

**DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL
MANAGEMENT PROGRAMME REPORT
FOR THE PROPOSED BUFFELSFONTEIN WEST OPENCAST SECTION**

**Portions 139 of the Farm Buffelsfontein 465 JQ and the remaining extent of portion 35
of the Farm Buffelsfontein 465 JQ**

DMRE REF: NW 30/5/1/2/3/2/1/ (482) EM

FILE 2 of 2

August 2023

**Submitted as part of an application process for environmental authorisation in terms of the National Environmental
Management Act (Act 107 of 1998) [as amended] in respect of listed activities that have been triggered by application in terms of
the Mineral and Petroleum Resources Development Act (Act 28 of 2002) [as amended]**



DOCUMENT HISTORY

Document Control, Quality Control and Disclaimer

Report	DRAFT ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR SAMANCOR CHROME LTD. WESTERN CHROME MINES (WCM) – BUFFELSFONTEIN WEST OPENCAST SECTION: DMRE REF NW 30/5/1/2/3/2/1/ (482) EM		
Client	Samancor Chrome Ltd. Western Chrome Mines (WCM)		
Responsible Person	Contact Person: Mpho Mokone Contact nr.: 014 574 6051 Email: Mpho.Mokone@SamancorCr.Com		
Report Number	Buffelsfontein West EA_07_2023	Report Status	Draft for Public Review from 31 August 2023 to 02 October 2023
SAMRAD	NW 30/5/1/2/3/2/1/ (482) EM NW00318MR/102	Final Report:	To be confirmed

Report no	Date	Version	Status
V0.0	24 August 2023	0.0	Draft for Public Review

DOCUMENT COMPILED AND REVIEWED BY

Responsible person	Date	Position
Sonja van de Giessen	24 August 2023	EAP – Senior Specialist (Pr.Sci.Nat) EAPASA
Signature		
Reviewer person	Date	Position
Corlien Lambrechts	24 August 2023	Senior Environmental Assessment Practitioner
Signature		



mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

DRAFT ENVIRONMENTAL IMPACT ASSESSMENT REPORT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

**FOR LISTED ACTIVITIES ASSOCIATED WITH THE MINING RIGHT
FOR SAMANCOR CHROME LTD. WESTERN CHROME MINES (WCM) – BUFFELSFONTEIN
WEST OPENCAST SECTION**

**PORTIONS 139 OF THE FARM BUFFELSFONTEIN 465 JQ AND THE REMAINING EXTENT OF
PORTION 35 OF THE FARM BUFFELSFONTEIN 465 JQ**

**SUBMITTED FOR ENVIRONMENTAL AUTHORIZATIONS IN TERMS OF THE NATIONAL
ENVIRONMENTAL MANAGEMENT ACT, 1998 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT
WASTE ACT, 2008 IN RESPECT OF LISTED ACTIVITIES THAT HAVE BEEN TRIGGERED BY
APPLICATIONS IN TERMS OF THE MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT,
2002 (MPRDA) (AS AMENDED).**

Name of Applicant	Samancor Chrome Ltd. Western Chrome Mines (WCM)
Project	Buffelsfontein West Opencast Section
Contact person	Mpho Mokone
Tel No	014 574 6051
Email	Mpho.Mokone@SamancorCr.Com
Postal Address	P.O. Box 245 Mooinooi 0325
Physical Address	Samancor Western Chrome Mines Elandskraal, Mooinooi 0325
File Reference Numbers	NW 30/5/1/2/3/2/1/ (482) EM NW00318MR/102

IMPORTANT NOTICE

In terms of the Mineral and Petroleum Resources Development Act (Act 28 of 2002 as amended), the Minister must grant a prospecting or mining right if among others the mining “will not result in unacceptable pollution, ecological degradation or damage to the environment”.

Unless an Environmental Authorisation can be granted following the evaluation of an Environmental Impact Assessment and an Environmental Management Programme report in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA), it cannot be concluded that the said activities will not result in unacceptable pollution, ecological degradation or damage to the environment.

In terms of section 16(3)(b) of the EIA Regulations, 2014, any report submitted as part of an application must be prepared in a format that may be determined by the Competent Authority and in terms of section 17(1)(c) the competent Authority must check whether the application has taken into account any minimum requirements applicable or instructions or guidance provided by the competent authority to the submission of applications.

It is therefore an instruction that the prescribed reports required in respect of applications for an environmental authorisation for listed activities triggered by an application for a right or a permit are submitted in the exact format of, and provide all the information required in terms of, this template. Furthermore, please be advised that failure to submit the information required in the format provided in this template will be regarded as a failure to meet the requirements of the Regulation and will lead to the Environmental Authorisation being refused.

It is furthermore an instruction that the Environmental Assessment Practitioner must process and interpret his/her research and analysis and use the findings thereof to compile the information required herein. (Unprocessed supporting information may be attached as appendices). The EAP must ensure that the information required is placed correctly in the relevant sections of the Report, in the order, and under the provided headings as set out below, and ensure that the report is not cluttered with un-interpreted information and that it unambiguously represents the interpretation of the applicant.

OBJECTIVE 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 activity complies with and responds to the policy and legislative context;
- (b) Describe the need and desirability of the activity, including the need and desirability of the activity in the context of the preferred location;
- I Identify the location of the development footprint within the preferred site 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;
- (d) Identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;
- I Identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;
- (f) Identify suitable measures to manage, avoid or mitigate identified impacts; and
- (g) Identify residual risks that need to be managed and monitored.

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- Appendix 19: Closure Cost Assessment**
- Appendix 20: Waste Classification Report**

ABBREVIATIONS

Abbreviation	Description
ARC	Agricultural Research Council
BPEO	Best Practicable Environmental Option
DAFF	Department of Agriculture, Forestry and Fisheries
DEFF	Department of Environment, Forestry and Fisheries
DEA	Department of Environmental Affairs
DESTEA	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
DMRE	Department of Mineral Resources and Energy (previously Department of Mineral Resources - DMR)
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989)
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Assessment Report
EMPR	Environmental Management Programme
ESMS	Environmental and Social Management System
GNR	Government Notice Regulation
I&APs	Interested and Affected Parties
IDP	Integrated Development Programme
IEM	Integrated Environmental Management
IHAS	Invertebrate Habitat Assessment System
IHIA	Intermediate Habitat Integrity Assessment
IWUL	Integrated Water Use License
IWULA	Integrated Water Use License Application
LED	Local Economic Development
LM	Local Municipality
LOM	Life of Mine
MAMSL	Meter Above Mean Sea Level
MPRDA	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
NAEIS	National Atmospheric Emission Inventory System
NEMA	National Environmental Management Act (Act 107 of 1998)
NEMAQA	National Environmental Management: Air Quality Act, 39 of 2004
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMWA	National Environmental Management: Waste Act (Act 59 of 2008)
NFA	National Forest Act (Act 84 of 1998)
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
PES	Present Ecological State
PM10	Thoracic Particulate Matter
PM2.5	Inhalable Particulate Matter
PPP	Public Participation Process
ROM	Run of Mine
SAHRA	South African Heritage Resources Agency
SANRAL	South African National Roads Agency Limited
SANS	South African National Standard
SASS	South African Scoring System (Currently Version 5 is utilised)

SIA	Social Impact Assessment
SMME	South African Small, Medium and Micro Enterprise
TPA	Tons Per Annum
TSP	Total Suspended Particulates
WUL	Water Use License
WML	Waste Management License

PART A: SCOPE OF ASSESSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1 Details of the EAP

The details of the Environmental Assessment Practitioner's (EAPs) are provided in Table 1.

Table 1: Details and Name of the EAP

Name of the Practitioner:	Sonja van de Giessen
Tel No.:	083 388 4633
Fax No.:	None
Email address:	sonja@elemental-s.co.za
Name of the co-author	Natasha Graaf
Tel No.:	073 685 7671
Fax No.:	None
Email address:	natasha@elemental-s.co.za

1.2 EXPERTISE OF THE EAP

1.2.1 THE QUALIFICATIONS OF THE EAP (WITH EVIDENCE)

Elemental Sustainability (Pty) Ltd. was appointed by Samancor Chrome Ltd. Western Chrome Mines (WCM) to undertake an environmental authorisation application process in terms of the National Environmental Management Act (Act 108 of 1998), as amended, the Waste Management Licence in terms of National Environmental Management Waste Act, 2008 (Act No. 59 of 2008) as amended, and the Environmental Impact Assessment Regulations of 2014, as amended, for the Buffelsfontein West Opencast Section. Refer to Appendix 1 for more details (CV).

Ms Sonja van de Giessen (Pr.Sci.Nat & EAPASA):

- University of South Africa / North West University, BSc Honours Environmental Management 2011
- North West University, MSc. Environmental Management, 2018

1.2.2 SUMMARY OF THE EAPS PAST EXPERIENCE (IN CARRYING OUT THE ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE)

(Attached the EAP's curriculum vitae as Appendix 1)

Provided here is a summary of the qualification and experience of the EAP. Refer to Appendix 1 for copies of the curriculum vitae's.

Sonja van de Giessen is an Environmental Scientist with nearly 10 years of experience in environmental management, specifically the mining industry sector, focusing on Environmental Impact Assessments, Environmental Management Programmes, Water Use Licence Applications and Integrated Water and Waste

Management Plans and Environmental Auditing. Sonja has extensive experience in public participation. She is registered as a Natural Professional Scientist (*Pr. Sci.Nat.* Number: 400084/18) with SACNASP and as an Environmental Assessment Practitioner South Africa (EAPASA Number: 2019/1496).

Natasha Graaf is a junior consultant with 4 years of experience in environmental impact assessments and environmental management at the Department of Mineral Resources and Energy (DMRE). Her experience is in the mining industry sector, focusing on Environmental Impact Assessment Reports, Environmental Management Programmes, Basic Assessment Reports, Financial Provisioning, Compliance and Complaint Inspections, Compiling Records of Decision and Environmental Authorisations. Her role includes assisting with the compilation of Environmental Impact Assessment Reports, Environmental Management Programmes and Basic Assessment Reports.

2 DESCRIPTION OF THE PROPERTY

Site Location

The Samancor Chrome Limited Buffelsfontein West Opencast Section falls within the Magisterial District of Madibeng on the farm Buffelsfontein 465 JQ. Refer to Table 2 below for the property description.

Table 2: Property description and surveyor codes

Farm Name:	The proposed opencast activities will be undertaken on: <ul style="list-style-type: none"> • Portions 139 of the Farm Buffelsfontein 465 JQ • Remaining extent of portion 35 of the Farm Buffelsfontein 465 JQ 		
Application area (Ha)	<ul style="list-style-type: none"> • Estimated 70 ha 		
Magisterial district:	Bojanala Platinum District Municipality and the Madibeng Local Municipality		
Distance and direction from nearest town	The Buffelsfontein West Opencast Section is situated in the North West Province in the Magisterial District of Madibeng on the farm Buffelsfontein 465JQ, approximately 23 km west of Brits and 65 km east of Rustenburg. It is located within the Western Limb of the Bushveld Igneous Complex which hosts the world's largest reserves of Platinum-Group Metals (PGMs) along with vast quantities of iron, tin, chromium, titanium and vanadium.		
21 digit Surveyor General Code for each farm portion	Farm	Portion	Surveyor General Code
	Buffelsfontein 465 JQ	RE	T0JQ00000000046500000
	Buffelsfontein 465 JQ	PTN 139	T0JQ00000000046500139

Locality Map (show nearest town, scale not smaller than 1:250 000)

(Show nearest town, scale not smaller than 1:250000 attached.

Figure 1 indicates the locality of the Buffelsfontein West Opencast Section.

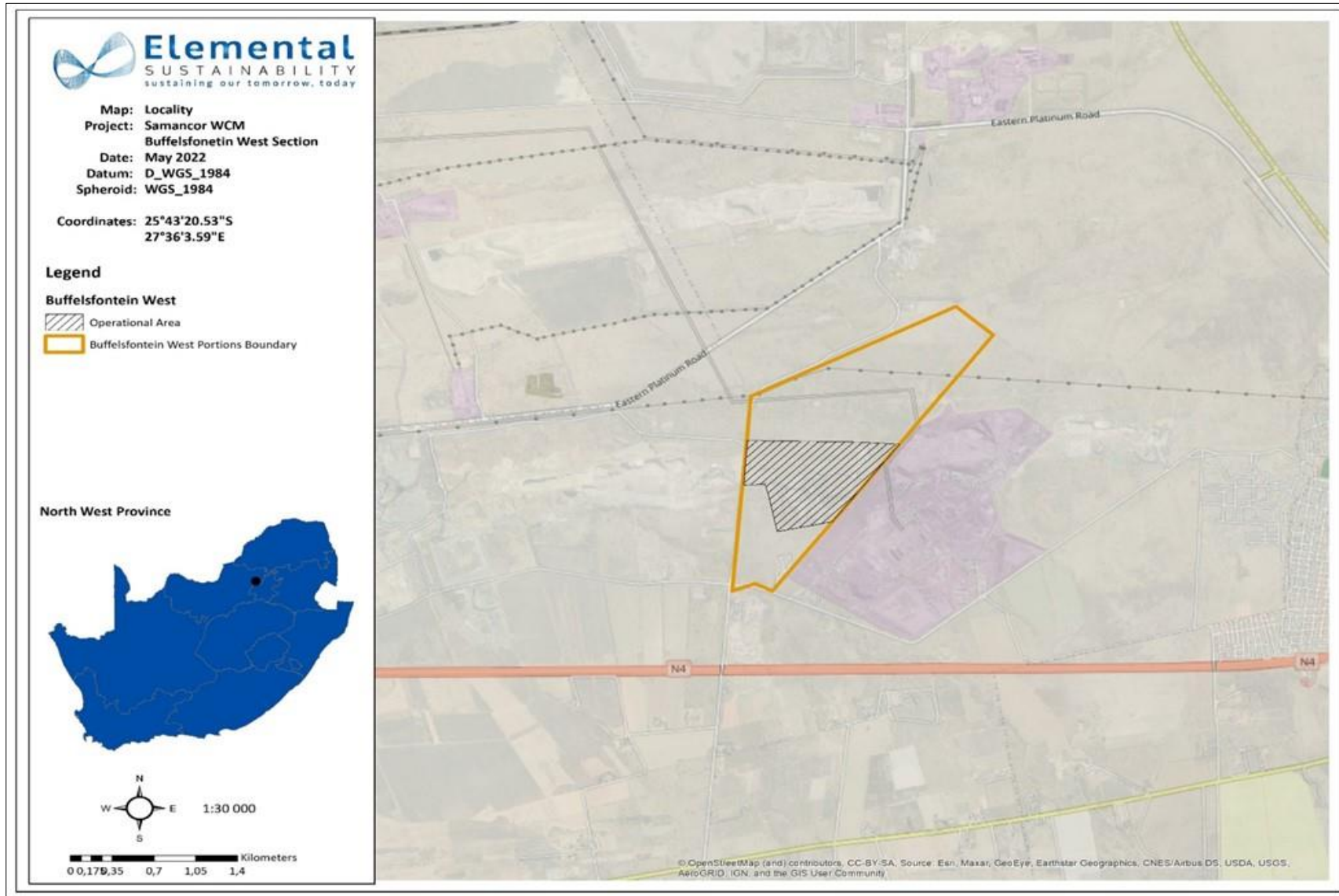


Figure 1: The regional locality of the proposed Buffelsfontein West Opencast Section

3 DESCRIPTION OF THE SCOPE OF THE OVERALL ACTIVITY

This section provides a detailed project description. The aim of the project description is to indicate the activities that are planned to take place.

3.1 LISTED AND SPECIFIED ACTIVITIES

Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site and attach as Appendix.

Table 3 below provides the listed and specified activities that are applicable to the Buffelsfontein West Opencast Section. The site layout plan is attached as Appendix 3.

Table 3: Listed and specified activities

Legislation	Listed activities	Applicability of the activity	Competent Authority
<p>NEMA and the EIA Regulations, 2014, as amended (2021)</p>	<p>GN 983 of 2014, as amended:</p> <ul style="list-style-type: none"> • <u>Listing Notice 1 - Activity 9:</u> <i>The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water</i> <ul style="list-style-type: none"> (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where <ul style="list-style-type: none"> (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area. - Stormwater management infrastructure – Pipelines for transportation of stormwater • <u>Listing Notice 1 – Activity 10:</u> <i>The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes with an internal diameter of 0,36 metres or more; or with a peak throughput of 120 litres per second or more; excluding where</i> <ul style="list-style-type: none"> (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area. - Pipelines for the transportation of process water • <u>Listing Notice 1 – Activity 12:</u> <i>The development of-</i> <ul style="list-style-type: none"> (i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or (ii) infrastructure or structures with a physical footprint of 100 square metres or more; <i>where such development occurs-</i> <ul style="list-style-type: none"> (a) within a watercourse; (b) in front of a development setback; or (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse excluding- <ul style="list-style-type: none"> (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour; (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies; 	<p>Section 102, Environmental Authorisation</p> <p>Water Use License, and</p> <p>Waste Management License for all Stockpiles (permanent or temporary) in terms of NEM:WA.</p>	<p>North West Department of Mineral Resources and Energy AND Department of Water and Sanitation</p>

Legislation	Listed activities	Applicability of the activity	Competent Authority
	<p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of the development and where indigenous vegetation will not be cleared.</p> <p>- Attenuation Dam</p> <ul style="list-style-type: none"> • <u>Listing Notice 1 – Activity 21D</u> Any activity including the operation of that activity which requires an amendment or variation to a right or permit in terms of section 102 of the Mineral and Petroleum Resources Development Act, as well as any other applicable activity contained in this Listing Notice or in Listing Notice 3 of 2014, required for such amendment. - Amendment to Mining Right to include opencast mining • <u>Listing Notice 1 – Activity 24</u> The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter - Access and haul roads • <u>Listing Notice 1 – Activity 28</u> Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes. - Opencast mine and related infrastructure • <u>Listing Notice 1 – Activity 30</u> Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). 		

Legislation	Listed activities	Applicability of the activity	Competent Authority
	<p>- Activity within a threatened ecosystem</p> <ul style="list-style-type: none"> • <u>Listing Notice 1 – Activity 56</u> <i>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre (i) where the existing reserve is wider than 13,5 meters; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.</i> - Access road <hr/> <p><u>GN 984 of 2014, as amended:</u></p> <ul style="list-style-type: none"> • <u>Listing Notice 2 – Activity 6</u> <i>The development of facilities or infrastructure for any process or activity which requires a permit or license or an amended permit or license in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent.</i> - Activity requiring an amended licence • <u>Listing Notice 2 – Activity 15</u> <i>The clearance of an area of 20 hectares or more of indigenous vegetation (Alternatively more than >1 ha consequently triggering Activities from Listing Notice 1, Activity 27).</i> - Opencast mining and related infrastructure <hr/> <p><u>GN 985 of 2014 as amended:</u></p> <ul style="list-style-type: none"> • <u>Listing Notice 3 – Activity 4</u> <i>The development of a road wider than 4 metres with a reserve less than 13,5 metres. (h) North West</i> <ul style="list-style-type: none"> (i) A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation; (ii) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (iii) Sites or areas identified in terms of an international convention; (iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority; (v) Core areas in biosphere reserves; (vi) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve; (vii) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (viii) All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999). - Development of access and haul roads within a sensitive area • <u>Listing Notice 3 – Activity 12</u> 		

Legislation	Listed activities	Applicability of the activity	Competent Authority
	<p><i>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan</i></p> <p>(c) North West</p> <ul style="list-style-type: none"> <i>i. World Heritage Sites; core of biosphere reserve; or sites or areas identified in terms of an international convention;</i> <i>ii. A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;</i> <i>iii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999);</i> <i>iv. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;</i> <i>v. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; or</i> <i>vi. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.</i> <p>- Vegetation clearance within a sensitive area</p> <ul style="list-style-type: none"> • <u>Listing Notice 3 – Activity 18</u> <i>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</i> <p>c. North West</p> <ul style="list-style-type: none"> <i>i. A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;</i> <i>ii. Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve;</i> <i>iii. Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</i> <i>iv. Sites or areas identified in terms of an international convention;</i> <i>v. Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;</i> <i>vi. Core areas in biosphere reserves;</i> <i>vii. Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;</i> <i>viii. All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999); or</i> <i>i. Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.</i> <p>- Access road development within a sensitive area</p> <hr/> <p><u>Waste License Activities Triggered:</u></p> <ul style="list-style-type: none"> • <u>NEM:WA GNR 632, as amended – Activity B7</u> <i>The disposal of any quantity of hazardous waste to land.</i> <p>- Waste Rock Dump</p>		

Legislation	Listed activities	Applicability of the activity	Competent Authority
	<ul style="list-style-type: none"> • <u>NEM:WA GNR 632, as amended – Activity B10</u> <i>The construction of a facility for a waste management activity listed in Category B of this Schedule (not in isolation to associated waste management activity).</i> - Waste Rock Dump • <u>NEM:WA GNR 632, as amended – Activity B11</u> <i>The establishment or reclamation of a residue stockpile or residue deposit resulting from activities which require a mining right, exploration right or production right in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).</i> - Waste Rock Dump 		
Legislation	Listed activities	Applicability of the activity	Competent Authority
NWA Section 21 Water Uses	<p><u>Water Use Activities Triggered:</u></p> <ul style="list-style-type: none"> • Section 21(a): Abstraction of water for dust suppression • Section 21 (c): Impeding or diverting the flow of water in a watercourse • Section 21(g): Disposing of water in a manner which may detrimentally impact on a water resource • Section 21(i): Altering the bed, banks course or characteristics of the watercourse; and • Section 21(j): Removing, discharging or disposing of water found within the opencast pits 	Water Use Licence	Department of Water and Sanitation (DWS)

3.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

(Describe Methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity)

Refer to Appendix 3 for Master Layout

This section provides a detailed description of the current and proposed activities at the Buffelsfontein West Opencast Section. Furthermore, the detailed mine/project description is presented to facilitate the understanding of the project related activities, which result in the impacts identified and assessed, and for which management measures have been proposed.

3.2.1 BACKGROUND

Samancor Chrome Ltd. Western Chrome Mines (WCM) has an existing mining right for the underground mining of chrome in terms of the Minerals and Petroleum Resources Development Act (MPRDA) (Act 28 of 2002, as amended). A Section 102 application in terms of the Mineral and Petroleum Resources Development Act, 2002 (MPRDA) (Act 28 of 2002) has been submitted to the Department of Mineral Resources and Energy (DMRE) to amend the Mining Works Programme and the Environmental Management Programme to include opencast mining of the LG and MG successions of chromite seams and for the establishment of a new road, office buildings, workshop, topsoil stockpiles, waste rock dumps and Run of Mine (ROM) pads.

The proposed Buffelsfontein West Opencast Section is situated in the North West Province in the Magisterial District of Rustenburg on portions of the farm Buffelsfontein 465 JQ, approximately 23 km west of Brits and 65 km east of Rustenburg. It is located within the Western Limb of the Bushveld Igneous Complex (BIC) which hosts the world's largest reserves of Platinum-Group Metals (PGMs) along with vast quantities of iron, tin, chromium, titanium and vanadium. The current Buffelsfontein West Section comprises of a historical shaft, portal, underground mine, ventilation shafts, compressors, surface fan, decline and overland conveyor structures and two ore stockpile areas, from where ore is transported to the Mooinooi beneficiation plant for processing. Historical opencast areas have been rehabilitated.

The MG1 seam has been the primary economic horizon of interest for all historic mining activities conducted at Buffelsfontein West Section. Mining activity at Buffelsfontein West Section predominantly focussed on underground extraction of the MG1 seam. The underground mine remained operational for approximately 30 years before permanently closing in 2003. Small scale underground mining operations continued intermittently, both in authorised and illegal mining activities. Underground mining was conducted from a minimum depth of 50 meters below surface up to a maximum depth of approximately 370 meters below surface. Buffelsfontein West shaft is designated for long term development of the Mooinooi-Buffelsfontein complex. Buffelsfontein West Section is consolidated in the Mooinooi Section due to underground development and historic mining right boundaries.

Samancor WCM is proposing to develop an opencast pit to undertake opencast mining. The mining activities will be conducted vertically above the old MG1 mined out areas and partially mined MG2. This will be done from sub-outcrop to an estimated highwall of 50m to 60m vertically above the footwall of the MG4. Buffelsfontein West Section is planned to build up production to a steady state of 50,000t of ROM per month for the Life of Mine (LOM) duration.

Specialist studies will be undertaken for the EIA phase. Public participation with landowners, Interested and Affected Parties (I&APs) and any other stakeholders will be undertaken during the Scoping and EIA phases, therefore, the layout could undergo some changes. The final surface infrastructure layout will, therefore, be provided in the Environmental Impact Assessment Report (EIAR). Figure 2 indicates the proposed infrastructure for the Buffelsfontein West Opencast Section.

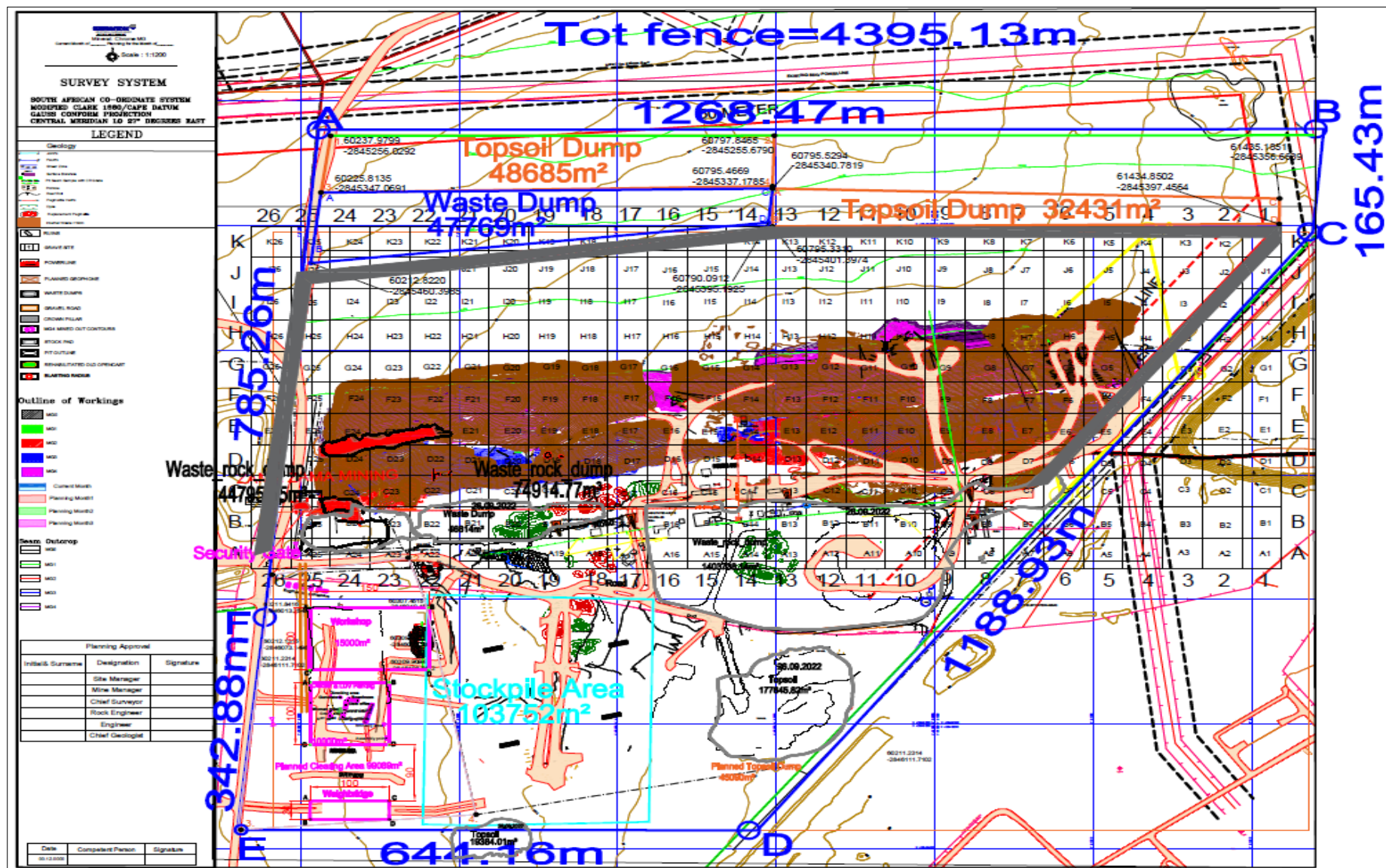


Figure 2: Proposed layout plan for the Buffelsfontein West Opencast Section

3.2.2 THE MINERAL RESOURCE

The reported opencast mineral resources, comprising of the total Middle Group succession, amount to 20.43 Million Tons (MT) as stated on 30 September 2021. This includes all three mineral resource confidence levels (Measured, Indicated, and Inferred). The reported mineral resource estimates are inclusive of the mineral resources reported for Mining Right NW 30/5/1/2/2/482 MR.

The Life of Mine (LoM) estimates of NW 30/5/1/2/2/482 MR in the mineral reserve category, for opencast operations, is estimated at 9.5 years based on a production rate of 150 000 per month (modifying factors included). Opencast mining activities will predominantly concentrate on the continuation of currently dormant pits and residual mineral resources.

Open Cast Mineral Resources of Buffelsfontein 465JQ as at 30 September 2021											
Resource Category	Site	Seam	SG	Seam Thickness	DIP	Cr ₂ O ₃	FeO	SiO ₂	Cr:Fe	Tonnes	Geological Loss
			(t/m ³)	(m)	(°)	(%)	(%)	(%)	Ratio	Mt	(%)
Measured	Buffelsfontein 465JQ	MG4A	3.65	1.06	14.00	31.64	22.04	16.44	1.26	0.53	5.00
		MG4	3.84	1.72	14.00	30.96	21.27	14.84	1.29	0.94	5.00
		MG3	3.83	0.82	14.00	34.95	23.28	10.94	1.32	0.09	5.00
		MG2	4.22	1.87	14.00	39.67	24.71	6.71	1.41	0.28	5.00
		MG1	4.05	1.54	14.00	40.50	23.29	8.07	1.53	0.01	5.00
		MG0									
Total Measured			-	-	-	-	-	-	-	1.85	
Indicated	Buffelsfontein 465JQ	MG4A	3.68	1.14	14.00	31.97	22.12	16.12	1.27	0.05	5.00
		MG4	3.95	1.63	14.00	31.23	21.25	14.61	1.28	0.09	5.00
		MG3	3.83	0.31	14.00	34.74	23.59	11.12	1.30	0.01	5.00
		MG2									
		MG1									
		MG0									
Total Indicated			-	-	-	-	-	-	-	0.14	
Inferred	Buffelsfontein 465JQ	MG4A									
		MG4									
		MG3									
		MG2									
		MG1									
		MG0									
Total Inferred			-	-	-	-	-	-	-	0.00	
Grand Total			-	-	-	-	-	-	-	1.99	

Figure 3: Opencast Mineral Resources of Buffelsfontein 465 JQ (30 September 2021)

3.2.2.1 MINERAL RESOURCE MAPS

Boreholes were drilled and samples were obtained through various drilling campaigns throughout the Buffelsfontein West Section. Geological information gathered through the drilling projects was modelled using Geovia Minex software. Recent improvement strategies implemented in both beneficiation and smelting processes has allowed for the inclusion of the upper MG seams (MG3, MG4 and MG4A) as part of the potentially available opencast mineral resources. The MG1 and MG2 seams confirm Reasonable Prospects for Eventual Economic Extraction (RPEEE) in both opencast and underground operations. The mineral resource maps for the underground and opencast MG seams are indicated below in Figure 4, Figure 5, Figure 6, Figure 7 and Figure 8.

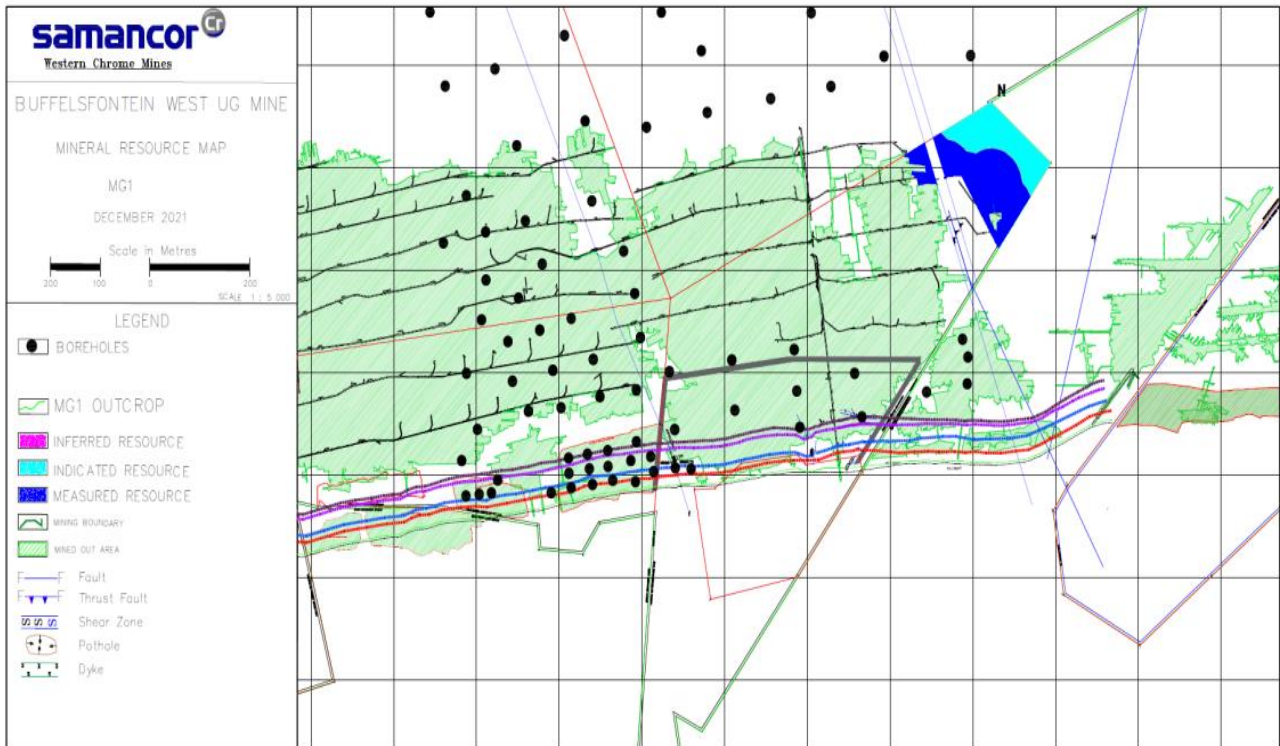


Figure 4: Buffelsfontein West Underground MG1 Mineral Resource Map

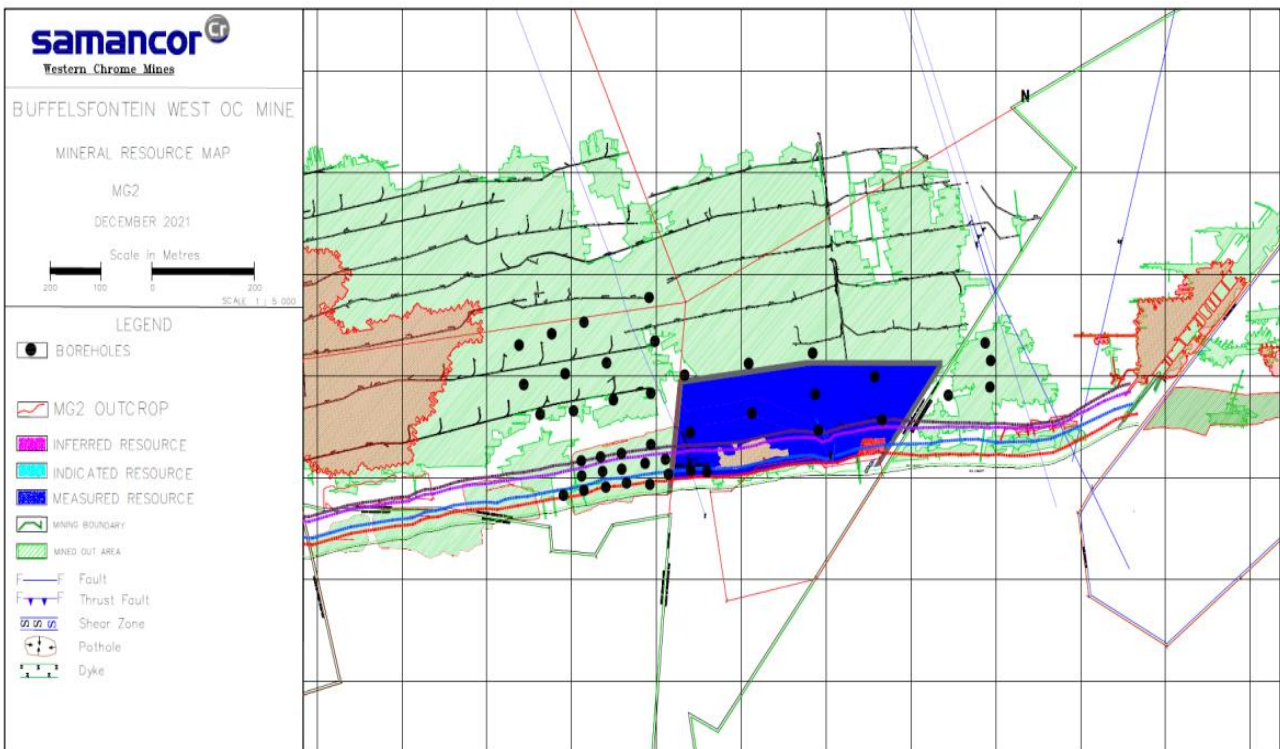


Figure 5: Buffelsfontein West Opencast MG2 Mineral Resource Map

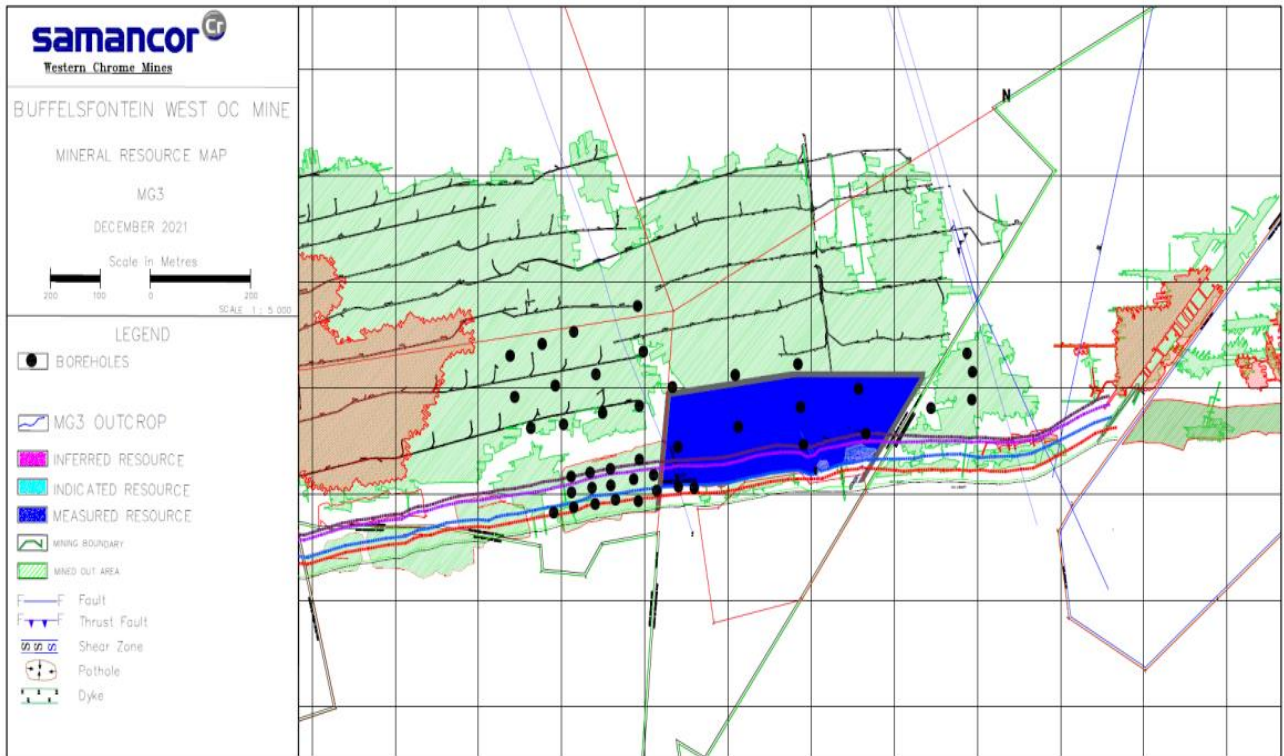


Figure 6: Buffelsfontein West Opencast MG3 Mineral Resource Map

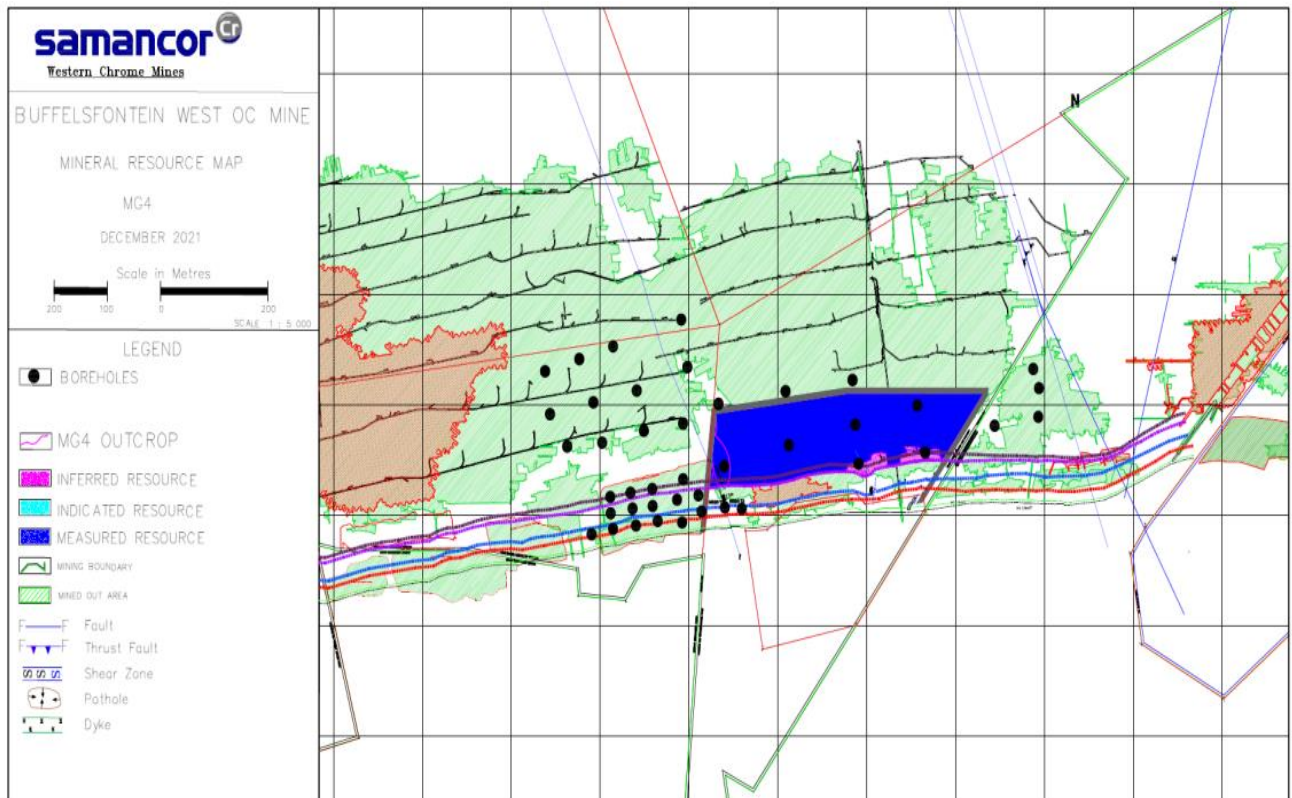


Figure 7: Buffelsfontein West Opencast MG4 Mineral Resource Map

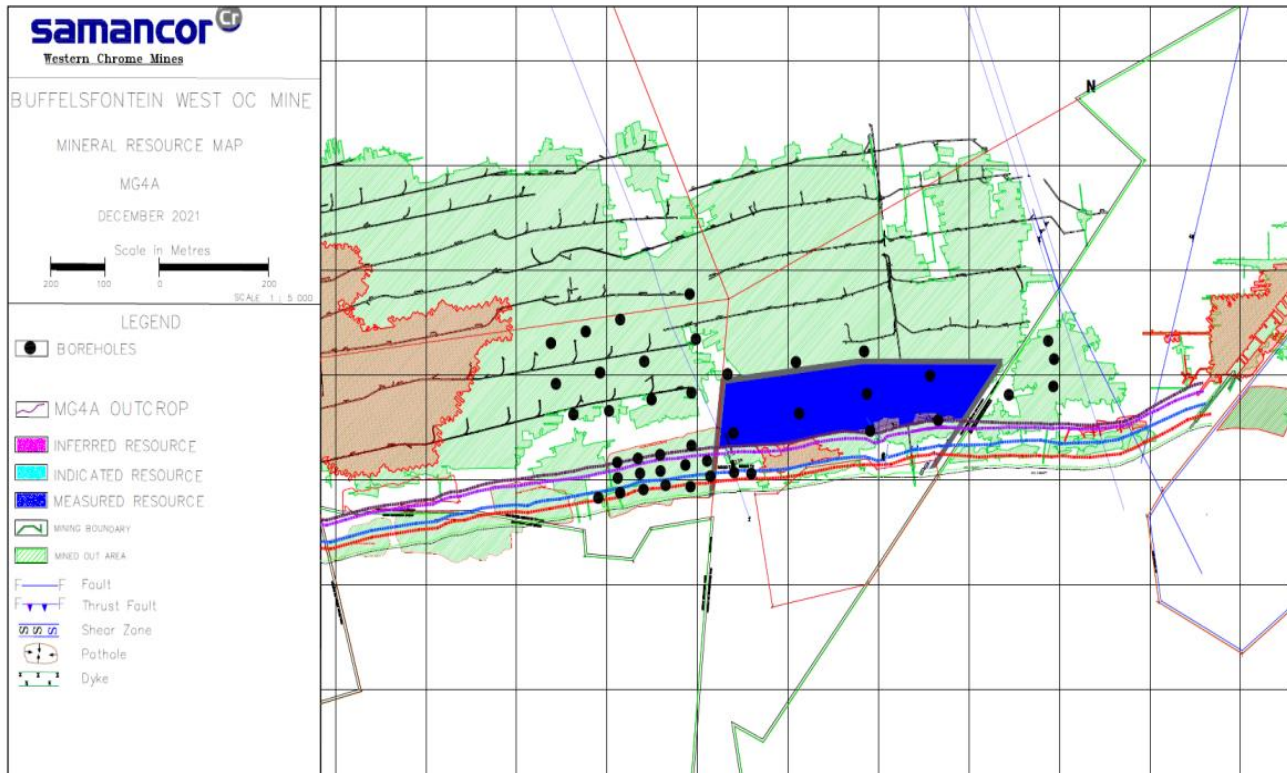


Figure 8: Buffelsfontein West Opencast MG4A Mineral Resource Map

3.2.3 MINING METHOD

All existing mining methods as applied for and granted in NW 30/1/2/2/482 MR will continue as initially stipulated in the existing EMP. The ore body at Buffelsfontein, consists of multiple seams and the method to be employed is a combination of free digging and surface blasting mining. The topsoil, hard overburden and chromitite mined during the life of this mine will be transported and gathered on separate dumps and stockpiles within the Buffelsfontein surface area. Material will be crushed and screened on site and transported to predetermined beneficiation plants for processing.

The horizons of economic interest sub-outcrop (approximately 0.5m to 1.5m) below the black turf on the farm Buffelsfontein 465 JQ and dip north-northwest. Mining of the MG succession of chromitite seams is planned at depths ranging from 0 m to 100 meters below surface for opencast mining operations and 100 meters to 600 meters for underground mining operations. Mining on NW 30/5/1/2/2/482 MR will however be limited to a maximum depth below surface of 150 meters. The approximated depth below surface specified for the individual mining methods remains dependent on modifying factor considerations. Optimization of mine designs are dependent on socio- and economic considerations and will be an ongoing function of the planning department.

3.3 DESCRIPTION OF MINERAL PROCESSING OPERATIONS

All the ore from the Buffelsfontein West Opencast Section will be transported to the already existing plant for processing. Run of mine ore will be beneficiated in a hydrometallurgy separation beneficiation plant consisting

of dense medium separation (DMS) and gravity concentration via spiral equipment. Internal and external customers require ore to be of a certain grade and quality to produce required quality ferrochrome.

The main plant feed consists of three separate vibrating feeders supplied from three different stockpiles onto the main plant feed conveyor. The main feed conveyor feeds the primary screens, two screens placed in parallel in order to split the plant feed into 3 different plant feed streams, i.e., Drum feed, Mill feed and Wash Plant feed.

The different size ranges are as follows:

- Drum feed: +20mm & -100mm
- Mill feed: +1mm & -20mm
- Wash Plant feed: -1mm

The following high level flow diagram as seen in Figure 9, indicates the process flow of the already established beneficiation plant for the of the run of mine material to produce the products.

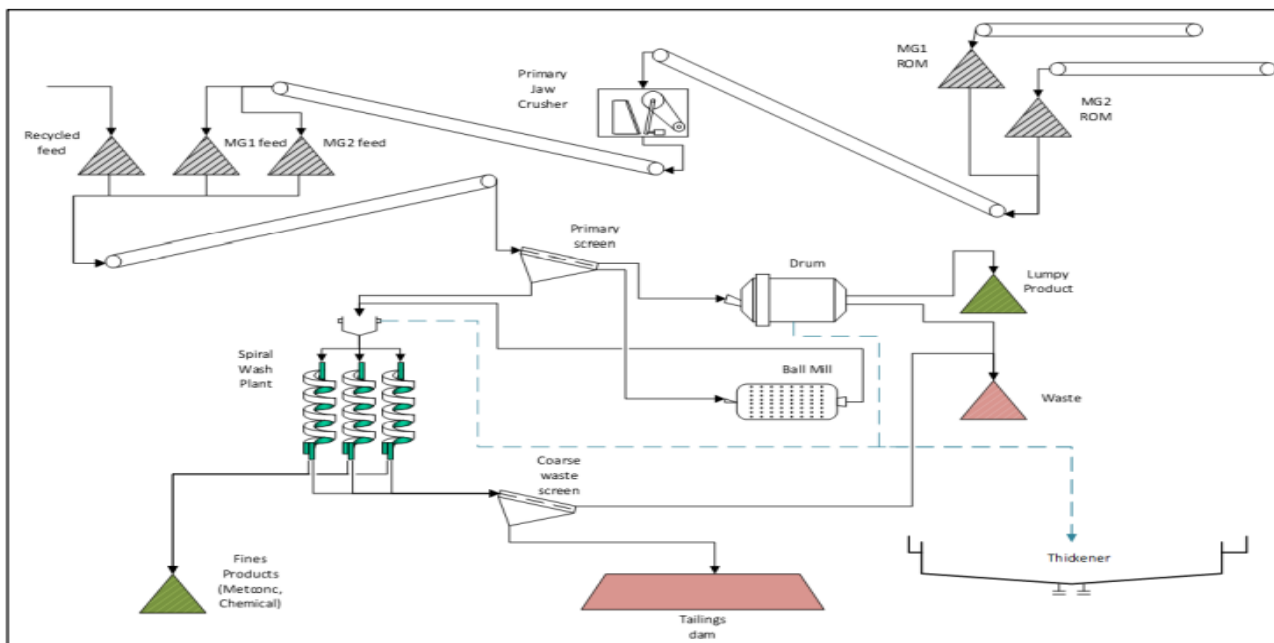


Figure 9: Diagram indication high level process flow

3.3.1 THE ASSOCIATED MINERALS

Samancor Chrome primarily mines chrome to feed smelters with a minimal surplus being sold to market. As mentioned above the chrome occurs with secondary associated minerals or by products. These are primarily 4E PGMs and minor silver and gold.

3.3.1.1 BRIEF DESCRIPTION OF THE PGM BENEFICIATION PLANTS

Processing of platinum group metals (PGMs) is conducted by Sylvania Platinum Limited (Sylvania) and Jubilee Metals Group which has entered into an agreement with Samancor Chrome for retreating of tailings dumps which involves the re-treatment of PGM-rich chrome tailings material from Buffelsfontein West Section. Samancor Chrome Limited has standing agreements with Sylvania Platinum limited and Jubilee Metals Group

to beneficiate chromitite ore from the active mining operations. The beneficiation contractor operations are provided for in the approved EMPs as required and preceded the conversion of the mining rights.

3.3.1.2 DESCRIPTION OF THE PGM PROCESSING METHOD

After extracting the chrome from the current risings and dumps and returning it to WCM Mooinooi at nominal cost, Sylvania Platinum Ltd (appointed as a contractor with the exclusive right to recover the associated minerals) produces between 1, 5 to 2, 1 grams per ton of associated minerals. The Mooinooi Sylvania Plant has the capacity to process up to 57 000tpm of combined dump material and current risings.

