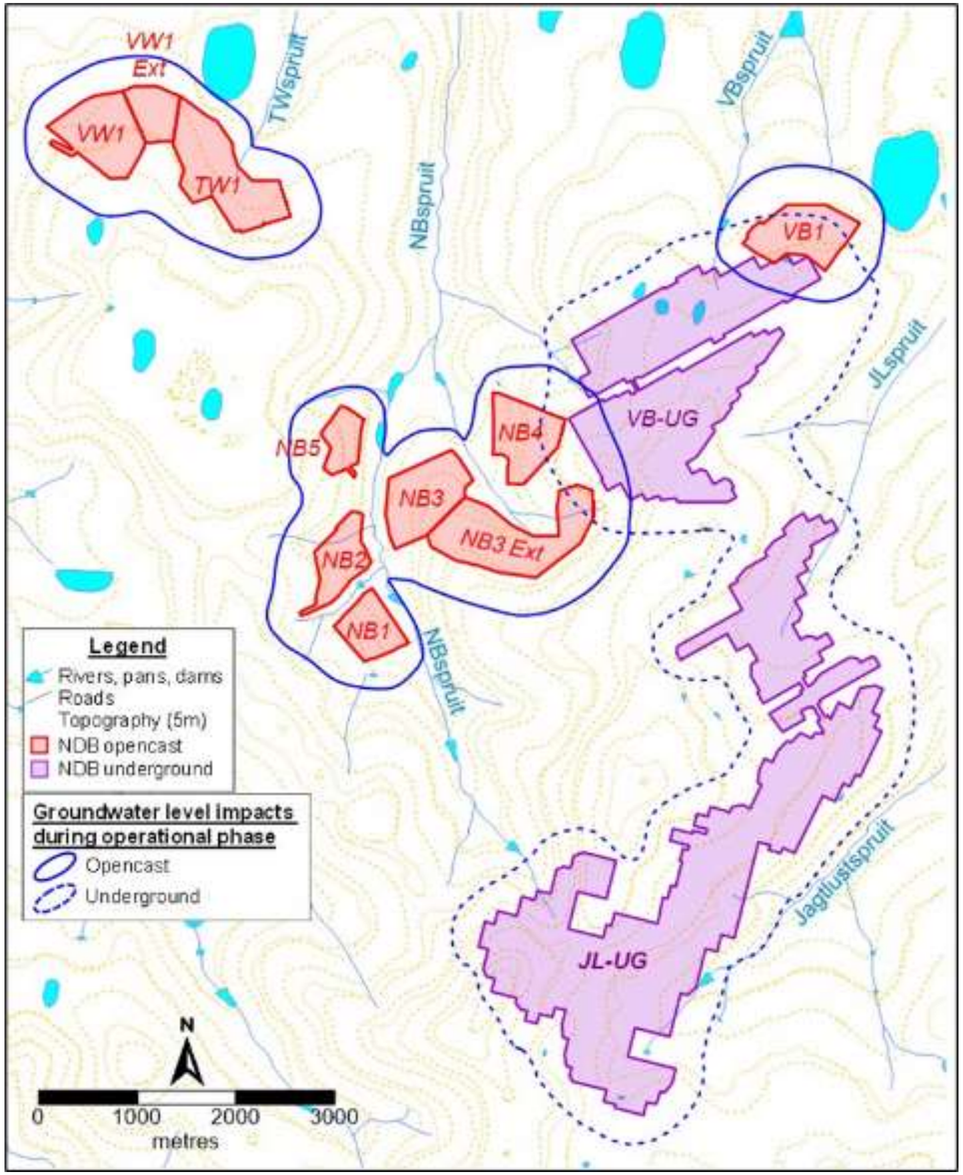


Figure 69: Groundwater level drawdown

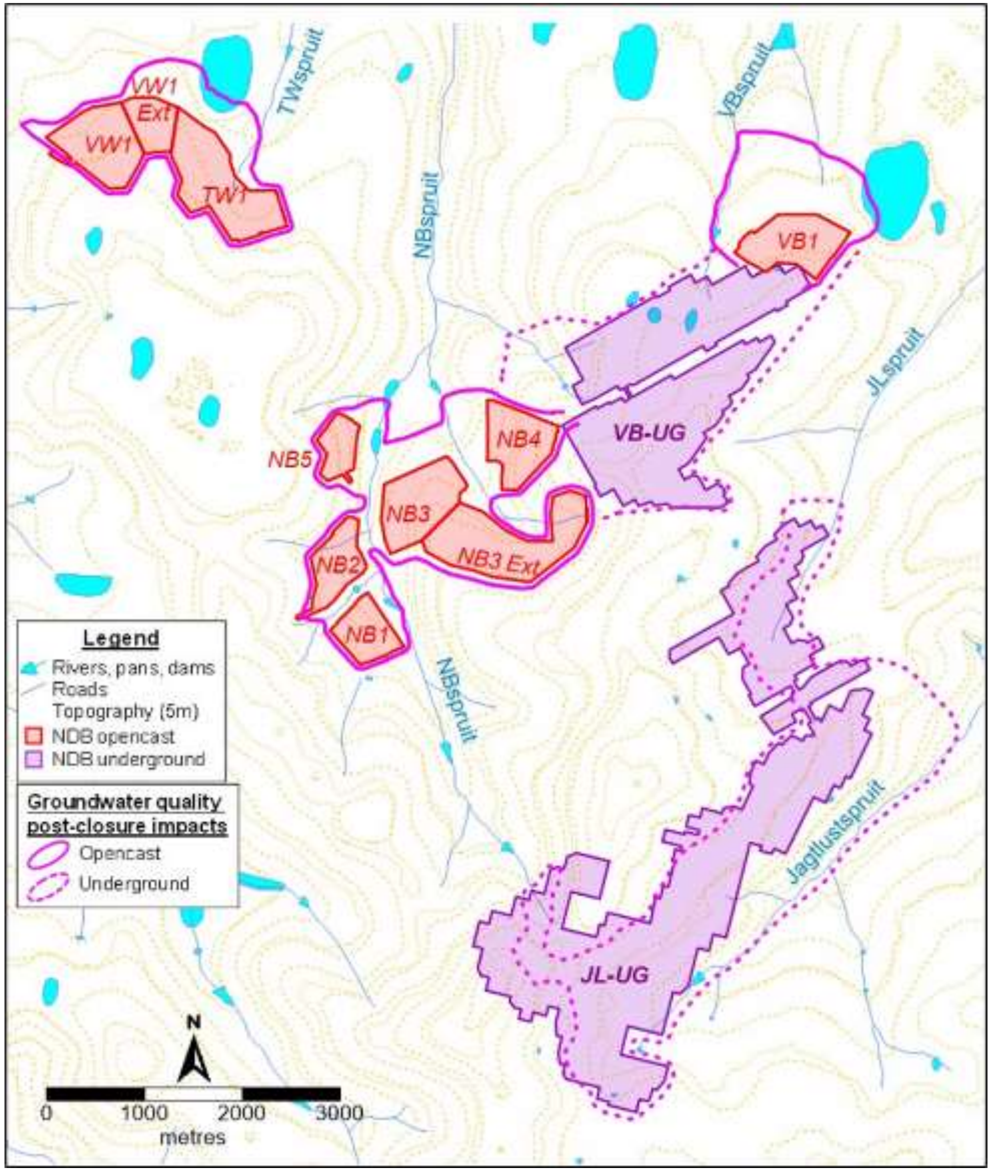


Figure 70: Groundwater qualities impacted zones for opencast and underground mining

Table 65: Monitoring boreholes and external users that might be impacted by mining activities

Label	Operational Phase Impact			Post-mining Impact		Farm		Site Status
	Groundwater Levels		Groundwater Quality	Groundwater Levels	Groundwater Quality	Owner	Name	
	Opencast	Underground						
EUB-03		Potential				Gideon Gebhardt	Portion 16 of the Farm Naudesbank 172 IS	Not in Use
EUB-05		Yes				Martina Breedt	Portion 4 of the Farm Naudesbank 172 IS	In Use
EUB-06		Yes			Potential			In Use
EUB-07		Yes			Potential			Not in Use
EUB-08		Yes			Potential			Not in Use
EUB-09		Yes			Potential			Not in Use
EUB-13	Yes			Potential		CB de Villiers	Portion 1 of the Farm Naudesbank 172 IS	In Use
EUB-14	Yes							In Use
EUB-17		Potential				CB de Villiers	Portion 5 of the Farm Naudesbank 172 IS	In Use
EUB-18	Dry					Gysbert Samuel Kleyn	Portion 2 of the Farm Jaglust 47 IT	Not in Use
EUB-19	Destroyed							Destroyed
EUB-20	Blocked							Not in Use
EUB-21		Yes		Not in Use	Yes			Not in Use
EUB-22		Yes		Potential	Yes			In Use
EUB-23								Not in Use
EUB-24		Yes		Potential	Yes			Not in Use
EUB-25	Dry							Not in Use
EUB-26		Potential		Not in Use		Gysbert Samuel Kleyn	Portion 6 of the Farm Naudesbank 172 IS	Not in Use
EUB-27		Potential						In Use
EUB-42	Will be Mined Out					Gene Wright	Portion 3 of the Farm Vaalwater 173 IS	In Use
EUB-43	Will be Mined Out					Gene Wright	Portion 8 of the Farm Naudesbank 172 IS	Not in Use
EUB-44	Yes	Yes			Yes			In Use
EUB-45	Yes	Yes			Potential			Not in Use

Label	Operational Phase Impact			Post-mining Impact		Farm		Site Status
	Groundwater Levels		Groundwater Quality	Groundwater Levels	Groundwater Quality	Owner	Name	
	Opencast	Underground						
EUB-54		Yes				Sarel van der Merwe	Portion 6 of the Farm Vaalbult 3 IT	Not in Use
EUB-55	Yes	Yes			Yes		Portion 5 of the Farm Vaalbult 3 IT	In Use
EUB-57		Yes			Potential		Portion 12 of the Farm Vaalbult 3 IT	
EUB-58	Yes	Yes			Yes		Portion 5 of the Farm Vaalbult 3 IT	
EUF-01	Yes	Yes			Potential	Gideon Gebhardt	Portion 7 of the Farm Naudesbank 172 IS	In Use
EUF-02	Yes					Gideon Gebhardt	Portion 13 of the Farm Naudesbank 172 IS	In Use
EUF-03						Martina Breedt	Portion 4 of the Farm Naudesbank 172 IS	In Use
EUF-04								
EUF-05								
EUF-06								
EUF-08		Potential				Gysbert Samuel Kleyn	Portion 2 of the Farm Jaglust 47 IT	In Use
EUF-13	Yes	Yes				Gene Wright	Portion 8 of the Farm Naudesbank 172 IS	In Use
EUF-14		Potential				Sarel van der Merwe	Portion 6 of the Farm Vaalbult 3 IT	In Use
NBH-2M	Will be Mined Out					PF Janse van Rensburg	Portion 3 of the Farm Twyfelaar 173 IS	Hydrogeological Boreholes
NBH-6M	Will be Mined Out					Gene Wright	Portion 8 of the Farm Naudesbank 172 IS	
NBH-6S	Will be Mined Out							
NBH-8M		Yes			Potential	Gysbert Samuel Kleyn	Portion 6 of the Farm Naudesbank 172 IS	
NBH-10D						South32 SA Coal Holdings (Pty) Ltd	Portion 2 of the Farm Kromkrans 208 IS	
NBH-10S								

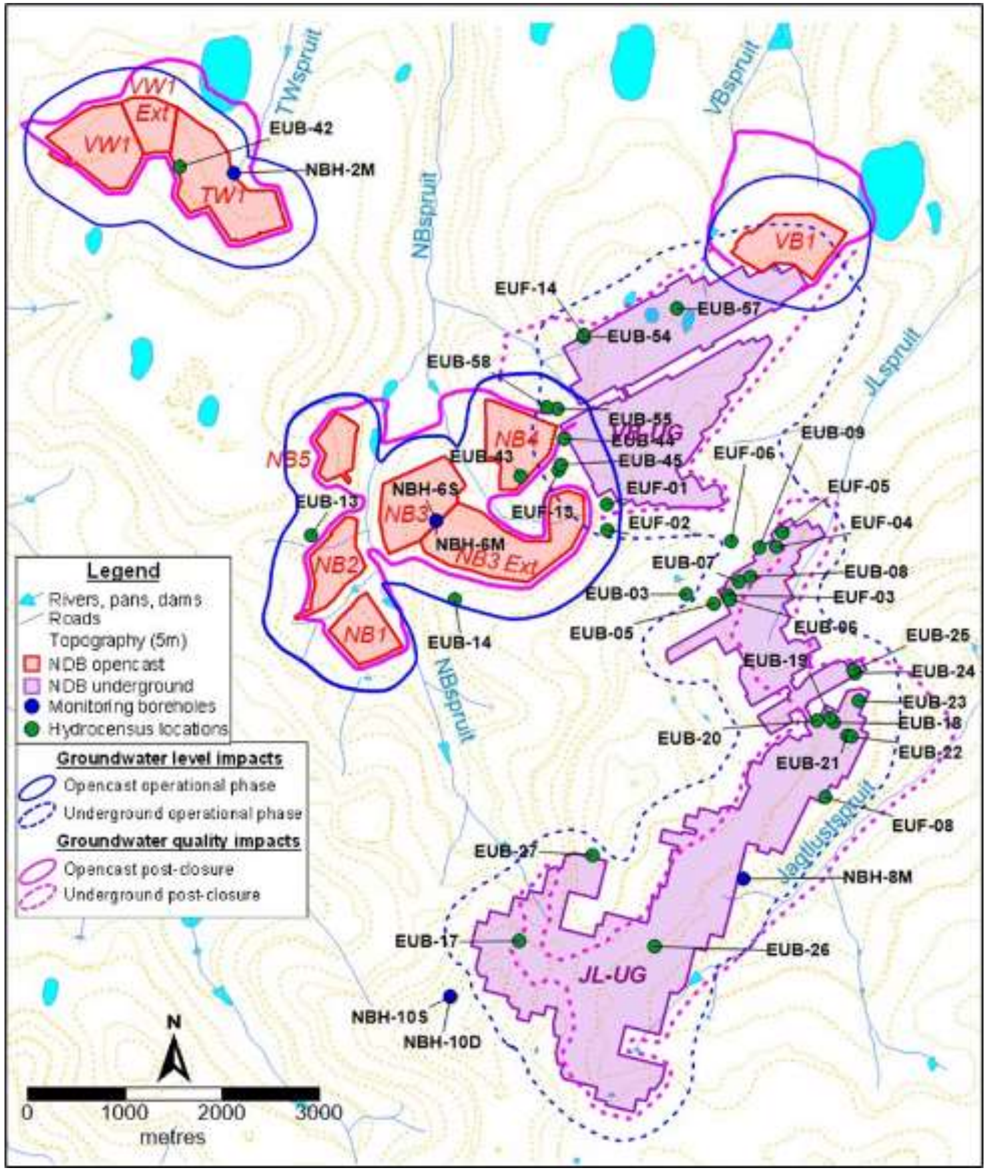


Figure 71: Monitoring boreholes and external users that might be impacted by mining activities

Table 66: Summary of long-term post-mining decant and baseflow zones from the underground

Decant / Base-flow Zone #		Decant Type	Decant Volume (m^3/d) Individual Zones	Decant Volume (m^3/d) All Decant		Decant SO_4 Concentration (mg/l)	Comment on Location of Decant
VB-UG	Northern portion of underground	Main	120	120	2 040	2 000	Tributary of Naudesbankspruit.
		Seep 1	80	440		1 300	Tributary of Naudesbankspruit.
		Seep 1	360			1 100	Via connection to nearby southern opencast NB4 to tributary of Naudesbankspruit.
		Seep 2	20	1 480		250	Via connection to nearby southern opencast NB4 to tributary of Naudesbankspruit.
		Seep 2	940			250	Via connection to nearby southern opencast NB3ext to Naudesbankspruit.
		Seep 2	520			150	Via connection to nearby southern opencast VB1 to Vaalbultspruit.
JL-UG	North	Main	20	20	215	1 800	Jagtlustspruit.
		Seep 2	140	195		1 400	Jagtlustspruit.
		Seep 2	50			500	Jagtlustspruit.
		N/A	5			556	Jagtlustspruit.
	South	Main	210	1 060	1 485	1 700	Jaglust direction.
		Main	850			1 700	Jaglust direction.
		Seep 2	40	40		500	Jaglust direction.
		Seep 1	150	385		900	Jaglust direction.
		Seep 1	230			900	Downstream Jaglustspruit.
		Seep 1	5			1 178	Downstream Jaglustspruit.

“Seep1” = near pit, slightly diluted “Seep2” = further from pit, more diluted to <1000mg/L

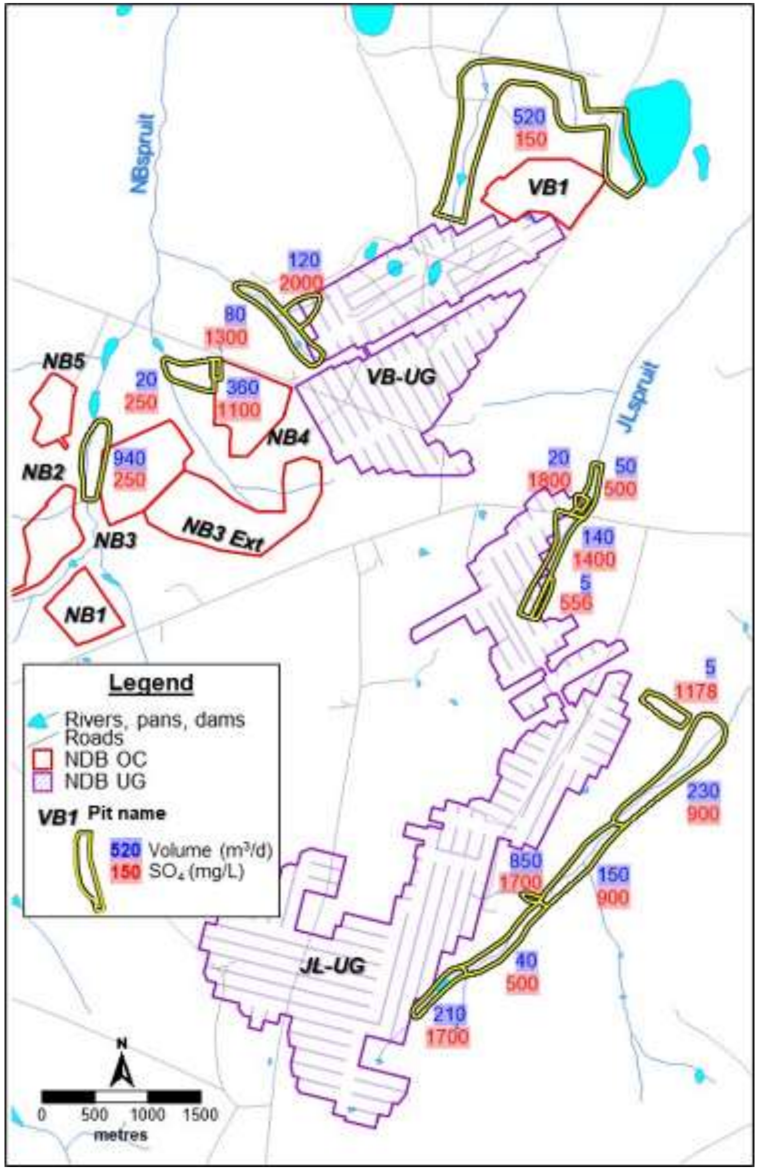


Figure 72: Long-term post-mining decant and baseflow zones (underground)

Table 67: Impact Assessment – Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Groundwater											
Deterioration of groundwater quality (O).	N	Long Term	Local	Moderate	Moderate	Probable	Low	Moderate	Low	Low	Conduct water quality monitoring.
Drawdown resulting from underground operations impacting surface water levels (O).	N	Long Term	Local	High	Moderate to Low	Probable	Moderate	Low	Low	Low	Water volumes of wetlands potentially impacted must be monitored on a bi-annual basis. A baseline must be established prior to the commencement of mining for both the wet and dry season.
Deterioration of surface water quality (O).	N	Long Term	Local	Moderate	Moderate	Unlikely	Very Low	Moderate	Very Low	Low	Surface water monitoring must be undertaken.
Drawdown impacting groundwater and surface water levels (D, Clo).	N	Long Term	Local	Moderate	Moderate	Definite	High	Moderate	Low	Low	Provide alternative water/compensation to users should they be impacted by the operations.
Recovery of groundwater and surface water levels once underground mining areas have flooded (Clo).	P	Permanent	Local	Very High	Low	Definite	Very High	-	-	Low	Positive impact – no mitigation required.
Deterioration of groundwater quality including decant potential resulting from underground operations (D, Clo).	N	Long Term	Site	Moderate	Moderate	Highly Likely	Moderate	Moderate	Low	High	Update geohydrological model every two years.
Deterioration of surface water quality including decant potential resulting from underground operations (D, Clo).	N	Long Term	Local	High	Moderate	Definite	High	Moderate	Low	High	A post-closure water management plan must be developed and implemented.
Freshwater Resources											

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Alteration and deterioration of freshwater resources due to underground mining preparation and construction of associated infrastructure. (C).	N	Short Term	Regional	High	Moderate	Definite	High	Low	Moderate	Low	All exposed soil must be protected for the duration of the construction phase to prevent erosion and sedimentation of the downgradient wetlands.
Alteration and deterioration of freshwater resources due to underground mining. (O)	N	Long Term	Regional	Moderate	Moderate	Definite	High	Low	Moderate	Low	Underground mining closer to the surface should be carried out with extreme caution to ensure that the subsurface process sustaining the wetland systems are not impaired.
Alteration and deterioration of freshwater resources due to decant (D, Clo).	N	Long Term	Regional	Moderate	Moderate	Definite	High	Low	Moderate	High	Post-closure water management plan must be developed and implemented.
Geology											
Disturbance of natural geology (C, O, D, Clo).	N	Permanent	Site	Very High	Low	Definite	Very High	Low	Very High	Low	No mitigation possible.
Use and loss of non-renewable coal resource (C, O, D, Clo).	N	Permanent	Site	Very High	Low	Definite	Very High	Low	Very High	Low	No mitigation possible.

9.4.3 Activity 2: Opencast Mining (including Stripping and Stockpiling of Topsoil)

As mentioned, some impacts are only applicable to one activity during a particular phase of the project. The other impacts during various project phases were already discussed under **Section 9.4.1**.

Impact	Impact Discussion - Activity 2
Groundwater – Operational	
Deterioration of groundwater quality resulting from mining activities.	➢ During the operational phase, groundwater flow will be predominantly towards the pits. Therefore, the chance of contamination plumes associated with these mining operations is very unlikely. Groundwater flow into the pits is expected to reflect background groundwater qualities.
Groundwater level drawdown impacting availability of water.	➢ During the early stages of mining, dewatering should be limited to the boundaries of opencast mining, where the most significant groundwater level drawdown effect will occur, gradually expanding outward, having a cumulative impact, where overlapping with neighbouring pits. ➢ The groundwater level impact zones in **Figure 69** indicates typical impact zones of 150 m to 250 m on the downstream sides of pits and 250 m to 400 m on the upstream sides of the pits.
Deterioration of surface water quality.	➢ Several wetlands are located within the groundwater quality impact zone, these should not be impacted, because the contamination plumes should not be that shallow in these areas
Groundwater – Decommissioning and Closure	
Dewatering impacting water levels until opencast pits are flooded. Recovery of groundwater levels once pits have flooded.	➢ As the opencasts continue to fill, the dewatering cones will retract around most opencasts. The dewatering cones may continue to expand slightly in some opencasts where the final groundwater table is lower compared to the pre-mining situation before retracting again as the opencast fills up over time. Until the opencast's groundwater levels flood, groundwater flow will mainly be towards the opencast. ➢ The post-mining dewatering cones will differ slightly from the dewatering cones during the operational phase but not extend further than the zones indicated in **Figure 69**. ➢ Monitoring boreholes and hydrocensus boreholes that fall within the impact zones are indicated in **Table 65** and **Figure 71**.
Deterioration of groundwater quality including decant potential resulting from opencast operations.	➢ **Figure 70** shows the maximum extent of the contamination plumes which will extend from both the opencast pits and the underground sections. ➢ Monitoring boreholes and hydrocensus boreholes that fall within the impact zones are indicated in **Table 65** and **Figure 71**. ➢ **Figure 73** shows the post-mining decant zones and **Table 68** the volumes, concentrations, etc. ➢ As shown in **Figure 74**, groundwater contamination plumes will develop in the direction of groundwater flow. All pits are expected to decant directly to the surface, but seepage zones will develop further downstream due to the formation of groundwater contamination.
Deterioration of surface water quality including decant potential resulting from opencast operations.	➢ Although direct decant and high concentrations seepage zone will contribute eight times more contaminated water than seepage zones developing further away from pits within the local surface receiving environment, such seepages might develop in the local non-perennial rivers. Refer to **Figure 73** and **Table 68**. ➢ The contamination plumes will continue to expand over time, resulting in deteriorating base-flow water quality where the plume enters the local non-perennial river system. Refer to **Figure 74**. ➢ In addition, such contaminated seepages can result in contaminated surface water run-off or salts precipitating, which may, in turn, be transported further by rainfall run-off.

Impact	Impact Discussion - Activity 2
	➢ **Figure 70** shows the maximum extent of the contamination plumes which will extend from both the opencast pits and the underground sections.
Fauna and Flora – Operational	
Loss/alteration of faunal habitat and diversity.	➢ Loss of faunal habitat displacing species including potential SCC. ➢ Loss of suitable food resources, breeding grounds. ➢ Habitat fragmentation within the landscape. ➢ Loss or degradation of faunal habitat, diversity, and potential SCC within the direct footprint and adjacent areas of the proposed development. ➢ Fauna including potential SCC may not be able to escape ahead of clearance activities and may be killed by machinery and construction activities. ➢ Isolation of faunal species and smaller populations thereof with limited movement ability, reducing overall movement of fauna within the landscape. ➢ Inability for faunal species populations to recover or re-establish within the disturbed footprint areas. ➢ Impact on food resource suitability for herbivores, potentially leading to displacement of fauna as move out of the surrounding areas in order to find suitable food resources.
Loss/alteration of floral habitat and diversity. Loss/alteration of floral SCC including their habitats.	➢ Unmitigated loss of SCC individuals and potential impacts to population dynamics. ➢ Loss of floral habitat, diversity, and floral SCC. ➢ Degradation and modification of the receiving environment, as well as loss of sensitive floral habitat with limited potential for rehabilitation success. ➢ Loss of intact (or sensitive) floral habitat, as well as unnecessary edge effect impacts on areas outside of the proposed footprints. ➢ Loss of favourable floral habitat outside of the direct project footprint, including a decrease in species diversity and a potential loss of floral SCC. ➢ Declines in plant functioning leading to loss of floral species and habitat for optimal growth. ➢ Loss or alteration of CBAs and associated ecological functionality.
Freshwater – Construction	
Alteration and deterioration of freshwater resources due to site clearance at opencast pits.	➢ Partial destruction of Wetland System 1. ➢ Runoff with high sediment loads entering into the wetlands, smothering the vegetation and thus altering the habitat of the wetlands. ➢ Compaction of soil due to vehicular movement leading to alterations of runoff patterns into the wetlands. ➢ Soil and stormwater contamination from oils and hydrocarbons. ➢ Vegetation degradation, and the subsequent loss of habitat for wetland species. ➢ Proliferation of AIPs as a result of disturbances. ➢ Decreased ecoservice provision. ➢ Soil compaction. ➢ Impacts on the hydrological processes supporting the wetlands locally and downstream.
Freshwater – Operational	
Loss of freshwater resources due to opencast mining.	➢ Complete loss of the portion of the wetlands located within the proposed opencast mining footprint.
Alteration and deterioration of freshwater resources due to opencast mining	➢ Impacts to the hydrological processes of the remaining portions of wetland as well as the downgradient wetlands due to removal of interflow soils may occur; however, edge effects of the opencast pits may also be experienced by these wetlands. ➢ Increased risk of pollution of surface water and groundwater leading to impaired water quality and salinisation of wetland soil.

Impact	Impact Discussion - Activity 2
activities including blasting and dewatering.	➢ Increased risk of sediment transport in surface runoff from the overburden stockpile into the wetlands leading to altered water quality, altered channel competency, and altered vegetation community composition. ➢ Altered topography/geomorphology, leading to altered runoff patterns and formation of preferential flow paths. ➢ Smothering of vegetation by stockpiles, and the possible creation of habitats for invasive or encroacher pioneer species which will form a node for dispersal of AIPs into adjacent areas. ➢ Seepage from overburden dumps, leading to contamination of the adjacent soils and water in the landscape with specific mention of salinisation, reduced pH and associated trace heavy metals. ➢ Potential spillage of oils/hydrocarbons as well as overburden material from vehicles used to transport overburden material and coal. ➢ Nitrates from blasting leading to eutrophication of the receiving environment and detrimentally impacting fitness for use of water within the catchment. ➢ Increased risk of pollution of surface water and groundwater, which may affect the remaining wetland areas, leading to impaired water quality including an altered pH regime with associated likelihood of mobilising trace heavy metals, salinisation of soils and increased concentration of CPCs within the wetlands. ➢ The depth of the opencast pits is anticipated to be greater than 15 mbgl which may result in the formation of a cone of depression associated with dewatering, pulling the water towards the open pit area over time. ➢ Potential moisture stress and subsequent loss of habitat and biodiversity. ➢ As a result of dewatering, contaminated water may enter the receiving environment leading to altered water quality. ➢ Alteration (increase) of flow regimes, reduction in water quality (increase in salts and specific contaminants of concern including trace heavy metals associated with reduced pH) and subsequent loss of biodiversity of the wetlands due to decant of contaminated water. ➢ As a result of decant, contaminated water may enter the receiving environment leading to altered water quality.
Freshwater – Decommissioning and Closure	
Alteration and deterioration of freshwater resources due to decant.	➢ Contamination of water within the receiving environment, and subsequent reduction in water quality (increase in salts and specific contaminants of concern including trace heavy metals associated with reduced pH). ➢ Subsequent negative impacts on biota and vegetation. ➢ Altered flow regimes (increased hydroperiod). ➢ Habitat degradation.
Topography – All Phases	
Alteration of the topography due to the opencast mining.	➢ The natural topography of the area will be disturbed where opencast pits are planned.
Additional disturbance of physical and landscape features.	➢ The natural topography of the area will be disturbed where the stockpiles are planned, altering the physical and landscape features.
Geology – All Phases	
Disturbance of natural geology.	➢ Drilling and blasting of the proposed mine areas will permanently destroy the geological strata located in these areas. Even when rehabilitation occurs, spoils will be replaced back into the voids, but the original geological strata will no longer be present at the site.
Loss of non-renewable coal resource.	➢ Mining of the coal resource will result in the usage and permanent removal of a non-renewable resource. No mitigation is possible. However, it will be to the benefit of the local, regional and national economy of South Africa.
Increased porosity and hydraulic conductivity.	➢ The alteration of the geological strata will increase porosity and conductivity in the opencast areas impacting on water filtration and flow.

Impact	Impact Discussion - Activity 2
Blasting – Construction and Operational (Annexure 17)	
Ground vibrations perceived as unpleasant by surrounding communities.	➢ Should 2.54 mm/s be exceeded during blasting, is it expected that people in the vicinity will experience the vibration level as unpleasant. Refer to **Figure 75** for Blasting Sensitive Receptors (BSR).
Ground vibrations resulting in damage of residential structures.	➢ Should 25 mm/s be exceeded during blasting, damage to brick structures are likely. Refer to **Figure 76** for Blasting Sensitive Structures (BSS).
Ground vibrations resulting in damage of cement dams, bridges and pipelines.	➢ Should 50 mm/s be exceeded during blasting, damage to cement dams can be expected. Refer to **Figure 76** for BSS.
Ground vibration potentially causing damage to R38 Regional Road.	➢ Should 150 mm/s be exceeded during blasting, damage to tar roads can potentially occur when using a 1 585 kg charge mass per delay. Refer to **Figure 76** for BSS.
Air blast potentially leading to damage.	➢ Air blast exceeding 120 dB can be negatively perceived by people. Air blasts can cause discomfort to persons and, at high levels, damage to structures. At very high levels, it may even cause injury to people. Refer to **Figure 75** for BSR and **Figure 76** for BSS.
Fly rock posing a danger to people, animals, structures and/or equipment.	➢ Fly rock can cause potential injuries to humans and animals. It can also result in damage to property. Refer to **Figure 75** for BSR and **Figure 76** for BSS.

Table 68: Summary of long-term post-mining decant and baseflow zones (Opencast)

Decant / Base-flow Zone #	Decant Type	Decant Volume (m^3/d)			Rainfall Recharge to Pit					Decant SO_4 Concentration (mg/l)	Time to Decant
		Individual Zones	All Decant		Volume (m^3/d)		% of Decant at Pit	% of All Decant			
NB1	Decant at Pit	130	160	1 930*	85	753*	65%	53%	39%*	3 000	<1year
	Seep 2	30								1 100	
NB2	Decant at Pit	300	325		94		31%			3 000	<1year
	Seep1	25								2 000	
NB3 NB3 Ext	Decant at Pit	790	865		391		49%	45%		3 000	<1year
	Seep 1	60								1 700	
	Seep 2	15								900	
NB4	Decant at Pit	340	395		125		37%	32%		3 000	<1year
	Seep 1	15								1 900	
	Seep 2	40								350	

Decant / Base-flow Zone #	Decant Type	Decant Volume (m^3/d)		Rainfall Recharge to Pit			Decant SO_4 Concentration (mg/l)	Time to Decant
		Individual Zones	All Decant	Volume (m^3/d)	% of Decant at Pit	% of All Decant		
NB5	Decant at Pit	75	185	58	78%	32%	3 000	2-5 Years
	Seep 1	50					2 300	
	Seep 2	60					900	
VB1	Seep 1	50	160	139		87%	1 000	8-12 Years
	Seep 2	110					434	
VW1 VW1 Ext TW1	Decant at Pit	545	685	441	81%	63%	3 000	3-5 Years
VW1 VW1 Ext TW1	Seep1	120					2 500	
VW1 VW1 Ext TW1	Seep2	20					700	
VW1 VW1 Ext TW1	Seep2	20					400	

* Pits in central mining area combined

“Seep 1” = near pit, slightly diluted “Seep 2” = further from pit, more diluted to <1 000mg/L

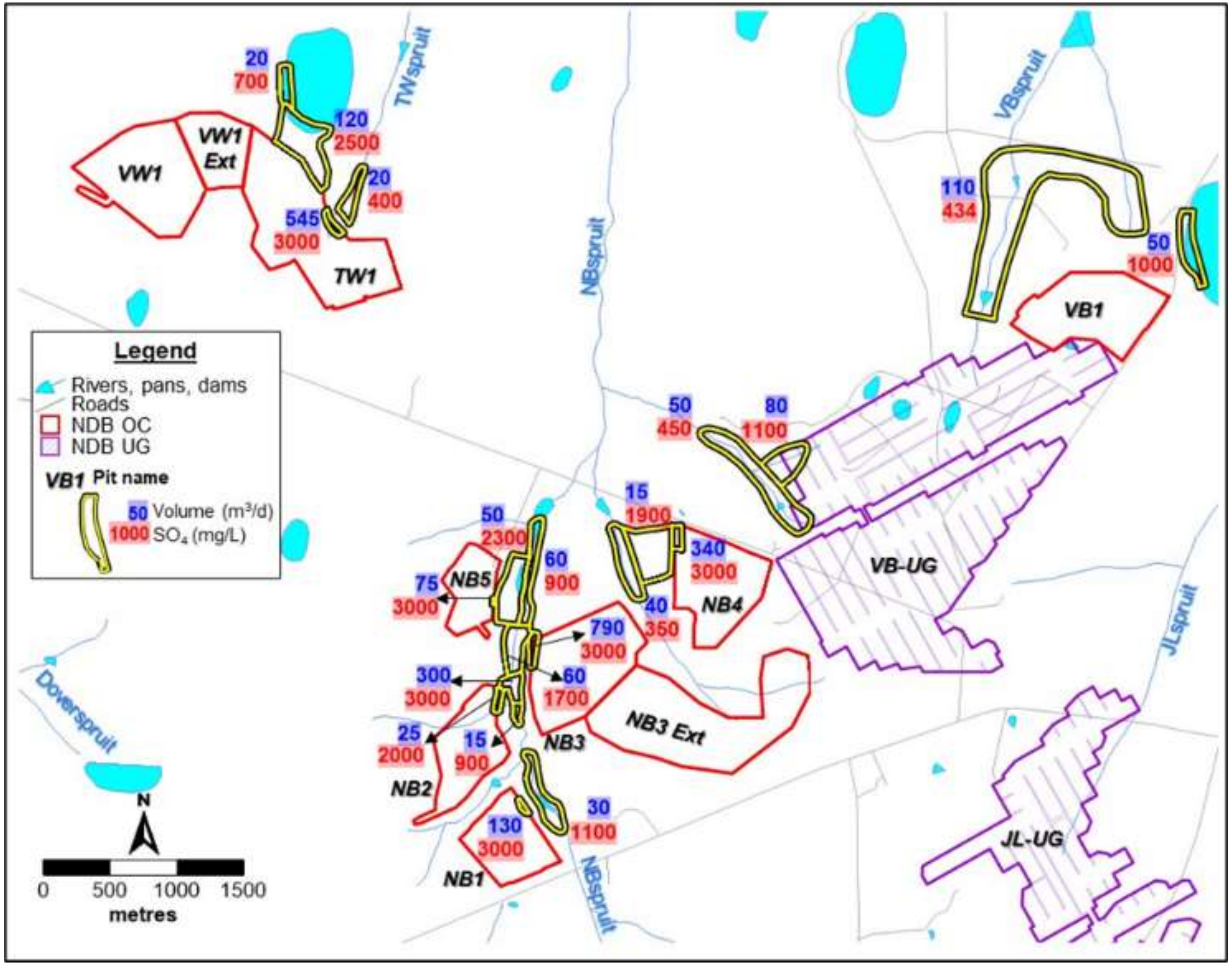
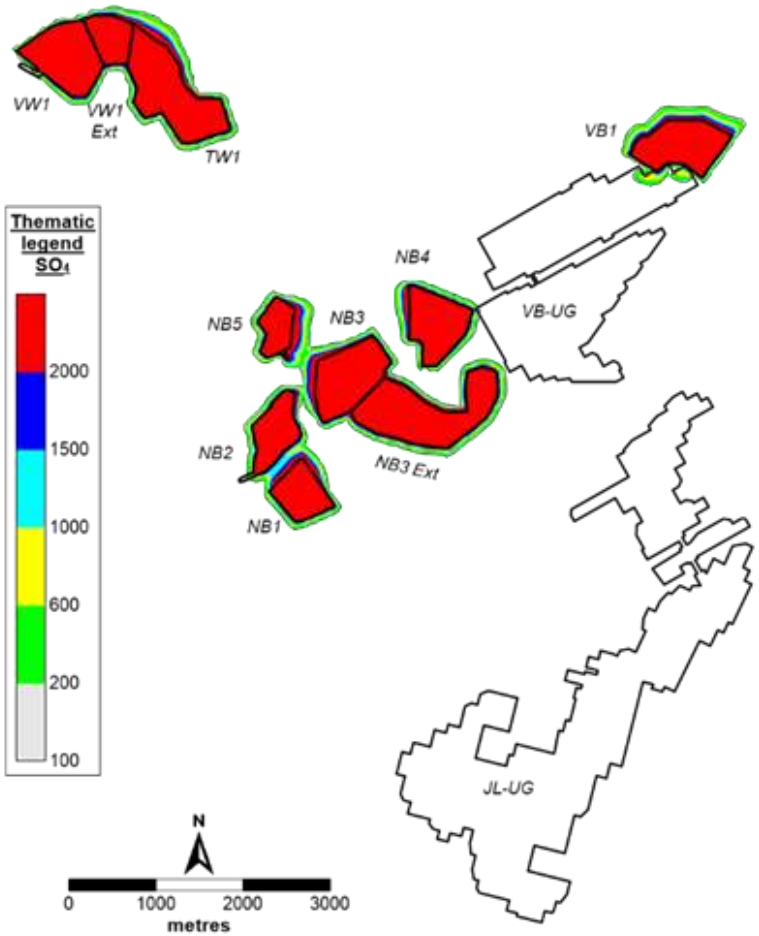
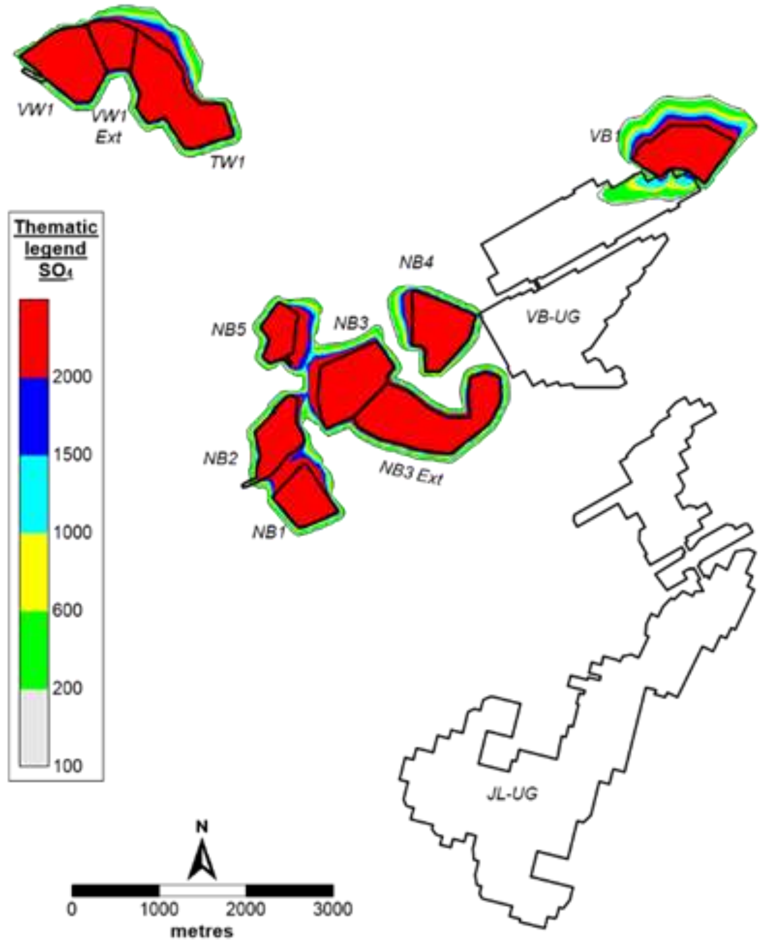


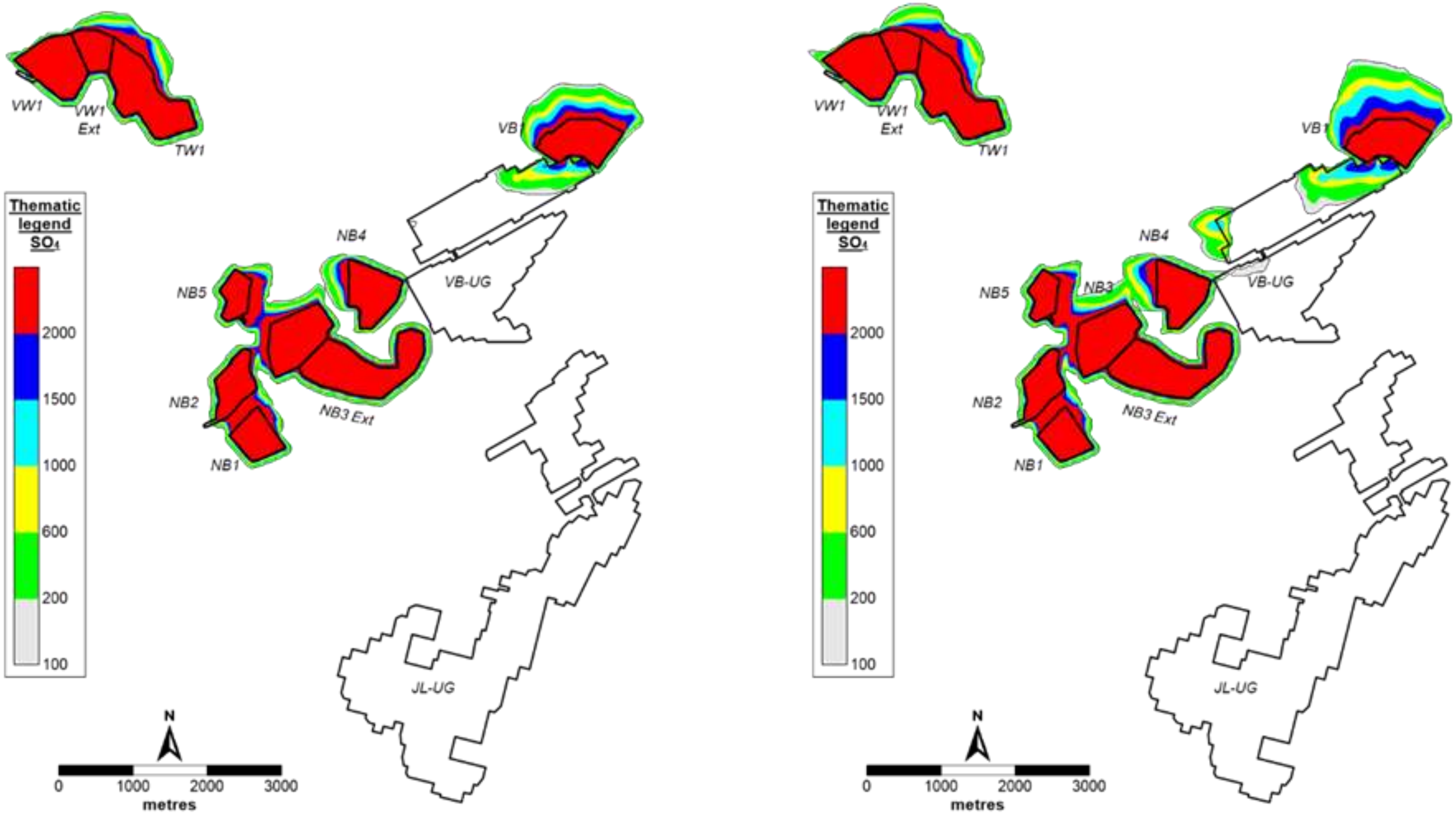
Figure 73: Long-term post-mining decant and baseflow zones



10-Year



30-Year



50-Year **100-Year**

Figure 74: Numerically simulated SO_4 contamination (mg/l) plumes from opencast mining areas after 10, 30, 50 and 100 years

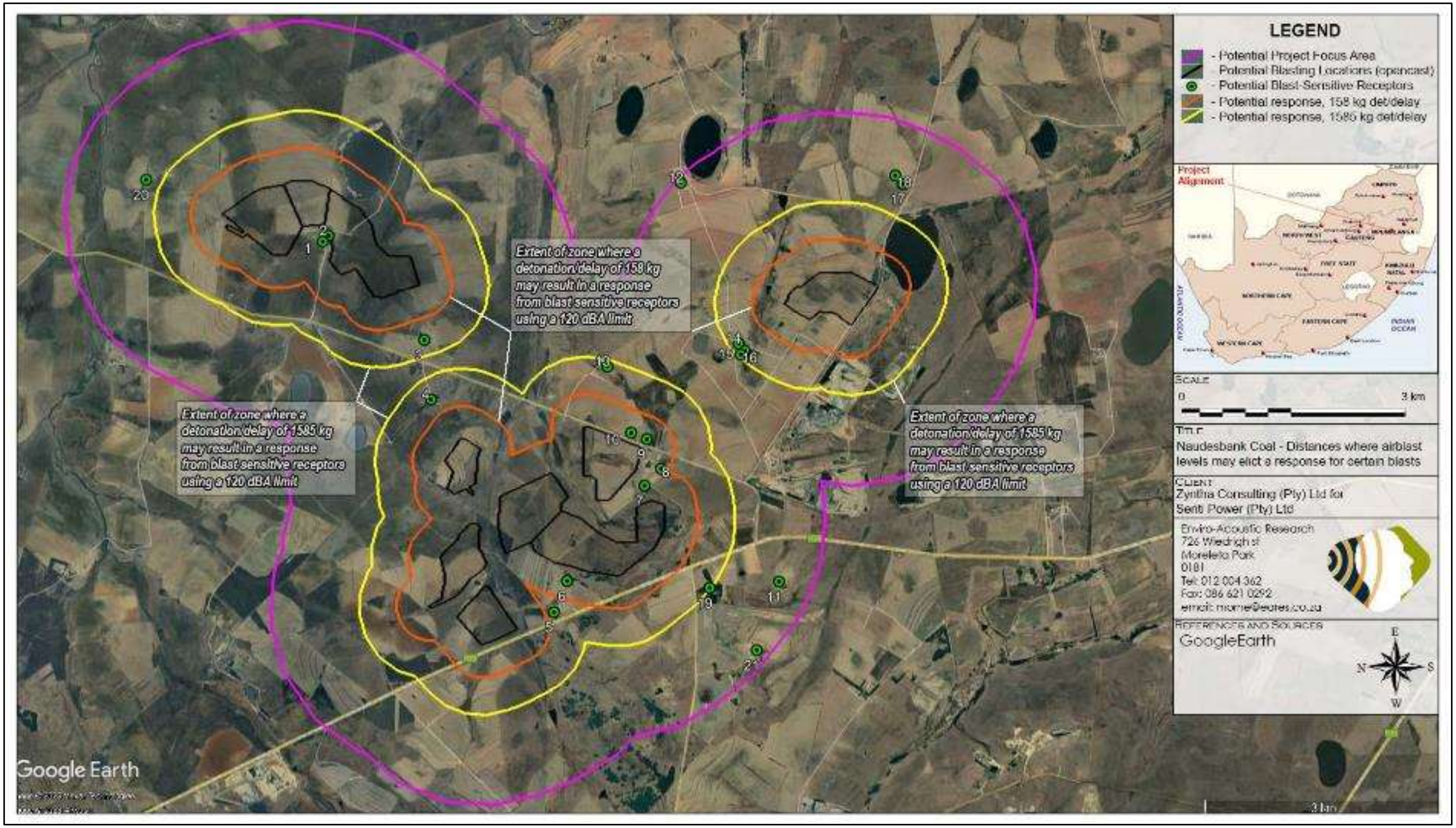


Figure 75: Blasting Sensitive Receptors within 2 000 m of Opencast Areas

Figure 76: Blasting Sensitive Structures within 2 000 m of Opencast Areas

Table 69: Impact Assessment – Opencast Mining of Wetlands and Stockpiling

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Groundwater											
Deterioration of groundwater quality resulting from mining activities (O).	N	Long Term	Local	Moderate	Moderate	Probable	Low	Moderate	Low	Low	Conduct water quality monitoring.
Groundwater level drawdown impacting availability of water (O).	N	Long Term	Local	Moderate	Moderate	Definite	High	Moderate	Low	Low	Provide alternative water/compensation to users should they be impacted by the operations.
Deterioration of surface water quality (O).	N	Long Term	Local	Moderate	Moderate	Unlikely	Very Low	Moderate	Very Low	Low	Surface water monitoring must be undertaken.
Dewatering impacting water levels until opencast pits are flooded (D, Clo).	N	Medium Term	Local	Moderate	Moderate	Highly Likely	Moderate	Moderate	Low	Moderate	Continue monitoring water levels once operations has ceased.
Recovery of groundwater levels once pits have flooded (D, Clo).	P	Permanent	Local	High	Low	Definite	Very High	-	-	Low	Positive impact – no mitigation required.
Deterioration of groundwater quality including decant potential resulting from opencast operations (D, Clo).	N	Permanent	Regional	Moderate	Moderate	Definite	High	Moderate	Moderate	High	Groundwater and surface quality monitoring.
Deterioration of surface water quality including decant potential resulting from opencast operations (D, Clo).	N	Permanent	Regional	High	Moderate to Low	Definite	Very High	Low	High	High	A post-closure water management plan must be developed and implemented.
Fauna and Flora											
Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat and Habitat Connectivity)(O).	N	Permanent	Regional	Very High	Moderate	Definite	Very High	Low	High	Low	No hunting, trapping or setting of snares by operational or contract personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Faunal Habitat and Diversity (Degraded Grassland and Transformed)(O).	N	Long Term	Local	Low to Moderate	Moderate	Definite	Moderate	Moderate	Low	Low	No on-site open fires are allowed.
Loss/alteration of Faunal Habitat and Diversity (Highveld and Moist Grassland)(O).	N	Long Term	Regional	High	Moderate	Definite	High	Low	Moderate	Low	Clearing activities should also happen in a phased manner to give fauna enough time to escape ahead of clearing/construction activities.
Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands and Significant Biodiversity Features)(O).	N	Permanent	Regional	High	Moderate	Definite	High	Low	High	Low	Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved project footprint.
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland, Highveld Grassland and Modified Wetlands)(O).	N	Long Term	Local	Moderate	Moderate	Definite	High	Low	Moderate	Low	No dumping of litter, rubble or cleared vegetation on site should be allowed.
Loss/alteration of Floral Habitat and Diversity (Transformed)(O).	N	Long Term	Site	Low	Moderate	Definite	Moderate	Moderate	Low	Low	If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line.
Loss/alteration of Floral SCC including their Habitats (MNCA Protected species and Provincially important Flora)(O).	N	Long Term	Site	Low to Moderate	Moderate	Definite	Moderate	Moderate	Low	Low	Prior to any vegetation clearing activities commencing, all floral SCC within direct footprint areas should either have been rescued and relocated, or sufficient propagules of specimens sampled for nursery propagation.
Loss/alteration of Floral SCC including their Habitats (Sensitive species 1200)(O).	N	Permanent	Local	High	Moderate	Definite	High	Moderate	Moderate	Low	No protected or threatened floral species may be removed during any mining phase activities without 1) permits from the DFFE and MTPA, and 2) all conditions of the permits being adhered to.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Floral SCC including their Habitats (Highveld Grasslands, Forb-rich Wetlands, Moist Grasslands and Valley-bottom Wetlands)(O).	N	Long Term	Local	Moderate	Moderate	Definite	High	Low	Moderate	Low	Harvesting of protected or threatened floral species by personnel should be strictly prohibited.
Loss/alteration of Floral SCC including their Habitats (*Khadia carolinensis* and Rocky Outcrops)(O).	N	Long Term	Site	Low	Moderate	Unlikely	Very Low	Low	Very Low	Low	AIP proliferation, which may affect adjacent natural areas, must be strictly managed.
Freshwater Resources											
Alteration and deterioration of freshwater resources due to site clearance at opencast pits (C).	N	Permanent	Regional	Very High	Moderate	Definite	Very High	Low	High	Low	The footprint of the proposed opencast pits should be optimised further if possible to avoid or further minimise encroaching into wetland habitat, and limited to the minimum viable footprint to ensure optimal and safe mining.
Loss of freshwater resources due to opencast mining (O).	N	Permanent	Regional	Very High	Moderate	Definite	Very High	Low	High	Low	Ensure that opencast mining does not exceed authorised footprints to prevent additional losses of wetlands.
Alteration and deterioration of freshwater resources due to opencast mining activities including blasting and dewatering (O).	N	Long Term	Regional	Moderate	Moderate	Definite	High	Low	Moderate	Low	Pollution prevention through infrastructure design, to prevent, eliminate and/or control potential pollution of soils, groundwater and surface water should be implemented.
Alteration and deterioration of freshwater resources due to decant (D, Clo).	N	Long Term	Regional	Moderate	Moderate	Definite	High	Low	Moderate	High	Post-closure water management plan must be developed and implemented.
Topography											
Alteration of the topography due to the opencast mining (C, O, D).	N	Long Term	Site	High	Moderate	Definite	High	Moderate	Low	Low	Areas should be rehabilitated to resemble pre-mining topography as far as practically possible.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Additional disturbance of physical and landscape features (C, O, D).	N	Long Term	Site	High	Moderate	Definite	High	Moderate	Low	Moderate	
Geology											
Disturbance of natural geology (C, O, D, Clo).	N	Permanent	Site	Very High	Low	Definite	Very High	Low	Very High	Low	No mitigation possible.
Use and loss of non-renewable coal resource (C, O, D, Clo).	N	Permanent	Site	Very High	Low	Definite	Very High	Low	Very High	Low	No mitigation possible.
Increased porosity and hydraulic conductivity (O, D, Clo).	N	Long Term	Site	High	Moderate	Definite	High	Moderate	Low	Low	Ensure rehabilitation is conducted as per approved plan.
Blasting											
Ground vibrations perceived as unpleasant by surrounding communities (C, O).	N	Long Term	Local	Very High	High	Definite	High	High	Low	Low	BSR residing within 500 m from opencast area (where blasting may take place in future) to be relocated.
Ground vibrations resulting in damage of residential structures (C, O).	N	Long Term	Site	Very High	High	Definite	High	High	Low	Low	The mine should undertake a survey of all buildings and structures (during the recommended photo survey) located within 2 000 m from the proposed mining opencast pits to determine the building material and potential sensitivities of the structures.
Ground vibrations resulting in damage of cement dams, bridges and pipelines (C, O).	N	Long Term	Site	Very High	High	Definite	High	High	Low	Low	It is recommended that the mine undertake a photo survey at all cement dams located within 500 m from the proposed opencast pits.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Ground vibration potentially causing damage to R38 Regional Road (C, O).	N	Long Term	Site	Very High	High	Probable	Moderate	Moderate	Low	Low	The mine should calculate potential vibration levels at the tar roads and railway line for each blast (considering the actual blasting parameters) once blasting is closer than 500 m from the roads/se structures. The mine should reduce the charge mass per detonation to ensure that vibration levels are less than 150 mm/s when blasting closer than 500 m from the R38 road.
Air blast potentially leading to damage (C, O).	N	Long Term	Local	Very High	High	Definite	High	High	Low	Low	Mine to erect blasting notice boards and clear warnings in the area (along the tar roads located within 500 m from future blasting activities) with blasting dates and times highlighted.
Fly rock posing a danger to people, animals, structures and/or equipment (C, O).	N	Long Term	Local	Very High	High	Definite	High	High	Low	Low	People and livestock to be moved further than 500 m from active blast before a blast is detonated.

9.4.4 Activity 3: Overburden Stockpiles and RoM Yards

As mentioned, some impacts are only applicable to one activity during a particular phase of the project. The other impacts during various project phases were already discussed under **Section 9.4.1**.

Impact	Impact Discussion - Activity 3
Groundwater – Operational	
Deterioration of groundwater quality resulting from stockpiles.	➢ Potential contamination via leaching and seepage from structures. ➢ Impacts on groundwater levels are not expected.
Deterioration of surface water quality resulting from stockpiles.	
Groundwater – Decommissioning and Closure	
Deterioration of surface water and groundwater quality resulting from stockpile areas.	➢ No impacts are expected to materialise since the overburden will be backfilled and RoM Yards will be rehabilitated. All contaminated materials will be removed and disposed of into the opencast voids.
Freshwater – Operational	
Alteration and deterioration of freshwater resources due to overburden stockpiles	➢ Impacts to the hydrological processes of the remaining portions of wetland as well as the downgradient wetlands due to removal of interflow soils may occur; however, edge effects of the opencast pits may also be experienced by these wetlands. ➢ Increased risk of pollution of surface water and groundwater leading to impaired water quality and salinisation of wetland soil. ➢ Increased risk of sediment transport in surface runoff from the overburden stockpile into the wetlands leading to altered water quality, altered channel competency and altered vegetation community composition. ➢ Altered topography/geomorphology, leading to altered runoff patterns and formation of preferential flow paths. ➢ Smothering of vegetation by stockpiles, and the possible creation of habitats for invasive or encroacher pioneer species which will form a node for dispersal of AIPs into adjacent areas. ➢ Seepage from overburden dumps, leading to contamination of the adjacent soils and water in the landscape with specific mention of salinisation, reduced pH and associated trace heavy metals. ➢ Potential spillage of oils/hydrocarbons as well as overburden material from vehicles used to transport overburden material and coal.
Fauna and Flora – Operational	
Loss/alteration of faunal habitat and diversity.	➢ Loss of faunal habitat displacing species including potential SCC. ➢ Loss of suitable food resources, breeding grounds. ➢ Habitat fragmentation within the landscape. ➢ Loss or degradation of faunal habitat, diversity, and potential SCC within the direct footprint and adjacent areas of the proposed development. ➢ Isolation of faunal species and smaller populations thereof with limited movement ability, reducing overall movement of fauna within the

Impact	Impact Discussion - Activity 3
	landscape. ➢ Inability for faunal species populations to recover or re-establish within the disturbed footprint areas. ➢ Impact on food resource suitability for herbivores, potentially leading to displacement of fauna as move out of the surrounding areas in order to find suitable food resources.
Loss/alteration of floral habitat and diversity.	➢ Unmitigated loss of SCC individuals and potential impacts to population dynamics. ➢ Loss of floral habitat, diversity, and floral SCC. ➢ Degradation and modification of the receiving environment, as well as loss of sensitive floral habitat with limited potential for rehabilitation success. ➢ Loss of intact (or sensitive) floral habitat, as well as unnecessary edge effect impacts on areas outside of the proposed footprints. ➢ Loss of favourable floral habitat outside of the direct project footprint, including a decrease in species diversity and a potential loss of floral SCC. ➢ Declines in plant functioning leading to loss of floral species and habitat for optimal growth. ➢ Loss or alteration of CBAs and associated ecological functionality.

Table 70: Impact Assessment – Overburden Stockpiles

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Groundwater											
Deterioration of groundwater quality resulting from stockpiles (O).	N	Long Term	Local	Moderate	Moderate	Highly Likely	Moderate	Moderate	Low	Low	Lining of stockpiles as per civil designs.
Deterioration of surface water quality resulting from stockpiles (O).	N	Long Term	Local	Moderate	Moderate	Highly Likely	Moderate	Moderate	Low	Low	Undertake groundwater and surface quality monitoring.
Deterioration of surface water and groundwater quality resulting from stockpile areas (D, Clo).	N	Long Term	Local	Moderate	Moderate to Low	Low	Low	Low	Low	Low	Rehabilitate stockpile areas and remove any contaminated material prior to topsoiling.
Freshwater Resources											

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Alteration and deterioration of freshwater resources due to overburden stockpiles (O).	N	Long Term	Regional	Moderate	Moderate	Definite	High	Low	Moderate	Low	Pollution prevention through infrastructure design, to prevent, eliminate and/or control potential pollution of soils, groundwater and surface water should be implemented.
Fauna and Flora											
Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat and Habitat Connectivity)(O).	N	Permanent	Regional	Very High	Moderate	Definite	Very High	Low	High	Low	Fires are strictly prohibited.
Loss/alteration of Faunal Habitat and Diversity (Degraded Grassland and Transformed)(O).	N	Long Term	Local	Low to Moderate	Moderate	Definite	Moderate	Moderate	Low	Low	No hunting, trapping or setting of snares by operational or contract personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.
Loss/alteration of Faunal Habitat and Diversity (Highveld and Moist Grassland)(O).	N	Long Term	Regional	High	Moderate	Definite	High	Low	Moderate	Low	Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habit.
Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands, Moist Grasslands, and Significant Biodiversity Features)(O).	N	Permanent	Regional	High	Moderate	Definite	High	Low	High	Low	Ongoing AIP monitoring and clearing/control should take place.
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland and Highveld Grassland)(O).	N	Long Term	Local	Moderate	Moderate	Definite	High	Low	Moderate	Low	No dumping of litter, rubble or cleared vegetation on site should be allowed.
Loss/alteration of Floral Habitat and Diversity (Transformed)(O).	N	Long Term	Site	Low	Moderate	Definite	Moderate	Moderate	Low	Low	If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Floral SCC including their Habitats (MNCA Protected species and Provincially important Flora, Valley-bottom Wetlands and Sensitive species 1200)(O).	N	Long Term	Site	Low to Moderate	Moderate	Definite	Moderate	Moderate	Low	Low	Edge effects such as erosion and AIP proliferation, which may affect adjacent or sensitive habitat, need to be strictly managed adjacent to the footprint areas.
Loss/alteration of Floral SCC including their Habitats (Highveld Grasslands, Forb-rich Wetlands and Moist Grasslands)(O).	N	Long Term	Local	Moderate	Moderate	Definite	High	Low	Moderate	Low	Harvesting of protected or threatened floral species should be strictly prohibited.
Loss/alteration of Floral SCC including their Habitats (*Khadia carolinensis* and Rocky Outcrops)(O).	N	Long Term	Site	Low	Moderate	Unlikely	Very Low	Low	Very Low	Low	AIP proliferation, which may affect adjacent natural areas, must be strictly managed.

9.4.5 Activity 4: Water Management Infrastructure

As mentioned, some impacts are only applicable to one activity during a particular phase of the project. The other impacts during various project phases were already discussed under **Section 9.4.1**.

Impact	Impact Discussion - Activity 4
Freshwater – Construction	
Loss of freshwater resources due to construction of water management infrastructure.	➢ Partial destruction of Wetland System 1. ➢ Loss of catchment yield resulting from stormwater containment, leading to reduction in volume of water entering the wetlands, leading to loss of recharge of the wetlands. ➢ Increased flood peaks as a result of formalisation and concentration of surface runoff in clean water diversion structures. ➢ Potential for erosion, leading to sedimentation of the wetlands. ➢ Reduction in volume of water entering the wetlands, leading to loss of recharge of the wetlands. ➢ Altered vegetation community structure and diversity due to moisture stress and changes to goods and service provision. ➢ Limited reduction in volume of water entering the wetlands, leading to loss of recharge of the wetlands which may affect small portions of the wetlands.
Alteration and deterioration of freshwater resources due to construction of water management infrastructure.	
Freshwater – Operational	
Alteration and deterioration of freshwater resources due to the operation of the water management infrastructure.	➢ Increased flood peaks into the wetlands as a result of formalisation and concentration of surface runoff. ➢ Potential for erosion of terrestrial areas as a result of the formation of preferential flow paths, leading to sedimentation of the wetlands. ➢ Reduction in volume of water entering the wetlands, leading to loss of recharge (and thus potential desiccation) of the wetland systems. ➢ Erosion and sedimentation of the wetlands at the outlet of the clean water trench. ➢ Altered vegetation communities due to moisture stress. ➢ The potential failure of the PCD infrastructure may result in leakages and possible contamination of surface and groundwater, increased flow into the wetlands, and lowered water quality (increase in salts and specific contaminants of concern including trace heavy metals associated with reduced pH) within the wetlands.
Groundwater - Operational	
Deterioration of groundwater quality resulting water management infrastructure.	➢ Potential contamination via leaching and seepage from structures. ➢ Impacts on groundwater levels are not expected.
Deterioration of surface water quality water management infrastructure.	
Groundwater – Decommissioning and Closure	
Deterioration of surface water and groundwater	➢ No impacts are expected to materialise post-closure should all the dirty water canals and PCDs be rehabilitated. Should PCDs remain for water management purposes it is expected that impacts may potentially materialise.

Impact	Impact Discussion - Activity 4
quality resulting from water management infrastructure.	
Fauna and Flora – Operational	
Loss/alteration of faunal habitat and diversity.	➢ Loss of faunal habitat displacing species including potential SCC. ➢ Loss of suitable food resources, breeding grounds. ➢ Habitat fragmentation within the landscape. ➢ Loss or degradation of faunal habitat, diversity, and potential SCC within the direct footprint and adjacent areas of the proposed development. ➢ Isolation of faunal species and smaller populations thereof with limited movement ability, reducing overall movement of fauna within the landscape. ➢ Inability for faunal species populations to recover or re-establish within the disturbed footprint areas. ➢ Impact on food resource suitability for herbivores, potentially leading to displacement of fauna as move out of the surrounding areas in order to find suitable food resources.
Loss/alteration of floral habitat and diversity.	➢ Unmitigated loss of SCC individuals and potential impacts to population dynamics. ➢ Loss of floral habitat, diversity, and floral SCC. ➢ Degradation and modification of the receiving environment, as well as loss of sensitive floral habitat with limited potential for rehabilitation success. ➢ Loss of intact (or sensitive) floral habitat, as well as unnecessary edge effect impacts on areas outside of the proposed footprints. ➢ Loss of favourable floral habitat outside of the direct project footprint, including a decrease in species diversity and a potential loss of floral SCC. ➢ Declines in plant functioning leading to loss of floral species and habitat for optimal growth. ➢ Loss or alteration of CBAs and associated ecological functionality.

Table 71: Impact Assessment – Water Management Infrastructure

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Freshwater Resources											
Loss of freshwater resources due to construction of water management infrastructure (C).	N	Permanent	Regional	Very High	Moderate	Definite	Very High	Low	High	Low	Water diversion structures must, as far as practically possible, be placed outside the catchments of depression wetlands.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Alteration and deterioration of freshwater resources due to construction of water management infrastructure (C).	N	Short Term	Regional	High	Moderate	Definite	High	Low	Moderate	Low	Dirty water areas must be kept as small as possible and must only be expanded as mining progresses to ensure that the volume of clean surface runoff supplying the wetlands is optimised.
Alteration and deterioration of freshwater resources due to the operation of the water management infrastructure (O).	N	Long Term	Regional	Moderate	Moderate	Definite	High	Low	Moderate	Low	Proactive monitoring and maintenance to ensure structural integrity is maintained.
Groundwater											
Deterioration of groundwater quality resulting from stockpiles and water management infrastructure (O).	N	Long Term	Local	Moderate	Moderate	Highly Likely	Moderate	Moderate	Low	Low	Construct infrastructure as per civil designs.
Deterioration of surface water quality resulting from stockpiles and water management infrastructure. (O).	N	Long Term	Local	Moderate	Moderate	Highly Likely	Moderate	Moderate	Low	Low	Undertake groundwater and surface quality monitoring.
Deterioration of surface water and groundwater quality resulting from water management infrastructure (D, Clo).	N	Long Term	Local	Moderate	Moderate to Low	Probable	Moderate	Low	Low	Low	Rehabilitate structures upon decommissioning. Should PCDs remaining, it is recommended that monitoring boreholes be drilled to detect leakages.
Fauna and Flora											
Loss/alteration of Faunal Habitat and Diversity (Habitat Connectivity, Degraded Grassland and Transformed)(O).	N	Long Term	Site	Low	Moderate	Definite	Moderate	Moderate	Low	Low	No hunting, trapping or setting of snares by operational or contract personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Faunal Habitat and Diversity (Highveld and Moist Grassland)(O).	N	Long Term	Regional	High	Moderate	Definite	High	Moderate	Moderate	Low	Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habit.
Loss/alteration of Floral Habitat and Diversity (Significant Biodiversity Features)(O).	N	Long Term	Regional	High	Moderate	Definite	High	Low	Moderate	Low	Ongoing AIP monitoring and clearing/control should take place.
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland and Highveld Grassland)(O).	N	Long Term	Local	Low to Moderate	Moderate	Definite	Moderate	Low	Moderate	Low	No dumping of litter, rubble or cleared vegetation on site should be allowed.
Loss/alteration of Floral Habitat and Diversity (Transformed)(O).	N	Long Term	Site	Low	Moderate	Probable	Low	Moderate	Very Low	Low	If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line.
Loss/alteration of Floral SCC including their Habitats (MNCA Protected species and Provincially important Flora)(O).	N	Long Term	Site	Low to Moderate	Moderate	Probable	Low	Low	Low	Low	Edge effects such as erosion and AIP proliferation, which may affect adjacent or sensitive habitat, need to be strictly managed adjacent to the footprint areas.
Loss/alteration of Floral SCC including their Habitats (Highveld Grasslands)(O).	N	Long Term	Local	Low to Moderate	Moderate	Definite	Moderate	Low	Moderate	Low	Harvesting of protected or threatened floral species should be strictly prohibited.
Loss/alteration of Floral SCC including their Habitats (*Khadia carolinensis*, Rocky Outcrops, Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands and Sensitive species 1200)(O).	N	Long Term	Site	Low	Moderate	Unlikely	Very Low	Low	Very Low	Low	AIP proliferation, which may affect adjacent natural areas, must be strictly managed.

9.4.6 Activity 5: Roads

As mentioned, some impacts are only applicable to one activity during a particular phase of the project. The other impacts during various project phases were already discussed under **Section 9.4.1**.

Impact	Impact Discussion - Activity 5
Traffic – All Phases	
Increase in traffic impacting the current road network.	➢ It is concluded that the road network, surrounding Naudesbank, will be able to handle the expected additional traffic with no detrimental impact on the traffic on any of the relevant surrounding roads. ➢ Recommendations are made in **Annexure 15** to upgrade an intersection.
Fauna and Flora – Operational	
Loss/alteration of faunal habitat and diversity.	➢ Loss of faunal habitat displacing species including potential SCC. ➢ Loss of suitable food resources, breeding grounds. ➢ Habitat fragmentation within the landscape. ➢ Loss or degradation of faunal habitat, diversity, and potential SCC within the direct footprint and adjacent areas of the proposed development. ➢ Fauna including potential SCC may not be able to escape ahead of clearance activities and may be killed by machinery and construction activities. ➢ Isolation of faunal species and smaller populations thereof with limited movement ability, reducing overall movement of fauna within the landscape. ➢ Inability for faunal species populations to recover or re-establish within the disturbed footprint areas. ➢ Impact on food resource suitability for herbivores, potentially leading to displacement of fauna as move out of the surrounding areas in order to find suitable food resources.
Loss/alteration of flora habitat and diversity.	➢ Unmitigated loss of SCC individuals and potential impacts to population dynamics. ➢ Loss of floral habitat, diversity, and floral SCC. ➢ Degradation and modification of the receiving environment, as well as loss of sensitive floral habitat with limited potential for rehabilitation success. ➢ Loss of intact (or sensitive) floral habitat, as well as unnecessary edge effect impacts on areas outside of the proposed footprints. ➢ Loss of favourable floral habitat outside of the direct project footprint, including a decrease in species diversity and a potential loss of floral SCC. ➢ Declines in plant functioning leading to loss of floral species and habitat for optimal growth. ➢ Loss or alteration of CBAs and associated ecological functionality.

Table 72: Impact Assessment – Roads

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Traffic											
Increase in traffic impacting the current road network (C, O, D).	N	Long Term	Regional	Low	Low	Unlikely	Very Low	Very Low	Very Low	Low	The impact is considered negligible however the intersection of Road D1252 and Regional Road R38 must be upgraded.
Fauna and Flora											
Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat, Habitat Connectivity, Highveld and Moist Grassland)(O).	N	Long Term	Local	High	Moderate	Definite	High	Low	Moderate	Low	No hunting, trapping or setting of snares by operational or contract personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.
Loss/alteration of Faunal Habitat and Diversity (Degraded Grassland and Transformed)(O).	N	Long Term	Local	Low to Moderate	Moderate	Definite	Moderate	Low	Moderate	Low	Speed limits of 40 km/h must be implemented on-site to reduce risk of collisions with faunal species.
Loss/alteration of Floral Habitat and Diversity (Valley-bottom Wetlands and Significant Biodiversity Features)(O).	N	Long Term	Local	High	Moderate	Definite	High	Low	Moderate	Low	No on-site open fires are allowed.
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland, Highveld Grassland, Modified Wetlands, Forb-rich Wetlands and Moist Grasslands)(O).	N	Long Term	Local	Moderate	Moderate	Definite	High	Low	Moderate	Low	No dumping of litter, rubble or cleared vegetation on site should be allowed.
Loss/alteration of Floral Habitat and Diversity (Transformed)(O).	N	Long Term	Site	Low	Moderate	Definite	Moderate	Moderate	Low	Low	If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Floral SCC including their Habitats (MNCA Protected species and Provincially important Flora and Sensitive species 1200)(O).	N	Long Term	Site	Low to Moderate	Moderate	Definite	Moderate	Moderate	Low	Low	No collection of floral SCC or indigenous vegetation are permitted.
Loss/alteration of Floral SCC including their Habitats (Highveld Grasslands, Moist Grasslands and Valley-bottom Wetlands)(O).	N	Long Term	Local	Moderate	Moderate	Definite	High	Low	Moderate	Low	Edge effects such as erosion and AIP proliferation, which may affect adjacent or sensitive habitat, need to be strictly managed adjacent to the footprint areas.
Loss/alteration of Floral SCC including their Habitats (*Khadia carolinensis,* Forb-rich Wetlands and Rocky Outcrops)(O).	N	Long Term	Site	Low	Moderate	Unlikely	Very Low	Low	Very Low	Low	AIP proliferation, which may affect adjacent natural areas, must be strictly managed.

9.4.7 Activity 6: Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)

As mentioned, some impacts are only applicable to one activity during a particular phase of the project. The other impacts during various project phases were already discussed under **Section 9.4.1**.

Impact	Impact Discussion - Activity 6
Fauna and Flora – Operational	
Loss/alteration of faunal habitat and diversity.	➢ Loss of faunal habitat displacing species including potential SCC. ➢ Loss of suitable food resources, breeding grounds. ➢ Habitat fragmentation within the landscape. ➢ Loss or degradation of faunal habitat, diversity, and potential SCC within the direct footprint and adjacent areas. ➢ Isolation of faunal species and smaller populations thereof with limited movement ability, reducing overall movement of fauna within the landscape. ➢ Inability for faunal species populations to recover or re-establish within the disturbed footprint areas. ➢ Impact on food resource suitability for herbivores, potentially leading to displacement of fauna as move out of the surrounding areas in order to find suitable food resources.
Loss/alteration of floral habitat and diversity.	➢ Unmitigated loss of SCC individuals and potential impacts to population dynamics. ➢ Loss of floral habitat, diversity, and floral SCC. ➢ Degradation and modification of the receiving environment, as well as loss of sensitive floral habitat with limited potential for rehabilitation success. ➢ Loss of intact (or sensitive) floral habitat, as well as unnecessary edge effect impacts on areas outside of the proposed footprints. ➢ Loss of favourable floral habitat outside of the direct project footprint, including a decrease in species diversity and a potential loss of floral SCC. ➢ Decline in plant functioning leading to loss of floral species and habitat for optimal growth. ➢ Loss or alteration of CBAs and associated ecological functionality.

Table 73: Impact Assessment – Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Fauna and Flora											
Loss/alteration of Faunal Habitat and Diversity (Habitat Connectivity, Degraded Grassland and Transformed)(O).	N	Long Term	Site	Low	Moderate	Definite	Moderate	Moderate	Low	Low	No hunting, trapping or setting of snares by operational or contract personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.
Loss/alteration of Faunal Habitat and Diversity (Highveld and Moist Grassland)(O).	N	Long Term	Regional	High	Moderate	Definite	High	Moderate	Moderate	Low	Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habit.
Loss/alteration of Floral Habitat and Diversity (Significant Biodiversity Features)(O).	N	Long Term	Regional	High	Moderate	Definite	High	Low	Moderate	Low	Ongoing AIP monitoring and clearing/control should take place.
Loss/alteration of Floral Habitat and Diversity (Degraded Grassland and Highveld Grassland)(O).	N	Long Term	Local	Low to Moderate	Moderate	Definite	Moderate	Low	Moderate	Low	No dumping of litter, rubble or cleared vegetation on site should be allowed.
Loss/alteration of Floral Habitat and Diversity (Transformed)(O).	N	Long Term	Site	Low	Moderate	Probable	Low	Moderate	Very Low	Low	If any spills occur, they should be immediately cleaned up to avoid soil contamination that can hinder floral rehabilitation later down the line.
Loss/alteration of Floral SCC including their Habitats (MNCA Protected species and Provincially important Flora)(O).	N	Long Term	Site	Low to Moderate	Moderate	Probable	Low	Low	Low	Low	Edge effects such as erosion and AIP proliferation, which may affect adjacent or sensitive habitat, need to be strictly managed adjacent to the footprint areas.
Loss/alteration of Floral SCC including their Habitats (Highveld Grasslands)(O).	N	Long Term	Local	Low to Moderate	Moderate	Definite	Moderate	Low	Moderate	Low	Harvesting of protected or threatened floral species should be strictly prohibited.

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Loss/alteration of Floral SCC including their Habitats (*Khadia carolinensis*, Rocky Outcrops, Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands and Sensitive species 1200)(O).	N	Long Term	Site	Low	Moderate	Unlikely	Very Low	Low	Very Low	Low	AIP proliferation, which may affect adjacent natural areas, must be strictly managed.

9.5 Cumulative and Latent Impacts

Impact	Cumulative Impact Discussion
Freshwater	
Deterioration of surface water quality and alteration of wetland functioning.	➢ Freshwater resources in the regional area is already impacted by activities including mining and agriculture resulting in deteriorating water quality of various systems. The project may potentially also contribute to these existing impacts by improper water management and decant from mining operations. Edge effects on wetlands are to be expected from the project, even though on a limited scale, it will still result in negative impacts on freshwater systems.
Alteration or loss of wetlands.	➢ Wetlands are already impacted by activities including mining and wetlands.
Air Quality	
Deterioration of ai quality.	➢ Air quality is the HPA is already impacted by various activities such as power generation, mining, tailpipe emissions, etc. The project will contribute to all the existing emissions, yet on a limited scale.
Biodiversity	
Loss/alteration of on diversity and habitats.	➢ Loss of faunal and flora species as well as their habitats will be escalated in the provincial area where losses already occur due to various developments including mining, agriculture, residential, etc. ➢ The local area has already been subjected to impacts as a result of historic and current agriculture, livestock farming and ongoing mining activities. The proposed mining activities will, nonetheless, lead to faunal species as well as SCC being displaced from the proposed footprint areas into adjacent habitats. This may lead to increased competition for space, food resources and breeding habitat, increasing intra and inter competition amongst species, which may lead to an increased attrition of species diversity and abundance over time. ➢ Edge effects and AIP proliferation will additionally lead to further habitat loss and a decreased suitability of the current habitats for faunal habitation. ➢ The proposed project will result in significant fragmentation of the landscape. ➢ AIPs pose a considerable risk to remaining areas of natural, intact habitat. Within a landscape associated with agriculture and mining, AIPs quicker to spread and may result in the loss of intact habitat for both threatened flora and threatened ecosystems. ➢ Agriculture and mining are expanding within the area and are known threats to the remaining habitat of Sensitive Species 1200.
Noise	
Elevated noise levels.	➢ Noise levels in the area will increase with the operations and existing noise disturbances will be exacerbated.
Land Capability	
Loss of arable soils.	➢ Loss of arable soils will exacerbate existing losses of arable soils within Mpumalanga due to development.

Table 74: Impact Assessment – Cumulative

Impact Phase: C = Construction, O = Operational, D = Decommissioning, Clo = Post-closure/Closure	Nature	Duration	Extent	Magnitude	Reversibility	Probability	Impact significance	Mitigation efficiency	Impact Significance (Post Mitigation)	Level of Residual Risk	Summary of Mitigation Measures
Freshwater											
Deterioration of surface water quality and alteration of wetland functioning (C, O, D, Clo).	N	Long Term	Regional	Low	Moderate	Definite	Moderate	Moderate	Low	Low	Develop and implement post-closure water management plan.
Loss of wetlands (C, O).	N	Permanent	Regional	Moderate	Moderate	Definite	High	Moderate	Moderate	Low	Wetlands offsetting should be conducted once opencast operations has ceased.
Air Quality											
Deterioration of ai quality (C, O, D).	N	Long Term	Regional	Low	Moderate	Definite	Moderate	Moderate	Low	Low	Conduct dust suppression.
Biodiversity											
Loss/alteration of on diversity and habitats (C, O, D).	N	Long Term	Regional	Low	Moderate	Definite	Moderate	Moderate	Low	Low	Limit disturbance footprint to what is absolutely essential.
Noise											
Elevated noise levels (C, O, D).	N	Long Term	Regional	Low	Moderate	Definite	Moderate	Moderate	Low	Low	Consider using of white-noise alarms instead of tonal reverse alarms.
Land Capability											
Loss of arable soils (C, O, D).	N	Permanent	Regional	Low	Moderate	Definite	High	Moderate	Low	Low	Footprint disturbance must be limited.

10 ENVIRONMENTAL IMPACT STATEMENT

10.1 Impacts on Geology

The Naudesbank Project will change the lithology of the areas where mining is conducted and a non-renewable resource will be utilised. There is no mitigation for the expected impacts.

10.2 Impacts on Topography

The infrastructure and opencast pits are likely to materially affect the local topography. Effective rehabilitation can however limit this impact.

10.3 Impacts on Soils, Land Use and Land Capability

Soils will be impacted by the project through potential contamination, compaction, and erosion. The arable land capability will be permanently altered. Successful rehabilitation can re-instate the agricultural potential to at least sustain grazing practises. Implementation of mitigation measures will reduce the expected impacts to a moderate significance.

10.4 Impacts on Hydropedology

Underground mining is not anticipated to have an impact on the hydropedolgical process, but opencast mining is planned within the scientific buffer and therefore will impact on these processes. Approximately 85.76 ha of opencast mining is planned within the scientific buffer, but it is important to note that the opencast areas within the scientific buffer was reduced by 95.18% (1 693.28 ha) after applying the hierarchy of control. Hydropedological flow losses have been quantified and it was concluded that lateral flow will reduce by 5.221% while percolation will reduce with 5.784%. After instating mitigation measures, the impact is expected to be of low significance.

10.5 Impacts on Terrestrial Biodiversity

The area is of high significance from a faunal and floral perspective. Various areas are also classified as CBA. Protected faunal and floral species were observed during the site assessments. The significance can be reduced to varying degrees with the implementation of mitigation measures. These impacts post-mitigation range from very low to high.

10.6 Impacts on Freshwater Resources

Portions of wetlands will be lost resulting in more significant impacts however with the implementation of the hierarchy of control, the wetlands to be mined was reduced by 95.18%. An opencast area was further eliminated not only to preserve the wetlands by to not impose on protected species identified within this wetland system. Even though wetland losses have been reduced, edge effects on freshwater systems can also be expected. Water quality deterioration and decant are all causes for concern. Implementing mitigation measures will reduce the significance of the impacts and no fatal flaws have been identified.

10.7 Impacts on Groundwater

Impacts on water quality during operations are expected to be limited however, the groundwater quality is expected to deteriorate once mining has ceased. Dewatering and drawdown is expected to have an impact on numerous boreholes until the mining areas has flooded. Five boreholes will also be mined out. Boreholes shallower than 25 m is not expected to be affected by the underground mining. Mitigation can reduce the significance of the predicted impacts and no fatal flaws have been identified.

10.8 Visual Impacts

The project will have an impact on the sense of place and will result in visual intrusions, especially considering the relatively flat topography of the area. Limited mitigation measures can reduce the impacts during the construction and operational phases, but successfully rehabilitating the area once mining has ceased will reduce the significance to moderate.

10.9 Impacts on Air Quality

The project is situated within the HPA which has already been impacted to a severe extent because of air pollution. Three air quality parameters are of concern namely dust fallout, $PM_{2.5}$ and PM_{10}. Air quality deterioration cannot be prevented by the implementation of control measures however, the impacts can be reduced to low.

10.10 Impacts on Climate Change

The project will contribute to climate change via GHG emissions and could also be potentially impacted by climate change in terms of fire prevalence, water scarcity, etc. The calculated contribution of Naudesbank in terms of GHG emission sis 0.096%, which is considered negligible. The impacts that could materialise from climate change on the other hand is considered moderate and can be mitigated to some extent.

10.11 Impacts related to Noise

The background noise levels will increase with the project with some noise sources being sudden and short term (blasting, etc.) while noises from vehicles as well as daily operations being more of a continual source of noise. Mitigation can reduce the expected impacts to low significance.

10.12 Impacts related to Blasting

Blasting will have an impact on surrounding communities and potentially an impact on structures within 2 000 m of blasting areas. It is vital that a detailed blast design be developed taken cognisance of the recommendations made in the Blasting Assessment. The significance of the blasting impact can be reduced to low with the implementation of mitigation measures.

10.13 Impacts related to Traffic

It was determined that the road networks surrounding Naudesbank will be able to handle the expected increase and no detrimental impacts are expected. Discussions are ongoing with SANRAL and the intersection will be upgraded as per SANRAL guidance if necessary for the intersection linking with the R38 Regional Road.

10.14 Socio-economic Impacts

Various positive and negative impacts can be expected from the project. Positive impacts include:

- Employment opportunities.
- Improved livelihoods.
- Contribution to GDP.
- Contribution to human resources and socio0economic development programmes.

Negative impacts include:

- Increased social pathologies and crime.
- Disruption to daily lives.
- Potential damage to infrastructure.
- Potential influx of job seekers.
- Impacts on agricultural land uses and employment.

Mitigation will reduce the significance of impacts but some impacts cannot be avoided such as potential agricultural job losses.

10.15 Impacts on Archaeological, Paleoethological and Cultural Interest

Identified graves and structures have the potential to be impacted by the project and the likelihood of unearthing unmarked graves is also possible. Caution needs to be applied when earthworks commence and SAHRA must be consulted prior to relocation (graves) or demolishing/refurbishment (structures) since permits must be obtained.

No palaeontological material was observed during the assessment by Dr. Fourie, but a possibility exists that materials may be found during excavations. A chance find procedure must be developed.

10.16 Impacts related to Health and Safety

The operation of machinery and heavy-duty vehicles both on-site and off-site may increase risks to personal health and safety. Occupational risks affect the workforce including, professionally trained, skilled and unskilled staff. Risks pertain specifically to the presence of heavy mechanised vehicles and excavation machinery which is aggravated by poor visibility as a result of increased dust.

The air quality of the area surrounding the mine is likely to be reduced as a result of construction and continuous mining activities.

10.17 Community Perceptions and Responses

Community perceptions and concerns regarding the effects of the proposed project may in themselves constitute a social impact. If community members believe that the project will have a negative effect on their lives, regardless of whether or not this perception is justified, they are likely to be extremely resistant to the proposed development. This constitutes a source of social risk to the project, which should be addressed by allaying unjustified community fears regarding the project and instituting appropriate mitigation measures to address realistic concerns.

10.18 Final Site Map

The final site map is attached on larger scale in **Annexure 18**.

11 SUMMARY OF SPECIALIST STUDIES

The following table lists the specialist studies that was undertaken as part of this EIA process to assess the possible impacts that will be caused by the proposed activities at Naudesbank. References have been included to some of the specialist recommendations and where these have been included in the EIAR.

Table 75: Summary of specialists' recommendations

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
Groundwater Assessment (Attached as Annexure 5)		
➢ A groundwater monitoring system should be adapted and expanded according to the mine plan and scheduling. The first hydrogeological drilling phase and hydrocensus were conducted to obtain baseline groundwater information. Additional groundwater monitoring boreholes are required upstream and downstream of pits and near its long-term decant area. Where judged relevant, in-pit boreholes (Odex/Symmetrix) should be drilled to monitor the recovering mine water levels and quality. ➢ Each pit will require unique post-mining water management measures. If coal is processed in the project area, it is preferable to store coal discard and filter cake (slurry) in mine-out areas below the predicted post-mining groundwater table (typically below the lowest elevation along the pit perimeter). The mine water quality impacts in this study did not provide for such assessments. Where several pits are located in the same area in the centre of the study area (pits NB1, NB2, NB3-NB3ext, NB4 and NB5), it may be beneficial to find a solution which benefits all six pits. ➢ The dewatering effect of the underground mine should also be evaluated through hydrocensus information and dedicated groundwater monitoring boreholes. ➢ Care should be taken of the interflow between the NB4 pit and the VB-UG underground as well as the interflow between the VB1 pit and the VB-UG underground. The NB4 Pit decant elevation is almost 20 m lower than the VB1 Pit decant elevation, but there may be a barrier pillar between the underground and the NB4 Pit. The potential decant dynamics should be investigated in detail near the end of mining, but it may be advisable to ensure that decant occurs as soon as possible through the NB4 Pit, because this will ensure the best water quality (which can be used downstream). ➢ Once the mining plan is finalised, all groundwater users in the groundwater level impact areas should be visited again and their groundwater resource determined (e.g. though updating existing hydrocensus information and pump testing of important water supply boreholes and springs). ➢ The water supply mechanisms of wetlands overlying the underground mining areas should be studied to determine if these will deteriorate as a result of underground mining. ➢ Using the underground areas to store water (as in a reservoir) provides unique opportunities to mitigate mine water impacts and ensure continued quality water supply after the cessation of mining.	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.8 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr
Air Quality Impact Assessment (Attached as Annexure 6)		

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
➢ In view of ambient pollutant concentrations resulting from emissions from the Naudesbank Colliery, the installation of seventeen dust deposition gauges is recommended. The source monitors should be located downwind of the ROM area, near mining operations and important transport routes. Three receptor gauges should be located near the Naudesbank operations, one near the Vaalbank operations, three near the Vaalwater operations and two covering the Jagtlust underground operations. The proposed monitoring locations are indicated in the EMPr. ➢ The ultimate purpose of monitoring is not merely to collect data, but to provide information necessary to make informed decisions on managing and improving the environment. Monitoring fulfils a central role in this process, providing the necessary sound scientific basis for policy and strategy development, objective setting, compliance measurement against targets and enforcement action. ➢ However, the limitations of monitoring should be recognised. In many circumstances, measurements alone may be insufficient, or impractical for the purpose of fully defining population exposure. No monitoring programme, however well-funded and designed, can comprehensively quantify patterns of air pollution in both space and time. ➢ At best monitoring provides an incomplete, but useful, picture of current environmental air quality. Monitoring often needs to be used in conjunction with other objective assessment techniques, including modelling, emission measurement and inventories, interpolation and mapping. ➢ The recommended performance assessment and reporting programme for continued dustfall monitoring at Naudesbank is given in the EMPr.	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.9 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr
Soil, Land Use and Land Capability Assessment (Attached as Annexure 7)		
➢ The shallow subsurface coal reserves that cannot be mined by underground methods reside at fixed locations that cannot be moved to locations with medium or low agricultural sensitivity. There are thus no alternative open pit footprints with medium or low agricultural sensitivity. The proposed infrastructure footprints can be located around open pits on medium and low agricultural sensitive zones, if such zones are available and within a feasible distance, which was done as far as possible. ➢ All open pits and infrastructure footprints will be rehabilitated during the operational and decommissioning phase according to the procedures in Section 9.2 and therefore the post-mining landscape is expected to be stable and soil erosion should be minimal. Alien infestation can occur sporadic during the operational phase and should be monitored and controlled. ➢ The proposed development will certainly cause fragmentation and disturbance of agricultural activities, because it is situated on highly productive farms that are utilized for crop- and	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.4 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
livestock farming. The disturbance is to a large extent unavoidable and it is therefore a condition to support of approval that the mining area is fenced of properly to the smallest extend to enable effective utilization of the remaining farm land. ➢ The proposed development is situated within a large highly productive agricultural zone and agricultural production will cease completely at all infrastructure and open pit footprints for the entire operational phase, which makes the impact in principle unacceptable. However, in South Africa, the majority of coal reserves resides within highly productive agricultural land, which makes it, to a large extent unavoidable that coal mining will impact negatively on agriculture, which caused the cumulative impact on agriculture, especially on the Eastern Highveld, to become devastating in the past 30 years. What contributes significantly to the cumulative impact is the general poor standard of rehabilitation, which causes the majority of rehabilitated land to be hardly or not suitable for crop farming at all afterwards. In many cases the principles of rehabilitation are known to mining companies and in most cases the procedures required to achieve a high standard of rehabilitation are included in the approved EMP reports, but are simply not executed or poorly executed. The solution thus lies in the mitigation of the impacts of mining on agriculture, which implies that rehabilitation of coal mined areas should be executed at a standard that ensure that the pre-mining land capability are restored, and agriculture production can resume after mining was done. ➢ The solution lies thus undisputedly in precise rehabilitation procedures and controls that are constantly monitored, and the achievements determined, and reported by independent third parties. Considering the history of poor rehabilitation in South Africa, the impact can only be declared acceptable if rehabilitation procedures are monitored by an independent third party that, to a fair degree, guarantees a high standard of rehabilitation of especially the open pit sections. The acceptability of the impact is thus conditionally to acceptance of the rehabilitation monitoring procedures, which are provided in Section 9.2 and subsections thereof. ➢ The Agricultural Protocol requires above, firstly, a statement on the acceptability of the development, which was addressed in Section 10.6 above. Secondly, it requires a statement on whether the development should be approved or not. This is a serious issue, because both electricity supply and food security reached a critical state in South Africa. The electricity crisis is, however, not due to shortages of coal but solely due to poor governance and poor management and maintenance of electricity generating facilities. The mining of coal resources should however not be postponed until coal supply to power stations also become an issue. It is therefore unavoidable that approval of the mining of this coal resource should purely be based on whether the impact on agriculture can be mitigated to a degree that the restoration of the pre-mining land capability is guaranteed to a large extent. It is		