3.3.1.3 EXTRACTION OF THE ASSOCIATED MINERALS

As a result of the mineralogical nature of the ore body there are other minerals entrenched in the ore body that are to be mined out of necessity when mining the chrome ore. It is not possible to mine these other minerals on their own due to this fact. As a result of Samancor mining the additional minerals it incurs a cost for winning such material.

PGM concentrations are slightly elevated in the tailings storage facilities due to the extraction of chromite in the beneficiation process. After extracting the chromite from the current risings and dumps and returning it to WCM Mooinooi at nominal cost, the contracted beneficiation plants use flotation cells to produce the PGM concentrate which is sold to various PGM smelters.

3.3.2 PRODUCT

The chemical composition of the Run of Mine (ROM) generated from Buffelsfontein is listed in Table 4 below. ROM from the respective opencast and underground operations will be crushed and screened on site for opencast operations. The crushed and screened material will be dispatched to in-house and contractor beneficiation plants for processing. ROM generated from underground operations will be directly fed into in-house beneficiation plants.

Table 4: Chemical composition of the Run of Mine generated from the Buffelsfontein Section

Seam	Opencast Run of Mine Grades				Underground Run of Mine Grades			
	Cr ₂ O ₃	FeO	SiO ₂	Cr:Fe	Cr ₂ O ₃	FeO	SiO ₂	Cr:Fe
	(%)	(%)	(%)	Ratio	(%)	(%)	(%)	Ratio
MG4A	30.38	21.13	15.62	1.27	-	-	-	-
MG4	29.84	20.43	14.04	1.23	-	-	-	-
MG3	31.91	21.23	9.87	1.20	-	-	-	-
MG2	34.88	21.54	5.85	1.25	29.66	20.92	20.65	1.16
MG1	36.72	21.11	7.33	1.39	32.93	19.35	5.26	1.19

The final product specifications are predominantly determined by customer requirements in terms of size fraction and chemical composition. Internal transfer specifications dictate that a minimum chromium-oxide [Cr₂O₃%] concentration, generated from the different saleable size fractions, of 41.5% cumulative composition be

maintained. Mass balancing of the expected feed and tailings grades place the approximate mass yield at 65%. Typical size and chemical specifications for the various products are summarized as follows:

- Chemical Concentrate – Chemical grade chrome ore concentrate has a minimum chromium-oxide [$\text{Cr}_2\text{O}_3\%$] concentration of 46.0% and silica content of less than 1.0%. Manufacturers of chromium-based chemicals find these chemical compositions attractive for alloy manufacturing. A maximum size fraction not exceeding 1.0mm must be maintained for this product. Chemical concentrate is typically not generated from the ore bodies confined to NW 30/5/1/2/2/482 MR.
- Metallurgical Concentrate – Metallurgical grade chrome ore concentrate has a minimum chromium-oxide [$\text{Cr}_2\text{O}_3\%$] concentration of 44.0% and silica content of less than 4.0%. As with Chemical Concentrate, manufacturers of chromium-based chemicals find these grades Chemical Concentrate, 19% Metallurgical Concentrate, 38% Lumpy Ore, 25% Chips, 19% MOOINOOI PRODUCT SPLIT attractive for alloy manufacturing. A maximum size fraction not exceeding 1.0mm must be maintained for this product.
- Coarse products, which include Lumpy ore and Chips are produced at a minimum chromium-oxide [$\text{Cr}_2\text{O}_3\%$] concentration of 38%, Cr/Fe ratio of 1.4 and a silica content of 8 - 12%. The required chemical compositions are ascertained by aligning the mining schedules for the respective chromitite seams. Lumpy ore has a maximum diameter of 100mm and chips a maximum diameter of 6mm. Maximum silica contents of 11.5% for lumpy ore and 10.5% for chips must be maintained.

3.3.3 MARKETS

Most chromite ore produced from Buffelsfontein West Opencast Section will be consumed internally by Samancor Chrome's smelting operations to produce ferrochrome. Direct exports of chromite ore and specific products is driven by international markets and is conducted on an ad-hoc basis. The products will be trucked from the beneficiation operations with the main customers being the following:

- TC Smelter, located in Mooinooi, North West province,
- Ferrometals, located in Emalahleni, Mpumalanga province,
- Middelburg Ferrochrome, located in Middelburg, Mpumalanga Province,
- Tubatse Chrome, located in Steelpoort, Limpopo Province,
- Tubatse Alloys Smelter, located in Steelpoort; Limpopo Province.

3.3.3.1 USES OF CHROME ORE

Chromite has several industrial end uses, primarily based on its Chrome to Iron ratio (Cr: Fe) and Cr_2O_3 content. High chromium ores (defined by having high Cr:Fe ratios) are used for producing Ferrochromium for metallurgical applications such as stainless steel (the most important application by volume 85%) and special uses (super-alloys, special steels, and plating). Chromite ores are also used to produce chromium salts (used in the leather tanning industry, as a pigment and in chromium plating) and refractory purposes (production of

magnesite chromite and chromite magnesite bricks). Figure 10 and Figure 11 indicates the breakdown of applications for chrome ore and ferrochrome alloys respectively.

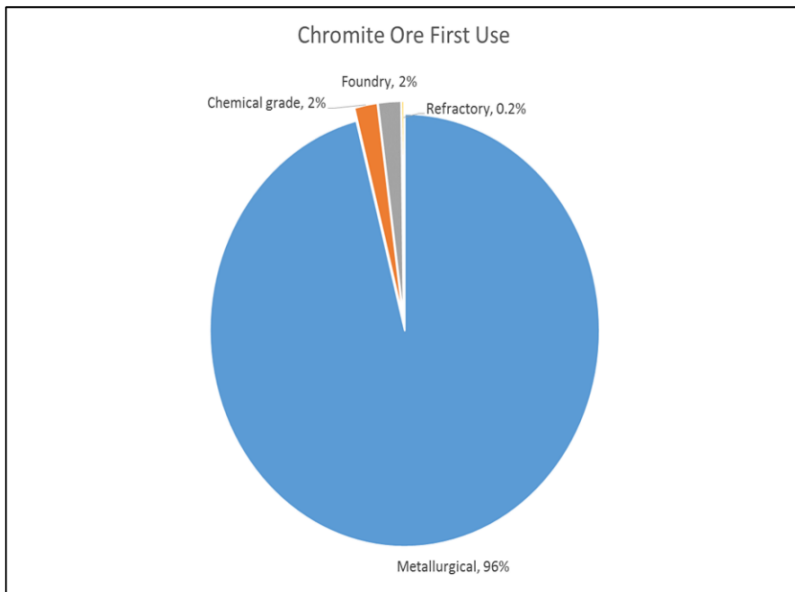


Figure 10: Chromite Ore First Uses (As presented by the ICDA on 25 January 2015 at Indinox conference, India)

Thin coatings of chromium alloys are used as plating on automotive parts, appliances and other products and given the name “chrome plated”. Foundry sands and refractory ore with a high chromium (Cr_2O_3) content are also produced and is in demand for its sizing qualities. There are no economical substitutes for chromite ore in the production of ferrochrome (i.e. stainless steel), chromium chemicals, super-alloys or chromite refractories at present. Currently, chromium-free substitutes either compromise product quality and/or increase costs.

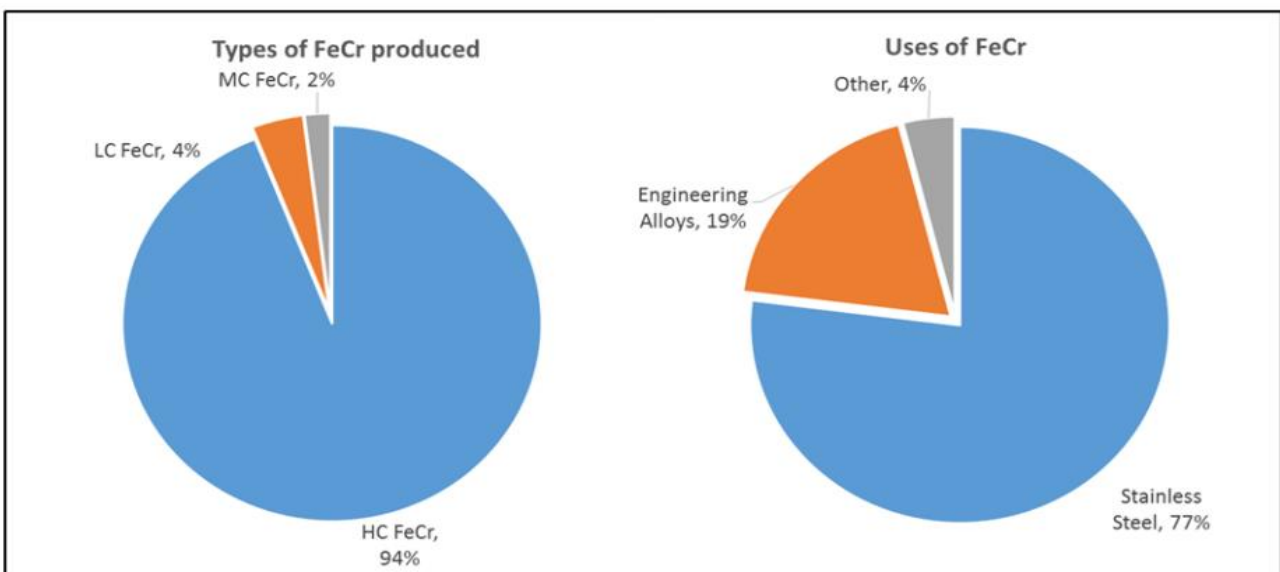


Figure 11: Types of Ferrochrome produced and Ferrochrome uses (As presented by the ICDA on 25 January 2015 at Indinox conference, India)

3.3.3.2 CHROME ORE SUPPLY/DEMAND

Up to mid-2008, supply of world chromite was under severe pressure driven by the robust demand for ferrochrome used in ferroalloy production. Over 90% of the world's chromite production is converted into ferrochrome for metallurgical applications. Given that most chromite is produced by vertically integrated ferrochrome producers, the amount of material available to non-metallurgical markets has been in short supply. This has changed somewhat since 2008 and global chrome prices have fallen drastically, in a large part due to the rapid introduction of UG2 chromite ore into the global trade of chrome ore market. UG2 chromite ore is produced as a by-product by South African Platinum miners that mine the UG2 reef in the Bushveld complex.

In addition to the introduction of low cost UG2 into the market, stainless steel and ferrochrome markets were negatively impacted by the global financial crisis. As a result of the global crisis in late 2008, the demand for steel plummeted, forcing most of the ferrochrome producers to place their operations on care and maintenance. This situation lasted through most of 2009 and it was only in late 2009 that ferrochrome producers began to slowly restart their furnaces.

Demand for ferrochrome used in making ferroalloy, which in turn is used in making stainless steel, has led to a healthy demand for chromite ore. Non-metallurgical applications consume only a fraction of chromite production, with the refractory industry accounting for only about 1% and 3% each for the foundry and chemical industries. The non-metallurgical industry is dependent on chromite requirements of the metallurgical industry as most chromite is manufactured by vertically integrated ferrochrome producers. Major traders of non-metallurgical chromite from South Africa provide more than half of global chromite supply.

The declining availability of chromite ore is proving challenging for producers that are not vertically integrated, especially when non-metallurgical applications are indicating increased demand for the material. The supply shortage is mainly attributed to the booming stainless-steel industry, with China being the main consumer of globally traded chromite ore. China consumes approximately 35% of total global chrome ore production in its raw form, and as China only has 0.1% of global ore resources, this requirement is met almost completely with imported ore.

3.4 MINE INFRASTRUCTURE

The proposed infrastructure for the Buffelsfontein West Opencast Section pits includes:

- Crown Pillar
- Engineering Containers
- Fence
- Gravel Roads
- Offices & LDV Parking
- Opencast Area
- Parking
- Pedestrian Walkway
- Security Gate

- Security Office
- Safety Berm
- Stockpad
- Stockpile Area
- Topsoil Dump
- Waste Dump
- Weighbridge
- Workshop
- Attenuation Dam

The layout for the proposed Buffelsfontein West Opencast Section is shown in Figure 2 above.

3.4.1 GENERAL AND HAZARDOUS WASTE

Hazardous waste, as defined under NEM:WA means waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles.

- Hazardous business waste that could occur on site is:
 - Waste from the manufacture, formulation, supply and use (MFSU) of coatings (paints, varnishes and vitreous enamels), adhesives, sealants and printing inks:
 - Wastes from MFSU and removal of paint and varnish;
 - Wastes from MFSU of other coatings (including ceramic materials);
 - Wastes from MFSU of printing inks; and
 - Wastes from MFSU of adhesives and sealants (including waterproofing products).
- Oil wastes and waste of liquid fuels (except edible oils) and includes:
 - Waste hydraulic oils;
 - Waste engine, gear and lubricating oils;
 - Waste insulating and heat transmission oils;
 - Oil/water separator contents;
 - Wastes of liquid fuels; and
 - Hazardous portions of other wastes.
- Waste organic solvents, refrigerants and propellants:
 - Waste organic solvents, refrigerants and foam/aerosol propellants.
- Other waste not specified in the list:

- Hazardous portion of wastes from end-of-life vehicles from different means of transport (including off-road machinery) and wastes from dismantling of end-of-life vehicles and vehicle maintenance;
- Hazardous portions of wastes from electrical and electronic equipment;
- Hazardous portion of wastes from off-specification batches and unused products;
- Wastes from discarded gases in pressure containers and discarded chemicals;
- Wastes from discarded batteries and accumulators;
- Wastes from transport tank, storage tank and barrel cleaning;
- Spend catalyst wastes;
- Oxidising substances wastes;
- Aqueous liquid wastes destined for off-site treatment; and
- Waste lining and refractories;
- Construction waste:
 - Wastes from bituminous mixtures and tarred products;
 - Discarded metals (including their alloys);
 - Waste soil (including excavated soil from contaminated sites), stones and dredging spoil;
 - Wastes from insulating materials and asbestos-containing construction materials;
 - Wastes from gypsum-based construction material; and
 - Wastes from other construction and demolition;
- Wastes from human or animal health care and/or related research (except kitchen and restaurant wastes not arising from immediate health care):
 - Wastes from natal care, diagnosis, treatment or prevention of disease in humans.

3.4.2 WASTE CLASSIFICATION

General waste (as per the National Environmental Management: Waste Amendment Act, 2014 (Act No. 26 of 2014) (NEMWAA) means waste that does not pose an immediate hazard or threat to health or environment, and includes (a) domestic waste; (b) building and demolition waste; (c) business waste; (d) inert waste and (e) any waste classified as non-hazardous waste in terms of the regulations made under Section 69.

3.4.3 POWERLINES

The proposed operation will have adequate power supply since there are existing Eskom powerlines that will supply electricity to the Buffelsfontein West Opencast Section.

3.4.4 WATER AND SERVICES

The majority of water supply will be from the existing Buffelsfontein operation. De-watering, stormwater and boreholes will be used for water supply for dust suppression, primary processing and other activities related to the proposed operation. Samancor Western Chrome Mine will apply for the relevant water use licenses that are triggered by the proposed opencast mining activities.

3.4.5 STORMWATER MANAGEMENT PLAN

The run-off water from the proposed overburden dumps with a type 4 waste classification can be defined as relatively clean water, only with a higher silt load. Grassed lined earth channels and berms are required to divert the clean stormwater run-off to be released into the natural environment and streams via energy dispersion erosion control type structures downstream of the channels. However, clean water run-off from the overburden dumps is likely to have a higher silt load, especially when the dumps are not covered by grass yet. Thus, to ensure that siltation of the existing streams is negligible this water will be diverted to the open cast pits, there it can be “stored” in sumps / designated areas for later use on the mine site.

At Buffelsfontein West it is proposed that the stormwater attenuation area be formalised to facilitate handling of a larger flood event, side slopes to be 1: 3 max the overflow would be controlled at the lowest point to NGL with an emergency spillway for flood intensities of minimum 1:100 years.

Final designs and construction of stormwater infrastructure will be based on the Infrastructure Designs. Upon commencement of mining the following basic procedures will be followed for the duration of the operations:

- Keep dirty and clean water separate by ensuring infrastructure remains intact as constructed, with as-built plans signed-off by a Professional Engineer, as finally designed in accordance to the Water Use Licence.
- Keep channels and culverts clean in order to maintain their design capacity.
- Keep grass cover on grass covered infrastructure in good condition. Ensure that no erosion occur by regular monitoring of stormwater infrastructure and repair and upgrade where required.
- Clean silt traps regularly as required.
- Maintain the emergency spillway of the PCDs and do not allow any obstruction in the spillway.
- Protect the clean water catchment areas by preventing, movement of vehicles, veld fires, cutting of trees, etc.

Upon closure, existing stormwater structures must be considered for the closure designs to be either utilized or removed. A copy of the Stormwater Management and Water Balance Report is attached as Appendix 18.

4 POLICY AND LEGISLATIVE CONTEXT

Relevant South African legislation requires various authorisations prior to the commencement of the project. Although cognisance of all applicable legislation is being taken, the following table details the relevant environmental authorisations, which are required:

Table 5: Policy and Legislative Context

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
<p>Constitution of South Africa, 1996 (Act No. 108 of 1996) [as amended]</p> <ul style="list-style-type: none"> • <i>Section 24</i> <i>Environment: Everyone has the right-</i> <ul style="list-style-type: none"> • <i>to an environment that is not harmful to their health or well-being; and</i> • <i>to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that-</i> <ul style="list-style-type: none"> i) <i>prevent pollution and ecological degradation;</i> ii) <i>promote conservation; and</i> <p><i>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</i></p>	<p>The proposed project has the potential to harm the environment and poses a risk to the health and wellbeing of people. The development, however, also has the potential to secure sustainable development through reusing process products and thereby limiting the use of natural resources.</p> <p>The Applicant has the overall responsibility to ensure that the rights of people in terms of Section 24 of the Constitution is protected in terms of the proposed development activity.</p>
<p>National Environmental Management Act (No. 107 of 1998) [as amended]</p> <ul style="list-style-type: none"> • <i>Section 28 (1)</i> <i>Duty of Care and responsibilities to minimise and remediate environmental degradation.</i> 	<p>The Applicant is the developer and overall responsibility of the mine rests with him, especially in terms of liabilities associated with the operational phase.</p>
<p>EIA Regulations, 2014 (Government Notices 982 - 984) [as amended]</p> <p><i>The proposed construction, operational and closure activities of the proposed development triggers listed activities that are listed in the EIA regulations for which a Scoping and Environmental Impact Assessment (EIA) process have to be conducted:</i></p> <p>Listing Notice 1, 2 & 3 have been triggered as well as GN633 for several waste activities requiring a Waste License as well.</p>	<p>The proposed project requires an amendment to the existing mining right to include the proposed infrastructure.</p> <p>An integrated NEMA and NEM:WA application has been launched with the DMRE (This application).</p>
<p>EIA Regulations, 2014 (Government Notices 982 - 984)</p> <p><i>Chapter 6: Regulation 39 to 44: Public Participation;</i></p> <p><i>Chapter 4: Application for Environmental Authorisation:</i></p> <p><i>Part 3 Scoping and Environmental Impact Report (S&EIR)</i></p> <p><i>Appendix 2: Scoping Report</i></p> <p><i>Appendix 3: Environmental Impact Assessment Report</i></p>	<p>The EIA Regulations, 2014 [as amended] prescribes inter alia:</p> <p>the manner in which public participation needs to be conducted as well as the requirements of a scoping and environmental impact assessment process and the content of a scoping report, environmental impact assessment report and environmental management programme.</p> <p>The content of specialist reports, closure plans and environmental audit reports are also provided.</p>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
<p><i>Appendix 4: Environmental Management Programme</i></p> <p><i>Appendix 5: Closure Plan</i></p> <p><i>Appendix 6: Specialist Reports</i></p>	
<p>Mineral and Petroleum Resources Development Act, 2002 (Act. 28 of 2002) [as amended]:</p>	<p>A Section 102 amendment has been submitted to the DMRE. This requires the full EIA/EMP process for Environmental Authorisation as well.</p>
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]</p> <ul style="list-style-type: none"> • <i>Section 16</i> <i>General duty in respect of waste management;</i> • <i>Section 17;</i> <i>Reduction, re-use, recycling and recovery of waste;</i> • <i>Section 18; and</i> <i>Extended producer responsibility; and</i> • <i>Section 21</i> <i>General requirements for storage of hazardous and general waste.</i> 	<p>The proposed mining area will produce general and hazardous waste which need to be managed and disposed of according to best practices such as recycling, safe storage, etc.</p> <p>An integrated NEMA and NEM:WA application has been launched with the DMRE (this application).</p>
<p>National Water Act, 1998 (Act No. 36 of 1998) [as amended]</p> <ul style="list-style-type: none"> • <i>Section 3</i> <i>Regulation of flow and control of all water</i> • <i>Section 19</i> <i>Prevention of pollution to watercourses</i> • <i>Section 21</i> <i>The water use activities associated with the proposed development requires compliance with the requirements of the NWA as listed under GN No. 19182. An application for an integrated water use license is lodged in terms of Section 21 of the National Water Act, 1998 (Act 36 of 1998) [as amended] to undertake the following activity:</i> <p><i>Section 21: (a) Taking water from a water resource;</i></p> <p><i>Section 21: (c) Impeding or diverting the flow of water in a watercourse;</i></p> <p><i>Section 21: (g) disposing of waste in a manner which may detrimentally impact on a water resource;</i></p> <p><i>Section 21(i): Altering the bed, banks course or characteristics of the watercourse; and</i></p> <p><i>Section 21(j); Removing, discharge or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people</i></p>	<p>The proposed mine will have to apply for a Water Use License for the following Section 21 water uses:</p> <ul style="list-style-type: none"> - Section 21(a): Abstraction of water for use at the wash plant and on site for dust suppression - Section 21 (c): Impeding or diverting the flow of water in a watercourse - Section 21(g): Disposing of water in a manner which may detrimentally impact on a water resource - Section 21(i): Altering the bed, banks course or characteristics of the watercourse; and - Section 21(j): Removing, discharging or disposing of water found within the opencast pits <p>Water management on the mine will be in line with the requirements of the site specific Water Use License and GN R704 National Water Act, 1998 (Act No. 36 of 1998).</p>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
<p>Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals published in terms of NWA in Government Notice 267 of March 2017</p> <p>Several General Authorisations have been published in terms of Section 39 of the NWA (various dates)</p>	<p>The Regulations will be taken into consideration during the Water Use Licence Application process and will be utilised by the wetland and aquatic specialist to determine the impact of the Buffelsfontein West Opencast Section on the wetland and pan areas. The risk assessment will be in the format as required by the regulations.</p>
<p>Mine Health and Safety Act, 1996 (Act No. 29 of 1996) [as amended] and associated regulations</p> <ul style="list-style-type: none"> • Chapter 2, Sections 2 – 4 <i>Responsibilities of owner</i> • Chapter 2, Sections 5 – 13 <i>Responsibilities of manager;</i> • Chapter 2, Sections 14 – 18; <i>Documentation requirements;</i> • Chapter 2, Section 19 – 20 and 22 to 24 <i>Employee’s rights and duties; and</i> • Chapter 2, Section 21 <i>Manufacturer’s and supplier’s duty for health and safety.</i> 	<p>The proposed project activities may create an environment that is not safe and healthy for workers on and visitors to the site (if not managed correctly). The act provides for measures to prevent threats to the health and safety of humans in the development area.</p>
<p>National Heritage Resources Act, 1999 (Act No. 25 of 1999)</p> <ul style="list-style-type: none"> • Section 44 (1); <i>Preservation and protection of heritage resources;</i> • Section 3 Types and ranges of heritage resources (i) (i); <i>Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.</i> 	<p>Protection of indigenous heritage resources on the property will be assessed. A Heritage assessment will be conducted for the project and the documents will be distributed to SAHRA for comments during the onset of the PPP Phase.</p>
<p>National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) [as amended]</p> <ul style="list-style-type: none"> • Section 32 <i>Control of dust</i> • Section 34 <i>Control of noise</i> 	<p>An Air Quality Impact Assessment and a Noise Impact Assessment will be undertaken for the Buffelsfontein West Opencast Section. Impacts on surrounding landowners need to be managed through mitigation measures. The full reports will be included in this EIAr as appendices.</p>
<p>List of Activities which Result in Atmospheric Emissions, published in terms of NEM:AQA in Government Notice 893 of 2013 (as amended)</p>	<p>The proposed mining activities will not trigger any of the activities.</p>
<p>National Dust Control Regulations, 2013 (Government Notice 827 of 2013)</p> <ul style="list-style-type: none"> • Section 3 <i>Dust fall standard</i> • Section 4 <i>Dust fall monitoring program</i> • Section 6 	<p>Dust fallout needs to be monitored in accordance with the standards set out in the monitoring programme with the specified measures due to the Applicant being liable to offences and penalties associated with non-conformance to dust which may influence employees and surrounding landowners.</p>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
<p><i>Measures for control of dust</i></p> <ul style="list-style-type: none"> • Section 7 <p><i>Ambient air quality monitoring (PM10)</i></p> <ul style="list-style-type: none"> • Section 8 <p><i>Offences</i></p> <ul style="list-style-type: none"> • Section 9 <p><i>Penalties</i></p>	
<p>National Greenhouse Gas Emission Reporting Regulations, published in terms of NEM:AQA in Government Notice of July 2017</p>	<p>The mine will be required to report in the prescribed format.</p>
<p>Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) [as amended]</p> <ul style="list-style-type: none"> • Section 12 (1) <p><i>Duty of the landowner to prevent fire from spreading to neighbouring properties.</i></p>	<p>Cautionary steps in avoiding the spread of fires to and from neighbouring properties.</p>
<p>National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended]</p> <ul style="list-style-type: none"> • Section 9 <p><i>Norms and standards</i></p> <ul style="list-style-type: none"> • Section 27 <p><i>Delegation of power and duties</i></p> <ul style="list-style-type: none"> • Section 30 <p><i>Financial accountability</i></p> <ul style="list-style-type: none"> • Section 43 <p><i>Biodiversity management plans.</i></p>	<p>Indigenous vegetation needs to be protected and managed in accordance with management measures set out in the management plans developed for the mine and the Applicant need to ensure he is aware of and covers his liabilities.</p> <p>An activity for removing and clearance of vegetation has been applied for within this application and no other vegetation clearance will be permitted other than that approved in terms of the EA when/if the Competent Authority makes its decision.</p>
<p>Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2014 in terms of NEMBA (Government Notice 599 of 2014), as amended</p> <ul style="list-style-type: none"> • Notice 2 <p><i>Exempted Alien Species in terms of Section 66 (1)</i></p> <ul style="list-style-type: none"> • Notice 3 <p><i>National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11</i></p> <ul style="list-style-type: none"> • Notice 4 <p><i>Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12</i></p>	<p>It is the responsibility of the Applicant to ensure that all prohibited plant and animal species are eradicated as far as possible.</p>
<p>Conservation of Agricultural Resources Act (no. 43 of 1983)</p> <ul style="list-style-type: none"> • Section 5 <p><i>Prohibition of spreading of weeds</i></p> <ul style="list-style-type: none"> • Section 12 <p><i>Maintenance of soil conservation works and maintenance of certain states of affairs</i></p> <ul style="list-style-type: none"> • Section 16 	<p>Listed invader/alien plants occurring on site which requires management measures to be implemented to strive to maintain the status quo environment, especially through the guidelines provided by the Regional Conservation Committee.</p>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
<i>Regional Conservation Committees</i>	
Mining and Biodiversity Guideline (2013)	The Act, regulation and guideline have informed project planning and will be considered in the assessment and mitigation of impacts.
National Biodiversity Offset Policy, 2021	Not applicable to this project.
<p>Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended]</p> <ul style="list-style-type: none"> • Section 2 <p><i>Declaration of grouped hazardous substances;</i></p> <ul style="list-style-type: none"> • Section 4 <p><i>Licensing;</i></p> <ul style="list-style-type: none"> • Section 16 <p><i>Liability of employer or principle</i></p> <ul style="list-style-type: none"> • Section 9 (1) <p><i>Storage and handling of hazardous chemical substances</i></p> <ul style="list-style-type: none"> • Section 18 <p><i>Offences</i></p>	The Applicant must ensure the safety of people working with hazardous chemicals (specifically fuels), as well as safe storage, use and disposal of containers during the on-site operational phase together with the associated liability should non-compliance be at the order of the day.
<p>Hazardous Chemical Substances Regulations, 1995 (Government Notice 1179 of 1995)</p> <ul style="list-style-type: none"> • Section 4 <p><i>Duties of persons who may be exposed to hazardous chemical substances</i></p> <ul style="list-style-type: none"> • Section 9A (1) <p><i>Penalties</i></p>	Hazardous substances will be stored and utilised on the site and non-compliance to management measures will result in prosecution of the Applicant in terms of his liabilities to the socio-economic environment.
<p>Waste Classification and Management Regulations and Norms and Standards for the assessment of for landfill disposal and for disposal of waste to landfill, 2013 (Government Notice 634 – 635 of 2013) promulgated in terms of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]; and</p> <p>Regulations regarding the planning and management of residue stockpiles and residue deposits from a prospecting, mining, exploration or production operation (GN R. 632 of 2015)</p>	<p>The proposed activities will produce general and hazardous waste which need to be managed and disposed of according to best practices such as recycling, safe storage, etc.</p> <p>Disposal will take place on an existing approved waste disposal facility. Waste Classification will be done and a Waste License is required for the establishment of Stockpiles.</p> <p>An integrated NEMA and NEM:WA application has been launched with the DMRE.</p>
National Norms and Standards for the Storage of Waste, published in terms of NEM:WA in Government Notice 926 of 2013	<p>The purpose of the norms and standards is to –</p> <ol style="list-style-type: none"> a. Provide a uniform national approach relating to the management of waste storage facilities. b. Ensure best practice in the management of waste storage facilities; and c. Provide minimum standards for the design and operation of ne waste storage facilities.

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
	Management of the waste storage facility will be in line with the requirements.
National Norms and Standards for the Sorting, Shredding, Grinding, Crushing, Screening or Baling of General Waste, published in terms of NEM:WA in Government Notice 1093 of 2017	The purpose of these Norms and Standards is to provide a uniform national approach relating to the management of waste facilities that sort, shred, grind, crush, screen, chip or bale general waste. The waste rock dump is not regulated under these Norms and Standards. No general waste will be processed in terms of these norms and standards on the mining area.
Guideline on the Need and Desirability, Department of Environmental Affairs, 2017	This guideline has been taken into account as part of project planning. The 2017 Guideline has been used within this process.
NEMA: Government Notice. 805 Companion Guideline on the Implantation of the Environmental Impact Assessment Regulations, 2010, October 2012.	The application for Environmental Authorisation is submitted in terms of the EIA Regulations.
NEMA: GN. 807 Public Participation Guideline, October 2012.	Consultation with Interested and Affected Parties and Communities.
Public Participation guideline in terms of NEMA EIA Regulations, Department of Environmental Affairs, 2014 as amended	This guideline has informed the public participation process for the project.
Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, 2015 (Notice 1147 of 2015), as amended <ul style="list-style-type: none"> • Regulation 5: Scope of financial provision • Regulation 6: Method for determining financial provision • Regulation 12: Preparation and submission of plans and reports 	An applicant must determine the financial provision through a detailed itemisation of all activities and cost, calculated based on the actual cost of implementation of the measures required.
Regulations on use of Water for Mining and Related Activities Aimed at the Protection of Water Resources, 1999 (Notice 704 of 1999). <ul style="list-style-type: none"> • Regulation 4: Restrictions on location of mining activities • Regulation 7: Protection of water resources • Regulation 12: Technical investigation and monitoring. 	Every person in control of a mine or activity must take measures to manage water in an effective manner as prescribe by the regulation.
Noise Control Regulations (The Republic of South Africa, 1992) published in terms of Section 25 of the Environment Conservation Act (Act no. 73 of 1989)	The regulations define the following <ul style="list-style-type: none"> • Controlled areas; and • Disturbing noise Limits are provided for rating levels for outdoor noise. To be utilised by the Noise specialist to determine the impact and mitigation measures.
NEM:AQA: GNR 283. National Atmospheric Emissions Reporting Regulations, 2015. For purposes of these Regulations, emission sources and data providers are classified according to groups A to D listed in Annexure 1 to these Regulations. Section 5(3): For purposes of these Regulations, emission sources and data providers are classified according to groups A to D listed in Annexure 1 to these Regulations.	Any person, that holds a mining right or permit in terms of the MPRDA. Emissions report must be made in the format required for NAEIS to the relevant air quality officer.
National Guideline on minimum information requirements for preparing Environmental Impact Assessments for mining activities that require	This guideline has been taken into account as part of project planning.

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
environmental authorisation, published in terms of NEMA in Government Notice 86 of 2018	
Restitution of Land Rights Amendment Act, 2014 (Act 15 of 2014). The act deals with Land claims.	<p>The validity of the amendment Act was challenged in the Constitutional Court. The Constitutional Court found the Amendment Act to be invalid because of the failure of Parliament to facilitate public involvement as required by the Constitution. The Amendment Act ceased to be law on 28 July 2018. The Constitutional Court ordered that the claims that were lodged between 1 July 2014 and 27 July 2016 are validly lodge, but it interdicted the Commission from processing those claims until the Commission has finalised the claims lodged by 31 December 1998 or until Parliament passes a new law providing for the re-opening of lodgement of land claims. It is important to note that the provisions of section 11(7) of the Restitution of land Rights Amendment Act, 1994 do not apply until after the Commission has accepted the claim for investigation and published its details in the Government Gazette.</p> <p>Where section 11(7) of Restitution of land Rights Amendment Act, 1994 applies, the land claim commission will be informed a month before any activity is undertake on the property.</p>
Deeds Registries, 1937 (Act No. 47 of 1937) [as amended]	Registration of servitudes and deed titles.
South African Mining Charter	Focus on sustainable transformation of the mining industry. WCM is compliant with the BEE requirements. Social management and mitigation measures, developed as part of the SIA, are aligned to the Mining Charter.
National Strategy for Sustainable Development and Action Plan 2011 – 2014 (NSSD 1) (2011)	<p>The Strategy for Sustainable Development and Action Plan (NSSD1) is a proactive strategy that regards sustainable development as a long-term commitment, which combines environmental protection, social equity and economic efficiency with the vision and values of the country. It is a milestone in an ongoing process of developing support, and initiating and up-scaling actions to achieve sustainable development in South Africa (DEA, 2011) and has outlined the following strategic objectives:</p> <ul style="list-style-type: none"> • enhance systems for integrated planning and implementation; • sustain ecosystems and use natural resources efficiently; • move towards a green economy; • build sustainable communities; and • respond effectively to climate change. <p>The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project, and will be taken into account in the assessment and mitigation of impacts during the EIA phase.</p>
National Development Plan 2030 (2010)	<p>The National Development Plan aims to ensure that all South Africans attain a decent standard of living through the elimination of poverty and reduction of inequality by 2030. The core elements of a decent standard of living identified in the plan are:</p> <ul style="list-style-type: none"> • housing, water, electricity and sanitation; • safe and reliable public transport; • quality education and skills development;

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
	<ul style="list-style-type: none"> • safety and security; • quality health care; • social protection; • employment; • recreation and leisure; • clean environment; and • adequate nutrition <p>The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project, and will be taken into account in the assessment and mitigation of impacts during the EIA phase.</p>
New Growth Path (2010)	<p>South Africa has embarked on a new economic growth path in a bid to create 5 million jobs and reduce unemployment from 25% to 15% over the next ten (10) years. The plan aims to address unemployment, inequality and poverty by unlocking employment opportunities in South Africa’s private sector and identifies seven job drivers. These job drivers have the responsibility to create jobs on a large scale. The seven key economic sectors or “job drivers” for job creation are listed below:</p> <ul style="list-style-type: none"> • infrastructure development and extension: Public works and housing projects; • agricultural development with a focus on rural development and specifically • “Agro-Processing”; • mining value chains; • manufacturing and industrial development (IPAP); • knowledge and green economy; • tourism and services; and • informal sector of economy <p>The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project and will be considered in the assessment and mitigation of impacts during the EIA phase.</p>
National Framework for Sustainable Development (2008)	<p>The purpose of the National Framework on Sustainable Development is to enunciate South Africa’s national vision for sustainable development and indicate strategic interventions to re-orientate South Africa’s development path in a more sustainable direction. It proposes a national vision, principles and areas for strategic intervention that will enable and guide the development of the national strategy and action plan.</p>
Bojanala Platinum District Municipality IDP – Draft (2022-2027)	<p>The mining sector is the largest within Bojanala Platinum District Municipality accounting for R 71.5 billion or 52.1% of the district municipality’s economy. Bojanala Platinum District Municipality has been severely affected with the closure of mining & tourism sectors which are the main employers in the district. This led to municipal revenue loss and potential jobs at risk due to instability. The development frameworks have informed project planning and the need and desirability of the project and will be considered in the assessment and mitigation of impacts during the Scoping and EIA phase.</p>
<p>All other relevant national, provincial, district and local municipality legislation and guidelines that may be applicable to the application. Some of these are discussed in the next section but will be discussed in detail within the EIAR / EMPr report.</p>	

5 NEED AND DESIRABILITY OF THE ACTIVITIES

(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location).

The main benefits of the proposed amendment to the mining project are:

- Continued direct economic benefits will be derived from wages, taxes and profits;
- Continued indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees;
- Continued provision of employment opportunities to employees already skilled in within the area.
- Implementation of the proposed project will result in skills development associated with mining;
- It will continue contributing to the economic welfare of the surrounding community by creating working opportunities;
- It will contribute to the upliftment of living standards and the health and safety of the local community;
- The project will result in economic mining of a known resource;
- Reduction in illegal mining and unregulated mining.

The proposed project is aligned with the objectives of the MPRDA (Act 28 of 2002):

- To promote economic growth and mineral development in the Republic;
- To promote employment and advance the social and economic welfare of all South Africans;
- To ensure that the nation's mineral resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development; and
- To ensure that mining developments contribute towards the social-economic development of the area in which they are operating.

The then Department of Environmental Affairs (DEA) published a Guideline on Need and Desirability (2017) in terms of the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). The key components are listed and discussed below:

- Securing ecological sustainable development and use of natural resources; and
- Promoting justifiable economic and social development.

According to DEA's (2017) Guideline on Need and Desirability, to describe the need for a development, it must be established whether it is the right time for locating the type of land use and/or activity being proposed. To describe the desirability for a development, it must be determined, whether it is the right place for locating the type of land use and/or activity being proposed. Need and desirability can be equated to the concept of wise use of land which can be determined through asking the question: "what is the most sustainable use of land?" Considering the above, the need and desirability of an application must be addressed separately and in detail answering *inter alia* the questions as indicated in Table 6.

Table 6: Need and desirability considerations

Securing ecological sustainable development and use of natural resources	
<p>1.1.1 How will this development (and its separate elements/aspects) impact on the ecological integrity of the area? How were the following ecological integrity considerations taken into account? 1.1.1 Threatened Ecosystems, 1.1.2 Sensitive, vulnerable, highly dynamic or stressed ecosystems, such as coastal shores, estuaries, wetlands, and similar systems require specific attention in management and planning procedures, especially where they are subject to significant human resource usage and development pressure, 1.1.3 Critical Biodiversity Areas (“CBAs”) and Ecological Support Areas (“ESAs”), 1.1.4 Conservation targets, 1.1.5 Ecological drivers of the ecosystem, 1.1.6 Environmental Management Framework, 1.1.7 Spatial Development Framework, and 1.1.8 Global and international responsibilities relating to the environment (e.g. RAMSAR sites, Climate Change, etc.).</p>	<p>The following specialist studies shall be conducted in support of this application:</p> <ul style="list-style-type: none"> • Agricultural Impact Assessment • Landscape/Visual Impact Assessment • Archaeological and Cultural Heritage Impact Assessment • Palaeontology Impact Assessment • Terrestrial Biodiversity Impact Assessment • Aquatic Biodiversity Impact Assessment • Hydrogeological Assessment • Noise Impact Assessment • Traffic Impact Assessment • Geotechnical Assessment • Social Impact Study • Ambient Air Quality Impact Assessment • Blasting and Vibration Impact Assessment • Hydrological Assessment (including water balance) • Storm Water Management Plan • Waste Classification • Engineering Designs • Closure Plan and Quantum Report <p>The conclusions of these studies, and the identified impacts and mitigation measures stemming there from are included in this EIA and EMPR. The need of the project in terms of the Bojanala Platinum District Municipality SDF is also further considered in this EIA and EMPR.</p>
<p>1.2 How will this development disturb or enhance ecosystems and/or result in the loss or protection of biological diversity? What measures were explored to firstly avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>Refer to the Terrestrial Biodiversity Impact Assessment in Section 10.5, and the impact assessment and mitigation measures in Section 14 and Section 15 of this EIAR.</p>
<p>1.3 How will this development pollute and/or degrade the biophysical environment? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>Refer to the Terrestrial Biodiversity Impact Assessment in Section 10.5, and the impact assessment and mitigation measures in Section 14 and Section 15 of this EIAR.</p>
<p>1.4 What waste will be generated by this development? What measures were explored to firstly avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and/or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?</p>	<p>General waste, hazardous waste and litter will be generated during the life of the mine and these should be kept in designated areas and disposed of to a licensed landfill facility. Other wastes that may cause soil contamination, are from the use of vehicles and loaders during the mining process, which may lead to hydrocarbon spills. Regulations for soil clean-up and management have been prescribed in the EMPR.</p>

1.5	<p>How will this development disturb or enhance landscapes and/or sites that constitute the nation’s cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>Refer to the Archaeological and Cultural Heritage Impact Assessment in Section 10.13. the impact assessment and mitigation measures are included in Section 14 and Section 15 of this EIAR.</p>
1.6	<p>How will this development use and/or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy (including offsetting) the impacts? What measures were explored to enhance positive impacts?</p>	<p>The operation will remove a non-renewable resource (chrome resource – limited resource) within the designated area. This cannot be reversed. The study area has been transformed as noted in the specialist investigations and the chrome mining already occurs in the vicinity.</p> <p>Through implementing good practice environmental management measures and mitigation measures, it will ensure that both human and environment are not negatively affected by the development.</p>
1.7	<p>How will this development use and/or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and/or impact on the ecosystem jeopardise the integrity of the resource and/or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources? What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?</p> <p>1.7.1. Does the proposed development exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e. de-materialized growth)? (note: sustainability requires that settlements reduce their ecological footprint by using less material and energy demands and reduce the amount of waste they generate, without compromising their quest to improve their quality of life).</p> <p>1.7.2. Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used (i.e. what are the opportunity costs of using these resources this the proposed development alternative?)</p> <p>1.7.3. Do the proposed location, type and scale of development promote a reduced dependency on resources?</p>	<p>The use of borehole water, to a limited amount, on-site and primary processing may require additional water. All water uses will be licensed in terms of the National Water Act.</p> <p>Stormwater management, and the water stemming from the primary processing, is captured in containment infrastructure and re-used and recycled into the process and may be used as dust suppression around the dirty footprint areas within the area. This will alleviate the requirement for clean make-up water to be sourced from groundwater. No discharges into the environment will be applied or proposed for Buffelsfontein West Opencast Section.</p>
1.8	<p>How were a risk-averse and cautious approach applied in terms of ecological impacts?</p> <p>1.8.1 What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?</p> <p>1.8.2 What is the level of risk associated with the limits of current knowledge?</p> <p>1.8.3 Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?</p>	<p>The current knowledge gaps include are discussed in Section 13 of this report. Details as indicated by the various specialist assessments that have been undertaken for this project are included in Section 10. The impacts on all environmental aspects have been explored in more detail and quantified wherever possible as per Section 14 and Section 15. The mitigation measures associated with the impacts have been determined and are included in Section 15.</p>
1.9	<p>How will the ecological impacts, resulting from this development, impact on people’s environmental right in terms following.</p> <p>1.9.1 Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour,</p>	<p>Refer to the impacts described in Section 14, the impact assessment and proposed mitigation measures included in Section 15.</p>

	<p>etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?</p> <p>1.9.2 Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?</p>	
1.10	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	Refer to the impact assessment and mitigation measures in Section 15 of this EIAR.
1.11	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives/targets/considerations of the area?	The Environmental risk assessment for all environmental features have been assessed and included in the EIA and EMP. Refer to Section 14 and Section 15 of this report.
1.12	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	Refer to Section 7 details of the alternatives considered, and Section 14 and Section 15 the advantages and disadvantages of the proposed activity, of this EIA and EMP.
1.13	Describe the positive and negative cumulative ecological/biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	Refer to Section 15 of this EIAR and EMP.
"Promoting justifiable economic and social development"		
2.1	<p>What is the socio-economic context of the area, based on, amongst other considerations, the following considerations?</p> <p>2.1.1 The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks of policies applicable to the area,</p> <p>2.1.2 Spatial priorities and desired spatial patterns (e.g. need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),</p> <p>2.1.3 Spatial characteristics (e.g. existing land uses, planned land uses, cultural landscapes, etc.), and</p> <p>2.1.4 Municipal Economic Development Strategy ("LED Strategy").</p>	<p>The project is aligned with the objectives as chrome mining is already an ongoing and historic activity within the area and within North West and therefore may not compromise the integrity of the surrounding land uses and neighbouring properties.</p> <p>According to the draft IDP for Bojanala Platinum District Municipality (2022 – 2027) "The mining sector is the largest within Bojanala Platinum District Municipality accounting for R 71.5 billion or 52.1% of the total GVA in the district municipality's economy".</p> <p>This gives a good indication that Chrome mining within the Local area is prevalent and aligned with current developments found within the local vicinity.</p>
2.2	<p>Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?</p> <p>2.2.1. Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?</p> <p>2.2.2. Implementation on Social labor Plan (SLP)</p>	<p>Also refer to the comments made above.</p> <p>The proposed project will benefit society and the surrounding communities both directly and indirectly by providing job security at the proposed operation and through the extraction of chrome reserves within the North West Province. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees.</p> <p>The existing SLP will be implemented and any amendments will be made if necessary to</p>

		<p>ensure local economic development (as recommended in the EMPR).</p> <p>The local community will benefit through the implementation of the SLP which will provide bursaries, learnership and internship opportunities as part of the human resources development programme. A local economic development project will also be identified in conjunction with the STLM IDP.</p>
2.3	<p>How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?</p>	<p>Refer to comments made above. All aspects and comments received from I&APs during the process have been reasonably addressed and are incorporated into this EIA/EMPr to be submitted to the DMRE. Local economic growth and work opportunities will be the main benefits from the project if approved and may address some of the physical, psychological, development, cultural and social needs.</p> <p>Refer to the proposed public participation process in Section 8 of this EIAR and EMPR.</p>
2.4	<p>Will the development result in equitable (intra- and inter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?</p>	<p>Refer to the impact assessment and mitigation measures in Section 15 of this EIA and EMPR.</p>
2.5	<p>In terms of location, describe how the placement of the proposed development will;</p> <p>2.5.1. result in the creation of residential and employment opportunities in close proximity to or integrated with each other,</p> <p>2.5.2. reduce the need for transport of people and goods,</p> <p>2.5.3. result in access to public transport or enable non-motorised and pedestrian transport (e.g. will the development result in densification and the achievement of thresholds in terms public transport),</p> <p>2.5.4. compliment other uses in the area,</p> <p>2.5.5. be in line with the planning for the area,</p> <p>2.5.6. for urban related development, make use of under-utilised land available with the urban edge,</p> <p>2.5.7. optimise the use of existing resources and infrastructure,</p> <p>2.5.8. opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),</p> <p>2.5.9. discourage "urban sprawl" and contribute to compaction/densification,</p> <p>2.5.10. contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs,</p> <p>2.5.11. encourage environmentally sustainable land development practices and processes</p> <p>2.5.12. take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),</p> <p>2.5.13. the investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential),</p> <p>2.5.14. impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the</p>	<p>Alternatives have been assessed during the process and the best suited alternative has been described within this application and depicted in the EIA Phase. Refer to Section 7, details of alternative considered, in this EIAR and Section 15.7.</p>

	area, and 2.5.15. in terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement?	
2.6	How were a risk-averse and cautious approach applied in terms of socio-economic impacts? 2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)? 2.6.2. What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge? 2.6.3. Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	Specialist studies have been undertaken for the EIA phase of the project. All gaps in knowledge have been identified and are included in the EIA phase (Sections 13 and 17) of this report. The expected potentially significant impacts have been identified as part of this EIA process and quantified in Section 15.1 of this EIA report. The mitigation measures associated with the impacts have been determined in Section 15.2.
2.7	How will the socio-economic impacts, resulting from this development impact, on people’s environmental right in terms following: 2.7.1. Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts? 2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	Refer to the impact assessment and mitigation measures in Section 15 of this EIAR and EMPR. The following studies have been undertaken to address this section: Agricultural Impact Assessment, Landscape/Visual Impact Assessment and a Social Impact Study.
2.8	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development’s socio-economic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	An Agricultural Impact Assessment and Social Impact Study has been undertaken for this EIAR (Section 10).
2.9	What measures were taken to pursue the selection of the “best practicable environmental option” in terms of socio-economic considerations?	Refer to the impact assessment and mitigation measures in Section 14 and 15 of this EAR and EMPR.
2.10	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the alternatives identified, allow the “best practicable environmental option” to be selected, or is there a need for other alternatives to be considered?	Refer to the impact assessment and mitigation measures in Section 15 of this EIA report. The mine will be in line with the regulatory requirements and provide financial provision to ensure that the mitigation measures proposed can be carried out. Refer to Section 19.
2.11	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	By conducting a Scoping and Environmental Impact Assessment Process, the Applicant ensures that equitable access has been considered. Refer to the impact assessment and mitigation measures in Sections 14 and 15 of this EIAR and EMPR.
2.12	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development’s life cycle?	Refer to the impact assessment and mitigation measures in Section 15 of this EIA report. The EIA and EMPR specify timeframes within which mitigation measures must be implemented.

2.13	<p>What measures were taken to:</p> <p>2.13.1. ensure the participation of all interested and affected parties,</p> <p>2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,</p> <p>2.13.3. ensure participation by vulnerable and disadvantaged persons,</p> <p>2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,</p> <p>2.13.5. ensure openness and transparency, and access to information in terms of the process,</p> <p>2.13.6. ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge, and</p> <p>2.13.7. ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted?</p>	<p>Refer to Section 8 of this EIAR, describing the public participation process to be undertaken for the proposed project.</p> <p>A copy of the Public Participation Process, including the site notice locations, the newspaper advertisement, and comments and responses received to date from the public have been included in Appendix 4. The site notice locations, the newspaper advertisement, and comments and responses received to during the EIAR phase will be included as an Appendix in the Final EIAR.</p>
2.14	<p>Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g. a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?</p>	<p>Refer to Section 8 of this EIAR, describing the public participation process that has been implemented for the proposed project. The Applicant has a Social Labour Plan in place, which further addresses this aspect.</p>
2.15	<p>What measures have been taken to ensure that current and/or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?</p>	<p>The Mining Right holder will need to follow the existing Environmental Policy and Health and Safety Policy, which will regulate activities on the mining area. All workers and contractors will need to abide to the policies and framework as specified.</p>
2.16	<p>Describe how the development will impact on job creation in terms of, amongst other aspects:</p> <p>2.16.1. the number of temporary versus permanent jobs that will be created,</p> <p>2.16.2. whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area),</p> <p>2.16.3. the distance from where labourers will have to travel,</p> <p>2.16.4. the location of jobs opportunities versus the location of impacts (i.e. equitable distribution of costs and benefits), and</p> <p>2.16.5. the opportunity costs in terms of job creation (e.g. a mine might create 100 jobs, but impact on 1000 agricultural jobs, etc.).</p>	<p>A Social Impact Study and Agricultural Impact Assessment has been undertaken as part of the EIA process.</p>
2.17	<p>What measures were taken to ensure:</p> <p>2.17.1. that there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment, and</p> <p>2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?</p>	<p>The applicant is in the process of applying for the following aspects across different legislation requirements:</p> <ul style="list-style-type: none"> • Section 102 Amendment • Environmental Authorisation in terms of NEMA; • WUL (Department of Water and Sanitation –DWS – To be initiated). • All legislation that has been incorporated within these processed were discussed within Section 4 regarding Policy and Legislative Content above.

2.18	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Refer to Section 8 of this EIAR, describing the public participation process to be implemented for the proposed project, as well Section 15 and Section 21.1.2 (the impact on any national estate), in the EIAR. The Applicant also has a Social Labour Plan in place.
2.19	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	Refer to the impact assessment and mitigation measures in Section 14 and Section 15 of this report.
2.20	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	This has been addressed in Section 19 of the EIAR.
2.21	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Refer to Section 7 (description of the process followed to reach the proposed preferred site), of the EIAR.
2.22	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	Refer to Section 14 of this report

6 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

This section provides a short discussion for the timeframes and scheduling for the implementation of the various project phases.

6.1 EXPLANATION OF THE TIME TAKEN TO DEVELOP THE MINE AND COMMENCE PRODUCTION

To develop the opencast mine, a full feasibility study was conducted. The opencast time frames will consider key assumptions with respect to project timing used in constructing the financial model:

- Project start, site establishment – Month 1,
- Induction and training of employees - Month 1,
- Establish perimeter fence, water reticulation, weighbridge, roads and additional infrastructure required - Month 2 - 3,
- Preparation of temporary offices/facilities - Month 3,
- Commence stripping of topsoil and overburden - Month 4,
- Development of Box cuts – Month 2 to 5,
- First ore available from open pit blocks (Crushing and screening) - Month 5,
- Steady state production from opencast - Month 6.