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
therefore recommended that the development is approved on condition that the rehabilitation monitoring procedures as provided in Sections 9.2 are included in the EMPr. ➢ The statement in section 10.7 that the development should be approved, is on condition that the rehabilitation monitoring requirements in Sections 9.2 are included in the EMPr and executed precisely. ➢ It is further a condition to support of approval that the mining footprint is fenced off properly to the smallest extend to enable effective utilization of the remaining farm land.		
Hydropedological Assessment (Attached as Annexure 8)		
➢ The proposed mining development will lead to alterations of the natural topography as part open cast pits and surface infrastructure establishment. These activities will likely, at least partially, intercept the subsurface flows in the vadose zone feeding the wetland as well as affect vadose zone recharge mechanisms. Based on the proposed layout and the extensive presence of plinthic soils that are hydropedologically active, total avoidance of the interflow soils will not be possible due to the dominance of these interflow processes, however it is the opinion of the hydropedology specialist that although the layout has been previously optimised, further optimisation which avoids the wetlands and associated scientific buffer (to further reduce the lateral flow losses to within acceptable levels) is deemed imperative in line with the mitigation hierarchy to ensure that the integrity of the wetland systems is maintained during all phases of development. ➢ The proposed underground mining within the study area is not anticipated to pose a risk on the hydropedological processes, however this risk of subsidence must be confirmed by a suitably qualified rock engineer to ensure that the wetlands and hydropedologically important soils remain unimpacted during all phases of development. Mitigation measures as stipulated by a suitably qualified Rock Engineer to mitigate against subsidence must be implemented. Should subsidence not occur, the underground mining development is deemed acceptable from a hydropedological risk point of view. ➢ As part of the mitigation measure, a scientifically derived buffer was developed to ensure that appropriate consideration of the hydropedological drivers within the study area is given in support of the principles of Integrated Environmental Management (IEM) and sustainable development. The buffer was developed to minimise impact in line with the mitigation hierarchy. ➢ A variable scientific buffer ranging between a minimum of 32 m to greater than 100 m was afforded to the occurring wetland features, while the depression features were protected at catchment level (as far as practically feasible) to ensure that all the surface runoff and subsurface flows report to these features during all phases of development. Some areas	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.4 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
within the scientific buffer can be considered for linear developments such as haul roads, but development must ensure that hydropedological processes are supported. ➢ Key, recommendations have been developed in the points below to minimise impact on the wetlands systems: ○ Minimise impacts on wetlands and wetland recharge areas, through management of edge effects to ensure that wetlands remain functional during and post-mining; ○ Disturbance of interflow (A/B) and to a lesser degree interflow (soil/bedrock) should be limited to what is essential. Where impact is unavoidable, measures to maintain interflow such as permeable layer works, and sub-terranean drainage structures should be considered to ensure that wetlands are recharged and to limit impact on structures; ○ Restrict the amount of mechanical handling of soils, as each excise increase the compaction level; The A (0-30 cm where applicable), B1 (30- 60 cm where applicable) and B2 (60-90 cm where applicable) horizons of topsoil should be stripped separately; ○ Linear infrastructure such as roads and pipelines within the interflow A/B areas (shallow hydropedological processes) should be underlined by a permeable pioneering layer to allow water drainage freely and not change the pattern and timing of water within the wetland and interflow soils significantly; ○ Concurrent rehabilitation should strongly be considered to ensure that the duration that any pit or extent thereof is left unrehabilitated is minimised; ○ At rehabilitation, reinstate the soil back to its original sequence and backfilling to a free-draining scenario post-mining to restore recharge to these drainage features wetland and reduce the duration of impact; and ○ Implementation of strict erosion control measures to limit loss of soil and sedimentation of the watercourse within the proposed project.		
Terrestrial Biodiversity Assessment (Attached as Annexure 9)		
<u>Floral (Part B):</u> ➢ The proposed activities will largely occur within degraded habitat (478 ha of the total 805 ha); however, approximately 327 ha of sensitive habitat classified as CBAs and an EN ecosystem as well as habitat harbouring a population of Sensitive Species 1200 (EN) will be directly impacted by the proposed project. It is therefore the opinion of the specialist that several aspects of the proposed OC mining activities (especially the OC Pits, Overburden Dumps, and Topsoil Dumps) will result in significant, negative impacts of moderately-high to high residual impacts to sensitive floral habitat and species regardless of sufficiently implemented mitigation measures. UG mining activities is not estimated to result in significant impacts to the receiving environment.	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.5 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
➢ It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development. <u>Faunal (Part C):</u> ➢ The proposed mining activities will largely occur within transformed habitat (328 ha of the total 805 ha) which is of decreased importance for fauna. Approximately 136 ha of sensitive Freshwater Habitat and 249 ha of Highveld and Moist Grasslands, which are important for many faunal species including various SCC, will be lost, which will have a negative effect on species utilising these habitats leading to reduction in species diversity and abundance. ➢ It is the opinion of the specialist that several aspects of the proposed OC mining activities (especially the OC Pits, Overburden Dumps, and Topsoil Dumps) will result in significant, negative impacts ranging between high to medium-high to sensitive faunal habitat and species irrespective of mitigation measures due to the nature of opencast mining and the associated infrastructures. A high impact can also be expected on potential and confirmed SCC within the study area. UG mining activities is not estimated to result in significant impacts to the receiving environment. ➢ It is the opinion of the ecologists that this study provides the relevant information required to implement Integrated Environmental Management (IEM) and to ensure that the best long-term use of the ecological resources in the study area will be made in support of the principle of sustainable development.		
Freshwater Assessment (Attached as Annexure 11)		
➢ Based on the outcome of the DWS Risk Assessment, the proposed open cast pits pose a 'high' risk to portions of Systems 1 and 4, as the pits will directly transect various HGM units associated with these drainage systems, causing direct and indirect loss of wetland habitat. Whilst the majority of the remaining drainage systems, depression wetlands and isolated hillslope seep HGM units (including remnant hillslope seeps) are not likely to be directly impacted, edge effects may occur in varying degrees and extents, and therefore, adherence to the mitigation hierarchy, and the strict implementation of mitigation measures outlined in this report, is considered essential. Should the proponent commit to such adherence to the mitigation hierarchy and mitigation measures, the significance of potential impacts arising from some of the proposed mining activities can be reduced although the direct impact to those wetlands which will be mined through is irreversible. The proponent should consider options to minimise irreversible loss of wetlands, but if not possible, the proponent must	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.7 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
engage with the DWS as the custodians of water resources in South Africa to implement appropriate management measures in line with the mitigation hierarchy which are deemed acceptable to both the competent authority and the proponent with regards to the outright loss of the affected wetland HGM units. ➢ Based on the outcome of the freshwater ecological assessment, and the DWS Risk Assessment, it is the specialist's opinion that the proposed open cast mining activities have the potential to result in impacts of very high significance on the receiving freshwater environment. Thus, consideration of the value of this landscape must be considered from a freshwater and terrestrial biodiversity resource management point of view and juxtaposed with the responsibility to comply with Regulation 23 of the Mining and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) MPRDA pertaining to the optimisation of the Mining Right as well as the socio-economic and socio-cultural impact the project will have and the decision should be made and aligned with the principles of sustainable development and Integrated Environmental Management.		
Environmental Noise Impact Assessment (Attached as Annexure 12)		
➢ Using conceptual worst-case noise models, it was determined that the potential noise impacts at the project would be: ○ of a high significance for daytime construction/mining activities. Potential mitigation measures are available and, if implemented, could reduce the significance of the noise impact to low; ○ of a high significance for night-time construction activities. Potential mitigation measures are available and, if implemented, could reduce the significance of the noise impact to low; ○ of a high significance for daytime operational activities. Potential mitigation measures are available and, if implemented, could reduce the significance of the noise impact to low; and ○ of a high significance for night-time operational activities. Potential mitigation measures are available and, if implemented, could reduce the significance of the noise impact to low. ➢ The construction and operational scenario's all consider noise-generating activities close to the verified NSR (and NSR representing these communities), at the same time considering worst-case noise emission levels. The scenarios consider various activities at numerous mining locations, that would increase cumulative effects. ➢ It is expected that the mining activities will be clearly audible at the closest NSR, though noise impacts are not considered to be a fatal flaw as mitigation measures are available to reduce the noise levels as well as probability of noise complaints. While complaints about	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.10 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
noise might be possible, the implementation of the recommended mitigation measures will assist in reducing annoyance with the project. It is therefore the recommended that the Naudesbank Coal Project be authorized (from a noise impact perspective). ➢ This noise impact assessment is sufficient, but it is recommended that a noise monitoring programme be designed and implemented.		
Heritage Impact Assessment (Attached as Annexure 13)		
➢ The literature review indicates that there are some cultural heritage (archaeological & historical) sites and features in the larger geographical area within which the study area falls. A number of sites, features and material of cultural heritage (archaeological and/or historical) origin & significance were identified and recorded in the study and the proposed development area during the May & June 2023 field assessments. ➢ A number of sites, features and remains of recent historical origin were identified in the area during the field assessment, as well as some individual Stone Age objects just outside and in the area. The recent historical sites included some old farmsteads and related infrastructure (some of which are still in use and occupied), as well as a number of grave sites (informal cemeteries) in the area. Mitigation measures to negate the potential impacts of the mining development on the sites have been provided. ➢ The impact of the proposed development on the recorded and known cultural heritage sites in the area is seen as Moderate based on the Impact Assessment criteria used. There is always a possibility of sites, features and material being missed as a result of various factors such as vegetation cover hampering visibility on the ground, as well as the often-subterranean nature of cultural heritage resources, including low stone-packed or unmarked graves. The drafting and implementation of a Chance Finds Protocol for the proposed Naudesbank Mining Project is therefore also recommended. ➢ From a Cultural Heritage point of view, it is recommended that the proposed Naudesbank Mining Project Development should be allowed to continue taking into consideration the recommended mitigation measures.	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.11 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr
Palaeontological Impact Assessment (Attached as Annexure 14)		
➢ There is no objection to the development, it was necessary to request a Phase 1 Palaeontological Impact Assessment: Field Study to determine whether the development will affect fossiliferous outcrops as the palaeontological sensitivity of the site is VERY HIGH. A Phase 2 Palaeontological Mitigation is only required if the Phase 1 Palaeontological Assessment identified a fossiliferous formation (Karoo Supergroup) and fossils or if fossils are found during mining or construction.	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.12 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
➢ This project may benefit the community, will create short- and long-term employment, the life expectancy of the community, the growth of the community, and social development in general. ➢ The ECO must undertake periodic audits to monitor and record heritage impacts and non-compliance, preferable weekly or bi-weekly. ➢ The following should be conserved: if any palaeontological material is exposed during clearing, digging, excavating, drilling or blasting SAHRA must be notified. All construction activities must be stopped, a 30 m no-go barrier constructed and a palaeontologist should be called in to determine proper mitigation measures. ➢ This report must be submitted to SAHRA/PHRA together with the Heritage Impact Assessment Report.		
Traffic Impact Assessment (Attached as Annexure 15)		
➢ It is concluded that the road network, surrounding the Naudesbank Mining Project, will be able to handle the expected additional traffic with no detrimental impact on the traffic on any of the relevant surrounding roads. ➢ It is therefore recommended that the proposed Naudesbank Mining Project, including the proposed geometric upgrading of the current existing intersection of road D1252 onto Route R38, be approved from a traffic point of view, by the relevant road authorities.	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 8.13 – EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr
Blasting Impact Assessment (Attached as Annexure 17)		
➢ The potential impacts of ground vibration, air blast levels and fly rock risks were determined using methods provided by the USBM. A potential blast design was estimated considering the potential bench height (when considering the depth to the coal resource), with this assessment indicating that: ○ That ground vibration levels may be unpleasant to BSRs when blasting take place within approximately 2 200 m from structures used for residential or business activities (precautious evaluation using a worst-case scenario). The impact is of a potential High significance and mitigation is required and proposed that could reduce the significance of potential impact of vibration levels on BSR to Low. However, due to the sensitivity to blast effects, it is possible that people may still complain about the perceived blast effects even after the implementation of mitigation measures; ○ That ground vibration levels could be of High significance to any brick buildings located within 500 m from the proposed opencast pits. Mitigation is required and included that could reduce the significance of potential impact of vibration levels on such buildings to Low;	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
○ That ground vibration levels could be of High significance once blasting activities take place closer than 200 m from any cement dams. Mitigation is required and included that could reduce the significance of potential impact of vibration levels on the dams to Low; ○ That ground vibration levels could be of Medium significance once blasting activities take place closer than 160 m from the tar road and railway line. Mitigation is required and included that could reduce the significance of potential impact of vibration levels on these structures to Low; ○ Air blast levels will be clearly audible to all surrounding receptors and the significance will be High for the closest BSRs. Additional mitigation is recommended and included to reduce potential complaints and annoyance with the project. Due to the sensitivity of people to the significant loud noise as well as secondary vibration of large surfaces (due to the change in air pressure) associated with a blasting event, BSRs must be informed about the potential impacts. It is possible that people may still complain about the perceived blast effects even after the implementation of mitigation measures; ○ There may be a risk of High significance of fly rock to BSRs or BSSs, and blasting close to the mine equipment and infrastructure may result in fly rock damage. Management measures are available to ensure that risks are minimised. ➢ In addition, community involvement throughout the project is of utmost importance. This is especially true for any mining projects where blasting may take place, irrespective of the temporary nature of blasting. Blasting related impacts may potentially upset the surrounding community and complaints could be one of the tools that the community may use to express their annoyance with the project, rather than a rational reaction to the vibration or air blast levels itself. ➢ At all stages surrounding receptors should be informed about the project, providing them with factual information without setting unrealistic expectations. Even with the best measures, blasting related impacts will be perceived negatively and the community members may complain. It is therefore in the best interest of the mine to continually monitor and manage the blast in an effort to improve and minimise potential blasting effects. ➢ It is highly recommended that the mine conducts a detailed photographic survey at selected structures (that does not belong to the mine) located within 2 000 m from the mine (from locations where blasting may take place) before any mining activities start (before the construction phase start where blasting is to take place). This should include a survey (condition assessment with photographic records) of residential structures (within 2 000 m from opencast pits), heritage structures (of high cultural or archaeological value – if relevant), water boreholes (within 2 000 m from opencast pits) and cement dams (within 500 m from opencast pits) to determine the status of these structures.		

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
➢ Blasting will take place closer than 500 m from any roads and the mine must note that GNR.584 of 2015 does limit blasting within 500 m from certain structures (such as roads, railway lines or overhead power lines) unless certain conditions are met. The mine will have to discuss the project with the relevant provincial authorities to authorize the temporary closure of the roads and implement the agreed upon mitigation measures. The mine must obtain the schedule of rail traffic and plan blasting times accordingly. Warning signs should be erected within 1 000 m during blasting events along the roads and railway line. ➢ It is concluded that, if the mine considers the recommendations in this report (incorporated in the Environmental Management Plan), that blasting risks do not constitute a fatal flaw. It is, therefore, the recommendation that the blasting activities associated with the Naudesbank Coal project be authorized subject to compliance with the conditions of the EMP, on condition that: o That this report be updated once the actual blast design at the mine is finalized; o This report be updated if the blast design is changed where more than 1 585 kg explosives are detonated per delay; o This report be updated if the location of the opencast pit is moved with more than 100 m; and, o This report be updated if the blast parameters changed with the mine making use of borehole with a larger diameter than considered in this report (150 mm) or the burden and spacing distances are increased.		
Climate Change Impact Assessment (Attached as Annexure 16)		
➢ Although mitigation will not alter the impacts of GHG emissions in terms of the extent, duration or probability of the impact, the intensity of the impact can be reduced, notably by reducing the quantity of GHG emissions. There are many ways to reduce GHG emissions from coal mining, which include basic mitigation strategies to specific tactics and actions. ➢ Basic mitigation strategies include: o Optimising construction activities, operational activities and logistics – performing as efficient and effective as possible. o Implementing a fuel management strategy, which encourages more efficient use of plant and vehicles, planning, logistics, driver education and maintenance. o Reducing the amount of waste disposed to landfill and reuse of waste, which will subsequently reduce the amount of vehicle movements and fuel usage. o Exploring alternative energy possibilities. o Monitoring of fuel and energy.	Recommendations of aspects that should receive adequate attention as stated in the specialist study were included in the EIAR/EMPr. No amendments were made as to what the specialist recommended.	Section 6 - EIAR Section 9 – EIAR Section 5 – EMPr Section 7 – EMPr

Recommendation of specialist reports	Specialist recommendations included amendments and reference where included in EIAR	Reference to the applicable section of the report where the specialist recommendations have been included
○ Identifying significant energy consuming equipment and recognising opportunities where technical efficiencies in plant and equipment can be applied. ○ Reviewing the GHG emissions inventory annually. ○ Conducting a Climate Change Impact Assessment prior to commencement of rehabilitation and closure. ➢ A key concept to climate change adaptation is "adaptive management", the process whereby climate related risks are continually monitored, measurements implemented, tailored and revised in relation to climate change.		

12 PUBLIC PARTICIPATION

The PPP is an important part of the EIA process, ensuring all project stakeholders are informed and have an opportunity to contribute to the process. The guidelines for engagement with project stakeholders and public participation during the EIA process are stipulated in Section 24 (5) and regulation 39-44 of GNR 982 of NEMA (as amended). The Public Participation Report is attached as **Annexure 19.**

12.1 Objectives of the Public Participation Process

The objectives of the Naudesbank Public Participation Process (PPP) are to:

- Comply with national legislation;
- Establish and manage good relationships with key stakeholder groups;
- Encourage involvement and participation in the EIA process; and
- Obtain and utilise local knowledge.

Note that a single, consolidated stakeholder engagement process is undertaken for this project, adhering to the PPP requirements of all three acts, including the requirements from the following acts:

- the NEMA;
- the MPRDA; and
- the NWA.

A PPP has been initiated as part of the Naudesbank development and is undertaken as per GNR 982 of NEMA. As part of this PPP the details of the Interested and Affected Parties (I&APs) were registered and included in the database. Individuals and groups who requested to be registered as I&APs have been registered.

12.2 General Public Participation Approach

The PPP for the project has been undertaken in accordance with the NEMA Regulations and timeframes; however, the principles of the PPP are governed by the NEMA: EIR regulations. The aim of the PPP conducted throughout the entire S&EIR of the project was primarily to ensure that:

- Any potential stakeholders and I&APs are identified and consulted with;
- Information containing all relevant facts in respect of the application is made available to identified stakeholders and I&APs;

- Participation is facilitated in such a manner that all potential stakeholders and I&APs are provided with a reasonable opportunity to comment on the application and identify issues to be addressed throughout the S&EIR process; and
- Comments received from stakeholders and I&APs is recorded.

The PPP activities undertaken during the S&EIR of the project are discussed in the sections below.

12.3 Stakeholder Engagement and Consultation Process

12.3.1 Meetings

One-on-one meetings were held with Mr. Combrink, Me. Wright and Mr. van der Merwe, refer to **Annexure 19.9** for the record of the meetings. Additional meetings can be scheduled on request. A public meeting will be held during the EIA phase.

12.3.2 Advertisements

A newspaper notice was published in the Daily Sun on 12 August 2022 and the proof of the notice is attached as **Annexure 19.3**.

12.3.3 On-Site Notices

On-site notices were placed at the following locations on 12 August 2022 (Refer to **Annexure 19.2**):

- Next to the R38 Regional Road (26° 6'29.73" S; 29°57'46.07" E);
- At the intersection of the R38 Regional Road and Vaalbank Gravel Road (26° 6'11.32" S; 29°58'37.20" E);
- At the school next to the R38 (26° 8'5.98" S; 29°53'2.20" E); and
- At the gravel T-junction at the specified coordinates (26° 2'28.38"S; 29°50'58.66"E).

12.3.4 Background Information Document

The announcement of the Naudesbank Project to these parties were done by way of distributing a BID, a copy thereof is attached in **Annexure 19.4**. The BID was distributed to everyone listed in the current database by means of e-mails. The proof of distribution of the BID is attached as **Annexure 19.5**.

The identified I&APs were afforded the opportunity to gain background knowledge of the proposed project and to raise their initial concerns.

12.4 Registration of I&APs

12.4.1 Registration of I&APs

This is an on-going process and stakeholders are welcome to register throughout the process. The placement of site notices and advertising in the newspaper afforded the general public the opportunity to register as I&APs and to participate in the process. As depicted in the BID, all landowners, lawful occupiers, municipal ward councillors and relevant organs of the state will be contained in the I&AP register throughout the life of the project. However, as stipulated in the BID, other parties need to register to remain on the I&AP database.

An I&AP's personal information (name, organisation, contact numbers, email address, etc.) is collected for communication purposes to fulfil the public participation requirements of the NEMA. Personal information, with the exclusion of their names and comments recorded, will not be made available during the PPP. This is done in order to protect all I&APs personal information in accordance with the requirements set out in the Protection of Personal Information Act 4 of 2013, (as amended). The I&APs personal information will only be made available to the Competent Authority on their request but will never be included in any documents that will be in the public domain.

12.4.2 Notification of Relevant Authorities

The following government departments and non-governmental organisations (NGOs) were notified about the project during the PPP:

- Department of Mineral Resources and Energy (DMRE);
- Inkomati-Usuthu Catchment Management Agency (IUCMA);
- Department of Agriculture, Land Reform and Rural Development (DALRRD); and
- Mpumalanga and Tourism Parks Agency (MTPA).

12.5 Access and Opportunity to Comment

12.5.1 Scoping Report

The Draft Scoping Report was circulated to all the registered I&APs for a comment period of 30 days from 13 February 2023. Refer to **Annexure 19.6** for the proof of distribution.

The Final Scoping Report was submitted to the DMRE on 24 March 2023. Refer to **Annexure 19.7** for the proof of submission.

12.5.2 Availability of the EIR and EMPr

The Draft Environmental Impact Assessment Report (EIAR) and Environmental Management Programme (EMPr) will be made available for comments by all registered I&APs on 1 August 2023 for 30 days.

12.5.3 Issues and Concerns Raised

All issues/comments raised throughout the course of the project were (and will continue to be) recorded in an Issue Response Register (**Table 76**) that will be updated on a regular basis and included as part of the Final EIAR. Comments received to date are included in **Annexure 19.9**.

Table 76: Issue and Response Register

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
Landowner/s				
Gene Wright Werner Taute	X	19 August 2022 10h00 One-on-one Meeting	Family had a lot of land.	Statement noted.
			Very fertile land, 6 ton/ha soybeans produced using dryland agricultural methods.	Information noted, agricultural impact will be considered in detail during the EIA phase when an agricultural impact assessment is undertaken.
			A lot of water.	Noted.
			September 2021 – August 2022 rainfall of 1 100 mm.	Noted.
			Graveyard of family on CB de Villiers land.	Noted, a heritage impact assessment identifying all graves within the area will be undertaken during the EIA phase.
			Asked about the process of objection and appeal process.	Process of objection and appeal process is explained. Objections can be noted during the EIA process. A letter can also be sent to the DMRE to state objection against the project. The appeal process only commences if the EA is granted. An appeal must be submitted to the Department of Forestry, Fisheries and the Environment (DFFE) within 20 days from date of notification and should be lodged as prescribed in Chapter 2 of the National Appeal Regulation of 2014 (as amended).
			Provide tons and LoM.	The LoM is estimated to be 34 years, but construction and decommissioning will add an additional 6 - 7 years to the project. Therefore the entire period required for the mine is 43 years. An estimated 50.744 million tonnes of RoM coal will be produced during the LoM.
			Erosion around the roads accessing the area.	The concern is noted. This is a provincial gravel road but an assessment will be made of how this erosion can be addressed during the EIA phase.
			Protection of the house important, sandstone structure to be protected. House built in 1956.	Statement noted, a heritage impact assessment and blasting assessment will consider the potential

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
				impacts in detail. The findings will be made available during the EIA phase.
			Plan to move the factory to the farm.	Statement noted.
			Plan to establish sawmill on the farm.	Statement noted.
			Local business must be supported.	The SLP commitments usually focus on supporting the local SMME's and this aspect will also be evaluated as part of the socio-economic assessment. The assessment will be included in the EIA phase.
			Control room geovision.	The use of geovision will be investigated during the EIA phase and the applicability to mitigate the potential increase in the risk of theft in the area.
Mr. Combrink	**X**	19 August 2022 12h00 One-on-one Meeting	Area not used, used as passage for livestock theft.	Concern is noted and will be addressed during the EIA phase.
			Concerned that issues raised at meetings are discarded and not considered.	An EAP is required by law to record all comments and concerns raised during the process and included in the documentation. This include a response to the issues raised as per this table.
			Labour is moving to the mine, but remain living on the farm. If that happens mine must ensure labourers move off the property.	Concern is noted and will be addressed during the EIA Phase.
			Issue of season, must be finalised by 1 August, if later they must wait for the next season. Planning and exclusion commences on 1 August.	The applicant will be informed that the season commences on the first of August every here and that if land is required for mining purposes agreements needs to be made prior to the 1st of August else farmers will commence with preparation.
			Buildings must be recorded, who will inspect monthly and who will repair it.	Concern is noted and will be addressed during the EIA Phase.
			Water – I cannot drink it.	Noted. A geohydrologist will undertake a groundwater study and will also look at the current water qualities.
			No problem with impact assessment specialist studies.	Noted.
			Graveyard of grandfather's farther.	Noted, a heritage impact assessment identifying all graves within the area will be undertaken during the EIA phase.

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
Mr. van der Merwe	**X**	30 August 2022 09h00 One-on-one Meeting	Properties associated with Van der Merwe Group are: Baruch Eiendomme – adjacent to application area Kareepoort Eiendomme – adjacent to application area SJM Trust Vaalwaterspruit Trust BJ van der Merwe	Noted.
Mr. van der Merwe	**X**	30 August 2022 09h00 One-on-one Meeting	Email address will change, new email are: [redacted]	Details noted. Please note that contact information is withheld to comply with POPI Act.
			Maps to be emailed.	Maps and list of studies provided to Mr. van der Merwe on 30 August 2022, refer to **Annexure 4.8** for proof of the email.
			Access to land for specialist studies not decided yet, first seek legal advice.	Noted. A follow up email pertaining to access to the property was sent by Mr. Kleynhans on 12 September 2022.
			Legal representative Mr Japie van Zyl [redacted]	Details noted. Please note that contact information is withheld to comply with POPI Act.
Japie Van Zyl Attorneys on behalf of Mr. van der Merwe	**X**	27 September 2022 11h40 Email	We confirm that we act on behalf of the trustees of the SJM Trust, Mr B.J. van der Merwe, the trustees of the Vaalwaterspruit Trust, Kareepoort Eiendomme and Baruch Eiendomme.	Noted.
			Please provide your written confirmation that you request access in relation to the following application: 1. Application for a mining right submitted by Seriti Power (Pty) Ltd on various portions of various farms including Vaalbult 3 IT, Naudesbank 172 IS and Vaalwater 173 IS. The department reference number quoted on your Background Information Document (BID) refers to a prospecting right with reference number MP30/5/1/1/2/1057PR. Please provide the correct department reference number.	This application pertains to the conversion of the prospecting right to a mining right including an EA application. The Mining Right reference number will be provided once the application has been submitted.
			Subject to your confirmation of the above, our client is prepared to grant access without prejudice to any of	Noted.

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
			its rights.	
Japie Van Zyl Attorneys on behalf of Mr. van der Merwe	X	27 September 2022 11h40 Email	The access granted is subject to the following: 1. 48 hours' notice must be provided to our client before the properties are entered; 2. Only existing access roads must be used; 3. Full names of the parties who will conduct the specialist studies must be provided before access is granted; 4. Zyntha Consulting (Pty) Ltd and/or the applicant for the mining right will jointly and severally be responsible for all costs or damages the surface owner may suffer as a result of the access granted ; 5. The specialists who shall conduct the specialist studies shall be properly identified with name tags. Identification must be provided on request; 6. All telephone numbers of the specialists must be provided to our client, Mr. Jan Harm van der Merwe. Mr. van der Merwe's contact number is: 082 556 9960. This information can be sent to him via Whatsapp; 7. The specialist shall at all times comply with all applicable laws; 8. No hunting shall be allowed; 9. Only new vehicles which have been checked for oil leaks shall be used; 10. No damages shall be caused to any improvements; 11. The applicable laws in relation to dust and noise elimination shall be applied with; 12. No disturbances shall be caused to the environment other than vehicle tracks that may be left on the property; 13. No driving shall be allowed in wet areas.	Noted and agreed to. These conditions were communicated to all specialist on 28 September 2022.
			The specialist shall access the property at their own risk and shall indemnify the surface owner and all other parties who hold a direct or indirect interest in the surface owner from any	Noted.

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
			loss, destruction, injury, death, cost, damages which may be incurred as a result of the specialist accessing the property.	
Japie Van Zyl Attorneys on behalf of Mr. van der Merwe	X	27 September 2022 11h40 Email	The result of the study shall be strictly confidential and only be provided to the relative authority, our office, our client, and our clients' appointed specialists.	Refer to correspondence of 28 September 2022 below.
			Kindly acknowledge receipt of this e-mail.	Receipt of email was acknowledged on 27 September 2022.
Japie Van Zyl Attorneys on behalf of Mr. van der Merwe	X	28 September 2022 09h55 Email	We refer to our previous correspondence and the telephonic discussion between yourself and Carin of our offices on 27 September 2022. We confirm that the following paragraph can be omitted: "The result of the study shall be strictly confidential and only be provided to the relative authority, our office, our client, and our clients' appointed specialists." We trust you find the above mentioned in order. Kindly acknowledge receipt.	The omission is noted. Receipt of email was acknowledged on 28 September 2022.
Lawful occupier/s of the land & individuals/communities residing on land				
B.J Nkosi Naudesbank Farmers Association	X	15 August 2022 11h56 Email	We think mining should happen for the Naudesbank farm community to benefits employment and business, particularly those who qualify but with no experience. And also give training to those who do not qualify.	The comment is noted. This will be addressed as part of the Social and Labour Plan.
			The mining company must provide us with information about its impact pertaining the plan of how will it avoid polluting water, air, soil and noise.	Detailed assessments will be conducted by specialist and the finding included in the EIAR and EMPr.
			We need clarity if whether it will be necessary for us to be relocated, and how will be done, and how are we going to be compensated.	Portion 14 of the Farm Naudesbank will not have any surface infrastructure, therefore no relocation will be necessary.

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
B.J Nkosi Naudesbank Farmers Association	X	16 August 2022 15h26 Email	Note that the Naudesbank farm community will be also seeking the answers of the following questions as part of additional comments. So we urge the proposed mining to prepare them early.	Statements noted.
			Is the mining company applying for a permit, a mining permit or mining right?	The application is for a Mining Right. It should be noted that the project also include an Environmental Authorisation Application and Water Use License Application.
			When will they apply? Have they applied? Can the community see the application before it is submitted? Who will application submitted to? What will be in the application.	The application will be submitted to the Department of Mineral Resources and Energy (DMRE). It should be noted that it will not be possible to provide the application prior to submission, as the application may be rejected by the DMRE, but once the application is accepted the application can be made available. Note that the scoping report, environmental impact assessment report and environmental management programme report will be made available for comments prior to submission. Documentation submitted as part of a Mining Right Application include: • A plan showing the area. • Mine Work Programme. • Existing Rights. • Social and Labour Plan. • Environmental Authorisation Application.
B.J Nkosi Naudesbank Farmers Association	X	16 August 2022 15h26 Email	What will the distance of the project area be from community.	The nearest surface infrastructure development is located ±550 m from Portion 14 of the Farm Naudesbank 172 IS. The distance to the nearest visible houses as per the Google Earth satellite image is 1.8 km.
			Who is the land owner or the land occupier of the project area? What are the contact details.	All the landowners were identified. Land occupiers are welcome to also send their contact details to register as an Interested and Affected Party (I&APs). We are

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
				prohibited by the Protection of Personal Information Act (POPIA, Act 4 of 2013) to provide contact details of the landowners or land occupiers.
			What information does the mine have about the size, personal circumstances and income of the community.	Information to be collected will form part of the Social and Labour Plan. It should be noted that a socio-economic impact assessment is planned, this information will be collected for the report.
			Who will be adversely affected by potential environmental and social impact in the project area of influence? How will they control dust? What will trucking affect traffic on local road.	The potential impacts and sensitive receptors will be identified by the specialist studies to be undertaken. The air quality specialist will assess the expected dust fallout and recommend measures on how to control dust. A traffic impact assessment will be undertaken to determine the impacts on roads. All the information listed above will be made available to all the registered I&APs during the Environmental Impact Assessment (EIA) Phase.
			Who are the most vulnerable among the potentially impact and are special engagement effort necessary?	All affected stakeholders may perceive that they are the most vulnerable and this is why the public engagement process is followed.
B.J Nkosi Naudesbank Farmers Association	X	16 August 2022 15h26 Email	At which stage of project development will parties be affected (e.g. prospecting, extraction, decommissioning, and rehabilitation at all stages?	The environment and affected parties may be impacted during all the phases of the mine. These impacts will be assessed in detail by the specialists during the EIA Phase and the documents distributed to all I&APs for comments.
			How will the project be done in a manner that prevents the pollution of water resources.	Detailed assessments will be undertaken by a freshwater ecologist and a geohydrologist to assess the potential pollution of water resources. These reports will be made available to all registered I&APs during the EIA Phase.

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
			How many times a day does the mine plan on blasting and how will roads, cropping and grazing land be diminished? Will this have a negative impact on infrastructure and services.	Blasting frequency can only be confirmed when prior to the establishment of the mine, but before this can happen the necessary authorisations must be obtained. The impacts on roads, cropping and grazing land will be assessed and detailed assessments will form part of the EIA Process. These reports will be made available to all registered I&APs. A blasting impact assessment will be conducted to determine what the impact will be on surrounding infrastructure.
			What various interests of project stakeholders and what influence might this have on the project and community?	The interest from stakeholders in general is how they will be affected since they are often farm owners or land occupiers. These concerns are noted and should be adequately addressed in the reports compiled and can also result in changes of the project layout. The project will have an impact on the landowners, farming communities and the environment, the exact extent of the impacts and measures to mitigate these impacts will be assessed in detail during the EIA Phase by appointed specialists.
			How will the benefits local communities in terms of social and labour plan? And when communities make comments on the plan?	The SLP will address in detail how the community will benefit from the mine. As indicated above under the availability of the application, the SLP can only be made available upon acceptance of the application.
B.J Nkosi Naudesbank Farmers Association	X	16 August 2022 15h26 Email	Does the mine plan on relocating to a different area?	The surface activities are limited to certain farm portions, this will either result in a lease agreement or purchase agreement with the landowner. Relocation will be considered, but it will form part of the next phase of the project. Relocation, if required, will be done in conjunction with consultation with the affected parties.
Patrick Malindisa 7 Rooms Naudesbank	X	22 August 2022 08h35	We need the house, water, electricity, tenders jobs be a part of the mining project.	The issues pertaining to opportunities to the community will be addressed during the SLP. If

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
		Email		relocation is required, it will entail housing, water and electricity.
Bongani Khandizwe (Pty) Ltd	X	24 August 2022 09h07 Email	Khandizwe Maintanance and Drilling Exploration (Pty) Ltd is located on Naudesbank portion 14. Exercising preference of prospecting by drilling holes and bus commuter business opportunity for the above mention company may bring community certainty and stabilization. Not only for the company but also for the Naudesbank employees who experience the existing skill. Lastly please assist with the electricity and clean drinking water.	The issues pertaining to opportunities to the community will be addressed during the SLP. Prospecting has already been undertaken and this application is for mining. Your request for electricity and drinking water will be forwarded to the applicant.
B.J Nkosi Naudesbank Farmers Association	X	10 March 2023 10h32 Email	We declare fitness according the draft scoping report, as well as every harmful impact are very well safeguarded and our request to Seriti is to harmonize with the provided relevant report.	Statement noted.
			Comments is pertaining Naudesbank portion 6 and 14 whereby the nine Naudesbank mud houses are located. To say in which year of the LoM could be the mining on the above mentioned portion ? and what kind of mining could take place between the OC and OG?. If it is the OC how will the noise and houses damages will be mitigated ?.	The final layout has not been finalised to date and an indication as to when mining will take place on Portion 6 and 14 cannot be confirmed yet. Based on the current optimised plan, both opencast and underground mining is planned on Portions 6 and 14 of the Farm Naudesbank 172 IS. This can however only be confirmed once the final layout has been determined. Mitigation measures pertaining to noise and potential damage to structures will be evaluated in-depth in the EIA phase by specialists. The report will be made available for review.
			Lastly according to the recruitment of permanent employment opportunities, employee training and procurement of which includes SMMEs development that will serve the Seriti LoM preference must be given to Naudesbank farm.	Response by Seriti: Your concerns are noted. Seriti prides itself as a responsible and reputable employer with solid recruitment policies and procedures that not only ensures a transparent and lawful, but also inclusive and equitable processes when recruiting talent. Our Social and Labour Plan submitted to the regulator
			Please let preference also be considered pertaining every body who is situated at the indicated farm portion whereby the Environmental Impact Assessment was taken so as to avoid the NO GO OPTION whereby on the other	

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
			side Carolina township will be prioritize to benefit everything.	(DMRE) prioritises our primary and secondary host communities for opportunities that may arise during the course of our mining activities, including but not limited to job opportunities, training and development amongst others. Receipt of email was confirmed on 13 March 2023 by Zyntha.
			After indicated farm portion recruitment and procurement is complete then the Carolina township should follow.	
			What more to say for time will fail us if we go on reveal how township NPO manipulated recruitment and procurement on our behalf. Please acknowledge email receipt confirming that the Seriti is aware to provide us with the preference we required and the clarity pertaining mining of Naudesbank portion 6and14.	
Landowners or lawful occupiers on adjacent properties				
Thomas Marius Manzi Tomrhino Enterprises Kromkrans Community	X	15 March 2023 18h52 Email	Can the mine please priorities the Surrounding farms community in employment first. Using the radius till to the locations (Carolina and Hendrian). The mine should be opened go that the Surrounding farms the will have to train the community members. Experience is not much in the Surrounding farms but the certification and skill is available.	Response by Seriti: At Seriti we work with our host municipalities to address pressing needs and harness opportunities to create self-sustaining and empowered communities for generations to come. Our Social and Labour Plan that was submitted to the regulator (DMRE) prioritises our primary and secondary host communities for opportunities that may arise during the course of our mining activities, including but not limited to job opportunities, training and development amongst others.
			On business opportunities can the mine also give the priorities the Surrounding farms.	Response by Seriti: Seriti has an Enterprise and Supplier Development Programme that enables us to support local SMMEs in acquiring essential business skills needed to expand their operating capacity. In our Social and Labour Plan we have made commitments to invest in various interventions to cultivate our preferential procurement value chain to sustain our mining operations over the life of mine.
			Can the mine allow the surrounding farms business people the opportunity to submit their proposals before the tenders are advertised. This will prevent the mine from outsourcing companies to do work that the local farms can be able to do.	
			The mine to be in a position to have a Incubation program. Assist the new companies that are showing potential and will to grow specializing on a specific service or product.	
Nduduzo Sibiya	X	15 March 2023 19h51	The mine please first prioritise the farm community in all opportunities regarding employment. You should do a study	Response by Seriti:

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
Kromkrans Community		Email	(Census) on the surrounding farms to get a clear picture of available skills that are currently available and the ones that you will need on the operations of the mine that are not available. For example i.e many people do have certifications but no experience. We are tired of the people from the Locations (Carolina and Hendrina) that end-up taking the majority of opportunities. We do not have a problem with the location community,but the majority should be the surrounding farms as they are directly affected.	Your concerns are noted. Our Social and Labour Plan submitted to the regulator (DMRE) prioritises our primary and secondary host communities for opportunities that may arise during the course of our mining activities, including but not limited to job opportunities, training and development amongst others.
			Again the mine must also first prioritise the surrounding farms when it comes to business. The mine should invest on Incubation programs for the surrounding farms. All big contractors that the mine will appoint from outside the surrounding farms business people should at least subcontract 30% to one local farm company, after a certain period the SME will be able to be self sustainable and be able to specilaise with one service or product. The mine to have a program that will financial assist local surrounding farms during the start after appointments.	Response by Seriti: Seriti has an Enterprise and Supplier Development Programme that enables us to support local SMMEs in acquiring essential business skills needed to expand their operating capacity. In our Social and Labour Plan we have made commitments to invest in various interventions to cultivate our preferential procurement value chain to sustain our mining operations over the life of mine.
			The mine should allow surrounding farms to be able to submit their proposal to the mine before any mining operations start. Proposals to be accepted on other opportunities before they are advertised to tenders.	
			The mine should have a Supplier Development Program for the surrounding farms.	
Municipal councillor and Municipality				
Government Departments/Regulatory Authorities				
B.C Sithole Department of Agriculture, Land Reform and Rural Development (DALRRD)	**X**	8 March 2023 11h22 Letter via Email	With reference to the above mentioned application, the Department of Agriculture, Land Reform and Rural Development Directorate: Land and Soil Management does not have any comments at this stage.	Noted.

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
M.H Vilakazi Mpumalanga Tourism and Parks Agency (MTPA)	X	16 March 2023 08h22 Letter (Dated 14/3) via Email	Your correspondence with DMRE Reference number: MP 30/5/1/1/2/1057 PR dated 13/02/2023 refer. The sensitivity of the above farm on which the proposed activity is likely to occur was assessed according to the Mpumalanga Biodiversity Sector Plan (MBSP; MTPA, 2014). This sensitivity is assessed in terms of terrestrial and freshwater assessments. In the MBSP, sensitive areas are identified in terms of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). CBAs and ESAs are deemed to be necessary to ensure the protection of biodiversity, environmental sustainability, and are to remain unaltered.	Statement noted. Assessments will be undertaken by freshwater ecologist and terrestrial ecologist to evaluate any potential impacts on the listed sensitive areas.
M.H Vilakazi Mpumalanga Tourism and Parks Agency (MTPA)	X	16 March 2023 08h22 Letter (Dated 14/3) via Email	According to the MBSP terrestrial assessment, Figure 1, the proposed development will occur in an area with CBA Irreplaceable areas, CBA Optimal areas, Other natural areas, moderately and heavily modified areas. According to the MBSP freshwater assessment, Figure 2, the proposed development will occur in an area with CBA Wetlands, ESA Wetlands, CBA Rivers, ESA Important sub-catchments.	Statement noted. Assessments will be undertaken by freshwater ecologist and terrestrial ecologist to evaluate any potential impacts on the listed sensitive areas.
			The Scoping report indicate that the proposed development will consist of both opencast roll over mining and underground mining. The Life-of-Mine is estimated to be 34 years with an expected production of 50.744 million tonnes of run of mine coal during the entire operational period.	Statement confirmed as correct.
			The MPTA take note of the content of the Scoping report, and provide some recommendations. In addition to the prosed specialist studies that will be conducted during the EIA phase please also take the following into consideration:	
			Consider the MBSP terrestrial and freshwater maps when deciding on where to place surface infrastructure and on your mining methods.	Consideration by the appointed specialists of these features will be undertaken.
			A floristic (plant) survey must be conducted during the growing season of all species that may potentially occur (this may require more than one-season's survey in order to identify flowering species) with two (2) visits undertaken (November and February). Visits during other seasons will be determined	Scientific Terrestrial Services has undertaken the floral and faunal assessments from 30 November to 2 December 2022. A recommendation will however be made in the EMPr that surveys are conducted once again prior to construction, one during November and once during February. The report will be made

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
			by the flowering and fruiting times of species that do not occur during the summer.	available with the distribution of the Draft EIAR and EMPr.
			Relocation plan for plants of conservation importance should be included and relocation should be done by specialists with expertise in the area of environmental concern. Plant species of conservation importance include the following: • Species Endemic to the Province • Red Data Listed Plants • Medical Plants • Protected plants (Mpumalanga Conservation Legislation and National Forest Act).	A rescue and relocation plan will not be developed at present, however a following mitigation measure will be incorporated into the EMPr: *The development and implementation of a rescue and relocation plan, compiled by a suitably qualified specialist, must be undertaken prior to construction.*
			A list of alien plant species occurring on the property should be provided.	This will be by done by the appointed specialist, Scientific Terrestrial Services. The report will be made available with the distribution of the Draft EIAR and EMPr.
M.H Vilakazi Mpumalanga Tourism and Parks Agency (MTPA)	X	16 March 2023 08h22 Letter (Dated 14/3) via Email	The invasion extent of Category 1 & 2 plants (CARA: Act 43 of 1983 – Regulation 15, as well as new NEMA regulations regarding aliens and invasives) should be investigated.	This will be by done by the appointed specialist, Scientific Terrestrial Services. The report will be made available with the distribution of the Draft EIAR and EMPr.
			Existing and/or planned eradication programs of alien vegetation should be indicated in the report.	No such plan will be developed yet since various authorisations must still be obtained prior to the project commencing, however it will be included in the EMPr as a mitigation measure requiring the development and implementation of an alien invasive management plan.
			A full survey to determine faunal (mammals, birds, reptiles, amphibians and invertebrates) species richness should be carried out. The time of the year to conduct surveys should depend on the activity pattern of species.	Scientific Terrestrial Services has undertaken the floral and faunal assessments from 30 November to 2 December 2022. The report will be made available with the distribution of the Draft EIAR and EMPr.
			A wetland specialist should assess the integrity of wetlands (if any) within the proposed mining footprint area.	Scientific Aquatic Services was appointed to assess the wetlands in the area and detailed assessments on the integrity wetlands will be undertaken. The report will be made available with the distribution of the Draft EIAR and EMPr.
			A map should be provided with the proposed development plan (scale diagram) indicating the location, size and proximity	A map showing the aquatic features and planned activities will be included.

Interested and Affected Parties (Marked with an X if consulted as required)		Date Comments Received	Issues raised/Comments	Response to issues raised
			to the relevant aquatic eco-system/s. State the eco-region within the catchment.	
			The layout plans to be included in the Environmental Impact Assessment Report (EIA) should be eligible to show the following: ○ General locality map ○ Demarcation of proposed mine boundaries including the total area that is proposed for clearance and development in hectares. ○ Any other infrastructure associated with the development (e.g. electrical power lines, pipelines) ○ A map of sensitive features (e.g. CBAs, species of conservation concern, riparian areas and wetlands), including buffers around these features. ○ A final layout map overlaid on the map of sensitive features.	The plans requested by MTPA will be included in the EIAR.
M.H Vilakazi Mpumalanga Tourism and Parks Agency (MTPA)	**X**	16 March 2023 08h22 Letter (Dated 14/3) via Email	The MTPA agree to the list of specialist studies that will be undertaken as part of the EIA process in order for the site specific baseline information to be established and for the assessment of the potential impacts of the development.	Statement noted.
			The MTPA looks forward to receiving the draft EIA report once it is available.	Statement noted, report will be distributed to the MPTA once available.

13 DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE

13.1 Adequacy of Predictive Methods Utilised

13.1.1 Noise Model

The noise emissions into the environment from the various sources as defined were calculated for the operational phase in detail, using the sound propagation model described in ISO 9613-2.

The following was considered:

- The octave band sound pressure emission levels of processes and equipment;
- The time the activities and equipment are operational and generating the noise rating levels as assumed. For this project a worst-case was assessed, assuming that most equipment (excluding the bulldozer used for clearing of vegetation) would be operating at a 100% load (generating the maximum noise rating levels), 100% of the time. In practice this is inaccurate as no activity or equipment are 100% operational of the time and the assumption will result in an over-estimated noise rating levels;
- The distance of the receiver from the noise sources;
- The impact of atmospheric absorption;
- The operational details of the proposed project, such as projected areas where activities will be taking place;
- Topographical layout; and
- Acoustical characteristics of the ground. Fifty per cent (50%) soft ground conditions were modelled, as the area where the mining activity would be taking place is well vegetated and sufficiently uneven to allow the consideration of relatively soft ground conditions. This is because the use of hard ground conditions could represent a too precautionary situation.

The noise emission into the environment due to potential project traffic was calculated using the sound propagation model described in RLS-90 used in Germany. Corrections such as the following were considered:

- Distance of receptor from the road;
- Road construction material;
- Average speeds of travel;
- Types of vehicles used; and

- Ground acoustical conditions.

This noise model generates the potential LA10 noise level, which is used in various countries (such as the United States of America, United Kingdom, Germany, Canada, Australia, New Zeeland, etc.) to define potential road traffic noise analysis (and abatement). In this project, it illustrates the potential extent of the calculated noises (the noise rating level) of the complete project and not noise levels at a specific moment in time. It is used to define potential issues of concern and not to predict an actual noise level at a potential noise-sensitive receptor. For this, the selected model is internationally recognised and considered adequate. This noise model is recommended for use to calculate potential traffic noises in Germany, Switzerland, Netherlands, United Kingdom, France, Denmark, Italy, Denmark and Austria.

13.2 Assumptions, Limitations and Uncertainties

According to the other specialists the underlying assumptions used in their studies are sufficiently adequate.

13.2.1 Air Quality Impact Assessment

The following assumptions and limitations are applicable to this report:

- Unified model meteorological data for the period 1 January 2022 to 31 December 2022, supplied by Meteoblue was used to determine dispersion potential.
- No ambient monitoring data was available for the site.
- The impact assessment was limited to airborne particulates from mobile equipment operation, material handling and fugitive emissions. Vehicle tailpipe emissions were quantified for the operational phase of the project only.
- All transport trucks were assumed to have a 34-tonne load-carrying capacity.
- The dispersion model (AERMOD) cannot compute real time mining processes, therefore average mining process throughputs were utilised.
- Routine emissions for future operations were simulated based on average discard handling rates. Atmospheric releases occurring as a result of non-routine conditions were not accounted for.
- All sources were digitised from site layout diagram provided by Zyntha Consulting and Seriti Power.
- The amount of surface area available to wind erosion for all stockpiles was conservatively assumed to be 85%.
- ROM production rate of approximately 540 000 tonnes per annum for opencast operations and 1 440 000 tonnes per annum for underground operations.

- The report was compiled with due consideration of all process information and specific conditions outlined by Zyntha Consulting and Seriti Power.

13.2.2 Freshwater Assessment

The following assumptions and limitations are applicable to this report:

- The freshwater ecosystems associated with the study area were ground-truthed, however freshwater ecosystems within 500 m of the study area (within the investigation area) were delineated in fulfilment of GN509 of the NWA using various desktop methods including use of topographic maps, historical and current digital satellite imagery and aerial photographs. Desktop delineations were ground-truthed where feasible. The delineations of freshwater ecosystems outside the study area must not be utilised for any purpose, other than planning within the study area. Any areas that may have additionally been mapped will require field-based delineation and ground-truthing as directed by applicable legislation and best practice methods;
- Ground-truthing of freshwater ecosystems was undertaken at a high-level with the aim of informing the conversion of the prospecting right to a mining right and to allow for further planning and optimisation of infrastructure and mining footprints. As such, whilst every effort was made to verify the extent and boundaries of the freshwater ecosystems as much as possible, the field-verified delineations were extensively supplemented with delineations undertaken using desktop methods. Following finalisation of the proposed development footprint it is strongly recommended that a detailed site verification process be undertaken to refine the delineations presented in this report;
- Various areas within the study and investigation area displayed transformed topography, soil profiles and runoff patterns within the landscape largely as a result of historical and ongoing agricultural activities. As such, these disturbances have likely resulted in alterations to the hydroperiod and geomorphological regimes of the identified freshwater ecosystems, leading to altered boundaries and desiccation of certain freshwater ecosystems;
- Further to the two above points, the soil type delineations undertaken by Piet Steenekamp of Rehab Green Environmental and Rehabilitation Monitoring Consultant (2023) were relied on to supplement the data collected during the field assessment as well as available topographic data and various databases when delineating wetlands which could not be ground-truthed. It is assumed that the soil data provided by Rehab Green Environmental and Rehabilitation Monitoring Consultant (2023) is accurate and SAS takes no responsibility for any inaccuracies arising from incorrect soil data;

- Although some smaller, isolated hillslope seep and remnant hillslope seep wetlands were not quantitatively assessed, the outcome of the detailed assessments of the larger wetland systems, all of which include hillslope seep hydrogeomorphic (HGM) units provided adequate information to allow for the high-level qualitative assessment of such HGM units, sufficient for informed decision-making of this nature since the resources in the area should be managed on a system protection level to meet regional RQOs;
- The ecological service provision for the depression wetlands was determined on a collective level, since the characteristics of the drivers and receptors of the depression wetlands within the study area are all considered largely homogenous, and the differences in ecological service provision between the different depression wetlands is likely to be negligible;
- It is important to note that although all data sources used provide useful and often verifiable, high-quality data, the various databases used do not always provide an entirely accurate indication of the actual site characteristics within the study area at the scale required to inform the EA process. However, this information is considered to be useful as background information to the study;
- Global Positioning System (GPS) technology is inherently inaccurate and some inaccuracies due to the use of handheld GPS instrumentation may occur. If more accurate assessments are required, the freshwater ecosystems will need to be surveyed and pegged according to surveying principles and with surveying equipment;
- Wetland, riparian and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the freshwater ecosystem boundaries may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results; and
- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. It is, however, expected that the freshwater ecosystems that may be affected by the proposed mining activities have been accurately assessed and considered, based on the site observations undertaken in terms of freshwater ecosystem ecology.

13.2.3 Biodiversity Assessment

The following assumptions and limitations are applicable to Part B:

- The floral assessment is confined to the study area. The immediate surroundings were, however, not part of the floral assessment but were included in the desktop analysis of which the results are presented in Part A: Section 3;

- Sampling by its nature means that not all individuals are assessed and identified. With ecology being dynamic and complex, some aspects (some of which may be important) may have been overlooked. A more comprehensive assessment would require that assessments occur across all seasons of the year (ideally where November/ December assessments are followed by a February/March assessment as per the Mpumalanga Tourism and Parks Agency's (MTPA) recommendations for vegetation assessments). Once-off site assessments are unlikely to result in a comprehensive list of species for the study area. Species from the Asteraceae, Iridaceae, Orchidaceae and Poaceae families are considered under-represented at this stage due to the limited and/or restricted flowering times of these species, as well as the high turnover associated with grasslands. However, the primary objective of this floral assessment is not to compile an exhaustive species list but rather to ensure that sufficient data are collected to describe the vegetation communities present in the study area and to optimise the detection of SCC and to assess habitat suitability for other potentially occurring SCC (SANBI, 2020). An understanding of the location and extent of vegetation types of increased sensitivity, and the location of areas of increased importance for various species of SCC, will focus efforts for the identification and marking of SCC during detailed pre-construction walkdown effort efforts (if deemed necessary; refer to Section 5.3.2);
- The field methodology incorporates the subjective sampling method (refer to section 2 below and Appendix A) and as such field surveys did not cover the entire extent of the study area (approximately 9200 hectares (ha)). Given the analysed satellite imagery, information taken from the field assessment, combined with field experience within the area, the species lists and the developed habitat unit delineations, as well as conclusions drawn from these, were extrapolated for the study area. These extrapolations are considered a suitable representation of the associated habitat within the study area for this stage of the project. Where additional sampling is deemed required, this will be recommended in section 5 and 6 of this report; and
- Some floral SCC identities will not be made known in this report, although their potential to occur on site will still be assessed. As per the best practice guideline that accompanies the protocol and Screening Tool, the name of the sensitive species may not appear in the final Environmental Impact Assessment (EIA) report nor any of the specialist reports released into the public domain. It will be referred to as sensitive plants, and its threat status included, e.g., critically endangered sensitive plant.

The following assumptions and limitations are applicable to Part C:

- The faunal assessment is confined to the study area and does not include the neighbouring and adjacent properties, these were however considered as part of the desktop assessment;
- With ecology being dynamic and complex and the habits of many faunal species, some aspects (some of which may be important) may have been overlooked. It is, however, expected that most faunal communities have been accurately assessed and considered and the information provided is considered sufficient to allow informed decision making to take place and facilitate integrated environmental management;
- Due to the nature and habits of many faunal taxa, the high level of surrounding anthropogenic activities, it is unlikely that all species or classes would have been observed during a field assessment of limited duration. Furthermore, time constraints and security risks prevented employment of sherman and camera traps. Therefore, site observations were compared with literature studies where necessary;
- Sampling by its nature, means that not all individuals are assessed and identified. Some species and taxa within the footprint area may therefore have been missed during the assessment; As part of the assessment a field investigation was undertaken from the 30th of November 2022 to the 2nd of December 2022, to determine the ecological status of the study area, and to “ground-truth” the results of the desktop assessment. On-site data was significantly augmented with all available desktop data and specialist experience in the area, and the findings of this assessment are considered to be an accurate reflection of the ecological characteristics associated with the locality of the proposed development;
- The assessment was undertaken for the entire study area in order to inform the mining layout. It is acknowledged that the finalised layout will not encompass the full extent of the study area. As it was not feasible nor practical to assess the study area in its entirety, data was extrapolated from key sample points and applied to the remaining extent of the study area;
- As not all of the areas were ground-truthed during the site assessment, the precautionary principle was applied based on the available ground truth data and desktop information when determining the site sensitivity, species of conservation concern (SCC) probability scores as well as the impact significance; and
- A more comprehensive assessment would require that assessments take place in all seasons of the year.

13.2.4 Groundwater Assessment

It is assumed that:

- Three-dimensional geological information of the coal seams would be provided in compatible formats specifically, grids of coal seams and surface topography).
- The latest lidar surveys will sufficiently cover the area beyond the anticipated mining zone.
- Drilling will take part outside of active mining areas, and as such limited induction requirements will be imposed on the driller.
- Groundwater Square field personnel will be able to move freely on the property with due consideration of the property owner's permissions. Where this is not possible, mine personnel will accompany the personnel.
- A life of mine (LOM) plan will be made available.
- Core samples of stratigraphy will be made available by the mine geologists. These can be used for geochemical laboratory analyses, in addition to the samples obtained during the drilling of hydrogeological/monitoring boreholes.

13.2.5 Blasting Assessment

It is not the purpose of this assessment to calculate exact vibration levels, or the precise level of the air overpressure, but to use various tools to identify potential issues of concern. Due to unknowns this assessment leans towards a precautious approach, rather over-estimate the distance that fly-rock may travel, the ground vibration or the air blast levels. However, the following assumptions and limitations must be noted:

- A blast design was not available, and this assessment used a conceptual design, considering a potential 10 m bench height and optimal borehole diameter (considering the Dyno (2017) “Rule of Thumb” recommendations) considering the geology and resource depth;
- Optimal burden and spacing information were calculated using the Dyno (2017) “Rule of Thumb” calculations when considering the assumed bench height and borehole diameter. Stemming length is based on the maximum length possible to allow a powder factor of approximately 0.7 kg/m^3 (typical powder factor for hard rock);
- This impact assessment does not make a statement on the acceptability of the blast design as evaluated (viable bench height, fracturing, throw, powder factors, drilling cost, blasting cost, etc.) and only assesses the potential impacts considering the available information;
- The report is based on a desktop assessment, considering feedback from the project EAP. The status of structures and the associated uses were not assessed. It is required that the mine completes a survey of all structures and boreholes (location, depth, yield, static water level, ground water quality, usage, etc.) located within 2 000 m from the

proposed opencast pits. The mine must determine the status and state of the structures (before first blasting taking place);

- Boreholes was not identified and verified, and it was assumed that boreholes may be located close to residential structures and water dams/reservoirs;
- Attenuation rates for ground vibration levels, air blast levels and fly rock distances are site-specific. Empirical formula has been developed by a number of researchers, yet all these equations use constants that should be developed considering site specifics (geology, rock characteristics, etc). These site constants can initially be assumed but should be refined considering the results of blasting vibration and air pressure measurements. Vibration levels should be measured, with the data analysed to calculate site-specific onsite constants. The initial constants for ground vibration (section 5.3 of **Annexure 17**) are based on typical constants for coal mining projects in the area, using 1149 and 1.51;
- Calculations are based on an ideal situation, with the bedrock having constant characteristics, whereas in practice the geology is complex with faults, dykes, folds, stratigraphical layers etc. This means that each blast may be different;
- This report assumed that blasting would take place during the afternoon when atmospheric conditions are the most unstable with no inversion layer, or a potential inversion layer that is high with no overcast conditions; and
- There are a residential house and a number of cement dams within the area earmarked for opencast mining. It is assumed that the people and livestock located in this area will be relocated and that any cement dams and water reservoirs will be destroyed (have no further use).

13.2.6 Climate Change Assessment

Data limitations and assumptions associated with the climate change impact assessment in support of mining operations at the Naudesbank Colliery are listed below:

- The inventory included all sources that were practically and economically feasible to assess.
- The GHG inventory for the project includes the construction operations and the proposed Naudesbank Colliery operations.
- It was assumed that construction operations will only include Scope 3 GHG emissions. GHG emissions for the construction operations could not be determined due to a lack of data availability.
- Naudesbank Colliery’s GHG emissions include Scope 1, Scope 2 and Scope 3 GHG

emissions.

- The expected LoM was estimated at 34 years.
- Limitations exist with the use of climate change projections to inform future climate scenarios.
- Mining operations are designed to cater for a 1:50 year flood event.

13.2.7 Paleontological Assessment

The accuracy and reliability of the report may be limited by the following constraints:

- Most development areas have never been surveyed by a palaeontologist or geophysicist.
- Variable accuracy of geological maps and associated information.
- Poor locality information on sheet explanations for geological maps.
- Lack of published data.
- Lack of rocky outcrops.

13.2.8 Noise Assessment

The assumptions include the following:

- That octave sound power levels selected for processes and equipment accurately represent the sound character and power levels of these processes and equipment. The determination of octave sound power levels in itself is subject to errors, limitations and assumptions with any potential errors carried over to any model making use of these results;
- Sound power emission levels from processes and equipment changes depending on the load the process and equipment are subject to. While the octave sound power level is the average (equivalent) result of a number of measurements, this measurement relates to a period that the process or equipment was subject to a certain load (work required from the engine or motor to perform action). Normally these measurements are collected when the process or equipment is under high load. The result is that measurements generally represent a worst-case scenario;
- As it is unknown which processes and equipment will be operational (when and for how long), modelling considers a scenario where processes and equipment are under full load for a set time period. Modelling assumptions comply with the precautionary principle and operational time periods are frequently overestimated. The result is that projected noise rating levels would likely be over-estimated;
- Modelling cannot capture the potential impulsive character of a noise that can increase the potential nuisance factor;

- The XYZ topographical information is derived from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER) Global DEM data, a product of Japan's Ministry of Economy, Trade, and Industry (METI) and the National Aeronautical and Space Administration (NASA). There are known inaccuracies and artefacts in the data set, yet this is still one of the most accurate data sets to obtain 3D-topographical information;
- The impact of atmospheric absorption is simplified and very uniform meteorological conditions are considered. This is an over-simplification and the effect of this in terms of sound propagation modelling is difficult to quantify; and
- Acoustical characteristics of the ground are over-simplified with ground conditions accepted as uniform. Fifty per cent (50%) soft ground conditions will be modelled as the area where the activities are proposed is well vegetated and sufficiently uneven to allow the consideration of medium ground conditions.

13.2.9 Soil, Land Capability and Agricultural Agro-ecosystem Assessment

There are some uncertainties about the exact extent of the Development Site, because the location of a proposed fence around mining infrastructure was not provided and it is therefore not sure if the agricultural impact might stretch beyond the footprint of the Development Site indicated on the maps in this report.

13.2.10 Hydropedology Assessment

The following assumptions and limitations are applicable to this report:

- This assessment is confined to the study area, and does not include the neighbouring and adjacent properties, although land uses and possible catchment impacts occurring on surrounding properties were taken into consideration.
- The soil delineations presented in this document were provided by Rehab Green Environmental and Rehabilitation Monitoring Consultant, 2023. Some gap filling was undertaken by ZRC based on the hydropedology specialist's site visit to ensure that the soils cover a larger area of the affected wetland systems. Therefore, some inaccuracies may occur.
- The soil delineations presented in this document are limited to the surface infrastructure areas since the underground mining development is not anticipated to impact the wetlands and associated hydropedologically important soils. The remaining areas within the study area were however considered particularly the modelling process.

- Sampling by definition means that not all areas are assessed, and therefore some aspects of soil and hydropedological characteristics may have been overlooked in this assessment. However, it is the opinion of the professional study team that this assessment was carried out with sufficient sampling and in sufficient detail to enable the proponent, the EAP and the regulating authorities to make an informed decision regarding the proposed activity; and
- The effects climate change dynamics were not considered as part this assessment; however, it is acknowledged that this might exacerbate the anticipated reduction in water inputs and the resultant hydrological function of the watercourse beyond the extent of the proposed development.

14 REASONED OPINION AS TO WHETHER THE PROPOSED ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED

14.1 Reasons why the Activity Should be Authorized or Not

This application should be authorised based on the following:

- Coal produced may be supplied to various international markets. Currently there is a demand of coal internationally, but opportunities may also arise from providing the coal mined to Eskom for the generation of electricity.
- Temporary employment opportunities during the construction phase;
- 270 new employment opportunities will be created, including contactors;
- All aspects have been closely considered and investments have been made to have top specialists working on the development of this project;
- There will be benefits derived from taxes and royalties that can be utilised by the South African Government;
- Impacts on the bio-physical and socio-economic environments can be limited with the effective implementation of the proposed mitigation measures summarized in the EMPr;
- Water management infrastructure was designed in line with the requirements of GN 704, and if managed accordingly, a limited impact on the surface water resources can be expected; and
- A Closure Plan has been developed to provide for an acceptable post-activity land use strategy.

The objective of the proposed development should be to establish and manage a balance between the benefits created and the mitigation, management and compensation for losses. If Authorities, in reviewing the report, make an affirmative decision, continuous management, monitoring and evaluation of socio-economic and environmental impacts must be implemented to ensure the effectiveness of the mitigation measures and management strategies. Seriti must also establish continuous communication channels with the affected parties through the management plans proposed.

14.2 Conditions that must be included in the authorisation

14.2.1 Specific conditions that need to be included in the compilation and approval of the EMPr

The EMPr was compiled from a holistic view perspective of the project. Management objectives, proposed mitigation measures, as well as monitoring, reporting and auditing requirements have been included in the EMPr. Hence, if this project is approved, it is important that the EMPr be implemented and approved.

An Environmental Officer or Environmental Manager should also be actively involved throughout the lifespan of the project, especially during construction, to ensure that the EMPr is effectively implemented to keep the impacts of this project as low as possible.

14.2.2 Rehabilitation requirements

The EMPr contains management objectives, proposed mitigation measures, as well as monitoring, reporting and auditing requirements that is relevant to the rehabilitation requirements and the closure phase of the project. In addition, a Closure Plan will be developed that will be utilised for the project. Hence, if the activities are approved, it is important that the EMPr be implemented as approved, as well as the Closure Plan.

15 ASPECTS WHICH WERE CONDITIONAL TO THE FINDINGS OF THE ASSESSMENT

No conditional findings were made, however the mitigation measures in the EMPr must be strictly implemented.

16 ANY DEVIATION FROM THE APPROVED STUDY REPORT

The site layout changed based on the outcome of the specialist reports. The extent of the opencast mining and infrastructure was also finalised. The changes are not considered significant.

17 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The EA is required for the period equal to the operational period of the mine (+/- 23 years), as well as an additional 3-5 years for decommissioning and closure purposes. The EA is therefore required for a total period of 28 years.

18 FINANCIAL PROVISION

Refer to *Section 6* in the **EMPr** for details related to the financial provision of Naudesbank. The provision amounts to R 75 949 879.21 including VAT.

19 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

19.1 Compliance with the Provisions of Sections 24(4)(a) and (b) Read with Section 24 (3) (a) and (7) of NEMA

19.1.1 Impact on the Socio-economic Conditions of any Directly Affected Person

Refer to **Section 8.14** in this report.

19.1.2 Impact on any National Estate Referred to in Section 3(2) of the National Heritage Resources Act

Refer to **Sections 8.11** and **8.12** in this report.

19.2 Other Matters Required in Terms of Sections 24(4)(a) and (b) of the Act

This report adheres to the requirements stipulated in the NEMA and the recently published EIA Regulations 2014 (as amended). The NEMA Appendix 2 guidelines were used as framework.

20 EAP OPINION ON FUTURE CHANGES TO LAYOUT

Changes may be expected in terms of the layout from a practical perspective or operations are reduced due to financial constrains when the construction commence. It is the opinion of the EAP the following WILL NOT be considered a change of scope and that the impacts assessed will be relevant to the changes listed below, and that the mitigation measures provided will be applicable to manage the impacts resulting from the locality changes:

- The significance ratings of the assessed impacts remain as is or are reduced.
- Reduction of opencast footprints.
- Reduction of underground mining.
- Reduction in footprints of all planned surface infrastructure.
- Moving opencast footprints by less than 100 m from the localities in **Figure 4**.
- Repositioning infrastructure (including but not limited to stockpiles, roads, offices, workshops, hard parks, water management infrastructure, etc.), but only if the following has been confirmed:
  - Structures remain outside of freshwater resources and the recommended scientific buffer (**Figure 42**).
  - No populations of Sensitive Species 1200 (EN) or *Khadia carolinensis* (VU) occur within the new area.
  - Infrastructure remains within the Mining Right Area.

The following will however be considered a change of scope and will require an amendment:

- Increasing the opencast footprint.
- Increasing the underground areas.
- Increasing infrastructure footprints by more than 10%.
- Any activity planned within the scientific buffer that is not authorised.
- Activities not assessed in this report.
- Change of mining methods.
- Increase in significance of evaluated impacts.

21 UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports; ☒

b) the inclusion of comments and inputs from stakeholders and I&APs; ☒

c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☒ and

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed. ☒

Zyntha Consulting (Pty) Ltd

Company

Date

Signature of EAP

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Seriti Power (Pty) Ltd

NAUDESBANK DRAFT ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT (EMPR)

August 2023

Project No.: A1284C

Report No.: ZC_1492

Client:

Seriti Power (Pty) Ltd

15 Chaplin Street, c/o Chaplin and Oxford Streets

Illovo

1039

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PROJECT DETAILS

Client Details	
Name of Project:	Naudesbank Colliery
DMRE Reference:	MP 30/5/1/2/3/2/1 (10389) EM
Contact person:	Mr. SE Van der Weshuizen
Physical Address:	15 Chaplin Street, c/o Chaplin and Oxford Streets, Illovo , 1039
E-mail:	Etienne.vanderWesthuizen@seritiza.com
EAP Details	
Environmental Consultant (EAP):	Zyntha Consulting (Pty) Ltd
Responsible Person:	Jaco Kleynhans
Compiled by:	Christelle Swanepoel
Reviewed by:	Jaco Kleynhans
Physical address:	2 Walter Sisulu Street, Unit 3, Midlands Office Park, Middelburg
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Expertise of EAP:	**Jaco Kleynhans –** Professional Engineer, registered with ECSA (Engineering Council of South Africa, No. 940108). Registered Environmental Assessment Practitioner, registered with EAPASA: 2020/2255. Jaco Kleynhans is a professional engineer and EAP whom conducted closure cost assessments and practised environmental management for more than 28 years. During that period, he worked as an environmental manager at two large mines for 10 years where after he has been an environmental consultant. As environmental consultant he compiles and reviews various closure cost assessments and conducted various due diligence assessments. Refer to **Annexure 1** for the Expertise and Curriculum Vitae of Jaco Kleynhans. **Christelle Swanepoel –** Registered Environmental Assessment Practitioner: Number 2020/2106 Christelle Swanepoel is a registered EAP and has practised environmental management for more than 5 years. During this period she worked on various S&EIA Projects. As an environmental consultant she compiles and reviews various assessments and also conducted various due diligence assessments.

EXECUTIVE SUMMARY

Seriti is in the process of converting the Prospecting Right (DMRE Ref. No.: **MP 30/5/1/1/2/1057 PR**) to a Mining Right, but an application for Environmental Authorisation to satisfy the requirements of the National Environmental Management Act, Act 107 of 1998 (as amended) (NEMA) is also required. An application for authorisation in terms of Section 24 of the NEMA was submitted to the Department of Mineral Resources and Energy (DMRE) on 10 February 2023. The Final Scoping Report was accepted on 26 May 2023.

Naudesbank is located approximately 8 km west-southwest of Carolina in the Mpumalanga Province of South Africa. The project is situated in the Chief Albert Luthuli Local Municipality within the Gert Sibande District Municipality. The project area extends over various portions of the farms Vaalbult 3 IT, Steynsdraai 46 IT, Jaglust 47 IT, Twyfelaar 171 IS, Naudesbank 172 IS, Kromkrans 208 IS and Vaalwater 173 IS.

Seriti intends to conduct opencast roll over mining using truck and shovel mining methods. Underground mining is also planned via bord-and-pillar mining methods utilising mechanised or conventional mining methods. Access to underground mining areas will be obtained via the opencast pits and possibly from adjacent opencast operations. Run of Mine (RoM) coal will be processed at the on-site crushing and screening plant. Coal products will be transported off-site to various clients. The Life-of-Mine (LoM) is estimated to be 23 years with an expected production of 51 million tonnes of RoM coal during the entire operational period. The project will have opencast areas totalling 487.71 ha and underground areas totalling 922.58 ha. Other infrastructure will include workshops, offices, change houses, water management infrastructure, access roads, sub-station, diesel bay, and stockpiles.

Measures recommended in **Section 5** of the report are comprehensive with the focus on air quality management, water management, preservation of biodiversity and successful rehabilitation. An extensive monitoring network is recommended in **Section 7** focussing on water, air, noise, soils and biodiversity. The financial provision for Naudesbank amounts to R 75 949 879.21 including VAT.

DOCUMENT STRUCTURE

Number	GNR 982 of NEMA - Appendix 4 Description	Report Reference
1 (1)	An EMPr must comply with section 24N of the Act and include—	
(a)	details of—	
(i)	the EAP who prepared the report; and	Project Details – EAP Details
(ii)	the expertise of the EAP, including a curriculum vitae;	
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 2
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	Section 3
(d)	a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including—	
(i)	planning and design;	Section 4
(ii)	pre-construction activities;	
(iii)	construction activities;	
(iv)	rehabilitation of the environment after construction and where applicable post closure; and	
(v)	where relevant, operation activities;	
(e)	*Item 1(1)(e) deleted by Government Notice 326 in Government Gazette 40772 dated 7 April 2017*	
(f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to—	
(i)	avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	Section 5 Section 6
(ii)	comply with any prescribed environmental management standards or practices;	
(iii)	comply with any applicable provisions of the Act regarding closure, where applicable; and	
(iv)	comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5.7
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Section 5.7
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 5
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 5

Number	GNR 982 of NEMA - Appendix 4 Description	Report Reference
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Section 5.7
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Section 7
(m)	an environmental awareness plan describing the manner in which—	
(i)	the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	Section 8
(ii)	risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	any specific information that may be required by the competent authority.	Section 9

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Annexure 1	Qualifications and Curriculum Vitae of EAP
Annexure 2	Large Scale Figures (A3)

LIST OF ABBREVIATIONS

dBA:	A-weighted decibels
DMRE:	Department of Mineral Resources and Energy
DWS:	Department of Water and Sanitation
EA:	Environmental Authorisation
EC:	Electrical Conductivity
ECO:	Environmental Control Officer
EIAR:	Environmental Impact Assessment Report
EIS:	Ecological Importance and Sensitivity
EMPr:	Environmental Management Programme
GN:	Government Notice
GNR:	Government Notice Regulation
ha:	Hectare
HSEC:	Health, Safety, Environmental and Community
I&APs:	Interested and Affected Parties

IWWMP:	Integrated Water and Waste Management Plan
km:	Kilometre
l:	Litre
LDV:	Light Delivery Vehicle
mamsl:	Metres above sea level
mbgl:	Metres below ground level
m:	Metre
mg:	Milligram
mm:	Millimetre
m^2:	Square metre
m^3:	Cubic metre
MPRDA:	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MR:	Mining Right
MRF:	Mine Residue Facility
NDCR:	National Dust Control Regulation
NEMA:	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NWA:	National Water Act, 1998 (Act 36 of 1998)
PES:	Present Ecological State
PPE:	Personal Protective Equipment
REC:	Recommended Ecological Category
RoM:	Run-of-Mine
RSIP:	Rehabilitation Strategy and Implementation Plan
RQO:	Resource Quality Objectives
SANS:	South African National Standard
SAHRA:	South African Heritage Resources Agency
SAWQG:	South African Water Quality Guidelines
SCC:	Species of Conservation Concern
SMME:	Small, Medium and Micro-Sized Enterprises
SO_4:	Sulphate
TMM:	Trackless Mobile Machines
VAT:	Value Added Tax
WQPL:	Water Quality Planning Limits
WUL:	Water Use Licence
WULA:	Water Use Licence Application

1. ENVIRONMENTAL ASSESSMENT PRACTITIONER

Refer to **Project Details** for details and **Annexure 1** for the Curriculum Vitae including evidence of qualifications of Jaco Kleynhans.

2. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY

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The Environmental Authorisation is required for the period equal to the operational period of the mine (+/- 23 years), as well as an additional 3-5 years for decommissioning and closure purposes.

<u>Activities discussed in this EMPr:</u>

Activity 1: Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)

Underground mining is also planned via bord-and-pillar mining methods utilising continuous miners as primary cutting units. Access to underground mining areas obtained via opencast pits. In bord-and-pillar mining, parallel roadways are developed in the direction of advance. Perpendicular roads, called splits, are developed at predetermined intervals to parallel roads. These roads interlink, creating pillars. The underground panel widths are determined by the size of the pillars required to support the overburden above the coal seam and the length of the production equipment's trailing cables. In between mining panels are barrier pillars which carries the abutment stress and therefore breaks the span of the panels who assist with the overall mine stability. The road width design is approximately 6.0 – 7.2m wide with an average mining height of 1.8 m. The pillar size determined by the safety factor formula results in the pillar strength divided by the pillar load. No pillar extraction is planned. Nine Refuge Boreholes are also planned, each borehole will be drilled and fitted with a casing of approximately 150 mm.

Activity 2: Opencast Mining (including Stripping and Stockpiling of Topsoil)

Seriti plans to conduct opencast roll over mining using truck and shovel mining methods. Three main mining areas are planned namely Vaalwater, Vaalbult and Naudesbank. Box-cuts will be developed, and the topsoil will be stockpiled. During the development of the box-cut, the overburden material is removed and stockpiled. Once the coal is mined out, the next mining strip is stripped of topsoil and the overburden material is blasted. Concurrent rehabilitation will be undertaken at all the pits except the Vaalbult Pit which will be used to access underground section VB-UG.

Activity 3: Overburden Stockpiles and RoM Yards

Overburden hards and softs will be stockpiled separately. The material will be used to backfill the opencast pits during rehabilitation. The RoM coal will be stockpiled at the stockpiles located within the RoM Yard footprints. Five RoM Yards will be utilised at Naudesbank.

Activity 4: Water Management Infrastructure

Water management facilities will be constructed which includes berms, canals (clean and dirty), sumps and Pollution Control Dams (PCDs). These water management facilities will be utilised throughout the life of the project.

Activity 5: Roads

An existing access road will be utilised. Haul roads will be required at the three opencast areas. Two track farm roads will also be developed for access to the mining areas from the existing access roads.

Activity 6: Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)

Diesel tanks will be required for on-site storage. The tanks will be contained in a bunded area and comply with SABS standards. The total volume stored on-site will not exceed 500 m^3.

Surface infrastructure will be required and include (but are not limited to) offices, workshop, change houses, hard parks, etc.

More details are provided in *Section 7* of the *Environmental Impact Assessment Report (EIAR).*

3. COMPOSITE MAP

Figure 1 below indicates the proposed development, associated activities and infrastructure in relation to environmental sensitivities present in the area. **Figure 1** further provides various buffers indicating potential influence zones. A large-scale map (A3) is attached as **Annexure 2**.

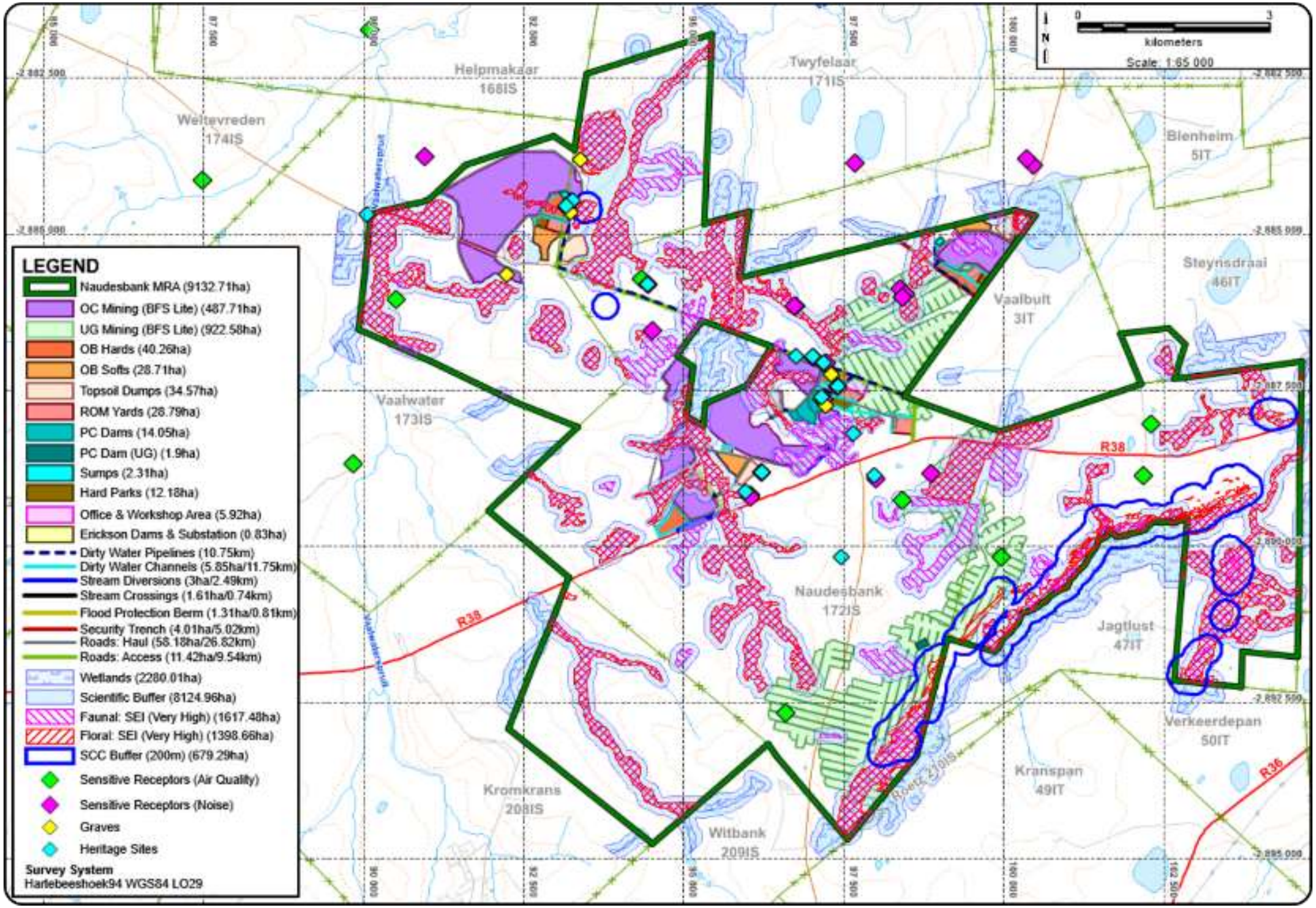

Figure 1: Composite Map of Naudesbank

4. DESCRIPTION OF IMPACT MANAGEMENT OUTCOMES INCLUDING MANAGEMENT STATEMENTS

4.1 Determination of Closure Objectives

Closure objectives should be identified prior to any development. This is important since Seriti will manage the activities throughout all the project phases by taking closure into consideration. Desirable closure objectives can be achieved solely by the implementation of adequate environmental management practises throughout all the project phases.

The closure framework aims to meet the following:

- The standards described in the *Mineral and Petroleum Resources Development Act (Act 28) of 2002* (MPRDA), require that Seriti:
  - Rehabilitate the surface disturbed by infrastructure to a final landform that is sustainable, free-draining and non-erosive;
  - Establish a post-activity land use that will sustain post-activity land use as per the closure plan;
  - Guarantee a post-activity ecosystem that is sustainable and functional; and
  - Promote economic and social development.
- The requirements of Section 28 of the *National Environmental Management Act, 1998 (No. 107 of 1998)* (NEMA), require Seriti to:
  - Provide a duty of care; and
  - Remediate all environmental impacts.

The overall closure objectives for Naudesbank are:

- Rehabilitate the topography of the area to resemble the appropriate form for the required end land use category and to minimise disturbance to natural watercourses.
- Ensure that the management level required to utilise rehabilitated land is within the means of the landowner who is most likely to use it.
- Ensure that the topography is stable and free-draining.
- All disturbed areas must be rehabilitated to sustain the land use practise agreed upon.
- Ensure that any methods used to achieve the closure objectives result in a self-sustaining environment after closure.
- Ongoing maintenance shall be carried out until the rehabilitated areas require minimal management.

- Judicious management of the financial provisions to ensure finances are available to achieve closure.
- Establish a soil cover that will sustainably support vegetation establishment and growth.
- Conduct proper soil amelioration prior to final re-vegetation as part of rehabilitation.
- Establish natural vegetation on the disturbed areas and control alien invasive species.
- Maintain functional attributes of the habitats.
- Enhance the terrestrial biodiversity at post-closure by successful rehabilitation practises.
- Provide sufficient resources to manage excess affected water.
- Demolish all infrastructure and roads that cannot be used by a subsequent landowner or some other third party.
- Compliance with legislative requirements.
- Future public health and safety shall not be compromised.
- The after-use of the site is beneficial and sustainable to the affected communities in the long term.
- Adverse socio-economic impacts are minimised, and socio-economic benefits are maximised.
- All infrastructure, delivery systems and draining pipes that are not intended for further use should be removed to ensure that they do not constitute a potential risk to people or to the environment.
- All aspects needing maintenance during the aftercare (including post-closure) period should be assessed and the required maintenance should be done in accordance with an approved programme.
- Any sloping or earthworks (or both) that are required should be done as quickly as possible.
- Ensure that the areas mined via underground methods do not subside and that it will be safe to conduct the agreed land use above these workings.
- Monitor groundwater levels within underground workings to prevent any environmental or safety risks.
- Develop and implement water management strategy.

4.2 Impact management objectives and management statements to apply to the activities of the development that are associated with and can reduce the identified impacts and risks that might result from the project.

This section serves as an introduction to the EMPr for Naudesbank. The EMPr describes measures that Seriti will implement to ensure that the project's impacts (as identified in *Sections 9 and 10* of the *EIAR*) are managed throughout the life of the project.

The EMPr for Naudesbank was compiled in accordance with the NEMA and the Regulations (Appendix 4 of Government Notice Regulation 982 of 2014, as amended) which require that a description of mitigation and management measures are provided to address all the expected and current impacts on various aspects of the environment. The management measures will be defined per activity, similar to the impact assessment.

In characterising the sensitivity of the proposed project area and the general environmental management requirements associated with the planned mining activities, the process for managing any environmental or socio-economic degradation are categorised into the following sections:

- Topography;
- Soils, Land Capability and Land Use;
- Terrestrial Biodiversity;
- Aquatic Environments (Surface Water and Wetlands);
- Groundwater;
- Air Quality;
- Noise;
- Sites of Archaeological and Cultural Interest;
- Visual Impact; and
- Socio-economic.

These sections focus on the protection of the human, physical and biophysical resources, and are consistent with local legislative requirements that are stipulated under the South African environmental legislation, mining legislation, relevant sectoral legislation and associated regulations (*Section 4* in the *EIAR*). Management objectives have been identified and converted into management statements that will lead the process of avoiding, minimising, managing and mitigating the identified impacts and risks.

Seriti will be responsible for provision of adequate resources (human and financial) and will ensure that those resources are available for the implementation of the EMPr. In managing the environmental and social impacts associated with the project, Seriti will ensure that the roles, responsibilities and accountabilities of all senior personnel working on-site are clearly outlined and in line with the EMPr.

The following sections outline the management objectives and measures to manage the project impacts identified and assessed in *Sections 9 and 10* of the *EIAR*. The measures that are described in this EMPr may be implemented (and are applicable) throughout the construction, operations, decommissioning, mine closure and post-closure phases of the project.

4.2.1 Topography

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts on the topography that are identified in *Sections 9 and 10* of the *EIAR* for each activity. The plan has the following objectives:

- Rehabilitate the topography of the area to resemble the appropriate form for the required end land use category and to minimise disturbance to natural watercourses.

It is the responsibility of the Mine/General Manager, Project Team and the Environmental Officer/Manager to implement and uphold the management measures to ensure environmental and social responsibility.

4.2.2 Soils, Land Capability and Land Use

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts on the land use and capability of the soils that are identified in *Sections 9 and 10* of the *EIAR* for each activity. The plan has the following objectives:

- Minimise land disturbance to that which is only absolutely necessary for the development of the project;
- Achieving a post-mining land use;
- Retain natural soil characteristics and fertility of un-impacted topsoil;
- Manage stripping and stockpiling of topsoil, from the planning and construction phase, as it is the first step to successful rehabilitation;
- Establish a soil cover that will sustainably support vegetation establishment and growth;
- Rehabilitate all disturbed areas through a progressive rehabilitation plan; and
- Conduct proper soil amelioration prior to final re-vegetation as part of rehabilitation.

The Mine/General Manager and Environmental Officer/Manager for the project will assume responsibility for implementing and upholding the management measures recommended in this EMPr for soils and land use.

4.2.3 Terrestrial Biodiversity

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts on the terrestrial biodiversity that are identified in the *Sections 9 and 10* of the *EIAR* for each activity. This will include the measures identified to minimise the impacts on the floral and faunal communities of the Naudesbank Project. The plan has the following objectives:

- Avoid sensitive areas as far as possible;
- Protect natural resources in the project area (fauna and flora) by limiting the ecological footprint of the proposed development activities;
- Preservation of Species of Conservation Concern (SCC);
- Educate all employees involved in the project about the importance of the natural floral and faunal species and biodiversity of the natural surroundings;
- Educate employees involved in the project regarding the importance of conservation of both flora and fauna, and the respective SCCs;
- Create awareness among employees involved in the project regarding the importance of conservation;
- Control alien invader species within the project site area;
- Curb dust generation to avoid impacts on ecological features;
- Develop a rehabilitation plan that will ensure structural rehabilitation, but that will also ensure that the functional attributes of the landscape are re-instated; and
- Ensure that the rehabilitation plan is adequately implemented to enhance the terrestrial biodiversity at post-closure.

The Mine/General Manager and Environmental Officer/Manager for the project will assume responsibility for implementing and upholding the management measures recommended in this EMPr for terrestrial biodiversity.

4.2.4 Aquatic Environments (Surface Water and Wetlands)

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts on the aquatic environment that are identified in *Sections 9 and 10* of the *EIAR* for each activity. The plan has the following objectives:

- Compliance with legislative requirements;
- Prevent contamination of surface water run-off from site;
- Prevent contamination of surface water resources in the vicinity of the project site;
- Prevent contamination of the natural areas surrounding the site with polluted water;
- Prevent erosion and the possible impact thereof on aquatic systems;
- Optimise water use and enhance the re-use of water for activities;
- Minimise interference with natural drainage patterns;
- Ensure that the water management systems are constructed prior to commencement of activities and as per the approved civil designs;
- Ensure that the water management systems are always operational and maintained;

- Ensure the availability of water for intended use in and around the area;
- Prevent degradation of the surrounding wetlands on adjacent properties by maintaining the Present Ecological State (PES) of these habitats;
- Prevent degradation of the remaining intact wetlands by striving to achieve/maintain the Recommended Ecological Class (REC) of these habitats;
- Preservation of SCC;
- Sustain the environmental and social functions of the remaining wetlands;
- Create awareness among employees involved in the project regarding the importance and conservation of these habitats;
- Develop and implement a rehabilitation plan that will adequately handle surface water at the site post-closure; and
- Support the Integrated Water and Waste Management Plan (IWWMP) for the project.

The Mine/General Manager and Environmental Officer/Manager for the project will assume responsibility for implementing and upholding the management measures recommended in this EMPr for surface water.

4.2.5 Groundwater

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts on groundwater that are identified in *Sections 9 and 10* of the *EIAR* for each activity. The plan has the following objectives:

- Compliance with legislative requirements;
- Prevent contamination of groundwater and prevent contamination of groundwater on adjacent properties;
- Optimise water use for activities;
- Ensure availability of water for intended use in and around the area;
- Support the IWWMP for the project; and
- Provide sufficient resources to manage affected water during the operational and post-closure phases.

The Mine/General Manager and Environmental Officer/Manager for the project will assume responsibility for implementing and upholding the management measures recommended in this EMPr for groundwater.

4.2.6 Air Quality

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts on the air quality that are identified in *Sections 9 and 10* of the *EIAR* for each activity. The plan has the following objectives:

- Minimise particulate emissions from the proposed project operations;
- Reduce nuisance impacts of dust fall.

The Mine/General Manager and Environmental Officer/Manager for the project will assume responsibility for implementing and upholding the management measures recommended in this EMPr for air quality.

4.2.7 Noise

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts regarding noise pollution that are identified in *Sections 9 and 10* of the *EIAR* for each activity. The plan has the following objectives:

- Minimise the sources of noise;
- Where not avoidable, implement adequate mitigation measures;
- Undertake noise monitoring; and
- Appoint qualified independent specialist to undertake noise monitoring upon receiving a valid complaint of a receptor within 2 000 m of noise source.
- Berms will be constructed to mitigate anticipated noise impacts from the project

The Mine/General Manager and Environmental Officer/Manager for the project will assume responsibility for implementing and upholding the management measures recommended in this EMPr for noise pollution.

4.2.8 Sites of Archaeological and Cultural Interest

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts on sites of archaeological and cultural interest that are identified in *Sections 9 and 10* of the *EIAR*. The plan has the following objectives:

- Obtain the necessary permits for relocation of graves and demolishing/refurbishment of heritage structures with high significance.
- Develop and implement Chance Find Procedure.

The Mine/General Manager and Environmental Officer/Manager for the project will assume responsibility for implementing and upholding the management measures recommended in this EMPr for the sites identified as having archaeological and cultural interest.

4.2.9 Visual Impact

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts regarding visual amenity associated with the development of the project area throughout the life of the project, as identified in *Sections 9 and 10* of the *EIAR* for each activity. The plan has the following objectives:

- Minimise the visual impact of the infrastructure areas;
- Rehabilitate all disturbed areas through a progressive rehabilitation plan; and
- Ensure that the visual character of the adjacent areas are not permanently destroyed.
- Visual berms will be constructed to mitigate anticipated visual impacts from the project.

The responsibility for implementing and upholding the management measures recommended in this EMPr for visual amenity will be issued to the Mine/General Manager and Environmental Officer/Manager for the project.

4.2.10 Socio-economic Impact Assessment

Section 5 describes the measures that will be implemented by Seriti to avoid, mitigate and manage the project's impacts on the socio-economic environment, that are identified in *Sections 9 and 10* of the *EIAR* each activity. The plan has the following objectives:

- Minimise project-related negative socio-economic and health impacts in the study area;
- Monitor the impact on neighbouring properties;
- Promote good relationships between Seriti, the adjacent landowners and the local communities;
- Develop and maintain an ongoing process of communication with stakeholders;
- Protect the interests of all project affected parties through commitment to sound legal process;
- Promote employment, business and contracting opportunities, specifically focussing on local employment and optimising local involvement to maximise local economic growth;
- Implement skills and economic development programmes; and
- Promote education and awareness concerned with health, safety and risks.

The responsibility of implementing and upholding the management measures recommended in this EMPr will be issued to the Community Liaison Officer for the project, under the supervision of the Mine/General Manager.

4.3 Volumes and Rate of Water Use Applicable to this Mining Application

Refer to the *EIAR* **-** *Section 9* for a discussion regarding the water balance, including volumes of water that will be applicable to the activities as part of the Naudesbank Project. The volumes will also be included in the Water Use Licence Application.

A consultation meeting was held with IUCMA regarding the application process. A list of the water uses identified is provided below:

- Section 21 (a): Abstraction of water.
- Section 21 (c) and (i): Activities within and within 500 m of freshwater resources.
- Section 21 (g): PCDs, Stockpiles, Sewage Treatment Plant, In-pit Disposal of Overburden, etc.
- Section 21 (j): Dewatering of opencast and underground mining areas.

Additional water uses may be added, but detailed information will be made available with the distribution of the IWWMP.

4.4 Water Use Licence Status

A Water Use Licence Application was initiated on the e-WULAAS website on 26 April 2023. I&APs will be notified when the Technical Report is available for public comment.

5. IMPACT MANAGEMENT ACTIONS AND OUTCOMES

5.1 All Activities Outcome

Certain impacts are applicable to all or the majority of activities, therefore an all activities mitigation table was compiled. It is not possible to always predict which activities will have an impact on noise, the socio-economic environment or cultural/heritage aspects. As a result of this, noise, the cultural and heritage as well as socio-economic mitigation measures will not be discussed per activity, but in general.