It is assumed that the construction of the engineering and surface infrastructure for the site would be spread over 3 months. This would include the provision of bulk services (water) at the initial starting point of the opencast mining operation.

6.2 EXPLANATION OF THE PRODUCTION BUILD UP PERIOD ONCE PRODUCTION COMMENCES

Samancor WCM plans to include opencast mining to the existing EMPr by means of an application in terms of Section 102 of the MPRDA, 28 of 2002. The production build-up period once production commences is shown in Section 0 below.

6.3 EXPLANATION OF PRODUCTION DECLINE PERIOD

Production decline will be caused by reserve depletion. Profiles of existing operations will remain aligned to initial application and approvals granted for Buffelsfontein West Opencast Section.

6.4 PRODUCTION FORECAST FOR EACH YEAR OVER THE FULL PERIOD APPLIED FOR BASED ON THE ABOVE EXPLANATIONS. (NOT LIFE OF MINE CALCULATION).

Production profiles of existing operations will remain aligned to initial application and approvals granted for NW 30/1/2/2/482MR. At the production forecast rate of 65 000t/m, it is estimated to take 10 years to exploit the reported mineral reserve in opencast mining operations conducted on the respective portions of the farm Buffelsfontein 465 JQ. The production forecast estimated mineral reserves and LOM estimates are based on

current mining modifying factors and economic considerations and may be adjusted as part of continuous optimization strategies.

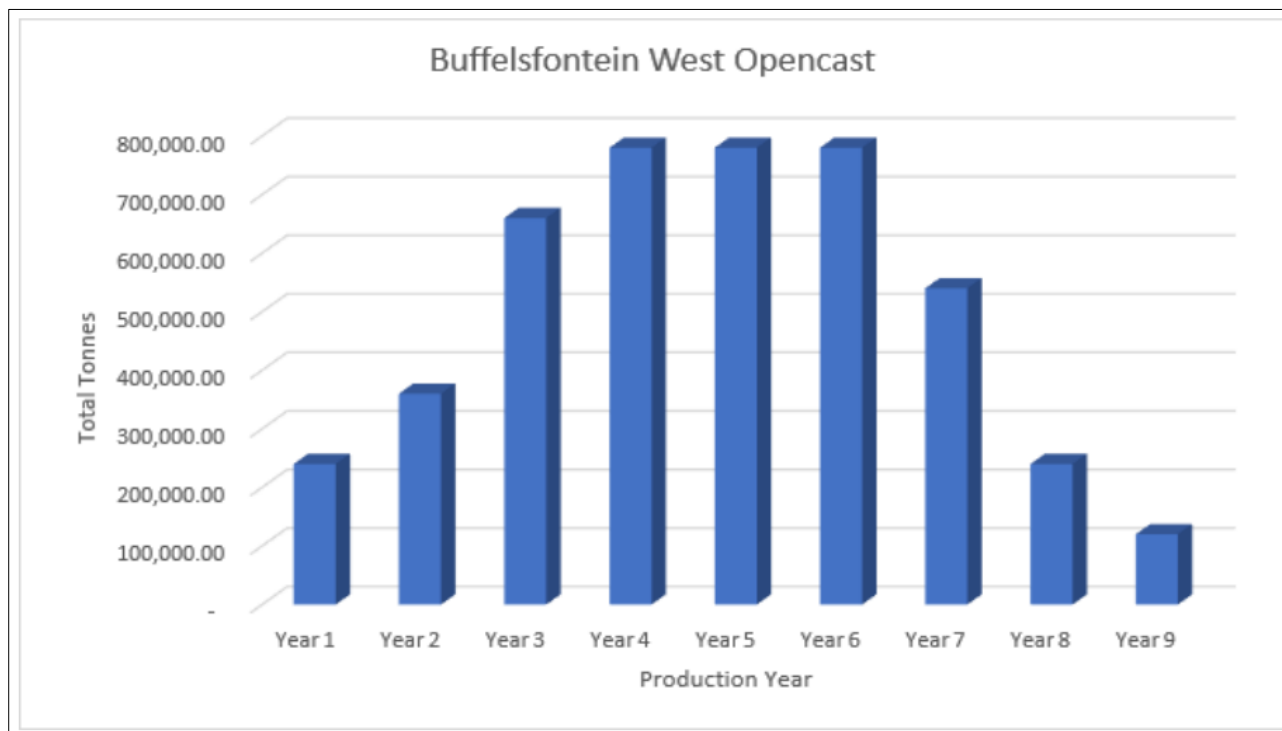


Figure 12: Production forecast for Buffelsfontein West Opencast Section

7 MOTIVATION FOR THE OVERALL PREFERRED SITE, ACTIVITIES AND TECHNOLOGY ALTERNATIVE

NB!! to This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout.

i) Details of all alternatives considered

(With reference to the site plan provided as Appendix 3).

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

The identification of alternatives is a key aspect of the success of the EIA process. All reasonable and feasible alternatives must be identified and screened to determine the most suitable alternatives to consider and assess. There are, however, some significant constraints that have to be taken into account when identifying alternatives

for a project of this scope. Such constraints include social, financial and environmental issues, which will be discussed in the evaluation of the alternatives. Alternatives can typically be identified according to:

- Location/layout/design alternatives;
- Process alternatives;
- Technological alternatives; and
- Activity alternatives (including the No-go option).

For any alternative to be considered feasible such an alternative must meet the need and purpose of the development proposal without presenting significantly high associated impacts.

The alternatives are described, and the advantages and disadvantages are presented in this section. It is further indicated which alternatives are considered feasible from a technical as well as environmental perspective.

Alternatives can also be distinguished into discrete or incremental alternatives. Discrete alternatives are overall development options, which are typically identified during the pre-feasibility, feasibility and or scoping phases of the EIA process (DEAT; 2004). Incremental alternatives typically arise during the EIA process and are usually suggested as a means of addressing identified impacts. These alternatives are closely linked to the identification of mitigation measures and are not specifically identified as distinct alternatives. This section provides information on the development footprint alternatives, the properties considered, as well as the type of activity, activity layout, technological and operational aspects of the activity.

7.1 DETAILS OF LOCATION ALTERNATIVES

The section below describes the site/location alternatives considered as part of the project. As indicated the Buffelsfontein West Section is an existing mine, and has been subjected to previous environmental processes, which considered alternatives in the form of both development and land use alternatives prior to approval.

7.1.1 DETAILS OF DEVELOPMENT PROPERTY

The sites for the opencast mining were determined based on the evaluation of the current mineral asset base as described within the Mining Works Programme (MWP). Minerals can only be mined where identified and verified, therefore, it was not practical to select any other sites. The proposed opencast mining of the current mining right area must be taken into consideration for economic viability and practicality as well as the location of the resource to be mined.

7.1.2 CONSIDERATION OF PROPERTY

The proposed opencast mining includes areas that are already included in the existing Mining Right of Samancor Chrome. Therefore, no other alternatives were considered with regards to consideration of property.

7.1.3 SITE ALTERNATIVES

7.1.3.1 SITE ALTERNATIVES FOR MINING AREA SUITABLE FOR OPENCAST EXCAVATION.

The site for the opencast mining operation was selected based on the availability of Chrome and PGM seams/reserves to be mined. Minerals can only be mined where identified and verified, therefore it was not practical to select any other sites. Infrastructure from existing operations will be utilised during the proposed opencast mining. Existing infrastructure has been investigated during previous EIA phase of the initial mining application and subsequent environmental authorization process. The sites for the infrastructure related to the proposed mining operations are located at the various points which are practical for the mining and would have the least impact on the surrounding environment. The areas that would be most suitable for aboveground infrastructure must take into consideration environmental conditions, topography, financial feasibility, the linkage between opencast pits, adits/shafts and surface infrastructure, access to various parts of the site and existing infrastructure.

7.2 DESIGNS AND LAYOUT ALTERNATIVES

Please refer to Section 7.1.3 above where the site alternatives for the mining infrastructure in relation to the reserves are discussed.

7.3 PROCESS ALTERNATIVES

Run of mine ore is processed through an already established beneficiation plant. The plant forms part of the Western Chrome Mine facilities. The plant is situated next to the shaft. The current process plant is proven technology, allowing the most efficient extraction of chrome (and related minerals) from the mined resources at the most cost-effective manner.

7.3.1 MINING METHOD

- Process Alternative P1a – Opencast Mining: this would involve the creation of a new opencast pit. The opencast mining will be done by means of drilling and blasting, using the single benching method as defined in the blast design. Roll over mining will be done.
- Process Alternative P1ab – Underground: The UG1 ore resource have already been mined.

Process Alternative P1a is the “preferred alternative” due to the availability of the ore resource and proximity to the surface. P1a is also the most cost-effective process of extracting the ore from the ground.

7.3.2 DISPOSAL OF WASTE

- Process Alternative P2a – Discard: This option means that remaining residue deposit from the UG1 will be discarded onto existing stockpiles within the mining property.
- Process Alternative P2b – Stockpile: This option involves stockpiling the waste on site at a designated overburden area specific for the UG1 opencast project.

Process alternative P2b is the “preferred alternative” to ensure that the material is like the existing geology of the UG1 opencast footprint area. The proposed footprint areas for the waste sites will be included in the Final EIA, following specialist assessments and feedback received from the I&APs during public consultation.

7.4 ACTIVITY ALTERNATIVE

The appropriateness of undertaking opencast mining methods for the proposed area has been considered and will allow for mining in areas where previous underground mining was undertaken. An alternative to the proposed mining is grazing and wilderness.

- Activity alternative A1 – Mining: The land would be used for mining.
- Activity alternative A2 – Grazing: This option would be to revert the land use back to its original use.
- Activity alternative A3 – No-go option: The ‘no-go’ or ‘do-nothing’ alternative is the option of not undertaking the proposed activity or any of its alternative. The ‘do-nothing’ alternative also provides the baseline against which the impacts of other alternatives should be compared. The implication of not going through the proposed opencast to include mining additional Chrome and PGM resources includes a reduction in the existing mining operations overall Life of Mine (LOM), as well as compromising the ability of Samancor WCM to ensure consistent supply of Chrome and PGM. If the ‘no-go’ option is opted for, then most likely the mine will cease to operate, and the existing mining areas will be rehabilitated. An opportunity will remain for future mining applicant to apply for rights to access the Chrome and PGM remaining and thereby possibly re-activate mining at a later stage. The ‘no-go’ alternative will sterilise the resource and reduce potential income in the area in terms of salaries and the GDP for the economy and thus is not the preferred activity. The proposed extension would increase the Life of Mine. The potential employment and economic benefits will therefore be foregone. The no-go alternative would therefore maintain the current environmental condition at the site but would reduce the potential Life of Mine.

7.5 DETAILS OF TECHNOLOGY ALTERNATIVES

7.5.1 PROCESSING TECHNOLOGY TO BE USED IN THE ACTIVITY

Technology Alternative T1a – Crushing and Screening configuration: The existing Mooi noi beneficiation plant comprises of four subsections including the heavy medium separation (HMS) Wemco section, the HMS cyclone plant, the wash plant section and the fines (-2mm) plant with a capacity of 110 000 tonnes/month.

T1a is the “preferred alternative” because the plant is existing. The financial implications for using any alternative methods would render the opencast mining operation economically not viable due to the cost involved in changing to new alternatives.

7.5.2 TRANSPORT OPTIONS

There are several product transports options available. The feasibility of these options would hinge on the final market for Chrome and PGMs, as well as the proximity of available transport infrastructure. The following alternatives have been considered:

- Transport Alternative T2a – Road: This option would involve transport of the product by existing tar road networks around the mountain to the respective destination. This is the alternative currently used to transport the Chrome and PGM. These roads include the existing Samancor access roads.
- Transport Alternative T2b – Use of Conveyor: This option would involve transport of chrome and PGM by conveyor to its end destination. There is no existing and feasible chrome and PGM conveyor network within proximity to the mine.

T2a technology is the “preferred Alternative”. The product will be loaded from the stockpiles into trucks by front-end loaders and transported by road to Rustenburg siding. At the siding the products will be loaded onto railway trucks for transportation to inland customers and to the ports of Durban and Richards Bay for export to customers abroad.

7.6 No Go Option

The no-go option refers to the alternative of the proposed development not going ahead at all. This alternative will avoid potentially positive and negative impacts and the environmental condition of the area would remain without any deviations or expansions. The implications of the no-go focus on comparing potential impacts from the proposed project with the status quo and are particularly relevant should it be found that detrimental impacts cannot be managed to an acceptable level.

This section describes the pros and cons of various alternatives described above. The findings are presented here in Table 7 and Table 8.

Table 7: Summary of advantages and disadvantages of alternative land uses

Feasible Land Use Alternative	Advantages	Disadvantages
Mining	<ul style="list-style-type: none"> • A commercial mining operation with a sustainable life of mine; • Provision of sustainable employment and employment retention; • On-going economic input into the immediate and surrounding area; • Improvement of existing infrastructure; • Local economic development through the implementation of the SLP; • Economic injection into the region in terms of small business enterprise development; • On-going supply of both export quality chrome and chrome for the domestic South African market. 	<ul style="list-style-type: none"> • Numerous potential significant negative social and environmental impacts; • Limited duration of socio-economic benefits; • Rezoning of land required; • Changes to existing land use and land character; • Long-term environmental liability; and • Residual/latent environmental impacts that requiring management and monitoring post mining; • Chrome can be a toxic, mutagenic and carcinogenic metal posing a risk to microorganisms, plants, animals and humans. The effluents and solid wastes from the mining of chrome are high in chromium concentration and identified as a major health hazard because of pollution to the environment. Seepage, and leaching of toxic chromium from soil into water bodies poses a threat to the environment.
Mixed (Agriculture & Mining)	<ul style="list-style-type: none"> • A commercial mining operation with a sustainable life of mine; • Provision of sustainable employment and employment retention; • On-going economic input into the immediate and surrounding area; • Improvement of existing infrastructure; • Local economic development through the implementation of the SLP; • Economic injection into the region in terms of small business enterprise development; 	<ul style="list-style-type: none"> • Potentially compounded significant negative social and environmental impacts; • Rezoning of sections of land required; • Long-term environmental liability; and • Residual/latent environmental impacts that requiring management and monitoring post mining;

Feasible Land Use Alternative	Advantages	Disadvantages
	<ul style="list-style-type: none"> • On-going supply of both export quality chrome; • Continuation of agriculture and associated based economic benefits; • Reduced disruption of existing land use; • Reduced disruption of landscape character; and • Better, more effective use of land 	

Table 8: Summary of advantages and disadvantages of mining alternatives

Mining Method Alternative	Advantages	Disadvantages
Opencast Mining	<ul style="list-style-type: none"> • Chromite extraction can start much more quickly, which equals faster return on investment; • Production is higher; • Improved safety condition for workers; • Mechanization has no limits in terms of the dimensions of the equipment; • More flexible planning as the pit progresses; and • Better recovery of the volume of exploitable ore. 	<ul style="list-style-type: none"> • Rezoning of land required; • Landscape and visual impacts more significant; • Generation of dust and noise during mining activities; • Long-term environmental liability; and • Residual/latent environmental impacts that requiring management and monitoring post mining.
Underground Mining	<ul style="list-style-type: none"> • Resource has already been depleted; • Reduced land footprint; • Deep reserves can be exploited; and 	<ul style="list-style-type: none"> • Mining in is often inefficient with economically valuable material inevitably, occasionally, being left

Mining Method Alternative	Advantages	Disadvantages
	<ul style="list-style-type: none"> • Reduced waste and mill tailings. 	<p>in the stope roof / floor or sidewalls (depending on the geometry of the orebody);</p> <ul style="list-style-type: none"> • Health risks involved; • Long-term environmental liability; and • Residual/latent environmental impacts that requiring management and monitoring post mining.

8 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

Describe the process undertaken to consult interested and affected parties including public meetings and one on one consultation. NB the affected parties must be specifically consulted regardless of whether or not they attended public meetings. (Information to be provided to affected parties must include sufficient detail of the intended operation to enable them to assess what impact the activities will have on them or on the use of their land.

8.1 PUBLIC PARTICIPATION

The Public Participation Process (PPP) is a requirement of several pieces of South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their comments are considered and a record of all comments and responses is included in the reports submitted to the Authorities. The process ensures that all stakeholders are provided an opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Involvement and participation in the environmental study and authorisation/approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Introduce the proposed project;
- Explain the authorisations required;
- Explain the environmental studies already completed and yet to be undertaken (where applicable);
- Solicit and record any issues, concerns, suggestions, and objections to the project;
- Provide opportunity for input and gathering of local knowledge;
- Establish and formalise lines of communication between the I&APs and the project team;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximize and/or promote positive environmental impacts associated with the project.

8.2 LEGAL FRAMEWORK

The PPP for the proposed project will be undertaken in accordance with the requirements of the MPRDA and the NEMA EIA Regulations (2014), as amended in 2021, as well as the NWA and in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project and have their views considered and included as part of project planning.

8.2.1 SECTION 39: ACTIVITY ON LAND OWNED BY PERSON OTHER THAN THE PROPONENT - SUBREGULATION 1 AND 2(A), (B) AND (C)

- (1) *If the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land.*
- (2) *Subregulation (1) does not apply in respect of—*
 - (a) *linear activities;*
 - (b) *activities constituting, or activities directly related to prospecting or exploration of a mineral and petroleum resource or extraction and primary processing of a mineral or petroleum resource; and*
 - (c) *strategic integrated projects as contemplated in the Infrastructure Development Act, 2014.*

The application is applying for an amendment of the existing mining right to utilize opencast mining instead of underground mining. The proponent is required to obtain written consent of the landowner or person in control of the land to undertake the activity.

8.2.2 SECTION 41: PUBLIC PARTICIPATION PROCESS

8.2.2.1 SECTION 41, SUBREGULATION 2 (A) – SITE NOTICES

- 1) *The person conducting a public participation process must take into account any relevant guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of an application or proposed application which is subjected to public participation by—*
 - a) *fixing a notice board at a place conspicuous to and accessible by the public at the boundary, on the fence or along the corridor of—*
 - i. *the site where the activity to which the application or proposed application*
 - ii. *relates is or is to be undertaken; and*
 - iii. *any alternative site.*

Eleven (11) site notices were erected within and surrounding the proposed project area. The site notices were placed in conspicuous areas that are accessible by the public at the boundary. The site notices included a short background to the proposed project, the locality of the project, information on the activities that are being applied for and details of how the Environmental Assessment Practitioner (EAP) can be contacted to provide any comments. Refer to Appendix 4 for a copy of the site notice and where they were placed. Sites notices will be placed in conspicuous areas that are accessible by the public at the boundary during this EIA phase.

8.2.2.2 SECTION 41, SUBREGULATION 2 (B) – WRITTEN NOTICE

- b) *giving written notice, in any of the manners provided for in section 47D of the Act, to—*
 - i. *the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;*

- ii. *owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken and to any alternative site where the activity is to be undertaken;*
- iii. *the municipal councillor of the ward in which the site and alternative site is situated and any organisation of ratepayers that represent the community in the area;*
- iv. *the municipality which has jurisdiction in the area;*
- v. *any organ of state having jurisdiction in respect of any aspect of the activity; and*
- vi. *any other party as required by the competent authority;*

All preidentified I&APs were provided with a written notice (Appendix 4), together with a background information document (BID) (refer to Appendix 4 for a copy of the BID).

Written notices have also been sent to the municipality that has jurisdiction in the area and all organs of state as preidentified and that register for the project (Appendix 4). This includes the following:

- South Africa Heritage Resource Agency (SAHRA) – SAHRIS upload;
- Department of Roads and Transport;
- North West Department: Economic Development, Environment, Conservation and Tourism;
- Department of Mineral Resources and Energy (DMRE);
- Department of Water and Sanitation (DWS);
- Department of Forestry, Fisheries and the Environment (DFFE);
- North West Agriculture, Land Reform and Rural Development;
- North West Parks Board;
- North West Department: Public Works and Roads;
- North West Department: Human Settlements;
- Department of Social Development – Provincial;
- South African National Roads Agency;
- Provincial Heritage Authority;
- Eskom Holdings SOC Limited;
- Madibeng Local Municipality;
- Bojanala Platinum District Municipality;
- Ward Councillor/s.

8.2.2.3 DETAILS OF BACKGROUND INFORMATION DOCUMENT (BID)

A BID in English was compiled for distribution (refer to Appendix 4 for a copy of the BID). The BID contained the following information:

- Project name;
- Applicant name;
- Project location (including map of study area);
- Description of the EA application process, EIA flow chart, and public participation process;
- Information on future document review opportunities;

- A detailed questionnaire/ I&AP registration form; and
- Relevant EAP contact person for the project.

Copies of the BID were emailed to the current landowners and adjacent landowners (Appendix 4). Copies of the BID were also given to occupiers of the site and I&APs via direct consultation or emailed to potential I&APs. Copies of the BID documents were hand delivered to government departments and municipalities. The following government departments and municipalities received copies of the BID:

- DWS - North West Regional Office;
- Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA);
- Bojanala Platinum District Municipality; and
- Madibeng Local Municipality.

Copies of the BID will be distributed to any other parties if required by the competent authority. The BID and distribution of the BIDs is presented in this Scoping Report (refer to Appendix 4).

8.2.2.4 SECTION 41, SUBREGULATION 2 (C), (D) & (E) – ADVERTISEMENTS

- c) *placing an advertisement in—*
- one local newspaper; or*
 - any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;*
- d) *placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or district municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and*
- e) *using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desirous of but unable to participate in the process due to—*
- illiteracy;*
 - disability; or*
 - any other disadvantage.*

As the boundary of the proposed project is restricted to the Rustenburg area, an advertisement was placed in the Rustenburg Herald on 31 March 2023 containing the following information:

- Project name;
- Applicant name;
- Project location;
- Nature of the activity;
- Availability of the Draft Scoping Report; and
- Relevant EAP contact person for the project.

A copy of the advert is included in Appendix 4. An advert will be placed in the local newspaper during the draft EIA phase to advise the I&APs and stakeholders of the availability of the EIAR and EMPR. Information in the advert will

include a short project background (including project and applicant name), project location, nature of the activity, information regarding the availability of the reports for review and contact details for the relevant EAP where I&APs can send comments/concerns. A copy of the advert will be included as an Appendix in the Final EIAR and EMPr to be submitted to the DMRE.

8.2.2.5 SECTION 41, SUBREGULATION 3

- 3) *A notice, notice board or advertisement referred to in subregulation (2) must—*
- a) give details of the application or proposed application which is subjected to public participation; and*
 - b) state—*
 - i. whether basic assessment or S&EIR procedures are being applied to the application;*
 - ii. the nature and location of the activity to which the application relates;*
 - iii. where further information on the application or proposed application can be obtained; and*
 - iv. the manner in which and the person to whom representations in respect of the application or proposed application may be made.*

As indicated in Section 8.2.2.2 and Section 8.2.2.4 above, both the site notice and the advert included all information as per the requirements of Section 41, subregulation 3.

The EAP's contact number and email address will be stated on the site notice and adverts. Comments/concerns and queries will be encouraged to be submitted in either of the following manners:

1. Electronically (email).
2. Telephonically; and/or
3. Written letters.

8.2.2.6 SECTION 41, SUBREGULATION 4

- 4) *A notice board referred to in subregulation (2) must—*
- a) be of a size of at least 60cm by 42cm; and*
 - b) display the required information in lettering and in a format as may be determined by the competent authority.*

Site notices erected around the boundary of the proposed project area were at least 60cm by 42 cm. The proposed format is Arial and the font size is 14. A locality map was included on the site notice. Refer to Appendix 4 for a copy of the site notice, as well as a locality map of where the site notices have been placed.

8.2.2.7 SECTION 41, SUBREGULATION 5, 6 & 7

- 5) *Where public participation is conducted in terms of this regulation for an application or proposed application, subregulation (2)(a), (b), (c) and (d) need not be complied with again during the additional public participation process contemplated in regulations 19(1)(b) or 23(1)(b) or the public participation process contemplated in regulation 21(2)(d), on condition that—*

- a) *such process has been preceded by a public participation process which included compliance with subregulation (2)(a), (b), (c) and (d); and*
- b) *written notice is given to registered interested and affected parties regarding where the—*
 - i. *revised basic assessment report or, EMPr or closure plan, as contemplated in regulation 19(1)(b);*
 - ii. *revised environmental impact assessment report or EMPr as contemplated in regulation 23(1)(b);*
or
 - iii. *environmental impact assessment report and EMPr as contemplated in regulation 21(2)(d);*
may be obtained, the manner in which and the person to whom representations on these reports or plans may be made and the date on which such representations are due.
- 6) *When complying with this regulation, the person conducting the public participation process must ensure that—*
 - a) *information containing all relevant facts in respect of the application or proposed application is made available to potential interested and affected parties; and*
 - b) *participation by potential or registered interested and affected parties is facilitated in such a manner that all potential or registered interested and affected parties are provided with a reasonable opportunity to comment on the application or proposed application.*

All relevant facts in respect of the proposed application, were made available to potential I&APs for the Scoping Phase and will be made available for the Environmental Impact Assessment Report with the Environmental Management Programme Report which will be made available for public review and comment for a period of 30 days.

- 7) *Where an environmental authorisation is required in terms of these Regulations and an authorisation, permit or licence is required in terms of a specific environmental management Act, the public participation process contemplated in this Chapter may be combined with any public participation processes prescribed in terms of a specific environmental management Act, on condition that all relevant authorities agree to such combination of processes.*

As this is an integrated application, namely an environmental authorisation and waste licence application in terms of section 102 of the MPRDA to amend the existing EMPr, it was proposed to combine the public participation process with all notification documentation and other public participation opportunities referring to all the authorisation/permit or licence. Public participation for the WUL application will also be conducted according to the relevant regulations.

8.2.3 SECTION 42: REGISTER OF INTERESTED AND AFFECTED PARTIES

8.2.3.1 INTERESTED AND AFFECTED PARTY (I&AP) DATABASE

A proponent or applicant must ensure the opening and maintenance of a register of interested and affected parties and submit such a register to the competent authority, which register must contain the names, contact details and addresses of—

- a) *all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;*
- b) *all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; and*
- c) *all organs of state which have jurisdiction in respect of the activity to which the application relates.*

As part of the PPP, an I&AP database has been developed and will be continuously updated for the project. A copy of the database for the scoping phase is included as Appendix 4. The database will be updated for the EIA phase.

8.2.4 SECTION 43: REGISTERED INTERESTED AND AFFECTED PARTIES ENTITLED TO COMMENT ON REPORTS AND PLANS

8.2.4.1 INTERESTED AND AFFECTED PARTIES AND COMMENTING AUTHORITIES

- 43) 1). *A registered interested and affected party is entitled to comment, in writing, on all reports or plans submitted to such party during the public participation process contemplated in these Regulations and to bring to the attention of the proponent or applicant any issues which that party believes may be of significance to the consideration of the application, provided that the interested and affected party discloses any direct business, financial, personal or other interest which that party may have in the approval or refusal of the application.*
- 2) *In order to give effect to section 240 of the Act, any State department that administers a law relating to a matter affecting the environment must be requested, subject to regulation 7(2), to comment within 30 days.*

Stakeholders who are captured/registered on the database for the project shall include the following:

- The owners or persons in control of the land where the proposed mining is to be undertaken (if different than applicant);
- The occupiers of the property where the development is to be undertaken;
- The owners and occupiers of land adjacent to the mining area;
- Provincial and local government (relevant local and district municipalities);
- Organs of state, other than the authorising authority, such as the Department of Agriculture, Forestry and Fisheries (DAFF – now grouped with Environmental Affairs, forming DFFE since March 2021) or Department of Roads, having jurisdiction in respect of any aspect of the proposed project;
- Relevant residents' associations, rates payers' organisations, community-based organisations and NGOs;
- Environmental and water bodies, forums, groups and associations; and
- Private sector (business, industries) in the vicinity.

8.2.4.2 DECISION MAKING AUTHORITIES IN TERMS OF THE ENVIRONMENTAL AUTHORISATION AND WATER USE LICENCE

The decision-making authorities includes the:

- Department of Mineral Resources and Energy (DMRE); and
- Department of Water and Sanitation (DWS) – (Water Use License).

I&APs who attend any public open days/public meetings and /or submitted contact details will be registered on the I&AP database. The database will be updated on an on-going basis throughout the process and included as an Appendix to the Environmental Impact Assessment Report, as well as the Integrated Water and Waste Management Plan.

8.2.4.3 ENVIRONMENTAL AUTHORISATION AND MINING RIGHT APPLICATION

- Notification:

All potential I&APs will be notified by means of and advertisement, site notices and/or notification letter and be requested to register as an I&AP for the proposed project.

- Scoping Phase:

- During the Scoping phase the I&APs were given the opportunity to comment on the Scoping Report, which was made available for public review for 30 days from 31 March 2023 to 04 May 2023. Registered I&APs were notified of the availability of the Scoping Report. The report was made available electronically via a downloadable link. A hard copy of the report was also made available at the Mooinoi Security Reception and the Madibeng Local Municipality.
- Hard copies of the Scoping Report were also submitted to government departments (North West Department: Economic Development, Environment, Conservation and Tourism, DMRE and DWS) for review.
- All comments received during the scoping phase are included in Appendix 4 in this EIAr/EMPr to be submitted to the DMRE.

- Environmental Impact Assessment Phase:

- The draft EIAr will be made available for public review for 30 days from 31 August 2023 to 02 October 2023. Registered I&APs will be notified of the availability of the EIAr. The report will be made available electronically via a downloadable link and a hard copy of the report will be made available;
- Copies of the EIAr will be submitted to the stakeholders and government departments for review;
- All comments received during the environmental impact assessment phase will be included as an Appendix in the Final EIAr to be submitted to the DMRE.

8.2.4.4 SECTION 44: COMMENTS OF INTERESTED AND AFFECTED PARTIES TO BE RECORDED IN REPORTS SUBMITTED TO COMPETENT AUTHORITY

8.2.4.4.1 PUBLIC MEETINGS AND OPEN DAYS

A public meeting did not take place for the scoping phase.

A public meeting and / or Zoom or Skype, and/or phone calls with landowners, stakeholders and other I&APs will be conducted during the EIA phase of the project. The aim of the meetings (either in person or online) is to share

the results of the specialist studies and provide information from the draft EIAr for the proposed Buffelsfontein West Opencast Section.

8.2.5 SUMMARY OF ISSUES RAISED BY I&APS FROM PUBLIC PARTICIPATION

All issues raised and / or comments received to date have been included in the Public Participation Report, which is attached in Appendix 4 in this report. Comments received to date from the PPP session during the scoping phase have been included in Table 9.

Summary of issues raised by I&APs

(Complete the table summarising comments and issues raised, and reaction to those responses)

Comments received during the public review period to date are included below.

Table 9: Summary of issues raised

Interested and Affected Parties		Date	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and		Comments Received			
Mark with an X where those who must be consulted were in fact consulted.					
AFFECTED PARTIES					
Landowner/s					
Hennie Schoeman	X	31 March 2023	<p>From: Hennie Schoeman Sent: Friday, March 31, 2023 9:13 AM To: sonja@elemental.co.za; Natasha Graaff Subject: NW00318MR/102</p> <p>“Dear all,</p> <p>With reference to the above:</p> <p>According to my GIS, the portion 139 of 465 JQ is correctly referenced. However, your reference to the remaining extent of 465 JQ seems to be incorrect. The correct reference appears to be the remaining extent of portion 35 of 465JQ.</p> <p>Kind regards, Hennie Schoeman”</p>	<p>Response by project team:</p> <p>“Dear Hennie</p> <p>Thank you for the feedback. The farm portion will be confirmed and amended accordingly.</p> <p>Kind regards”</p>	Appendix 4
J.A.P. Bezuidenhout & J.C. Olivier	X	04 May 2023	<p>From: kobusbez@truenw.co.za Sent: Thursday, May 4, 2023 11:42 AM To: Sonja Van De Giessen and Melissa Pillay</p> <p>Cc: jcolivier@lantic.net “Good day Ms Van de Giessen and Ms</p>	Comment noted.	Appendix 4

Interested and Affected Parties	Date			Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and	Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	
Mark with an X where those who must be consulted were in fact consulted.				
		<p>Pillay</p> <p>Find attached herewith a letter regarding the above mentioned applications, for your attention.</p> <p>Please acknowledge receipt of this e-mail and the letter attached herewith.</p> <p>Yours faithfully</p> <p>JC Olivier and JAP Bezuidenhout”</p> <p>“The notice of the public participation process for the above mentioned applications, as advertised in the Rustenburg Herald on 31 March 2023, has reference.</p> <ol style="list-style-type: none"> 1. You are herewith informed that we, JAP Bezuidenhout and JC Olivier have first covering bonds over Portion 26 and Portion 27 of the farm Buffelsfontein 465 JQ, which is directly adjacent to the properties as mentioned in the newspaper notice. 2. Therefore, we herewith formally register as interested and affected party for the public participation process as advertised. 3. We herewith request that all notices, documents and reports regarding the above applications be made available to us at the above mentioned e-mail addresses. 4. Township Establishment approval and Environmental Authorisation has been 		

Interested and Affected Parties		Date	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and		Comments Received			
Mark with an X where those who must be consulted were in fact consulted.					
			<p>granted on Portions 26, 27 and 30 of Buffelsfontein 465JQ.</p> <p>5. The North West Department of Human Settlements has already entered into agreements with the Developer, Lockeport Projects, for an integrated housing project on these properties and the project has already commenced.</p> <p>6. We herewith object to the proposed open cast mining activities and associated infrastructure that will be in conflict with the housing project and the approved development rights and existing contracts.</p> <p>7. As bondholders, we cannot allow any activities that will have a negative influence on the property value of Portion 26 and Portion 27 of Buffelsfontein 465JQ.</p> <p>8. We reserve the right to provide more detailed comments at a later stage of the scoping process.</p> <p>We trust that you find it in order. Yours faithfully”</p>		
Lawful occupier/s of the land					
	X		No response received to date.		
Landowners or lawful occupiers on adjacent properties (Please see under other)					
	X		No response received to date.		
Municipality					
Local & District	X		Emails have been sent, but no response received to date.		
Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS)					
Eskom	X		No comments received to date	All organs of the state received notification of the Buffelsfontein West Opencast Section Draft Scoping Report.	
North West	X		No comments received to date		

Interested and Affected Parties	Date	Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
Parks Board					
Department of Agriculture, Land Reform and Rural Development					
Lesolobe Moaisi	X	31 March 2023	<p>From: Lesolobe Moaisi Sent: Friday, March 31, 2023 9:31 AM To: Natasha Graaff Cc: Batlang Lekalake ; Moduku Khwene Subject: RE: Buffelsfontein West Opencast Section: Availability of Draft Scoping Report</p> <p>“Good Day,</p> <p>Please liaise with the above copied officials in future for further assistance</p> <p>Thanks”</p>	<p>Response by project team:</p> <p>“Good day</p> <p>Kindly noted, thank you.</p> <p>Kind regards”</p>	Appendix 4
Department of Public Works					
Solly Ncoane	X	12 April 2023	<p>From:Solly.Ncoane@dpw.gov.za Sent: Wednesday, April 12, 2023 1:26 PM To: Natasha Graaff Cc: dimakatso.mokhachane@dpw.gov.za; Noel.Netshifhefhe@dpw.gov.za; Mmalenyalo.Mowa@dpw.gov.za</p> <p>“Dear Natasha, I hereby confirm receipt of your mail and its contents noted accordingly.</p> <p>It would be important that we arrange a meeting with your company to make a formal presentation to the Department before a decision can be taken on this matter. Kindly confirm your availability, preferably three tentative dates.</p> <p>Thanking you in anticipation.</p>	<p>Response by project team:</p> <p>Sent: Friday, April 14, 2023 12:34 PM</p> <p>Good day Solly</p> <p>Thank you for your email. Please note a public meeting will be arranged to engage with all interested and affected parties. Once the date is confirmed it will be communicated.</p> <p>In the meantime please advise if you will be able to attend a Teams meeting? You can let me know which date is suitable from the following:</p> <p>1) 19 April 2023 – 09:00am 2) 21 April 2023 – 08:30am 3) 24 April 2023 – 08:30am</p> <p>Please contact me if you have any queries.</p>	Appendix 4

Interested and Affected Parties		Date	Issues raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and		Comments Received			
Mark with an X where those who must be consulted were in fact consulted.					
			Sincere regards, Solly Ncoane Director REMS State Owned Property Portfolio"	Kind regards Natasha Graaf"	
				Follow up email: Sent: Tuesday, 25 April 2023 13:54 "Good day Solly I just wanted to follow up on the meeting request. The suggested dates have already passed. Please advise which date you will be available. Kindly note the 30 day public participation period ends on the 04th of May 2023. Kind regards"	
Traditional Leaders					
Dept. Environmental Affairs					
	X		No comments received to date		
Competent Authorities affected					
Department of Mineral Resources and Energy (DMRE)	X	-			
Department Water and Sanitation	X	30 March 2023	Attention: Sonja van de Giessen, Melissa Pillay / Mpho Mokoene / NW30/5/1/2/3/2/1 (480 & 482) EM Draft Scope Report for proposed - Samancor Chrome Ltd - WCM -	Noted.	Appendix 4

Interested and Affected Parties	Date			Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and	Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	
Mark with an X where those who must be consulted were in fact consulted.				
		<p>Buffelsfontein West Opencast Section (and establishment of new road, topsoil stockpiles, waste rock dumps and Run of Mine (ROM) - ptn 139, re/ext Buffelsfontein 465 JQ</p> <p>This office acknowledges the receipt of your documents regards to the above-mentioned on 30 March 2023 (Task T174/2023). The office responsible for this area is: Mr Herbert Kutama and can be contacted at 083-308-0293.</p> <p>Comments would be forwarded in due time.</p> <p>Thank you</p> <p>Ms C THEUNISSEN CHIEF ADMIN CLERK”</p>		
OTHER AFFECTED PARTIES				
Marisa Pienaar	-	<p>March 31, 2023 12:41 PM</p> <p>“Good morning Natasha</p> <p>I assume this was sent to us as IAPs pertaining to Rustenburg Minerals Development Company (Thutsi Mining) ? If so, please note that we sold the land and transferred our interest in the mining rights in terms of a Section 11 transfer in 2018. You can therefore remove us as IAPs.</p> <p>Can you please confirm if my assumption above is correct.</p>	<p>Response by project team (March 31, 2023 12:48 PM):</p> <p>“Good day Marisa</p> <p>The notification was sent pertaining to the African Mining Trust. Kindly advise if I should still remove you as an I&AP?</p> <p>Kind regards”</p> <p>-----</p> <p>-----</p>	Appendix 4

Interested and Affected Parties	Date			Section and paragraph reference in this report where the issues and or response were incorporated.
List the names of persons consulted in this column, and	Comments Received	Issues raised	EAPs response to issues as mandated by the applicant	
Mark with an X where those who must be consulted were in fact consulted.				
		<p>Kind Rgds Marisa”</p> <p>-----</p> <p>----</p> <p>March 31, 2023 12:54 PM:</p> <p>“Hi Natasha</p> <p>Yes, that is correct. African Mining and Trust used to be the holding company of Rustenburg Minerals Development Company (now Thutse Mining), but we transferred our rights to the new owners by means of a S11 transfer on 31 August 2018. You can add Thutse Mining as the new mining operation and remove AMT as an IAP.</p> <p>Contact details for them: mampa@polka.co.za Attention: Mr. Willie Modise Fax: 012 543 9051 I trust the above will suffice.</p> <p>Kind Rgds Marisa”</p>	<p>Response by project team (March 31, 2023 1:02 PM):</p> <p>“Hello Marisa</p> <p>Thank you for the feedback and contact details. Thutse Mining will be added and AMT will be removed.</p> <p>Kind regards”</p>	
OTHER: (NONE)				

8.2.5 WAY FORWARD

All comments received from I&APs and organs of state and responses will be addressed in a transparent manner and included in the Public Participation Report in the final Environmental Impact Assessment Report to be submitted to the Competent Authority (CA). Any additional comments received after submission will be forwarded to the Department of Mineral Resources and Energy (DMRE) (if received after commenting period).

8.2.6 DMRE REVIEW OF ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT REPORT – FINALISED REPORT

The DMRE will decide whether the Environmental Authorisation will be approved or rejected based on the contents of the final report submitted.

9 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES

(The environmental attributes described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

The description of the baseline receiving environment (on site and surrounding) was obtained from the studies undertaken by the specialist team, as well as the existing EMP.

10 THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES: BASELINE ENVIRONMENT

(Its current geographical, physical, biological, socio-economic and cultural character)

This section of the EIA Report provides a description of the environment that may be affected by the proposed project. Aspects of the biophysical, social and economic environment that could be directly or indirectly affected by, or could affect, the proposed development have been described.

10.1 GEOLOGY

The general rock sequence of the Bushveld Complex (BC) consists predominantly of mafic to ultramafic rock types in successive stratiform layering. This formed due to continuous injections of magma into sub-volcanic, shallow level chambers. The Rustenburg Layered Suite (RLS), a subdivision of the BC is the primary ultramafic sequence of interest in the region due to its multiple valuable mineral resources and relative ore body morphology and chemical homogeneity. The RLS can be subdivided into five discrete geographic compartments, or limbs. These include the Upper Zone (UZ), Main Zone (MZ), Critical Zone (CZ), Lower Zone (LZ) and Marginal Zone (MGZ). The general geology of the RLS can be described as Peridotitic intrusion containing rock types: dunite, pyroxenite, norite, gabbro, anorthosite, magnetite and apatite-rich with thin intercalated chromitite seams.

The continuity of the Critical Zone is intermediate between that of the Lower Zone and Main-Upper Zones. The Critical Zone is the host to all chromium and PGM mineralization within the BC. The igneous layering within the

Critical Zone is remarkably uniform over large extents of the BC, with individual layers traceable for tens to hundreds of kilometers. It may be subdivided into lower and upper sections with cyclic units consisting of chromitite, pyroxenite, norite and anorthosite. Cycles in the Lower Critical Zone are entirely ultramafic in character. Cycles in the Upper Critical Zone comprise ultramafic lithology transitioning into a felsic norite-anorthosite succession.

Chromitite seams occur throughout the Critical Zone of the BC, in successive sequences from the base of crystallization cycles. The chromitite seams have been classified into the Lower, Middle and Upper groups, with the Lower Group occurring in the Lower Critical Zone and the Upper Group in the Upper Critical Zone. The Middle Group chromitite seams straddle the boundary between lower and upper divisions of the Critical Zone. The chromitite seams are named according to their location within the layered succession, with numbers commencing from the bottom up, with the lowermost group being named LG1, followed by LG2, LG3, etc. in the Lower Group (consisting of 7 layers), progressing to MG0, MG1, MG2, etc. (consisting 4 layers) in the Middle Group, and then on two layers in the Upper Group, UG1 and UG2. The thickness of these chromitite layers ranges from several millimeters to several meters and named chromitite layers may comprise multiple, composite layers of chromitite separated by interlaminated silicate rocks. Rocks of the Lower Critical Zone and Upper Critical Zone of the BC underlie the target area of this application, consisting of chromitite interlayered with pyroxenite, norite, anorthositic-norite, and mottled anorthosite.

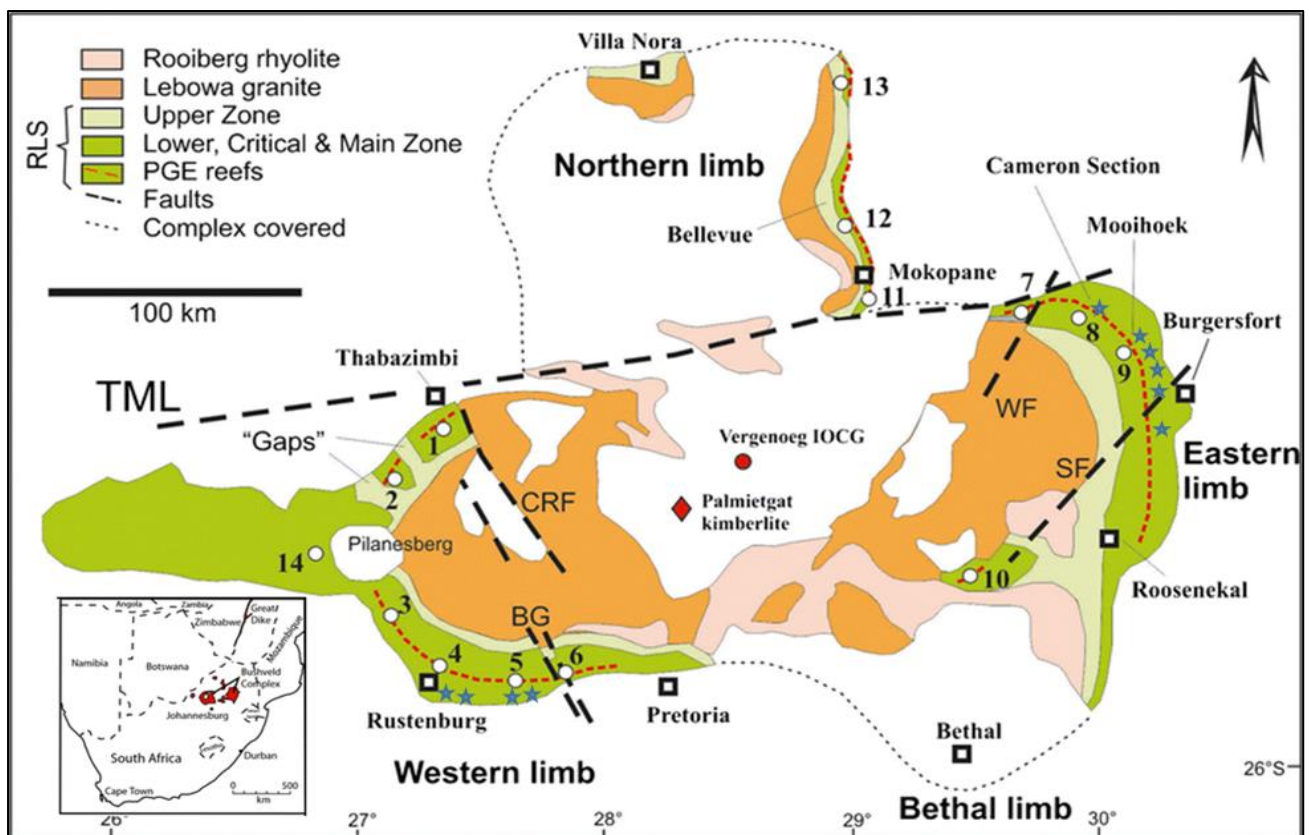


Figure 13: Generalized locality and regional geology

10.1.1 GEOLOGICAL SETTING

The Middle Group (MG) chromitite succession of the Marikana section of the RLS comprises of five main chromitite horizons hosted in primarily ortho-pyroxene, anorthosite and norite. The chromitite seam horizons are closely spaced comprising of eight independent discernible seams horizontally spaced over an interval of 50 meters. As per standard nomenclature, the eight seams are termed MG0 to MG4A in vertical succession. The Lower Group (LG) succession is poorly developed in the Marikana section of the RLS, with only partially developed lenses evident throughout the section. The MG0 single chromitite seam is the lowermost horizon in the MG succession and marks the initial economic seam of interest in the region. The MG1 seam is identified as a single homogeneous tabular seam primarily focused on during chromitite mining activity in the region. The MG2 package is subdivided into three closely spaced and continuous chromitite seams separated by two pyroxenite layers. The seams are termed MG2A, MG2B and MG2C respectively from base to top in the succession. The MG2 hanging wall contact marks the first occurrence of anorthosite in the CZ of the RLS. The MG3, MG4 and MG4A chromitite seams are hosted primarily in norite with gradual localized transitions to pyroxenite. Gradational reductions in chromium and iron oxide concentrations from basal seams to uppermost seams necessitates simultaneous extraction of the seams.

The chromitite seams sub-outcrop on the Properties and strike east-west, dipping an average of 15°N. The outcrops are overlain by predominantly clay rich soils, locally referred to as “black turf”. Sub-outcrop depths vary between 0.5 meters and 1.5 meters below surface. Figure 14 illustrates the generalized stratigraphic section of the RLS.

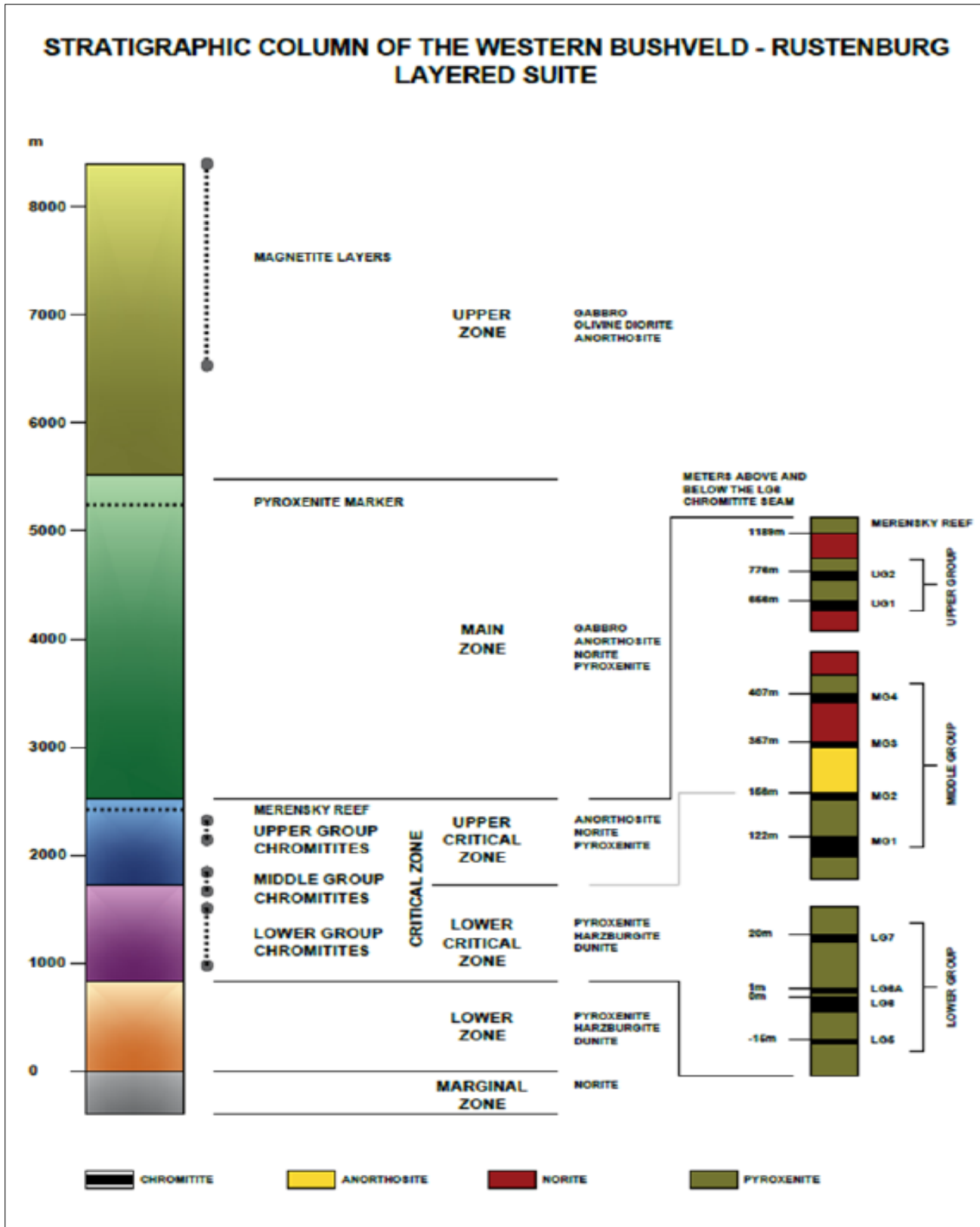


Figure 14: Generalized stratigraphic section of the RLS

10.1.2 DEPTH OF THE SEAMS BELOW SURFACE

The horizons of economic interest sub-outcrop (approximately 0.5m to 1.5m) below the black turf on the farm Buffelsfontein 465JQ, Elandsdraal 469JQ, Elandsdrift 467JQ, Middelkraal 466JQ, and dip north-northwest.

Mining of the MG succession of chromitite seams is planned at depths ranging from 0 m to 100 meters below surface for opencast mining operations and 100 meters to 600 meters for underground mining operations. Mining on NW 30/5/1/2/2/482 MR will however be limited to a maximum depth below surface of 150 meters.

The approximated depth below surface specified for the individual mining methods remains dependent on modifying factor considerations. Optimization of mine designs are dependent on socio- and economic considerations and will be an ongoing function of the planning department.

10.1.3 MAJOR GEOLOGICAL FEATURES PRESENT WITHIN THE MINING RIGHT AREA

Geological structures and stratigraphic discontinuities, whether locally or regionally scaled, have been significant if not the primary modifying factors in mine development and planning. These structures and discontinuities not only alter the general trend (strike and dip) of an ore body, but will subsequently influence the mineralogy, composition and stratigraphy of the ore body and its surrounding country rock. The interpretation and understanding of geological structures and discontinuities remain an integral part of mining and mine workings.

The Buffelsfontein West Opencast Section, inclusive of the respective farms listed in the mining right, is considered a geologically complex area due to the frequency and influence of major geological discontinuities on the general homogeneity of the ore bodies. Multiple major geological discontinuities bisect the chromitite seams identified on NW 30/5/1/2/2/482 MR and are extrapolated to impact mining activities in NW 30/5/1/2/2/482 MR. Figure 15 illustrates the identified geological discontinuities present at the Buffelsfontein West Opencast Section.

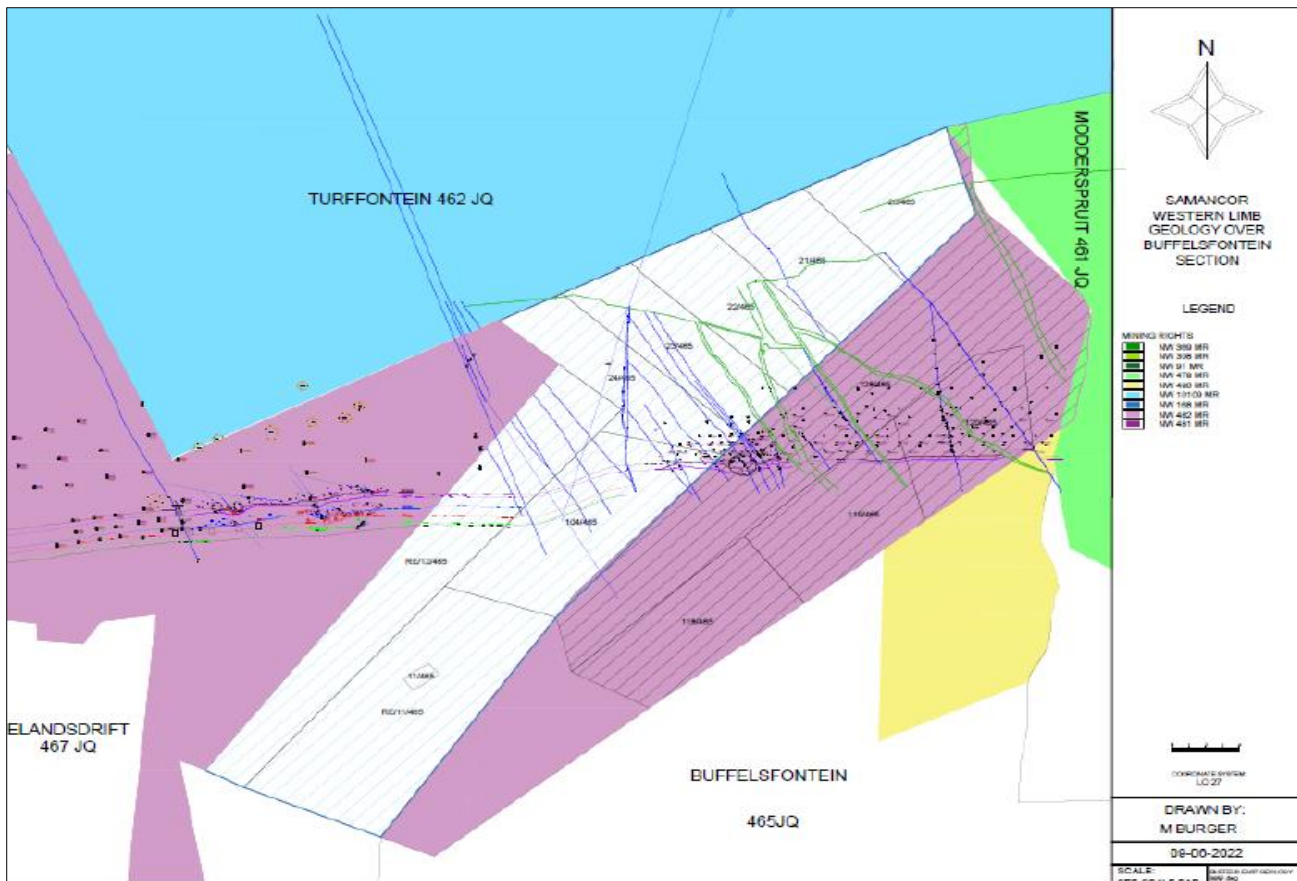


Figure 15: The identified geological discontinuities present at the Buffelsfontein West Opencast Section

10.1.4 FAULTING

Multiple major faults and associated minor faults bisect the Buffelsfontein West Opencast Section, with north-south trending normal faults and east-west trending reverse faults representing the predominant displacement discontinuities. The frequency of faulting as well as severity of displacement and associated ground conditions increases from west to east (Buffelsfontein 465JQ). Multiple major faults have been delineated through surface drilling, historic opencast and underground excavations (both active and historic) to influence the opencast mining activities on NW 30/5/1/2/2/482 MR. The faults trend north-northwest and displace the chromitite seams approximately 2.0 meters to 30.0 meters.

10.1.5 DYKES

Multiple dolerite dykes trending predominantly northwest bisect the planned mining areas. Secondary dyke swarms bisect the planned mining area, striking west north west, east south east. Multiple thin intrusions, striking sub-parallel to the major intrusion directions have been identified in active and historic workings confined to the mining right area. These thin intrusive bodies are not expected to disrupt mining activities and will be controlled as part of the ground control strategies. The mine designs have been adjusted to incorporate the expected geological losses incurred as a result of the extrapolated dykes.

10.1.6 POTHOLING

These are broadly circular to oval shaped randomly distributed features of highly variable size, within which the chromitite sharply transgresses its footwall units and ultimately lies at a lower stratigraphic elevation than the typical seam horizon. These features are frequently accompanied by thinning of the chromitite seams, coupled with steep and erratic dips around the pothole, resulting in a potential total ground loss during underground mining operations. Potholes may vary in size and shape, as well as overall morphology and chemical characteristics. NW 30/5/1/2/2/482 MR is expected to routinely encounter potholing and potholing related structural discontinuities as mining faces advance. Potholing locations and extrapolated areas of impact are based on surface drilling information as well as historic and active surface and underground excavations.

10.1.7 FELSIC PEGMATITE VEINS AND ULTRAMAFIC PEGMATITE BODIES

Pegmatite veins are thin dyke like intrusions extending through the chromitite seams and pyroxenite host rock but may pinch out when intersecting a thicker underlying chromitite seam. Felsic Pegmatite veins composed of predominantly quartz, alkali feldspar and iron rich mica vary in thickness and can dissipate or divert on stratigraphic boundaries. The pegmatite veins actively monitored in the operations confined to NW 30/5/1/2/2/482 MR trend in a predominantly east-west direction. Pegmatite veins in conjunction with other geological structures will also result in poor and blocky hanging wall and highwall conditions. The pit highwalls are designed syn-parallel to the dominant trend direction of pegmatite veins. This will result in continuous scaling and dislodging of material due to reduced cohesion of the rock mass. Active monitoring of these discontinuities will ensure that sufficient risk mitigation measures are applied in all surface and underground operations.

10.2 Topography

The area is situated on the northern slopes of the Magaliesberg and adjacent low-lying areas to the north, is very effectively sheltered by an extensive plateau and the Magaliesberg Mountain.

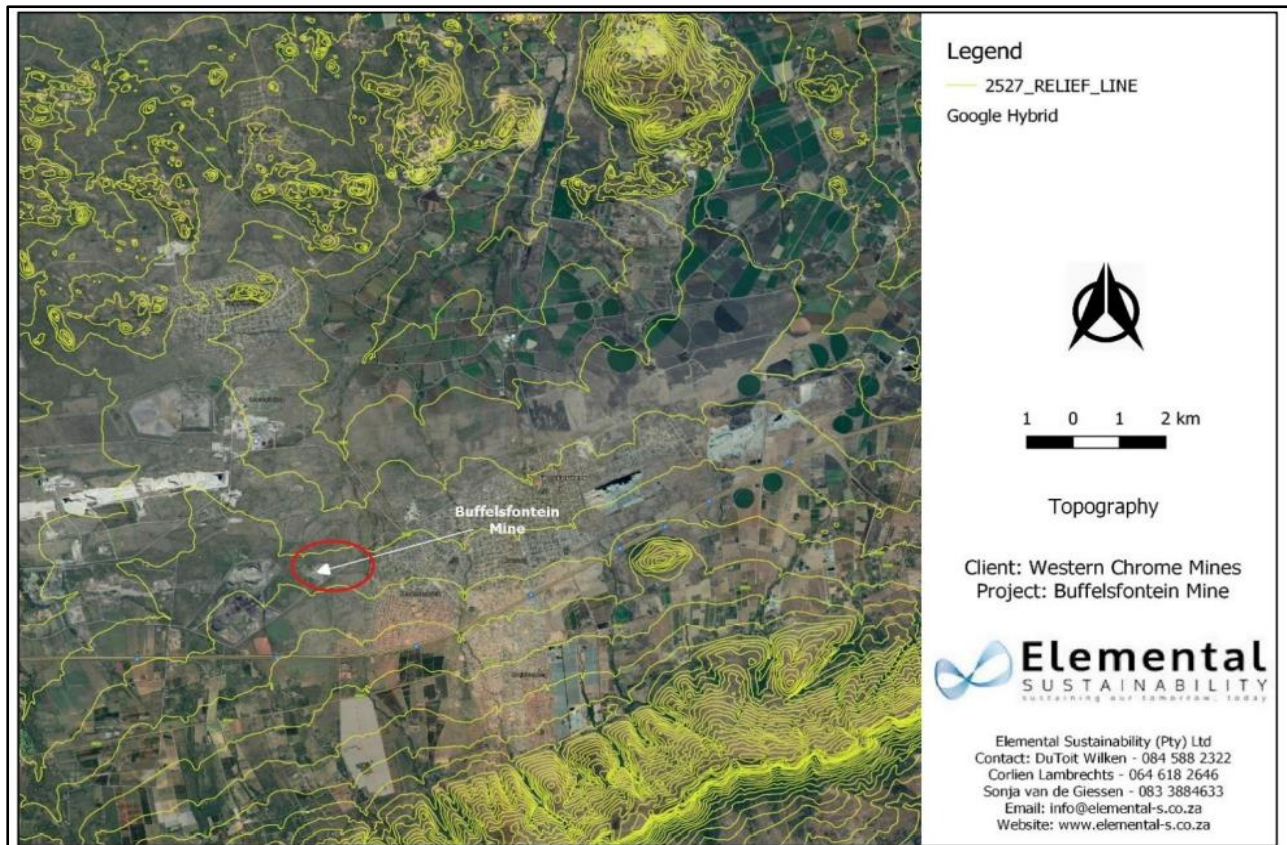


Figure 16: Topography associated with the Buffelsfontein West Opencast Section and surrounds

10.3 Climate

The project area is situated on the northern slopes of the Magaliesberg and adjacent low-lying areas to the north, is very effectively sheltered by an extensive plateau and the Magaliesberg Mountain. The main features associated with the project area include a warm temperate climate and annual average precipitation of 600 – 900 mm/year consisting mainly of thunderstorms in the summer months.

The area, in which the water catchment area is found, is characterised by a flat topography with undulating areas. The climate of the catchments is generally semi-arid and the temporal and spatial variability of the rainfall varies. The natural mean annual runoff (MAR) of the Crocodile (West) Marico WMA is 855 million m³/annum. Approximately 75% of the total surface runoff from the WMA flows down the Crocodile River, while the Marico catchment contributes 20% and the Upper Molopo catchment 5%.

10.3.1 TEMPERATURE

For the Buffelsfontein West Opencast Section, in the summer months, the maximum average daily temperatures range between 27.8°C and 28.3°C, with a maximum of 37.35°C possible during hot days. At night, the average temperatures are around 20.1°C to 21.18°C on average, with a minimum of 13.15°C on colder nights.

During the autumn months, the average daytime temperatures are estimated to range from 17.8°C to 25.6°C, while night-time temperatures are projected to be in the range of 10.4°C to 17.8°C on average. In the winter months, the average daytime temperatures range between 13.7°C and 17.9°C, while the night-time temperatures may drop as low as 6.0°C to 8.9°C on average. As for the spring months, the average daytime

temperatures range between 23.8°C and 28.0°C, with night-time temperatures ranging from 12.9°C to 19.8°C on average.

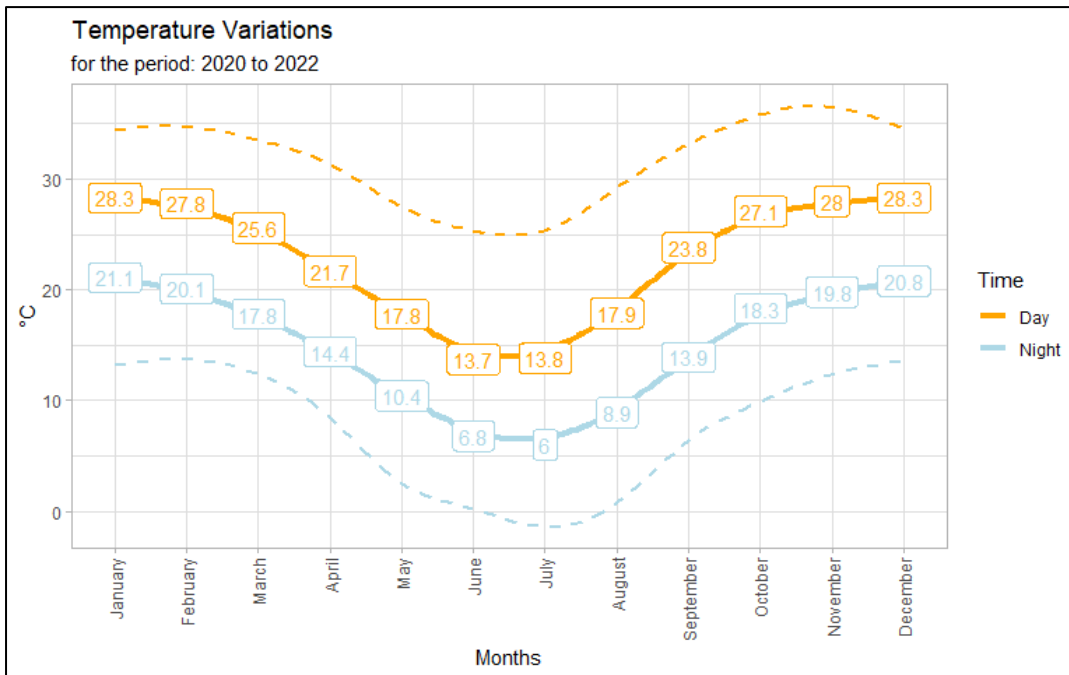


Figure 17: Temperature for the Buffelsfontein West Opencast Section (2020 - 2022)

10.3.2 PRECIPITATION AND EVAPORATION

Marikana normally receives about 581mm of rain per year, with mostly rainfall occurring during midsummer show average rainfall values of Marikana per month. It receives the lowest rainfall (0mm) in the month of June and the highest (104mm) in January (refer to Table 10). The distribution of the Mean Annual Precipitation (MAP) ranges between 600 and 800mm in the Marico catchment.

Table 10: Rainfall distribution for 2014 and 2017

Month	Rainfall 2014 (mm)	Rainfall 2017 (mm)
January	136	127
February	89	85
March	85	77.7
April	62	42.3
May	16	14.2
June	7	2.5
July	4	2.1
August	7	5.3
September	21	20.8
October	63	58.8
November	95	99.9
December	115	107.1
Total annual precipitation	700	642.7

The mean evaporation figures range from 930 mm to 1980 mm. In all catchments in the North West Province, evaporation exceeds rainfall.

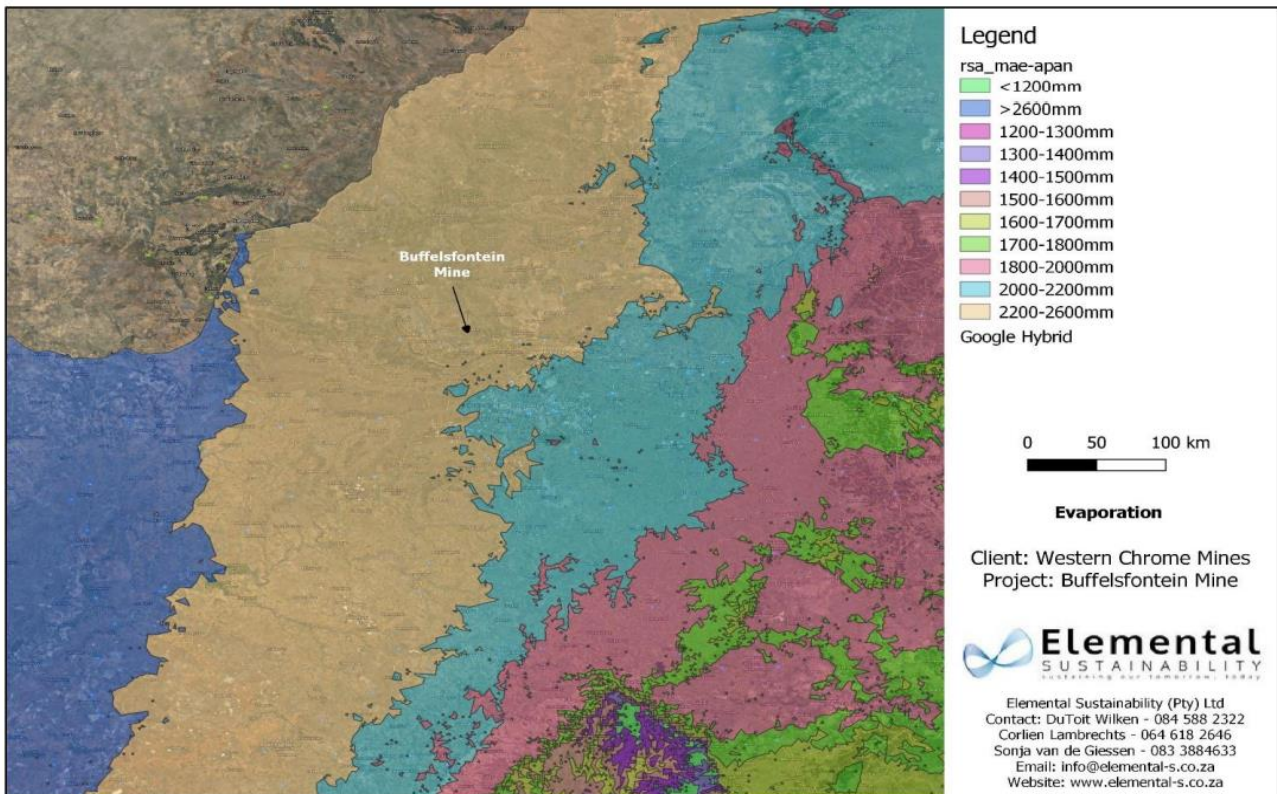


Figure 18: Mean Annual A-pan evaporation (WR2005 (Middleton & Baily, 2008))

10.3.3 MEAN ANNUAL RUNOFF

Comparative mean annual runoff (MAR) volumes were calculated from the data available in the Water Research WR90 report, as no onsite data is available for the two non-perennial streams. The A21K catchment where the Buffelsfontein West Opencast Section is located, has a gross MAR of 14,69 x 106 m³ and a catchment area of 119 km² that comprises of an upper mountainous area and a lower grass and vegetative area. (C-factor used is 18.5). The Elandskraalspruit was estimated to have an MAR of 10,1 x 106 m³, with the catchment profile being very similar to the A21K catchment. Similarly, the Modderspruit sub-catchment has been estimated to have a MAR of 10,5 x 106 m³.

Table 11: Variables and result for the MAR calculations

Catchment	Receiving Water Body	MAR (mm)	Area (km ²)	Run-off (MI)
Sub-catchment upstream of the mine				
Buffelsfonteinspruit	Elandskraalspruit	37	32.82	1 214.34
Elandskraalspruit	Maretlwane River	37	10.55	390.35
Maretlwane River	Confluence of Maretlwane and Elandsdriftspruit	37	26.64	985.68
Affected catchment – discharge to the receiving water body				
Buffelsfonteinspruit	Elandskraalspruit	37	37.67	1 393.79
Elandskraalspruit	Maretlwane River	37	10.89	402.93
Maretlwane River	Confluence of Maretlwane and Elandsdriftspruit	37	30.08	1 112.96

10.3.4 NORMAL DRY WEATHER FLOW

The mean dry season rainfall, May to September, is very small. It can be assumed that dry weather flow would be negligibly small and in the River. With a mean dry season rainfall (May to September), which ranges from 5 to 17 mm and an average of 10.8 mm, the run-off would be negligibly small.

10.4 AGRICULTURAL ASSESSMENT

Index (Pty) Ltd. was appointed by Elemental Sustainability to undertake the agricultural assessment: Compliance Statement for the proposed Buffelsfontein West Opencast Section. A copy of the report is included in Appendix 5.

10.4.1 METHODOLOGY

10.4.1.1 SITE SENSITIVITY VERIFICATION

On a desktop level, a review of existing information on soils and topography is done to determine areas with high sensitivity in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs. The current land use and environmental sensitivity of the site available in the screening tool were used in assessing the site.

- The desktop verification was done through use of satellite imagery and a site visit took place on 21 June 2023.
- The aim was to verify the findings of the interpretation done on the satellite images and of the data obtained from the Screening Tool.
- The outcome of the site verification is included in the agricultural assessment report.

The report compared the current crop land and the environmental sensitivity as identified by the screening tool with the present situation.

10.4.1.2 SITE EVALUATION PROCESS

Satellite images were used as backdrop and the present land uses digitised. Soil profiles were augured to determine soil depth and clay content was used to determine land conditions. Capability classification is according to the guidelines published on the Agricultural Geographic Information System (AGIS) website of the National Department of Agriculture (NDA). This was used to determine the capability of soils and their agricultural potential (DALRRD, 2019).

10.4.2 PRESENT LAND USES

The entire site that is not under mining infrastructure is vacant. The size of the land that can potentially be used for grazing land is 34,53ha for Buffelsfontein West. There is no cultivated land on the project area. Weeds have encroached on some of the natural veld. The present land uses are indicated below:

Table 12: Land uses on site

Land uses	Buffelsfontein West
Grazing	34,53 ha
Mining	78,97 ha
Total	113,50 ha

10.4.3 SOIL PROPERTIES

10.4.3.1 SOIL TYPES

The whole site is situated on mafic rock with an abundance of rock and stones that developed expansive properties. The clay content exceeds 55% with strongly developed slickensides. Soil types identified are Mispah, Glenrosa and Arcadia. The soil varies in depth between 300mm and to more than a metre over very short distances. In general, the soils are not suitable for growing crops and are only suitable for grazing.

10.4.3.2 SOIL CAPABILITY

The Department of Agriculture, Land Reform and Rural Development (DALRRD) developed a national spatial land capability data set to indicate the spatial delineation of the then defined eight land capability classes. The approach followed was based on the approach of Klingebiel and Montgomery (1961) but adapted for South Africa. The aim was to develop a system for soil and land capability classification. It further aimed to incorporate the parameters within a Geographic Information System (GIS). This resulted in a spatial data set which was derived from a 1:250 000 land type data set as the main input data set for the derived land capability classes together with climatic and terrain parameters. This dataset is used within the screening tool. While the new dataset is more complex than that of Klingebiel *et al*, the latter has clear guidelines and is generally still followed when assigning capability to land. A comparison between the two systems is provided below.

DALRRD (2016)	Klingebiel	Capability	Arability
1-2	viii	Very low	Not arable
3-4	vii	Very low to low	
5-6	vi	Low	
7	v	Low to moderate	
8	iv	Moderate	Arable
9-10	iii	Moderate to high	
11-12	ii	High	
13-14	i	High to very high	
15	i	very high	

Figure 19: Relationship between grading of the Screening tool and that of Klingebiel et al.

Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. Land capability involves consideration of difficulties in land use owing to physical land characteristics, climate and the risks of land damage from erosion and other causes. According to the criteria in AGIS, the arable portions are Class 5 or poorer. This is mainly due to the high clay content and the presence of rocks and stone.

According to Klingebiel *et al*, the soil capability is Class v and lower, mainly because of depth and mechanical limitations to root development and cultivation. According to the soil capability classification, the soils have low capability (or sensitivity as related to the Screening Tool).



Figure 20: Rock outcrops and expansive properties on the Arcadia soils

10.4.4 VEGETATION

The land on Buffelsfontein West in its natural state is Bushveld with Acacia trees that are dominant. The grazing capacity according to DALRRD is estimated at 7ha/large livestock unit (LSU).

10.4.5 WATER

There is no irrigated land at the Buffelsfontein West Opencast Section.

10.4.6 SENSITIVITY ANALYSIS

10.4.6.1 ECOLOGICAL SENSITIVITY– SCREENINGTOOL

According to the level of environmental sensitivity as indicated by the national web-based environmental screening tool, an applicant that intends to undertake an activity on land with '*very high*' or '*high*' sensitivity for agricultural resources must submit an Agricultural Agro-Ecosystem Specialist Assessment. Alternatively, a compliance statement will suffice.

In the case of this project, the Screening Tool indicates that the sensitivity of Buffelsfontein West is *medium*. The current use of the land and the environmental sensitivity of the site under consideration as identified by the screening tool was confirmed by undertaking a site sensitivity verification. The outcome of the site sensitivity verification found the following:

- There is no cultivated land on Buffelsfontein West.

- The land environmental sensitivity according to the tool is indicated as moderate. This is the case; the soil is shallow and rocky with many outcrops that renders the site as not arable and only suitable for grazing. There are no irrigation rights nor is there any land under irrigation.
- In line with the provisions of the Protocol, a compliance statement is required for the EIA report.



Figure 21: Results of the Screening Tool for Buffelsfontein West

10.4.6.2 SPECIALIST SITE ANALYSIS

The outcome of the site sensitivity verification of Buffelsfontein West found that:

- According to guidelines in AGIS (DALRRD), the land has a low arable potential. This is because of the shallow soils and rock outcrops. According to the criteria in AGIS the land is not arable and more suitable for livestock grazing.
- The site visit found very little deep arable soils that is without rock outcrops.
- No land can be regarded as high potential for cropping that warrants protection because it is *highly sensitive* for farming purposes.

10.4.7 CONCLUSION

The land on which the mining is proposed is low potential cropping land that has a low sensitivity in in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs. It is recommended that opencast chrome mining and related infrastructure of Buffelsfontein West be approved.

10.5 TERRESTRIAL ECOLOGY

Red Kite Environmental Solutions (Pty) Ltd was appointed to conduct a Terrestrial Ecology Assessment for the Samancor Chrome Ltd.: Western Chrome Mines - Buffelsfontein West Opencast Section. A copy of the report is included in Appendix 6.

10.5.1 METHODOLOGY

A baseline assessment was conducted to establish whether any potentially sensitive species/receptors might occur on site. The South African National Biodiversity Institute's (SANBI) online biodiversity tool and the Virtual Museum and Animal Demography Unit (ADU) was used to query species lists for the project area. The National Web Based Environmental Screening Tool, hosted by the Department of Forestry, Fisheries and Environment, was also used to determine geographically based sensitivity information in terms of terrestrial ecology, and animal and plant species themes, including potential sensitive species associated with the region. The site survey was undertaken to supplement and confirm several findings indicated during the desktop analysis. This will serve as a fatal flaw analysis to determine whether there are any major concerns in relation to flora species in terms of the proposed development.

10.5.2 BIOME

The project area is located in the Savanna biome. The Savanna Biome is the largest biome in South Africa, covering 46% of the country (Low & Rebelo, 1996). Savanna stretches from the Kalahari in the north-west across to the lowveld in the north-east and southwards to the lowlands of KwaZulu Natal and the Eastern Cape. The Savanna biome is characterised by a grassy ground layer and a distinct upper layer of woody plants. Where this upper layer is near the ground the vegetation may be referred to as Shrubveld, where it is dense as Woodland, and the intermediate stages are locally known as Bushveld (Low & Rebelo, 1996).

The environmental factors delimiting the biome are complex: altitude ranges from sea level to 2 000 m; rainfall varies from 235 to 1 000 mm per year; frost may occur from 0 to 120 days per year; and almost every major geological and soil type occurs within the biome. A major factor delimiting the biome is the lack of sufficient rainfall which prevents the upper layer from dominating, coupled with fires and grazing, which keep the grass layer dominant. Summer rainfall is essential for the grass dominance, which, with its fine material, fuels near-annual fires. In fact, almost all species are adapted to survive fires, usually with less than 10% of plants, both in the grass and tree layer, killed by fire. Even with severe burning, most species can resprout from the stem bases (Low & Rebelo, 1996).

10.5.3 VEGETATION TYPES

According to SANBI (2006 – 2018), the project footprint lies within the Marikana Thornveld (SVcb6). A description of the vegetation type, extracted from the CD accompanying Mucina & Rutherford (2006), is presented below. The Marikana Thornveld vegetation type occurs in the North-West and Gauteng Provinces, on plains from the Rustenburg area in the west, through Marikana and Brits to the Pretoria area in the east. The ecosystem is characterised by open *Vachellia karroo* woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs are denser along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire.

A list of expected common and dominant species in undisturbed vegetation includes the following (those with a "d" are considered to be dominant) (Mucina and Rutherford, 2006):

- **Trees:** *Senegalia burkei*, *S. caffra* (d), *Vachellia gerardii* (d), *V. karroo* (d), *Combretum molle* (d), *Searsia lancea* (d), *Ziziphus mucronata* (d), *Vachellia nilotica*, *V. tortilis* subsp. *heteracantha*, *Celtis africana*, *Dombeya rotundifolia*, *Pappea capensis*, *Peltophorum africanum*, *Terminalia sericea*.
- **Shrubs:** *Euclea crispa* subsp. *crispa* (d), *Olea europaea* subsp. *africana* (d), *Searsia pyroides* var. *pyroides* (d), *Diospyros lycioides* subsp. *guerkei*, *Ehretia rigida* subsp. *rigida*, *Euclea undulata*, *Grewia flava*, *Pavetta gardeniifolia*, *Asparagus cooperi* (d), *Rhynchosia nitens* (d), *Indigofera zeyheri*, *Justicia flava*.
- **Graminoids:** *Elionurus muticus* (d), *Eragrostis lehmanniana* (d), *Setaria sphacelata* (d), *Themeda triandra* (d), *Aristida scabrivalvis* subsp. *scabrivalvis*, *Fingerhuthia africana*, *Heteropogon contortus*, *Hyperthelia dissoluta*, *Melinis nerviglumis*, *Pogonarthria squarrosa*.
- **Herbs:** *Hermannia depressa* (d), *Ipomoea obscura* (d), *Barleria macrostegia*, *Dianthus mooiensis* subsp. *mooiensis*, *Ipomoea oblongata*, *Vernonia oligocephala*, *Ledebouria revoluta*, *Ornithogalum tenuifolium*, *Sansevieria aethiopica*.

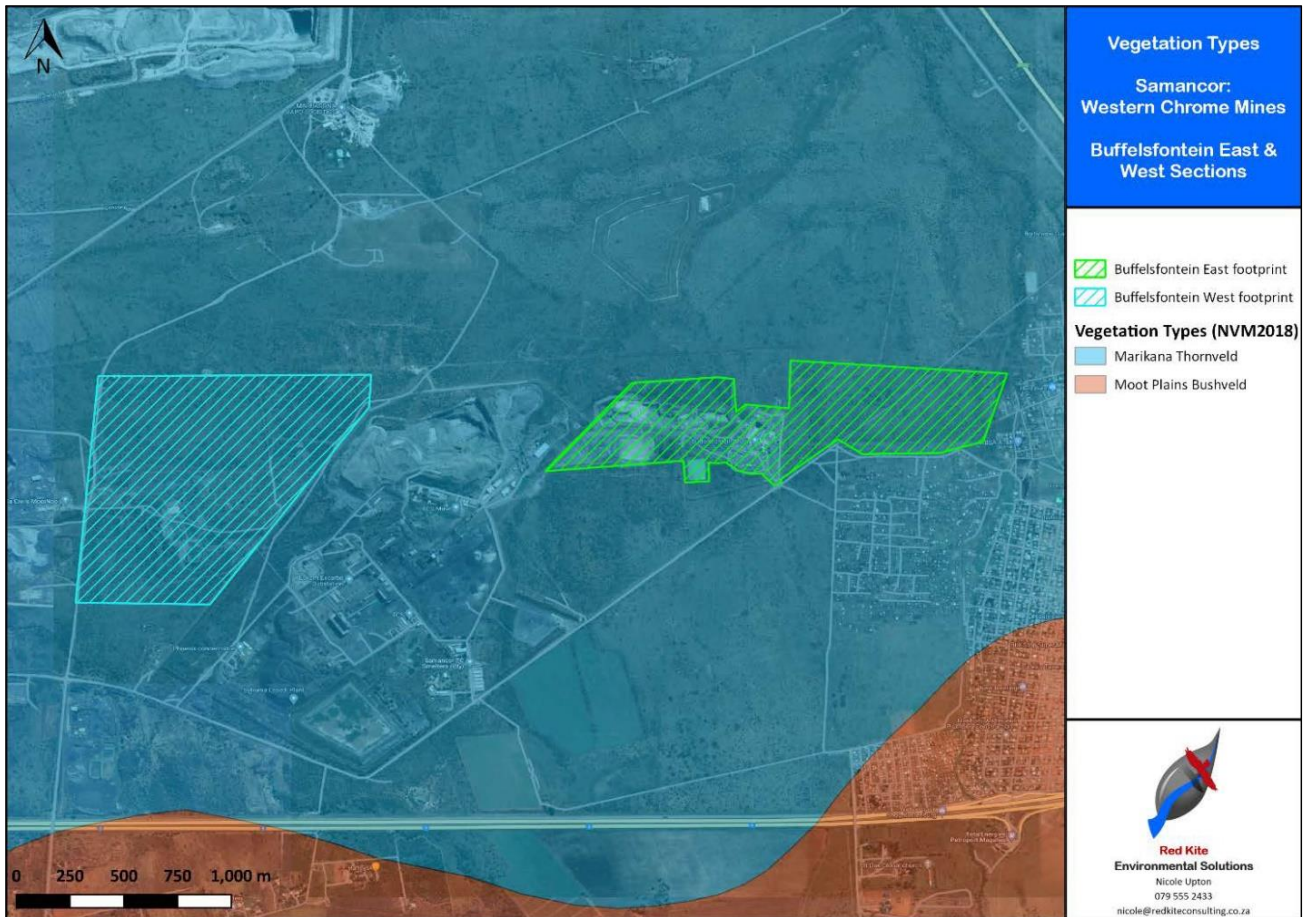


Figure 22: Vegetation types of the Buffelsfontein West Opencast Section

10.5.4 VEGETATION CONSERVATION STATUS

The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under NEMBA (Section 3.1.1), lists national vegetation types that are afforded protection on the basis of rates of transformation. The Marikana Thornveld vegetation type occurring on the project footprint is listed in the “National List of Ecosystems that are Threatened and need of protection”, as Vulnerable and as Endangered by the 2018 National Biodiversity Assessment.

There is one main conservation management plan for the province, namely the North West Biodiversity Sector Plan (NW BSP). The purpose of a Biodiversity Sector Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. The NW BSP comprises two spatial components: maps of critical biodiversity areas (CBAs); and a set of land-use guidelines that are important for maintaining and supporting the inherent biodiversity values of these critical biodiversity areas.

- **Critical Biodiversity Areas (1) (CBA1):** Irreplaceable Sites. Areas required to meet biodiversity pattern and/or ecological processes targets. No alternative sites are available to meet targets. Maintain In a natural state with limited or no biodiversity loss. Rehabilitate degraded areas to a natural or near natural state, and manage for no further degradation.

- **Critical Biodiversity Area (2) (CBA2):** Best Design Selected Sites. Areas selected to meet biodiversity pattern and/or ecological process targets. Alternative sites may be available to meet targets. Maintain in a natural state with limited or no biodiversity loss. Maintain current agricultural activities. Ensure that land use is not intensified and that activities are managed to minimize impact on threatened species.
- **Ecological Support Areas (1) (ESA1):** Natural, Near natural and degraded areas supporting CBAs by maintaining Ecological processes. Maintain ecosystem functionality and connectivity allowing for limited loss of biodiversity pattern.
- **Ecological Support Areas (2) (ESA2):** Areas with no natural habitat that is important for supporting ecological processes. Avoid additional / new impacts on ecological processes.
- **Other Natural Areas (ONA):** Natural and intact but not required to meet targets, or identified as CBA or ESA. No management objectives, land management recommendations or land-use guidelines are prescribed.
- **No natural habitat remaining:** Areas with no significant direct biodiversity value. Not Natural or degraded natural areas that are not required as ESA, including intensive agriculture, urban, industry; and human infrastructure. No management objectives, land management recommendations or land-use guidelines are prescribed.

The entire Buffelsfontein West project footprint is located on areas categorised as ESA1 in terms of the NWBSP. The majority (60%) of the footprint is located on thornveld which is moderately to heavily disturbed by adjacent activities such as mining and high density residential areas. The remainder of the project footprint has been transformed by current and historic mining activities. The North West / Gauteng Bushveld National Protected Areas Expansion Strategy (NPAES) area is located 7 km north-west of the project area. The Magaliesberg Protected Environment, which is protected in terms of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEMPAA), is situated approximately 6 km south of the project footprint. The project footprint is located within the transition zone of the Magaliesberg Biosphere. According to the Mining and Biodiversity Guideline (2013), the project footprint is located on areas categorised as Highest Biodiversity Importance (highest risk for mining).

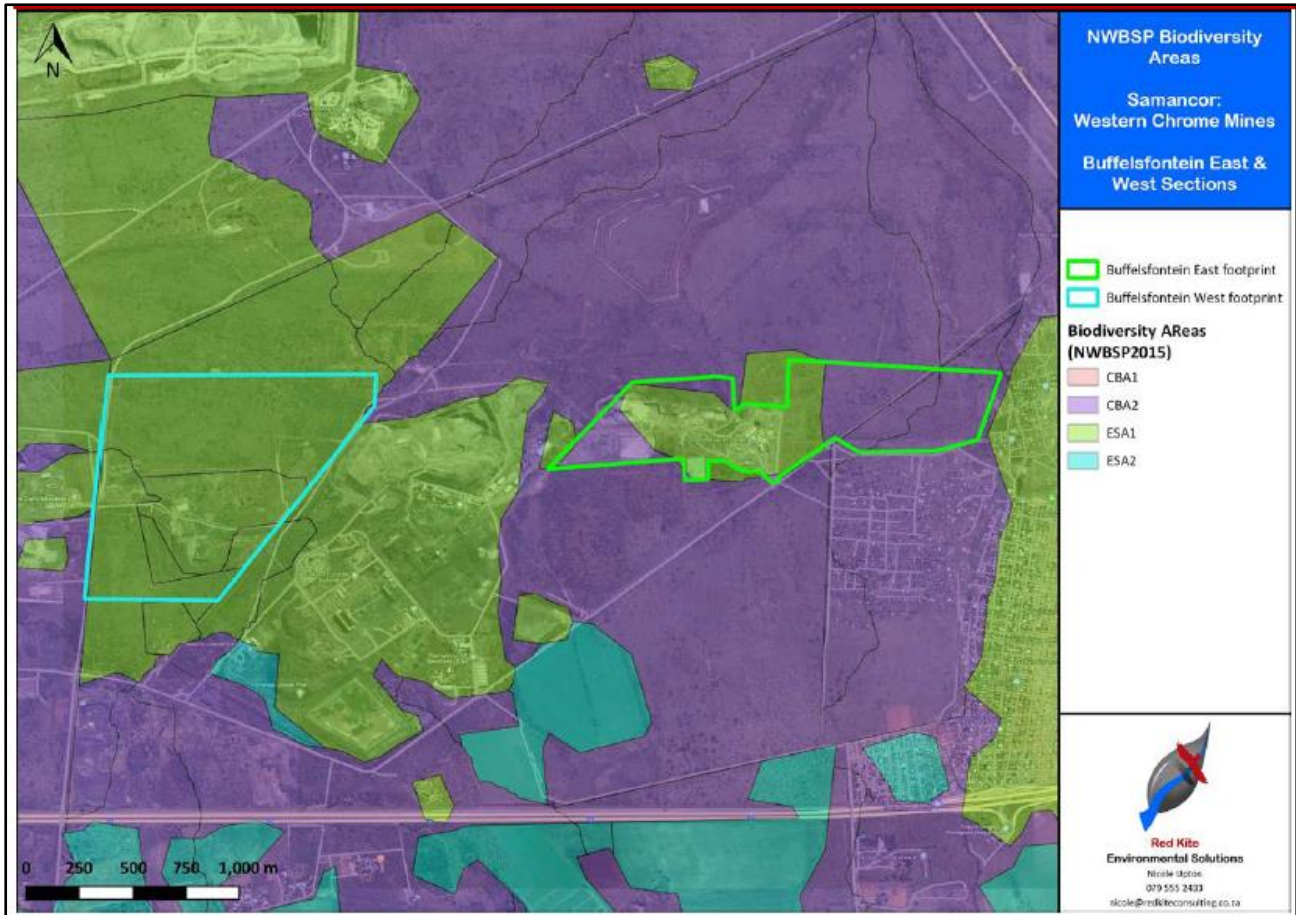


Figure 23: NWBSP Biodiversity areas on the proposed Buffelsfontein West Opencast Section

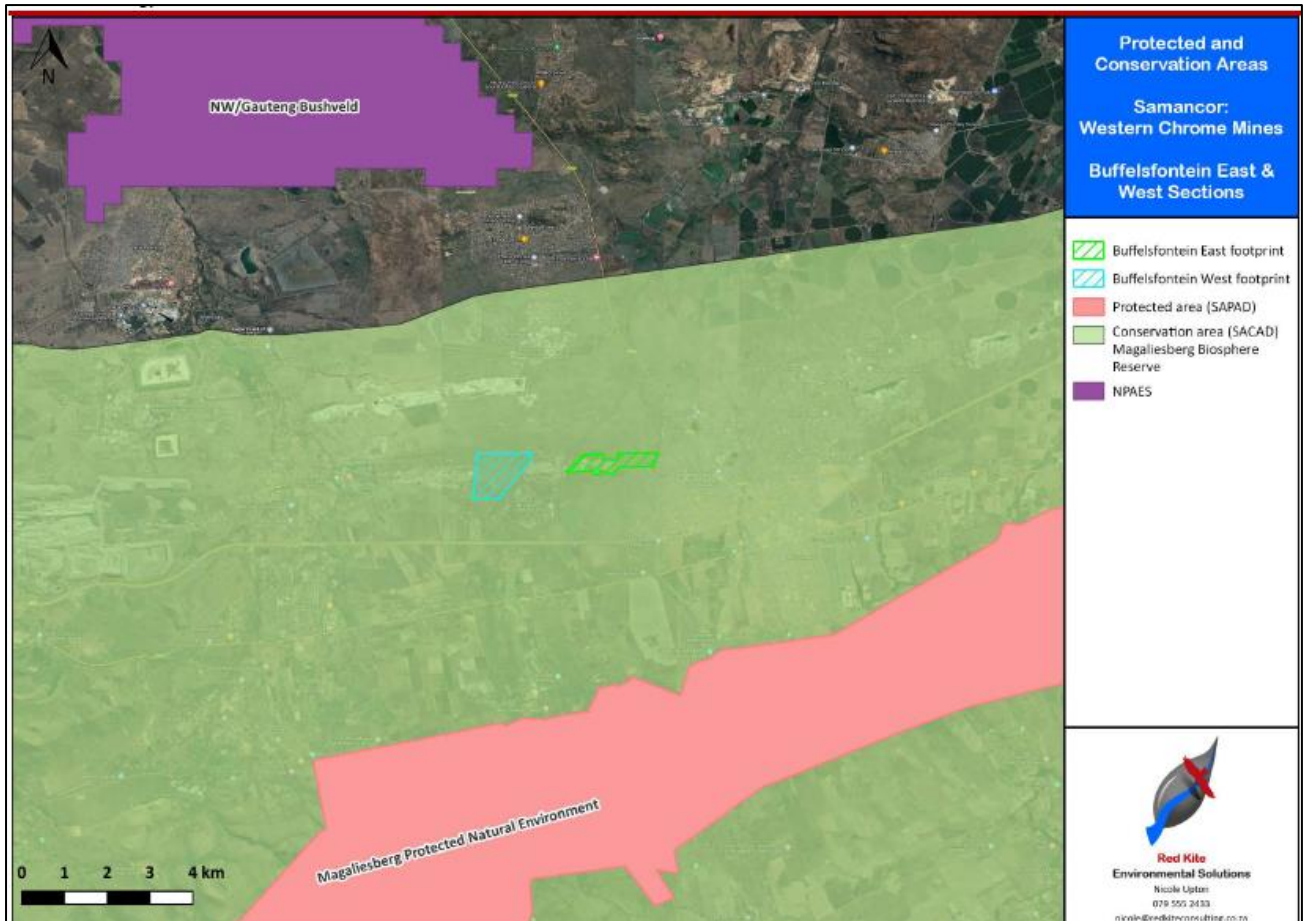


Figure 24: Protected and conservation areas

The Buffelsfontein West footprint is located in an area designated as a FishFSA (Fish Support Area) in terms of FEPA. Areas designated as Fish Support areas (FishFSA) are areas identified as fish sanctuaries that are lower than an A or B ecological condition, and the associated sub-quaternary catchment. Fish Support Areas also include sub-quaternary catchments that are important for migration of threatened or near-threatened fish species.

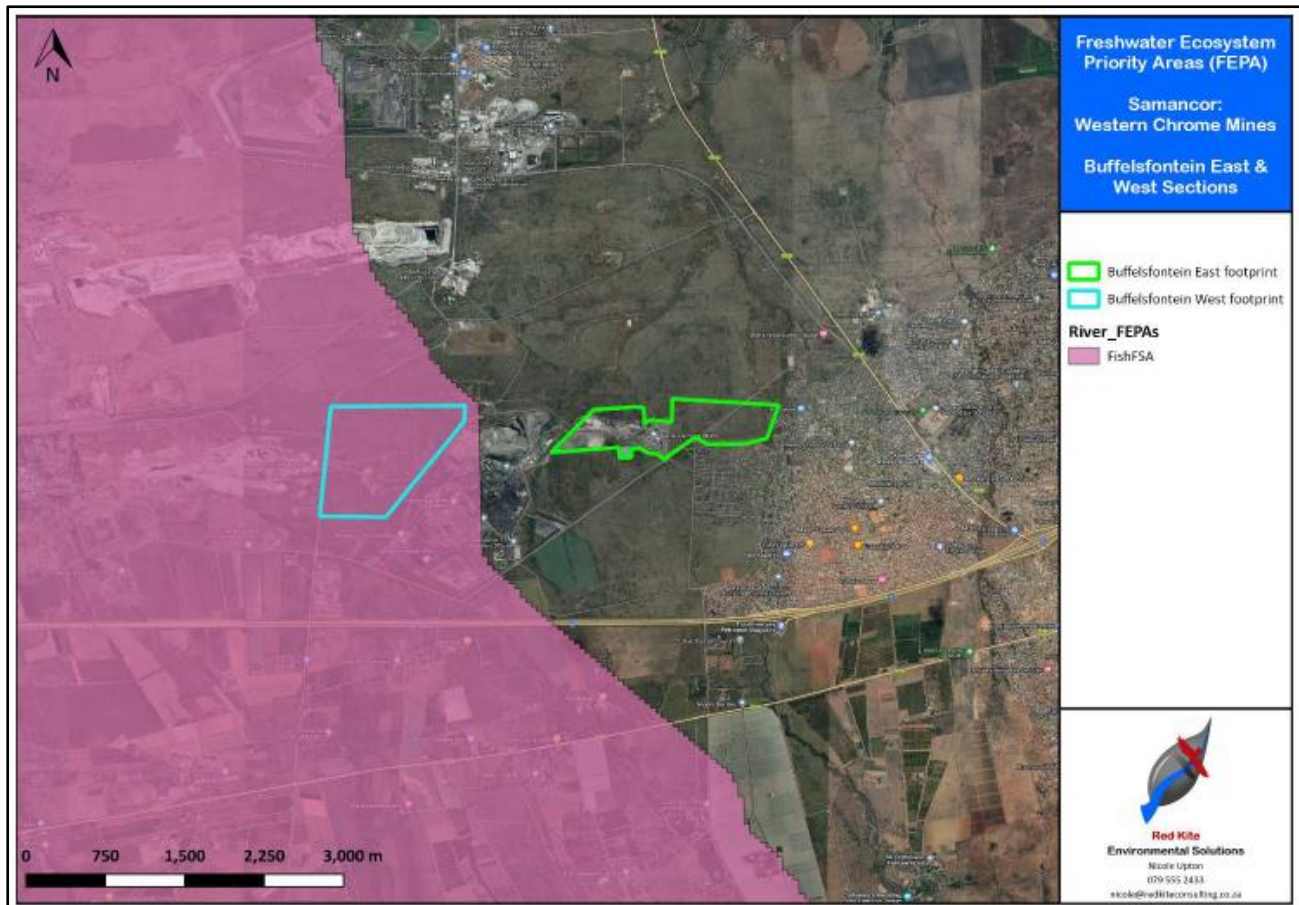


Figure 25: Freshwater Ecosystem Priority Areas associated with the Buffelsfontein West Opencast Section

10.5.5 POSA PLANT SPECIES

Information on plant species previously recorded for the project area was extracted from the POSA online database hosted by SANBI. A list of plant species that have previously been recorded in the project area is provided in Appendix C. The results indicate that 27 plant species have been recorded in the area queried. One of the flora species previously recorded for the area is a Species of Conservation Concern (SCC) in terms of its Red List status:

- *Stenostelma umbelluliferum* (Red List Status: NT): Occurs in deep black turf in open woodland mainly in the vicinity of drainage lines. It also appears that the species is favoured by disturbance, as repeated surveys in frequently disturbed areas recorded marked increases in the number of mature individuals after disturbance events (Red List of Southern African Plants). This species has a moderate likelihood of occurrence on the project footprint.

One additional flora species was listed for the project area in the Environmental Screening Tool Report:

- Sensitive species 1248 (Red List Status: VU): Occurs, among other vegetation types, in the Marikana Thornveld. Low and medium altitudes, usually along mountain ranges and in thickly vegetated river valleys, often under bush clumps and in boulder screes. In Gauteng, Mpumalanga and North West

Province it is often found in open woodland or on steep rocky hills usually in well-shaded situations. Tolerates wet and dry conditions.

None of the species previously recorded on the area queried are protected in terms of the ToPS List, the NFA or the NWBMA. Two of the plant species is known to have medicinal uses and two of the flora species are endemic to South Africa.

10.5.6 SITE EVALUATION

One site survey was conducted on 20 May 2022. The Buffelsfontein West Section footprint is approximately 117 ha. The majority (60%) of the footprint is located on thornveld which is moderately to heavily disturbed by adjacent activities such as mining and high density residential areas. The remainder of the project footprint has been transformed by current and historic mining activities. Vegetation units were identified according to the plant species composition and land use on the proposed project footprint. The following broad classification of Vegetation Units (VU) were found to occur on the project footprint:

- Degraded indigenous Thornveld (VU1)
- Transformed (VU2)

The vegetation units, as identified during site visit, databases and aerial imagery are indicated in Figure 26.

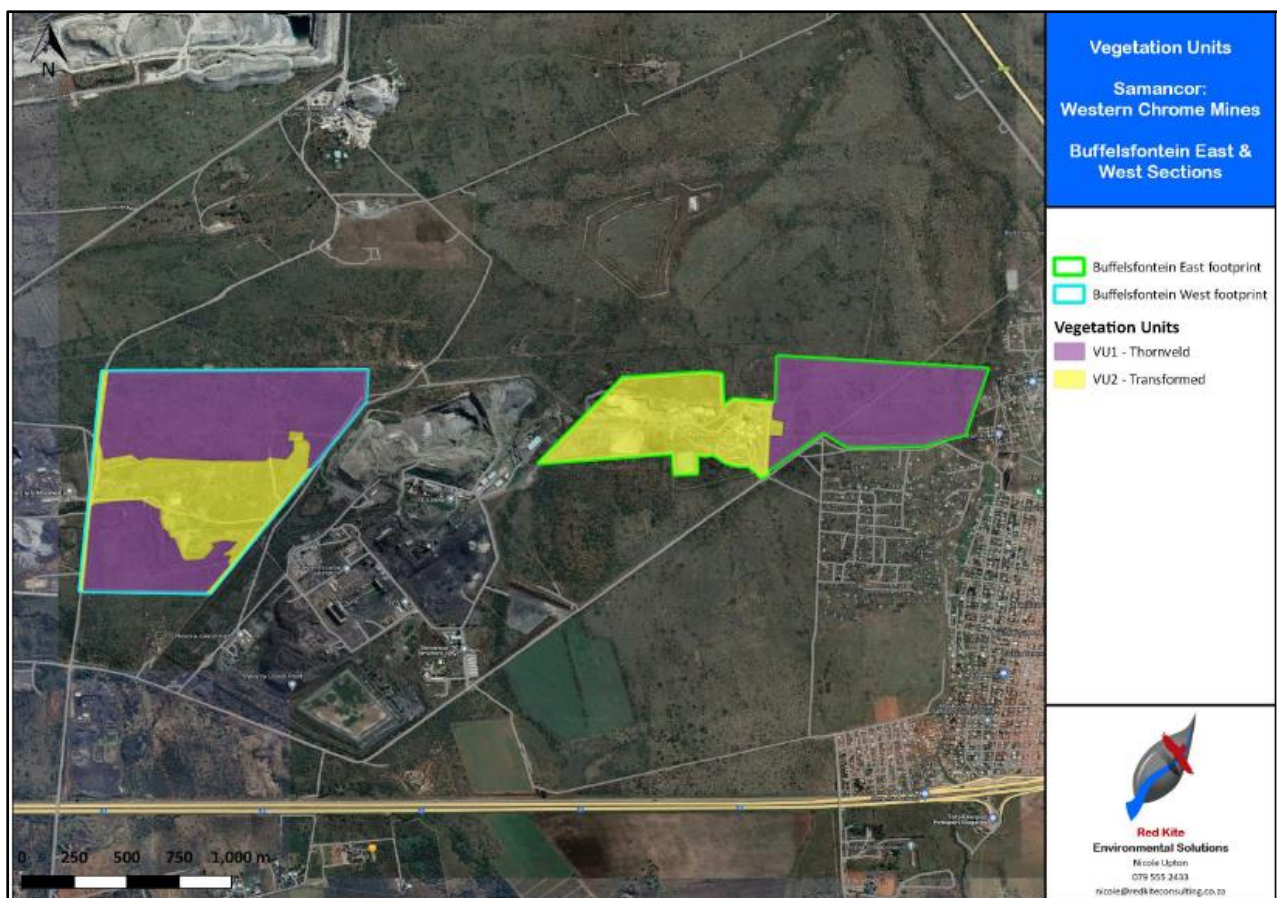


Figure 26: Delineated Vegetation Units for the project footprint

10.5.6.1 VEGETATION UNIT 1 – THORNVELD

The vegetation of the proposed project footprint consists largely of thornveld which is moderately to heavily impacted by current and historic activities in the area. Most of the proposed project footprint is located on VU1 with 77.4 ha of the Buffelsfontein West proposed project footprint located on VU1. Although the vegetation composition bears some resemblance to the Marikana Thornveld vegetation type (refer to section 5.2), the species composition of this VU is no longer representative of the Marikana Thornveld. The vegetation composition and has been significantly altered by the surrounding activities, including roads; adjacent developments and mining activities; high density residential areas; wood and plant harvesting; and human and vehicle movement. The vegetation unit was highly fragmented by the aforementioned activities. Plant species diversity for the project footprint is considered to be moderate, with the vegetation composition homogenous.