Table 1: Mitigation and Implementation - All Activities Outcome

<table>
<tr><th rowspan="3">Impact management actions</th><th colspan="6">Implementation</th></tr>
<tr><th colspan="4">Timeframe</th><th rowspan="2">Responsible person</th><th rowspan="2">Method</th></tr>
<tr><th>C</th><th>O</th><th>D</th><th>Clo</th></tr>
<tr><td colspan="7">Impact management outcome: Preventing impacts, where possible, or manage impacts associated with the deterioration deterioration/alteration/loss of soils though erosion, contamination, compaction as well as loss of agricultural land capability.</td></tr>
<tr><td>A soil specialist with GIS skills, registered at SACNASP will be appointed to oversee the soil stripping, stockpiling and replacement process. Alternatively, the appointed ECO must undergo training sessions with a SACNASP registered soil specialist prior to the commencement of the project and report back to the specialist on a weekly basis for 6 months to ensure that soil stripping, stockpiling and replacement is done as specified.</td><td>✔</td><td>✔</td><td>✔</td><td></td><td rowspan="7">Health and Safety Manager (Induction)

Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager</td><td rowspan="7">• Induction – focussing on waste management and spill prevention.
• Demarcate no-go areas.
• Mark footprint areas.
• Monitor stripping and stockpiling.
• Implementation and review of monitoring network.
• Conduct rehabilitation on-site as stipulated in the rehabilitation plan.
• Review and monitor effectiveness of rehabilitation.
• ECO inspections to ensure compliance with measures.
• Distribute the EMPr and IWWMP.</td></tr>
<tr><td>Stripping and stockpiling should be undertaken as specified by the Soil Specialist in Section 5.8.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>The soil striping depth will be verified progressively on a 6-monthly basis by the soil specialist and he/she will generate maps that facilitate soil stripping progressively, based on the mine block plan that overlaid on the soil stripping and replacement plans.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>The soil replacement process will be monitored by the soil specialist and he/she will assess the soil replacement depth and soil quality on a six-monthly basis. A report must be compiled where the land capability post-mining is expanded on.</td><td></td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>No topsoil will be replaced prior to the prepared section was signed off by the soil specialist/ ECO and mine surveyor confirming that the section has the correct elevation and slope and are free-draining and will tie in with the surrounding undisturbed landscape after the topsoil was replaced at depths as specified in Section 5.8.</td><td></td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Soil compaction will be minimised by tipping enough topsoil at prepared spoil surfaces and by doing a once off levelling on the surface, with minimum traversing and without dozing soil over far distances.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Specific measures pertaining to roads must be implemented:
• The upper A-horizon should be removed to a depth of 200-400 mm and stored as a berm along the edges.
• The footprint should then be covered with the required base materials as specified by the engineering design.
• During the decommissioning phase the footprint should be thoroughly cleaned and all base materials should be removed to a suitable disposal facility.
• The cleaned footprint (or exposed upper part of the B-horizon) should be ripped thoroughly prior to replacement of the stored A-horizon to alleviate all compaction caused by the structure.
• The stored A-horizon should be graded evenly over the total structure footprint.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
</table>

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
• The soil should then be ameliorated as recommended by a soil specialist according to soil chemical analysis of samples taken after replacement. • The footprint should be re-vegetated indigenous species seed mixture.						
Specific measures pertaining to water management structures must be implemented: • Liner systems must be constructed as per civil designs. • The A and B-horizons up to a depth of 1m can be used for the construction of embankments but should not be mixed with subsoil material. • During the decommissioning phase the footprint should be thoroughly cleaned and all sludge and other building material should be removed to a suitable disposal facility. • The soil material used for wall embankments should be graded evenly over the entire footprint. • The soil should then be ameliorated as recommended by a soil specialist according to soil chemical analysis of samples taken after replacement. • The footprint should be re-vegetated indigenous species seed mixture.	✔	✔	✔			
Topsoil or overburden material should be dumped directly on the natural surface without removal of any soil horizons.	✔	✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on waste management and spill prevention. • Demarcate no-go areas. • Mark footprint areas. • Monitor stripping and stockpiling. • Implementation and review of monitoring network. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
No maximum stockpile height is proposed from a soil's perspective. Stockpile height restrictions causes stockpile footprints sizes to increase and causes larger natural soil footprints to be compacted and simultaneously causes the natural soil processes within a larger footprint to cease to a large extent.	✔	✔				
The dumped topsoil or overburden should all be removed precisely up to the original natural surface. The surface should be thoroughly cross-ripped to a minimum depth of 400 mm to alleviate all compaction caused by the weight of the dumped material. The surface should then be smoothed with a disc-implement.		✔	✔			
Stockpile liners and all water management infrastructure must be constructed as per civil designs.	✔					
Erosion berms are to be put in place where there is a high risk of erosion.	✔	✔	✔			
All vehicular traffic must be restricted to the existing service roads and the selected road servitude as far as practically possible; to avoid unnecessary compaction of the surrounding soils.	✔	✔	✔			
Unnecessary disturbances of the potentially arable soils outside the demarcated areas must be avoided, where possible, to minimise loss of arable soils.	✔	✔				
During the decommissioning phase the footprint should be cleaned thoroughly and all building material should be removed to a suitable disposal point. The cleaned footprint should be cross-ripped to alleviate compaction.			✔			
The soil's fertility status should be ameliorated as recommended by a soil specialist according to soil chemical analysis.		✔	✔			
The footprint should be re-vegetated indigenous species seed mixture.		✔	✔			
The landscape must be backfilled and re-profiled to mimic the natural topography for potential agricultural activities and grazing opportunities post-mining. If possible, ensure a continuation of the pre-mining surface drainage pattern.		✔	✔			
A spill prevention and emergency spill response plan must be compiled and implemented.	✔	✔	✔			
Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.	✔	✔	✔			
An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.	✔	✔	✔			
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.	✔	✔	✔			

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.	✔	✔	✔			
All vehicles are to be serviced in a correctly bunded area or at an off-site location.	✔	✔	✔			
Use of drip trays are compulsory in the event of vehicle or heavy machinery breakdown.	✔	✔	✔			
All hydrocarbons must be stored within bunded areas.	✔	✔	✔			
Sewage Package Treatment Plant must be within a bunded concrete area.	✔	✔	✔			
Bunded areas must be frequently inspected to ensure that the integrity of the structures are not compromised by cracks, etc.	✔	✔	✔			
Develop and implement waste management plan to ensure proper management of waste, including hazardous waste.	✔	✔	✔			
Oil separators and wash bays must be frequently cleaned, maintained, and inspected.	✔	✔	✔			
Impact management outcome: Prevention and management of the impacts associated with hydropedological losses.						
Minimise impacts on wetlands and wetland recharge areas, through management of edge effects to ensure that wetlands remain functional.	✔	✔	✔		Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Demarcate footprint areas. • Ensure water management structures are constructed as per civil designs. • Implement water management strategy. • ECO inspections to ensure compliance with measures. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • Distribute the EMPr and IWWMP to all supervisors and managers.
Limit footprint disturbance and ensure that proper stormwater control measures are constructed.	✔	✔				
Implementation of strict erosion control measures to limit loss of soil and sedimentation of the watercourse.	✔	✔	✔			
Disturbance of interflow (A/B) and to a lesser degree interflow (soil/bedrock) should be limited to what is essential. Where impact is unavoidable, measures to maintain interflow such as permeable layer works, and sub-terranean drainage structures should be considered to ensure that wetlands are recharged and to limit impact on structures.	✔	✔	✔			
Restrict the amount of mechanical handling of soils, as each excise increase the compaction level.	✔	✔	✔			
Linear infrastructure such as roads and pipelines within the interflow A/B areas (shallow hydropedological processes) should be underlined by a permeable pioneering layer to allow water drainage freely and not change the pattern and timing of water within the wetland and interflow soils significantly.	✔	✔				
Concurrent rehabilitation should strongly be considered to ensure that the duration that any pit or extent thereof is left unrehabilitated is minimised.		✔	✔			
At rehabilitation, reinstate the soil back to its original sequence and backfilling to a free-draining scenario post-mining to restore recharge to these drainage features wetland and reduce the duration of impact.		✔	✔			
Impact management outcome: Preventing impacts, where possible, or manage impacts associated with the deterioration of groundwater quality resulting from seeping contaminants due to spills or leakages.						
A spill prevention and emergency spill response plan must be compiled and implemented.	✔	✔	✔		Health and Safety Manager (Induction)	• Induction – focussing on waste management and spill prevention. • Weekly inspections by ECO to ensure
Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.	✔	✔	✔			
An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.	✔	✔	✔			

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.	✔	✔	✔		Environmental Manager Environmental Control Officer (ECO) Mine/General Manager Mine Engineer	compliance with conditions. • Maintenance and inspection schedules should be developed and implemented. • Manage spills as stipulated in spill prevention and management plan. • Distribute the EMPr and IWWMP to all supervisors and managers.
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.	✔	✔	✔			
All vehicles are to be serviced in a correctly bunded area or at an off-site location.	✔	✔	✔			
Use of drip trays are compulsory in the event of vehicle or heavy machinery breakdown.	✔	✔	✔			
All hydrocarbons must be stored within bunded areas.	✔	✔	✔			
Sewage Package Treatment Plant must be within a bunded concrete area.	✔	✔	✔			
Bunded areas must be frequently inspected to ensure that the integrity of the structures are not compromised by cracks, etc.	✔	✔	✔			
Develop and implement waste management plan to ensure proper management of waste, including hazardous waste.	✔	✔	✔			
Oil separators and wash bays must be frequently cleaned, maintained, and inspected.	✔	✔	✔			
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to site clearance.						
The footprint of the proposed opencast pits should be optimised further if possible to avoid or further minimise encroaching into wetland habitat, and limited to the minimum viable footprint to ensure optimal and safe mining.	✔				Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focusing on no-go areas, spill prevention and waste management. • Implementation and review of monitoring network until closure certificate is obtained. • Demarcate no-go areas. • Mark footprint areas. • Monitor stripping and stockpiling. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Construction should be initiated by first constructing clean and dirty water separation systems thus ensuring that as site clearing takes place, dirty water runoff is appropriately managed.	✔					
Contractor laydown areas, and material storage facilities to remain outside of the wetlands and the 100 m buffer.	✔					
All vehicle re-fuelling is to take place outside of the wetlands and the 100 m buffer.	✔					
All development footprint areas to remain within the approved footprint thereof, and vegetation clearing to be limited to what is essential within that footprint.	✔					
Retain as much indigenous wetland vegetation as possible.	✔					
It should be feasible to utilise existing roads to gain access to sites, and crossing the wetlands in areas where no existing crossing is apparent should be unnecessary, but if it is essential, crossings should be made at right angles.	✔					
Areas where bank failure is observed because of such crossings should be immediately repaired.	✔					
The wetlands, and the 100 m buffer should be demarcated and defined as areas in which no activities are proposed, and should be marked as a no-go area wherever no mining is planned and approved.	✔					
Stockpiles must be placed outside of the applicable zone of regulation where practically possible.	✔					
Excavated materials must not be contaminated, and it must be ensured that the minimum surface area is taken up.	✔					
All exposed soil must be protected for the duration of the construction phase to prevent erosion and sedimentation of the downgradient wetlands.	✔					
A bio-monitoring network must be developed and implemented.	✔					
Surface water monitoring must be undertaken.	✔					
Soil stripping and stockpiling must be undertaken as per soil specialist recommendations.	✔					
A spill prevention and emergency spill response plan must be compiled and implemented.	✔					

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Oil separators and wash bays must be frequently cleaned, maintained, and inspected.	✔					
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to construction of infrastructure.						
During excavation activities, the topsoil and vegetation should be stockpiled separately from other material outside of the applicable zone of regulation if possible. The vegetation must be kept moist, until it can be used to rehabilitate the exposed areas.	✔				Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on waste management and spill prevention. • Demarcate no-go areas. • Demarcate footprint areas. • Construct water management infrastructure as per civil designs. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Excavated materials must not be contaminated, and it must be ensured that the minimum surface area is taken up.	✔					
All exposed soil must be protected for the duration of the construction phase to prevent erosion and sedimentation of the downgradient wetlands.	✔					
No mixed concrete may be deposited outside of the designated construction footprint.	✔					
Protective equipment should be provided, onto which any mixed concrete can be deposited whilst it awaits placing.	✔					
Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site.	✔					
All excavated areas should be backfilled to the natural ground level with excavated material.	✔					
Soil must be lightly recompacted to a depth of 450 mm, and all construction material and excess overburden must be removed from site upon the completion of construction or used in the rehabilitation process.	✔					
Develop and implement waste management plan to ensure proper management of waste, including hazardous waste.	✔					
A spill prevention and emergency spill response plan must be compiled and implemented.	✔					
All development footprint areas to remain within the approved footprint thereof, and vegetation clearing to be limited to what is essential within that footprint.	✔					
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to rehabilitation activities.						
Management measures recommended under groundwater must be continuously implemented.			✔	✔	Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Implementation and review of monitoring network until closure certificate is obtained. • Develop and implement rehabilitation plan as well as post-closure water management plan. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all
Soil replacement must be undertaken as per soil specialist recommendations.			✔			
Surface water quality monitoring and bio-monitoring must be undertaken.			✔	✔		
Material from the overburden stockpiles should be used to backfill the opencast pits.			✔	✔		
The final backfilled opencast landscape should be free draining so as to allow recharge of the wetland resources in the landscape and the greater catchment. The post-closure recharge of the catchment should also be as near natural as possible.			✔	✔		
Ensure that soils are replaced in the correct layers, ripped and re-profiled post-closure, and that vegetation is restored to a point where succession will lead to the same conditions as the pre-mining state as a minimum.			✔	✔		
Bare areas should be revegetated within suitable indigenous vegetation species.			✔	✔		
Rehabilitation measures stipulated in Maintenance and Management Plan (MMP) must be implemented. Implementation must be overseen by a suitably qualified Environmental Site Officer (ESO) with wetland rehabilitation experience and the ESO must sign off the rehabilitation before the relevant contractors leave site.			✔	✔		
Post-closure monitoring of the wetlands and any rehabilitated areas is strongly recommended to be undertaken. This should be determined by an appropriately qualified freshwater ecologist.			✔	✔		

Impact management actions	**Implementation**					
	Timeframe				**Responsible person**	**Method**
	C	**O**	**D**	**Clo**		
						supervisors and managers.
Impact management outcome: Prevention and management of impacts associated with the: • **Loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat, Highveld Grassland, Moist Grassland, Grassland Habitat, Habitat Connectivity, Rocky Outcrop, Degraded Grassland, Transformed).** • **Loss/alteration of Faunal SCC including their Habitats (Freshwater Habitat, Grassland Habitat, Habitat Connectivity, Rocky Outcrop, Degraded Grassland, Transformed).**						
Where possible, and feasible, access roads should be kept to existing roads so to reduce further fragmentation of existing natural habitat.	✔	✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on spillages, SCC and prohibited actions. • Implementation and review of monitoring network until closure certificate is obtained. • Construct water management infrastructure as per civil designs. • Demarcate footprint areas. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Implement water management strategy. • Distribute the EMPr and IWWMP to all supervisors and managers.
Develop and implement Alien Invasive Plants (AIPs) Management Plan prior to construction commencing. This will include ongoing monitoring of the removal of AIPs. The AIPs Management Plan should include the following: • A 30 m buffer surrounding the proposed activities should also be regularly monitored for AIP proliferation and instances thereof controlled appropriately. • Disturbed areas and linear infrastructure must be regularly checked for AIP proliferation to prevent spread into surrounding natural areas (until successfully rehabilitated). • All cleared alien vegetation must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards, or at a garden refuse site. • The plan should be implemented by a qualified professional (i.e., the person must have a good record of experience in AIP management and control). • No chemical control of AIPs to occur within 32 m of a watercourse, unless registered as safe for use in watercourses by the Working for Water group.	✔	✔	✔	✔		
Prior to the commencement of mining activities, a Biodiversity Action Plan, including the rehabilitation plan should be developed for implementation throughout all the project phases.	✔	✔	✔	✔		
Migratory corridors for faunal species movement between the sensitive areas must be planned for to limit habitat and species population fragmentation in the study area.	✔	✔				
Stormwater management plan must be implemented.	✔	✔	✔			
A spill prevention and emergency spill response plan must be compiled and implemented.	✔	✔	✔			
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.	✔	✔	✔			
No hunting, trapping or setting of snares by personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.	✔	✔	✔			
No on-site open fires permitted.	✔	✔	✔			
Removal of vegetation should be limited to disturbance footprint.	✔	✔				
Disturbance footprints must be demarcated.	✔	✔				
On-site speed limit of 40 km/h must be implemented.	✔	✔	✔			
Disturbed areas affected beyond the footprint areas are to be suitably rehabilitated in accordance with the rehabilitation plan and should include the use of indigenous species.			✔	✔		
As far as possible vegetation clearance activities should be undertaken in the winter months, as faunal species will not be breeding and there is a lower risk to nesting avifauna.	✔	✔				
As part of the clearing activities, it is acknowledged that during the winter months, reptiles and some invertebrates will be slower moving and/or, in a state of torpor. As such, it is recommended that as vegetation clearance/earth works	✔	✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
takes place, team of trained individuals moves ahead of these activities and searches for and relocates any species unable to move out of the way themselves. Species are to be moved to adjacent areas of the same habitat type outside of the disturbance footprint.						
Clearing activities should also happen in a phased manner to give fauna enough time to escape ahead of clearing/construction activities.	✔	✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on spillages, SCC and prohibited actions. • Implementation and review of monitoring network until closure certificate is obtained. • Construct water management infrastructure as per civil designs. • Demarcate footprint areas. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Implement water management strategy. • Distribute the EMPr and IWWMP to all supervisors and managers.
A walkdown of areas of increased sensitivity should be undertaken to search for potential SCC. Should any protected faunal species be noted within the proposed mining footprint, these species should be rescued and relocated, should they not move off on their own. In instances where such species require capture and relocation, a permit will have to be obtained from the relevant provincial or national authority for their translocation.	✔	✔				
Weekly inspections of the footprints must be made to ensure that no dumping or further vegetation clearance outside of the demarcated area has occurred. Where this has occurred, this must be rectified, and the habitat rehabilitated.	✔	✔				
Personnel are to be educated about the various faunal species in the area, particularly about venomous spiders, snakes and scorpion species. Personnel are to be educated not to kill or harm any of these or other faunal species.	✔	✔	✔			
Should any species be encountered, these species are to be safely and carefully relocated by a suitably qualified person to the surrounding natural habitat adjacent the development site, should the not move off on their own. The contact details of a suitably qualified snake handler for the mine must be made available to operational teams should a venomous snake be encounter that needs removal. Alternatively, suitable training of select staff members must be undertaken to affect / ensure the safe capture and relocation of snakes.	✔	✔	✔			
Noise levels should be kept to acceptable levels as per noise specialist recommendations.	✔	✔				
Dust suppression must be undertaken.	✔	✔	✔			
External lighting should be kept to a minimum with downward facing lights. Yellow or red fluorescent lights should be used while the use of LED lights should be avoided.	✔	✔	✔			
Fencing should not be erected before the vegetation has been cleared so as to give faunal species a chance to escape into the surrounding areas, away from the disturbance.	✔					
Fences should make use of culverts to allow for the safe and easy movement of smaller species through fence lines. These culverts are to be regularly checked to ensure that they have not become blocked by vegetation or sedimentation which will limit species movement.	✔	✔	✔			
Fences erected adjacent to wetlands and within the wetland buffers should have bird diverters fitted to them, notably on the top wire strand. Such diverters should be placed along the fence line every 5 m for a total length of 100 m either side of the wetland.	✔	✔				
The post-closure rehabilitation land use must be determined for the rehabilitation plan to be drafted. It is recommended that the post-closure land use be to natural vegetation that represents, as far as possible, the pre-mined vegetation communities, with ecological function prioritised. The rehabilitated areas must be able to sustain faunal SCC so that they can re-establish in the area. The plan should be developed by incorporating recommendations by a soil specialist and ecologist.		✔	✔	✔		
All infrastructure and footprint areas should be rehabilitated in accordance with the rehabilitation plan. Rehabilitation efforts must be implemented and continuously monitored for a period of at least 5 years after decommissioning and closure, or until an acceptable level of habitat and biodiversity re-instatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous with the desired post-closure land use.			✔	✔		
All temporary structures, waste, rubble, AIPs etc. must be removed from the site before re-vegetating can commence. Site levelling and preparation for rehabilitation activities must ensure no harm or disturbance come to the surrounding natural areas.			✔	✔		

<table>
<tr><th rowspan="3">Impact management actions</th><th colspan="6">Implementation</th></tr>
<tr><th colspan="4">Timeframe</th><th rowspan="2">Responsible person</th><th rowspan="2">Method</th></tr>
<tr><th>C</th><th>O</th><th>D</th><th>Clo</th></tr>
<tr><td>Habitat connectivity to be re-established within the landscape.</td><td></td><td></td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td colspan="7">Impact management outcome: Prevention and management of impacts associated with the:
Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands, Highveld Grasslands, Moist Grasslands, Pan Wetlands, Rocky Outcrops, Valley-bottom Wetlands, Degraded Grassland, Modified Wetlands, Transformed Habitat).
Loss/alteration of Floral SCC and their Habitat (Khadia carolinensis, Sensitive species 1200, Forb-rich Wetland, Moist Grassland, Rocky Outcrops, Valley-bottom Wetlands, MNCA Protected Species, Provincially Important Species).</td></tr>
<tr><td>Stockpile height and slope angle / steepness should follow sound geotechnical design. Ensure that the slope ratio is not excessively steep which may induce slope failure or implement mechanisms to improve slope stability where necessary.</td><td>✔</td><td>✔</td><td></td><td></td><td rowspan="9">Health and Safety Manager (Induction)

Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager</td><td rowspan="9">Induction – focussing on spillages, SCC and prohibited actions.
Implementation and review of monitoring network until closure certificate is obtained.
Construct water management infrastructure as per civil designs.
Demarcate footprint areas.
Conduct rehabilitation on-site as stipulated in the rehabilitation plan.
Review and monitor effectiveness of rehabilitation.
ECO inspections to ensure compliance with measures.
Implement water management strategy.
Implement AIP Management Plan.
Distribute the EMPr and IWWMP to all supervisors and managers.</td></tr>
<tr><td>Removal of vegetation should be limited to disturbance footprint.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Where possible, and feasible, access roads should be kept to existing roads so to reduce further fragmentation of existing natural habitat.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Develop and implement Alien Invasive Plants (AIPs) Management Plan prior to construction commencing. This will include ongoing monitoring of the removal of AIPs. The AIPs Management Plan should include the following:
A 30 m buffer surrounding the proposed activities should also be regularly monitored for AIP proliferation and instances thereof controlled appropriately.
Disturbed areas and linear infrastructure must be regularly checked for AIP proliferation to prevent spread into surrounding natural areas (until successfully rehabilitated).
All cleared alien vegetation must not be allowed to lay on unprotected ground as seeds might disperse upon it. All cleared plant material to be disposed of at a licensed waste facility which complies with legal standards, or at a garden refuse site.
The plan should be implemented by a qualified professional (i.e., the person must have a good record of experience in AIP management and control).
No chemical control of AIPs to occur within 32 m of a watercourse, unless registered as safe for use in watercourses by the Working for Water group.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Demarcate footprint areas.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>No vegetation clearing may commence prior to floral SCC walkdowns.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Collection of floral SCC or indigenous vegetation beyond the planned footprints are prohibited. Permits will have to be obtained to move protected species.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Floral SCC (both provincially protected as well as nationally/globally threatened) were recorded within the proposed OC mining footprint. However, a thorough walkdown of all footprint areas must take place within the optimal flowering season of all recorded and anticipated SCC prior to the project authorisation, where all anticipated floral SCC (protected and threatened) are searched and marked for development of a rescue and relocation plan so that all necessary permits can be applied for from MTPA and DFFE.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Based on the outcome of the walkdown, the following permit application and/or authorisation will be necessary before project activities can commence:
Where MNCA-protected species will be impacted, permits from the MTPA will be required. Provincially protected species can be targeted for rescue and relocation attempts or destruction permits prior to undertaking activities.
For RDL species, a 200 m buffer around known populations is required in which no loss of species or habitat may occur. Where layouts cannot be optimised to ensure the 200 m buffer is excluded from development, all RDL species that will be impacted would require a thorough assessment of the extent and the number of</td><td>✔</td><td>✔</td><td></td><td></td></tr>
</table>

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
affected species. Liaison with SANBI, DFFE, and MTPA will be required to determine 1) suitability of rescue and relocation initiatives and 2) identification of suitable relocation sites. Depending on the outcome, reconsideration of proposed layouts may be required.						
Where feasible, all RDL plant species that will be lost due to clearing of vegetation must be replaced either during rehabilitation initiatives or through translocation to suitable habitat surrounding the disturbance footprint. The relocation site will need to be fenced-off (or somehow barricaded) and monitoring of relocated / transplanted species will be essential until it is evident that the species have successfully established. Development of a nursery for storing and propagation of rescued SCC (both protected and threatened species) can be considered; however, cognisance should be given to potential introductions of pathogens and exotic earthworms into the natural environment.	✔	✔	✔		Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on spillages, SCC and prohibited actions. • Implementation and review of monitoring network until closure certificate is obtained. • Construct water management infrastructure as per civil designs. • Demarcate footprint areas. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Implement water management strategy. • Implement AIP Management Plan. • Distribute the EMPr and IWWMP to all supervisors and managers.
No on-site open fires permitted.	✔	✔	✔			
No vegetation cuttings may be left to accumulate. Discard all construction related waste and material (including cleared vegetation) at a registered waste facility or in a secluded area designated by the mine and no waste of construction rubble may be dumped in the surrounding natural habitats.	✔	✔				
Bi-weekly (once, every two weeks, recommended) to monthly (minimum requirement) monitoring and recording of the footprint areas must be done by the Environmental Manager and photographic records kept – special attention should also be paid to potential increase and spread of alien vegetation.	✔	✔				
Construct stream crossings as per civil designs.	✔					
Appropriate sanitary facilities must be provided during the construction of the development and must be removed to an appropriate waste disposal site;	✔					
No dumping of litter, rubble or cleared vegetation on site should be allowed. Infrastructure and rubble removed because of the construction activities should be disposed of at an appropriate registered dump site away from the development footprint. No temporary dump sites should be allowed in areas with natural vegetation. It is advised that waste disposal containers and bins be provided during the construction phase for all construction rubble and general waste.	✔					
A spill prevention and emergency spill response plan must be compiled and implemented.	✔	✔	✔			
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.	✔	✔	✔			
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.	✔	✔	✔			
All vehicles are to be serviced in a correctly bunded area or at an off-site location.	✔	✔	✔			
Use of drip trays are compulsory in the event of vehicle or heavy machinery breakdown.	✔	✔	✔			
Upon completion of construction activities, it must be ensured that no bare areas remain, and that indigenous species be used to revegetate the disturbed area. A rehabilitation plan should be developed to guide rehabilitation of the affected areas (outside of the mining footprints). Rehabilitation of areas outside of the mining footprints (that have been impacted by construction and operational activities) must allow be to an ecologically functioning state, thereby increasing habitat connectivity within affected areas. Rehabilitation of natural vegetation should proceed in accordance with the rehabilitation plan – concurrent rehabilitation is strongly recommended	✔	✔	✔			
Soils should be managed as per the recommendations of the soil specialist.	✔	✔	✔			
The post-closure rehabilitation land use must be determined for the rehabilitation plan to be drafted. It is recommended that the post-closure land use be to natural vegetation that represents, as far as possible, the pre-mined vegetation communities, with ecological function prioritised. The rehabilitated areas must be able to sustain faunal SCC so that		✔	✔	✔		

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
they can re-establish in the area. The plan should be developed by incorporating recommendations by a soil specialist and ecologist.						
All infrastructure and footprint areas should be rehabilitated in accordance with the rehabilitation plan. Rehabilitation efforts must be implemented and continuously monitored for a period of at least 5 years after decommissioning and closure, or until an acceptable level of habitat and biodiversity re-instatement has occurred, in such a way as to ensure that natural processes and veld succession will lead to the re-establishment of the natural wilderness conditions which are analogous with the desired post-closure land use.			✔	✔		
All temporary structures, waste, rubble, AIPs etc. must be removed from the site before re-vegetating can commence. Site levelling and preparation for rehabilitation activities must ensure no harm or disturbance come to the surrounding natural areas.			✔	✔	Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on spillages, SCC and prohibited actions. • Implementation and review of monitoring network until closure certificate is obtained. • Construct water management infrastructure as per civil designs. • Demarcate footprint areas. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Implement water management strategy. • Implement AIP Management Plan. • Distribute the EMPr and IWWMP to all supervisors and managers.
Species selected for rehabilitation should meet the biodiversity and land end-use objectives. Only use species that are well adapted to local climatic conditions and post-establishment method of use.		✔	✔	✔		
The rehabilitation plan should consider the following: • Appropriate shaping of disturbed areas is essential. To promote successful establishment of vegetation, the slopes must not be steeper than 1(V):5(H) or 1(V):3(H) (depending on engineering input and recommendations). Where slopes are left steeper than what is recommended for whatever reason, additional measures will be required to prevent soil erosion and to appropriately manage stormwater. • Monitoring of rescued and relocated floral SCC should continue until it is evident that the species have successfully established. Where possible, these species should be reintroduced into rehabilitation sites. • Areas that will be backfilled must be monitored for subsidence (as the backfill settles) and depressions filled using available material. • All disturbed areas must be shaped to blend in with the surrounding landscape. The reinstated footprint must be shaped to ensure free flow of run-off and to prevent damming of water. • The site must be monitored for signs of erosion and remedial action taken where there are problems.		✔	✔	✔		
Impact management outcome: Prevention and management of impacts associated with the deterioration of air quality in the region.						
Set speed limits of 40km/hr or less for site traffic.	✔	✔	✔		Health and Safety Manager (Induction)	• Induction – focussing on speed limits. • Implementation and review of monitoring network until closure certificate is obtained.
Wet suppression of unpaved areas should be applied during dry windy periods, using a water car and/or sprinklers at a rate of more than 2.0l/m^2/hour.	✔	✔	✔			
Chemical suppression can also be used in conjunction with wet suppression.	✔	✔	✔			
Inspect road integrity and repair frequently.	✔	✔	✔			

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<tr><td>Provide firm marshalling areas.</td><td>✔</td><td>✔</td><td>✔</td><td></td><td rowspan="11">Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager</td><td rowspan="11">• ECO inspections to ensure compliance with measures.
• Distribute the EMPr and IWWMP to all supervisors and managers.</td></tr>
<tr><td>Reduce track-on through the use of a wheel wash-bay.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Reduce unnecessary traffic.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Limit load size.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Minimise travelling distance through good layout and process design.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Limit the area of operation to what is absolutely necessary.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Minimise spillage from loading/unloading and clean up spillage as soon as possible.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Limit height and slope of stockpiles to reduce wind entrainment.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Minimise drop heights onto stockpiles.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Wind barriers can be effectively used to control pollution from stockpiles.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Rehabilitation should be performed on an ongoing basis</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td colspan="7">Impact management outcome: Prevention and management of impacts associated with elevated noise levels during daytime and night-time disrupting surrounding communities.</td></tr>
<tr><td>Use available material (such as available topsoil) to construct a berm between the active mining areas (including the Vaalbult RoM area and eastern RoM area at Naudesbank) and the verified receptors. This berm should be as high as possible (at least 8 m recommended). This barrier/berm should only be constructed during the day-time period.</td><td>✔</td><td>✔</td><td></td><td></td><td rowspan="11">Health and Safety Manager (Induction)

Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager</td><td rowspan="11">• Induction – focussing on PPE.
• Weekly checks of complaints register.
• Implementation and review of monitoring network until closure certificate is obtained.
• ECO inspections to ensure compliance with measures.
• Distribute the EMPr and IWWMP to all supervisors and managers.</td></tr>
<tr><td>Discuss relocation with verified living within 500 m from locations where mining activities will take place.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Implement a noise monitoring programme at residential dwellings in the area.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Minimise night-time traffic passing within 250 m from verified NSR. If significant night-time traffic is anticipated, the mine can build an earth berm) between proposed access roads and verified NSR.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Appoint the services of an acoustic specialist to assist with the placement and design of berms, noise barriers and acoustic walls (if required) to ensure that noise levels are less than the recommended noise limit at verified NSR.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Minimize active night-time mining/construction activities within 600 m from verified NSR (before the berm is constructed).</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>All employees and contractors should receive Health and Safety induction that includes an environmental awareness component (noise). This is to allow employees and contractors to the potential noise risks that activities (especially night-time activities) pose to the realise surrounding environment.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Implement a line of communication (i.e., a helpline where complaints could be lodged). All potential sensitive receptors should be made aware of these contact numbers, or alternative means to communicate issues. The mine should maintain a commitment to the local community and respond to concerns in an expedient fashion. Sporadic and legitimate noise complaints could develop and if valid, should be investigated. Feedback must be provided to the affected stakeholder(s) with details of any steps taken to mitigate the impact (if valid complaint) or preventative steps to minimise this from happening again.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Investigate any reasonable and valid noise complaint if registered by a receptor staying within 2 000 m from the plant or active mining area.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Investigates the use of white-noise alarms instead of tonal reverse alarms.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Night-time hauling of product to the market should be minimised.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td colspan="7">Impact management outcome: Prevention and management of impacts associated with visual intrusion, change of character and sense of place.</td></tr>
</table>

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Concurrent/ progressive rehabilitation must be implemented and disturbed areas must be revegetated with indigenous vegetation as per the applicable vegetation rehabilitation and management plan as soon as areas become available.	✔	✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on spill prevention and waste management. • Implementation and review of monitoring network until closure certificate is obtained. • Demarcate footprint areas. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Erosion must be prevented throughout the lifetime of the project by means of putting soil stabilisation measures in place, where required, and through concurrent rehabilitation.	✔	✔	✔			
The development footprints and disturbed areas must be kept as small as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum.	✔	✔				
Painting or coating infrastructure components to match darker colours in the natural surroundings may reduce the distance required for effective screening.	✔	✔				
The surface infrastructure area must be screened through the use of a clear VU fence or equally approved, which will result in a more unified and tidy appearance.	✔	✔				
It must be ensured that all buildings or office containers fit its surroundings through the appropriate use of colour and material selection, in order to lower visibility of the proposed project.	✔	✔	✔			
Natural colours must be used in all instances and the use of highly reflective material must be avoided. Any metal surfaces must be painted to fit in with the natural environment in a colour that blends in effectively with the background. White structures are to be avoided as these will contrast significantly with the natural surroundings.	✔	✔				
The use of permanent signs and project construction signs must be in accordance with the requirements of the project and mining regulations, be minimised and visually unobtrusive.	✔	✔	✔			
The extent of all infrastructure footprint areas and permanent/ temporary structures must be limited to what is essential.	✔	✔				
As far as possible, existing roads are to be utilised, to limit cumulative impacts from roads and increased vehicular movement.	✔	✔				
All construction and operational areas must be kept in a neat and orderly condition at all times.	✔	✔				
No rubble must be dumped at random within the site, but within relevant removable bins.	✔	✔	✔			
Develop and implement waste management plan to ensure proper management of waste.	✔	✔	✔			
All facilities, including vehicles, must be maintained in good working order.	✔	✔	✔			
Any areas for material storage, waste sorting and other potentially intrusive activities must be designated and screened from view as far as considered feasible.	✔	✔	✔			
Access roads are to be maintained and dust from traffic on gravel roads minimised, through the use of approved dust suppression techniques, such as regular wetting of gravel roads.	✔	✔	✔			
Vehicle speed on gravel roads must be reduced to 40 km/h to limit dust creation.	✔	✔	✔			
Outdoor lighting must be strictly controlled.	✔	✔	✔			
Use minimum lumen or wattage in light fixtures, where possible and practical.	✔	✔	✔			
Up-lighting of structures must be avoided where possible, with lighting installed at downward angles that provide precisely directed illumination beyond the immediate surroundings of the infrastructure, thereby minimising the light spill and trespass.	✔	✔	✔			
No naked / unshielded light sources are to be directly visible from a distance. Only reflected light must be visible from outside the focus area.	✔	✔	✔			
The use of low-pressure sodium lamps, yellow fluorescent lighting, or an equivalent reduces sky glow and wildlife impacts where possible and practical.	✔	✔	✔			
Making use of motion detectors on security lighting, at office areas and the maintenance area, ensures that the site will remain in relative darkness, until lighting is required for security and maintenance purposes.	✔	✔	✔			

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Upon decommissioning when the opencast pit areas are backfilled, it is vital that vegetation be reinstated to blend with the natural environment.			✔			
Impact management outcome: Management of impacts associated with Greenhouse Gas (GHG) Emissions.						
Mitigation will not alter the impacts of GHG emissions in terms of the extent, duration, or probability of the impact. The magnitude of the impact can however be reduced, notably by reducing the quantity of GHG emissions. Mitigation strategies include: • Optimising of construction activities and logistics – performing as efficient and effective as possible. • Implementing a fuel management strategy, which encourages more efficient use of vehicles, planning, logistics, driver education and maintenance. • Reducing the amount of waste disposed to landfill and reuse of waste, which will subsequently reduce the amount of vehicle movements and fuel usage. • Exploring alternative energy possibilities. • Monitoring of fuel and energy. • Identifying significant energy consuming equipment and recognising opportunities where technical efficiencies in plant and equipment can be applied. • Reviewing the GHG emissions inventory annually.	✔	✔	✔		Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – driver education. • ECO reporting to verify that mitigation measures are implemented to reduce GHG emissions. • Distribute the EMPr and IWWMP to all supervisors and managers.
Impact management outcome: Prevention and management of impacts associated with increased temperatures posing potential health risk to employees.						
Integrating the risk and management of heat related illnesses in the Occupational Health and Safety Plans.	✔	✔	✔		Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – heat stress. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Educating staff to recognise early symptoms of heat stress	✔	✔	✔			
Monitoring of temperature and humidity levels.	✔	✔	✔			
Providing adequate cooling and ventilation.	✔	✔	✔			
Introducing systems to limit exposure to heat.	✔	✔	✔			
Impact management outcome: Prevention and management of impacts associated with increased wildfires resulting in damages.						
Assessing the risk of wildfires in relation to infrastructure and facilities	✔	✔	✔		Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO)	• Induction – fire management and prevention • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Implementing adequate monitoring, fire detection and suppression systems	✔	✔	✔			

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
					Mine/General Manager	
Impact management outcome: Prevention and management of impacts associated with water scarcity and drought constraining operations, increasing conflict with communities, and exacerbating dust deposition.						
Conducting regular monitoring of operational water requirements and available resources	✔	✔	✔		Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Develop and implement plans as specified. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Developing a contingency response plan in the event of short, medium, or long-term water shortages	✔	✔	✔			
Developing a water policy as to manage and minimise water usage. Setting clear objectives and targets to improve efficiency	✔	✔	✔			
Developing a water balance model that considers climate change variables	✔	✔	✔			
Considering community participation with regards to water infrastructure and management.	✔	✔	✔			
Performing of dust deposition monitoring.	✔	✔	✔			
Developing a contingency response plan for dust suppression in the event of dry spells and periods of elevated dust generation.	✔	✔	✔			
Impact management outcome: Prevention and management of impacts associated with Water scarcity and drought further exacerbating water quality	✔	✔	✔			
Conducting regular monitoring of operational water requirements and available resources.	✔	✔	✔			
Developing a contingency response plan in the event of short, medium, or long-term water shortages.	✔	✔	✔			
Impact management outcome: Prevention and management of impacts associated with extreme weather events (flooding) may occur resulting in damage to infrastructure, contaminated water entering natural environment and accessibility.						
Conducting a site-specific flood risk assessment to identify areas vulnerable to flooding.	✔	✔	✔		Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Develop and implement plans as specified. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Conducting a site-specific flood risk assessment to identify areas vulnerable to flooding.	✔	✔	✔			
Implementing a groundwater quality monitoring program.	✔	✔	✔			
Conducting a risk assessment to assess the flood risk in relation to key access roads.	✔	✔	✔			
Developing a contingency response plan should operations become inaccessibility due to floods.	✔	✔	✔			
Impact management outcome: Prevention and management of impacts associated with increased wind speed and gusts may result in infrastructure damage or excessive dust generation.						
Installation of a continuous monitoring station to obtain site specific climatic data. Alternatively, extreme conditions can be recorded and the nearest weather station consulted to record wind speed.	✔	✔	✔	✔	Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Performing regular maintenance checks for wind-related damage.	✔	✔	✔	✔		

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Impact management outcome: Prevention and management of impacts associated with the damage to or the destruction of archaeological artefacts, structures and/or graves during earthworks and blasting.						
Architectural Historian to verify the importance of structures and advise on mitigation. This will most likely require Seriti to obtain permits to demolished/refurbished structures that is deemed of cultural/heritage importance.	✔	✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – required action when grave, artefact or palaeontological material is unearthed. • Obtain permits prior to demolition, refurbishment or relocation (graves). • Weekly inspections during construction by ECO. • Distribute the EMPr and IWWMP to all supervisors and managers.
If any graves or archaeological artefacts are exposed during construction the following procedure must be followed: • SAHRA must be notified. • All development activities must be stopped. • An archaeologist must be called in to determine proper mitigation measures.	✔	✔				
Two options related to mitigating the impacts of development on grave sites are available: Option 1: Leaving the sites and the graves in situ. This will entail fencing the sites properly, with an access gate to provide entry to descendants to visit the graves. The sites should be cleaned under supervision, each grave should be numbered and a Grave Site Register be drafted and kept. A Grave Sites Management Plan needs to be drafted and implemented as part of the Development Plan. Option 2: Exhuming and relocating the graves if it cannot be left in situ. This will entail detailed Public Participation/Social Consultation to identify the descendants of the deceased individuals buried there in order to obtain their consent for the exhumation and relocation work to be undertaken. Permits also need to be applied for and obtained from various authorities including COGTA, Provincial Department of Health, Local Municipality and the SAP. For all graves unknown in age and older than 60 years of age a permit from SAHRA is also required.	✔	✔				
Impact management outcome: Prevention and management of impacts associated with the damage to or the destruction of paleontological materials during earthworks.						
If any palaeontological material is exposed during clearing, digging or excavating the following process must be followed: • SAHRA must be notified. • All operation activities must cease immediately. • A 30 m (minimum) no-go barrier must be placed around the palaeontological material. • A palaeontologist should be called in to determine the proper mitigation measures.	✔	✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – required action when grave, artefact or palaeontological material is unearthed. • Weekly inspections during construction by ECO. • Distribute the EMPr and IWWMP to all supervisors and managers.
Impact management outcome: Enhance benefits from the creation of temporary construction employment (Positive).						
Source goods and services from locally as far as practically possible.	✔				Supply Chain Department Community Relations Officer	• Monitor the implementation and effectiveness of SLP. • Annual Environmental Audit to verify compliance.
Prioritise people residing in the local area.	✔					
Implementation of practical skills programmes.	✔					

Impact management actions	**Implementation**					
	Timeframe				**Responsible person**	**Method**
	C	**O**	**D**	**Clo**		
					Mine/General Manager	
Impact management outcome: Enhance benefits of employment and the generation of household income for the duration of the mining activities, including indirect and induced impacts within the local and regional economies.						
Prioritise people residing in local area.		✔			Community Relations Officer Mine/General Manager	• Monitor the implementation and effectiveness of SLP. • Annual Environmental Audit to verify compliance.
Implementation of practical skills programmes.		✔				
Impact management outcome: Enhance benefits of the generation of revenue and contribution towards the local, regional and national economies.						
Optimise local involvement in on-mine business opportunities to maximise local economic growth.		✔			Supply Chain Department Community Relations Officer Mine/General Manager	• Monitor the implementation and effectiveness of SLP. • Annual Environmental Audit to verify compliance.
Implement and uphold the SMME commitments in the SLP, this include: • Provide local SMME an opportunity to participate in Seriti Power ESD programme to enable them to actively access procurement opportunities associated with our mining programme and other mining houses beyond the life of mine.		✔				
Impact management outcome: Enhance benefits associated with the contribution to human resource and socio-economic development programmes.						
Implementation of the Social and Labour Plan.	✔	✔			Community Relations Officer Mine/General Manager	• Monitor the implementation and effectiveness of SLP. • Annual Environmental Audit to verify compliance.
Impact management outcome: Prevention and management of impacts associated with impacts on agricultural land use and employment.						
Fair compensation negotiated and agreed with land owners based on valuation of land and economic value of the livelihood activities.	✔				Community Relations Officer Legal Department Mine/General Manager	• Fair legal agreements where both parties are satisfied. • Engage with local communities in terms of potential job creation. • Frequent engagement with surrounding landowners and communities. • Monitor the implementation and effectiveness of SLP.
Make available land not being used for lease back by agricultural operators.		✔	✔			
Continuous consultation with neighbouring landowners to ensure co-existence and collaboration on mitigation measures for impacts on water quality, quantity and dust.	✔	✔	✔			
Implement a consultation programme with regional stakeholders in the development of a closure plan and rehabilitation programme.		✔	✔			
Determine the regional needs and characteristics to ensure post-mining land use enhances the regional characteristics.		✔	✔			
Monitoring the impact on neighbouring properties.	✔	✔	✔			
Ensure that the farm workers are also consulted and informed about any aspects related to mining that will directly affect them for example when the mine intends to purchase the farm they reside and work on.	✔	✔				
Priority employment from local communities with the development of recruitment procedures and utilising the existing skills available from the local communities with special focus on those that are bound to lose their jobs.	✔	✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Rehabilitate the area to enable agricultural post-mining land uses for example grazing.		✔	✔			• Annual Environmental Audit to verify compliance.
Impact management outcome: Prevention and management of impacts associated with Disruption of day-to-day life and safety of road users.						
Speed limits of 40 km/h should be enforced on access road to ensure safety of landowners and communities.	✔	✔	✔		Community Liaison Officer Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Investigate all complaints. • Adhere to recommendations and designs of traffic impact assessment. • Frequent engagement with surrounding landowners and communities. • Annual Environmental Audit to verify compliance.
Dust suppression must be conducted on roads to ensure that visibility is not reduced.	✔	✔	✔			
Erect required traffic signs on access road.	✔	✔	✔			
Upgrade intersection as recommended in Traffic Impact Assessment.	✔					
Establishment of a complaint and grievance procedure.	✔	✔	✔			
The blasting schedule must be circulated to all adjacent landowners, land occupiers and communities.	✔	✔				
Impact management outcome: Prevention and management of impacts associated with damage to infrastructure.						
A pre-mining blast census will be done, photographic records will be included for future assessment of reported damages.	✔	✔			Community Liaison Officer Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Investigate all complaints. • Adhere to recommendations and designs of blasting assessment. • Frequent engagement with surrounding landowners and communities. • Annual Environmental Audit to verify compliance.
Fair compensation must be agreed upon if structures are damaged as a result of mining activities at Naudesbank.	✔	✔				
A blasting design must be compiled by a structural engineer. This must be conducted 3 months prior to the commencement of mining.	✔	✔				
The blasting schedule must be circulated to all adjacent landowners and communities.	✔	✔				
Impact management outcome: Prevention and management of impacts associated with Influx of job seekers						
Prioritise employment from local communities with the development of recruitment procedures.	✔	✔			Community Liaison Officer Mine/General Manager	• Engage with local communities in terms of potential job creation. • Monitor the implementation and effectiveness of SLP. • Annual Environmental Audit to verify compliance.
Implementation of practical skills programmes.	✔	✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Impact management outcome: Prevention and management of impacts associated with Increase in social pathologies and crime.						
Increased security on mine premises.	✔	✔	✔		Health and Safety Manager (Induction) Community Liaison Officer Mine/General Manager	• Induction – create awareness among employees to report suspicious activity. • Access control to site via access cards and visitor sign-in book. • Investigate all complaints • Monitor the implementation and effectiveness of SLP. • Annual Environmental Audit to evaluate compliance.
Properly constructed and secured fences can control access to mine site.	✔	✔	✔			
Implementing strict access control to the project site.	✔	✔	✔			
Employment of local people on the mine to improve the poverty levels in the neighbouring towns and suburbs.	✔	✔	✔			
Employees should be urged to recognise and report suspicious activity as well as signs of burglary.	✔	✔	✔			
Employees should be informed of crime prevention measures that they themselves can take.	✔	✔	✔			
Employees and contractors should be identifiable by wearing clear marked identifiable clothing.	✔	✔	✔			
Code of conduct must form part of induction of new workers with a clear statement and procedure regarding access, conduct and identification.	✔	✔	✔			
Establish grievance procedure within the local area.	✔	✔	✔			
Implement health awareness programmes for workers including education programmes on sexually transmitted diseases and other illnesses such as TB.	✔	✔	✔			
Impact management outcome: Prevention and management of impacts associated with Loss of job opportunities due to downscaling of the mine employment						
Implement portable skills development programmes to enable retrenched employees to find alternative employment.			✔	✔	Community Liaison Officer Mine/General Manager	• Engagement with employees during the retrenchment process. • Implement and review of closure plan. • Monitor the implementation and effectiveness of SLP. • Annual Environmental Audit to evaluate compliance.
Design and implement economic development programmes that will assist people being retrenched in sustaining their livelihoods.			✔	✔		
Establish a future forum with representation from the workforce to discuss potential difficulties and solutions.			✔	✔		
Implementation of programmes to minimise and mitigate the impact of downscaling and retrenchment			✔	✔		
Implementation of capacity building programmes to minimise and mitigate the impact of mine downscaling and closure.			✔	✔		
Closure plan implementation.			✔	✔		

Monitoring of the implementation of the impact management actions are defined in **Table 11**.

5.2 Activity 1: Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)

Table 2: Mitigation and Implementation – Underground Mining (including Ventilation Shafts, Refuge Boreholes and Fans)

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Impact management outcome: Preventing impacts, where possible, or manage impacts associated with the: • **Deterioration of groundwater quality resulting from mining activities.** • **Deterioration of surface water quality.** • **Deterioration of groundwater quality including decant potential resulting from underground operations and Deterioration of surface water quality including decant potential resulting from underground operations.**						
Conduct surface water and groundwater quality monitoring.	✔	✔	✔	✔	Environmental Manager Environmental Control Officer (ECO) Mine/General Manager Mine Engineer	• Implementation and review of monitoring network until closure certificate is obtained. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Water management infrastructure and stockpiles must be lined as well as maintained in accordance with the civil designs.	✔	✔	✔			
Provide alternative water (of similar quality) or compensate where water users are affected as a result of the Naudesbank operations.	✔	✔	✔	✔		
Conduct hydrocensus prior to the commencement of mining and ensure that water qualities and water levels for all the identified boreholes are recorded in an established baseline database.	✔					
Develop and implement water management strategy.	✔	✔	✔	✔		
Concurrent rehabilitation is assumed and overburden material should be placed in the deepest part of the pit (as far as practical possible), ensuring that oxygen is limited to these materials and that pyrite oxidation is minimised.		✔	✔			
Seal off individual high yielding inflow zones intercepted during mining.	✔	✔				
Where judged relevant, in-pit boreholes (Odex/Symmetrix) should be drilled to monitor the recovering mine water levels and quality.			✔	✔		
The potential decant dynamics should be investigated in detail near the end of mining.			✔			
Update geohydrological model every two years.		✔				
Impact management outcome: Preventing impacts, where possible, or manage impacts associated with the drawdown resulting from underground operations impacting surface water and groundwater levels.						
Monitor groundwater levels.	✔	✔	✔	✔	Environmental Manager Environmental Control Officer (ECO)	• Implementation and review of monitoring network until closure certificate is obtained. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan.
Water volumes of wetlands potentially impacted must be monitored on a bi-annual basis. A baseline must be established prior to the commencement of mining for both the wet and dry season.	✔	✔	✔	✔		
Provide alternative water (of similar quality) or compensate where water users are affected as a result of the Naudesbank operations.	✔	✔	✔	✔		

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Maintain rock engineer pillar safety factors to prevent subsidence.	✔	✔			Mine/General Manager Mine Engineer	• Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Seal off individual high yielding inflow zones intercepted during mining.	✔	✔				
Conduct hydrocensus prior to the commencement of mining and ensure that water volumes for all the identified boreholes are recorded in an established baseline database.	✔					
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to underground mining preparation and construction of associated infrastructure.						
Construction should be initiated by first constructing clean and dirty water separation systems thus ensuring that as site clearing takes place, dirty water runoff is appropriately managed.	✔				Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Implementation and review of monitoring network until closure certificate is obtained. • Induction – focussing on waste management and spill prevention. • Demarcate no-go areas. • Mark footprint areas. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Contractor laydown areas, and material storage facilities to remain outside of the wetlands and the 100 m buffer.	✔					
All vehicle re-fuelling is to take place in the approved licensed footprints (diesel bays) or outside 100m wetland buffers.	✔					
All development footprint areas to remain within the approved footprint thereof, and vegetation clearing to be limited to what is essential within that footprint.	✔					
Retain as much indigenous wetland vegetation as possible.	✔					
It should be feasible to utilise existing roads to gain access to sites, and crossing the wetlands in areas where no existing crossing is apparent should be unnecessary, but if it is essential, crossings should be made at right angles.	✔					
Areas where bank failure is observed because of such crossings should be immediately repaired.	✔					
The wetlands, and the 100 m buffer should be demarcated and defined as areas in which no activities are proposed, and should be marked as a no-go area wherever no mining is planned and approved.	✔					
Excavated materials must not be contaminated, and it must be ensured that the minimum surface area is taken up.	✔					
All exposed soil must be protected for the duration of the construction phase to prevent erosion and sedimentation of the downgradient wetlands.	✔					
A bio-monitoring network must be developed and implemented.	✔					
Surface water monitoring must be undertaken.	✔					
A spill prevention and emergency spill response plan must be compiled and implemented.	✔					
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to underground mining.						
Underground mining closer to the surface should be carried out with extreme caution to ensure that the subsurface process sustaining the wetland systems are not impaired. Long-term stability design criterion to be applied underneath wetlands. Sinkhole analysis to be conducted in shallow mining areas.		✔			Environmental Manager Environmental Control Officer (ECO)	• Implementation and review of monitoring network until closure certificate is obtained.
Ensure that the shallow underground mining areas are located outside of the wetland recharge soils if possible.		✔				
Develop and implement water management strategy.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Management measures recommended under groundwater must be continuously implemented.		✔			Mine/General Manager Mine Engineer	• ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
A bio-monitoring network must be developed and implemented.		✔				
Surface water monitoring must be undertaken.		✔				
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to decant.						
Management measures recommended under groundwater must be continuously implemented.			✔	✔	Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Implementation and review of monitoring network until closure certificate is obtained. • Develop and implement water management strategy. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Surface water quality monitoring and bio-monitoring must be undertaken.			✔	✔		
Post-closure monitoring of the wetlands and any rehabilitated areas is strongly recommended to be undertaken. This should be determined by an appropriately qualified freshwater ecologist.			✔	✔		

Mitigation measures applicable to all activity outcomes are defined in **Table 1**.

Monitoring of the implementation of the impact management actions are defined in **Table 11**.

5.3 Activity 2: Opencast Mining (including Stripping and Stockpiling of Topsoil)

Table 3: Mitigation Measures – Opencast Mining (including Stripping and Stockpiling of Topsoil)

<table>
<tr><th rowspan="3">Impact management actions</th><th colspan="6">Implementation</th></tr>
<tr><th colspan="4">Timeframe</th><th rowspan="2">Responsible person</th><th rowspan="2">Method</th></tr>
<tr><th>C</th><th>O</th><th>D</th><th>Clo</th></tr>
<tr><td colspan="7">Impact management outcome: Preventing impacts, where possible, or manage impacts associated with the:
• Deterioration of groundwater quality resulting from mining activities.
• Deterioration of surface water quality.
• Deterioration of groundwater quality including decant potential resulting from opencast operations.
• Deterioration of surface water quality including decant potential resulting from opencast operations.</td></tr>
<tr><td>Conduct surface water and groundwater quality monitoring.</td><td>✔</td><td>✔</td><td>✔</td><td>✔</td><td rowspan="9">Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager

Mine Engineer</td><td rowspan="9">• Implementation and review of monitoring network until closure certificate is obtained.
• Conduct rehabilitation on-site as stipulated in the rehabilitation plan.
• Review and monitor effectiveness of rehabilitation.
• ECO inspections to ensure compliance with measures.
• Distribute the EMPr and IWWMP to all supervisors and managers.</td></tr>
<tr><td>Water management infrastructure and stockpiles must be lined as well as maintained in accordance with the civil designs.</td><td>✔</td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Provide alternative water (of similar quality) or compensate where water users are affected as a result of the Naudesbank operations.</td><td>✔</td><td>✔</td><td>✔</td><td>✔</td></tr>
<tr><td>Conduct hydrocensus prior to the commencement of mining and ensure that water qualities and water levels for all the identified boreholes are recorded in an established baseline database.</td><td>✔</td><td></td><td></td><td></td></tr>
<tr><td>Develop and implement water management strategy.</td><td></td><td></td><td>✔</td><td>✔</td></tr>
<tr><td>Concurrent rehabilitation is assumed and overburden material should be placed in the deepest part of the pit (as far as practical possible), ensuring that oxygen is limited to these materials and that pyrite oxidation is minimised.</td><td></td><td>✔</td><td>✔</td><td></td></tr>
<tr><td>Where judged relevant, in-pit boreholes (Odex/Symmetrix) should be drilled to monitor the recovering mine water levels and quality.</td><td></td><td></td><td>✔</td><td>✔</td></tr>
<tr><td>The potential decant dynamics should be investigated in detail near the end of mining.</td><td></td><td></td><td>✔</td><td></td></tr>
<tr><td>Update geohydrological model every two years.</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td colspan="7">Impact management outcome: Preventing impacts, where possible, or manage impacts associated with the:
• Groundwater level drawdown impacting availability of water.
• Dewatering impacting water levels until opencast pits are flooded.</td></tr>
<tr><td>Monitor groundwater levels.</td><td>✔</td><td>✔</td><td>✔</td><td>✔</td><td rowspan="3">Environmental Manager

Environmental Control Officer (ECO)</td><td rowspan="3">• Implementation and review of monitoring network until closure certificate is obtained.
• Conduct rehabilitation on-site as stipulated in the rehabilitation plan.</td></tr>
<tr><td>Water volumes of wetlands potentially impacted must be monitored on a bi-annual basis. A baseline must be established prior to the commencement of mining for both the wet and dry season.</td><td>✔</td><td>✔</td><td>✔</td><td>✔</td></tr>
<tr><td>Provide alternative water (of similar quality) or compensate where water users are affected as a result of the Naudesbank operations.</td><td>✔</td><td>✔</td><td>✔</td><td>✔</td></tr>
</table>

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Seal off individual high yielding inflow zones intercepted during mining.	✔	✔			Mine/General Manager Mine Engineer	• Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Conduct hydrocensus prior to the commencement of mining and ensure that water volumes for all the identified boreholes are recorded in an established baseline database.	✔					
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to site clearance at opencast pits.						
The footprint of the proposed opencast pits should be optimised further if possible to avoid or further minimise encroaching into wetland habitat, and limited to the minimum viable footprint to ensure optimal and safe mining.	✔				Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Implementation and review of monitoring network until closure certificate is obtained. • Induction – focussing on waste management and spill prevention. • Demarcate no-go areas. • Mark footprint areas. • Monitor stripping and stockpiling. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Construction should be initiated by first constructing clean and dirty water separation systems thus ensuring that as site clearing takes place, dirty water runoff is appropriately managed.	✔					
Contractor laydown areas, and material storage facilities to remain outside of the wetlands and the 100 m buffer.	✔					
All vehicle re-fuelling is to take place in the approved licensed footprints (diesel bays) or outside 100m wetland buffers..	✔					
All development footprint areas to remain within the approved footprint thereof, and vegetation clearing to be limited to what is essential within that footprint.	✔					
Retain as much indigenous wetland vegetation as possible.	✔					
It should be feasible to utilise existing roads to gain access to sites, and crossing the wetlands in areas where no existing crossing is apparent should be unnecessary, but if it is essential crossings, should be made at right angles.	✔					
Areas where bank failure is observed because of such crossings should be immediately repaired.	✔					
The wetlands, and the 100 m buffer should be demarcated and defined as areas in which no activities are proposed, and should be marked as a no-go area wherever no mining is planned and approved.	✔					
Stockpiles must be placed outside of the applicable zone of regulation where practically possible.	✔					
Excavated materials must not be contaminated, and it must be ensured that the minimum surface area is taken up.	✔					
All exposed soil must be protected for the duration of the construction phase to prevent erosion and sedimentation of the downgradient wetlands.	✔					
A bio-monitoring network must be developed and implemented.	✔					
Surface water monitoring must be undertaken.	✔					
Soil stripping and stockpiling must be undertaken as per soil specialist recommendations.	✔					
A spill prevention and emergency spill response plan must be compiled and implemented.	✔					
Oil separators and wash bays must be frequently cleaned, maintained, and inspected.	✔					

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Impact management outcome: Prevention and management of impacts associated with the: • **Loss of freshwater resources due to opencast mining.** • **Alteration and deterioration of freshwater resources due to opencast mining activities including blasting and dewatering.**						
Pollution prevention through infrastructure design.		✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on spillages and prohibited actions. • Implementation and review of monitoring network until closure certificate is obtained. • Construct water management infrastructure as per civil designs. • Mark footprint areas. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Develop and implement water management plan. • Distribute the EMPr and IWWMP to all supervisors and managers.
Implement a monitoring programme to detect, manage and prevent the pollution of soils, surface water and groundwater.		✔				
If possible, the overburden stockpiles should be located in areas where it would not impact on any of the local hydrological drivers of the wetlands, outside the 100 m buffer.		✔				
Reduce airborne dust during blasting activities through: • Damping dust generation areas with freshwater (although not in sufficient quantities to generate runoff); and • Use of hessian or brush barrier fences.		✔				
Blasting should be carried out with extreme caution to avoid cracking of the underlying parent material of the adjacent areas, which might lead to leakages of the impermeable underlying material which might alter the hydropedological properties of the surrounding area.		✔				
Measures to be considered as part of the water management include: • Upstream dewatering boreholes should be utilised in order to minimise the creation of dirty water within the opencast area, and this clean water should be used to recharge the directly impacted wetlands or be discharged via the clean water system into the surrounding wetland systems. • Any areas where decant points may be determined by a geohydrological assessment, need to be carefully managed throughout the life of the mine. • Decant should be managed by implementing one or more of the water management strategies such as treatment or containment. A water management strategy will be developed and implemented.		✔				
A spill prevention and emergency spill response plan must be compiled and implemented.		✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO)	• Induction – focussing on spillages and prohibited actions. • Implementation and review of monitoring network until closure certificate is obtained. • Construct water management infrastructure as per civil designs.
Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.		✔				
An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.		✔				
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.		✔				
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.		✔				
All vehicles are to be serviced in a correctly bunded area or at an off-site location.		✔				
Use of drip trays are compulsory in the event of vehicle or heavy machinery breakdown.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.		✔			Mine/General Manager	• Mark footprint areas. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Develop and implement water management plan. • Distribute the EMPr and IWWMP to all supervisors and managers.
Management measures recommended under groundwater must be continuously implemented.		✔				
Bio-monitoring must be conducted.		✔				
Surface water monitoring must be undertaken.		✔				
Rehabilitate areas as per closure and rehabilitation plan, indigenous vegetation must be used.		✔				
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to decant.						
Management measures recommended under groundwater must be continuously implemented.			✔	✔	Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Implementation and review of monitoring network until closure certificate is obtained. • Develop and implement rehabilitation plan as well as post-closure water management plan. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Soil replacement must be undertaken as per soil specialist recommendations.			✔			
Surface water quality monitoring and bio-monitoring must be undertaken.			✔	✔		
Material from the overburden stockpiles should be used to backfill the opencast pits.			✔	✔		
The final backfilled opencast landscape should be free draining so as to allow recharge of the wetland resources in the landscape and the greater catchment. The post-closure recharge of the catchment should also be as near natural as possible.			✔	✔		
Ensure that soils are replaced in the correct layers, ripped and re-profiled post-closure, and that vegetation is restored to a point where succession will lead to the same conditions as the pre-mining state as a minimum.			✔	✔		
Bare areas should be revegetated within suitable indigenous vegetation species.			✔	✔		
Rehabilitation measures stipulated in Maintenance and Management Plan (MMP) must be implemented. Implementation must be overseen by a suitably qualified Environmental Site Officer (ESO) with wetland rehabilitation experience and the ESO must sign off the rehabilitation before the relevant contractors leave site.			✔	✔		
Post-closure monitoring of the wetlands and any rehabilitated areas is strongly recommended to be undertaken. This should be determined by an appropriately qualified freshwater ecologist.			✔	✔		
Impact management outcome: Management of impacts associated with the Increased porosity and hydraulic conductivity.						

<table>
<tr><th rowspan="3">Impact management actions</th><th colspan="6">Implementation</th></tr>
<tr><th colspan="4">Timeframe</th><th rowspan="2">Responsible person</th><th rowspan="2">Method</th></tr>
<tr><th>C</th><th>O</th><th>D</th><th>Clo</th></tr>
<tr><td>Rehabilitation of opencast areas must be conducted as stipulated in the closure and rehabilitation plan.</td><td></td><td>✔</td><td>✔</td><td></td><td>Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager</td><td>• Develop and implement rehabilitation plan.
• Conduct rehabilitation on-site as stipulated in the rehabilitation plan.
• Review and monitor effectiveness of rehabilitation.
• ECO inspections to ensure compliance with measures.
• Distribute the EMPr and IWWMP to all supervisors and managers.</td></tr>
<tr><td colspan="7">Impact management outcome: Management of impacts associated with the:
• Alteration of the topography due to the opencast mining.
• Additional disturbance of physical and landscape features.</td></tr>
<tr><td>Disturbances to natural areas must be minimised and limited to the disturbance footprints.</td><td>✔</td><td>✔</td><td></td><td></td><td rowspan="2">Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager</td><td rowspan="2">• Demarcate footprint areas.
• Implementation and review of monitoring network until closure certificate is obtained.
• Develop and implement rehabilitation plan.
• Conduct rehabilitation on-site as stipulated in the rehabilitation plan.
• Review and monitor effectiveness of rehabilitation.
• ECO inspections to ensure compliance with measures.
• Distribute the EMPr and IWWMP to all supervisors and managers.</td></tr>
<tr><td>Areas should be rehabilitated to resemble pre-mining topography as far as practically possible or the agreed end land use.</td><td></td><td>✔</td><td>✔</td><td></td></tr>
</table>

<table>
<tr><th rowspan="3">Impact management actions</th><th colspan="6">Implementation</th></tr>
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<tr><th>C</th><th>O</th><th>D</th><th>Clo</th></tr>
<tr><td colspan="7">Impact management outcome: Prevention and management of impacts associated with the ground vibrations perceived as unpleasant by surrounding communities.</td></tr>
<tr><td>Blasting Sensitive Receptor (BSR) staying closer than 500 m from opencast area (where blasting may take place in future) to be relocated.</td><td>✔</td><td>✔</td><td></td><td></td><td rowspan="6">Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager

Mine Blasting Engineer</td><td rowspan="6">• Frequent engagement with surrounding landowners, land occupiers and communities.
• Investigate all complaints.
• Adhere to recommendations and designs of blasting assessment.
• Annual Environmental Audits to evaluate compliance.</td></tr>
<tr><td>Initiate a forum to inform the close residents about the likely vibration and air blast levels, the proposed blasting schedule and warning methodology the mine will employ before a blast as well as a warning to residents that, when they are indoors during a blast, vibration of windows and ceilings may appear excessive.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>When blasting closer than 2 200 m from any BSR, the blast can be controlled (reducing the detonation/charge per delay - with a delay of at least 8 ms between consecutive detonations) for a vibration level less than 2.54 mm/s at the identified BSR.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Use a smaller borehole diameter (and a tighter associated drilling pattern) that would reduce the quantity of explosive detonated per delay.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Measure blasting vibration levels during blasts to define onsite constants. These constants can be used to update the blasting report within a year after mining started.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>Erect clear signs indicating blast dates and times on all roads within 1 000 m from the blasting areas. A blast schedule should be provided to the BSRs staying in the area.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td colspan="7">Impact management outcome: Prevention and management of impacts associated with the ground vibrations resulting in damage of residential structures.</td></tr>
<tr><td>BSR staying closer than 500 m from opencast area (where blasting may take place in future) to be relocated.</td><td>✔</td><td>✔</td><td></td><td></td><td rowspan="4">Environmental Manager

Environmental Control Officer (ECO)

Mine/General Manager

Mine Blasting Engineer</td><td rowspan="4">• Frequent engagement with surrounding landowners, land occupiers and communities.
• Investigate all complaints.
• Adhere to recommendations and designs of blasting assessment.
• Annual Environmental Audits to evaluate compliance.</td></tr>
<tr><td>Undertake a survey of all buildings and structures (during the recommended photo survey) located within 2 000 m from the proposed mining opencast pits to determine the building material and potential sensitivities of the structures.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>If brick buildings (located within 500 m) are to be used for residential purposes during the mining period, blasts closer than 500 m from brick buildings should be controlled (detonation per delay - with a delay of at least 8 ms between consecutive detonations) for a vibration level less than 25.0 mm/s at the identified Blasting Sensitive Structure (BSS).</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td>If brick buildings (located within 500 m) are to be used for residential purposes during the mining period, the mine can use a smaller borehole diameter (and a tighter associated drilling pattern) that would reduce the quantity of explosive detonated per delay.</td><td>✔</td><td>✔</td><td></td><td></td></tr>
<tr><td colspan="7">Impact management outcome: Prevention and management of impacts associated with the ground vibrations resulting in damage of cement dams, bridges and pipelines.</td></tr>
<tr><td>Undertake a photo survey at all cement dams located within 500 m from the proposed opencast pits. The mine must also undertake and determine the status and use of all water boreholes located within 2 000 m from the future blasting locations (before blasting activities start). Any dams located within 200 m should be decommissioned and livestock using these dams should be relocated and alternative sources of water should be supplied to users of these dams (if relevant).</td><td>✔</td><td>✔</td><td></td><td></td><td>Environmental Manager

Environmental Control Officer (ECO)</td><td>• Frequent engagement with surrounding landowners, land occupiers and communities.</td></tr>
</table>

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Cement dams located within 200 m should be decommissioned, livestock using these dams should be relocated and alternative sources of water should be supplied to users of these dams (if relevant).	✔	✔			Mine/General Manager Mine Blasting Engineer	• Investigate all complaints. • Adhere to recommendations and designs of blasting assessment. • Annual Environmental Audits to evaluate compliance.
Impact management outcome: Prevention and management of impacts associated with the ground vibration potentially causing damage to R38 Regional Road.						
Reduce the charge per detonation (detonation per delay) when blasting is to take place close than 160 m from the R38.	✔	✔			Environmental Manager Environmental Control Officer (ECO) Mine/General Manager Mine Blasting Engineer	• Adhere to recommendations and designs of blasting assessment. • Annual Environmental Audits to evaluate compliance.
Warn road users on the tar road transecting the mining area before and during blasting events (such as a red light flashing with clear signs that blasting is taking place).	✔	✔				
Calculate potential vibration levels at the tar roads and railway line for each blast (considering the actual blasting parameters) once blasting is closer than 500 m from the roads/se structures. Reduce the charge mass per detonation to ensure that vibration levels are less than 150 mm/s when blasting closer than 500 m from the R38 road.	✔	✔				
Implement a blast monitoring programme. This data is to be processed to calculate the site-specific constants to allow more accurate calculation of the potential blast impacts.	✔	✔				
Discuss the project with the relevant authorities to authorize the closure and implement the agreed upon mitigation measures once mining (with blasting) take place closer than 500 m from the tar road.	✔	✔				
Impact management outcome: Prevention and management of impacts associated with the air blast potentially leading to damage.						
Initiate a forum to inform the close residents about the likely vibration and air blast levels, the proposed blasting schedule and warning methodology the mine will employ before a blast as well as a warning to residents that, when they are indoors during a blast, vibration of windows and ceilings may appear excessive.	✔	✔			Environmental Manager Environmental Control Officer (ECO) Mine/General Manager Mine Blasting Engineer	• Frequent engagement with surrounding landowners, land occupiers and communities. • Investigate all complaints. • Adhere to recommendations and designs of blasting assessment. • Annual Environmental Audits to evaluate compliance.
Erect blasting notice boards and clear warnings in the area (along the tar roads located within 500 m from future blasting activities) with blasting dates and times highlighted.	✔	✔				
Prevent blasting in adverse meteorological conditions where possible (overcast conditions, strong wind blowing in direction of local community, early in the mornings or late in the afternoon).	✔	✔				
Potential airblast levels to be calculated for each blast to take place within 1 000 m from any BSR and the mine can reduce the number of holes detonated per delay when mining closer than 1 000 from BSR (to ensure airblast levels less than 120 dBA at BSR).	✔	✔				
Use of detonating cord should be minimised to control airblast levels. When used within 1 000 m from identified BSRs, the cord should be covered with cuttings or aggregate to minimise airblast levels from this source.	✔	✔				
Implement a blast monitoring programme when blasting is to take place closer than 1 000 m from verified BSR.	✔	✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
Impact management outcome: Prevention and management of impacts associated with fly rock posing a danger to people, animals, structures and/or equipment.						
Recommend that equipment, buildings and structures closer than 500 m from potential blasting sites be moved, relocated or protected.	✔	✔			Environmental Manager Environmental Control Officer (ECO) Mine/General Manager Mine Blasting Engineer	• Ensure blasting zone is establish and clear prior to detonation. • Adhere to recommendations and designs of blasting assessment. • Annual Environmental Audits to evaluate compliance.
People and livestock to be moved further than 500 m from active blast before a blast is detonated.	✔	✔				
Any evidence of fly rock is noted and the blast be analysed for possible improvements.	✔	✔				
Consider the blast design to increase the stemming length, or reducing the charge weight per linear meter (e.g., smaller blast hole diameter or different type of explosive) if fly rock problems are encountered.	✔	✔				
Blaster to keep full records of blast (blast design, timing, explosive mass per blast hole, stemming, subdrill, spacing, burden, etc.).	✔	✔				
Impact management outcome: Prevention and management of impacts associated with the loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat, Habitat Connectivity, Degraded Grassland, Transformed, Highveld and Moist Grassland).						
Construct and maintain water management infrastructure as per civil designs.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Ensure AIP control plan is implemented, and that AIPs are suitably controlled and managed.		✔				
Operational personnel are to be educated about the various faunal species in the area, particularly about venomous spiders, snakes and scorpion species. Personnel are to be educated not to kill or harm any of these or other faunal species. Should any of these species be encountered, these species are to be safely and carefully relocated by a suitably qualified person to the surrounding natural habitat adjacent the development site, should they not move off on their own.		✔				
The contact details of a suitably qualified snake handler for the mine must be made available to operational teams should a venomous snake be encountered that needs removal. Alternatively, suitable training of select staff members must be undertaken to affect / ensure the safe capture and relocation of snakes.		✔				
No on-site open fires are allowed.		✔				
External lighting should be kept to a minimum with downward facing lights. Yellow or red fluorescent lights should be used while the use of LED lights should be avoided.		✔				
Noise must be kept to acceptable levels as per the environmental norms and standards for noise mitigation as stipulated within the noise specialist report.		✔				
Mine vehicles must be limited to only travel 40 km/h on designated roads.		✔				
No vegetation clearance is allowed outside of the demarcated footprint areas. Disturbed areas beyond the footprint are to be suitably rehabilitated in accordance with the rehabilitation plan		✔				
Weekly inspections of the footprints must be made to ensure that no dumping or further vegetation clearance outside of the demarcated area has occurred. Where this has occurred, this must be rectified, and the habitat rehabilitated.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
No hunting, trapping or setting of snares by personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.		✔				
As far as possible vegetation clearance activities should be undertaken in the winter months, as faunal species will not be breeding and there is a lower risk to nesting avifauna. During the winter months, reptiles and some invertebrates will be slower moving and/or, in a state of torpor. As such, it is recommended that as vegetation clearance/earth works takes place, team of trained individuals moves ahead of these activities and searches for and relocates any species unable to move out of the way themselves. Species are to be moved to adjacent areas of the same habitat type outside of the disturbance footprint.		✔				
Clearing activities should also happen in a phased manner to give fauna enough time to escape ahead of clearing/construction activities.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Excavated topsoil must be stored with associated native vegetation debris for subsequent use in rehabilitation.		✔				
Any stockpiles should be placed within transformed areas or where possible, existing infrastructure should be used. No additional natural areas outside of those which have been planned for should be impacted for stockpiling.		✔				
Should any faunal SCC be found on site, a suitably qualified specialist must be consulted as to the best way forward. Permits for relocation should be obtained from the relevant authorities.		✔				
Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habit outside of the footprint areas.		✔				
Cleared and bare areas are to be rehabilitated and revegetated using an appropriate seed mix that is in line with the current species composition of the vegetation type.		✔				
Impact management outcome: Prevention and management of impacts associated with the: • **Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands, Significant Biodiversity Features, Degraded Grassland, Transformed, Highveld Grassland and Modified Wetlands).** • **Loss/alteration of Floral SCC including their Habitats (MNCA Protected species, Provincially Important Flora, Highveld Grasslands, *Khadia carolinensis*, Rocky Outcrops, Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands and Sensitive species 1200).**						
No collection of floral SCC or indigenous vegetation must be allowed by personnel.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Informal fires should be prohibited, and no uncontrolled fires whatsoever must be allowed.		✔				
A spill prevention and emergency spill response plan must be compiled and implemented.		✔				
Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.		✔				
An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.		✔				
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.		✔				
AIP proliferation, which may affect adjacent natural areas, must be strictly managed.		✔				
Ongoing AIP monitoring and clearing/control should take place.		✔				
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.		✔				
Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Clo		
No vegetation clearing may commence prior to floral SCC walkdowns.		✔				
Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved project footprint. Footprints to be clearly demarcated to avoid footprint creep into adjacent habitat. It must be ensured that, as far as possible, all proposed infrastructure, including temporary infrastructure, be placed outside of sensitive habitat units.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
No vegetation cuttings may be left to accumulate in Freshwater Habitat. Discard all construction related waste and material (including cleared vegetation) at a registered waste facility or in a secluded area designated by the mine and no waste of construction rubble may be dumped in the surrounding natural habitats.		✔				
Stockpiles, pits, and their expansion as material is deposited, should be kept as small as possible. No additional habitat outside of the demarcated approved footprints (being applied for) is to be disturbed during the operational phase of the project. Bi-weekly (once every two week, recommended) to monthly (minimum requirement) monitoring and recording of the footprint areas must be done by the Environmental Manager and photographic records kept – special attention should also be paid to potential increase and spread of alien vegetation.		✔				
Where OC Pits will develop through the Forb-rich Wetlands, it is recommended that clean water be diverted and discharged into the down-gradient system so to avoid complete loss of recharge of the affected system.		✔				
Stockpile slope monitoring should be carried out regularly to manage the slope angle and height. Where high levels of sediment are collecting at the base of the stockpiles, these areas should be re-vegetated to stabilise these sections and to minimise further dispersion of sediment into the surrounding soils during e.g., high rainfall events. Should this not be feasible, this material should be collected, transported, and stored in a suitable waste facility.		✔				
Steps should be taken to ensure that stockpiled topsoil is not contaminated by AIP material. Handling of topsoil should follow best-practice standards and must preferably only be done twice, i.e., once to strip and stockpile, and once to replace and level. Topsoil to be stockpiled in such a way as to limit soil compaction and erosion. No personnel and heavy vehicles to move over topsoil stockpiles. The topsoil stockpile should be vegetated and while vegetating, measures will be needed to contain erosion of the stockpile during rain events (this should be done if a stockpile will remain for a longer period of time).		✔				
Options to mitigate the loss of habitat associated with a CBAs and an EN ecosystem is limited. Edge effects should be managed to reduce cumulative loss of CBAs and EN ecosystems through 1) minimisation of habitat loss through reconsideration of layouts, 2) prevention of habitat fragmentation through utilisation of existing roads and keeping new construction activities within or close to existing disturbances, and 3) ensure a rehabilitation plan is developed and approved by authorities prior to mining activities commencing, which must incorporate concurrent rehabilitation through all phases of the project.		✔				
Prior to any vegetation clearing activities commencing, all floral SCC within direct footprint areas should either have been rescued and relocated, or sufficient propagules of specimens sampled for nursery propagation.		✔				
Following the guidelines from a rescue and relocation plan (to be drafted following a thorough walkdown of the footprint areas), all MNCA-protected species must be rescued and relocated upon receival of permits from the MTPA and prior to vegetation clearing activities commencing. It is further recommended that propagules and/or seed of the MNCA-protected species be harvested and grown under nursery conditions to be used for 1) rehabilitation activities later down the line, and/or 2) to supplement for unsuccessful relocation attempts.		✔				
No protected or threatened floral species may be removed during any mining phase activities without 1) permits from the DFFE and MTPA, and 2) all conditions of the permits being adhered to.		✔				
All rescue and relocation activities (successes, failures, exact number of species rescued) must be documented and monitored until it is evident that the species have successfully established within the relocated areas.		✔				

Mitigation measures applicable to all activity outcomes are defined in **Table 1**.

Monitoring of the implementation of the impact management actions are defined in **Table 11**.

5.4 Activity 3: Overburden Stockpiles and RoM Yards

Table 4: Mitigation and Implementation – Overburden Stockpiles and RoM Yards

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	Cl		
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to overburden stockpiles						
Pollution prevention through infrastructure design.		✔			Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on spillages and prohibited actions. • Implementation and review of monitoring network until closure certificate is obtained. • Construct water management infrastructure as per civil designs. • Mark footprint areas. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Develop and implement water management plan. • Distribute the EMPr and IWWMP to all supervisors and managers.
Implement a monitoring programme to detect, manage and prevent the pollution of soils, surface water and groundwater.		✔				
If possible, the overburden stockpiles should be located in areas where it would not impact on any of the local hydrological drivers of the wetlands, outside the 100 m buffer.		✔				
Reduce airborne dust during blasting activities through: • Damping dust generation areas with freshwater (although not in sufficient quantities to generate runoff); and • Use of hessian or brush barrier fences.		✔				
A spill prevention and emergency spill response plan must be compiled and implemented.		✔				
Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.		✔				
An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.		✔				
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.		✔				
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.		✔				
All vehicles are to be serviced in a correctly bunded area or at an off-site location.		✔				
Use of drip trays are compulsory in the event of vehicle or heavy machinery breakdown.		✔				
Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.		✔				
Management measures recommended under groundwater must be continuously implemented.		✔				
Bio-monitoring must be conducted.		✔				
Surface water monitoring must be undertaken.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
Impact management outcome: Preventing impacts, where possible, or manage impacts associated with the: • **Deterioration of groundwater quality resulting from stockpiles.** • **Deterioration of surface water quality resulting from stockpiles.**						
Conduct surface water and groundwater quality monitoring.	✔	✔	✔	✔	Environmental Manager Environmental Control Officer (ECO) Mine/General Manager Mine Engineer	• Implementation and review of monitoring network until closure certificate is obtained. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Water management infrastructure and stockpiles must be lined as well as maintained in accordance with the civil designs.	✔	✔	✔			
Conduct hydrocensus prior to the commencement of mining and ensure that water qualities for all the identified boreholes are recorded in an established baseline database.	✔					
A water management strategy must be developed and implemented.			✔	✔		
Update geohydrological model every two years.		✔				
Impact management outcome: Prevention and management of impacts associated with the loss/alteration of faunal habitat and diversity (Freshwater Habitat, Habitat Connectivity, Degraded Grassland, Transformed, Highveld and Moist Grassland).						
Construct and maintain water management infrastructure as per civil designs.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Ensure AIP control plan is implemented, and that AIPs are suitably controlled and managed.		✔				
Operational personnel are to be educated about the various faunal species in the area, particularly about venomous spiders, snakes and scorpion species. Personnel are to be educated not to kill or harm any of these or other faunal species. Should any of these species be encountered, these species are to be safely and carefully relocated by a suitably qualified person to the surrounding natural habitat adjacent the development site, should they not move off on their own.		✔				
The contact details of a suitably qualified snake handler for the mine must be made available to operational teams should a venomous snake be encounter that needs removal. Alternatively, suitable training of select staff members must be undertaken to affect / ensure the safe capture and relocation of snakes.		✔				
No on-site open fires are allowed.		✔				
External lighting should be kept to a minimum with downward facing lights. Yellow or red fluorescent lights should be used while the use of LED lights should be avoided.		✔				
Noise must be kept to acceptable levels as per the environmental norms and standards for noise mitigation as stipulated within the noise specialist report.		✔				
Mine vehicles must be limited to only travel 40 km/h on designated roads.		✔				
No vegetation clearance is allowed outside of the demarcated footprint areas. Disturbed areas beyond the footprint are to be suitably rehabilitated in accordance with the rehabilitation plan.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
Weekly inspections of the footprints must be made to ensure that no dumping or further vegetation clearance outside of the demarcated area has occurred. Where this has occurred, this must be rectified, and the habitat rehabilitated.		✔				
No hunting, trapping or setting of snares by personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.		✔				
Impact management outcome: Prevention and management of impacts associated with the: • **Loss/alteration of Floral Habitat and Diversity (Forb-rich Wetlands, Moist Grasslands, Significant Biodiversity Features, Degraded Grassland, Highveld Grassland and Transformed).** • **Loss/alteration of Floral SCC including their Habitats (MNCA Protected species, Provincially Important Flora, Highveld Grasslands, *Khadia carolinensis*, Rocky Outcrops, Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands and Sensitive species 1200).**						
No collection of floral SCC or indigenous vegetation must be allowed by personnel.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Informal fires should be prohibited, and no uncontrolled fires whatsoever must be allowed.		✔				
A spill prevention and emergency spill response plan must be compiled and implemented.		✔				
Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.		✔				
An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.		✔				
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.		✔				
AIP proliferation, which may affect adjacent natural areas, must be strictly managed.		✔				
Ongoing AIP monitoring and clearing/control should take place		✔				
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.		✔				
Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.		✔				
Stockpiles, dumps, OC pit expansion, PCD, RoM etc. positions, and their expansion as material is deposited, should be kept as small as possible. No additional habitat outside of the demarcated approved footprints (being applied for) is to be disturbed during the operational phase of the project. Bi-weekly (once every two week, recommended) to monthly (minimum requirement) monitoring and recording of the footprint areas must be done by the Environmental Manager and photographic records kept – special attention should also be paid to potential increase and spread of alien vegetation.		✔				
Stockpile slope monitoring should be carried out regularly to manage the slope angle and height. Where high levels of sediment are collecting at the base of the stockpiles, these areas should be re-vegetated to stabilise these sections and to minimise further dispersion of sediment into the surrounding soils during e.g., high rainfall events. Should this not be feasible, this material should be collected, transported, and stored in a suitable waste facility.		✔				

Mitigation measures applicable to all activity outcomes are defined in **Table 1**.

Monitoring of the implementation of the impact management actions are defined in **Table 11**.

5.5 Activity 4: Water Management Infrastructure

Table 5: Mitigation and Implementation – Water Management Infrastructure

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
Impact management outcome: Prevention and management of impacts associated with the: • **Loss of freshwater resources due to construction of water management infrastructure.** • **Alteration and deterioration of freshwater resources due to construction of water management infrastructure.**						
Water diversion structures must, as far as practically possible, be placed outside the catchments of depression wetlands.	✔				Health and Safety Manager (Induction) Environmental Manager Environmental Control Officer (ECO) Mine/General Manager	• Induction – focussing on waste management and spill prevention. • Demarcate no-go areas. • Mark footprint areas. • Construct water management infrastructure as per civil designs. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Clean and dirty water areas must be kept separate.	✔					
Dirty water areas must be kept as small as possible and must only be expanded as mining progresses to ensure that the volume of clean surface runoff supplying the wetlands is optimised.	✔					
Construct water management infrastructure as per civil designs.	✔					
A spill prevention and emergency spill response plan must be compiled and implemented.	✔					
Oil separators and wash bays must be frequently cleaned, maintained, and inspected.	✔					
All development footprint areas to remain within the approved footprint thereof, and vegetation clearing to be limited to what is essential within that footprint.	✔					
Impact management outcome: Prevention and management of impacts associated with the alteration and deterioration of freshwater resources due to the operation of the water management infrastructure.						
Construct and maintain water management infrastructure as per civil designs.		✔			Environmental Manager Environmental Control Officer (ECO) Mine/General Manager Mine Engineer	• Maintenance and inspection schedules should be developed and implemented. • Manage spills as stipulated in spill prevention and management plan. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
After construction of the outlet, the area surrounding the outlet should be re-seeded with indigenous wetland vegetation.		✔				
Proactive monitoring and maintenance to ensure structural integrity is maintained.		✔				
It is recommended that the infrastructure be regularly inspected for leaks, or more often should there be any sign or reports of a leak.		✔				
Should leakage occur all possible steps are to be taken to prevent the pollution of the downgradient wetlands systems during repair.		✔				
All unavoidable discharges should be managed according to the Direct Estimation of Ecological Effect Potential (DEEEP) method.		✔				
Management measures recommended under groundwater – all activities must be continuously implemented.		✔				
Surface water quality monitoring and bio-monitoring must be undertaken.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
Impact management outcome: Preventing impacts, where possible, or manage impacts associated with the: • **Deterioration of groundwater quality resulting from water management infrastructure.** • **Deterioration of surface water quality resulting from water management infrastructure.**						
Conduct surface water and groundwater quality monitoring.	✔	✔	✔	✔	Environmental Manager Environmental Control Officer (ECO) Mine/General Manager Mine Engineer	• Implementation and review of monitoring network until closure certificate is obtained. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP to all supervisors and managers.
Water management infrastructure and stockpiles must be lined as well as maintained in accordance with the civil designs.	✔	✔	✔			
Provide alternative water (of similar quality) or compensate where water users are affected as a result of the Naudesbank operations.	✔	✔	✔	✔		
Conduct hydrocensus prior to the commencement of mining and ensure that water qualities for all the identified boreholes are recorded in an established baseline database.	✔					
A water management strategy must be developed and implemented.			✔	✔		
Concurrent rehabilitation is assumed and overburden material should be placed in the deepest part of the pit (as far as practical possible), ensuring that oxygen is limited to these materials and that pyrite oxidation is minimised.		✔	✔			
Seal off individual high yielding inflow zones intercepted during mining.	✔	✔				
Where judged relevant, in-pit boreholes (Odex/Symmetrix) should be drilled to monitor the recovering mine water levels and quality.			✔	✔		
The potential decant dynamics should be investigated in detail near the end of mining.			✔			
Update geohydrological model every two years.		✔				
Impact management outcome: Prevention and management of impacts associated with the loss/alteration of faunal habitat and diversity (Habitat Connectivity, Highveld, Moist Grassland, Degraded Grassland and Transformed).						
Construct and maintain water management infrastructure as per civil designs.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Ensure AIP control plan is implemented, and that AIPs are suitably controlled and managed.		✔				
Operational personnel are to be educated about the various faunal species in the area, particularly about venomous spiders, snakes and scorpion species. Personnel are to be educated not to kill or harm any of these or other faunal species. Should any of these species be encountered, these species are to be safely and carefully relocated by a suitably qualified person to the surrounding natural habitat adjacent the development site, should they not move off on their own.		✔				
The contact details of a suitably qualified snake handler for the mine must be made available to operational teams should a venomous snake be encounter that needs removal. Alternatively, suitable training of select staff members must be undertaken to affect / ensure the safe capture and relocation of snakes.		✔				
No on-site open fires are allowed.		✔				
External lighting should be kept to a minimum with downward facing lights. Yellow or red fluorescent lights should be used while the use of LED lights should be avoided.		✔				
Noise must be kept to acceptable levels as per the environmental norms and standards for noise mitigation as stipulated within the noise specialist report.		✔				
Impact management outcome: Prevention and management of impacts associated with the: • **Loss/alteration of Floral Habitat and Diversity (Significant Biodiversity Features, Degraded Grassland, Highveld Grassland and Transformed).**						

<table>
<tr><th rowspan="3">Impact management actions</th><th colspan="6">Implementation</th></tr>
<tr><th colspan="4">Timeframe</th><th rowspan="2">Responsible person</th><th rowspan="2">Method</th></tr>
<tr><th>C</th><th>O</th><th>D</th><th>CI</th></tr>
<tr><td colspan="7">• Loss/alteration of Floral SCC including their Habitats (MNCA Protected species, Provincially Important Flora, Highveld Grasslands, Khadia carolinensis, Rocky Outcrops, Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands and Sensitive species 1200).</td></tr>
<tr><td>No collection of floral SCC or indigenous vegetation must be allowed by personnel.</td><td></td><td>✔</td><td></td><td></td><td rowspan="10">Health and Safety Manager (Induction)

Environmental Manager / Officer

Mine/General Manager</td><td rowspan="10">• Induction – focussing on SCC and prohibited actions.
• Implementation and review of monitoring network as recommended in Section 7 of the EMPr.
• ECO inspections to ensure compliance with measures.
• Distribute the EMPr and IWWMP.</td></tr>
<tr><td>Informal fires should be prohibited, and no uncontrolled fires whatsoever must be allowed.</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td>A spill prevention and emergency spill response plan must be compiled and implemented.</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td>Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td>An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td>Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td>AIP proliferation, which may affect adjacent natural areas, must be strictly managed.</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td>Ongoing AIP monitoring and clearing/control should take place</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td>If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.</td><td></td><td>✔</td><td></td><td></td></tr>
<tr><td>Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.</td><td></td><td>✔</td><td></td><td></td></tr>
</table>

Mitigation measures applicable to all activity outcomes are defined in **Table 1**.

Monitoring of the implementation of the impact management actions are defined in **Table 11**.

5.6 Activity 5: Roads

Table 6: Mitigation and Implementation – Roads

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
Impact management outcome: Prevention and management of impacts associated with the increase in traffic impacting the current road network.						
The impact is considered negligible however the intersection of Road D1252 and Regional Road R38 must be upgraded to ensure the safety of all road users. Alternatively, should SANRAL/ Department of Roads and Transport define other requirements upon engagement, these will be implemented.	✔	✔	✔		Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager Engineer	• Obtain permission from Mpumalanga Department of Public Works, Roads and Transport to upgrade intersection. • Induction – focussing traffic rules for site. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Speed limits on access road should be implemented for all contractors and personnel the recommended speed limit should be 40 km/h.	✔	✔	✔			
Ensure proper road signs are erected on access road and haul roads.	✔	✔	✔			
Dust suppression should be undertaken to ensure that visibility of road users are not altered.	✔	✔	✔			
Impact management outcome: Prevention and management of impacts associated with the loss/alteration of Faunal Habitat and Diversity (Freshwater Habitat, Habitat Connectivity, Highveld, Moist Grassland, Degraded Grassland and Transformed).						
Construct and maintain water management infrastructure as per civil designs.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Disturbance footprints must be demarcated. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation. • ECO inspections to ensure compliance with measures.
Ensure AIP control plan is implemented, and that AIPs are suitably controlled and managed.		✔				
Mine vehicles must be limited to only travel 40 km/h on designated roads.		✔				
No vegetation clearance is allowed outside of the demarcated footprint areas. Disturbed areas beyond the footprint are to be suitably rehabilitated in accordance with the rehabilitation plan.		✔				
Weekly inspections of the footprints must be made to ensure that no dumping or further vegetation clearance outside of the demarcated area has occurred. Where this has occurred, this must be rectified, and the habitat rehabilitated.		✔				
No hunting, trapping or setting of snares by personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.		✔				
Operational personnel are to be educated about the various faunal species in the area, particularly about venomous spiders, snakes and scorpion species. Personnel are to be educated not to kill or harm any of these or other faunal species. Should any of these species be encountered, these species are to be safely and carefully relocated by a suitably qualified person to the surrounding natural habitat adjacent the development site, should they not move off on their own.		✔				
The contact details of a suitably qualified snake handler for the mine must be made available to operational teams should a venomous snake be encounter that needs removal. Alternatively, suitable training of select staff members must be undertaken to affect / ensure the safe capture and relocation of snakes.		✔				
No on-site open fires are allowed.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
External lighting should be kept to a minimum with downward facing lights. Yellow or red fluorescent lights should be used while the use of LED lights should be avoided.		✔				• Distribute the EMPr and IWWMP.
Noise must be kept to acceptable levels as per the environmental norms and standards for noise mitigation as stipulated within the noise specialist report.		✔				
It is recommended that as vegetation clearance/earth works takes place, team of trained individuals moves ahead of these activities and searches for and relocates any species unable to move out of the way themselves. Species are to be moved to adjacent areas of the same habitat type outside of the disturbance footprint. This search and rescue activity is primarily to be undertaken within the Freshwater Habitat, Rocky Habitat and Highveld and Moist Grasslands but should also be done for the remaining natural habitats.		✔				
Clearing activities should also happen in a phased manner to give fauna enough time to escape ahead of clearing/construction activities.		✔				
Should any faunal SCC be found on site, a suitably qualified specialist must be consulted as to the best way forward. Permits for relocation should be obtained from the relevant authorities.		✔				
No additional natural areas outside of those which have been planned for should be impacted for stockpiling.		✔				
Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.		✔				
Edge effect control needs to be implemented to prevent further degradation and potential loss of faunal SCC or suitable habit outside of the footprint areas.		✔				
Haul roads that are not permanent should be rehabilitated and revegetated using an appropriate seed mix that is in line with the current species composition of the vegetation type when no longer in use.		✔				
Impact management outcome: Prevention and management of impacts associated with the: • **Loss/alteration of Floral Habitat and Diversity (Significant Biodiversity Features, Valley-bottom Wetlands, Degraded Grassland, Highveld Grassland, Forb-rich Wetlands, Moist Grasslands and Transformed).** • **Loss/alteration of Floral SCC including their Habitats (MNCA Protected species, Provincially Important Flora, Highveld Grasslands, *Khadia carolinensis*, Rocky Outcrops, Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands and Sensitive species 1200).**						
No collection of floral SCC or indigenous vegetation must be allowed by personnel.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Disturbance footprints must be demarcated. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • Conduct rehabilitation on-site as stipulated in the rehabilitation plan. • Review and monitor effectiveness of rehabilitation.
Informal fires should be prohibited, and no uncontrolled fires whatsoever must be allowed.		✔				
No dumping of litter, rubble or cleared vegetation on site should be allowed.		✔				
A spill prevention and emergency spill response plan must be compiled and implemented.		✔				
Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.		✔				
An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.		✔				
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.		✔				
Following heavy rains, access roads and areas adjacent to the mining footprints are to be inspected for signs of erosion which, if found, must be immediately rectified through appropriate erosion control measures		✔				
AIP proliferation, which may affect adjacent natural areas, must be strictly managed.		✔				
Ongoing AIP monitoring and clearing/control should take place		✔				
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.		✔				

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.		✔				• ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Haul roads that are not permanent should be rehabilitated and revegetated using an appropriate seed mix that is in line with the current species composition of the vegetation type when no longer in use.		✔				
Removal of vegetation must be restricted to what is absolutely necessary and should remain within the approved project footprint.		✔				
No dumping of litter, rubble or cleared vegetation on site should be allowed.		✔				
Prior to any vegetation clearing activities commencing, all floral SCC within direct footprint areas should either have been rescued and relocated,		✔				
Following the guidelines from a rescue and relocation plan (to be drafted following a thorough walkdown of the footprint areas), all MNCA-protected species must be rescued and relocated upon receival of permits from the MTPA and prior to vegetation clearing activities commencing. It is further recommended that propagules and/or seed of the MNCA-protected species be harvested and grown under nursery conditions to be used for 1) rehabilitation activities later down the line, and/or 2) to supplement for unsuccessful relocation attempts.		✔				
All rescue and relocation activities (successes, failures, exact number of species rescued) must be documented and monitored until it is evident that the species have successfully established within the relocated areas.		✔				

Mitigation measures applicable to all activity outcomes are defined in **Table 1**.

Monitoring of the implementation of the impact management actions are defined in **Table 11**.

5.7 Activity 6: Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)

Table 7: Mitigation and Implementation – Surface Infrastructure including Storage and Handling of Dangerous Goods (Diesel)

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
Impact management outcome: Prevention and management of impacts associated with the loss/alteration of Faunal Habitat and Diversity (Habitat Connectivity, Degraded Grassland, Transformed, Highveld, Moist Grassland).						
Construct and maintain water management infrastructure as per civil designs.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Ensure AIP control plan is implemented, and that AIPs are suitably controlled and managed.		✔				
Mine vehicles must be limited to only travel 40 km/h on designated roads.		✔				
No vegetation clearance is allowed outside of the demarcated footprint areas. Disturbed areas beyond the footprint are to be suitably rehabilitated in accordance with the rehabilitation plan.		✔				
Weekly inspections of the footprints must be made to ensure that no dumping or further vegetation clearance outside of the demarcated area has occurred. Where this has occurred, this must be rectified, and the habitat rehabilitated.		✔				
No hunting, trapping or setting of snares by personnel is to be allowed. Suitable fines / disciplinary actions for such must be made known and implemented.		✔				
Operational personnel are to be educated about the various faunal species in the area, particularly about venomous spiders, snakes and scorpion species. Personnel are to be educated not to kill or harm any of these or other faunal species. Should any of these species be encountered, these species are to be safely and carefully relocated by a suitably qualified person to the surrounding natural habitat adjacent the development site, should they not move off on their own.		✔				
The contact details of a suitably qualified snake handler for the mine must be made available to operational teams should a venomous snake be encounter that needs removal. Alternatively, suitable training of select staff members must be undertaken to affect / ensure the safe capture and relocation of snakes.		✔				
No on-site open fires are allowed.		✔				
External lighting should be kept to a minimum with downward facing lights. Yellow or red fluorescent lights should be used while the use of LED lights should be avoided.		✔				
Noise must be kept to acceptable levels as per the environmental norms and standards for noise mitigation as stipulated within the noise specialist report.		✔				
Fencing should not be erected before the vegetation has been cleared so as to give faunal species a chance to escape into the surrounding areas, away from the disturbance.		✔				
Fences should make use of culverts to allow for the safe and easy movement of smaller species through fence lines. These culverts are to be regularly checked to ensure that they have not become blocked by vegetation or sedimentation which will limit species movement.		✔				
Fences erected adjacent to wetlands and within the wetland buffers should have bird diverters fitted to them, notably on the top wire strand. Many owls, raptors and water fowl often get entangled in wire fences when flying low over the vegetation.		✔				
No additional natural areas outside of those which have been planned for should be impacted for stockpiling.		✔				
Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.		✔				
Impact management outcome: Prevention and management of impacts associated with the: • **Loss/alteration of Floral Habitat and Diversity (Significant Biodiversity Features, Degraded Grassland, Highveld Grassland and Transformed).**						

Impact management actions	Implementation					
	Timeframe				Responsible person	Method
	C	O	D	CI		
• **Loss/alteration of Floral SCC including their Habitats (MNCA Protected species, Provincially Important Flora, Highveld Grasslands, *Khadia carolinensis*, Rocky Outcrops, Forb-rich Wetlands, Moist Grasslands, Valley-bottom Wetlands and Sensitive species 1200).**						
No collection of floral SCC or indigenous vegetation must be allowed by personnel.		✔			Health and Safety Manager (Induction) Environmental Manager / Officer Mine/General Manager	• Induction – focussing on SCC and prohibited actions. • Implementation and review of monitoring network as recommended in **Section 7** of the EMPr. • ECO inspections to ensure compliance with measures. • Distribute the EMPr and IWWMP.
Informal fires should be prohibited, and no uncontrolled fires whatsoever must be allowed.		✔				
No dumping of litter, rubble or cleared vegetation on site should be allowed.		✔				
A spill prevention and emergency spill response plan must be compiled and implemented.		✔				
Spill kits should be made available and used in the event of a spill. Contain spillage, excavate and dispose of contaminated material/soil required at accredited disposal site.		✔				
An emergency response contingency plan must be put in place to address clean-up measures should a spill and/or a leak occur.		✔				
Vehicles/equipment must be regularly checked for leakages to avoid soil contamination by hydrocarbons.		✔				
AIP proliferation, which may affect adjacent natural areas, must be strictly managed.		✔				
Ongoing AIP monitoring and clearing/control should take place		✔				
If any vehicles or machinery break down on site and it cannot be transported to the workshop, the responsible person must have an emergency spill kit available when attending the breakdown to prevent soil contamination.		✔				
All vehicles are to be serviced in a correctly bunded area or at an off-site location.		✔				
Use of drip trays are compulsory in the event of vehicle or heavy machinery breakdown.		✔				
All hydrocarbons must be stored within bunded areas.		✔				
Sewage Package Treatment Plant must be within a bunded concrete area.		✔				
Bunded areas must be frequently inspected to ensure that the integrity of the structures are not compromised by cracks, etc.		✔				
Develop and implement a waste management plan to ensure proper management of waste, including hazardous waste.		✔				
Oil separators and wash bays must be frequently cleaned, maintained, and inspected.		✔				

Mitigation measures applicable to all activity outcomes are defined in **Table 1**.