The vegetation is dominated by the following tree species: *Vachellia karroo* (Sweet thorn), *Dichrostachys cinerea* (Sickle bush), *Vachellia nilotica* (Scented-pod thorn), *Searsia pyroides* (Firethorn crowberry) and *Searsia lancea* (Willow crowberry).

Dominant grass species included: *Setaria sphacelata* (Bristle grass), *Heteropogon contortus* (Spear grass), *Bothriochloa insculpta* (Pinhole grass), *Aristida bipartita* (Rolling grass) and *Melinis repens* (Natal red top).

Three exotic species were identified to occur in low densities on the project footprint, especially along road verges, i.e. *Tagetes minuta* (Tall khaki weed), *Xanthium strumarium* (Large cocklebur) and *Schkuhria pinnata* (Dwarf marigold).

No species of conservation concern were identified to occur on the project footprint. VU1 has been provided a sensitivity rating of medium, considering the Vulnerable categorisation of the Marikana Thornveld vegetation type in terms of the NEMBA and the areas being categorised as ESA and CBA in the NWBSP. Although the riparian vegetation is considered to be moderately to highly disturbed, watercourses and wetlands are considered high sensitivity due to their importance for ecosystem services and corridor functions, among others.



Figure 27: Thornveld vegetation (VU1)

10.5.6.2 VEGETATION UNIT 2 - TRANSFORMED

Vegetation Unit 2 occurs on the areas which have been transformed, i.e. land that has been transformed for mining and related activities, both current and historic. This habitat is considered to have very low ecosystem service provision capabilities. Approximately 37.5 ha of the Buffelsfontein West proposed project footprint is located on VU2. The vegetation unit is classified as having a low sensitivity due to the transformed state of the vegetation composition of the vegetation unit or lack of vegetation.



Figure 28: Transformed V2 unit within mining area

10.5.6.3 SUMMARY OF FLORISTIC COMPOSITION OF THE STUDY AREA

A total of 65 plant species were recorded in the study area during the time of the study and indicates moderate species diversity, taking into consideration the transformed areas of VU2. 94% (61 of 65) of the recorded plant species are indigenous to South Africa. Four exotic species were recorded as occurring on the study area, of which one is listed as AIP in terms of the NEMBA. From available literature it was established that at least seven of the recorded plant species in the study area are to some extent used for medicinal purposes.

Three of the species recorded on the project area are endemic to South Africa. No SCC were identified to occur on the project footprint during the site survey. The table below list the flora species identified during the site survey.

Table 13: Flora species identified during site survey

Species	Common name	SANBI Red List Status	Conservation
<i>Albuca virens</i>	Bosui	LC	
<i>Aeollanthus buchnerianus</i>		LC	
<i>Agelanthus natalitius</i>	Mistletoe	LC	
<i>Aloe davyana</i>	Spotted aloe	LC	Endemic
<i>Andropogon appendiculatus</i>	Vlei bluestem	LC	

<i>Aristida adscensionis</i>	Annual three-awn	LC	
<i>Aristida bipartita</i>	Rolling grass	LC	
<i>Aristida congesta</i>	Tassle three-awn	LC	
<i>Aristida rhiniochloa</i>	Rough three-awn	LC	
<i>Aristida rhiniochloa</i>	Rough three-awn	LC	
<i>Aristida scabrivalvis</i>	Asgaaisteeckgras	LC	
<i>Aristida stipitata</i>	Long-awned aristida	LC	
<i>Asparagus cooperi</i>	Haakdoring	LC	
<i>Asparagus laricinus</i>	Cluster-leaf asparagus	LC	
<i>Barleria macrostegia</i>	Tongklapper	LC	
<i>Bothriochloa insculpta</i>	Pinhole grass	LC	
<i>Brachiaria eruciformis</i>	Sweet signal grass	LC	
<i>Cenchrus ciliaris</i>	Blue buffalo grass	LC	
<i>Cymbopogon caesius</i>	Broad-leafed turpentine grass	LC	
<i>Cymbopogon nardus</i>	Giant turpentine grass	LC	
<i>Cynodon dactylon</i>	Couch grass	LC	
<i>Dichanthium annulatum</i>	Vlei finger grass	LC	
<i>Dichrostachys cinerea</i>	Sickle bush	LC	Medicinal
<i>Digitaria eriantha</i>	Common finger grass	LC	
<i>Enneapogon scoparius</i>	Bottlebrush grass	LC	
<i>Eragrostis lehmanniana</i>	Lehmann's love grass	LC	
<i>Eragrostis tricophora</i>	Hairy love grass	LC	
<i>Euclea crispa</i>	Blue guarri	LC	
<i>Fingerhuthia africana</i>	Thimble grass	LC	
<i>Gomphocarpus fruticosus</i>	Milkweed	LC	Medicinal
<i>Hermannia burkei</i>		LC	
<i>Heteropogon contortus</i>	Spear grass	LC	
<i>Hyparrhenia tamba</i>	Blue thatching grass	LC	
<i>Kohautia caespitosa</i>	Bushveld tremble tops	LC	
<i>Ledebouria revoluta</i>	Common African hyacinth	LC	
<i>Leonotis leonurus</i>	Lion's Tail	LC	Medicinal
<i>Melinis repens</i>	Natal red top	LC	
<i>Nidorella hottentotica</i>		LC	
<i>Polygala hottentotta</i>	Small purple broom	LC	
<i>Pygmaeothamnus zeyheri</i>	Sand apple	LC	
<i>Sansevieria aethiopica</i>	Mother-in-law's Tongue	LC	
<i>Schkuhria pinnata</i>	Dwarf marigold	NE	Exotic

<i>Searsia engleri</i>	Velvet karee	LC	Endemic
<i>Searsia lancea</i>	Willow crowberry	LC	
<i>Searsia leptodictya</i>	Mountain karee	LC	
<i>Searsia pyroides</i>	Firethorn crowberry	LC	
<i>Searsia pyroides</i>	Firethorn crowberry	LC	
<i>Senegalia caffra</i>	Common hook thorn	LC	Medicinal
<i>Setaria sphacelata</i>	Bristle grass	LC	
<i>Sporobolus stapfianus</i>	Fibrous dropseed	LC	
<i>Tagetes minuta</i>	Tall khaki weed	NE	Exotic
<i>Themeda triandra</i>	Red grass	LC	
<i>Vachellia gerrardii</i>	Red Thorn	LC	
<i>Vachellia karoo</i>	Sweet thorn	LC	
<i>Vachellia karoo</i>	Sweet thorn	LC	Medicinal
<i>Vachellia nilotica</i>	Scented-pod thorn	LC	
<i>Vachellia robusta</i>	Broad-pod robust thorn	LC	
<i>Vachellia sieberiana</i>	Paperbark thorn	LC	
<i>Vachellia tortillis</i>	Umbrella thorn	LC	
<i>Vachellia tortillis</i>	Umbrella thorn	LC	
<i>Hilliardiella oligocephala</i>	Bicoloured-leaved vernonia	LC	Medicinal
<i>Wahlenbergia magaliesbergensis</i>		LC	Endemic
<i>Xanthium strumarium</i>	Large cocklebur	NE	NEMBA: AIP Category 1b
<i>Zinnia peruviana</i>	Red star zinnia	NE	Exotic
<i>Ziziphus mucronata</i>	Buffalo thorn	LC	Medicinal
<i>Brachiaria eruciformis</i>	Sweet signal grass	LC	
<i>Cenchrus ciliaris</i>	Blue buffalo grass	LC	
<i>Cymbopogon caesius</i>	Broad-leafed turpentine grass	LC	

10.5.7 FAUNA

A desktop study was conducted to establish whether any potentially sensitive faunal species or species of conservation concern may possibly occur on site. The Virtual Museum (VM) and Animal Demography Unit (ADU) were used to compile species lists based on the sightings and data gathering from the South African Biodiversity Institute for the 2527DA QDS.

10.5.7.1 MAMMALS

Thirty-three (33) mammal species were found to possibly occur within the QDS, of which four are categorised as SCC in terms of their Red List status:

- *Atelerix frontalis* - Southern African Hedgehog - NT
- *Panthera pardus* - Leopard - VU – Not expected
- *Hyaena brunnea* - Brown Hyena - NT – Not expected
- *Crocidura maquassiensis* - Makwassie musk shrew - VU

Twenty-one (21) of the mammalian species previously recorded for the QDS are listed in terms of provincial legislation, i.e. the NWBMA. Refer to Appendix D for details of the species listed in terms of the NWBMA.

Most of these provincially listed species will only occur as game in nature reserves within the area or hunting farms and have specific range requirements. These are not supported by the habitat associated and remaining within the general area or associated with the footprint, unless occasionally and specifically only the smaller mammalian species.

10.5.7.2 AVIFAUNAL

According to data collected as part of the Southern African Bird Atlas Project 2 (SABAP2) <http://sabap2.adu.org.za>, the site falls within pentad: 2540_2735. Two hundred and thirty-one (231) bird species were recorded for this area. Six of the avifaunal species recorded for the pentad are categorised as SCC in terms of their Red List status:

- Falcon, Lanner - *Falco biarmicus* - VU (Regional), LC (Global)
- Falcon, Red-footed - *Falco vespertinus* - NT (Regional), NT (Global)
- Sandgrouse, Yellow-throated - *Pterocles gutturalis* - NT (Regional), LC (Global)
- Sandpiper, Curlew - *Calidris ferruginea* - LC (Regional), NT (Global)
- Secretarybird - *Sagittarius serpentarius* - VU (Regional), VU (Global)
- Eagle, Tawny - *Aquila rapax* - EN (Regional), VU (Global)

Seventeen (17) of the avifaunal species previously recorded for the pentad are listed in terms of provincial legislation, i.e. the NWBMA. Refer to Appendix D for details of the species listed in terms of the NWBMA. The site falls within the Magaliesberg Important Birding Area (IBA). Important species such as the *Gyps coprotheres* breeds at two main colonies within this IBA—the larger Skeerpoort (25°45'S 27°45'E) and the sister colony at Robert's Farm (25°50'S 27°17'E)—as well as a satellite colony at Nooitgedacht. Many other raptor species have been recorded at Skeerpoort, including *Gyps africanus* and *Torgos tracheliotus*. In other areas, patches of grassland are known to hold small numbers of *Grus paradisea*. The Skeerpoort area is located approximately 20 km towards the East and South east of the proposed project area.

Since the Buffelsfontein West project site is fairly disturbed by existing mining activities, it is unlikely that the sensitive species known to occur in the IBA are likely to be impacted by the proposed project and the habitat found on the project footprint is likely not of significant value to these species. However, the sensitive species identified for the pentad could occur within the immediate area of the project.

10.5.7.3 BUTTERFLIES

Eighty-seven (87) butterfly species were previously recorded for the 2527DA QDS, all of which are categorized as Least Concern in terms of their Red List status (Appendix D). Five butterfly species are listed in terms of the NWBMA.

10.5.7.4 OTHER INVERTEBRATES

One species of dung beetle, five species of Odonata and one species of scorpion were previously recorded for the QDS, all of which are categorised as Least Concern in terms of their Red List status (Appendix D). All Dung beetles are listed under Schedule 2 of the NWBMA.

10.5.7.5 REPTILES

Twelve (12) reptile species were previously recorded for the QDS. None of the reptile species were categorised as SCC in terms of their Red List status. However, three of the species are listed in terms of the NWBMA.

10.5.7.6 AMPHIBIANS

Fifteen (15) amphibian species were previously recorded for the QDS, none of which are categorised as SCC in terms of their Red List status.

10.5.8 SITE SURVEY

A site assessment was conducted on the 20th of May 2022. At Buffelsfontein West, the western section of the footprint has already been transformed and the eastern section of the footprint represents the only remaining habitat left. Remaining habitat on the proposed project footprint occurs directly adjacent active mining areas and human movement from mining personal, security patrols and informal community members are a constant occurrence within these areas.

Twenty faunal species were sighted during the site survey, all categorised as Least Concern in terms of their Red List status. The species sighted mostly occurred in the natural areas at the proposed development site, but diversity and abundance were clearly impacted showing a limited community structure, similar to an almost urban setting due to the large-scale mining, agricultural and anthropogenic impacts already present.

Table 14: Animal species sighted during site visit

Family	Species	Common Name	Sighting/Finding	Status and IUCN
Invertebrates and Butterflies				
Pisauridae	<i>Perenethis simoni</i>	Nursery web spider	Sightings	Least Concern
Nymphalidae	<i>Byblia ilithyia</i>	Spotted Joker	Sighting	Least Concern
Nymphalidae	<i>Danaus chrysippus</i>	African Monarch	Sighting	Least Concern
Nymphalidae	<i>Junonia hierta</i>	Yellow Pansy	Sightings	Least Concern
Reptiles				

No reptile species observed				
Amphibian				
No amphibian species observed				
Mammalians				
Leporidae	<i>Lepus saxatilis</i>	Scrub hare	Sightings of dung	Least Concern (2016)
Equidae	<i>Equus caballus</i>	Horses	Sighted and Droppings	Domestic
Bovidae	<i>Bos taurus</i>	Cattle	Sightings and Dung	Domestic
Avifaunal				
Coraciidae	<i>Coracias caudatus</i>	Lilac-breasted Roller	Sightings along road	Least Concern
Accipitridae	<i>Elanus caeruleus</i>	Black-Shouldered Kite	Sighting	Least Concern
Turnicidae	<i>Turnix sylvaticus</i>	Common buttonquail	Sightings	Least Concern
Leiothrichidae	<i>Turdoides jardineii</i>	Arrow-marked Babbler	Sightings	Least Concern
Estrildidae	<i>Estrilda astrild</i>	Common waxbill	Sightings at river crossing	Least Concern
Numididae	<i>Numida meleagris</i>	Helmeted guineafowl	Feathers, Sightings	Least Concern
Ploceidae	<i>Ploceus intermedius</i>	Lesser masked weaver	Sighted	Least Concern
Ploceidae	<i>Euplectes afer</i>	Yellow-crowned bishop	Sighted	Least Concern
Charadriidae	<i>Vanellus armatus</i>	Lapwing, Blacksmith	Sightings	Least Concern
Hirundinidae	<i>Riparia cincta</i>	Martin, Banded	Sightings	Least Concern
Ploceidae	<i>Ploceus velatus</i>	Masked-weaver, Southern	Sightings	Least Concern
Phasianidae	<i>Pternistis swainsonii</i>	Swainson's spurfowl/ Swainson's francolin	Sighted along the road	Least Concern

10.5.9 SENSITIVITY

The Marikana Thornveld vegetation type occurring on the project footprint is listed in the “National List of Ecosystems that are Threatened and need of protection”, as Vulnerable and as Endangered by the 2018 National Biodiversity Assessment. The entire Buffelsfontein West project footprint is located on areas categorised as ESA1 in terms of the NWBSP. The Magaliesberg Protected Environment, which is protected in terms of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEMPAA), is situated approximately 6 km south of the project footprint. The project footprint is located within the transition zone of the Magaliesberg Biosphere. According to the Mining and Biodiversity Guideline (2013), the project footprint is located on areas categorised as Highest Biodiversity Importance (highest risk for mining).

A number of fauna and flora SCC are listed as having the potential of occurring on the project area. However,

no fauna or flora SCC species were identified to occur on the project footprint. The majority (60%) of the footprint is located on thornveld which is moderately to heavily disturbed by adjacent activities such as mining and high density residential areas. The remainder of the project footprint has been transformed by current and historic mining activities.

According to the Department of Forestry, Fisheries and the Environment’s National Web-based Environmental Screening Tool the project area is categorised as medium and low sensitivity in terms of animal species themes; as medium sensitivity in terms of plant species themes; and very high sensitivity in terms of terrestrial biodiversity.

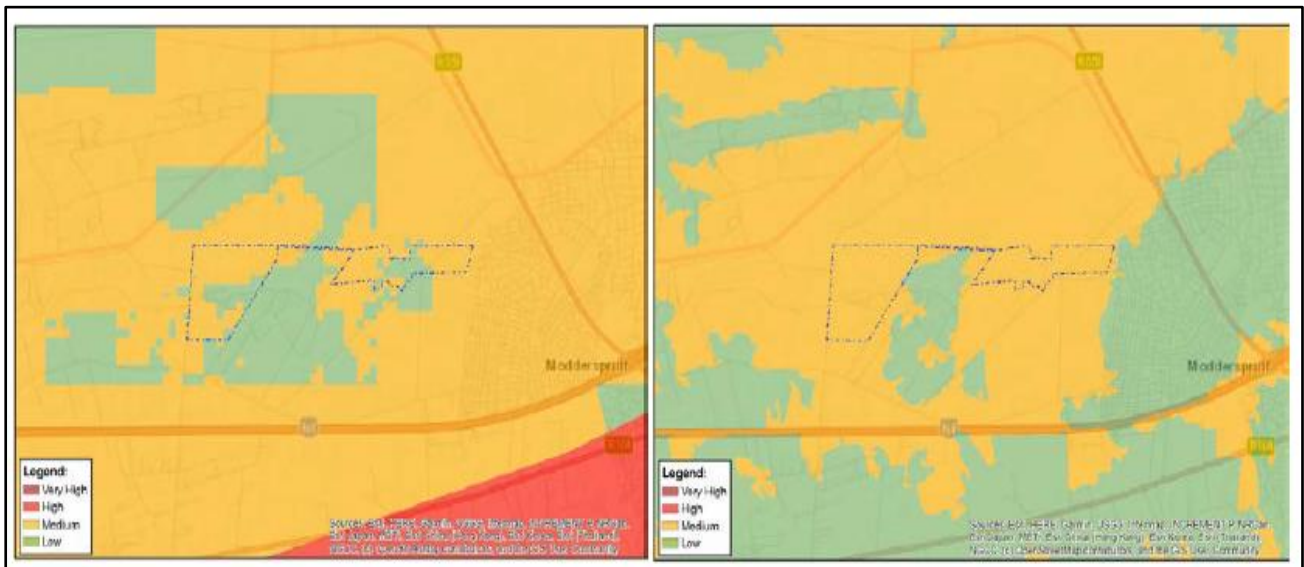


Figure 29: Environmental Screening Tool map of animal (left) and plant (right) species themes sensitivity

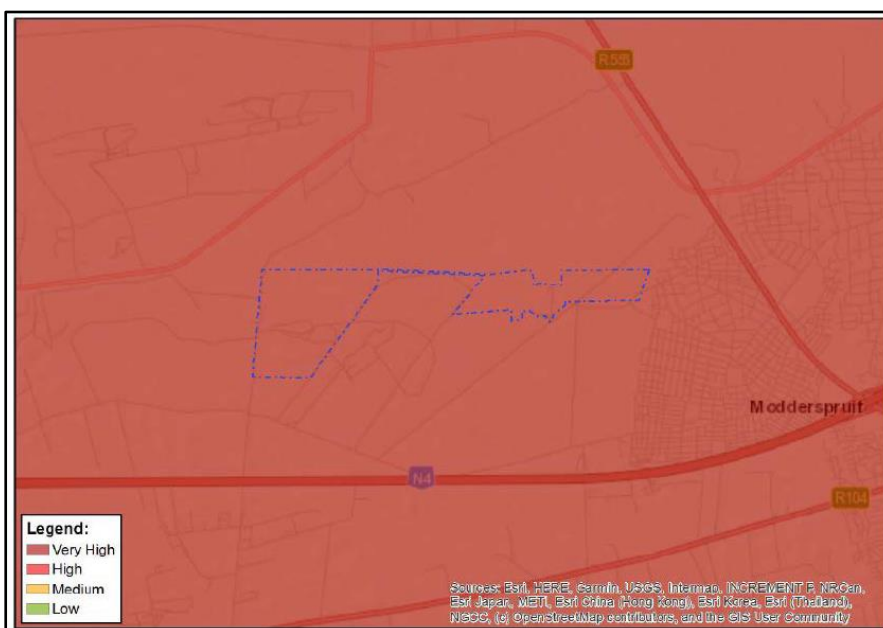


Figure 30: Environmental Screening Tool map of terrestrial biodiversity theme sensitivity

Based on the desktop assessment and findings of the site survey, the sensitivity of the delineated vegetation units were rated as follows:

- Degraded indigenous Thornveld (VU1) - VU1 has been provided a sensitivity rating of medium, considering the Vulnerable categorisation of the Marikana Thornveld vegetation type in terms of the NEMBA and the area being categorised as an CBA and ESA in the NWBSP.
- Stream of VU1 - Although the stream and associated vegetation is considered to be moderately to highly disturbed, watercourses and wetlands are considered high sensitivity due to their importance for ecosystem services and corridor functions, among others.
- Transformed (VU2) - The vegetation unit is classified as having a low sensitivity due to the transformed state of the vegetation composition of the vegetation unit or lack of vegetation.

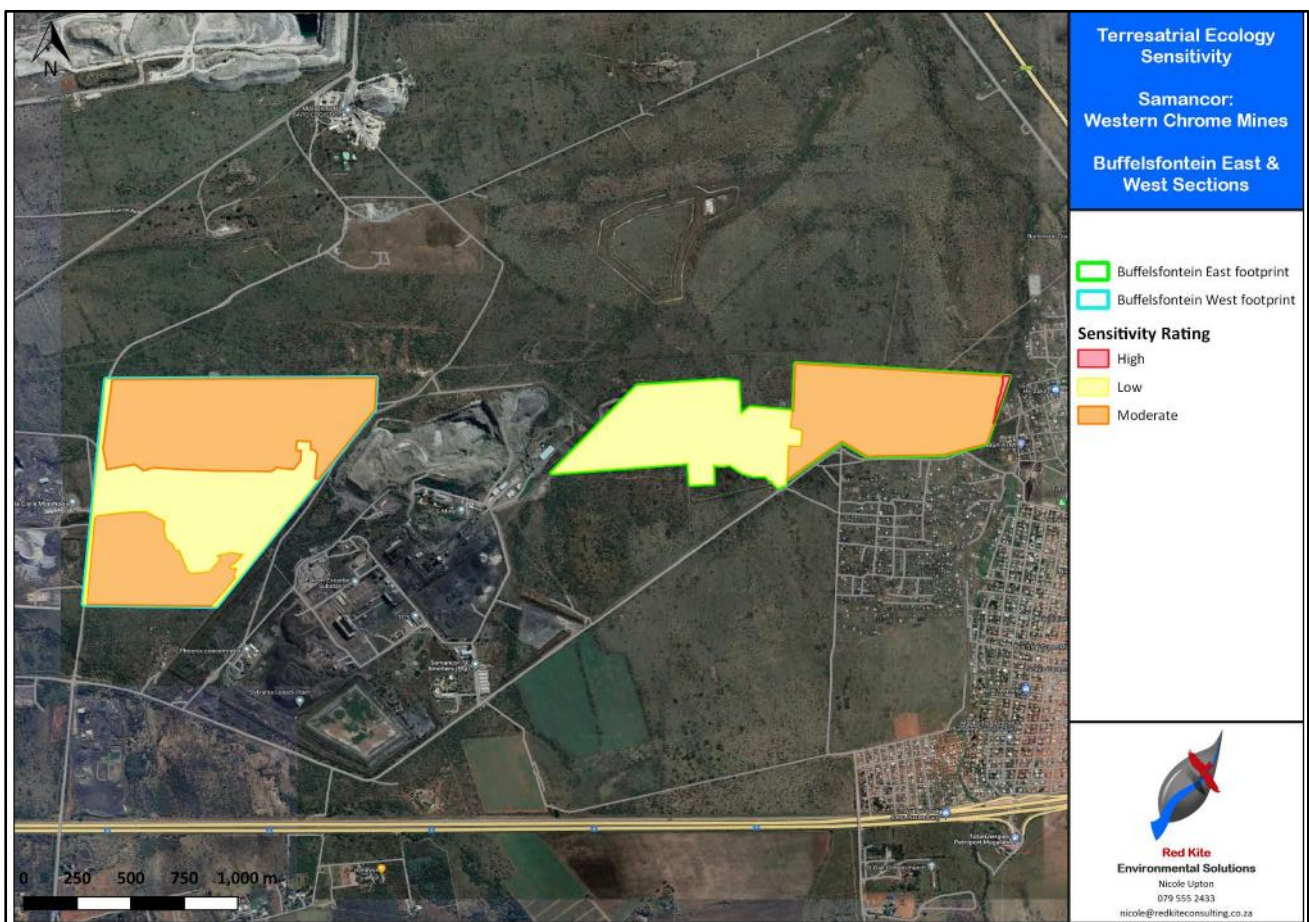


Figure 31: Terrestrial Ecology sensitivity for Buffelsfontein West

10.6 SURFACE WATER

Red Kite Environmental Solutions (Pty) Ltd was appointed to conduct a Surface Water Assessment for the proposed Buffelsfontein West Opencast Section. A copy of the report is attached as Appendix 10. The study includes a desktop study which provided the majority of the baseline surface water, climate and water quality data for comparison. Supplementary, a site survey to sample and assess the condition of the watercourses and the associated riparian vegetation was conducted on site. This allows for the application of rating criteria to assess the impacts of the proposed project on the surface water system. The field survey and desktop analysis

serve as a fatal flaw analysis to determine whether there are any major ecological concerns with regards to the proposed project. Water samples were not obtained as no flowing water was found in the streams in the vicinity of the project area. The Resource Water Quality Objectives (RWQO) for the catchments are noted as the water quality baseline for future sample comparison.

10.6.1 CATCHMENTS

The study area falls within the Limpopo Water Management Area (WMA 1), which major rivers including the Limpopo, Matlabas, Mokolo, Lephalala, Mogalakwena, Sand, Nzhelele, Mutale, and Luvuvhu river systems. The Limpopo WMA consists primarily of Drainage Region A.

The following major dams form part of the Limpopo WMA:

- Cross Dam in the Nwanedi River
- Doorndraai Dam in the Sterk River
- Glen Alpine Dam in the Mogalakwena River
- Luphephe Dam in the Luphephe River
- Mokolo Dam in the Mokolo River
- Mutshedzi Dam in the Mutshedzi River
- Nwanedi Dam in the in the Nwanedi River
- Nzhelele Dam in the Nzhelele River

The operation falls within the A21 tertiary catchment specifically within the A21K catchment, but also overlaps with the A21J quaternary catchment.

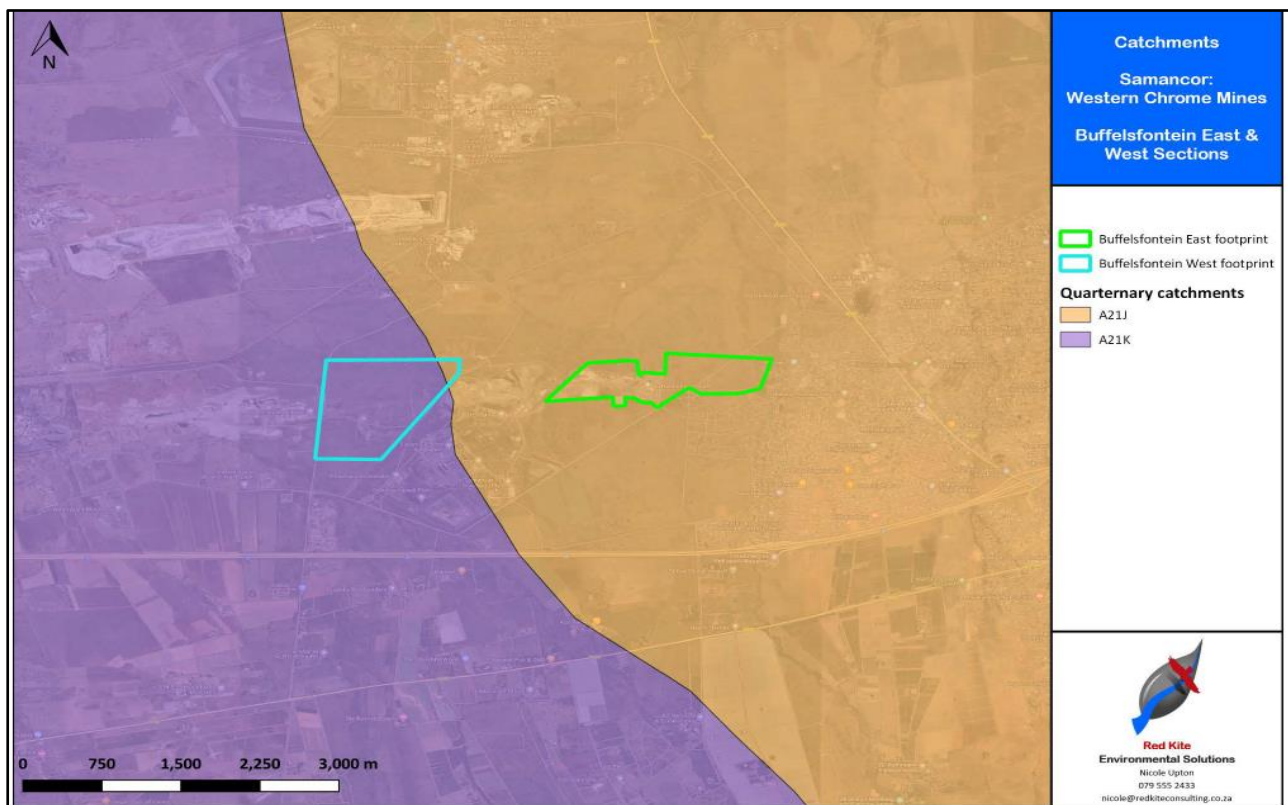


Figure 32: Quaternary Catchments related to the Buffelsfontein West Opencast Section

10.6.2 DRAINAGE SYSTEMS

A site survey of the affected surface water resources was undertaken in May 2022. The watercourses draining the proposed project area are all non-perennial. These systems have been significantly altered through the surrounding mining activities, agriculture and rural residential developments. The Buffelsfontein West Opencast Section located in the A21K quaternary catchment drains to the north-west towards the Maretwane river that confluences with the Sterkstroom River and continues as the Gwathe River, which serves as the main receiving watercourse for potential surface water impacts for the A21K catchment. The Gwathe also continues north meeting with the Crocodile River at the Roodekopjes dam.



Figure 33: Non-perennial rivers severely impacted by surrounding activities

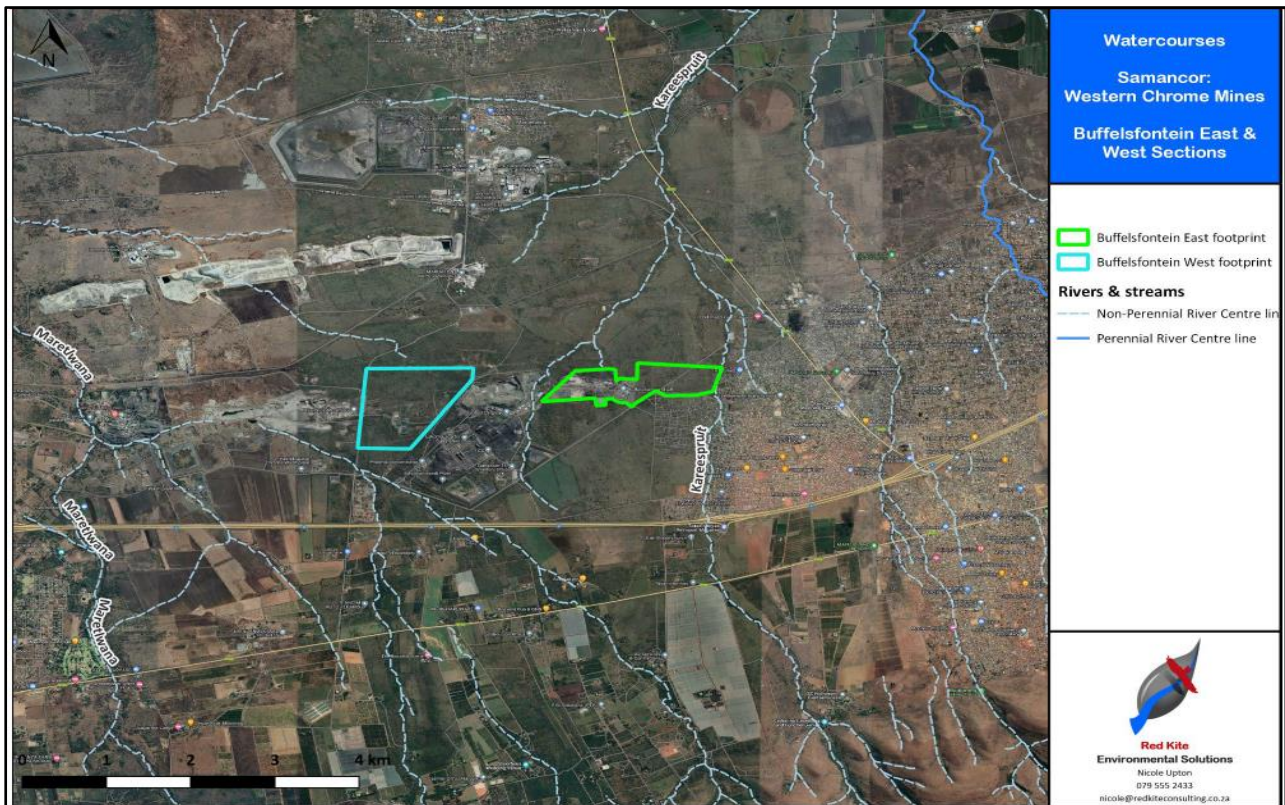


Figure 34: Surrounding Watercourses related to the Buffelsfontein West Opencast Section

10.6.3 RIPARIAN VEGETATION

The watercourses in the vicinity of the Buffelsfontein West Section are non-perennial and have been significantly altered through the surrounding activities, including road crossings, residential areas, crop cultivation adjacent to and within the riparian zone, adjacent developments and human and vehicle movements. Mining activities have taken place within and adjacent to the riparian zones of some of these streams.

The non-perennial streams in the vicinity of the project area exhibit vegetation representative of the vegetation found in the general area (thornveld) and are not considered indicators of riparian conditions. Apart from slightly denser plant growth in the immediate vicinity of these streams, no riparian zone could be identified, in relation to the surrounding vegetation. Although the riparian vegetation is considered to be moderately to highly disturbed, watercourses and wetlands are considered high sensitivity due to their importance for ecosystem services and corridor functions, among others.

10.6.4 FRESHWATER ECOSYSTEM PRIORITY AREAS

The National Freshwater Ecosystem Priority Areas (NFEPA) project is a multi-partner project between the Council for Scientific and Industrial Research (CSIR), the Water Research Commission, the South African National Biodiversity Institute, the Department of Forestry, Fisheries and the Environment, the South African Institute of Aquatic Biodiversity and South African National Parks. The project responds to the reported degradation of freshwater ecosystem condition and associated biodiversity, both globally and in South Africa. It uses systematic conservation planning to provide strategic spatial priorities for conserving South Africa's freshwater biodiversity, within the context of equitable social and economic development (Nel, et al., 2011).

The Buffelsfontein West Opencast Section intercepts with a Fish Support Area (FishFSA) as shown in the figure below. Areas designated as FishFSA are areas identified as fish sanctuaries that are lower than an A or B ecological condition, and the associated sub-quaternary catchment. Fish Support Areas also include sub-quaternary catchments that are important for migration of threatened or near-threatened fish species.

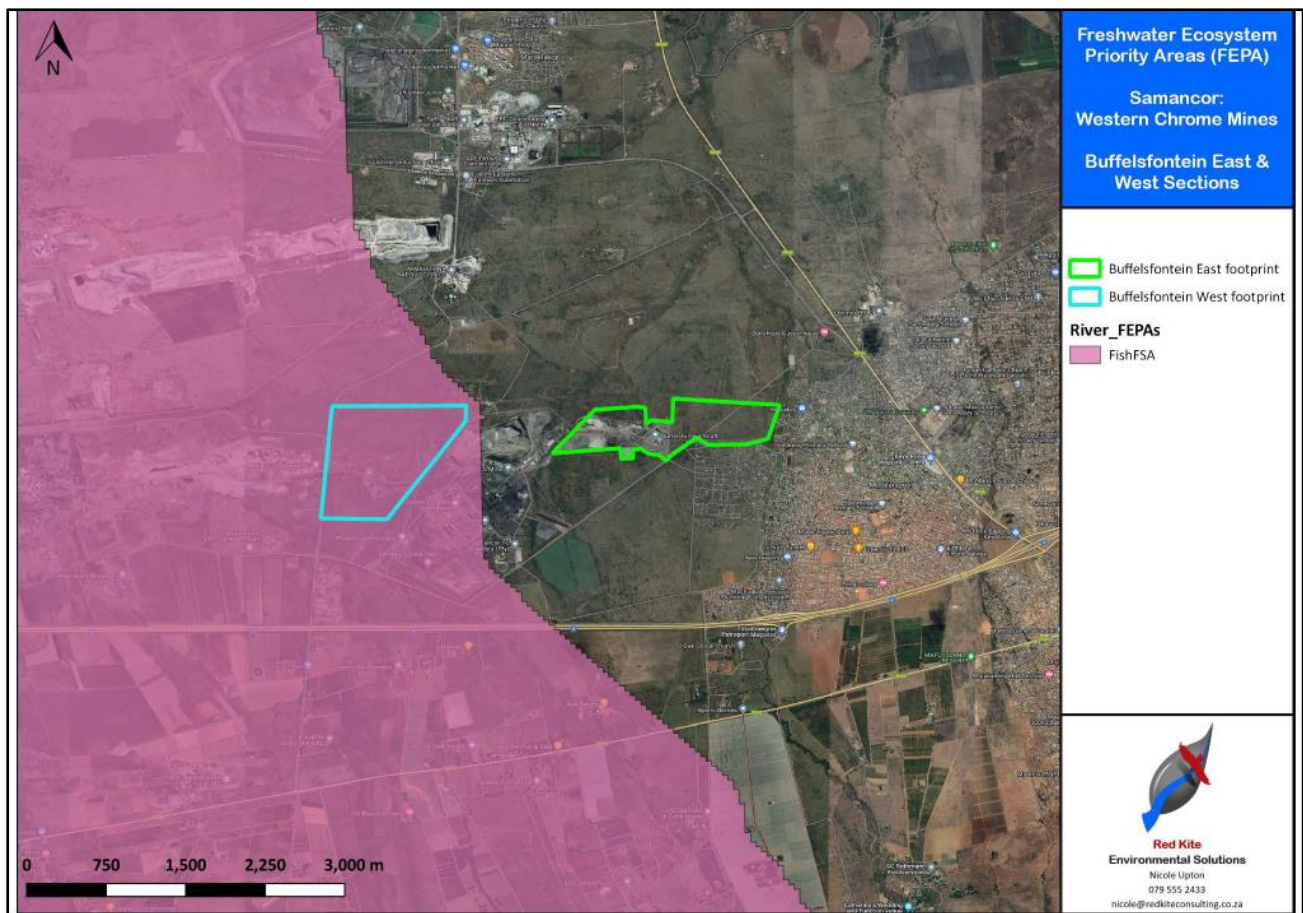


Figure 35: Freshwater Ecosystem Priority Areas (FEPA) for the Buffelsfontein West Opencast Section

10.6.5 RESOURCE CLASS

On 18 October 2019, the Minister of Water and Sanitation, published General Notice 562 of 2019, The Determination of Water Resource and Resource quality Objectives for Mokolo, Matlabas, Crocodile (West) and Marico Catchments. This notice provides a summary of the water resource classes and ecological categories for Integrated Units of Analyses (IUAs).

IUAs are classified in terms of their extent of permissible utilisation and protection as either Class I: indicating high environmental protection and minimal utilisation; or Class II: indicating moderate protection and moderate utilisation; and Class III: indicating sustainable minimal protection and high utilisation. The table below indicates the Resource Class set for the relevant Quaternary Catchment, within which the project area is situated.

Table 15: Water Resource Class and Ecological Category for the relevant Quaternary Catchments (DWS, 2019)

IUA	Water Resource Class for IUA	Biophysical Node Name	Quaternary Catchments	River Name
3 – Crocodile/Roodekopjes	III	HN19	A21J	Rosespruit at confluence with Crocodile
		CROC_EWR3	A21J	Crocodile from Hartbeespoort Dam to upstream Roodekopjes Dam
4 – Hex /Waterkloofspruit/Vaalkop	II	CROC Rapid_EWR11	A21K	Upper reaches of Sterkstroom (source) to inflow Buffelspoort Dam
		HN22	A21K	Sterkstroom from Buffelskloof Dam to Roodekopjes Dam

10.6.6 PRESENT ECOLOGICAL STATE, IMPORTANCE AND RESERVE

Studies undertaken by the Department of Water and Sanitation assessed all quaternary catchments as part of the Resource Directed Measures for Protection of Water Resources. In these assessments, the Present Ecological State (PES) and Recommended Ecological Class (REC) were defined. The details are summarised in the table below, as per Government Gazette GN 562, 18 October 2019 (No. 42775).

Table 16: PES, EIS and reserve data for A21J & A21K(DWS, 2019)

Component	A21J	A21K
Present Ecological Status (PES)	Class C/D	Class C
Ecological Importance	N/A	N/A
Ecological Sensitivity	N/A	N/A
Recommended Ecological Class	Class C/D	Class C
Ecological Reserve (%NMAR)	25.02	28.21
Basic Human Needs Reserve (%NMAR)	N/A	N/A
Total Reserve (%NMAR)	N/A	N/A
NMAR (MCM)	143.3	13.95

Class	Description
A	Unmodified, natural
B	Largely natural, with few modifications
C	Moderately modified
D	Largely modified
E	Extensively modified

Figure 36: Classification of River Health Assessment Classes

10.6.7 SURFACE WATER QUALITY

No water samples could be acquired during the site visit as the streams were dry at the time of the site visit. The DWAF Water Quality Guidelines – Aquatic Ecosystems (1st Edition, 1996) as well as the RQO's for the Resource Unit is presented below. The biophysical nodes HN19 (A21J) and HN22 (A21K) were used to list the RQO's for the quaternary catchments and are shown in Figure 37 below.

Variable	Unit	TWQR Aquatic Ecosystems (DWAF, 1996)	RQO (A21J)	RQO (A21K)
pH - Value	@ 25°C	< 5% deviation	6.5 -8.5	6.5 -8.5
EC	mS/m		≤ 75	≤ 70
Total Dissolved Solids (TDS)	mg/ℓ	< 15% deviation		
Sulphate as SO ₄	mg/ℓ		< 90	< 70
Nitrate as N	mg/ℓ	< 15% deviation	≤ 1.0	≤ 0.5
Nitrite as N	mg/ℓ	< 15% deviation	≤ 1.0	≤ 0.5
Dissolved Oxygen as O ₂	mg/ℓ	> 6 MAV, > 8 Target	≥ 6	≥ 6
Aluminium as Al	mg/ℓ	< 0.01	≤ 0.105	≤ 0.0625
Iron as Fe	mg/ℓ	< 15% deviation	≤ 0.1	≤ 0.1
Manganese as Mn	mg/ℓ	< 0.18	≤ 0.15	≤ 0.15

Figure 37: Baseline Water Quality as per RQO and TWQRO for A21J and A21K

10.6.8 SENSITIVITY / BUFFER ZONES

Buffer zones have been shown to perform a wide range of functions and have therefore been widely proposed as a standard measure to protect water resources and their associated biodiversity. These include (i) maintaining basic hydrological processes; (ii) reducing impacts on water resources from upstream activities and adjoining land uses; (iii) providing habitat for various aspects of biodiversity.

The watercourses draining the proposed project area are non-perennial and have been significantly altered through the surrounding mining activities, agriculture and residential developments. The buffer zone identified in this report serves to highlight an ecologically sensitive area in which activities should be conducted with this sensitivity in mind. Various site specific factors were considered in the calculation of the buffer zone for the water resources associated (within 100 m) of the project footprint, as per the methodology of “Guideline for the Determination of Buffer Zones for Rivers, Wetlands and Estuaries. Consolidated Report” by the WRC (Macfarlane *et al* 2015). Consequently, a 20 m buffer is recommended for the project activities (refer to sensitivity map, below).

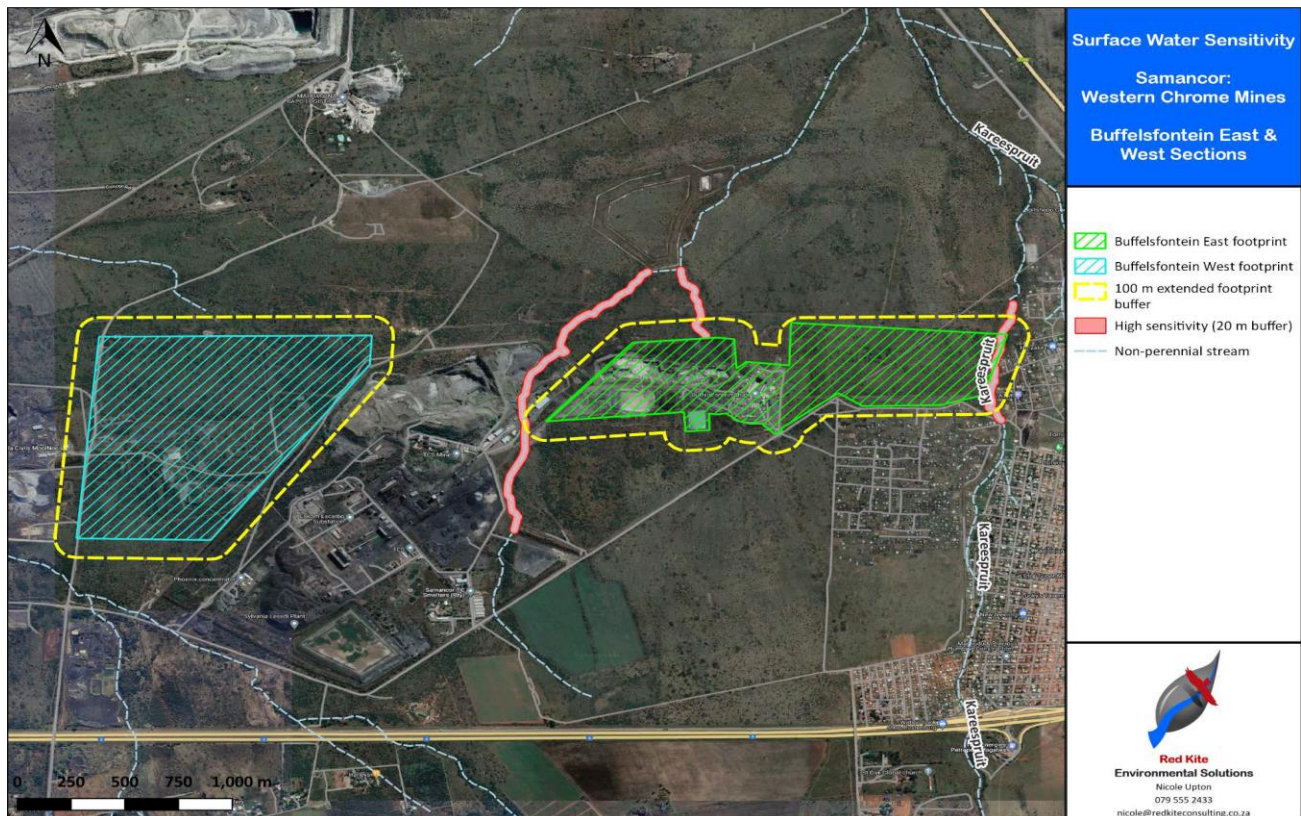


Figure 38: Surface Water sensitivity associated with the Buffelsfontein West Opencast Section

10.6.9 CONCLUSION

The physical characteristics of the associated rivers and streams, as well as the biological indices, indicated that the system is largely altered by the anthropogenic activities in the catchment. The primary surface water impacts associated with the operation are the potential impacts on water quantity and quality degradation due to the lack of proper storm water containment. As well as the risk of contamination from spills and transportation of product and waste during operation. It is important that the operation aim to limit impacts on the aquatic resources as far as possible in order to maintain its current basic ecosystem functions. All activities should aim at improving and maintaining the health class of the affected streams to a Class C/D.

It is the opinion of the specialists that the development may continue without severe impacts to the surface water environment if all recommended mitigation measures are implemented.

10.7 AQUATIC ECOLOGY

Enviridi Environmental Consultants prepared an Aquatic Ecology Impact Assessment for the proposed Buffelsfontein West Opencast Section. A copy of the report is included in Appendix 7.

10.7.1 METHODOLOGY

A desktop assessment was done using existing GIS database information and Google Earth™ imagery. Data available for the Water Management Area, the catchment, the promulgated Resource Quality Objectives (RQOs) and data as sourced from the Department of Water and Sanitation (DWS) were utilised to gain an understanding of the background baseline against which the field data could be compared.

A site visit was conducted on the 20th of May 2022 which could be described as a dry season assessment (end of the dry season). Unnamed drainage lines of the western Marethwane (associated with Buffelsfontein West), were undefined and not connected to the main river system and therefore not included or relevant for aquatic ecology assessment. The desktop assessment looked at the Screening tool reports generated for the area. In addition, Geographical Information Systems (GIS) data sets were used.

10.7.2 INTEGRATED UNIT OF ANALYSIS AND RESOURCE QUALITY OBJECTIVES

According to Government Notice 1388 of 8 December 2017 (National Water Act, 1998 (Act No.36 Of 1998) “Proposed Classes of Water Resource and Resource quality Objectives for Mokolo, Matlabas, Crocodile (West) and Marico Catchments” - (Department of Water and Sanitation, 2017), the following was published.