Monitoring of the implementation of the impact management actions are defined in **Table 11**.

The cumulative impacts can be mitigated by implementing mitigation measures recommended in **Sections 5.2 – 5.8**.

5.8 Stripping and Stockpiling

Vaalwater Section – Stripping and Replacement:

- A soil specialist with GIS skills, registered at SACNASP will be appointed to oversee the soil stripping, stockpiling and replacement process. Alternatively, the appointed ECO must undergo training sessions with a SACNASP registered soil specialist prior to the commencement of the project and report back to the specialist on a weekly basis for 6 months to ensure that soil stripping, stockpiling and replacement is done as specified.
- Backfilling of the pit with overburden material up to the correct elevation and slope is the first crucial procedure that determines the standard of rehabilitation. No topsoil shall be replacement on a backfilled section prior to the mine surveyor and the soil specialist declared that the following for the specific section is in order and is thereafter jointly signed off on an official document:
    - The spoil surface is at the correct elevation and will tie in with the surrounding undisturbed surface after the topsoil depth specified on Figure 9a is replaced.
    - The spoil surface is free-draining with no concave spots and has nowhere slopes that exceeds 6% (1:16.6) similar to the maximum pre-mining surface slopes and the post-mining surface draining will linkup with drainage patterns of the surrounding undisturbed surface.
- Soil stripping information is shown in **Table 8**.
- The soil specialist/ECO will progressively verify the stripping depths of the mining blocks of which the topsoil will be stripped in the following 6 months in order to keep track and indicate whether the stripping depths of any of the mining blocks should be adapted.
- Mixing of the high quality and low-quality soils will be prevented as far as possible.
- The stockpiled topsoil on stockpile A and B should be replaced in separate unified blocks to ensure that high- and low-quality soils are not mixed and that the post-mining land capability is subsequently degraded as little as possible.

Table 8: Soil stripping guide - Vaalwater

Stripping zones and associated soil types	Soil Type	Stripping Depth (m)	Area (ha)	Soil volume (m^3)
Deep high potential red soils to be stored on Stockpile A (SU-A).	Hu1	1.2	11.52	138 240
Medium potential yellow soils to be stored on Stockpile A (SU-B).	Av2 Gc1 Gc2	0.6	64.66	387 960
Shallow low potential soils to be stored on Stockpile B (SU-C).	Lo1 Ka	0.6	76.95	461 700
		Grand Total	**153.13**	**987 900**

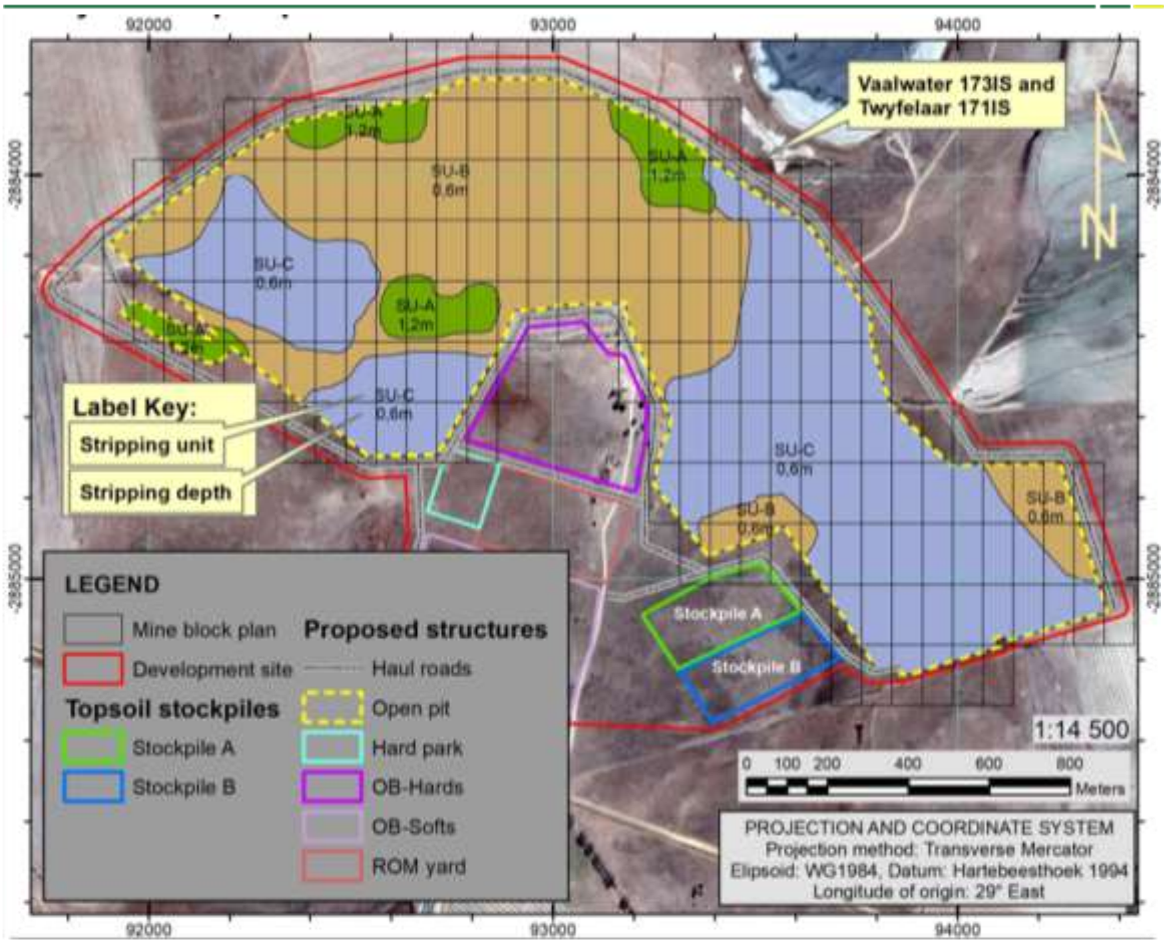

Figure 2: Vaalwater stripping guide (To be used in conjunction with Table 9 above)

__Vaalbult Section – Stripping and Replacement:__

- A soil specialist with GIS skills, registered at SACNASP will be appointed to oversee the soil stripping, stockpiling and replacement process. Alternatively, the appointed ECO must undergo training sessions with a SACNASP registered soil specialist prior to the commencement of the project and report back to the specialist on a weekly basis for 6 months to ensure that soil stripping, stockpiling and replacement is done as specified.
- Backfilling of the pit with overburden material up to the correct elevation and slope is the first crucial procedure that determines the standard of rehabilitation. No topsoil shall be replaced on a backfilled section prior to the mine surveyor and the soil specialist declared that the following for the specific section is in order and is thereafter jointly signed off on an official document:
    - The spoil surface is at the correct elevation and will tie in with the surrounding undisturbed surface after the topsoil depth specified on Figure 9a is replaced.
    - The spoil surface is free-draining with no concave spots and has nowhere slopes that exceeds 6% (1:16.6) similar to the maximum pre-mining surface slopes and

the post-mining surface draining will linkup with drainage patterns of the surrounding undisturbed surface.

- Soil stripping information is shown in **Table 9**.
- The soil specialist/ECO will progressively verify the stripping depths of the mining blocks of which the topsoil will be stripped in the following 6 months in order to keep track and indicate whether the stripping depths of any of the mining blocks should be adapted.
- During the initial phase, the medium quality soils will be stockpiled on stockpile A and the low-quality soils will be stored on stockpile B.

Table 9: Soil stripping guide - Vaalbult

Stripping zones and associated soil types	Soil Type	Stripping Depth (m)	Area (ha)	Soil volume (m^3)
Medium potential yellow soils to be stored on Stockpile A (SU-B).	Av2 Gc1	0.8	24.90	199 200
Shallow low potential soils to be stored on Stockpile B (SU-C).	Lo1	0.6	23.43	140 580
		Grand Total	**48.33**	**339 780**

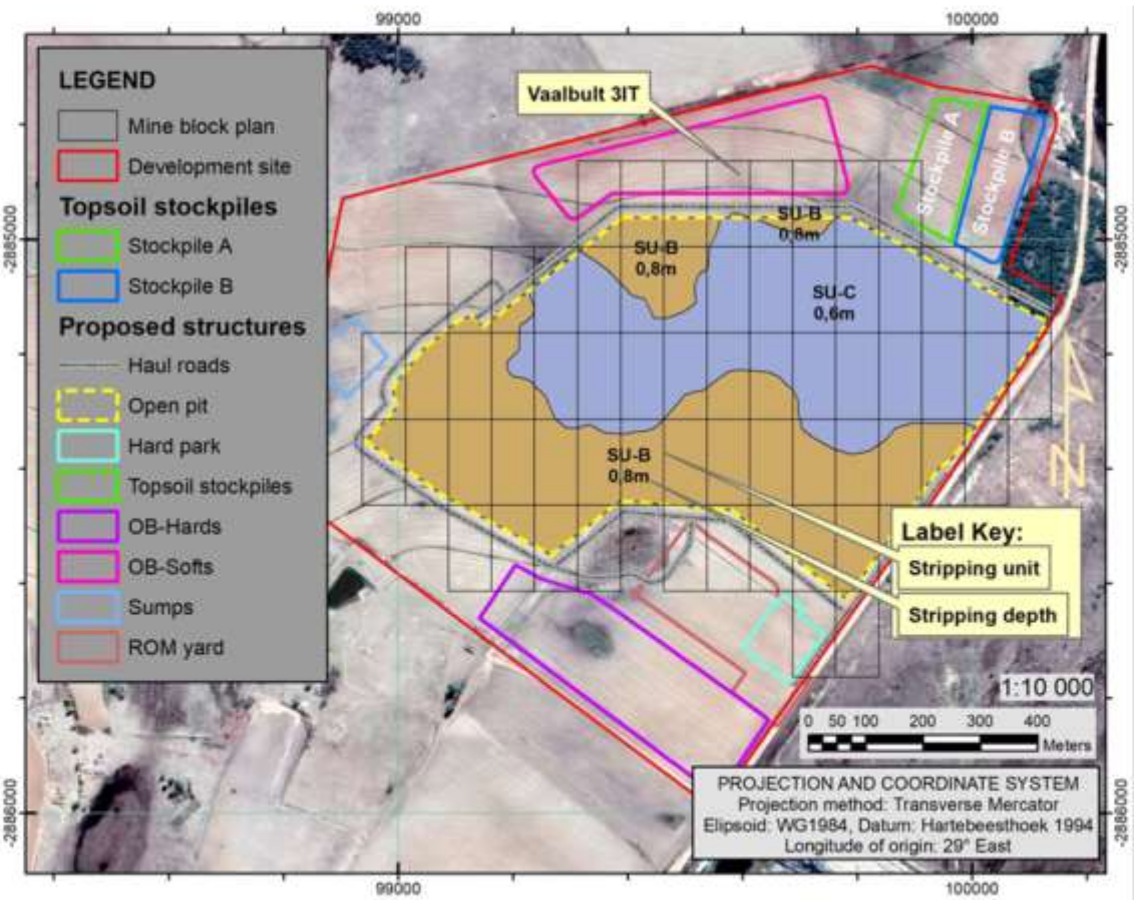

Figure 3: Vaalbult stripping guide (To be used in conjunction with Table 10 above)

Naudesbank Section – Stripping and Replacement:

- A soil specialist with GIS skills, registered at SACNASP will be appointed to oversee the soil stripping, stockpiling and replacement process. Alternatively, the appointed ECO must undergo training sessions with a SACNASP registered soil specialist prior to the commencement of the project and report back to the specialist on a weekly basis for 6 months to ensure that soil stripping, stockpiling and replacement is done as specified.
- Backfilling of the pit with overburden material up to the correct elevation and slope is the first crucial procedure that determines the standard of rehabilitation. No topsoil shall be replacement on a backfilled section prior to the mine surveyor and the soil specialist declared that the following for the specific section is in order and is thereafter jointly signed off on an official document:
    - The spoil surface is at the correct elevation and will tie in with the surrounding undisturbed surface after the topsoil depth specified on Figure 9a is replaced.
    - The spoil surface is free-draining with no concave spots and has nowhere slopes that exceeds 6% (1:16.6) similar to the maximum pre-mining surface slopes and the post-mining surface draining will linkup with drainage patterns of the surrounding undisturbed surface.
- Soil stripping information is shown in **Table 10**.
- The soil specialist/ECO will progressively verify the stripping depths of the mining blocks of which the topsoil will be stripped in the following 6 months in order to keep track and indicate whether the stripping depths of any of the mining blocks should be adapted.
- The stockpiled topsoil on stockpile A and B will be replaced in separate unified blocks to ensure that high- and low-quality soils are not mixed and that the post-mining land capability is subsequently degraded as little as possible.
- Replacement depths for each individual pit:
    - NB-01 = 0.6 m
    - NB-02 = 0.7 m
    - NB-03 = 0.5 m
    - NB-03 Ext = 0.5 m
    - NB-04 = 0.7 m
    - NB-05 = 0.5 m

Table 10: Soil stripping guide - Naudesbank

Stripping zones and associated soil types	Soil Type	Stripping Depth (m)	Area (ha)	Soil volume (m^3)
Medium potential yellow soils to be stored on Stockpile A (SU-B).	Cv1 Cv2	1.2 0.8	184.66	1 099 380

	Gc1 Gc2 Dr1	0.6 0.3		
Shallow low potential soils to be stored on Stockpile B (SU-C).	Lo1 Ka	0.6	76.77	460 620
		Grand Total	**261.43**	**1 560 000**

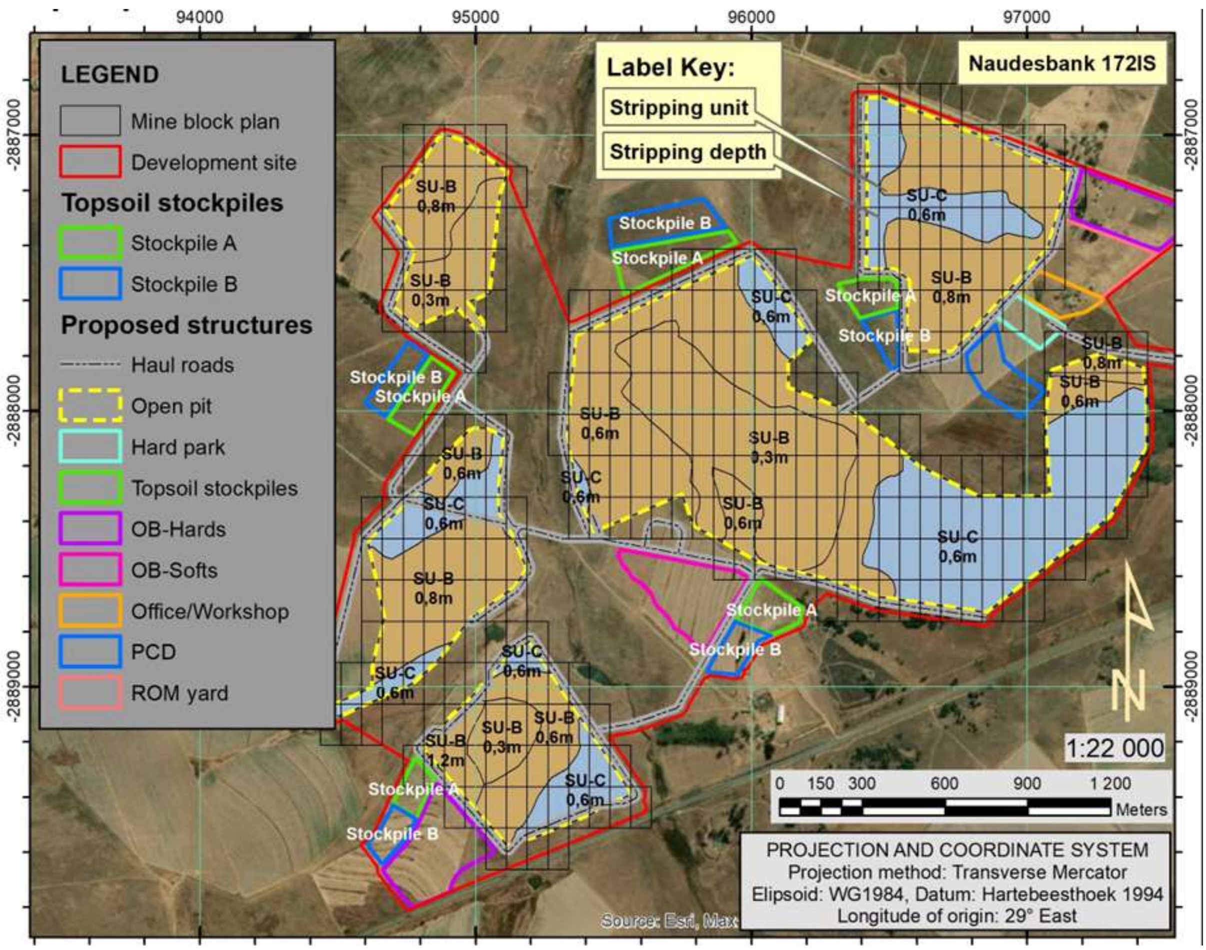

Figure 4: Naudesbank stripping guide (To be used in conjunction with Table 11 above)

5.9 Monitoring of the implementation of the impact management actions

Table 11: Monitoring of the implementation of the impact management actions

Aspect	Monitoring		
	Responsible person	**Frequency**	**Evidence of compliance**
Topography	Environmental Compliance Officer (ECO)	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
	External Qualified Consultant	As stipulated in the Water Use Licence (WUL).	Update Integrated Water and Waste Management Plan (IWWMP) & Rehabilitation

Aspect	Monitoring		
	Responsible person	Frequency	Evidence of compliance
			Strategy and Implementation Programme (RSIP).
Soils, Land Use, Land Capability and Hydropedology	ECO	Weekly inspections during construction, thereafter monthly.	Monthly ECO Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
	External Qualified Consultant	Bi-annual.	Soil rehabilitation assessment report.
Freshwater	ECO	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
	External Qualified Consultant	As stipulated in the WUL.	Update IWWMP & RSIP.
	Environmental Manager / ECO	Monthly	Internal Monitoring Results Report
	Environmental Manager / Environmental Officer	Annual.	Internal WUL audit report.
	External Qualified Consultant	Annual.	External WUL audit report – Submit to IUCMA.
	Accredited Laboratory	Monthly.	Submission of laboratory monitoring results to the mine.
	External Qualified Consultant	As stipulated in the WUL.	Analysis Submitted to IUCMA.
	External Qualified Consultant	Bi-annual, once during the wet season and once during the dry season.	Conduct bio-monitoring and submit report to IUCMA.
Groundwater	ECO	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
	External Qualified Consultant	As stipulated in the WUL.	Update IWWMP & RSIP.
	Environmental Manager / ECO	Monthly	Internal Monitoring Results Report
	Environmental Manager / Environmental Officer	Annual.	Internal WUL audit report.
	External Qualified Consultant	Annual.	External WUL audit report – Submit to IUCMA.
	Accredited Laboratory	Quarterly.	Submission of laboratory monitoring results and water levels to the mine.
	External Qualified Consultant	As stipulated in the WUL.	Analysis Submitted to IUCMA.

Aspect	Monitoring		
	Responsible person	**Frequency**	**Evidence of compliance**
Fauna & Flora	ECO	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
	External Qualified Consultant	As stipulated in the WUL.	Update IWWMP & RSIP.
	Environmental Manager / ECO	Monthly rehabilitation monitoring.	Internal Report.
	Environmental Manager / ECO	Monthly survey of alien vegetation management and disturbance footprints.	Internal Report.
Air Quality	ECO	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
	External Qualified Consultant	Annually (As required by the National Atmospheric Emission Reporting Regulations, GNR. 283)	Annual Air Quality Report
	Accredited Laboratory	Monthly	Submission of dust fallout laboratory monitoring results to mine.
Noise	ECO	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
	ECO	Weekly assessment of complaint register.	Review of complaints register, if complaint is received from a receptor within 2 000 m of active mining area, a qualified specialist must be appointed to conduct noise monitoring at the site immediately.
	Safety and Health Manager Contractor Safety, Health and Environment (SHE) Officer	Weekly	Weekly toolbox talk with employees regarding PPE.
	External Qualified Consultant	Quarterly prior to mining, bi-annually once mining commences.	Noise monitoring report.
Visual	ECO	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.

Aspect	Monitoring		
	Responsible person	**Frequency**	**Evidence of compliance**
Heritage, Cultural and Archaeological Aspects	ECO	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
Socio-economic	Health and Safety Manager ECO Mine/General Manager	Weekly assessment of complaint register.	Liaise with stakeholder that reported complaints and write internal report regarding the outcome.
	Health and Safety Manager	Annual health awareness education programme.	Internal report.
	External Qualified Consultant	As per authorisations.	Environmental audit of EA, EMPr and Closure Plan in line with GNR 982 audit requirements.
	ECO	Weekly inspections during construction, thereafter monthly.	Monthly Environmental Compliance Report.
Legal	External Qualified Consultant	Annual.	Revision of financial provisioning in accordance with GNR 1147.

6. FINANCIAL PROVISION

Previously, the MPRDA required that the holder of a mining right (or applicant) had to provide the DMRE with sufficient financial provision that covers the environmental liability at that time and for closure of the mine at that time. Specifically, Section 41(1) of the MPRDA required that the holder/applicant must: *"make the prescribed 'financial provision' for the rehabilitation or management of negative environmental impacts."*

However, the GNR 1147 of the NEMA, published on 20 November 2015 (as amended), is now the legislation that must be complied with in terms of financial provision. GNR 1147 has a different set of requirements compared to those of the MPRDA. The Regulation stipulates financial provision as follows:

> *An applicant or holder of a right or permit must determine and make financial provision to guarantee the availability of sufficient funds to undertake rehabilitation and remediation of the adverse environmental impacts of prospecting, exploration, mining or production operations, as contemplated in the Act and to the satisfaction of the Minister responsible for mineral resources.*

The scope of the financial provision includes:

> An applicant or holder of right or permit must make financial provision for -

(a) rehabilitation and remediation;

(b) decommissioning and closure activities at the end of prospecting, exploration, mining or production operations; and

(c) remediation and management of latent or residual environmental impacts which may become known in future, including the pumping and treatment of polluted or extraneous water.

The prerequisite on the availability of the financial provision is stipulated as follows:

The applicant or holder of a right or permit must ensure that the financial provision is, at any given time, equal to the sum of the actual costs of implementing the plans and report contemplated in regulation 6 and regulation 11(1) for a period of at least 10 years forthwith.

This provision estimate was calculated using the *Guideline Document for the Evaluation of the Quantum of Closure-Related Financial Provision Provided by a Mine* (DMRE, 2005). **Table 12** presents the characteristics of the project that informed the process for quantum calculation based on the abovementioned guideline.

Table 12: Project characteristics that informed the cost estimate calculation

Characteristics	Description
High risk class	The project has a high-risk rating based on the material and the size of the operation.
High sensitivity	The project has a high sensitivity rating. This is due to the following: • Presence of sensitive biodiversity areas; • Multiple wetland systems present; and • Extensive agricultural activities.
Adopted project components	Closure components that have been considered for this project include: • Dismantling of processing plant and related structures (including overland conveyors and powerlines); • Demolition of steel buildings and structures; • Demolition of reinforced concrete buildings and structures; • Rehabilitation of access roads; • Demolition and rehabilitation of electrified railway lines; • Demolition and rehabilitation of non-electrified railway lines; • Demolition of housing and/or administration facilities; • Opencast rehabilitation including final voids and ramps; • Sealing of shafts, adits and inclines; • Rehabilitation of overburden and spoils; • Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste); • Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste); • Rehabilitation of subsided areas; • General surface rehabilitation (topsoil); • General surface rehabilitation (seeding); • River diversions; • Fencing; • Water management; and • 2 to 3 years of maintenance and aftercare.
Generally flat topography	The area has a flat slope.
Within an urban setting	Naudesbank is located within 50 km of the closest developed urban area where goods and services are to be supplied from.

Table 13 presents the liability cost at Naudesbank.

Table 13: Closure and rehabilitation summary cost for Naudesbank

No.	Description	Unit	A	B	C	E=A*B*C
			Quantity	Escalated Master Rate	Factor	Amount (Rands)
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	ea	1	R 38 500,00	1	R 38 500,00
2(A)	Demolition of steel buildings and structures	m^2	2 554	R 270,52	1	R 690 908,08
2(B)	Demolition of reinforced concrete buildings and structures	m^2	1 666	R 398,67	1	R 664 184,22
3	Rehabilitation of access roads	m^2	179 250	R 48,41	1	R 8 677 492,50
4(A)	Demolition and rehabilitation of electrified railway lines	m	0	R 469,86	1	R 0,00
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	0	R 256,29	1	R 0,00
5	Demolition of housing and/or administration facilities	m^2	0	R 541,05	1	R 0,00
6	Opencast rehabilitation including final voids and ramps	ha	7,13	R 283 623,99	1	R 2 022 239,05
7	Sealing of shafts, adits and inclines	m^3	0	R 145,23	1	R 0,00
8(A)	Rehabilitation of overburden and spoils	ha	44,75	R 189 082,66	1	R 8 461 449,04
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic, salt-producing waste)	ha	15,18	R 235 499,04	1	R 3 574 875,43
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	0,00	R 684 000,83	1	R 0,00
9	Rehabilitation of subsided areas	ha	0	R 158 328,25	1	R 0,00
10a	General surface rehabilitation (topsoil)	ha	100,48	R 149 500,60	1	R 15 021 820,29
10b	General surface rehabilitation (seeding)	ha	144,04	R 20 205,82	1	R 2 910 446,31
11	River diversions	ha	0	R 149 500,60	1	R 0,00
12	Fencing	m	4 800	R 170,86	1	R 820 128,00
13	Water management	ha	31,97	R 56 952,61	1	R 1 820 774,94
14	2 to 3 years of maintenance and aftercare	ha	147,24	R 19 933,41	3	R 8 804 985,87
15A	Specialist study (Groundwater boreholes into opencast)	Sum	1	R 450 644,00	1	R 450 644,00
	(Sum of items 1 to 15 above)				**Subtotal 1**	**R 53 958 447,73**
1	Preliminary and General	12,0%	of Subtotal 1			R 6 475 013,73
2	Closure plan					R 214 067,00
3	Contingency	10,0%	of Subtotal 1			R 5 395 844,77
			Subtotal 2			**R 66 043 373,23**
			Add Vat (15%)			R 9 906 505,98
			GRAND TOTAL			**R 75 949 879,21**

7. ENVIRONMENTAL MONITORING

7.1 Monitoring Introduction

This section outlines the monitoring and reporting program to be implemented during the construction, operational and post-closure phases of the project. The monitoring and reporting program was developed based on the activities that will be carried out by Seriti, its potential impacts identified and assessed in *Section 9 and 10* of the *EIAR* and relevant legislation, standards and guidelines described in *Section 4* of the *EIAR*.

The principal purpose of the monitoring and reporting program is to provide information necessary to determine the project's operational and environmental performance within and around the proposed mining area. Regular monitoring serves as an indication of the efficiency of the mitigation and management measures, as well as compliance with applicable legislation, standards, guidelines and permit conditions imposed by DMRE.

The monitoring and reporting program was designed to:

- Comply with applicable South African legislation, standards and guidelines;
- Adhere to internationally acceptable good environmental monitoring practices;
- Allow periodic reassessment of the project's effects and subsequent review of mitigation and management measures;
- Be simple to implement and report results; and
- Be auditable.

Seriti will be responsible for conducting the monitoring and reporting program as part of ongoing operations as well as ensuring that sufficient resources are available for effective program implementation. Where appropriate, Seriti may establish agreements with others (i.e. external contractor) for provision of additional support in implementing the monitoring and reporting program.

The key aspects identified in this monitoring and reporting program are:

- Soil, Land, Closure and Rehabilitation;
- Terrestrial and Aquatic Biodiversity;
- Surface Water (quality and quantity);
- Groundwater (quality and quantity);
- Air Quality;
- Noise;

- Visual; and
- Waste.

Results from all environmental monitoring activities (including sampling and analysis) undertaken will be reported as per the reporting procedures outlined in **Section 7.11** (and as specified under each of the following sub-headings) of this document. A summary of the monitoring to be conducted is shown in **Table 24**.

7.2 Soil, Land, Closure and Rehabilitation Monitoring

Seriti will implement soil, land, closure and rehabilitation management measures to mitigate potential impacts during all phases of the project, as described in **Section 5** of this document. This section details monitoring that will be implemented relating to soil, land, closure and rehabilitation management.

Soil, land, closure and rehabilitation monitoring is required to provide information necessary to determine potential impacts on land, soil, water quality, vegetation and fauna habitat.

The objectives of the soil, land, closure and rehabilitation monitoring program are to ensure that:

- Compliance to the applicable legislation is achieved;
- Potential impacts directly related to project activities are detected early to allow for appropriate mitigation measures to be implemented;
- Measures to avoid, mitigate and manage impacts on soil and land use in this EMPr (see **Section 5**) are performed as expected; and
- Any additional impacts on land, soil, vegetation and fauna habitat that were not predicted are detected and appropriate mitigation measures are identified, initiated and implemented.

All potential impacts related to soils, land capability, rehabilitation (progressive and final) and closure will be monitored, including:

- Stripping of soils and related management of stockpiles;
- Re-instatement of soils (re-application of soils, grading and profiling);
- Re-vegetation with indigenous species;
- Erosion and siltation;
- Rehabilitation of all exposed areas as soon as the disturbance activity has ceased;
- Final rehabilitation of all disturbed areas; and
- Continuous progress on achieving the closure plan objectives (see **Section 4**), achieving final closure and leaving a safe, stable and self-sustaining ecosystem post-closure.

Monitoring will be undertaken as follows:

- Bi-annual field assessment and report undertaken by independent register soils specialist by conducting the following:
    - The post-mining soils and associated land capability should be assessed by means of auger observations at a density of at least 100 m x 100 m.
    - The holes should be augered up to at least 100mm into the underlying spoil material.
    - The auger cores should be placed in sequence on a sample board and photographed and the photographs should be provided as a separate appendix to the report.
    - A bulk density soil sample of the upper 100 mm should be taken every 4 ha.
    - A fertility soil sample of the upper 0-250 mm should be taken every 10 ha.
    - At each auger point the following must be noted:
        - Effective soil depth up to the underlying spoil material or underlying subsoil material or any other depth limiting material.
        - Estimated soil texture class and clay content of the upper horizon of 0-250 mm.
        - An estimate of the soil quality classified as high, medium or low, based on the degree whereto the original soil was degraded by means of coalliferous shale, non-coalliferous overburden, subsoil or clayey material.

A progressive report should be compiled and should contain the following information:

- A map showing the location of all auger observation points.
- A map showing the post-mining effective soil depth based on the categories of the Chamber of Mines as follows:
    - 50-250 mm = Wilderness land capability class.
    - 300-600 mm = Grazing potential class.
    - ≥ 650 mm = Arable potential.
    - Any depth = Wetland class – any areas that become saturated or submerged after rehabilitation on a temporary, seasonal or permanent basis.
- A bulk density map showing the bulk density values at sampling points as colour coded points as follows:
    - Green – 1400-1600 kg/m^3
    - Yellow – 1600-1700 kg/m^3
    - Red – 1700-1900 kg/m^3
    - Purple ≥ 1900 kg/m^3

- A table showing the fertility status as derived from chemical analysis in which the following was analysed:
  - pH(H_2O)
  - Extractable cations Na, K, Ca, Mg (ammonium acetate)
  - P (Phosphorus) Bray1
  - C (Organic carbon %) Walkley Black
- A post-mining surface slope map generated from a xyz file as obtained from an aerial or lidar survey. A map should be compiled with post-mining surface slope categories and associated land capability classes as follows:
  - 0 - 7.1% or (1:14 - 1:200 gradient) – Arable
  - 7.1-14.3% or (1:7 -1:14 gradient) – Grazing
  - >14.3% or (steeper than 1:7) – Wilderness
  - Any slope or gradient (saturated or submerged) - Wetland
- A combined post-mining land capability map where soil depth, soil quality and surface slope criteria are integrated and should serve as a final post-mining land capability and potential land use map that can also be submitted for closure applications.
- Provide a table based on the combined post-mining land capability map that progressively summarises and compare the post-mining land capability achievements against what is indicated on the stripping and stockpiling plans (**Section 5.8**).
- The report should further also contain a compliance statement by the soil specialist stating whether:
  - The backfilling of the pit and the levelling of the spoil material complies with the requirements in **Section 5.8**.
  - The prescribed stripping and replacement soil depths in **Section 5.8** are achieved or not.
  - If not, point out specific areas where mitigation measures failed and recommend controls to ensure that measures are achieved.
  - Provide proposed remedial actions to rectify failures.

In addition to the above, the ECO must conduct the following:

- Visual inspection of land clearance and disturbed areas monthly, and after heavy rain events; and
- Visual inspection of erosion and sediment control structures monthly, and after heavy rain events to ensure that these are not silted up.

An action plan should be developed to ensure effective soil and land management and monitoring thereof.

All soil, land, closure and rehabilitation monitoring results will be reported as described in **Section 7.11** of this document.

7.3 Terrestrial Biodiversity Monitoring

Seriti will implement terrestrial biodiversity management measures to mitigate potential impacts during all phases of the project, as described in **Section 5** of this document.

Biodiversity monitoring will be required to ensure the identification of potential impacts on flora, fauna and aquatic ecology that arise from the construction and operation of the project.

The objectives of the biodiversity monitoring program are to ensure that:

- Potential impacts on terrestrial and aquatic biodiversity that may be directly related to project activities are detected early to allow for appropriate mitigation measures to be implemented;
- Monitoring must start during the construction phase and continue until closure;
- Measures to avoid, mitigate and manage impacts on terrestrial biodiversity in this EMPr (see **Section 5**) are meeting the set objectives; and
- Any additional potential impacts on terrestrial and aquatic biodiversity that were not predicted as part of the EIA are detected and appropriate mitigation measures are identified, initiated and implemented.

7.3.1 Flora

7.3.1.1 Vegetation Communities Monitoring

The following specific vegetation characteristics will be assessed:

- Permanent monitoring plots must be established within (target area) and surrounding (reference area) all rehabilitated areas. These plots must be designed to accurately monitor the following parameters:
    - Species diversity and species abundance;
    - Recruitment of indigenous species and of alien and invasive species, including alien vs Indigenous plant ratios;
    - Erosion levels and the efficacy of erosion control measures; and
    - Vegetation community structure including species composition and diversity which should be compared to pre-development conditions and work towards the post-closure objective.

- Monitoring of all the natural areas should continue throughout the operational phase to ensure these systems are not adversely affected by associated activities;
- The rehabilitation plan must be continuously updated (i.e., adaptive management) in accordance with the monitoring results to ensure that optimal rehabilitation measures are employed. Adaptive management is an integral part of any rehabilitation plan as it assesses monitoring results to allow rehabilitation measures to be revisited and to be adapted accordingly;
- In the event that floral SCCs were relocated or a nursery developed for the propagation of species for rehabilitation, monitoring would need to focus on the establishment success of such species;
- Results of the monitoring activities must be considered during all phases of the proposed project and action must be taken to mitigate impacts as soon as negative effects from mining activities become apparent; and
- The method of monitoring must be designed to be subjective and repeatable to ensure consistent results.

7.3.1.2 Management of Alien Invasive Species

Monthly monitoring of alien invasive species must be undertaken by determining whether removal is undertaken as specified and note any proliferation in new areas, specifically after the wet season. This should be undertaken by the ECO.

Monitoring for alien invasive species will include:

- Recording the size of populations and the control treatment applied during the annual revision and update of the AIP Management Plan; and
- Recording the level of proliferation in the annual update of the AIP Management Plan.

Alien invasive vegetation control should take place throughout all phases of the development and beyond decommissioning. An AIP Management Plan should be compiled and should be implemented as per recommendations from the ecologists. The plan should be reviewed and updated annually.

7.3.1.3 Vegetation Clearance Monitoring

Areas that contain natural vegetation, which require clearing for the development of the project, will be inspected regularly (as the development takes place) to ensure that clearing activities are conducted in accordance with the terrestrial biodiversity measures in this EMPr (see **Section 5**).

Development of a rehabilitation plan by a suitably qualified specialist is of great importance. This plan should emphasise rehabilitation throughout all phases of the project. The plan must not only ensure structural rehabilitation but must also ensure that the functional attributes of the landscape are re-instated. Particular mention is made in this regard of the functional attributes of any disturbed wetlands. These aspects should be monitored as part of the ongoing activities.

As much vegetation growth as possible should be promoted within the proposed development area in order to protect soils and to reduce the percentage of the surface area which is paved. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping. This should also form part of the ongoing monitoring process.

7.3.2 Fauna

Faunal monitoring will include:

- Conducting bi-annual surveys after each wet season for the presence of species of conservation significance;
- Regular inspection of potential ‘faunal traps’ such as temporary trenches required during construction;
- Recording animal deaths that occur as a direct result of project activities; and
- Monitoring the success of control techniques in reducing impacts due to pest animals in the project area.

Monitoring will be conducted bi-annually and prior to, during and following disturbance. The number of sites to be sampled during monitoring will be calculated prior to each monitoring event to allow for valid statistical comparisons between control and impact sites.

The boundaries of the development footprint areas should be regularly monitored to remain as small as possible, should be clearly defined and it should be ensured that all activities remain within the defined footprint areas. Edge effects of all construction and operational activities, such as erosion and alien plant species proliferation, which may affect faunal habitat, need to be strictly managed in all areas, particularly within areas of increased ecological sensitivity. Alien species should be eradicated and controlled to prevent their spread beyond the development footprint areas.

All areas of increased ecological sensitivity beyond the development footprint should be designated as No-Go areas and be off limits to all unauthorised vehicles and personnel. Vehicles should be restricted to travelling only on designated roadways to limit the ecological footprint of the proposed development activities.

7.4 Bio-monitoring

Bio-monitoring should be conducted every bi-annually (once during summer season and once during winter season). The pre-liminary monitoring locations are show in **Table 14** and **Figure 5**. The localities must be confirmed by a freshwater ecologist once operations commence.

The following is recommended to be included in each bio-monitoring report:

- Scope;
- Water Quality Assessment;
- Invertebrate Habitat Assessment;
- Macroinvertebrate Response Assessment Index (MIRAI);
- Fish Response Assessment Index (FRAI); and
- South African Scoring System (SASS5).

Table 14: Bio-monitoring network

Monitoring Point	Latitude	Longitude	Description
NBBIO01	26° 07' 23.38" S	29° 55' 25.82" E	Upstream in tributary of Vaalwaterspruit.
NBBIO02	26° 07' 55.10" S	29° 54' 08.52" E	Upstream Vaalwaterspruit.
NBBIO03	26° 04' 00.24" S	29° 54' 01.41" E	Downstream Vaalwaterspruit.
NBBIO04	26° 06' 35.14" S	29° 57' 22.07" E	Upstream in tributary of Vaalwaterspruit.
NBBIO05	26° 03' 58.91" S	29° 57' 31.87" E	Downstream in tributary of Vaalwaterspruit.
NBBIO06	26° 05' 47.88" S	30° 02' 47.12" E	Upstream in tributary of Boesmanspruit.
NBBIO07	26° 08' 22.60" S	29° 59' 18.29" E	Downstream in tributary of Boesmanspruit.
NBBIO08	26° 05' 59.05" S	29° 59' 54.55" E	Jaglust upstream in tributary of Boesmanspruit.

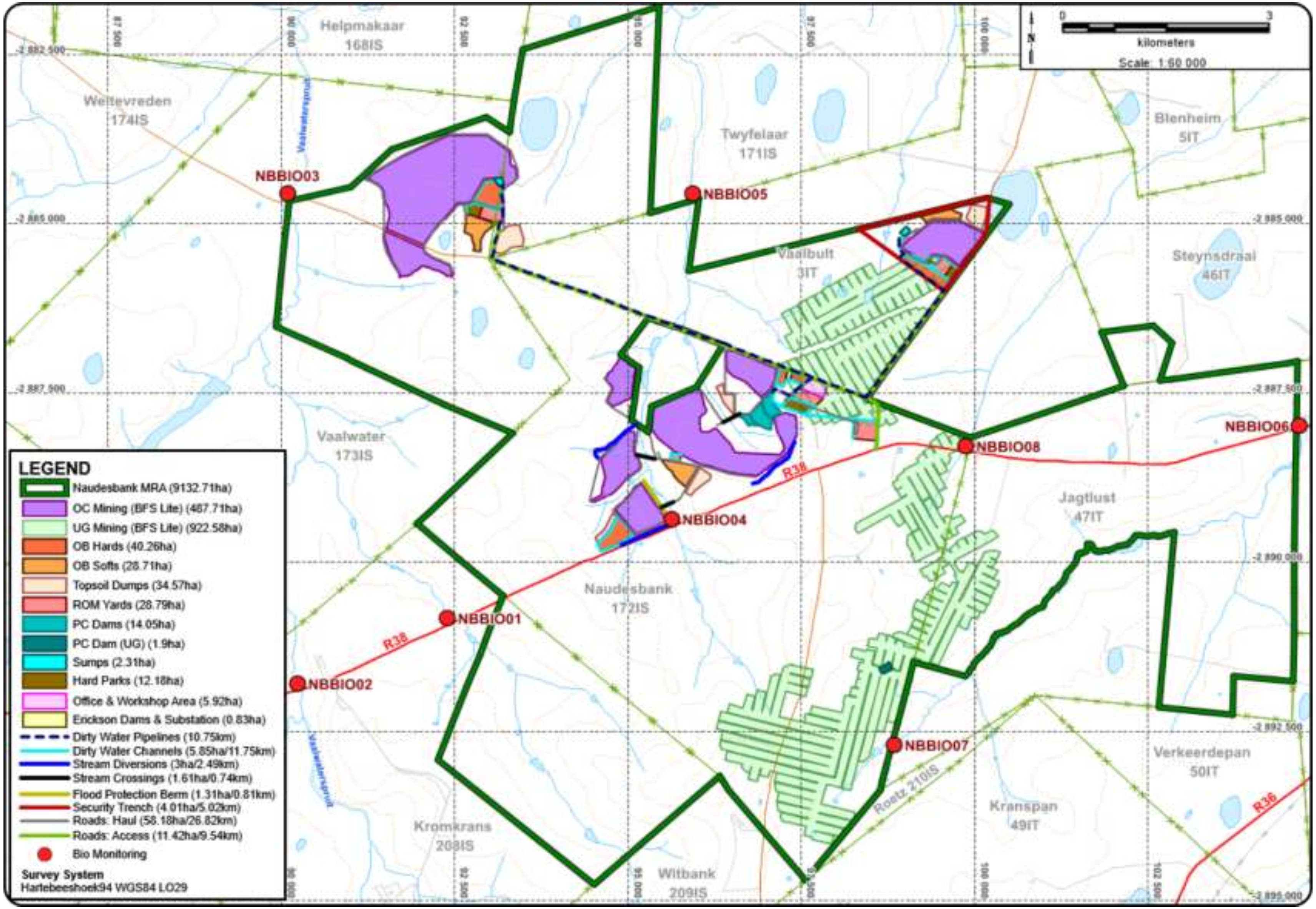

Figure 5: Bio-monitoring Network

7.5 Surface Water Monitoring

Seriti will implement surface water management measures to mitigate potential impacts during all phases of the project, as described in **Section 5** of this report. This section details the implementation of monitoring measured relating to surface water management.

Surface water quality and quantity monitoring is required to provide information necessary to determine potential project impacts on surface water, which can adversely affect human health, terrestrial life and wetland function.

The objectives of surface water quality and quantity monitoring are to ensure that:

- Measures to avoid, mitigate and manage impacts on surface water (see **Section 5**) are meeting set objectives;
- Surface water is maintained to an acceptable quality in compliance with all applicable legislation;
- Any potential changes to water quality or quantity are identified; and
- Changes in water resources are detected early to determine appropriate mitigation and management.

An action plan should be developed and implemented to ensure effective surface water management and monitoring thereof.

In addition, it is important that monitoring is conducted as stipulated in the WUL and as per all conditions related to surface water uses.

7.5.1 Surface Water Quality Monitoring

Monthly surface water quality monitoring must be conducted to ensure timely identification of any impacts from the project on downstream ecosystems.

7.5.1.1 Applicable Water Quality Guidelines and Standards

The surface water qualities will be evaluated against the IUCMA Resource Quality Objectives (RQO) and the South African Water Quality Guidelines (SAWQG) for parameters not listed in the RQO until a baseline can be established. Refer to **Table 15**.

Taking into consideration that the baseline water quality results in *Section 8.6.3* of the EIAR already exceeds various parameters in terms of the RQO and SAWQG, it is recommended that 12 months monitoring data is collected at each monitoring location prior to the commencement of mining. This data should be used to determine a baseline to measure future compliance.

Table 15: Surface Water Quality Parameters

Determinants	Units	RQO (IUCMA)	SAWQG
TDS	mg/l		≤ 450
pH at 25° C	pH units	≥ 5.9 to ≤ 8.8	≥ 6 to ≤ 9
Conductivity	mS/m	≤ 30	≤ 70
Sodium	mg/l Na		≤ 100
Cadmium	mg/l Cd		≤ 0.5
Chloride	mg/l Cl		≤ 100
Sulphate	mg/l SO_4	≤ 30	≤ 200
Nitrate	mg/l N		≤ 6
Fluoride	mg/l F		≤ 1
Ammonia	mg/l N		≤ 1
Iron	mg/l Fe		≤ 0.1
Manganese	mg/l Mn		≤ 0.05
Aluminium	mg/l Al		≤ 0.15
Alkalinity	mg/l $CaCO_3$		N/A
Zinc	mg/l Zn		≤ 3
Calcium	mg/l Ca		≤ 32
Magnesium	mg/l Mg		≤ 30
Potassium	mg/l K		≤ 50

If the WUL is issued, these requirements should be re-assessed, and the necessary changes made to ensure alignment. Parameters for the dirty water containment facilities must be set in the WUL. If no such parameters are set, a baseline measurement must be used for compliance.

7.5.1.2 Surface Water Monitoring Locations

Surface water monitoring will continue monthly. Refer to **Table 16** and **Figure 6**.

Table 16: Surface Water Monitoring Network

Sampling Point	Latitude	Longitude	Description
NBSW01	26° 07' 23.38" S	29° 55' 25.82" E	Upstream in tributary of Vaalwaterspruit.
NBSW02	26° 07' 55.10" S	29° 54' 08.52" E	Upstream Vaalwaterspruit.
NBSW03	26° 04' 00.24" S	29° 54' 01.41" E	Downstream Vaalwaterspruit.

Sampling Point	Latitude	Longitude	Description
NBSW04	26° 06' 35.14" S	29° 57' 22.07" E	Upstream in tributary of Vaalwaterspruit.
NBSW05	26° 03' 58.91" S	29° 57' 31.87" E	Downstream in tributary of Vaalwaterspruit.
NBSW06	26° 05' 47.88" S	30° 02' 47.12" E	Upstream in tributary of Boesmanspruit.
NBSW07	26° 08' 22.60" S	29° 59' 18.29" E	Downstream in tributary of Boesmanspruit.
NBSW08	26° 05' 59.05" S	29° 59' 54.55" E	Jaglust upstream in tributary of Boesmanspruit.
NBSW09	26° 02' 58.90" S	29° 57' 32.00" E	Farm Dam in tributary of Vaalwaterspruit.
NBSW10	26° 05' 44.75" S	29° 58' 07.04" E	Main PCD.
NBSW11	26° 07' 51.39" S	29° 58' 46.37" E	Underground PCD.