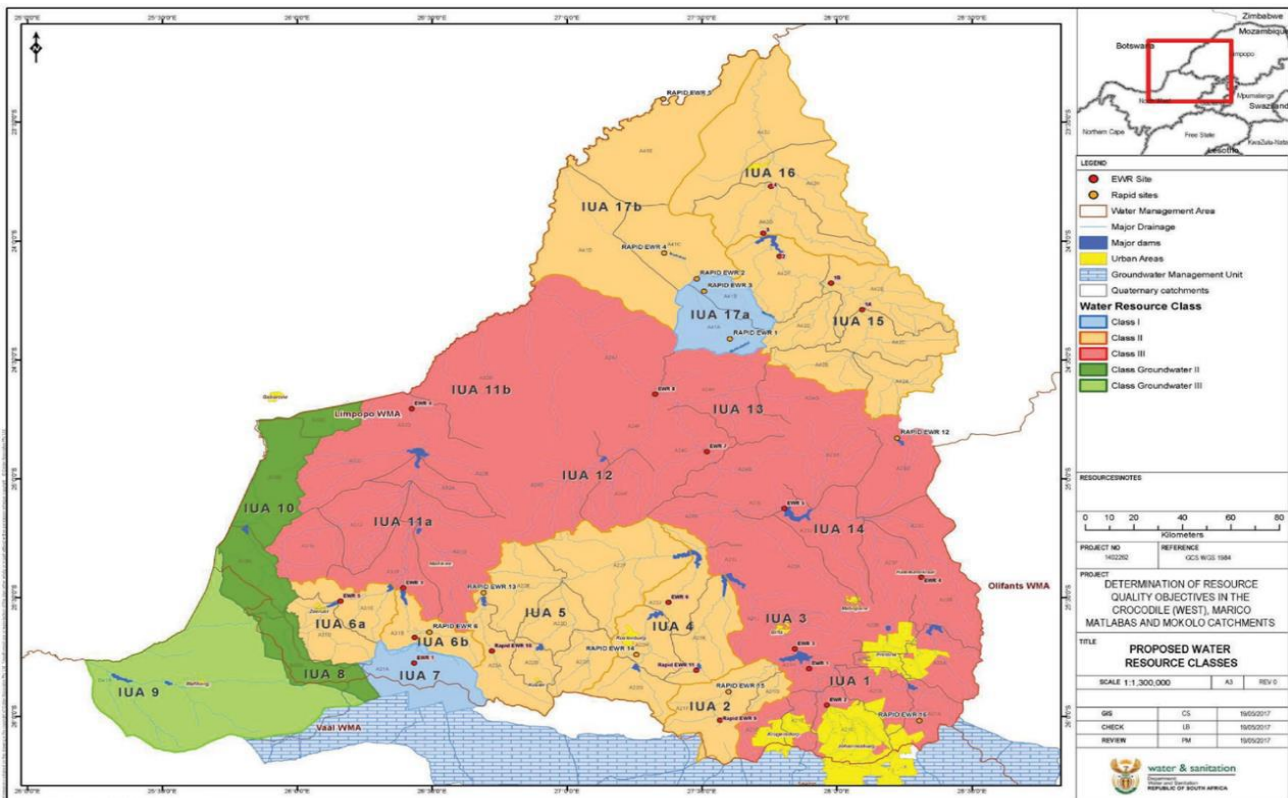


Figure 39: Integrated Unit of Analysis – showing area in IUA4 (BF West)

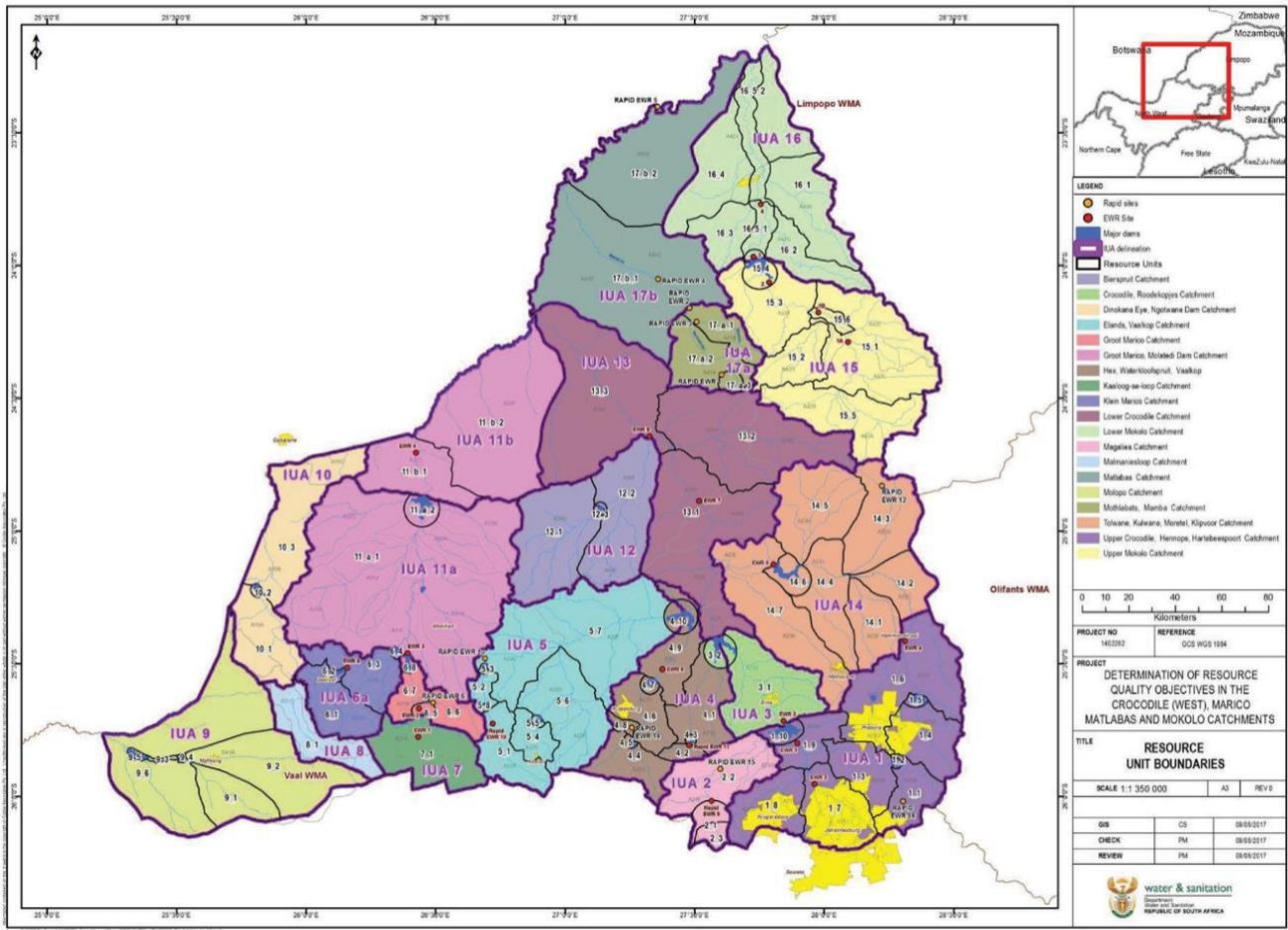


Figure 40: Resource Units (Hydro Nodes) in the WMA – IUA4 (BF West)

Table 17: Integrated Unit of Analysis (IUAs) and Resource Quality Objectives (RQOs) as per Quaternary Catchment (EC, MAR & EWR) – IUA 4 (BF West)

Integrated Unit of Analysis (IUA)	Water Resource Class for IUA	Biophysical Node Name	Quaternary Catchment	Resource Unit & River	Ecological Category to Maintain
4. Hex/ Waterkloofspruit/ Vaalkop	II	CROC Rapid_EWR11	A21K	4_2 Upper reaches of Sterkstroom (source) to inflow	C
		HN22	A21K	4_1 Sterkstroom from Buffelskloof Dam to Roodekopjes Dam	C
		HN23	A22G	4_4 Upper Kareespruit (source) to Olifantsnek Dam, Rooikloofspruit	C
		CROC Rapid_EWR14	A22K	4_8 Waterkloofspruit to confluence with Hex	B/C
		HN25	A22K	4_6 Hex from Olifantsnek Dam to Bospoort Dam, Sandspruit	D
		EWR site CROC_EWR6	A22J	4_9 Hex from Bospoort Dam to inflow Vaalkop Dam	D

10.7.3 DELINEATION OF RIPARIAN ZONES AND INDICES

Riparian vegetation is divided into three zones, the marginal zone, lower nonmarginal zone and the upper non-marginal zone, each having different vegetation growth (Table 18).

Table 18: Description of riparian vegetation zones (Kleynhans et al, 2007)

	Marginal	(Non-marginal) Lower	(Non-marginal) Upper
Alternative descriptions	Active features Wet bank	Seasonal features Wet bank	Ephemeral features Dry bank
Extends from	Water level at low flow	Marginal zone	Lower zone
Extends to	Geomorphic features / substrates that are hydrologically activated (inundated or moistened) for the greater part of the year.	Usually a marked increase in lateral Elevation.	Usually, a marked decrease in lateral elevation.
Characterized by	Refer to above; Moist substrates next to the water's edge; Water loving- species usually vigorous due to near permanent access to soil moisture	Geomorphic features that are hydrologically activated (inundated or moistened) on a seasonal basis. May have different species than marginal zone	Geomorphic features that are hydrological activated (inundated or moistened) on an Ephemeral basis. Presence of riparian and terrestrial species Terrestrial species with increased stature

10.7.3 QUALITATIVE HABITAT INTEGRITY (QHI)

The qualitative habitat integrity findings and scores for the A21K quaternary catchment associated with the Buffelsfontein West Opencast Section are shown in Table 19 below.

Table 19: QHI Findings and Scores

Quaternary Catchment	River	Bed Modification (0-5)	Flow Modification (0-5)	Inundation (0-5)	Riparian/bank condition (0-5)	Water Quality Modification (0-5)	Desktop Habitat Integrity	Invertebrate Rating (0-5)	Fish Rating (0-5)	Instream EC%	Instream EC	Vegetation Rating (0-5)	Ecostatus %	Ecostatus EC
A21K	Kareespruit US	5	4	2	4	3	38,0	5	5	19,3	E/F	5	16,2	F
A21K	Kareespruit DS	5	4	2	5	4,5	28,0	5	5	16,0	F	5	14,0	F

10.7.4 SENSITIVITY

Legislative requirements were taken into consideration when determining a suitable buffer zone for the riparian resources. In accordance with GN509 of 2016 as it relates to the NWA, a regulated area of a watercourse for section 21 (c) and (i) of the NWA, 1998 is defined as:

- The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of the river, spring, natural channel, lake or dam;
- In the absence of a determined 1 in 100-year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bend (subject to compliance to section 144 of the Act); or
- A 500 m radius from the delineated boundary (extent) of any wetland or pan.
- In terms of Regulation GN 704 of the NWA, 1998 (Act no. 36 of 1998), a 100 m zone of regulation or 1:100 year or 1:50 year floodline (dependent on activity) around the freshwater resource is required, whichever is greater.

A conservation buffer as per surface water report findings around the watercourse itself is recommended. All activity within 100 m of the river needs to be authorized in terms of Section 21 (c) & (i) water use in terms of the National Water Act, 1998 (Act no. 36 of 1998). Sensitivity as included within the National Screening Tool has also been included below.



Figure 41: Aquatic Sensitivity as per Screening Tool Report for the specific section of River – Buffelsfontein West– Required to be included based on Regulations (March, October 2020)

10.7.5 CONCLUSION

The applicant needs to ensure identified impacts will be minimised through the implementation of the mitigation measures included in the EMP. The findings should be confirmed during several seasons, since the results of one assessment cannot be taken as a standard. Therefore, several baseline follow-up assessments should be undertaken before the project starts with activities to ensure a trend has already been established as a baseline (ideally across both seasons). It is the reasoned opinion of the specialist that the development may continue if all management features are implemented from the onset of the project.

10.8 WETLANDS

A Watercourse Delineation and Functionality Assessment was conducted by Elemental Sustainability for the proposed Buffelsfontein West Opencast Section. A copy of the report is included in Appendix 8.

10.8.1 METHODOLOGY

A desktop assessment was undertaken of all available data. This involved the investigation of aerial photography, GIS databases, government records and previous studies, including literature reviews pertaining to the study site to determine the theoretical importance and sensitivity of the terrestrial and aquatic ecosystems involved. The study site was mapped using Geographical Information Systems (GIS) (e.g. ArcGIS) to better understand the layout and structure of the surrounding environment. A field assessment was conducted on the 20th of May 2022 to supplement and confirm the findings of the desktop analysis. A walkover field survey of the site was conducted where accessible. All wetland or riparian features encountered were assessed using the Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems, hereafter referred to as the “Classification System” (Ollis *et al.* 2013) was used.

10.8.2 LAND USE AND ECOLOGICAL STATE

The study site, Buffelsfontein West and the surrounding area has been severely transformed over the years. The immediate surrounding area is characterised by a mix of land uses, including fallow lands, old fields, degraded areas, dirt roads, mining activities and residential built-up areas. With some sections having natural occurring grassland, drainage, and wetland areas. A few major roads, including the N4 and R556, also pass the study site. The dominant land use in the area is urban built-up and mining related activities. Several wetland units and watercourses were identified on the study site. However, due to historical mining practices and other anthropogenic developments, the wetlands have become severely fragmented, with some sections no longer resembling wetland characteristics. A clear loss of wetland habitat due to mining establishment was observed.

Opencast mining areas have been established upstream of the watercourse areas, further impacting on the wetland's flow and upstream water input. The wetland receives most of its water from lateral inputs, therefore the water quality of the wetland has likely been impacted on by sedimentation from the surrounding activities, exposed soil surfaces and dirt roads. The wetland's hydrological and geomorphological functioning have been impacted by the upstream catchment activities, erosion and the dirt roads traversing the wetland. Alien invasive species establishment has ensued due to the anthropogenic disturbances and further spread is evident, especially along dirt roads in the surrounding area and next to mining dumps and boundaries. The disturbances

described above have negatively impacted on the wetland's ecological integrity and subsequently its ability to perform ecosystem services.

10.8.3 WETLAND CLASSIFICATION AND SYSTEM CHARACTERISATION

The wetland assessment focussed on the wetland units on and within 500 m of the Buffelsfontein West Opencast Section. The wetland systems were delineated in field and via desktop methodology. Within the assessment area (Buffelsfontein West), the wetlands total approximately 23.82 hectares (ha) in size. Five (5) Wetland Units (WU) were identified (refer to Table 20). The impacts of activities such as mining, erosion, road networks, and infilling within the greater catchment were taken into consideration during the assessment.

Mainly drainage lines were observed within 500 m of the Buffelsfontein West section of the study site. As mentioned, for this study only the Seep wetland units and the artificial wetland were assessed. Also, Wetland units Seep01, Seep02, Seep03 and Seep04 were assessed as one wetland unit due to their connectivity (i.e. wetland system) and all experiencing similar impacts in the same micro-catchment.

Table 20: Classification of the Wetland Units within the study site (Buffelsfontein West) and the 500 m DWS Regulated Area

HGM Units	Size within 500 m Regulated Area (ha)	Level 2: Regional Setting	Level 3: Landscape Unit	LEVEL 4: HGM Unit			Level 5: Hydrological Regime			Level 6: Descriptors
				A- HGM Unit	B- Longitudinal Zonation/Landform/ Outflow Drainage	C- Landform/Inflow Drainage	A- Inundation Periodicity	B- Saturation Periodicity (within 0.5 m of soil surface)	C – Inundation depth-class	Natural vs. Artificial
Seep01	3.46	Central Bushveld Group 2	Slope	Seep	With Channel Inflow	N/A	Unknown	Intermittently	N/A	Natural
Seep02	16.7		Slope	Seep	Without Channel Inflow	N/A	Unknown	Intermittently	N/A	Natural
Seep03	0.43		Slope	Seep	Without Channel Inflow	N/A	Unknown	Intermittently	N/A	Natural
Seep04	1.34		Slope	Seep	Without Channel Inflow	N/A	Unknown	Intermittently	N/A	Natural
Arti01	1.89		Plain	Depression	Endorheic	Without channelled inflow	Unknown	Intermittently	N/A	Artificial
Total	23.82									

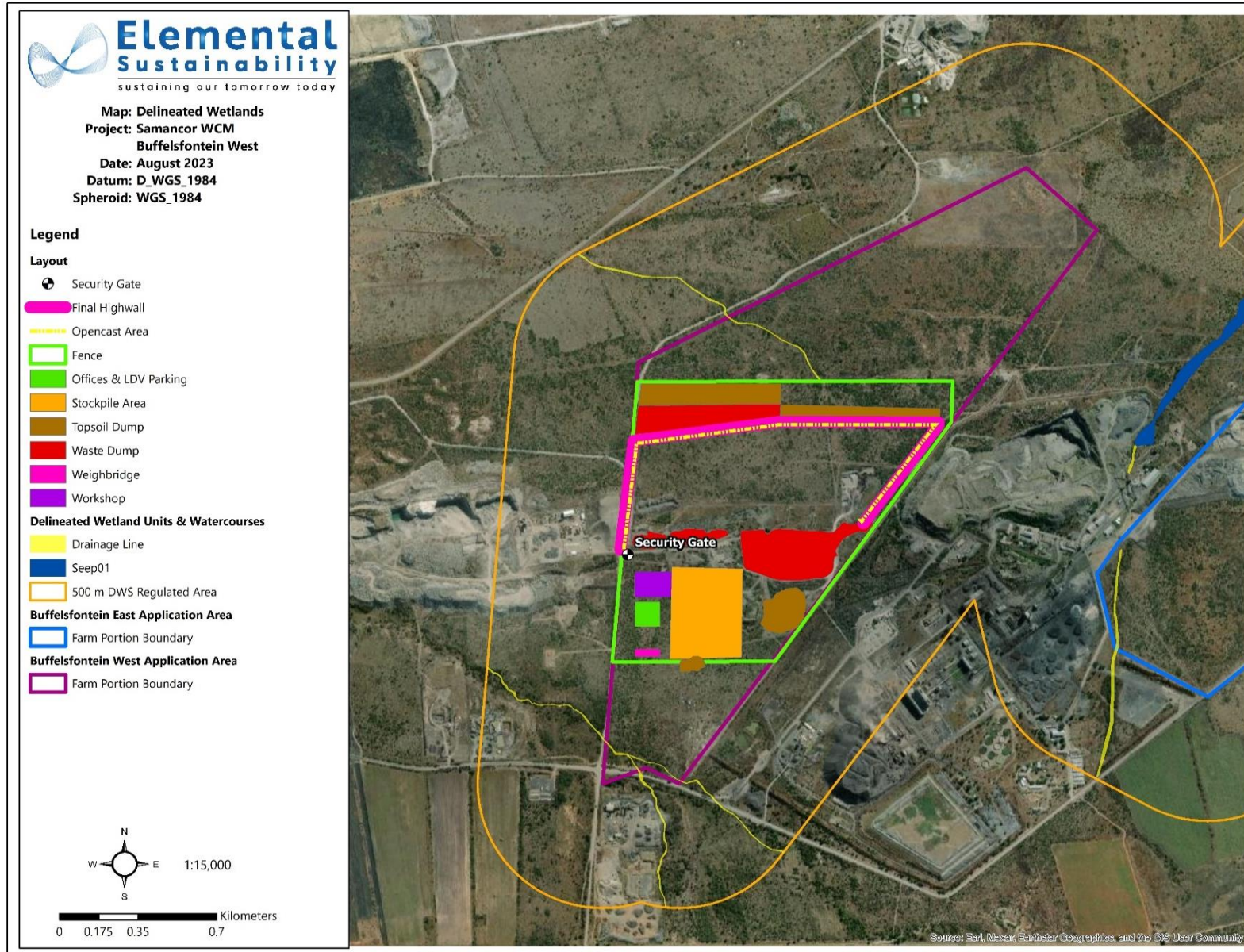



Figure 42: Delineated watercourses associated with the Buffelsfontein West Section and the 500 m surrounding area

10.8.3.1 WETLAND UNIT DESCRIPTION AND DELINEATION

All Wetland Units were delineated on a desktop level with the use of digital satellite imagery and topographical maps. Portions of the features were then verified during the field survey according to the guidelines advocated by DWA (2005, 2008) and the wetland delineations as presented in this report are regarded as a best estimate of the boundaries based on the site conditions present at the time of assessment. Five (5) Wetland Units were delineated in field, four (4) Seeps and one (1) Artificial Wetland (Arti01), and functionally assessed. The Artificial Wetland could only be studied from a far, as no access is allowed to the area. The outer boundaries of the Artificial Wetland were therefore determined via desktop methodology and aerial imagery. No infrastructure or mining activities is proposed for the area where the Artificial Wetland is situated.

Table 21 below provides a description of the Seep Wetland System and the indicators used to ascertain the boundaries of the wetlands:

Table 21: Description of the Seep Wetland System.

Feature		Assessment
Indicators	Terrain & Input Sources	Terrain units are an imperative characteristic of the landscape in order to identify potential areas of wetness, which can be found typically on slopes or in valleys. Seeps are formed by the drainage line input and runoff from the side slopes. Seepage from the tailings and adjacent dams also contribute to the water input.
	Vegetation	Vegetation, although transformed, was considered informative. Vegetation was dominated by a mix of grasses and sedges. <div style="text-align: center;">  </div>
	Soil Wetness	Soil was considered the primary indicator. Various colour components of the soil profile provide evidence of hydric soils, which can be defined as soils that undergo repeated and prolonged period of saturation (DWAF, 2008). These components include the presence of mottling (i.e. brightly coloured streaky, or specks of iron compounds), a gleyed soil matrix (i.e. grey coloured soil) and iron or manganese concretions. The soils of the Seep Wetland areas exhibited clear gleyed soil matrixes.



10.8.4 WETLAND INTEGRITY AND FUNCTIONAL ASSESSMENT

10.8.4.1 WET-HEALTH ASSESSMENT

The results of the Wet-Health (Version 2) assessment indicate that the Seep wetland system falls within a combined Ecological Category (EC) Category of D, having obtained an overall score of 5.1 (49%). This means the functionality of the wetland has been Largely Modified, the change in ecosystem processes and loss of natural habitat and biota is large. Approximately 51% of wetland integrity has been lost. The modification has a clearly detrimental effect on this component of habitat integrity. The condition is likely to decline over the next 5 years.

Table 22: Summary of results of the WET-Health (Version 2) assessment.

PES Assessment	Hydrology	Geomorphology	Water Quality	Vegetation
Impact Score	5,0	5,2	3,9	6,3
PES Score (%)	50%	48%	61%	37%
Ecological Category	D	D	C	E
Trajectory of Change	↓	↓	↓	↓
Combined Impact Score	5,1			
Combined PES Score (%)	49%			
Combined Ecological Category	D			

10.8.4.2 ECOSYSTEM SERVICES

Physical and hydrological features allow hydro-geomorphic units to perform specific ecosystems services. A WET-EcoServices Version 2 evaluation was done for the wetland systems found on site to determine the services as described in the methodology. The degree of disturbance and modification of wetlands results in a decrease in the ability to which they can perform these ecosystem services. The findings of the Wet-EcoServices (Version 2) evaluation conducted is provided below. The WET-EcoServices Version 2 evaluation

indicates that the Seep wetland system provides a Moderate degree of Regulating and Supporting Services, especially sediment trapping, and phosphate, nitrate, and toxicant assimilation. However, the demand for these services is low. The Artificial wetland unit (Arti01) does not provide much ecosystem services. It mainly contributes to streamflow regulation and carbon storage, with all other services scoring very low importance. This is likely attributed to the system being small and artificial in nature. It is also not connected to a stream network. Refer to Figure 43 and Figure 44 below.

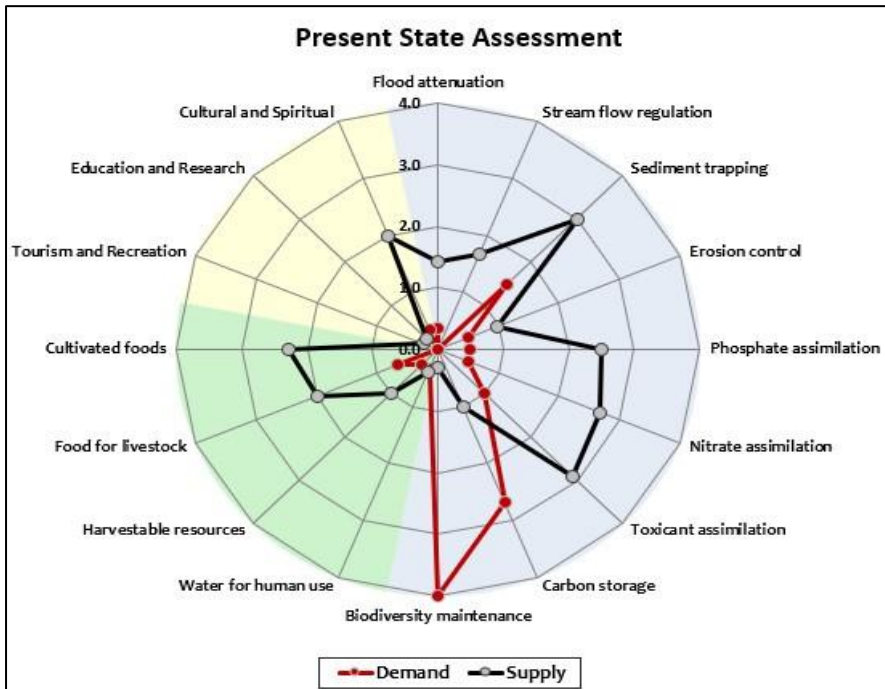


Figure 43: Radar diagram of supply and demand scores for the Seep wetlands

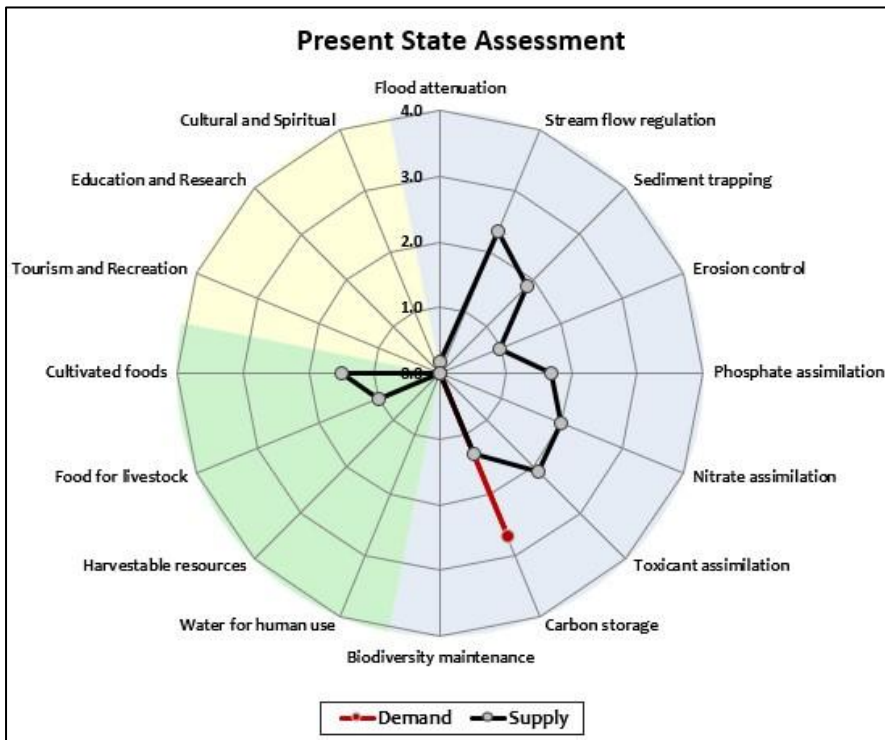


Figure 44: Radar diagram of supply and demand scores for the Artificial wetland.

10.8.4.3 RECOMMENDED ECOLOGICAL CATEGORY (REC)

The REC score is set at a D. The ecological category of the wetland should be maintained at a D, as it is not feasible or practicable for the PES to be improved to a C; as the existing opencast mining area and the proposed mining activities will not allow it. An improved C can be achieved once activities reach the rehabilitation and closure phase of the existing Buffelsfontein West section, and the proposed additional mining activities. Therefore, the REC is set at the current PES (Rountree *et al.*, 2013).

10.8.5 BUFFER ZONE DETERMINATION

Calculated buffer zones were based on industry worst case scenarios and were calculated as follows (Macfarlane *et al.* 2016):

- Construction Buffer: 45 m
- Operational Buffer: 45 m
- Riparian and Drainage Areas: 20 m – (Separate Surface Water Assessment Report)

No buffer zone was calculated for the Artificial wetland (Arti01) as it is situated within the existing mining right area and fenced off from the public and all unauthorised persons and/or activities. No mining activities or additional infrastructure is proposed for this area. The buffer zones identified in this report serves to highlight an ecologically sensitive area in which activities should be conducted with this sensitivity in mind.

10.8.6 SUMMARY OF RESULTS

The results recorded for the wetlands affected by the surrounding land uses are summarised below:

Table 23: Summary of results

Assessment	Score	
	Seep Wetland System	Arti01
Classification	Seep	Artificial Wetland
Wetland Condition / Present Ecological State (PES)	D - Largely Modified. The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.	N/A
Ecosystem Services Assessment	Highest Scores: Sediment Trapping (2.3) – Moderate Toxicant Assimilation (1.9) – Moderate Nitrate Assimilation (1.4) – Moderately Low	Highest Scores: Carbon Storage (1.2) – Low Streamflow Regulation (0.8) – Low

Ecological Importance and Sensitivity (EIS)	Low. The importance of services supplied is low relative to that supplied by other wetlands	N/A
Recommended Ecological Category (REC)	Maintain at a D	N/A

10.9 HYDROGEOLOGY

Geo Pollution Technologies – Gauteng (Pty) Ltd. (GPT) was appointed to conduct the Hydrogeological Impact Assessment for Buffelsfontein West Opencast Section. A copy of the report is attached in Appendix 9.

10.9.1 METHODOLOGY

A desktop study was conducted and involved the gathering of information through the collation, scrutiny and evaluation of available and relevant meteorological, geographical, geological, hydrogeological and water quality data. The hydrocensus was done as a site familiarisation exercise and the collection of data from the study areas and surrounding environments. It comprised a census of key boreholes, wells and any other groundwater related information. Other sources of information and methods included surface and groundwater monthly water quality reports, groundwater recharge calculations, groundwater modelling and numerical modelling.

10.9.2 HYDROCENSUS AND GROUNDWATER LEVELS

In general, a good relationship should exist between topography and static groundwater level. This relationship can be used to distinguish between boreholes with water levels at rest, and boreholes with anomalous groundwater levels due to disturbances such as pumping or local hydrogeological heterogeneities. The following boreholes were found to have anomalous groundwater levels due to disturbances or heterogeneities:

- BFGN01
- BFGN02
- BH13-D
- BH13-S
- BH15-S

However, due to the heterogeneity of the subsurface, these relationships should not be expected to hold everywhere under all circumstances, and deviations could thus be expected. The boreholes identified during the hydrocensus are shown in Figure 45 below.

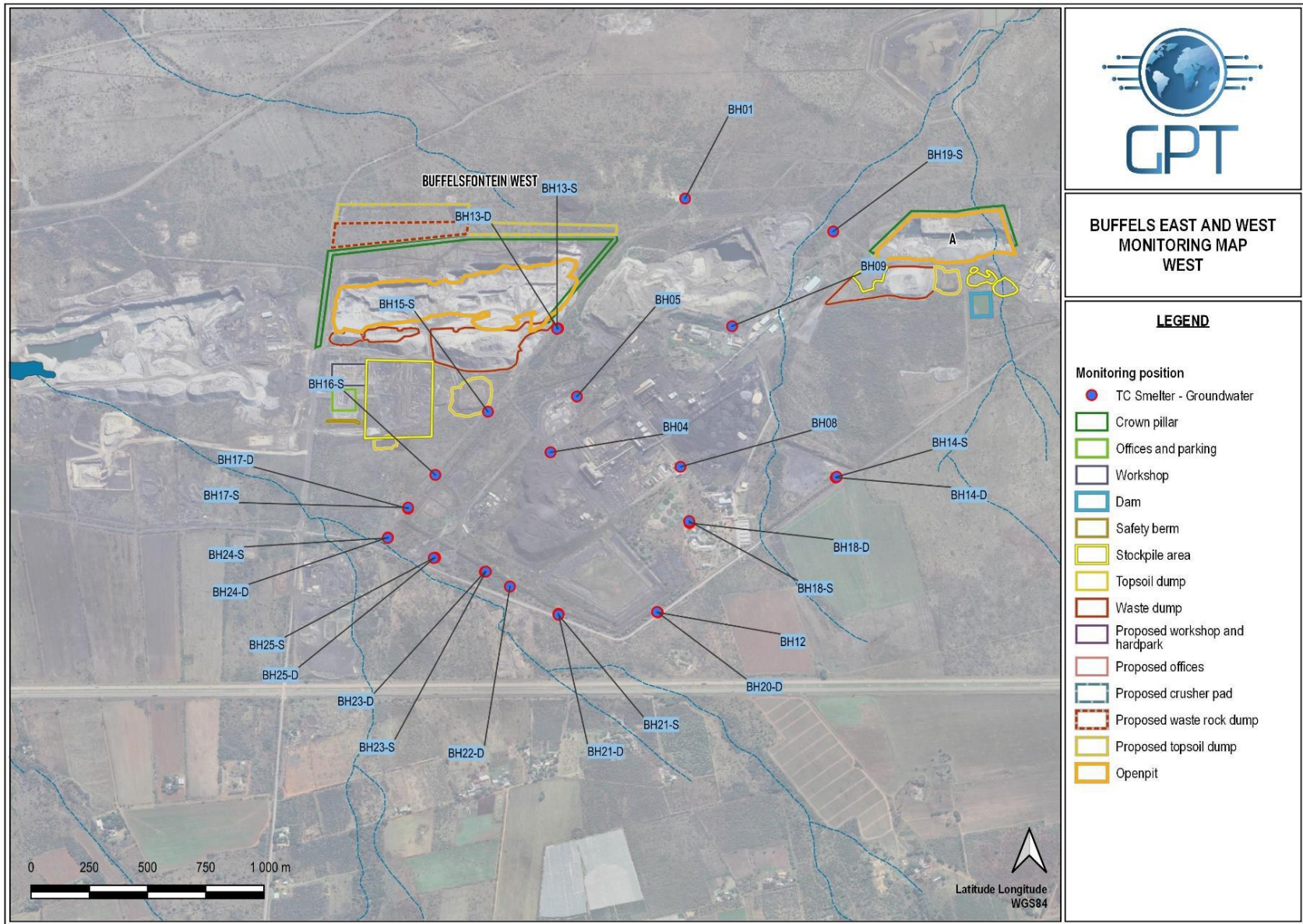


Figure 45: Hydrocensus Map for Buffelsfontein West Opencast Section

10.9.3 GROUNDWATER QUALITY

Groundwater quality results were obtained from the reports made available by the client; Samancor WCM-Buffelsfontein Monthly Water Quality Monitoring Report – January 2023 (22-1506/12-004); produced by Thlago Environmental (Pty) Ltd.

The water quality results are compared with the maximum recommended concentrations for domestic use as defined by the SANS 241-1: 2015 target water quality limits. The SANS 241-1: 2015 standard is applicable to all water services institutions and sets numerical limits for specific determinants to provide the minimum assurance necessary that the drinking water is deemed to present an acceptable health risk for lifetime consumption. Additionally, the groundwater results were compared to the WUL limits of the site.

Determinant	Risk	Unit	Standard limits	BFGN01	BFGN02	BFGN06
Physical and aesthetic determinants						
Conductivity at 25 °C	Aesthetic	mS/m	170	193	84.9	237
Total dissolved solids	Aesthetic	mg/L	1 200	927	476	1264
pH at 25 °C ^b	Operational	pH units	5 to 9.7	7.17	7.47	7.42
Chemical determinants – macro-determinants						
Nitrate as N (NO ₃ - N)	Acute health	mg/L	11	0.07	0.46	0.08
Sulfate as SO ₄ ²⁻	Acute health	mg/L	500	19.4	41.8	9.81
Fluoride as F ⁻	Chronic health	mg/L	1.5	BDL	BDL	BDL
Chloride as Cl ⁻	Aesthetic	mg/L	300	28	6.21	423
Sodium as Na	Aesthetic	mg/L	200	57.2	30.3	151
Zinc as Zn	Aesthetic	mg/L	5	BDL	BDL	BDL
Chemical determinants – micro-determinants						
Cadmium as Cd	Chronic health	mg/L	0.003	BDL	BDL	BDL
Total chromium as Cr	Chronic health	mg/L	0.05	BDL	BDL	BDL
Copper as Cu	Chronic health	mg/L	2	BDL	BDL	BDL
Iron as Fe	Aesthetic	mg/L	0.3	BDL	BDL	BDL
Lead as Pb	Chronic health	mg/L	0.01	BDL	BDL	BDL
Manganese as Mn	Aesthetic	mg/L	0.1	1.95	BDL	1.04
Nickel as Ni	Chronic health	mg/L	0.07	BDL	BDL	BDL
Aluminium as Al	Operational	mg/L	0.3	BDL	BDL	BDL
BDL = Below Detection Limit						

Figure 46: Groundwater qualities compared to SANS 241-1:2015 for Buffelsfontein July 2022

10.9.4 AQUIFER CLASSIFICATION

The aquifer system for Buffelsfontein West is classified as a “Minor Aquifer System”. based on the fact that although these aquifers seldom produce large quantities of water, they are important for local supplies and in supplying base flow for rivers.

10.9.5 AQUIFER PROTECTION CLASSIFICATION

A Groundwater Quality Management Index of 4 was estimated for Buffelsfontein West from the ratings for the Aquifer System Management Classification. According to this estimate a medium level groundwater protection is required for the aquifer. Reasonable and sound groundwater protection measures based on the modelling will therefore be recommended to ensure that no cumulative pollution affects the aquifer, even in the long term.

DWA's water quality management objectives are to protect human health and the environment. Therefore, the significance of this aquifer classification is that measures must be taken to limit the risk to the following environments.

- The protection of the underlying aquifer.
- The protection of the Maretlwane River to the west of the Buffelsfontein West site.

10.10 AIR QUALITY

Eco Elementum (Pty) Ltd was appointed to undertake the Air Quality Impact Assessment for the Buffelsfontein West Opencast Section.

10.11.1 METHODOLOGY

Emission factors are quantified using the Australian National Pollutant Inventory (NPI) which is an improvement on the US Environmental Protection Agency (US.EPA) AP-42 document of Air Pollution Emission Factors for Australian conditions, for fugitive dust deriving from material handling, on-site roads, milling and crushing operations, drilling and blasting, and wind erosion from exposed surfaces. The regulatory model of the US.EPA, AERMET/AERMOD dispersion model suite, was chosen for the study. AERMET uses both surface and upper air data. The model also has a terrain pre-processor (AERMAP) for including a large topography into the model. The AERMET / AERMOD suite was developed with the support of the AMS/EPA Regulatory Model Improvement Committee (AERMIC), whose objective was to include state-of the-art science in regulatory models.

10.11.2 DISCUSSION OF THE BASELINE AIR QUALITY

10.11.2.1 SENSITIVE RECEPTORS

Sensitive receptors identified in the immediate vicinity (Figure 47) of the proposed Buffelsfontein West project area have been listed below:

- Various dispersed homesteads surrounding the project area.
- Modderspruit Town
- Maroelakop Town

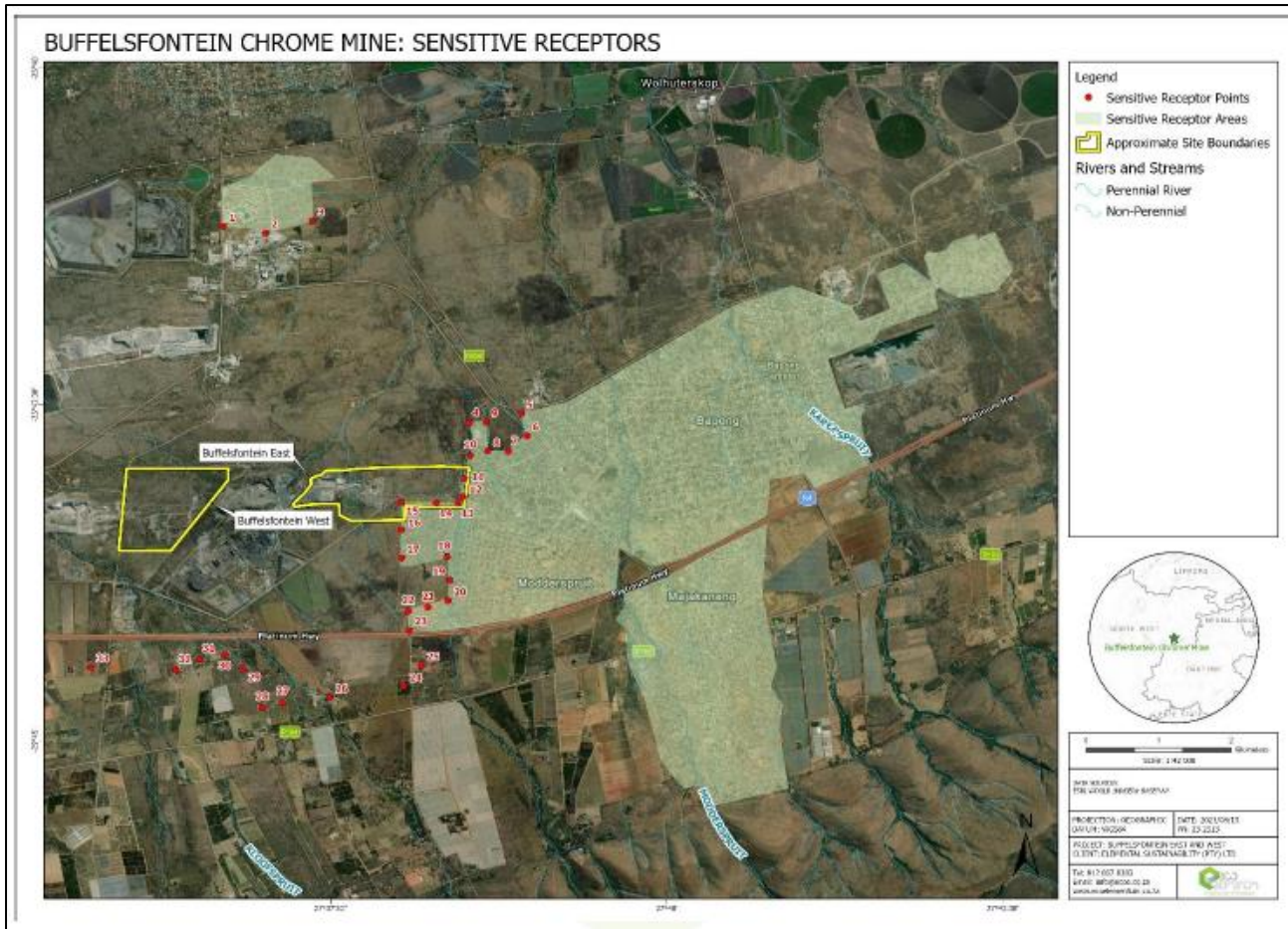


Figure 47: Sensitive receptors in the immediate area of the East and West project mining boundaries.

10.11.2.2 SOURCES OF EMISSIONS

10.11.2.2.1 VEHICLE EXHAUST GASES

Vehicle exhausts contain a number of pollutants including carbon dioxide (CO₂), carbon monoxide (CO), hydrocarbons, oxides of nitrogen (NO_x), sulphur and PM₁₀. Tiny amounts of poisonous trace elements such as lead, cadmium and nickel are also present. The quantity of each pollutant emitted depends upon the type and quantity of fuel used, engine size, speed of the vehicle and abatement equipment fitted. Once emitted, the pollutants are diluted and dispersed in the ambient air. Pollutant concentrations in the air can be measured or modelled and then compared with ambient air quality criteria.

10.11.2.2.2 VELD FIRES

Veld fires are widespread across the world, occurring in autumn, winter and early spring. In addition to controlled burning for fire-breaks and veld management, many fires are set deliberately for mischievous reasons. Some are accidental, notably those started by motorists throwing cigarettes out of car windows. Emissions from veld fires are similar to those generated by coal and wood combustion. Whilst veld fire smoke primarily impacts visibility and landscape aesthetic quality, it also contributes to the degradation of regional scale air quality. Dry combustible material is consumed first when a fire starts. Surrounding live, green material is dried by the large amount of heat that is released when there are veld fires, sometimes this material also burns. The major

pollutants from veld burning are particulate matter, carbon monoxide, and volatile organics. Nitrogen oxides are emitted at rates from 1 to 4 g/kg burned, depending on combustion temperatures. Emissions of sulphur oxides are negligible (USEPA, 1996).

10.11.2.2.3 TRUCKS PASSING ON THE ROADS, LOADING AND OFFLOADING RAW MATERIALS

Dust emissions occur when soil is crushed by a vehicle, as a result of the soil moisture level being low. Vehicles used on the roads will generate PM-10 emissions throughout the area and they carry soils onto the paved roads which would increase entrainment PM-10 emissions. The quantity of dust emissions from unpaved roads varies linearly with the volume of traffic.

10.11.2.2.4 WIND EROSION AS A RESULT OF ROM MATERIAL AND TOPSOIL STOCKPILES

The topsoil and overburden stockpiles generated during the construction phase will be minimal and probably used for construction purposes on site (berm and foundations for buildings), reason being that this will be limited to the mining area – since the project is mainly an opencast operation. At the ROM stockpile, there will be constant transfer of ore from the opencast to the stockpiles at Buffelsfontein West Opencast Section.

10.11.2.2.5 MATERIAL HANDLING (LOADING, HAULING AND TIPPING)

Material handling during loading, hauling and tipping as mining processes has been known to have influence on dust generation in terms of increasing the fugitive dust emissions being generated. With the different kind of materials – topsoil, soft, and hard, tipping will be negligible. The tipping is mostly associated with the ROM at the crushing and screening plant. During these activities factors such as the surrounding wind regime, the material tipping rate, and the moisture content of the material all have an influence on the dust generation at the tipping transfer points.

10.11.2.2.6 OTHER MINING ACTIVITIES

Other mining operations in the area contribute to emissions in the project area, the following can be likely sources:

- Particulate emissions generated due to wind erosion from exposed areas;
- Material handling;
- Drilling, blasting; and
- Vehicle entrained dust on paved and unpaved road surfaces.

10.11.3 MODELING RESULTS (OPERATIONAL PHASES)

10.11.3.1 PM10

For the unmitigated Daily PM10 concentrations it was predicted to be higher than the 75 µg/m³ limit for 33 of the sensitive receptors as can be seen in Table 20.

When comparing the Daily Mitigated PM10 modelled concentrations, the sensitive receptors exceeding the 75 µg/m³ limit dropped to 27 of the identified sensitive receptors. This as well is the highest levels predicted for a 24-hour period within the period. Due to site specific atmospheric conditions these exceedances may still occur.

The annual average PM10 limit of 40 µg/m³ is predicted to be exceeded at 13 sensitive receptors in unmitigated scenario, while for the mitigated scenario the sensitive receptors exceeding the threshold dropped to 8 of the identified sensitive receptors.

Receptor	PM10 2 nd Highest Daily (µg/m ³)		PM10 Annual Average (µg/m ³)	
	Unmitigated	Mitigated	Unmitigated	Mitigated
1	334,43	156,47	84,61	40,19
2	316,36	148,67	88,27	41,49
3	311,05	148,25	80,63	37,19
4	593,05	296,48	42,72	23,59
5	483,50	237,34	17,14	8,70
6	592,19	321,20	17,89	9,36
7	671,40	382,61	23,28	12,50
8	877,27	543,66	33,93	18,60
9	543,97	337,06	29,59	15,84
10	1145,22	669,80	54,73	30,48
11	1045,61	707,45	96,11	54,90
12	1092,93	605,30	129,70	59,67
13	1644,13	777,90	342,62	117,94
14	1674,54	1040,39	297,59	149,31
15	5151,62	1720,79	1976,48	546,84
16	910,25	410,17	159,19	58,45
17	380,21	157,46	60,21	24,87
18	364,69	195,97	44,48	20,27
19	252,96	137,44	30,98	13,94
20	190,60	110,10	22,92	10,54
21	222,32	75,71	21,89	9,96
22	172,43	84,88	21,34	9,66
23	146,50	61,60	16,70	7,65
24	98,77	40,79	11,06	5,21

Figure 48: PM Concentrations at sensitive receptors for the Buffelsfontein West Mining Project

Receptor	PM10 2 nd Highest Daily (µg/m ³)		PM10 Annual Average (µg/m ³)	
	Unmitigated	Mitigated	Unmitigated	Mitigated
25	105,66	48,96	11,85	5,54
26	97,58	65,93	12,53	6,11
27	124,17	57,84	13,57	6,56
28	119,63	56,90	13,44	6,55
29	180,30	94,92	19,44	9,53
30	221,10	126,71	23,27	11,62
31	212,76	121,06	22,07	11,06
32	231,29	148,74	19,32	9,87
33	232,93	132,20	17,11	8,61

Figure 49: PM Concentrations at sensitive receptors for the Buffelsfontein West Mining Project

10.11.3.2 TOTAL DUST FALLOUT

In both the mitigated and unmitigated scenarios, it is predicted that 5 sensitive receptors will exceed the monthly dust fallout limit of 600 mg/m²/day for the highest month. For both the mitigated and unmitigated scenarios, the annual dust fallout is predicted to exceed the annual limit of 300 mg/m²/day at 2 of the sensitive receptors.

Receptor	TSP Highest Monthly (mg/m ² /day)		TSP Annual Average (mg/m ² /day)	
	Unmitigated	Mitigated	Unmitigated	Mitigated
1	11,92	9,56	7,46	5,93
2	13,13	10,44	8,28	6,57
3	12,83	10,48	7,75	6,09
4	160,62	134,13	18,69	15,63
5	16,11	9,55	5,41	4,11
6	17,69	14,47	6,26	4,93
7	48,76	45,74	10,20	8,42
8	45,79	26,26	13,78	10,89
9	31,08	17,53	9,10	7,04
10	60,25	40,04	21,62	16,96
11	492,04	478,64	59,36	51,39
12	765,78	730,90	134,44	107,77
13	16897,27	4269,50	9047,71	2337,22
14	1767,74	1679,16	286,33	196,69
15	22716,36	5718,83	16593,90	4194,42
16	2077,70	1096,15	221,74	104,37
17	381,14	246,47	73,86	47,37
18	274,14	87,67	60,56	32,16
19	239,06	103,23	42,30	26,73
20	102,55	73,46	32,89	23,03
21	39,01	27,93	29,25	21,15
22	40,25	30,01	29,22	21,47
23	36,50	28,21	25,09	19,03
24	28,49	22,80	18,56	14,60
25	29,57	23,31	20,01	15,45
26	27,60	22,25	19,11	14,97
27	25,38	20,70	18,69	14,57
28	23,52	18,79	17,70	13,79
29	30,10	23,95	23,10	17,53
30	34,71	26,78	25,77	19,40

Figure 50: TSP Deposition rates at the sensitive receptors for the Buffelsfontein West Section

Receptor	TSP Highest Monthly (mg/m ² /day)		TSP Annual Average (mg/m ² /day)	
	Unmitigated	Mitigated	Unmitigated	Mitigated
31	35,27	27,31	24,17	18,27
32	32,24	24,14	20,84	15,83
33	29,44	22,34	16,06	12,36

Figure 51: TSP Deposition rates at the sensitive receptors for the Buffelsfontein West Section

10.11.4 CONCLUSION

For the unmitigated Daily PM10 concentrations it was predicted to be higher than the 75 µg/m³ limit for 33 of the sensitive receptors. When comparing the Daily Mitigated PM10 modelled concentrations, the sensitive receptors exceeding the 75 µg/m³ limit dropped to 27 of the identified sensitive receptors. This as well is the highest levels predicted for a 24-hour period within the period. Due to site specific atmospheric conditions these exceedances may still occur. The annual average PM10 limit of 40 µg/m³ is predicted to be exceeded at 13 sensitive receptors in unmitigated scenario, while for the mitigated scenario the sensitive receptors exceeding the threshold dropped to 8 of the identified sensitive receptors.

In terms of Total Suspended Particles (TSP), in both the mitigated and unmitigated scenarios, it is predicted that 5 sensitive receptors will exceed the monthly dust fallout limit of 600 mg/m²/day for the highest month. For both the mitigated and unmitigated scenarios, the annual dust fallout is predicted to exceed the annual limit of 300 mg/m²/day at 2 of the sensitive receptors.

Mitigation and management measures for mining as discussed in the Air Quality Impact Assessment and evaluated by the assessors should be sufficient to ensure the mining operation can be conducted with minimal impact on the receiving environment and therefore not have a detrimental effect. It is the opinion of the specialist that the project can go ahead.

10.11 BLASTING

Blast Management & Consulting (BMC) was appointed to undertake a Blasting Impact Assessment to review possible impacts with regards to blasting operations in the proposed Buffelsfontein West Opencast Section. A copy of the report is attached as Appendix 13.

10.12.1 METHODOLOGY

The detailed plan of study consists of the following sections:

- Site visit: The site was visited on 19 July 2023 with the intention to understand location of the site and its surroundings.
- Identifying surface structures / installations that are found within reason from project site. A list of Point of Interests (POI's) is created that will be used for evaluation.
- Base line influence or Blast Monitoring: The project is evaluated as a new operation with no blasting activities currently being done in the project area specific. Information from similar type operations were considered.
- Site evaluation: This consists of evaluation of the mining operations and the possible influences from blasting operations. The methodology is modelling the expected impact based on the expected drilling and blasting information provided for the project. Various accepted mathematical equations are applied to determine the attenuation of ground vibration, air blast and fly rock. These values are then calculated over the distance investigated from site and shown as amplitude level contours. Overlaying these contours on the location of the various receptors then gives an indication of the possible impacts and the expected results of potential impacts. Evaluation of each receptor according to the predicted levels then gives an indication of the possible mitigation measures to be applied. The possible environmental or social impacts are then addressed in the detailed EIA phase investigation.
- Reporting: All data is prepared in a single report and provided for review.

10.12.2 SEASON APPLICABLE TO THE INVESTIGATION

The drilling and blasting operations are not season dependable. The investigation into the possible effects from blasting operations is not season bounded.

10.12.3 SENSITIVITY OF PROJECT

A review of the project and the surrounding areas is done before any specific analysis is undertaken and sensitivity mapping is done, based on typical areas and distance from the proposed mining area. This sensitivity map uses distances normally associated where possible influences may occur and where influence is expected to be very low or none. Three different areas were identified in this regard:

- A highly sensitive area of 500 m around the mining area. Normally, this 500 m area is considered an area that should be cleared of all people and animals prior to blasting. Levels of ground vibration and air blast are also expected to be higher closer to the pit area.
- An area 500 m to 1500 m around the pit area can be considered as being a medium sensitive area. In this area, the possibility of impact is still expected, but it is lower. The expected level of influence may be low, but there may still be reason for concern, as levels could be low enough not to cause structural damage but still upset people.
- An area greater than 1500 m is considered low sensitivity area. In this area, it is relatively certain that influences will be low with low possibility of damages and limited possibility to upset people.

Figure 52 shows the sensitivity mapping with the identified points of interest (POI) in the surrounding areas for the proposed project area. The specific influences will be determined through the work done for this project in this report.



Figure 52: Identified sensitive areas at Buffelsfontein West

10.12.4 INFLUENCE FROM BLASTING OPERATIONS

Blasting operations are required to break rock for excavation to access the targeted ore material. Explosives in blast holes provide the required energy to conduct the work. Ground vibration, air blast, noxious fumes and fly rock are a result of the blasting process. Based on the regulations of the different acts consulted and international accepted standards these effects are required to be within certain limits. Section 13 of the Blasting Impact Assessment provides guidelines on these limits. It should be noted that there are no specific South African ground vibration and air blast limit standards.

10.12.5 BASELINE STRUCTURE PROFILE

Work was done familiarising oneself with the surroundings and the typical structures that are found in the area of the project. All possible structures in a possible influence area are identified. The site was reviewed using Google Earth imagery. Information sought during the review was to identify surface structures present in a 3500 m radius from the proposed open pit area, which will require consideration during modelling of blasting operations, e.g. houses, general structures, power lines, pipelines, reservoirs, mining activity, roads, shops, schools, gathering places, possible historical sites, etc. A list was prepared of all structures in the vicinity of the open pit area. The list includes structures and POI within the 3500 m boundary – see **Error! Reference source not found.** below. A list of structure locations was required to determine the allowable ground vibration limits and air blast limits. Figure 52 above shows an aerial view of the planned open pit area and surroundings with POIs. The type of POIs identified is grouped into different classes. These classes are indicated as “Classification” in Table 24. The classification used is a Blast Management & Consulting (BMC) classification and does not relate to any standard or national or international code or practice. Table 24 shows the descriptions for the classifications used.

Table 24: Points Of Interest (POI) Classification used

Class	Description
1	Rural Building and structures of poor construction
2	Private Houses and people sensitive areas
3	Office, High-rise buildings and Industrial buildings / Infrastructure
4	Ruins
5	Animal related installations and animal sensitive areas
6	Industrial Installations
7	Earth like structures – no surface structure
8	Heritage sites (buildings, infrastructure, activity)
9	Graves
10	Water Borehole
11	Water Resources Surface
12	Pipelines Buried
13	Powerlines / Telephone Lines / Towers
14	Road Infrastructure
15	Infrastructure Inside Pit

During the site visit the structures were observed and the initial POI list ground-truthed and finalised. Structures ranged from well-built structures to informal building styles.

10.12.6 BLASTING OPERATIONS

In order to evaluate the possible influence from blasting operations with regards to ground vibration, air blast and fly rock a planned blast design is required to determine possible influences. In the mining process blasting will definitely be required for the overburden material.

Blast design as applied at the existing Buffelsfontein Opencast operation was provided and used for defining expected outcomes. Using this data provided JKSimblast blast design software was used to design and simulate the blast. This designed blast was applied for the evaluation done in this report. The simulation of the blast provided the best prediction possible.

The simulation work done provided information that is applied for predicting ground vibration and air blast. Evaluation of the blasting operations considered a minimum charge and a maximum charge. The minimum charge was derived from the 127 mm diameter single blast hole and the maximum charge was extracted from the blast simulation in JKSimblast. The maximum charge relates to the total number of blast holes that detonates simultaneously based on the blast layout and initiation timing of the blast. Thus, the maximum mass of explosives detonating at once. The minimum charge relates to 204 kg and the maximum charge relates to 1020 kg. These values were applied in all predictions for ground vibration and air blast.

10.12.7 SUMMARY OF GROUND VIBRATION LEVELS

The opencast operation were evaluated for expected levels of ground vibration from future blasting operations. Review of the site and the surrounding installations / houses / buildings showed that structures vary in distances from the pit area. The influences will also vary with distance from the pit area. The model used for evaluation does indicate significant levels. It will be imperative to ensure that a monitoring program is done to confirm levels of ground vibration to ensure that ground vibration levels are not exceeded.

The evaluation considered a distance up to 3500 m from the pit area. The closest structures observed are the Road, Heritage Sites, Power Lines/Pylons, Mine Buildings/Structures, and Buildings/Structures. The ground vibration levels predicted for all POI's evaluated ranged between 0.5 mm/s and very high for structures surrounding the open pit area.

The distances between structures and the pit area are a contributing factor to the levels of ground vibration expected and the subsequent possible influences. It is observed that for the different charge masses evaluated those levels of ground vibration will change as well. In view of the minimum and maximum charge specific attention will need to be given to specific areas. The minimum charge used indicated seven POI's of concern and the maximum charge indicated nineteen POI's of concern in relation to possible structural damage.

On a human perception scale twenty-five POI's were identified where vibration levels may be perceptible and lower for the minimum charge and sixty-two POI's for the maximum charge. Three POI's were identified where vibration levels may be unpleasant and intolerable for the minimum charge and fifteen POI's for the maximum charge. Perceptible levels of vibration may be experienced up to 2707 m and unpleasant up to 880 m and

intolerable up to 449m. Problematic levels of ground vibration – levels greater than the proposed limit – are expected up to 426 m from the pit edge for the maximum charge. Any blast operations further away from the boundary will have lesser influence on these points.

The nearest public structures are located 200 m from the pit boundary. Ground vibration level predicted at this building where people may be present is very high for the maximum charge. In view of this specific mitigations will be required.

Structure conditions ranged from industrial construction to poor condition structures.

10.12.8 GROUND VIBRATION AND HUMAN PERCEPTION

Considering the effect of ground vibration with regards to human perception, vibration levels calculated were applied to an average of 30Hz frequency and plotted with expected human perceptions on the safe blasting criteria graph (see Figure 53 below). The frequency range selected is the expected average range for frequencies that will be measured for ground vibration when blasting is done. Based on the maximum charge and ground vibration predicted over distance it can be seen that up to a distance of 2707 m people may experience levels of ground vibration as perceptible. At 880 m and closer the perception of ground vibration could be unpleasant. Closer than 449 m the levels will be intolerable and generally greater than limits applied for structures in the areas.

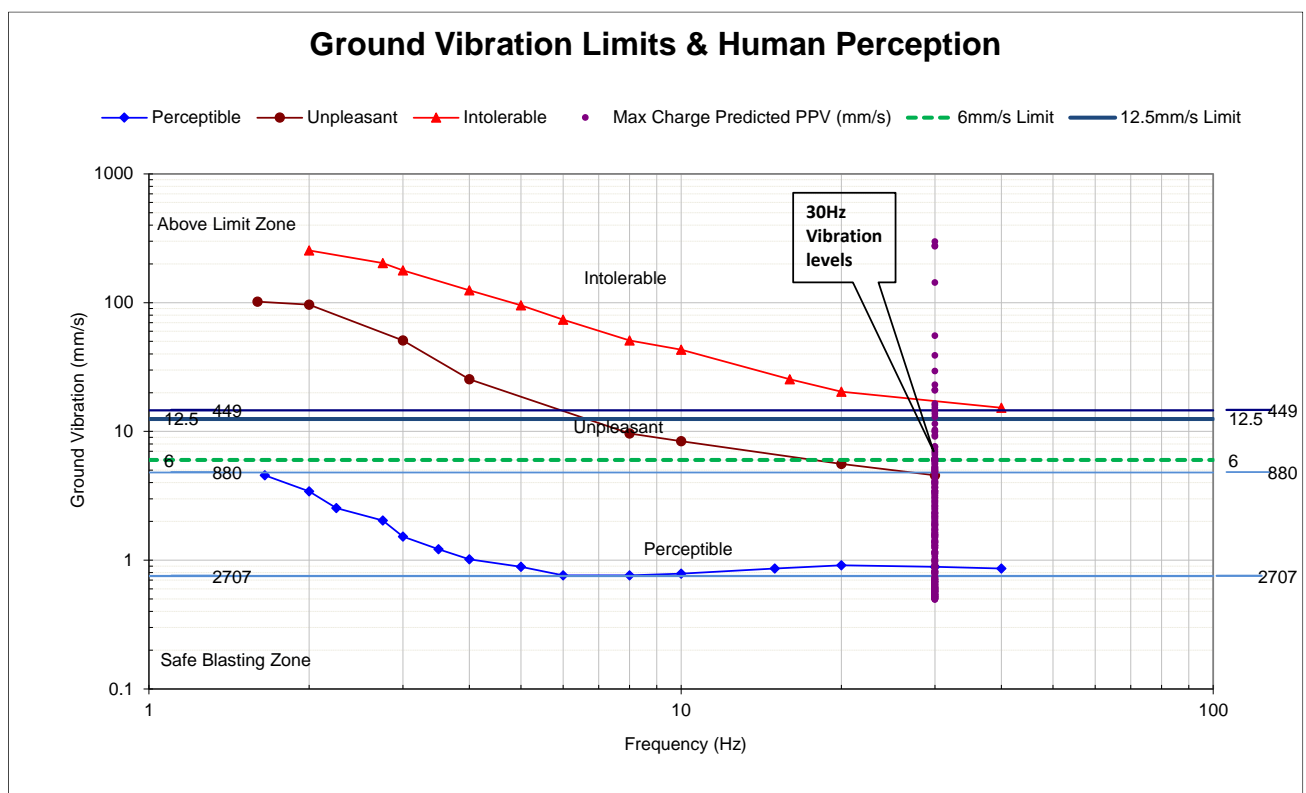


Figure 53: The effect of ground vibration with human perception and vibration limits

10.12.9 POTENTIAL THAT VIBRATION WILL UPSET ADJACENT COMMUNITIES

Ground vibration and air blast generally upset people living in the vicinity of mining operations. The nearest

buildings/structures (POI 1044) are approximately 200m from the planned operation. These buildings are located such that levels of ground vibration predicted from minimum charge may be intolerable and could lead to structural damage. Charge mass per delay greater than minimum charge will show increased levels of ground vibration and higher probability of damage.

Ground vibration levels expected from maximum charge has possibility to be perceptible up to 2707 m. It is certain that lesser charges will reduce this distance for instance at minimum charge this distance is expected to be 1198 m. Within these distance ranges there are a significant number of houses. The anticipated ground vibration levels are certain to have possibility of upsetting the house holds within these ranges.

The importance of good public relations cannot be over emphasised. People tend to react negatively on experiencing of effects from blasting such as ground vibration and air blast. Even at low levels when damage to structures is out of the question it may upset people. Proper and appropriate communication with neighbours about blasting, monitoring and actions done for proper control will be required.

10.12.10 CRACKING OF HOUSES AND CONSEQUENT DEVALUATION

The structures found in the areas of concern range from informal building style to brick, mortar structures and steel structures. There are various buildings found within the 3500 m range from the mining area. Building style and materials will certainly contribute to additional cracking apart from influences such as blasting operations.

The presence of general vertical cracks, horizontal and diagonal cracks that are found in all structures does not need to indicate devaluation due to blasting operations but rather devaluation due to construction, building material, age, standards of building applied. Thus, damage in the form of cracks will be present. Exact costing of devaluation for normal cracks observed is difficult to estimate. Mining operations may not have influence to change the status quo of any property if correct precautions are considered. The proposed limits as applied in this document i.e. 6 mm/s, 12.5 mm/s and 25 mm/s are considered sufficient to ensure that additional damage is not introduced to the different categories of structures. It is expected that, should levels of ground vibration be maintained within these limits, the possibility of inducing damage is limited.

10.12.11 REVIEW OF EXPECTED AIR BLAST

Presented herewith are the expected air blast level contours and discussion of relevant influences. Expected air blast levels were calculated for each POI identified surrounding the mining area and evaluated with regards to possible structural concerns. Tables are provided for each of the different charge models done with regards to:

- “Tag” No. is number corresponding to the location indicated on POI figures;
- “Description” indicates the type of the structure;
- “Distance” is the distance between the structure and edge of the pit area;
- “Air Blast (dB)” is the calculated air blast level at the structure;
- “Possible concern” indicates if there is any concern for structural damage or human perception.

Indicators used are:

- “Problematic” where there is real concern for possible damage – at levels greater than 134 dB;
- “Complaint” where people will be complaining due to the experienced effect on structures at levels of 120 dB and higher (not necessarily damaging);
- “Acceptable” if levels are less than 120 dB;
- “Low” where there is very limited possibility that the levels will give rise to any influence on people or structures. Levels below 115 dB could be considered to have low or negligible possibility of influence.

Presented are simulations for expected air blast levels from two different charge masses at pit area. Colour codes used in tables are as follows:

Air blast levels higher than proposed limit is coloured “Red”
Air blast levels indicated as possible Complaint is coloured “Mustard”
POI’s that are found inside the pit area is coloured “Olive Green”

10.12.11.1 AIR BLAST MINIMUM CHARGE MASS PER DELAY – 204 KG

Figure 54 below shows the simulated expected air blast levels from the minimum charge mass per delay (204 kg) for the Buffelsfontein West Opencast Section.

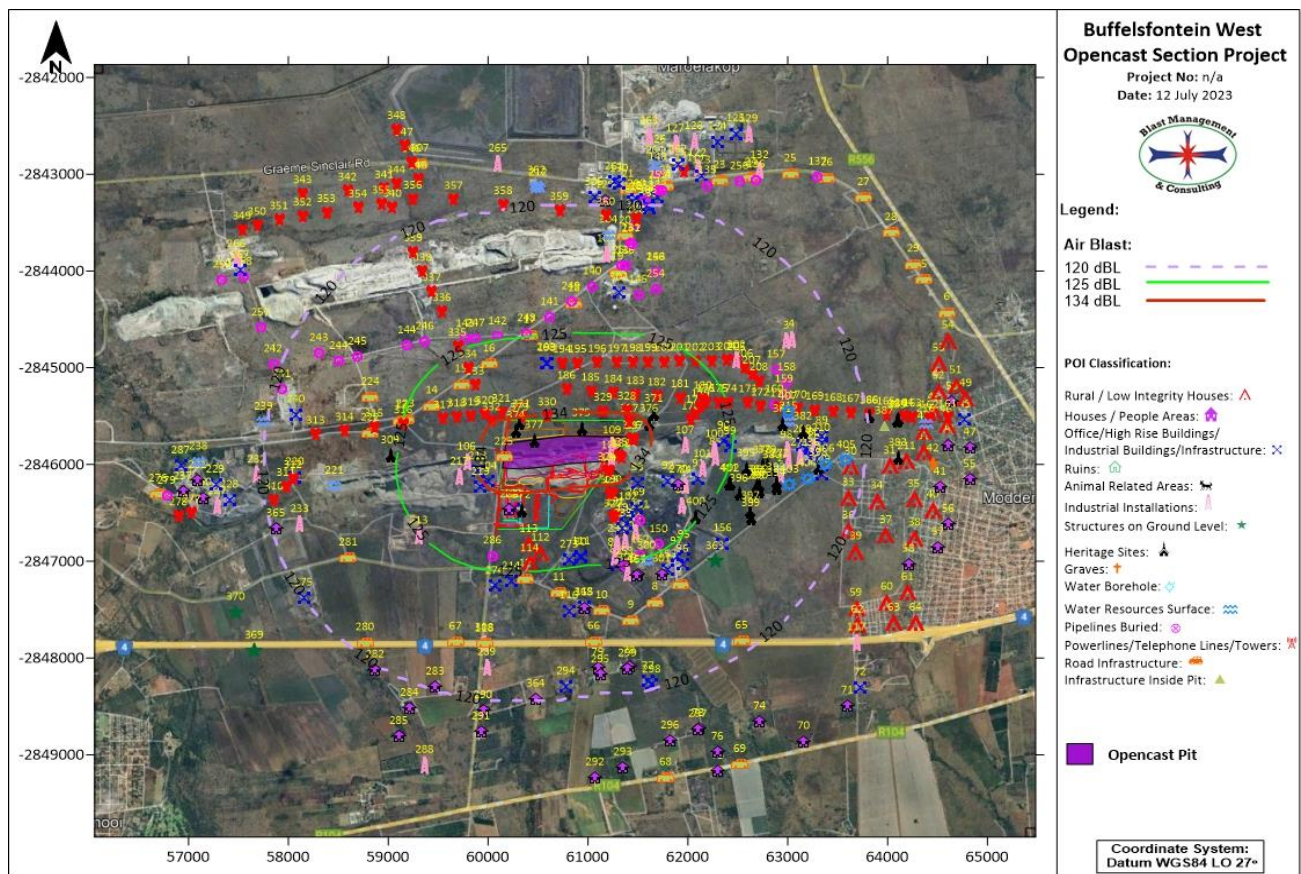


Figure 54: Air blast influence from minimum charge

10.12.11.2 AIR BLAST MAXIMUM CHARGE MASS PER DELAY – 1020 KG

Figure 55 below shows the simulated expected air blast levels from the maximum charge mass per delay (1020 kg) for the Buffelsfontein West Opencast Section.

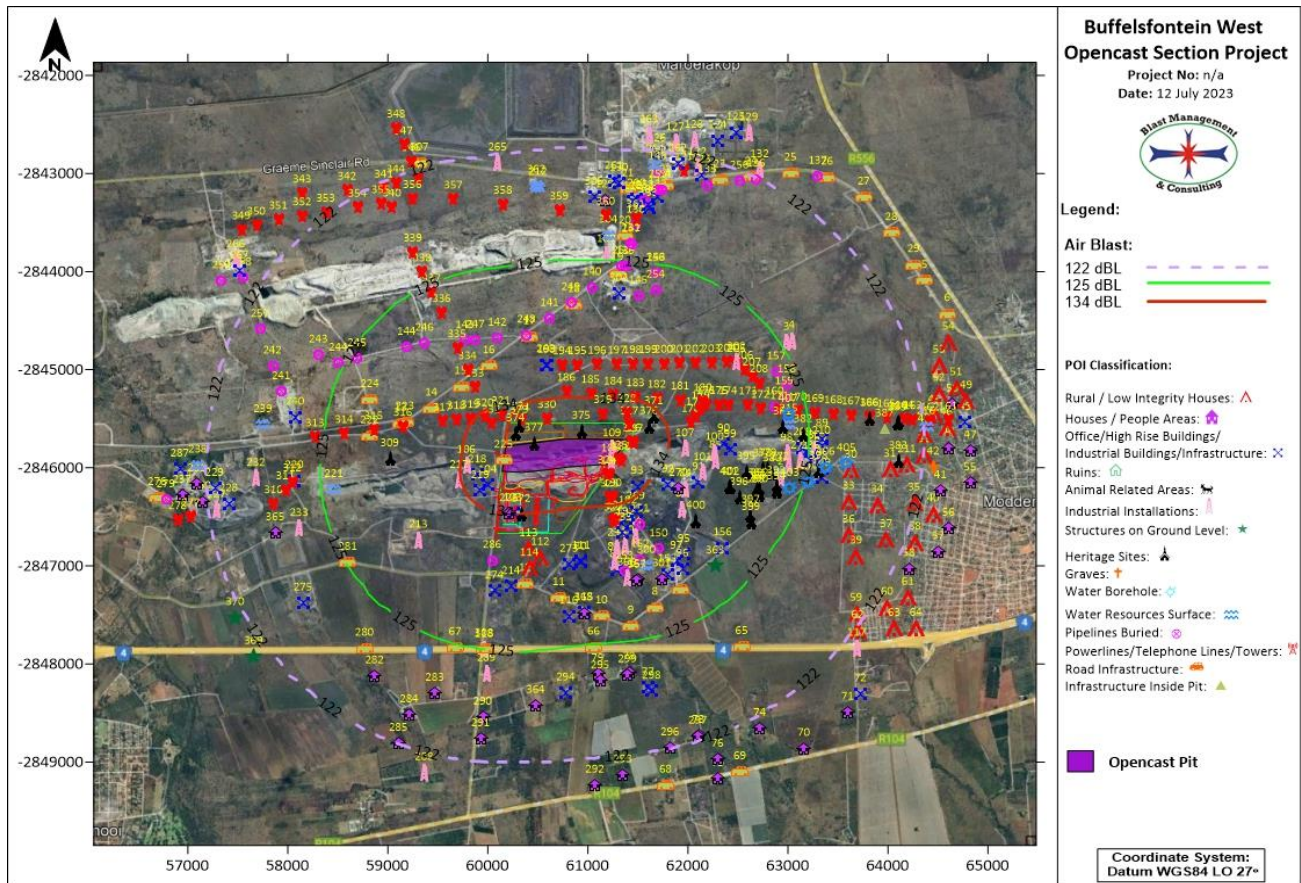


Figure 55: Air blast influence from maximum charge

10.12.12 SUMMARY OF FINDINGS FOR AIR BLAST

Review of the air blast levels predicted for the maximum charge ranges between 121.0 and 160.4 dB for all the POI's considered. This includes the nearest points such as the Heritage Site and Mine Buildings/Structures. These levels may contribute to effects such as rattling of roofs or door or windows with limited points that are expected to be damaging and that could lead to complaints.

Minimum charge predictions identified that seventy-one POI's at the pit area could experience levels of air blast that could lead to complaints. Maximum charge predictions indicate that two hundred thirty-eight POI's at the pit area could experience air blast that could lead to complaints. There are five POI's for minimum charge and eleven POI's identified where air blast levels are greater than the limits applied and possible contribution to damage.

The current accepted limit on air blast is 134 dBL. Damages are only expected to occur at levels greater than

134 dBL. Prediction shows that air blast will be greater than 134 dB at distance of 425 m and closer to pit boundary. Infrastructure at the pit area such as roads and power lines/pylons are present, but air blast does not have any influence on these installations.

The possible negative effects from air blast are expected to be the same than that of ground vibration. It is maintained that if stemming control is not exercised this effect could be greater with greater range of complaints or damage. The pit is located such that “free blasting” – meaning no controls on blast preparation – will not be possible. The effect of stemming control will need to be considered. In many cases the lack of proper control on stemming material and length contributes mostly to complaints from neighbours.

10.12.13 FLY-ROCK UNSAFE ZONE

The occurrence of fly rock in any form will have a negative impact if found to travel outside the unsafe zone. This unsafe zone may be anything between 10 m or 1000 m. A general unsafe zone applied by most mines is normally considered to be within a radius of 500 m from the blast; but needs to be qualified and determined as best possible.

Calculations are also used to help and assist determining safe distances. A safe distance from blasting is calculated following rules and guidelines from the International Society of Explosives Engineers (ISEE) Blasters Handbook. Using this calculation, the minimum safe distances can be determined that should be cleared of people, animals and equipment. Figure 56 shows the results from the ISEE calculations for fly rock range based on a 127 mm diameter blast hole and 2 m stemming length. Based on these values a possible fly rock range with a safety factor of 2 was calculated to be 570 m. The absolute minimum unsafe zone is then the 570 m. This calculation is a guideline and any distance cleared should not be less. The occurrence of fly rock can however never be 100% excluded. Best practices should be implemented at all times. The occurrence of fly rock can be mitigated but the possibility of the occurrence thereof can never be eliminated. Figure 57 shows the area around the Pit areas that incorporates the 570 m unsafe zone.

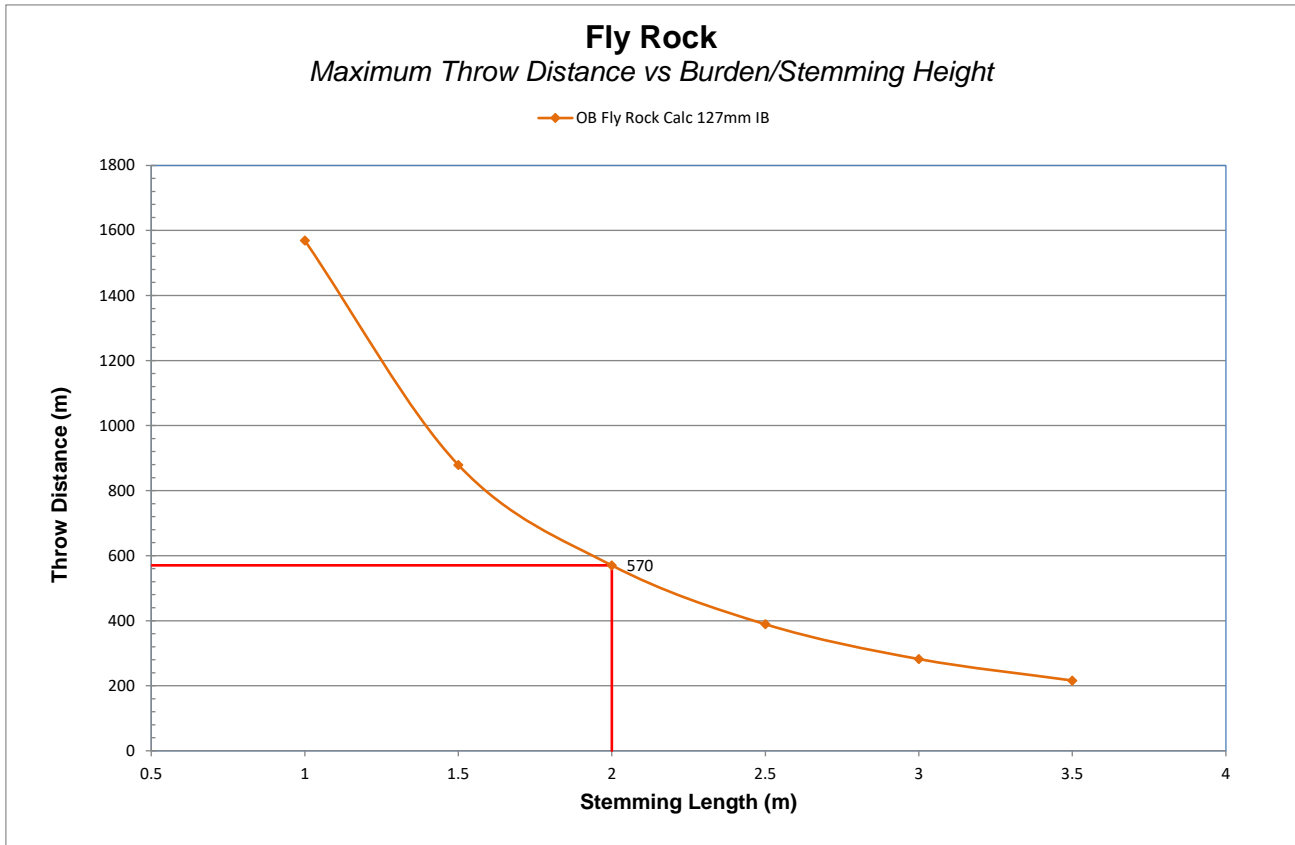


Figure 56: Fly rock prediction calculation

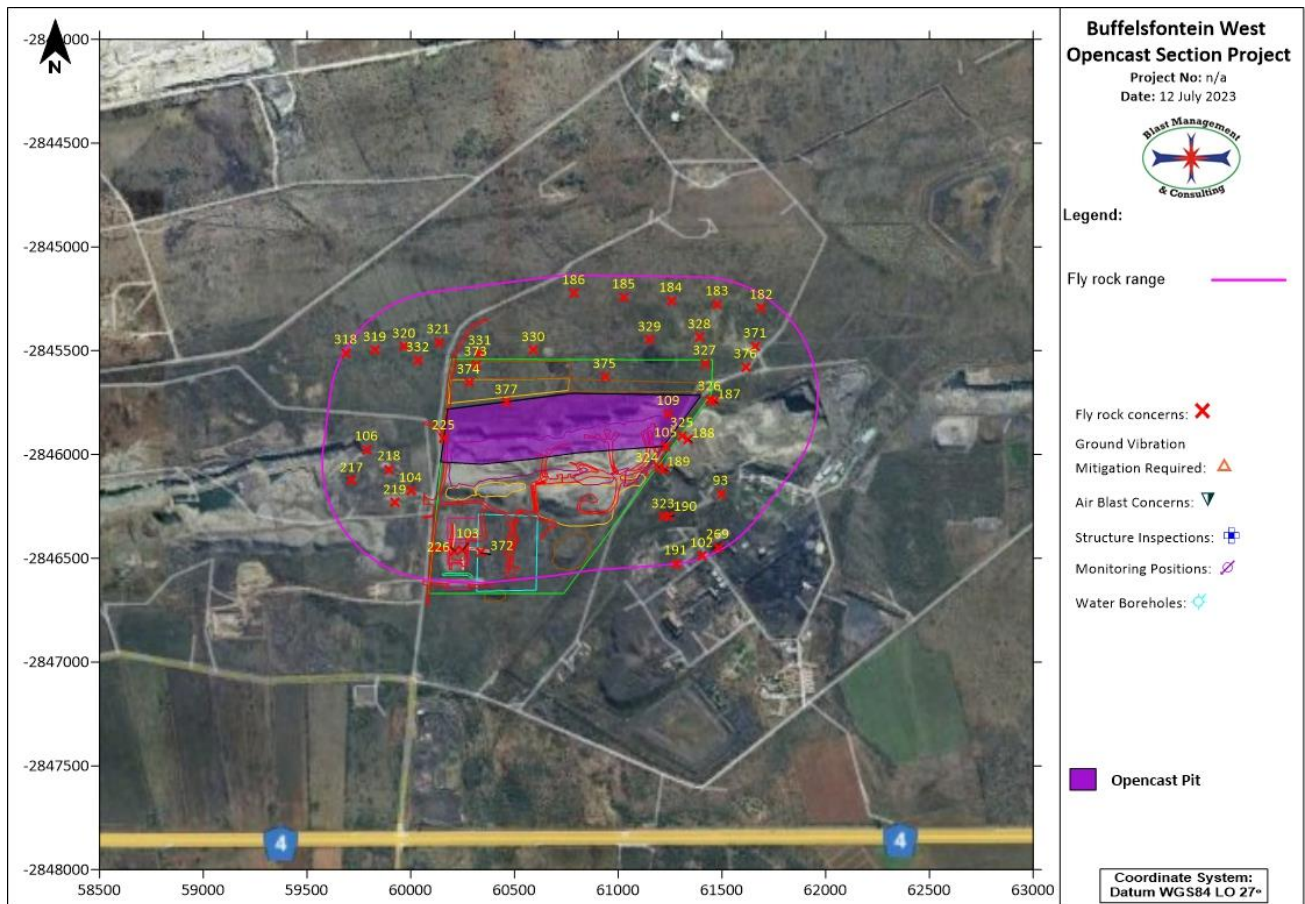


Figure 57: Predicted Fly Rock Exclusion Zone for the Pit area

10.12.14 NOXIOUS FUMES

The occurrence of fumes in the form the NO_x gas is not a given and very dependent on various factors. However, the occurrence of fumes should be closely monitored. Furthermore, nothing can be stated as to fume dispersal to nearby farmsteads, but if anybody is present in the path of the fume cloud it could be problematic.

10.12.15 WATER BOREHOLE INFLUENCE

Location of boreholes for water was evaluated for possible influence from blasting. Hydrocensus boreholes were identified within the influence area at the Pit area. There are no boreholes that are in proximity of the blasting area and off ground vibration concern. Table 25 shows the location of the boreholes in the area.

Table 25: Identified Water Boreholes

Tag	Description	Y	X	Specific Limit (mm/s)	Distance (m) to Pit	Predicted PPV (mm/s)
403	Hydrocensus - Borehole BFGN01	-63022.57	2846207.95	50	1702	1.6
404	Hydrocensus - Borehole BFGN02	-63198.59	2846146.53	50	1856	1.4
405	Hydrocensus - Borehole BFGN03	-63587.99	2845956.39	50	2209	1.1

Tag	Description	Y	X	Specific Limit (mm/s)	Distance (m) to Pit	Predicted PPV (mm/s)
406	Hydrocensus - Borehole BFGN04	-63380.27	2845993.95	50	2008	1.2
407	Hydrocensus - Borehole BFGN05	-63004.88	2845454.83	50	1635	1.7

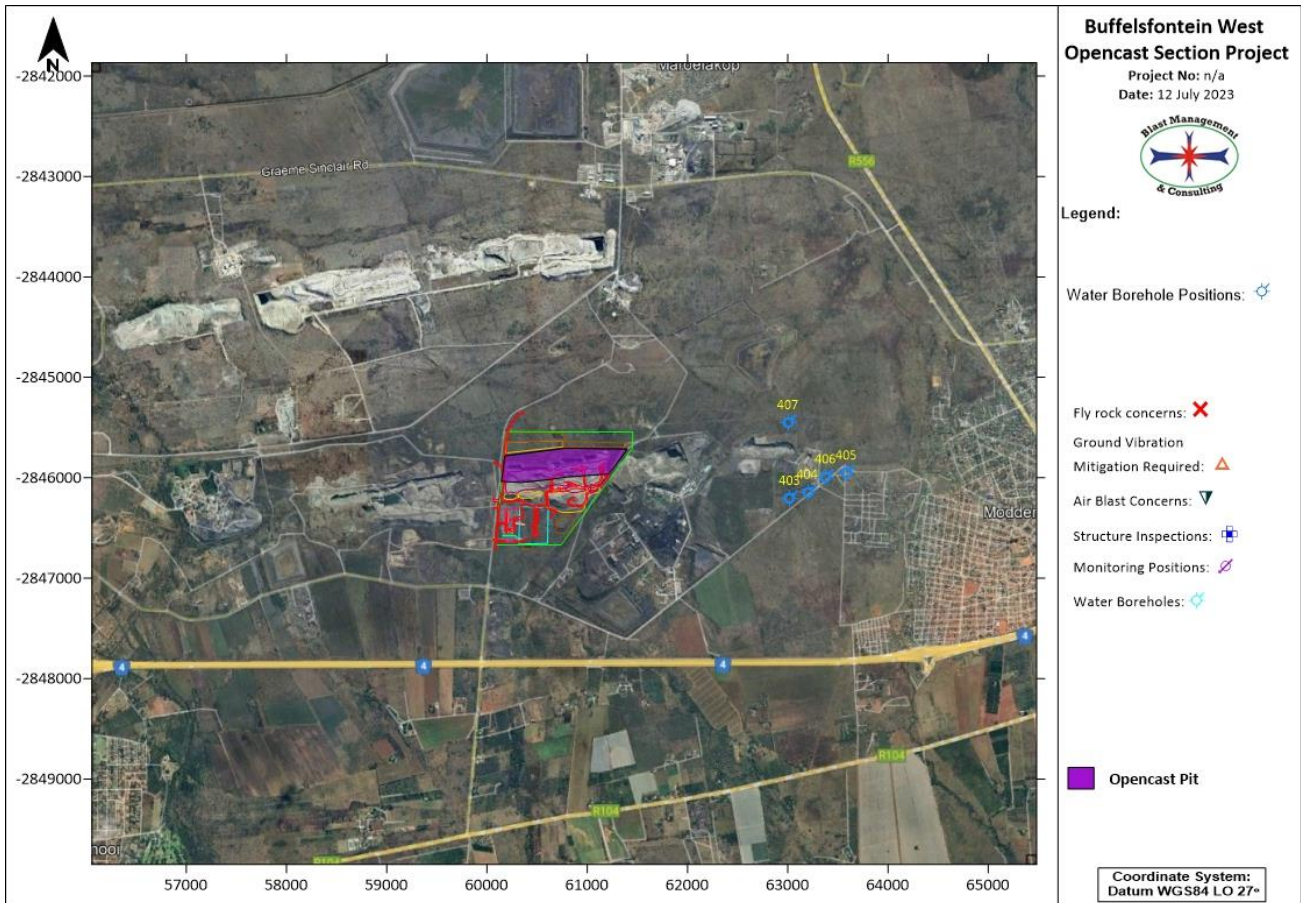


Figure 58: Location of the Boreholes

10.12.16 CONCLUSION

The pit area is located such that specific concerns were identified and addressed in the report. There are public structures located very close to the pit boundary. Specific mitigation measures will be required for these concerns. Recommendations to reduce impacts on these structures have been included in the report. There is no reason to believe that this operation cannot continue if attention is given to the recommendations made.

10.12 NOISE

EnviroRoots Pty (Ltd) prepared an Environmental Noise Impact Assessment (ENIA) for the proposed Buffelsfontein West Opencast Section. A copy of the report is attached as Appendix 12.

10.12.1 METHODOLOGY

The procedures, as detailed in SANS 10328:2008 and SANS10103:2008 have been applied to the noise measurements and assessments made in this report. A summary of the approach to this study is outlined below.

10.12.1.1 MEASUREMENT CRITERION

10.12.1.1.1 NOISE POLICY DOCUMENTS FOR REGION

No by-laws have been promulgated for North-West Province or for the Madibeng Local Municipality. The SANS10103:2008 guidelines methodology was used.

10.12.1.1.2 FIELDWORK ASSESSMENT OF THE SITE

Field assessments (13 - 15 June 2023) in and around both sites were undertaken. This included the identification of the noise sensitive stakeholders, existing noise sources and other baseline noise contributors. Viable and alternative measurement localities at the identified monitoring localities were further investigated to ensure measurements were not influenced by extraneous noise sources (e.g. an air-conditioning condenser unit near measured locality).

10.12.1.1.3 EXISTING BASELINE – NOISE MEASUREMENTS

Baseline measurements were conducted on the 13 - 15 June 2023 at a total of one (1) locality. Measurements were analysed to compile a subjective and objective determination of the Rating levels (LReq) based on the LAleq measurements. Measurements were a minimum of 10-minutes. Furthermore, certain statistical values and variables such as the LA90 LAMax, LAmin, (fast) third octave data (dBZ) were logged and considered. Prior to onsite investigations and measurements, a desktop assessment was conducted to identify key measurement areas and made use of online resources (GoogleEarth® etc.).

No longer-term measurements (or night-time measurements) could be conducted as no safe area exists to conduct longer-term measurements (see limitations section). For a Rating level determination 10-minute measurement (day and night), desktop assessment (of development of the area) as well as onsite investigations can be considered sufficient. If longer-term measurements are requested by local municipal authorities, the security area for a 2-day period should be supplied, whereby the security activities cannot influence measurements. The raw data SLM log sheet and metrological data will be available to relevant stakeholders upon request.

10.12.1.2 MODELLED SCENARIOS

The modelled scenario was designed and based on the layout as supplied by the main consultant. The significant noise sources were identified, and noise contours developed.

10.12.2 BASELINE SOUND PRESSURE MEASUREMENTS

Field assessments in and around the site were undertaken on the 13 - 15 June 2023 at a total of one (1) locality. The noise measurement localities were decided on based on receptors identified prior to fieldwork, via a desktop assessment. LAIeq (SANS10103:2008) measurements were conducted during a 48-hour period with only one safe area found (nearby security of project offices).

10.12.2.1 ATTENDED MEASUREMENTS – A01

Monitoring was conducted at a safe locality on the project footprint. Equivalent values (impulse setting) are presented in Table 5. The area was mostly noisy (use of a lower Rating worst-case). Subsequent analysis of the data, desktop information and onsite investigations concluded:

- Calculated LAIeq day 1 and day 2 was 48,9 and 50,3 dBA. Calculated LAIeq night 1 and night 2 was 42,3 and 44,7 dBA – The measurements, onsite investigations and desktop assessment reflected a developed suburban area or higher (community, local traffic and business-related sounds measured).
- Measurements and site observations indicated a suburban (or higher Rating);

Point	Locality	Measured LAIeq,10min (dBA)
A01	Project footprint	LAIeq 1 st day = 48,9
		LAIeq 1 st night = 42,3
		LAIeq 2 nd day = 50,3
		LAIeq 2 nd night = 44,7

Figure 59: Measurements – Shorter-term measurements

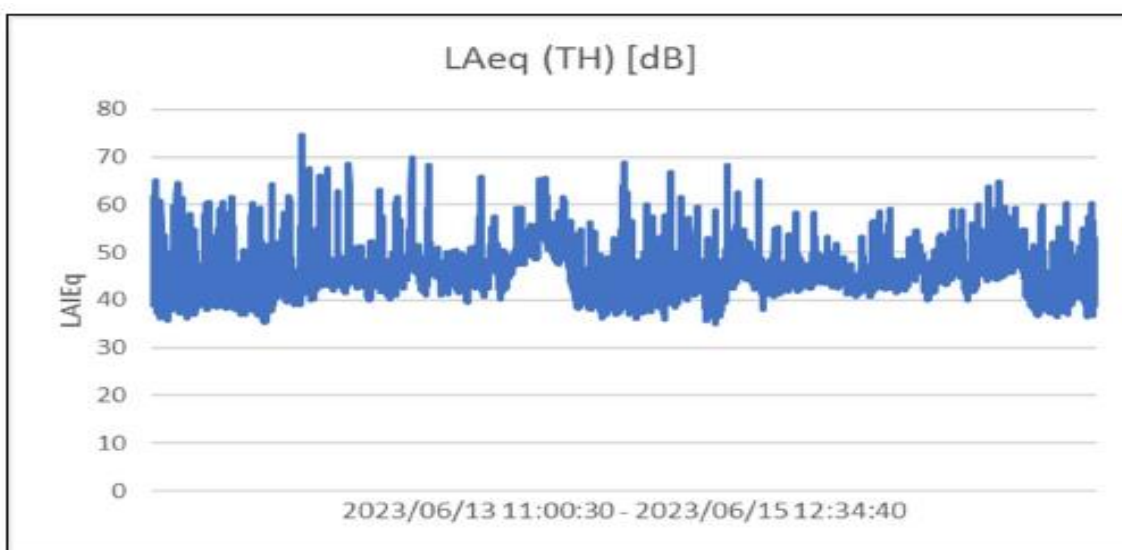


Figure 60: A01 site

10.12.2.2 BASELINE NOISE LEVELS FINDINGS AND IDENTIFIED SANS10103:2008 RATING LEVELS

Based on the measurements the following Rating Levels was selected for receptors:

- Suburban Rating for receptors. It should be noted this is a worst-case selection, and desktop as well as monitoring indicated a potential Urban Rating.

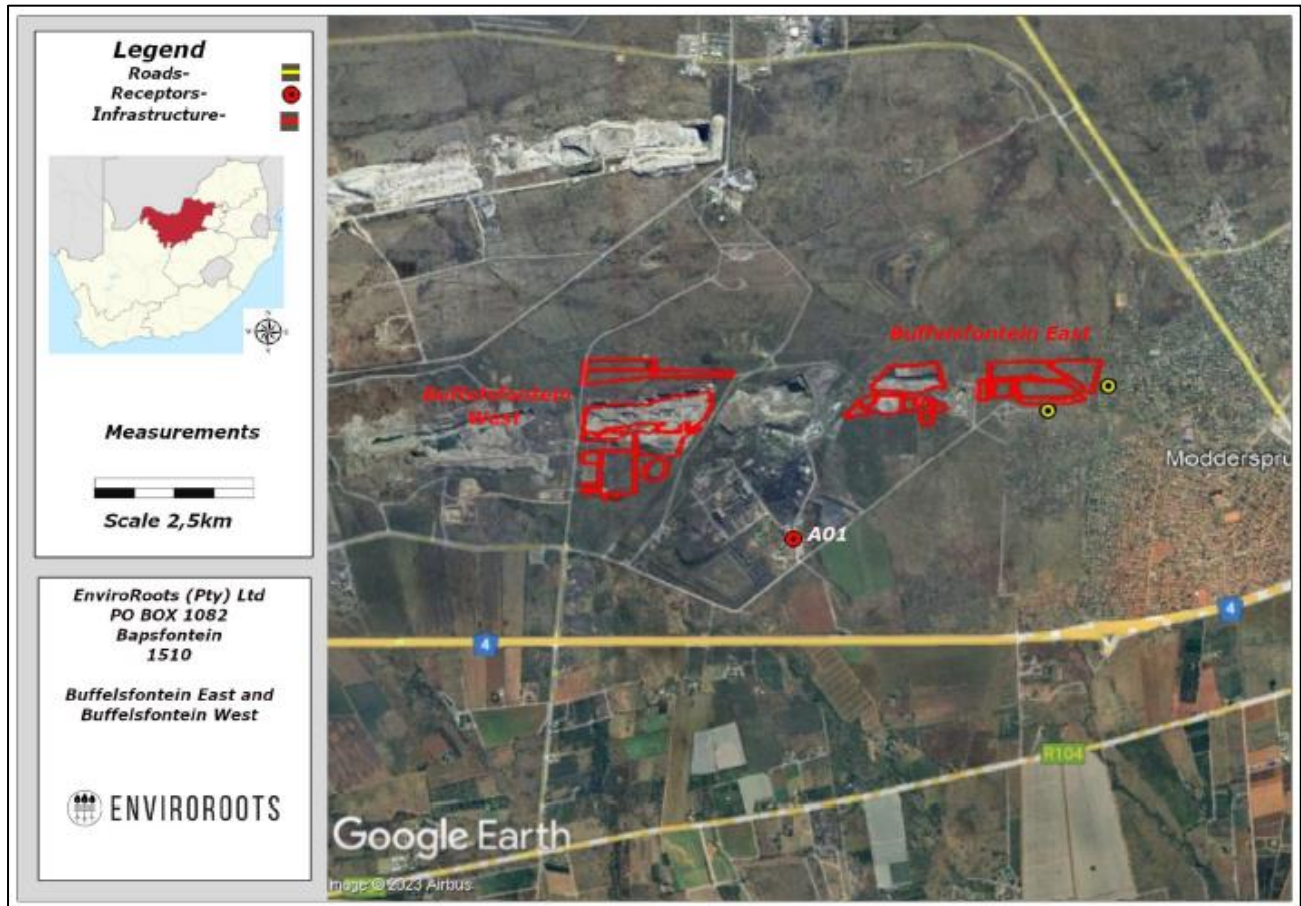


Figure 61: Measurement localities within the study area

10.13 SITES OF ARCHAEOLOGICAL AND CULTURAL INTEREST

Elemental Sustainability (Pty) Ltd appointed Tobias Coetzee to undertake a Phase 1 Archaeological Impact Assessment for the proposed Buffelsfontein West Opencast Section. A copy of the report is included in Appendix 14.

10.13.1 METHODOLOGY

Archaeological reconnaissance of the study area was initially conducted during April and September 2021 through systematic pedestrian surveys. In June 2023, an updated boundary of the proposed study area was provided, as well as a proposed layout. General site conditions were recorded via photographic record. The whole project area was inspected on Google Earth, historical aerial imagery and topographical maps to identify potential heritage remains. One potential site (B01), was noted on historical topographical maps and inspected during the survey. Seven additional sites where cultural remains were observed were recorded during the

pedestrian survey. The demarcated sensitive area associated with Site B01 was delineated from a combination of field observations and the inspection of historical topographical maps. The topographical datasets dating to 1943, 1968, 1979, 1980, 1985, 1996, and 2010, as well as the historical aerial photographs dating to 1949, 1962, 1964, 1968 and 1985 proved useful in terms of providing an indication of the location and age of some of the buildings, structures and features associated with the study area.

The reconnaissance of the area under investigation served a twofold purpose:

- To obtain an indication of heritage material found in the general area as well as to identify or locate archaeological sites on the area demarcated for development. This was done in order to establish a heritage context and to supplement background information that would benefit developers through identifying areas that are sensitive from a heritage perspective.
- All archaeological and historical events have spatial definitions in addition to their cultural and chronological context. Where applicable, spatial recording of these definitions were done by means of a handheld GPS (Global Positioning System) during the site visit, as well as by plotting the boundaries from aerial imagery and topographical maps.

10.13.2 ARCHAEOLOGICAL AND HISTORICAL REMAINS

10.13.2.1 STONE AGE REMAINS

One stone tool dating to the LSA was observed on the Remaining Extent of Portion 35 of the Farm Buffelsfontein 465 JQ. Site B05 is located 200 m north of the revised southern boundary of the proposed study area and is not associated with additional surface material. The area appears to have been impacted by mining activities since the initial assessment in 2021.

Table 26: Stone Age Sites

Name	Type	Source	Status	Age	Number of artefacts	Parcel
B05	Stone tool	Field	Intact	LSA	1	RE/35/465



Figure 62: LSA artefact at site B05.

10.13.2.2 IRON AGE FARMER REMAINS

No definite Iron Age Farmer remains were observed within the demarcated study area. Due to the majority of the potsherds being associated with angular and circular stone walling, as well as the absence of decoration, the sites associated with potsherds and stone walling are discussed under the Historical section. However, it should be noted that the large Iron Age site observed in the studies by Pelsler & Van Vollenhoven (2008) and Coetzee (2021) are located approximately 1.4 km to the southeast.

10.13.2.3 HISTORICAL REMAINS

The structures associated with site B01 are not visible on any of the aerial images, but several huts are shown on the 1968 and 1979 topographical maps in the north-eastern corner of the study area on the Remaining Extent of Portion 35 of the Farm Buffelsfontein 465 JQ. Based on contemporary satellite imagery, a section of the demarcate site B01 area was disturbed by mining development after 2021, and additional impacts are planned for the area along the southern boundary.

Sites B02, B03 and B04 are associated with undecorated potsherds on the Remaining Extent of Portion 35 of the Farm Buffelsfontein 465 JQ near the western boundary of the study area. A single potsherd was observed at Sites B02 and B04, while several sherds were noted at Site B03. No additional features, structures or other artefacts were observed in the vicinity of these sites and no buildings are indicated on the historical topographical maps and aerial photographs. Although no river lines are noted on the topographical datasets, observations made in the field suggest the presence of significant surface water action. This suggests the possibility of water erosion exposing the potsherds or the possibility of water runoff transporting the potsherds from elsewhere. It should also be noted that topographical maps indicate no cultivated fields near these sites, but when the historical aerial images dating to 1949 & 1964 are inspected, a cultivated field appears to be present at site B02 and potentially at the other sites as well. Also, based on contemporary satellite imagery, the area associated with site B04 was disturbed by mining activities after 2021 and additional development is planned for the area where site B03 was observed.

Site B06, located on the Remaining Extent of Portion 12 of the Farm Buffelsfontein 465 JQ and directly east of Site B01, consists of a section of stone walling of which the extent is roughly 5 m. This section of stone walling is better preserved compared to the rest of the stone walling encountered and consists of stones stacked on top of each other. Due to the dense vegetation and dilapidated sections, the exact extent could not be determined. Also, no additional material remains were observed at the site. This site, however, falls outside of the demarcated study area, but is likely to form part of Site B01. Site B07 is located in the north-western quadrant of the study area and on the Remaining Extent of Portion 35 of the Farm Buffelsfontein 465 JQ. The site consists of what appears to be a linear section of severely dilapidated stone walling measuring roughly 8 m. Due to poor preservation, the exact extent of the site could not be determined. No additional features, structures or artefacts were observed in the vicinity of this site and no buildings are indicated on the historical topographical maps and aerial photographs.

Table 27: Historic sites

Name	Type	Source	Status	Age	Estimated extent	Parcel
B01	Stone walling & potsherds	Topo (1968) & field	Intact, dilapidated, sherds	Historic/LIA	±10.2 ha	RE/35/465, RE/12/465
B02	Potsherds	Field	Sherds	Historic/LIA	±1 m ²	RE/35/465
B03	Potsherds	Field	Sherds	Historic/LIA	±1 m ²	RE/35/465
B04	Potsherds	Field	Sherds	Historic/LIA	±1 m ²	RE/35/465
B06	Stone walling	Field	Intact	Historic/LIA	±5 m	RE/12/465
B07	Stone walling	Field	Dilapidated	Historic/LIA	±8 m	RE/35/465

10.13.2.4 CONTEMPORARY REMAINS

One contemporary site, B08, was identified during the pedestrian survey on the Remaining Extent of Portion 35 of the Farm Buffelsfontein 465 JQ. The site consists of building foundation remains and concrete and based on the topographical map dating to 1996 the site used to be a mining shaft. Accordingly, the shaft was constructed between 1985 and 1996, and was closed by 2010.

Table 28: Contemporary Sites

Name	Type	Source	Status	Age	Number of artefacts	Parcel
B08	Building ruin	Topo (1996), Field	Demolished	Contemporary	±0.1 ha	RE/35/465

10.13.2.5 GRAVES/BURIAL SITES

No graves or burial sites were noted within the demarcated study area. However, the possibility exists that unmarked burial sites might be associated with site B01. The archaeological study conducted by Pelsers & Van Vollenhoven (2008) did not mention the presence of graves or burial sites. However, a large cemetery consisting of 100+ graves was located by Coetzee (2021). The cemetery is located approximately 1.4 km to the southeast, near an Iron Age settlement and is covered by dense vegetation.