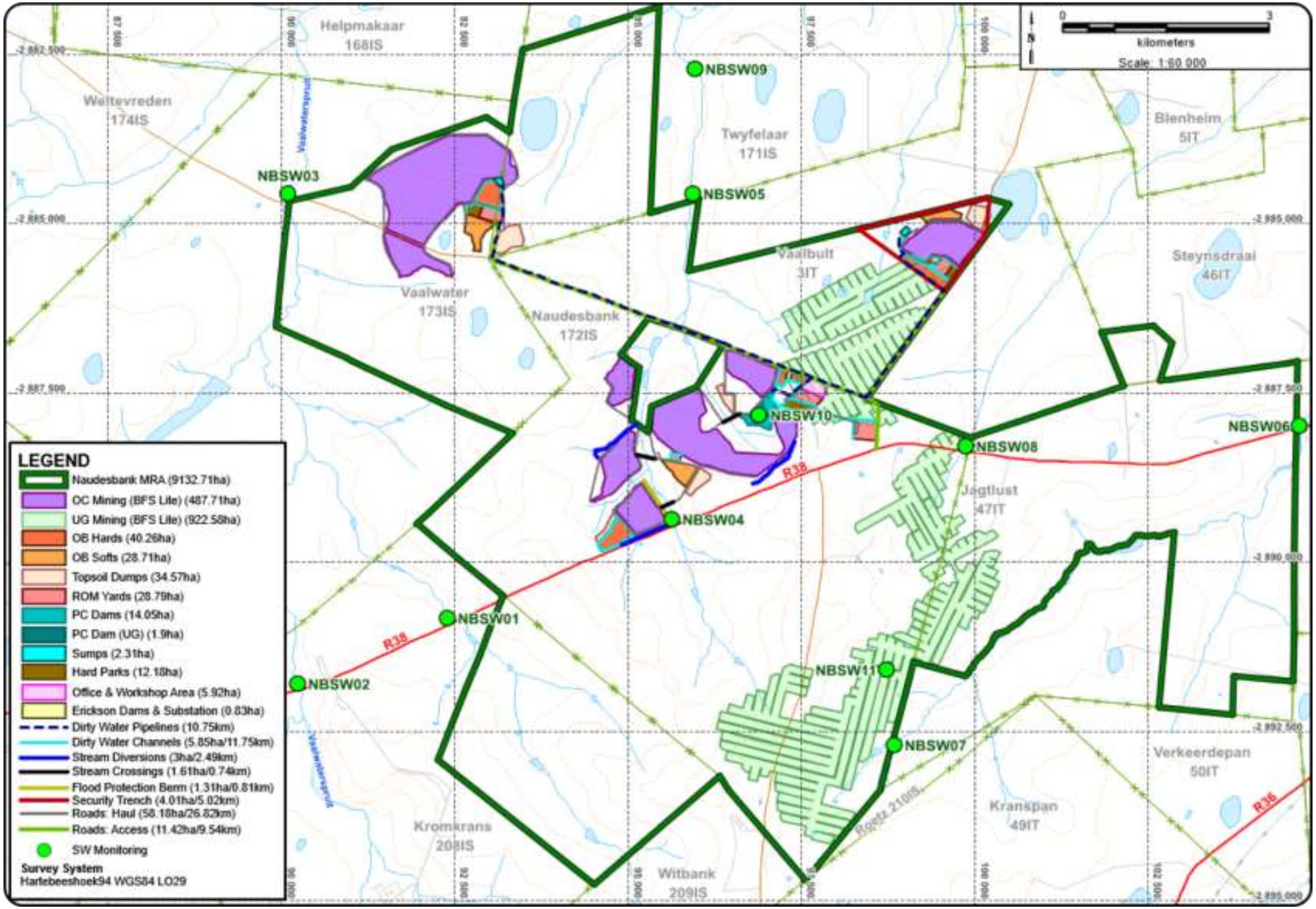

Figure 6: Surface Water Monitoring Network

7.5.2 Surface Water Quantity Monitoring

In order to monitor the potential impact of the project on the volume of surface runoff, the water balance within the project area will be monitored on an annual basis. This will allow for the volumes of water that are abstracted and discharged to be measured. Water balance monitoring will require that the total volume of water used for dust suppression is measured and recorded.

Seriti will measure rainfall within the project area to measure all precipitation. Furthermore, flow meters will be installed to measure water that is pumped to and from the dirty water containment facilities.

7.5.3 Surface Water Monitoring Data Reporting

Data should be collated in a well-structured formal database. Data reports should be submitted to management and to DWS as part of the compliance with the WUL.

Monitoring data should be reviewed in detail on an annual basis, specifically:

- Addressing any actions that could be undertaken to reduce impacts; and
- Motivation for additional monitoring localities, change in schedules etc.

If surface water qualities are found to exceed the limits or site-specific water quality objectives, action may be required to improve/mitigate the source of contamination. It might be prudent to assess current catchment water quality objectives in association with neighbouring mining, which take cognisance of the background surface water quality and feedback/discussions with upstream/downstream water users.

7.6 Groundwater Monitoring

A well-designed monitoring programme serves as a means of verifying predictions and ensuring more accurate predictions for future calculations. It is an early warning system for taking corrective actions.

Seriti will implement groundwater management measures to mitigate potential impacts during all phases of the project, as described in **Section 5**. This section details monitoring that will be implemented relating to groundwater management.

Groundwater quality and quantity monitoring is required to provide information necessary to determine potential project impacts on groundwater, which can adversely affect terrestrial biodiversity, wetland function and land use.

The objectives of groundwater quality and quantity monitoring are to ensure that:

- Measures to avoid, mitigate and manage potential impacts on groundwater (see **Section 5**) are achieving the set objectives;
- Any potential impacts on water quality or quantity are identified; and
- Changes in groundwater are detected early to determine appropriate mitigation.

An action plan should be developed and implemented to ensure effective groundwater management and the monitoring thereof.

In addition, it is important that monitoring is conducted as stipulated in the approved WUL as per all conditions related to groundwater uses.

7.6.1 Groundwater Monitoring

7.6.1.1 Applicable Water Quality Guidelines and Standards

All drinking water resources water qualities should be measured against the SANS 241: 2015 and the South African Water Quality Guidelines (SAWQG), refer to **Table 17** and **Table 18**, for parameters not listed below.

Mine boreholes used to measure water quality and water level trends from the operations should be compared against a baseline utilising 12 months data obtained prior to mining commencing.

Table 17: Groundwater quality parameters

Determinants	Units	SANS 241: 2015 Domestic Water	
		Acceptable (Aesthetic)	Tolerable (Acute Health / Chronic Health / Operational)
TDS	mg/l	≤1 200	-
pH at 25° C	pH units	-	≥ 5 to ≤ 9.7
Conductivity	mS/m	≤170	-
Sodium	mg/l Na	≤200	-
Chloride	mg/l Cl	≤300	-
Sulphate	mg/l SO_4	≤250	**≤500**
Nitrate	mg/l N	-	**≤11**
Fluoride	mg/l F	-	**≤1.5**
Ammonia	mg/l N	≤1.5	-
Iron	mg/l Fe	≤0.3	**≤2**
Manganese	mg/l Mn	≤0.1	**≤0.4**
Aluminium	mg/l Al	-	≤0.3

It should be noted that no specific parameters have been set by SANS 241:2015 for the following elements:

- Alkalinity;
- Calcium;
- Magnesium; and
- Potassium.

The SAWQG will be used to measure the aforementioned elements (refer to **Table 18**).

Table 18: SAWQG for parameters not listed in SANS 241:2015

Determinants	Units	SAWQG (No Risk)	SAWQG (Low Risk)
Alkalinity	mg/l $CaCO_3$	300	600
Potassium	mg/l K	50	100
Calcium	mg/l as Ca	0 - 32	32 - 80
Magnesium	mg/l as Mg	0 - 30	30 - 50

7.6.1.2 Groundwater Monitoring Locations

Table 19 and **Figure 7** present the groundwater quality monitoring locations.

Table 19: Groundwater Monitoring Network

Monitoring Point	Latitude	Longitude	Elevation (mamsl)	Depth (m)	Sampling Depth (m)	Frequency
EUB-03	26° 06' 18.46" S	29° 59' 4.27" E	1686			Quarterly
EUB-05	26° 06' 21.58" S	29° 59' 14.5" E	1677			Quarterly
EUB-06	26° 06' 20.08" S	29° 59' 20.36" E	1672	30		Quarterly
EUB-07	26° 06' 14.11" S	29° 59' 23.68" E	1678			Quarterly
EUB-08	26° 06' 12.42" S	29° 59' 27.85" E	1675	14.37		Quarterly
EUB-09	26° 06' 02.65" S	29° 59' 31.13" E	1677			Quarterly
EUB-13	26° 05' 59.70" S	29° 56' 45.31" E	1638			Quarterly
EUB-14	26° 06' 20.76" S	29° 57' 38.66" E	1660			Quarterly
EUB-17	26° 08' 14.38" S	29° 58' 03.36" E	1704			Quarterly
EUB-18	26° 07' 00.75" S	29° 59' 59.17" E	1676			Quarterly
EUB-19	26° 06' 59.26" S	29° 59' 57.77" E	1676			Quarterly
EUB-20	26° 07' 00.21" S	29° 59' 52.98" E	1677			Quarterly
EUB-21	26° 07' 05.20" S	30° 00' 04.14" E	1673	42.12		Quarterly
EUB-22	26° 07' 5.41" S	30° 00' 05.72" E	1672	100		Quarterly
EUB-23	26° 06' 53.50" S	30° 00' 08.32" E	1666			Quarterly
EUB-24	26° 06' 44.35" S	30° 00' 06.95" E	1670	125		Quarterly

Monitoring Point	Latitude	Longitude	Elevation (mamsl)	Depth (m)	Sampling Depth (m)	Frequency
EUB-25	26° 06' 43.32" S	30° 00' 06.27" E	1670			Quarterly
EUB-26	26° 08' 15.83" S	29° 58' 53.51" E	1680			Quarterly
EUB-27	26° 07' 45.61" S	29° 58' 30.29" E	1714			Quarterly
EUB-42	26° 03' 57.30" S	29° 55' 55.78" E	1635			Quarterly
EUB-43	26° 05' 39.60" S	29° 58' 02.64" E	1644	40		Quarterly
EUB-44	26° 05' 26.92" S	29° 58' 18.66" E	1666	180		Quarterly
EUB-45	26° 05' 35.60" S	29° 58' 17.51" E	1669			Quarterly
EUB-54	26° 04' 52.92" S	29° 58' 25.54" E	1657			Quarterly
EUB-55	26° 05' 16.99" S	29° 58' 16.07" E	1656			Quarterly
EUB-57	26° 04' 43.29" S	29° 58' 59.99" E	1670			Quarterly
EUB-58	26° 05' 16.47" S	29° 58' 12.04" E	1653			Quarterly
EUF-01	26° 05' 48.71" S	29° 58' 34.61" E	1666			Quarterly
EUF-02	26° 05' 57.29" S	29° 58' 34.86" E	1666			Quarterly
EUF-03	26° 06' 18.62" S	29° 59' 19.68" E	1676			Quarterly
EUF-04	26° 06' 02.44" S	29° 59' 37.39" E	1671			Quarterly
EUF-05	26° 05' 57.59" S	29° 59' 39.62" E	1669			Quarterly
EUF-06	26° 06' 00.68" S	29° 59' 20.69" E	1686			Quarterly
EUF-08	26° 07' 25.69" S	29° 59' 56.18" E	1669			Quarterly
EUF-13	26° 05' 37.46" S	29° 58' 16.64" E	1668			Quarterly
EUF-14	26° 04' 52.40" S	29° 58' 25.61" E	1657			Quarterly
NBH-2M	26° 08' 33.07" S	29° 57' 38.05" E	1622		18	Quarterly
NBH-6M	26° 08' 33.07" S	29° 57' 38.05" E	1641	30	7	Quarterly
NBH-6S	26° 03' 59.29" S	29° 56' 15.79" E	1641	9	7	Quarterly
NBH-8M	26° 05' 54.59" S	29° 57' 31.53" E	1675	36	20	Quarterly
NBH-10D	26° 05' 54.59" S	29° 57' 31.53" E	1712	70	6	Quarterly
NBH-10S	26° 07' 53.12" S	29° 59' 26.12" E	1712	9	6	Quarterly

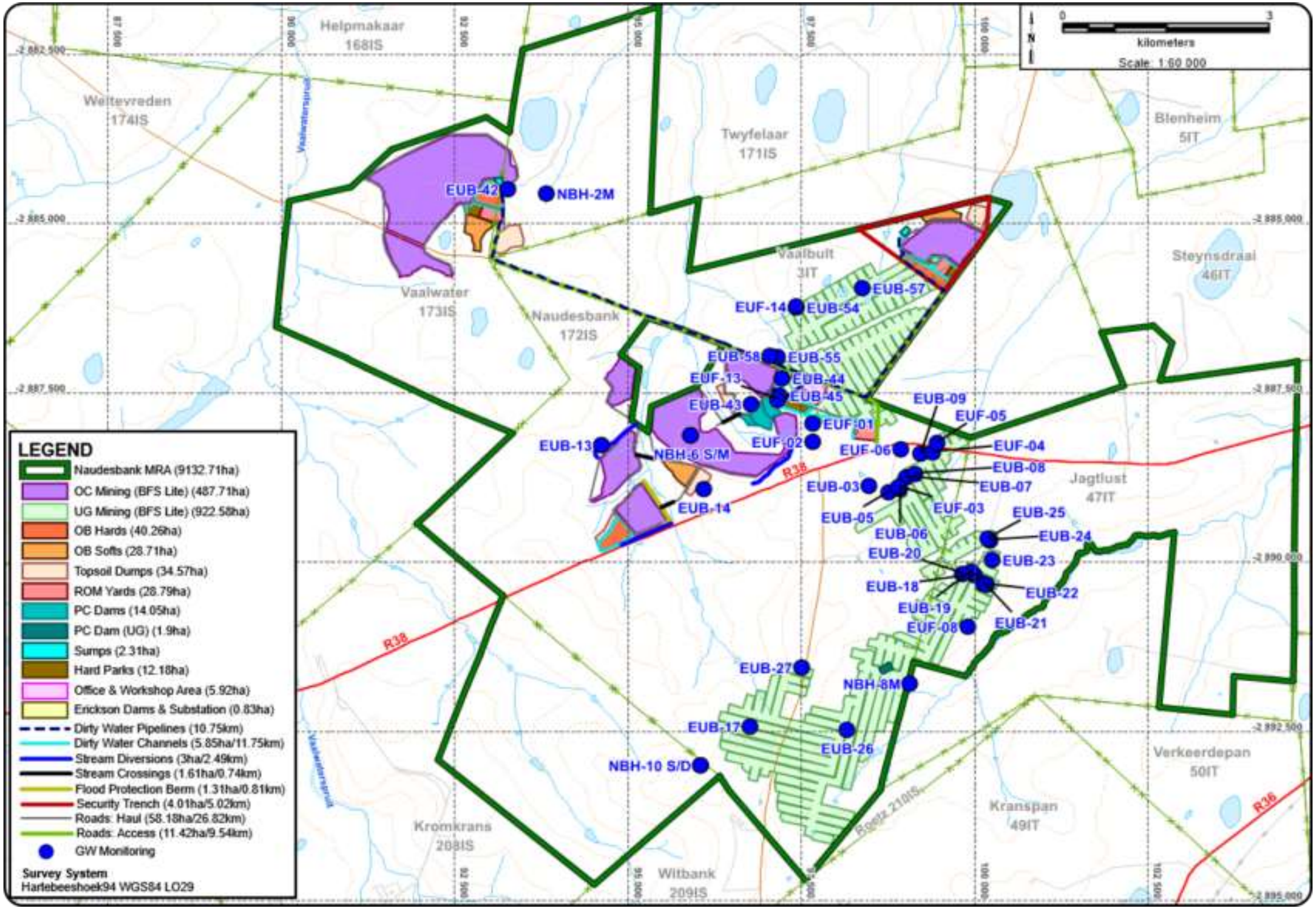

Figure 7: Groundwater Monitoring Network

7.6.1.3 Recommended Groundwater Monitoring Schedule and Analysis of Data

Groundwater analysis is done as per the frequencies specified in **Table 19**. Groundwater levels should be monitored monthly.

Table 20: Recommended Parameters

Type	Parameters
Chemistry	Total Dissolved Solids, pH, Electrical Conductivity, Sodium, Chloride, Sulphate, Nitrate, Fluoride, Ammonia, Iron, Manganese, Aluminium, Alkalinity, Calcium, Magnesium and Potassium.
Water Levels	Depth to Groundwater.
Bacterial (Only Drinking Water for Mine)	Total Coliform Bacteria, Faecal Coliform Bacteria and Heterotrophic Plate Count.

Water monitoring reports must be submitted to the DWS as per the WUL conditions.

7.6.2 Groundwater Monitoring Data Reporting

Data should be collated in a well-structured formal database. Water monitoring reports must be submitted to the DWS as per the WUL conditions.

Monitoring data should be reviewed in detail on an annual basis, specifically:

- Addressing any actions that could be undertaken to reduce impacts; and
- Motivation for additional monitoring localities, change in schedules, etc.

If groundwater qualities are found to exceed site-specific water quality objectives specified in the WUL, action may be required to improve/mitigate the source of contamination.

7.7 Air Quality Monitoring

Seriti will implement air quality management measures (described in **Section 5**) to mitigate potential impacts on air quality during all phases of the project. Ongoing monitoring is required to provide information necessary to determine potential project impacts on air quality, which can pose potential health and environmental risks.

The objectives of the air quality monitoring program are to ensure that:

- The measures to avoid, mitigate and manage impacts on air quality are achieving set objectives;
- Assessment of compliance with dust control regulations;
- Facilitate the measurement of progress against environmental targets;
- Temporal trend analysis to determine the potential for nuisance impacts;
- Tracking of progress due to pollution control measure implementation;
- Informing the public of the extent of localised dust nuisance impacts occurring in the vicinity of the operations; and
- Changes in air quality that may be directly related to project activities are detected early to allow implementation of appropriate mitigation measures.

It is of importance that the mitigation and monitoring recommendations contained within the air quality impact assessment are utilised as guidelines for the mitigation of all impacts on air quality, and that monitoring should take place in accordance with the recommendations. An action plan should be developed, utilising that document to ensure effective air quality management and monitoring thereof.

7.7.1 Applicable Air Quality Guidelines and Standards

The regulatory guidelines and standards relevant to air quality monitoring include:

- National Dust Control Regulations (NDCR); and
- South African National Ambient Air Quality Standards No. 1210.

The recommended guideline values under these standards are presented in **Table 21**.

Table 21: Acceptable dustfall rates

Restriction areas	Dustfall rate (D) in $mg/m^2/day$ over a 30 day average	Permitted frequency of exceedance
Non-residential areas	600 < D < 1 200	Two within a year, not sequential months.

It should be noted that the monitoring points close to the plant will not be measured against the acceptable dustfall rate since these monitoring locations are used to measure the effectiveness of mitigation measures implemented.

7.7.2 Proposed Air Quality Monitoring Locations

The pre-liminary monitoring points are reflected in **Table 22** and shown in **Figure 8**. Two different categories for dustfall monitoring is shown below:

- Receptor which monitoring the impact of dust fallout from the project on surrounding communities.
- Source which is used to monitoring the effectiveness of the measures implemented to control dust from the dust sources associated with Naudesbank.

It is however recommended that the monitoring programme is reviewed by an air quality specialist once the final mine layout has been determined.

Table 22: Proposed dust fallout monitoring locations

Monitoring Point	Latitude	Longitude	Description
Receptor			
NB4	26°05'19.60" S	29°58'17.46" E	Naudesbank Receptor 13
NB5	26°04'49.59" S	29°57'59.73" E	Naudesbank Receptor 12
NB6	26°06'28.06" S	29°57'36.53" E	Naudesbank Receptor 20
NB7	26°06'30.78" S	29°59'02.15" E	Naudesbank Receptor 19
VB3	26°04'43.56" S	29°59'02.16" E	Vaalbank Receptor 15
VW3	26°04'36.01" S	29°56'34.26" E	Vaalwater Receptor 22
VW4	26°04'47.60" S	29°54'16.68" E	Vaalwater Receptor 23
JL2	26°06'59.77" S	29°59'57.28" E	Jagtlust Receptor 18
JL3	26°06'16.32" S	30°01'17.90" E	Jagtlust Receptor 17
Source			
NB1	26°05'37.81" S	29°58'16.49"E	Naudesbank RoM
NB2	26°05'56.63" S	29°57'29.52"E	Naudesbank Mining
NB3	26°05'49.80" S	29°59'04.92"E	Naudesbank RoM
VB1	26°04'34.62" S	29°59'27.86"E	Vaalbank RoM
VB2	26°04'14.82" S	29°59'46.10"E	Vaalbank Mining
VW1	26°03'54.84" S	29°55'53.56"E	Vaalwater RoM
VW2	26°04'09.04" S	29°56'17.51"E	Vaalwater Mining
JL1	26°07'48.10" S	29°59'18.18"E	Jaglust Surface

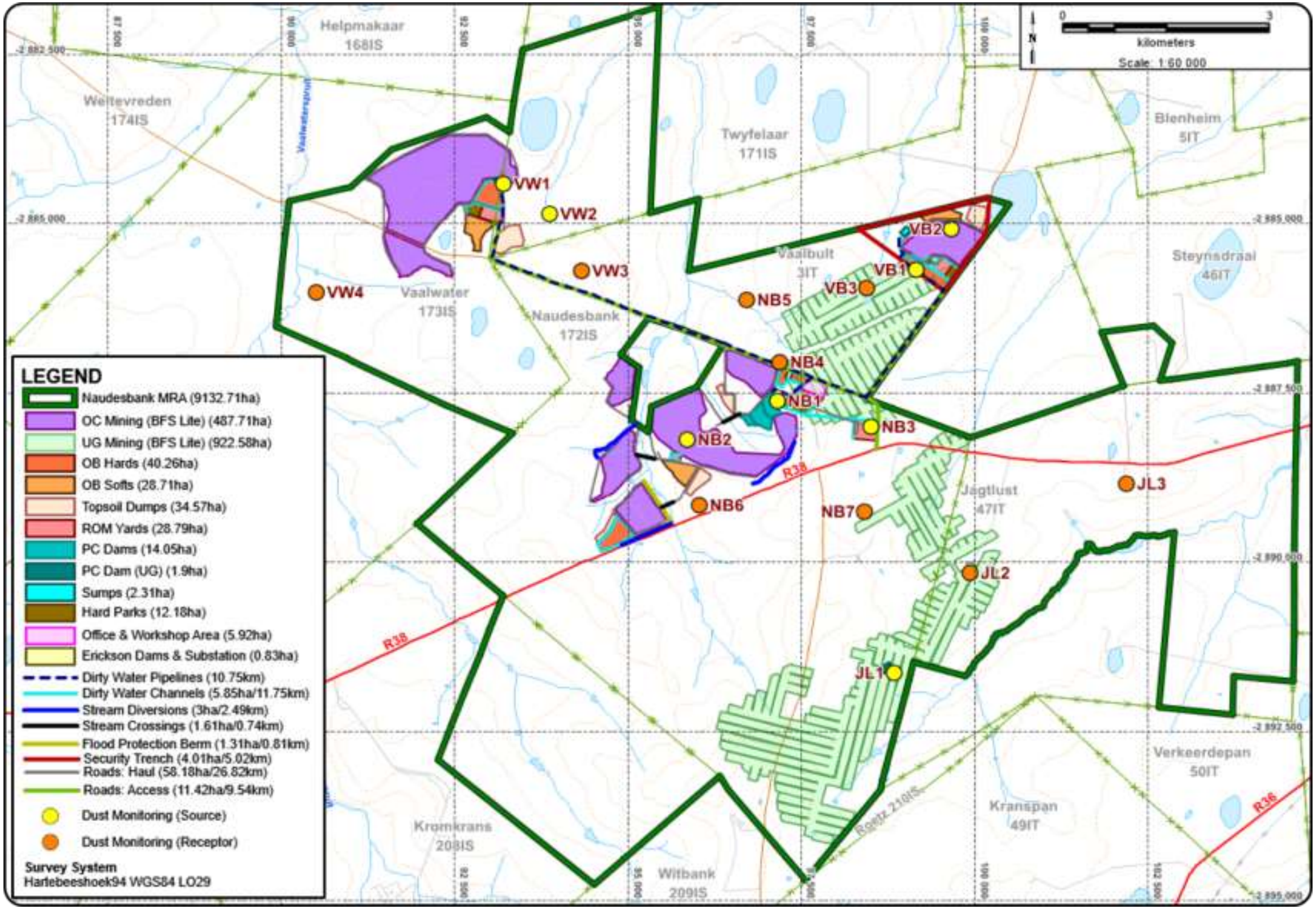

Figure 8: Proposed Air Quality Monitoring Network

7.7.3 Air Quality Monitoring Frequency

It is recommended that air quality monitoring is undertaken monthly at the monitoring points listed in **Table 22,** for the dust fallout on a monthly basis.

7.7.4 Analysis and Reporting of Monitoring Data

All air quality monitoring data will be analysed by an appropriately qualified professional, and the results will be reported annually to management and / or as described in **Section 7.11**.

The NDCR requires that monitoring reports be submitted to the local air quality officer where exceedances of the dustfall standards occur. Such reports will therefore have to be compiled when this is applicable and submitted as requested.

7.8 Noise Monitoring

Enviro-Acoustic Research recommended in their Environmental Noise Impact Assessment Report (2023, *Annexure 12* of the EIAR) that the following monitoring be undertaken:

- Quarterly noise monitoring at Noise Sensitive Receptor (NSR) 03, NSR04, NSR11/19, NSR 12, NSR 13 and NSR14/15/16 is recommended prior to mining. This is to develop baseline ambient noise levels. The monitoring should take place 1 year prior to construction commencing or alternatively, should construction commence immediately after EA is issued, noise monitoring must commence immediately.
- Once mining operations commence, bi-annual monitoring is recommended at the same locations.
- A noise investigation should also be undertaken by an independent acoustic consultant should a stakeholder within 2 000 m of the noise source lodge a valid complaint.

Table 23: Proposed noise monitoring locations

Description	Latitude	Longitude	Type
NSR03	26°04'39.00" S	29°56'37.97" E	Residential
NSR04	26°05'03.12" S	29°56'40.96" E	Residential
NSR11*	26°06'16.56" S	29°59'17.99" E	Residential
NSR12	26°03'34.92" S	29°58'33.71" E	Residential
NSR13	26°04'49.44" S	29°58'00.52" E	Residential
NSR14*	26°04'40.44" S	29°58'59.84" E	Residential
NSR15*	26°04'43.32" S	29°59'02.58" E	Residential
NSR16*	26°04'44.76" S	29°59'00.74" E	Residential
NSR19*	26°06'19.08" S	29°58'46.78" E	Residential

*** As specified in bullet point 1, best locality should be selected by acoustic specialist.**

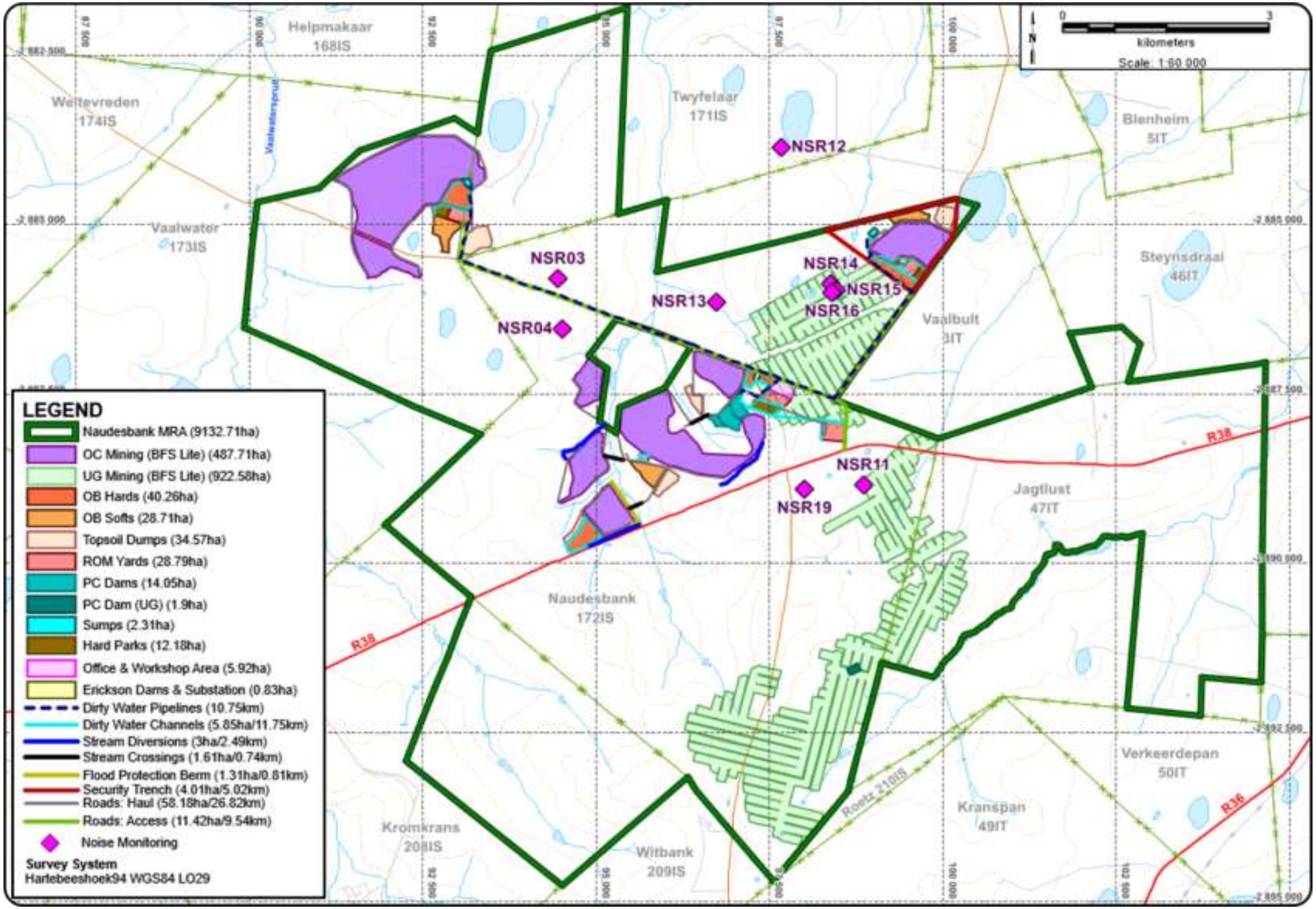

Figure 9: Proposed Noise Monitoring Network

7.9 Socio-economic Monitoring, including Health, Safety, Community and Visual Monitoring

Ongoing monitoring will be conducted to allow identification of any impacts from the project on stakeholders and socio-economic conditions in the local communities and on the surrounding farms, including health and safety, as well as visual impacts. This will involve monitoring of stakeholder and community sentiment and socio-economic impacts as part of Seriti's ongoing commitment to promoting public and community health and safety.

7.9.1 Proposed Socio-economic Monitoring Procedure

Monitoring of stakeholder consultation will include the following:

- Records of attendance at public events and community meetings to gauge the success of stakeholder consultation and to improve ongoing stakeholder consultation;
- Records of feedback including the person's name and contact details, method of consultation, information communicated, responses and outcomes of the consultation in the stakeholder database; and
- Articles that appear in the media, particularly local newspapers in the peripheral communities.

The Social and Labour Plan (SLP) must be monitored by annual audits to measure compliance with commitments made in the SLP. The annual audits will be undertaken by the Community Department of Seriti.

Ongoing socio-economic monitoring will be undertaken and reported as described in **Section 7.11**.

7.10 Quality Assurance and Quality Control

A quality assurance and quality control (QA/QC) system will be implemented to ensure consistency and quality of the proposed monitoring program. The QA/QC program will include the following:

- A clear statement regarding the objectives of the various aspects of the monitoring program;
- Clearly defined employee responsibilities for managing and conducting monitoring;
- Procedures for monitoring and sample collection (and filtering and preservation if required);

- The training of responsible personnel in the use of monitoring techniques, equipment and sample collection procedures;
- The regular maintenance and calibration of on-site monitoring equipment, as per the manufacturers' instructions;
- The use of appropriately qualified and regulated external laboratories to verify on-site monitoring results and to check for precision;
- The use of duplicate samples, field blanks, laboratory blanks, etc.; and
- Chain-of-custody procedures for sample handling and transportation for both internal and external samples.

7.11 Review of Monitoring Program

The monitoring program will be reviewed, as required, by management during the operational life. The review will consider:

- Consistency of monitoring results;
- Whether impacts vary from initial predictions;
- Significant changes to the configuration or operation of the project; and
- New company commitments, legislative requirements or stakeholder concerns.

As part of the monitoring program review a schedule of internal and third-party audits will be established and implemented. The audits will objectively assess an array of monitoring records and management practices against documented procedures to determine whether procedures are being followed and company commitments are being adhered to.

Auditing will take place at pre-determined intervals, with priority given to aspects of the project that have the potential to cause significant environmental damage. Audit results will be reported annually to management, or sooner if deemed necessary by the person of authority. The process of auditing and subsequent management review will allow for:

- Early detection of potential environmental issues;
- Implementation of corrective actions before the issue becomes significant or irreversible;
- Continual environmental performance improvement;
- Confirmation that the system reflects operational practices;
- Assessment of the relevance of the monitoring program;
- Measurement of compliance with legal and other requirements and organisational commitments; and
- Verification of the effectiveness of corrective actions.

The following table is a summary of the monitoring measures, which should be read in conjunction with **Section 7.2 - 7.9**.

Table 24: Summary of proposed monitoring measures

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling Method	Variables
Soil, land, closure and rehabilitation	Soil	To ensure effective topsoil management throughout the project for availability for rehabilitation.	Site	Continuous	Measurements (mm) Survey and visual	As per **Section 5** and **Section 7.2**.
	Soil stripping	To ensure that stripping and stockpiling is conducted as per soil specialist.	Site	Weekly	Monitoring of stripping and stockpiling by ECO.	As per **Section 5** and **Section 7.2**.
	Land	To prevent further degradation of the surrounding areas and those areas not affected on site.	Site	Continuous	Measurements (mm) Survey and visual	As per **Section 5** and **Section 7.2**.
	Rehabilitation	To ensure effective rehabilitation practices for re-establishment of a suitable post-mining land use and land capability.	Site.	Continuous	Measurements (mm) Survey and visual	As per **Section 5** and **Section 7.2**.
	Closure	To ensure effective rehabilitation practices in order to effectively implement the approved Closure Plan.	Site	Continuous	Measurements (mm) Survey and visual	As per **Section 5** and **Section 7.2**.
Freshwater	Water uses related to surface water use as per Section 21 of the NWA	To monitor compliance against the WUL conditions.	As per WUL Conditions.	Annually	External WUL Audit Internal WUL Audit	-
	Surface water quality	Determine any deterioration in water quality as a result of the mining activities.	As shown in **Table 16**.	Monthly	Grab sampling	As per description under **Section 7.5**.
	Bio-monitoring	Ongoing monitoring of the aquatic resources in the vicinity of the mining activities.	Refer to **Figure 5.**	Bi-annual	Field survey Wet and Dry Season	As per description under **Section 7.4**
	Water management infrastructure	Monitoring of condition of infrastructure. Identifying areas that require maintenance. Monitoring effectiveness of infrastructure.	Along clean & dirty water canals; dirty water dams; all pipelines; and all other infrastructure areas.	Weekly / After a big rain event.	Visual	Evidence of erosion, cracks, lack of capacity, subsidence, overgrowth, etc.
Groundwater	Water uses related to groundwater use as	To monitor compliance against the WUL conditions.	As per WUL Conditions.	Annually	External WUL Audit Internal WUL Audit	-

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling Method	Variables
	per Section 21 of the NWA					
	Groundwater quality	To determine any impact on the groundwater quality as a result of activities.	As shown in **Table 19.**	Quarterly.	High integrity grab sampler	As per description under **Section 7.6**.
	Groundwater levels	To track groundwater levels.	As above.	Monthly	Water level meters	Water level
Water balance	Dirty water recycled	To determine volume of dirty water abstracted & recycled for dust suppression.	Abstraction from dirty water storage areas.	Monthly reading	Water flow meters	Volume (m^3)
	Clean water	To determine volume of clean water abstracted.	Water supply abstraction points.	Monthly reading	Water flow meters	Volume (m^3)
Biodiversity / Land use management	Terrestrial Ecological Monitoring	Ongoing vegetation and animal life monitoring.	Site	Continuous	Survey and visual	As per description under **Section 7.3**.
	Alien vegetation	To monitor conformance with alien vegetation programme.	Site	Annual	Survey	Area (hectares)
Air quality	Dust fallout	To determine the levels of dust fallout as a result of the project activities.	Refer to **Figure 8.**	Monthly	Single dust buckets	Settleable particles (mg/m^2/day)
Environmental noise	Noise levels	To determine the noise levels within sensitive areas.	Refer to **Figure 9**.	Quarterly prior to mining, thereafter bi-annually.	As per GNR 154 and SANS 10103: 2008.	dBA
Visual	Visual impacts	To ensure that mitigation measures regarding visual impacts are implemented and maintained.	Site	Monthly	Visual inspection	Visual mitigation measures recommended in the EMPr**, Section 5**.
Cultural and heritage	Heritage/cultural resources	To capture all heritage/cultural resources exposed and impacted by development.	Site	Weekly during construction thereafter monthly by the ECO.	Inspection of construction site.	-
Socio-economic (including health, safety and visual)	Stakeholder consultation	Ongoing monitoring to allow identification of any impacts from the project on stakeholders and socio-economic conditions in the local communities and on the surrounding farms, including	Site-Local	Continuously	Stakeholder forums and one-on-one consultations.	-

Aspect	Issue	Purpose	Monitoring points	Frequency	Sampling Method	Variables
		health and safety, as well as visual impacts.				

8. ENVIRONMENTAL AWARENESS PLAN

8.1 Environmental Awareness

This section outlines the environmental awareness plan that will be implemented by Seriti to advise its employees of the environmental risks and potential impacts that may occur as a result of the project. The provision of the environmental awareness plan meets the requirements of Appendix 4 1(m) of the *National Environmental Management Act Regulations GNR 982*, which stipulates that an EMPr must include a plan that describes:

"(m) an environmental awareness plan describing the manner in which—

(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and

(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment;..-"

In general, the purpose of the environmental awareness plan is to educate site personnel regarding the potential environmental and social issues that are associated with the project with the aim of reducing the potential for their occurrence, and to provide site personnel with the knowledge and means to rectify these issues through direct responses, or through the appropriate communication pathways.

8.1.1 Approach to Environmental Awareness

The approach to the environmental awareness plan is to construct a multi-tiered induction, incidents and complaints strategy, whereby site personnel that are directly related to the project (including contractors and staff) can be educated in potential environmental issues as well as have an avenue to report environmental complaints and incidents. To achieve this, the environmental awareness plan will require the following steps:

- Develop an internal communication and awareness campaign to highlight environmental concerns and incidents;
- Develop and implement an induction program. Ensure that the induction program details environmental management that all site personnel will be required to participate in;
- Implement a communication pathway so that all employees can report environmental concerns/incidents and can make suggestions for improvement; and
- Provide means for external communication so that the public can highlight concerns and report incidents.

8.1.1.1 Internal Communication and Awareness Campaign

An internal communication and awareness campaign will be developed and implemented before commencement of the project. The objective of this campaign will be to identify environmental concerns and incidents that result from the development of the project and to identify ways to promote these to site personnel. Planning and updates to the campaign will be conducted as part of the Health, Safety and Environment meetings.

8.1.1.2 Induction Program

All site personnel will receive environmental awareness training as part of their induction, prior to working on-site. Site personnel will also be required to undergo this training once a year, even if they have completed their induction. The induction program will include a discussion of the following:

- Description of the existing environment;
- Identification of natural resources and their value (including habitats, specific species, wetlands, etc.);
- Applicable environmental legislation;
- Potential pollution sources, or project activities that may impair the environment;
- The steps that individuals can take to avoid, minimise and manage impairment to the environment (including direct, rectifying actions and communication pathways); and
- Outline the environmental management procedures and measures that have been developed as part of this project.

8.1.1.3 Communication Pathways

Incidents that create impacts and near-miss incidents can be reported to a relevant supervisor or the environmental manager. It must be reported as soon as possible, or within a maximum of 24 hours after the incident. Lodging of all incidents and near-misses will allow for improvements to standard operating procedures, and recognition of areas where improvements need to be made. The process will be as follows:

- Report all impacts to the relevant supervisor as soon as possible, or at least within 24 hours after the incident/near miss/observation;
- The relevant supervisor, or environmental manager will arrange for someone to find out what caused the incident, what to do to fix it and to stop it from happening again; and
- All incidents/near-misses/observations will be logged and will be discussed at each monthly Health, Safety and Environment meeting.

8.1.1.4 External Communication

Avenues for the public to voice environmental concerns/incidents resulting from the project were made available. Public environmental concerns and incidents can be identified through the following pathways:

- A HSEC external complaints register will be made available before the commencement of project activities. This register will be made available at the access gate to Naudesbank. If a complaint and/or concern is raised, a formal investigation must be opened as part of the Environmental Management System and managed and investigated in accordance with a fixed operating procedure; and
- A central complaints register will be kept and updated monthly by the environmental manager. External complaints will be recorded within this register and follow-up investigations will be undertaken within two days. Regular contact must be maintained with the complainant until the complaint has been addressed satisfactorily.

8.2 Environmental Emergency Response Planning

An emergency response plan was prepared for the project to ensure that suitable procedures are in place in the event of an environmental emergency, and to meet the requirements of NEMA. This section of the EMPr will come into effect if the avoidance, mitigation and management measures that are recommended in this EMPr fail to prevent incidents/emergencies that lead to unacceptable risks to human health and the environment.

In the event of an environmental emergency, the response will follow the procedures set out in the emergency response plan. These procedures will assist in the mitigation, remediation and conservation of the environment and contribute to the safety of employees (including direct employees, contractors and sub-contractors) and any other I&APs.

8.2.1 Objective

The overall objective of the environmental emergency response plan is to ensure that environmental emergencies are mitigated and managed as per best practice and that prevention of environmental emergencies is conducted, where applicable, to support the continuation of pre-activity land use functions.

8.2.2 Potential Environmental Emergencies

Potential environmental emergencies resulting from project activities include:

- Major spill of hydrocarbons (fuel or lubricating oils) outside of lined containment areas;
- Major spill of a hazardous waste substance outside a containment area;
- Major leaks and spills of contaminated water;
- Off-site accident (along the roads) that leads to chemical, coal or fuel spills;
- Seepage (or runoff) of contaminated water from the stockpile areas which leads to contamination of the receiving environment (outside of pollution containment structures);
- Instability of structures;
- Collapsing of underground mining tunnels;
- Malfunctioning of shaft or fans;
- Explosions or fire underground;
- PCD failure;
- Uncontrolled fire in or adjacent to the project area;
- Spontaneous combustion; and
- Extreme weather events that could result in flooding (and overtopping of dirty water management structures).

8.2.3 Environmental Responses

8.2.3.1 Roles and Responsibilities

Determination of the roles and responsibilities of all people working for the project is important so that each person is aware of the appropriate response that should be undertaken. The general roles and responsibilities are provided in the sections below:

Employees

Generally, all employees are responsible for:

- Preventing and managing any environmental incident;
- Minimising the impact of an environmental incident; and
- Reporting any environmental incident to the person responsible for the affected area as soon as possible.

Responsible Persons

Generally, all responsible persons are responsible for:

- Preventing environmental incidents by adhering to and adopting the relevant procedures and code of practices;
- Implementing corrective actions where appropriate (i.e. reactionary measures);

- Implementing preventative action to prevent a reoccurrence of the environmental incident (i.e. preventative measures); and
- Reporting environmental incidents and emergencies to the project's environmental manager.

Environmental Officer

Generally, the environmental officer is responsible for:

- Investigating all reported environmental incidents, determining their causes and checking whether the correct procedures were undertaken. A review of the emergency response procedures can be undertaken if the current procedures are deemed inadequate to prevent the incident from occurring again;
- Reporting incidents of a significant nature to the operations manager; and
- Reporting and discussing incidents with the management team.

8.2.3.2 Procedures

The procedures that will be undertaken in the event of an environmental incident/emergency are described in the sections below:

Employees/Incident Reporter

The employee, contractor or sub-contractor responsible to report the incident should:

- Report the incident immediately to the Control Room, his/her supervisor, the responsible person for the area, or the environmental officer.

Responsible Persons

In the event of an environmental incident/emergency, the responsible persons should:

- Contain, clean up or cordon incidents (such as spills or unstable infrastructure) immediately and implement corrective measures according to the relevant procedure; and
- Detail how the incident occurred into a behaviour-based reporting form or directly into the environmental electronic database.

Environmental Officer

In the event of an environmental incident/emergency, the environmental officer should:

- Follow-up on environmental incident actions and report all moderate and major incidents to the Naudesbank management as soon as possible;
- Create an external report that is submitted to the national and provincial departments if the incident/emergency is deemed to be serious (i.e. leading to death or sustaining significant impact on the environment). The external report will be submitted within 14 days of the incident and will include:
    - Details on the nature and extent of the environmental incident;
    - Specific information (e.g. on substances leaked or the volumes of dirty water overtopped) and the details of the initial impact on persons and the environment;
    - Initial remedial measures that have been implemented to minimise the impacts;
    - Causes of the incident;
    - A list of potential preventive and corrective measures; and
    - Evaluation of the success of remedial actions and reports to the manager representative no later than one month following the incident.

8.3 Remediation Procedures

Table 25 provides a description of the methods that Naudesbank will employ to manage environmental incidents/emergencies.

Table 25: Remediation procedures for environmental emergencies

Emergency	Monitoring	Potential Remediation
Major spill of hydrocarbons or chemicals outside of lined containment areas.	Inspections of equipment (prior to and after use) and containment and maintenance areas.	• Follow the recommendations in the EMPr to avoid, mitigate and manage the contamination of soil and water by hydrocarbons; • Ensure that all storage facilities are placed within bunded, containment areas in the event of a spill or rupture; • Ensure that the containment of each bund is equivalent to 110% of the capacity of the largest vessel within the bund; • Remove and replace contaminated soils; • Ensure that bio-remediated soil is reapplied to the affected area rapidly after remediation to avoid permanent changes to soil profile or surface drainage; • Ensure that water management structures are functioning to avoid contamination of surface water bodies; • Notify downstream users that there has been a spill (if contamination spreads off-site) and advise them not to use water from wetlands/river/stream in the area until further notice.
Off-site accidents that lead to chemical, coal or fuel spills.	Inspections of the vehicles transporting the goods.	• Report any issues that are observed along off-site areas to supervisors; • Ensure that contractors appointed for the transportation of produce are aware of the emergency response procedure in place; • Raise awareness of communities and stakeholders along the transportation route on associated risks.
Major leaks and spills of contaminated water.	Daily inspections of dirty water pipelines (for bursts and pressure), water management structures and dams (for water levels and structural integrity).	• Install pressure gauges on all permanent dirty water pipelines; • Ensure that water management structures are functioning to avoid contamination of surface water bodies; • Shut down pipes if they are still pumping contaminated water; • Use earth moving equipment to construct additional berms, if required, to facilitate the capture of sediment and dirty water to the highest degree possible; • Contaminated soil will be treated in-situ if possible, or removed for disposal off-site at a registered landfill site; • Monitor water quality within and adjacent to impacted areas until impacts are reduced to a level determined by the regulatory authorities to be protective of public health and the environment.
Seepage (or run-off) of contaminated water into the receiving environment.	Daily inspections of decant area around the mining areas, stockpile areas and PCDs.	• Follow the recommendations in the EMPr to avoid, mitigate and manage the contamination of soil and water by seepage of acidic water; • Ensure that water management structures are functioning to avoid contamination of surface water bodies and soil;

Emergency	Monitoring	Potential Remediation
		• Use earth moving equipment to construct additional berms, if required, to facilitate the capture of sediment and dirty water to the highest degree possible; • Monitor water quality within and adjacent to impacted areas until impacts are reduced to a level determined by the regulatory authorities to be protective of public health and the environment.
Instability of structures.	Annual inspections for structural integrity of project infrastructure, particularly focusing on instability of heavy infrastructure and 'loose' infrastructure (such as the stockpiles).	• Task engineers with inspections and the responsibility of formulating remedial measures to rectify structural integrity; • Re-profiling 'loose' infrastructure immediately, where practicable, to promote structural integrity; • Provide earthquake emergency response training to emergency response managers and teams.
Dam failure.	Daily inspections for structural integrity of dams and ensuring that the dams are operated as empty as possible but with a freeboard of at least 0.8 m.	• Notify the DWS and downstream users; • Task civil engineers with inspections and the responsibility of formulating remedial measures to first limit the outflow of water and then to repair the PCD.
Uncontrolled fire in or adjacent to the project area.	Inspections of firebreaks, as outlined in the fire break plan.	• Adhere to the fire break plan at all times; • Purchase fire extinguishers and keep these in designated areas for use where possible; • Evacuate the project area in line with the Seriti's Emergency Response Plan to avoid loss of life; • Maintain dedicated fire water pumps to be used for fire related emergencies; • Maintain firefighting equipment in good working order and ensure adequate water supplies are available.
Spontaneous combustion.	Regular inspections for signs of combustion.	• Place Fire hydrants / fire suppressant at high risk areas; • Maintain firefighting equipment in good working order and ensure adequate water supplies are available; • Evacuate the project area in line with the Seriti's Emergency Response Plan to avoid loss of life.
Extreme weather events resulting in flooding (and overtopping of water containment structures).	Inspections should be undertaken after an extreme weather event to evaluate integrity of water management infrastructure. Ensure that water management systems are functioning.	• All infrastructure to be constructed to function in a 1:50-year flood event; • Check that no activities are located within flood-line areas and within the wetland zone buffer areas; • Ensure that storm water drainage systems are designed, constructed, operated and maintained in such a way that it safely discharges to the environment via water management structures.

9. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The financial provision will be reviewed annually. The mitigation measures must be implemented as recommended in **Section 5** and monitoring must be undertaken as specified in **Section 7**.

10. UNDERTAKING

The EAP herewith confirms:

a) the correctness of the information provided in the reports; ☒

b) the inclusion of comments and inputs from stakeholders and I&APs; ☒

c) the inclusion of inputs and recommendations from the specialist reports where relevant; ☒ and

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed☒.

Zyntha Consulting (Pty) Ltd

Company

01/08/2023

Date

Signature of EAP

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