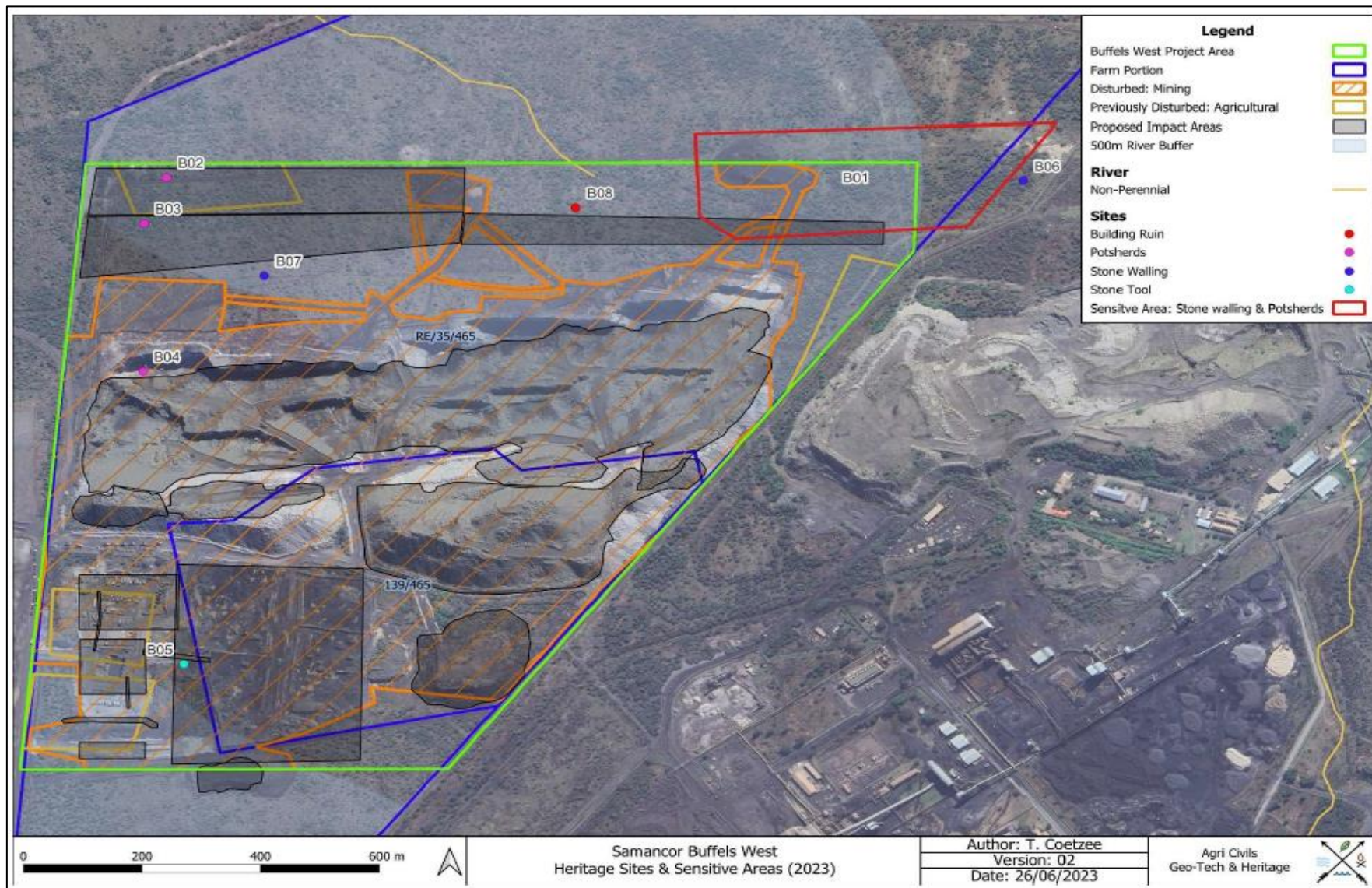


Figure 63: Heritage Sites indicated on a 2023 satellite image for Buffelsfontein West

10.13.3 STATEMENT OF SIGNIFICANCE

The greater study area is considered to be significant from a heritage perspective since the area is associated with Stone Age sites, LIA settlements, historic sites and cemeteries. The demarcated study area is also partially located within 500 m of rivers/streams, a zone that is generally associated with a higher heritage site probability. Site B01 consists of a high number of stone-walled sites and potsherds. Because angular and circular enclosures are present, and due to huts being indicated on historical topographical maps, it is likely that the stone walling and potsherds date to the Historic Period. Unfortunately, the site is not visible on historical aerial imagery, but it is likely that the structures were constructed between 1943 and 1968, meaning that the possibility exists that the site exceeds 60 years of age and could therefore be protected under the NHRA (Act No. 25 of 1999). The possibility also exists that some features might date to the LIA. The site is therefore considered to be significant.

Sites B02, B03 and B04, consisting of undecorated potsherds along the western boundary of the demarcated study area, might relate to Site B01. No additional features were observed in the vicinity of these sites and potential past agricultural activities, as well as surface water, appear to have disturbed the context of these sites. These sites are therefore not considered to be of high significance. Also, the area where Site B04 was observed, has completely been disturbed by mining activities since the surveys in 2021. Additional mining activities are planned for the areas associated with Sites B02 and B03 as well. Site B05, a single LSA stone tool, was observed on the surface and is not associated with any other artefacts. The context appears to be disturbed and the site is therefore not considered to be highly significant. Site B06, stone walling located to the east of the north-eastern corner of the study area, is likely to form part of

Site B01 and is considered to be significant. The site, however, falls outside of the proposed impact area. Site B07 appears to consist of severely dilapidated stone walling. Due to the poor level of preservation of the site, the absence of any additional features, structures and artefacts, as well as the potential impact of agricultural activities in the past, the site is considered to be of low significance. Site B08 is associated with modern mining remains that do not exceed 60 years of age. The structures are not considered to be significant.

10.13.4 CONCLUSION

The proposed Buffelsfontein West Mining Development will consist of opencast mining activities and surface infrastructure impacting approximately 114 ha. The project area is associated with a combination of LSA and LIA/Historic remains, some which could be protected by legislation. Should the recommendations made in this study be adhered to and with the approval of the South African Heritage Resources Agency, the proposed Buffelsfontein West Mining Development may proceed.

10.14 PALEONTOLOGICAL ASSESSMENT

Dr. Marion Bamford from the University of Witwatersrand undertook a paleontological assessment. A copy of the report is included in Appendix 15.

10.14.1 GEOLOGY AND PALAEONTOLOGY

The whole area is situated completely on non-fossiliferous volcanic and metamorphosed rocks of the Rustenburg Layered Suite (Bushveld Igneous Complex) on the Ruighoek Pyroxenite. Intrusive volcanic rocks do not preserve fossils. In addition, the Bushveld Igneous Complex was emplaced about 2055 million years ago (Cawthorne et al., Zeh et al., 2020) which precedes the evolution of macroscopic life forms.



Figure 64: Geological map of the area around the Farm Buffelsfontein 465 JQ.

The Buffelsfontein West project area is indicated within the red rectangle. Abbreviations of the rock types are: Vg = Pyramid Gabbro-norite; Vcm = Mathlagame Norite-anorthosite; Vcr = Ruighoek pyroxenite; VI = Tweelaagte Bronzite. Map enlarged from the Geological Survey 1: 250 000 map 2526 Rustenburg

10.14.2 PALAEOSENSITIVITY

There is no chance of finding fossils in the project footprint and this is confirmed by the grey colour-coding in the SAHRIS palaeosensitivity map (Figure 82). The DFFE Screening map (Figures 83) indicates that the site is moderately sensitive (yellow), but this is incorrect because fossils are not preserved in volcanic intrusive rocks. Based on the geology and the more accurate SAHRIS map, it is apparent that no further palaeontological impact assessment is required for the Buffelsfontein West Opencast Section.



Figure 65: SAHRIS palaeosensitivity map for the proposed Buffelsfontein West Section

Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = low; grey = insignificant/zero

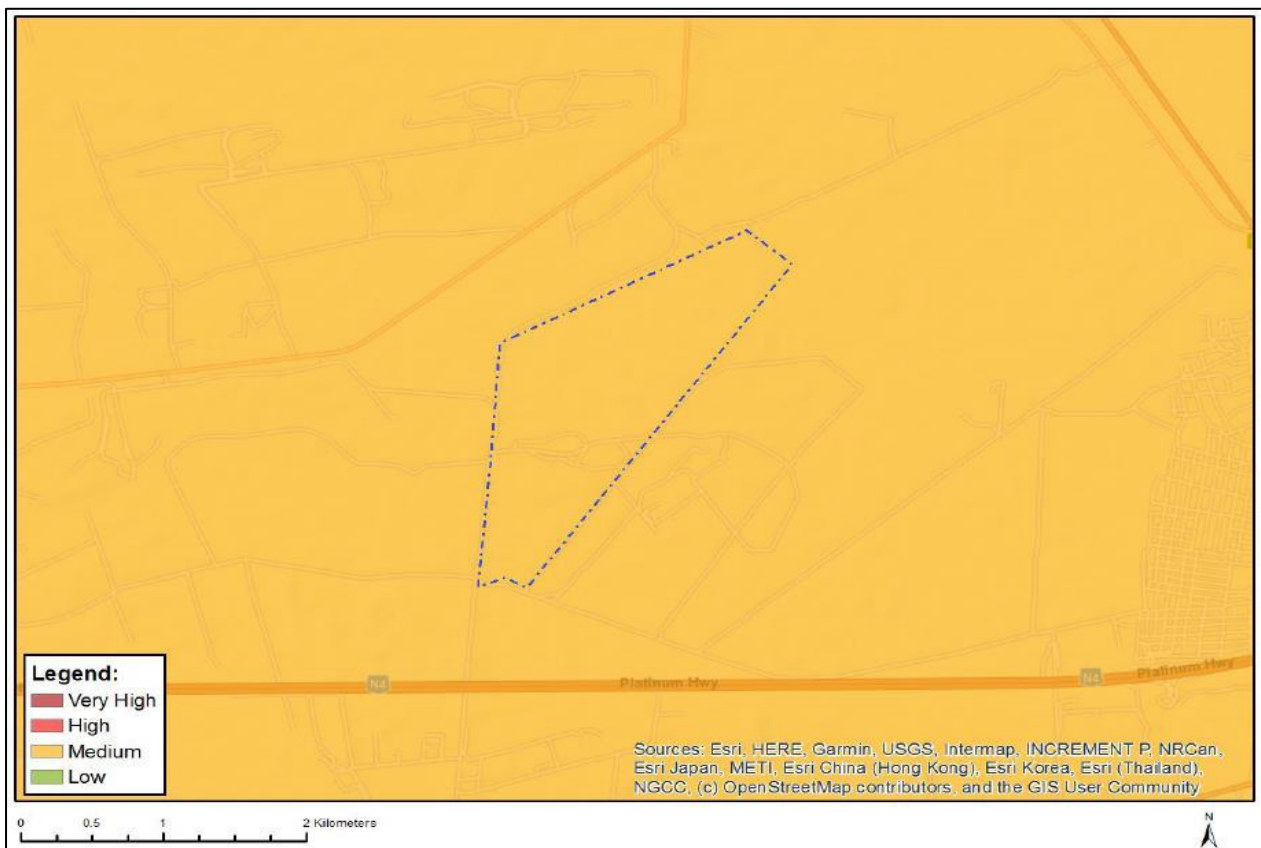


Figure 66: DFFE Screening map for palaeosensitivity for Buffelsfontein West section

10.15 TRAFFIC

Corli Havenga Transportation Engineers compiled the Traffic Impact Assessment for the Buffelsfontein West Opencast Section according to requirements of the South African Traffic Impact and Site Traffic Assessment Manual. A copy of the report is attached as Appendix 16.

10.15.1 METHODOLOGY

From the above mentioned Manual, Section 2.4 the following section pertaining to traffic impact assessments was highlighted:

The purpose of the traffic impact assessment is to investigate and assess the feasibility of accommodating the impact of a proposed change in land use rights on the roads and transportation system. An acceptable assessment means that the proposed change in land use can be accommodated to an acceptable standard by the transportation system, possibly with the implementation of mitigation measures or improvements.

However, an acceptable traffic assessment does not necessarily imply any approval or otherwise of the land use application itself. It is important to note that a traffic impact assessment is essentially a feasibility study.

The specific objectives of a traffic impact assessment are to determine:

- *The local impact of a proposed change in land use on the road and transportation system surrounding the proposed development.*
- *Whether it is possible to accommodate the proposed change in land use, with or without the implementation of mitigation measures within acceptable norms specified in the manual.*
- *The mitigation measures and improvements that may be required to accommodate the proposed change, including:*
 - *Demand side mitigation measures aimed at reducing traffic generation, such as mixed-use developments and reducing the size or changing the type of the development.*
 - *Supply side mitigation measures aimed at improving transportation infrastructure, such as roads and public transport infrastructure.*
 - *The estimated cost of the required improvements and services.*

10.15.2 EXISTING ROAD NETWORK

The existing road network related to Buffelsfontein West Opencast Section is depicted in the photos below.



Figure 67: Existing access Buffels West (direction South)



Figure 68: Gravel road between D1270 and Buffels West access



Figure 69: Existing access Buffels West (direction North)



Figure 70: Existing access Buffels West (direction East)



Figure 71: Existing access Buffels West (direction East)



Figure 72: Access road (low-water bridge) just north of D2170

10.15.3 ROAD NETWORK

The Buffelsfontein West Opencast Section in relation to the extract of the North West Road Network Plan is shown below.

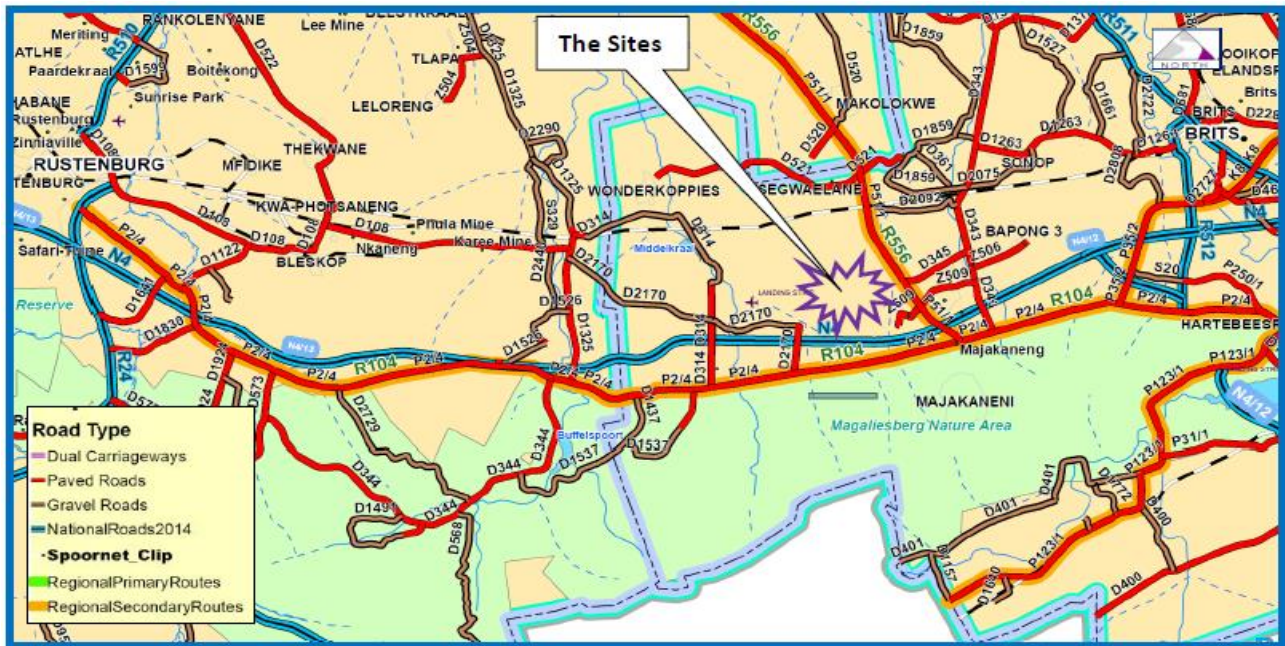


Figure 73: Extract North West Road Network Plan

Road R104, running approximately 2.4km south of the site is Provincial Road P2/4. National Road N4 runs just south (± 1.2 km) of the site. Provincial Road D2170 borders the southern corner of Buffelsfontein West. Lonrho Drive also forms part of the provincial road network and is called Road D314.

10.15.4 ACCESS TO THE MINE

Buffelsfontein West obtains access to the road network via an extension of Road D2170 (northern leg). This link is connected to an existing internal road (mine road) running in an east-west direction with access to a paved road between Saffy Shaft Sibanye Stillwater and Marikana Road (north of Moonooi Beneficiation Plant). The different route options are depicted on the Google Earth aerial photo below.



Figure 74: Route options between Buffelsfontein West and Mooinooi Beneficiation Plant

Between access of Buffelsfontein West and Mooinooi Beneficiation Plant:

- Green Route 15km
- Purple Route & section of Green Route 14.2km
- Red Route 16.2km

Green Route – 7km of route is a gravel road (between Road D2170 and access on access to a paved road between Saffy Shaft Sibanye Stillwater and Marikana Road). Purple and section of Green Route – 3km of route is a gravel road (between Buffelsfontein West access and access to a paved road between Saffy Shaft Sibanye Stillwater and Marikana Road). Red Route – Paved all the way.

10.15.5 EXISTING TRAFFIC DEMAND

The main intersections on the roads leading to the mine were surveyed for the purpose of this traffic impact assessment. The locations of the intersections are indicated on the Google map image. The intersections are as follows:

- T1: D314 (Lonrho Drive) & D2170
- T2: D314 (Lonrho Drive) & N4 Northern Terminal
- T3: D314 (Lonrho Drive) & N4 Southern Terminal
- T4: D2170 & R104
- T5: D2170 & Access roads to Site

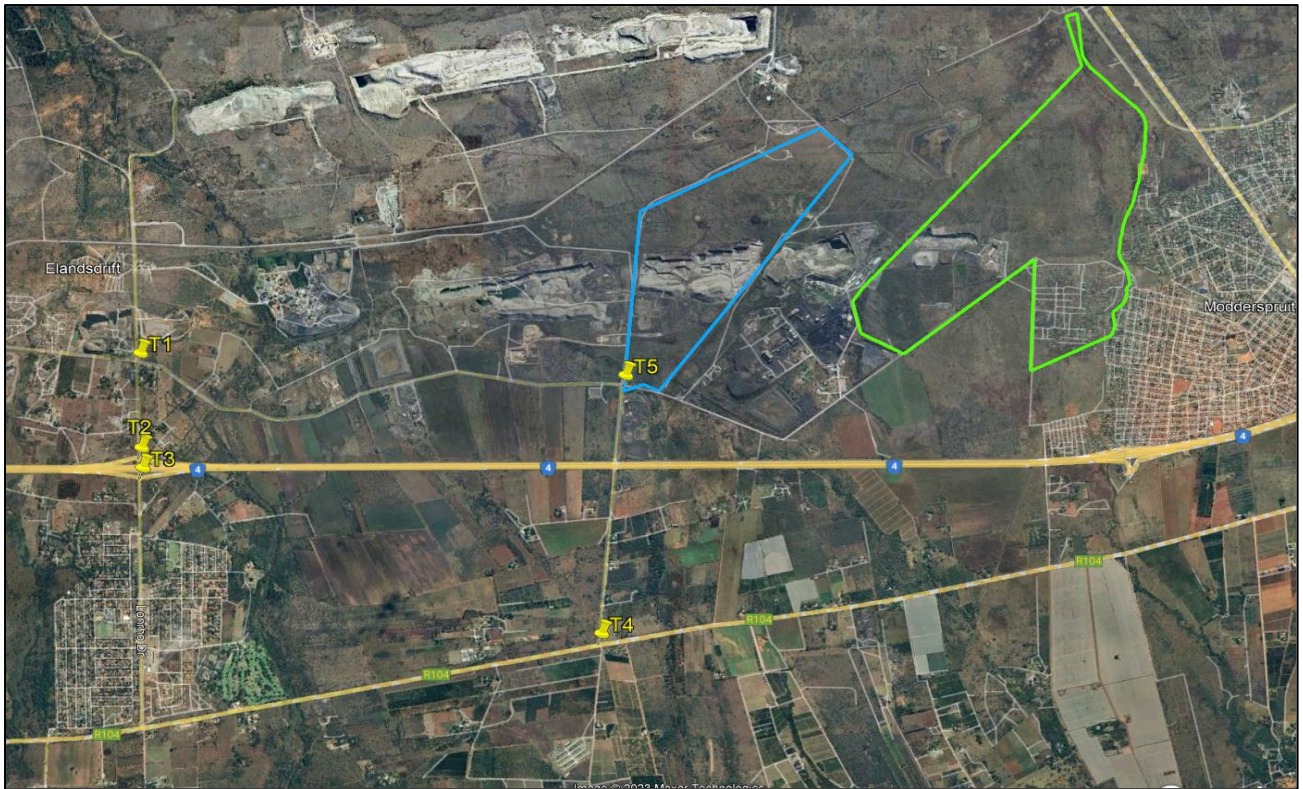


Figure 75: Location of intersections surveyed

Classified turning movement traffic surveys were conducted on Thursday, 8 June 2023 from 06:00 to 10:00 and 14:00 to 18:00. The peak hours were identified as follows:

- Weekday morning peak hour 06:30 – 07:30
- Weekday afternoon peak hour 15:45 – 16:45

The existing morning and afternoon peak hour traffic demand and traffic flows through the various intersections is presented in the figures below.

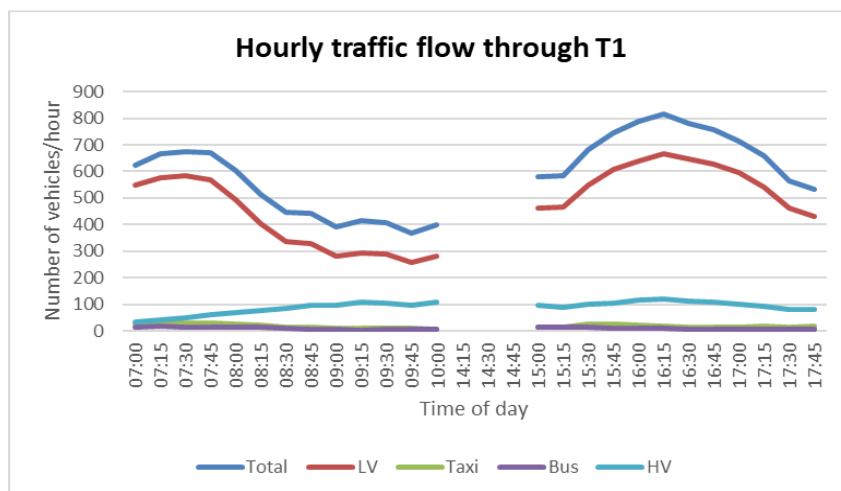


Figure 76: Hourly traffic flow through T1

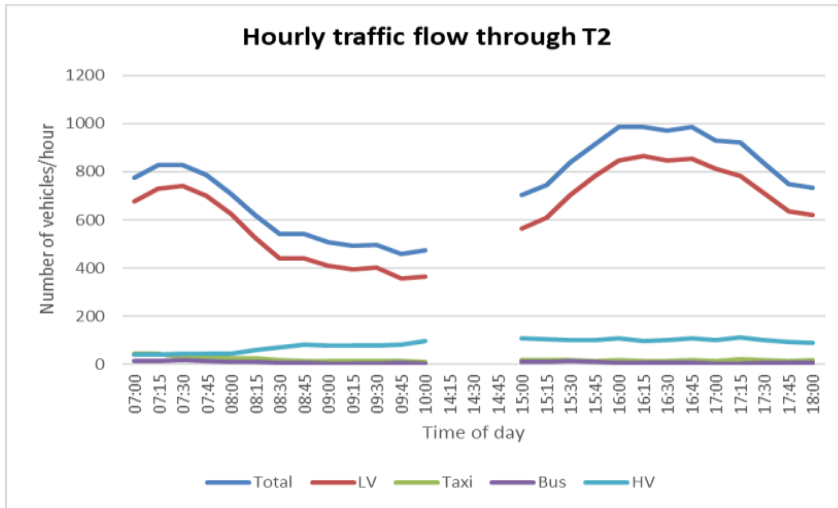


Figure 77: Hourly traffic flow through T2

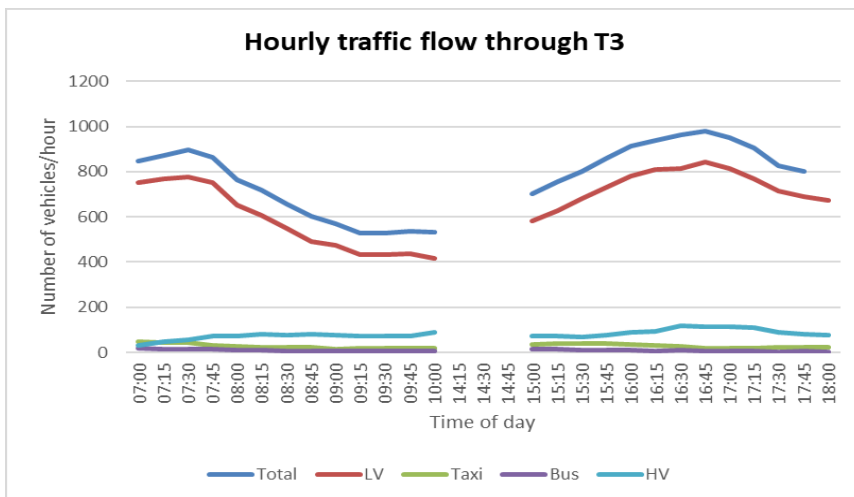


Figure 78: Hourly traffic flow through T3

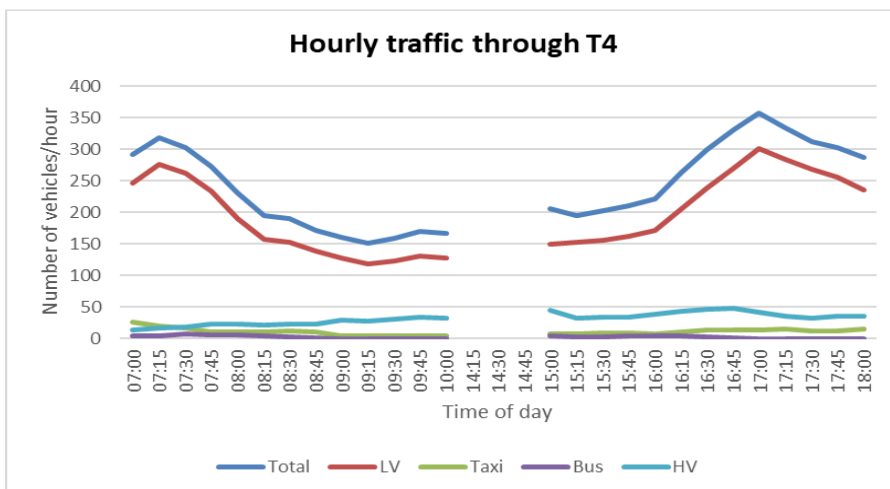


Figure 79: Hourly traffic flow through T4

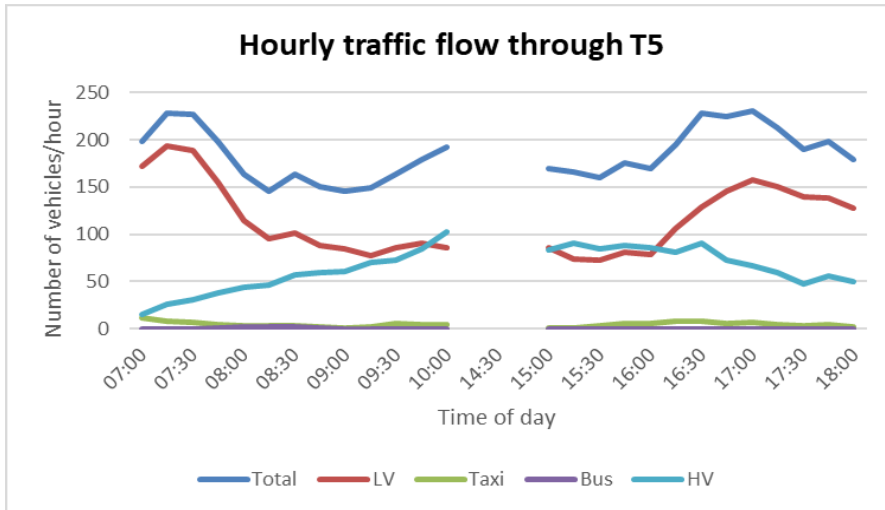


Figure 80: Hourly traffic flow through T5

The total 8-hour traffic demand through the respective intersections is depicted in the figure below, with the % heavy vehicles, number of taxis and buses indicated.

Intersection	Total	Heavy Vehicles	Buses	Taxis	% Heavy Vehicles
T1	4633	701	66	138	16.6%
T2	5815	667	66	164	12.6%
T3	6057	619	71	223	11.4%
T4	1921	261	19	90	14.6%
T5	1450	507	2	34	35.1%

Figure 81: Total 8-hour traffic demand

10.15.6 TRIP GENERATION

Mining operations is not a land use for which trip generation figures are available in the South African Trip Data Manual. Mines tend to have shift change times that fall outside the normal weekday morning and afternoon peak hours on the road network and therefore no peak hour trip generation rates are provided. A 20-hour/day operation is assumed with the operating hours: 06:00 to 16:00 (Day Shift) and 16:00 to 02:00 (Afternoon Shift).

10.15.6.1 WORK FORCE

The follow assumptions are made for the purpose of this study:

Morning shift:

In the morning staff comes to work and there is no shift change during this hour. The modal split are as follows:

- 20 workers own transport (vehicles occupancy 1)
- 208 workers 20% own transport (vehicles occupancy 2)

- Directional split (In/Out) 90:10 morning peak hour (own transport) 10:90 afternoon peak hour (own transport)
- 208 workers 80% public transport (40% buses and 40% taxis) vehicles occupancy 15/taxi and 65/bus= 40/vehicle average) Vehicles drop and leave

Afternoon shift:

During the afternoon peak hour the morning shift workers leave and the night shift workers come to work. The modal splits are as follows:

- 20 workers own transport (vehicles occupancy 1)
- 208 workers 20% own transport (vehicles occupancy 2)
- Directional split (In/Out) 90:10 Morning peak hour & 10:90 Afternoon peak hour (morning shift) 10:90 Afternoon peak hour 10:90 after 02:00 (night shift)
- 208 workers 80% public transport (40% buses and 40% taxis) vehicles occupancy 15/taxi and 65/bus= 40/vehicle average) Vehicles drop pick up and leave

Worse-case traffic impact scenario will be when peak traffic hours of the mining operations correspond with peak traffic hours on the surrounding road network. The expected weekday peak hour trip generation is presented in the figure below.

Different modes	Shift	Total Trips	A.m. peak hour trips		P.m. Peak hour trips	
			In	Out	In	Out
Private Vehicles	Morning	41	37	4	4	37
	Night	41	-	-	37	4
Public Transport	Morning	16	8	8		
	Night	16	-	-	8	8
Total			45	12	49	49

Figure 82: Expected weekday peak hour trip generation (Work force) Buffelsfontein West

10.15.6.2 PRODUCTION

The Mining Works Program gives the following production figures:

Year	1	2	3	4	5	6
Total	110 000	230 000	230 000	230 000	120 000	110 000
Truck/Y	3 143	6 571	6 571	6 571	3 429	3 143
Trucks/day	9	18	18	18	9	9

Figure 83: Production forecast Buffelsfontein West

Information provided also gives a projected 65 000t/m which equals 780kt/y. This is however over a 5 to 6 year period which translates to 61 trucks/day. In the information provided it also stated that this mine is aiming at a steady production of 50kt/month which equals 600 000t/y. This translates to 47 trucks/day over a period of 5.3 years.

The expected number of truck trips will be as follows:

- Production: 50kt/month
- Truck capacity: 35 tons
- Number of trips/day: 47 in and 47 trips out
- Operating hours: 06:00 to 16:00 (Day Shift) and 16:00 to 02:00 (Afternoon Shift)
- Expected peak hour trips are: 8 trips/hour (4 in & 4 out)

The expected total peak hour trip generation affecting the public road network (staff and production) is summarised below.

Table 29: Expected peak hour trip generation

Peak Hour	Total	In	Out
Buffelsfontein West			
A.M.	65	49	16
P.M.	106	53	53

These trips will be added as new mine trips to the exiting weekday morning and afternoon peak hour traffic demand.

10.15.7 BACKGROUND TRAFFIC GROWTH

There are SANRAL count stations with historic data east and west of the application site. The locations of the respective stations are indicated below.



Figure 84: Location of counting stations

The growth rates recorded between 2017 and 2019 (based on trend lines) at the counting stations are presented in the figure below.

Count Station	Annual Growth	
	ADT	ADTT
1633	3.82%	2.37%
2576	-3%	0.06%
1650	2.66%	5.21%
1396	6.02%	21.79%

Figure 85: Background traffic growth rates

Based on the above, the annual daily traffic (ADT) increased by 2.7-6%. There was a steep increase in the annual daily truck traffic (ADTT). An annual background traffic growth rate of 3% will be applied to a 5-year scenario.

10.15.8 PUBLIC TRANSPORT

The traffic counts show a number of buses and mini-bus taxis operating in the area as depicted in the figure below.

Intersection	Buses	Taxis
T1	66	138
T2	66	164
T3	71	223
T4	19	90
T5	2	34

Figure 86: Buses and taxis recorded through each intersection

Based on the assumptions made for trip generation a total of 6 taxis and 2 buses will be required to transport the expected workforce for Buffelsfontein West. We expect buses and taxis to transport workers to the access point. The mine should provide safe loading/offloading facilities for the operation.

10.15.9 CONCLUSION

There are four accesses that can be used to access the road between Safety Shaft Sibanye Stillwater and the Marikana Road. These are not formal accesses to this road which is a concern from a road safety point of view. Accesses should be formalised with proper road widenings, bell-mouths, road markings and road signs at Access Point 1 and Access Point 4. The Samancor Western Chrome Mine’s Buffelsfontein West Opencast application can be supported from a traffic flow point of view provided that the mitigation measures recommended are implemented.

10.16 VISUAL

The assessment of visual impacts takes the following issues into account: the pre-mining visual resource and the visibility, visual intrusion, sensitivity of viewing receptors, and visual exposure, associated with the mine. The following can be described as sensitive receptors in terms of visual impacts of the study area and surrounding area:

- Travelers on the R104 road (running approximately 2.4km south of the site).
- Travelers on the N4 national road (just south (\pm 1.2km) of the site).
- Travelers on the provincial road D2170 (bordering the southern corner of Buffelsfontein West).
- Surrounding land users within 2 km from the study area.

The visual resource of the mine area is determined by considering landscape character, sense of place, and landscape quality. The pre-mining visual resource has been compromised because the setting of the broader area compromising of power lines, roads, telephone lines, vacant land and mining activities within and surrounding the project area. Visibility refers to the extent to which people in the surrounding areas will see the project. The mine can be seen from all directions. Visual intrusion refers to the magnitude of the intrusion that the mine has on existing views. The visual intrusion of the mine can be reduced with successful implementation of the requirements for rehabilitation and closure.

Sensitivity of visual receptors refers to the fact that the visual impact varies according to the sensitivity of the receptors in the project area. Issues regarding visual impacts from surrounding land users must be addressed and mitigation measures must be implemented to prevent negative impacts. Visual exposure is the extent to which infrastructure and activities will appear in various views. It follows that the closer the infrastructure and activities, the greater the visual exposure.

All mitigation measures included in the EMP to reduce visual impacts, must be implemented throughout all phases of the proposed Buffelsfontein West Opencast Section.

10.17 SOCIAL

INDEX Social Consulting Services was appointed to undertake the Social Impact Assessment (SIA) for the proposed Buffelsfontein West Opencast Section. A copy of the full report is attached as Appendix 17. The Buffelsfontein West Opencast Section is located in the Madibeng Local Municipality. This municipality is one of five local municipalities in the Bojanala Platinum District Municipality and covers an area of approximately 3727.5 km² (Figure 10). In 2016, the Madibeng Local Municipality had a population of 536 111, which is 32.4% of the total population in the Bojanala Platinum District Municipality at the time.

10.17.1 POPULATION SIZE

The BPDM had a population of 1.81 million in 2018, which was 3.1% of South Africa's total population. The population growth rate in the district between 2008 and 2018 was 2.64% per year, almost double that of South Africa's growth rate (1.61%) and slightly higher than North West's average growth rate (1.97%). The projected average annual growth rate for BPDM between 2018 and 2023 is 1.7% (BPDM IDP, 2022).

According to the community survey of 2016 the Madibeng LM had a population of 536 111, which was 32,35% of the Bojanala Platinum DM and 0.96% of the South African population at the time. More recent demographic data could not be found for the Madibeng LM, but an increase in population can be expected.

Ward 27 had a population of 13 228 in 2011 (Census 2011). It can be expected that its population has also grown significantly most likely as a result of the mines. In terms of the population breakdown, the Economic Active population make up the largest segment of the population at 59 and 60% respectively in both BPDM and the Madibeng LM. The 0 – 18-year-old age group – the segment that is dependent on educational services and who will require job opportunities in the next few years – make up 36% (BPDM) and 35% (Madibeng LM) of the total population. Both the district and LM have a very small portion of people above 65 years, at 5%. What is interesting to note is that Ward 27 has a significantly larger Economic Active Population at 73%, possibly due to the mines that create employment and attract this age group to settle here. The higher number of males vs females could be another consequence of the occurrence of mines, as this industry is traditionally more male orientated. As reflected in Table 7 above, the male: female ratio are 53:47 in BPDM, 54:46 in Madibeng LM and 59:41 in Ward 27.

10.17.2 LANGUAGE AND RACE

The majority of the citizens in BPDM and Madibeng LM speak Setswana as first language (65% and 55%), followed by a variety of other languages, such as Isixhosa (5% and 3.4%), Sesotho (4% and 5.6%) and Afrikaans (5% and 6.2%) (CS 2016). The language trend looks different in Ward 27, where the dominating language is Afrikaans (23%), followed by Setswana (17%) and IsiXhosa (17%), as well as Xitsonga (12%) (Census 2011). The table below indicates that the majority of the population in all three the study areas is Black.

Table 30: Racial breakdown

	Black	Coloured	White
Bojanala DM	94%	1%	5%
Madibeng LM	92%	1%	7%
Ward 27	74%	1%	23%

10.17.3 MIGRATION

Migration patterns contribute to population growth, which place pressure on the local municipality for the provision of housing and basic services. The figure below illustrates where the population in the three study areas originate from. Whereas the majority of the population in the district and local municipality originate from North West Province, only 34% of Ward 27’s citizens are from North West. Fifty-two percent (52%) are from other provinces, predominantly from the Eastern Cape (16%) (Census 2011). The mines have contributed significantly to population growth and the population composition (language, race and age) in this ward.

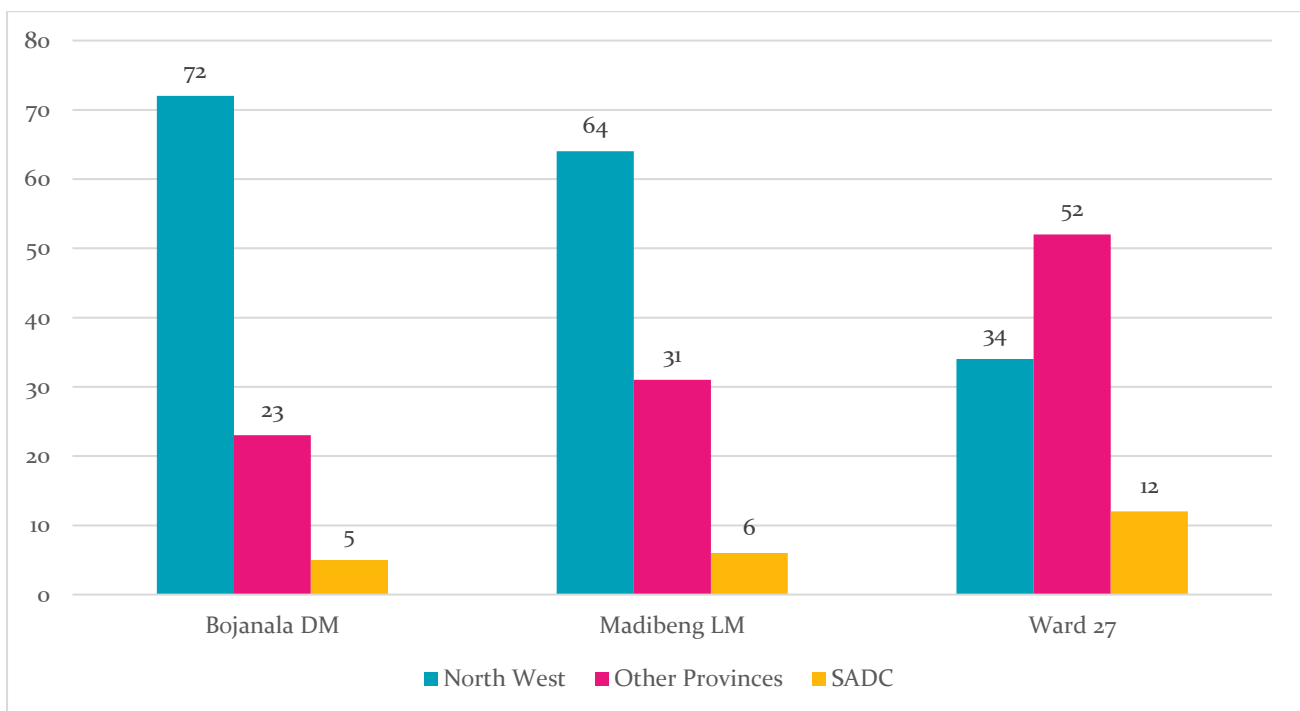


Figure 87: Province of Birth

10.17.4 EDUCATION

As seen below the number of individuals with no schooling within the BPDM, decreased with 2% from 2011 to 2016, and the individuals with matric increased with 4%, however the number of individuals with a form of Higher education decreased with 0.9% (Census 2011; CS 2016).

The BPDM IDP (2022) indicates that, between 2008 and 2018, the number of people with only a 'matric' level of education increased with 39.5%, from 228 000 to 377 000. This number seems very high and contradicts the Census and Community Survey data. During this same period the number of people with a 'matric' level of education plus a certificate or diploma increased at an average annual rate of 3.71%; while the number of people with a 'matric' level of education plus a Bachelor's degree increased at an average annual rate of 5.51% (BPDM IDP, 2022). If these statistics are correct, it indicates an overall improvement in the education levels of the district's population.

Within the Madibeng LM the individuals with no schooling decreased at a slightly higher rate than that of BPDM, with a 2.5% decrease between 2011 and 2016. The number of individuals with Matric within the Madibeng LM increased with 5.1%, which is also higher than the increase in the district. There was also a slight decrease within the LM in the number of individuals with a Higher education, which shows 0.4% fewer individuals having obtained a Higher education. Education levels in Ward 27 follow the trend discussed above, as 30% of the population received a Matric and 6% some form of Higher education (Census 2011).

Table 31: Labour force data

Education	Bojanala Platinum DM		Madibeng LM		
			Madibeng LM		Ward 27
	2011	2016	2011	2016	2011
Education					
- No schooling	7.5%	5.5%	7.6%	5.1%	7%
- Matric	28.5%	32.5%	27.1%	32.2%	30%
- Higher education	7.4%	6.5%	7.2%	6.8%	6%

10.17.5 INCOME

Following the trend of the education levels in the wider study area and Ward 27, income levels are fairly on par with each other, which could possibly be as a result of readily available employment opportunities. However, of the three study areas, Madibeng LM has the fewest households below the lower poverty line (18%) and the least households (2%) that earn more than R75 000 per annum.

Table 32: Income Category

Income Category	Bojanala Platinum DM	Madibeng LM	
		Madibeng LM	Ward 27 (2011)
No income	8%	8%	4%
Below lower poverty line (R20 000 per annum)	24%	14%	18%
More than R75 000 per annum	20%	2%	26%

10.17.6 EMPLOYMENT

Within the district, the importance of Mining is, amongst others, illustrated through its employment numbers. In 2018, the Mining sector employed the largest number of people in Bojanala at 27.4% of total employment, followed by the Trade sector with 18.8% of total employment. The Electricity sector employed the least number of people at 0.4%, followed by the Agriculture sector with 2.6% of total employment (BPDM IDP, 2022).

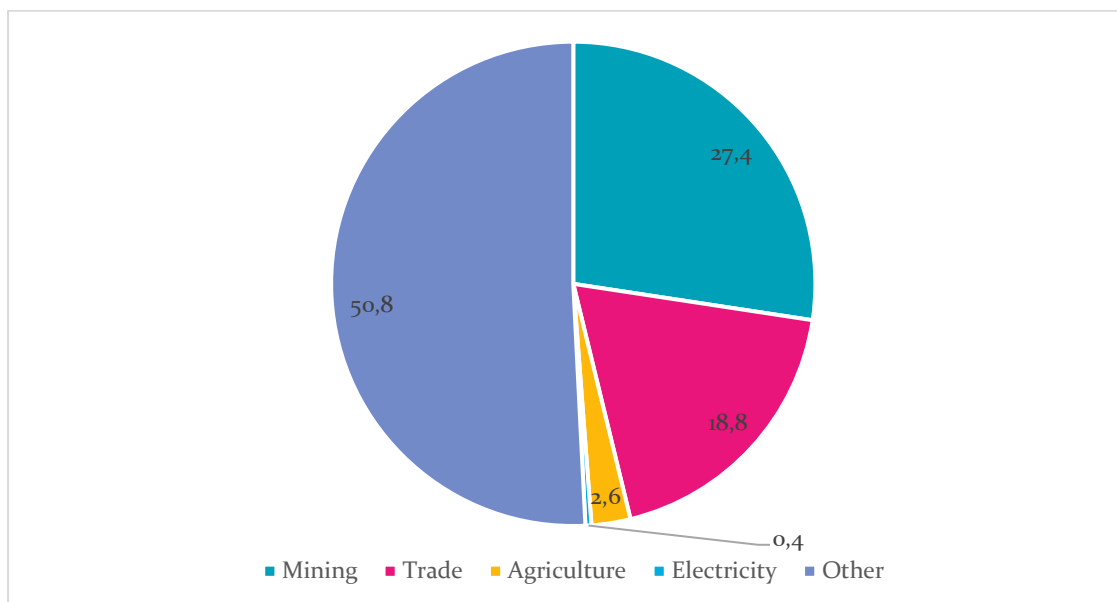


Figure 88: Employment Per Sector

10.17.7 UNEMPLOYMENT

Official unemployment (narrow definition) refers to the percentage of the labour force (15 – 64 years) that is without work, available for work and looking for work. It therefore excludes discouraged work seekers.

According to this definition, South Africa’s official unemployment rate was 32.9% in the first quarter of 2023 (Q1:2023) - amongst the highest in the world - and up from 32.7% in the previous period (StatsSA QLFS Q1:2023). The number of unemployed persons rose by 179 000 to 7.933 million; the employed increased by 258 000 to 16.192 million; and the labour force went up by 437 000 to 24.125 million (<https://tradingeconomics.com/south-africa/unemployment-rate>). The North West Province recorded an unemployment rate of 35.7% in Q3:2021, which was higher than the national figure of 34.9% for the same period. Compared to other provinces, North West Province registered the 5th highest unemployment rate for that quarter (StatsSA, www.iol.co.za). Table 11 reflects Census 2011 data for the study area and indicates that

19% of BPDM, 20% of Madibeng LM and 16% of Ward 27's population were unemployed.

Table 33: Employment and unemployment statistics

Demographics	Bojanala Platinum DM	Madibeng LM	
		Madibeng LM	Ward 27
Unemployment 2011 (official)	19%	20%	16%
Employed (2011)	42%%	45%	54%
Youth Unemployment 2011	39.1%	38.2%	Not Available

10.17.8 ECONOMIC PROFILE

Mining is the backbone of the Bojanala district's economy, accounting for over half of its GDP. Between 2001 and 2004, the district experienced a higher average annual GDP growth rate of 5%, compared to the national average of 3.3% and the North West Province average of 3.2%. Although the national and provincial growth rates were stable, the district's growth rate was more volatile. As of 2008, the district's GDP was estimated at around R36 billion, contributing 3.4% to the national GDP and 52.4% to the provincial GDP (BPDM IDP, 2022). Currently, Madibeng exhibits a diverse economy, encompassing vibrant Agriculture, Mining, Manufacturing, and Tourism sectors. These sectors presently contribute a substantial percentage to the overall Gross Geographic Product (GGP) and their potential for fostering economic growth and development remains significant (Madibeng LM IDP, 2017).

10.17.9 POVERTY AND INEQUALITY

'The upper poverty line' is defined by StatsSA as the level of consumption at which individuals are able to purchase both sufficient food and non-food items without sacrificing one for the other. This variable measures the number of individuals living below that particular level of consumption for the given area, and is balanced directly to the official upper poverty rate as measured by StatsSA. A summary of the poverty and equality status in the study area is provided below:

For the district, there has been an improvement in the poverty gap rate with -2.4% from 2008 (33.7%) to 2018 (31.3%), indicating an improvement in the depth of poverty (BPDM IDP, 2022).

According to figures provided in the Mooinooi SLP (2020-2024), the poverty rate has worsened recently, although the poverty rate within the Madibeng LM is slightly better than that of the Bojanala DM (55.79%) at 47.2% (Mooinooi SLP, 2020).

The African population is the group with the highest number of people living in poverty, at 50.6% (BPDM IDP, 2022).

The Madibeng LM is dedicated to implementing poverty reduction measures, with a specific focus on Maboloka, which has been declared one of the nodal areas in the North West Province under the poverty war-room project

initiated by the office of the President. The project aims to address poverty-related issues in Maboloka, and it receives support from the BPDM (Madibeng LM IDP, 2017).

11 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

11.1 ENVIRONMENTAL FEATURES

Most of the study site consists of vacant land and remaining opencast and underground mining areas or diggings from historic mining. The Kareespruit River borders the eastern section of the mining right area. Other areas within close proximity to the mining right boundary, include vacant land with vegetation and man made infrastructure.

11.2 EXISTING INFRASTRUCTURE ON THE STUDY AREA AND IN CLOSE PROXIMITY

There is existing mining infrastructure for the Buffelsfontein West project area, as described in Section 3. Other existing infrastructure in proximity includes mining infrastructure, farmhouses, roads and agricultural infrastructure.

12 DESCRIPTION OF THE CURRENT LAND USES

(Show all environmental and current land use features)

The Buffelsfontein West Opencast Section consists mostly of operational mining activities since this application involves an existing mine. The size of the land that can potentially be used for grazing land is 34,53 ha for Buffelsfontein West. There is no cultivated land on the site. Weeds have encroached on some of the natural veld.

12.1 SENSITIVE LANDSCAPES

The occurrence of possible sensitive landscapes at the project site is outlined in the table below.

Table 34: Sensitive Landscapes within the Buffelsfontein West Opencast Section

Types of sensitive landscapes	Occurrence at the Mining Site
Nature conservation or ecologically sensitive areas - indigenous plant communities (particularly rare communities and forests), wetlands, rivers, riverbanks, lakes, islands, lagoons, estuaries, reefs, intertidal zones, beaches and habitats of rare animal species.	A Terrestrial Ecology Assessment and Aquatic Ecology Assessment has been conducted for the proposed project. Refer to Sections 10.5, 10.7, 10.8 and 10.9 above for the assessment and baseline findings regarding the ecological assessment, aquatic ecology, hydrogeology and wetlands found on site.
Sensitive physical environments - such as unstable soils and geotechnically unstable areas.	None known.

Important natural resources - river systems, groundwater systems, high potential agricultural land.	All of these aspects have been assessed by specialists and are described in the baseline environment section (Section 10).
Sites of special scientific interest	None known.
Sites of social significance - including sites of archaeological, historic, cultural, spiritual or religious importance and burial sites.	Refer to Sections 10.13 and 10.14.
Sites of outstanding natural beauty, panoramic views and scenic drives	The area has already been impacted by mining activities, roads and agricultural activities.
Green belts or public open space in municipal areas	Not applicable.

13 LIMITATIONS AND ASSUMPTIONS

Limitations as per each specialist study has been provided within each specialist investigation as to comply with Appendix 6 of the Impact Regulations.

13.1 AQUATIC ECOLOGY ASSESSMENT

The following limitations and assumptions were listed for the Aquatic Ecology Impact Assessment:

- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.
- All opinions and comments are based on available resources and data at the time and findings during the site assessment may either verify or dispute the findings within this report.
- A field assessment has been conducted based on selected representative biomonitoring points for future sampling.
- It should be noted that substantial rainfall was experienced during the wet season and rainfall was experienced throughout the winter 2022, which is unusual for the North West Province.
- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

13.2 BLASTING IMPACT ASSESSMENT

The following assumptions have been made:

- The anticipated levels of influence estimated in this report are calculated using standard accepted methodology according to international and local regulations.
- The assumption is made that the predictions are a good estimate with significant safety factors to ensure that expected levels are based on worst case scenarios. These will have to be confirmed with actual measurements once the operation is active.
- The limitation is that this is a new project with no blasting done. No confirmation of the predicted values could be made.
- Blast designs from a similar Samancor operation was used for evaluation of impacts.

- The work done is based on the author's knowledge and information provided by the project applicant.

13.3 AGRICULTURAL ASSESSMENT

The observations are accepted as representative of the soil conditions. The author feels confident that this is the case. There were sufficient observations made that no gaps in knowledge or data is expected.

13.4 TERRESTRIAL ECOLOGY ASSESSMENT

The study area was assumed to be as indicated in the layout map. The desktop study was conducted with up to date resources. It might however be possible that additional information become available in time, because environmental impact assessments deal with dynamic natural ecosystems. It is therefore important that the report be viewed and acted upon with these limitations in mind. A site survey was conducted on 20 May 2022 which is generally at the start of the dry season for the region. The timing of the site visits was thus sub-optimal, and the seasonal constraints on the comprehensiveness of the botanical findings are considered to be moderate.

In order to obtain a comprehensive understanding of the dynamics of the vegetation character of the study area, surveys should ideally have been replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible and the survey was conducted in one site visit. Species flowering only during specific times of the year could be confused with a very similar species of the same genus and some plant species that emerge and bloom during another time of the year or under very specific circumstances may have been missed entirely. As part of the site survey a Species of Conservation Concern (SSC) scan was undertaken for SCC floral species identified during the desktop assessment. However, the SCC scan does not substitute an in depth survey specifically for SCC.

The results, typical flora, herpetofauna, avifauna and mammalian communities found within the study should/can therefore only be used as a general guideline. No scientific data was collected or analysed for the calculation of ecological veld condition. Any comments or observations made in this regard are based on observations, the expert knowledge and relevant professional experience of the specialist investigator. The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.

13.5 HYDROGEOLOGICAL IMPACT ASSESSMENT

The modelling was done within the limitations of the scope of work of this study and the amount of data available. Although all efforts have been made to base the model on sound assumptions and has been calibrated to observed data, the results obtained from this exercise should be considered in accordance with the assumptions made. Especially the assumption that a fractured aquifer will behave as a homogeneous porous medium can lead to error. However, on a large enough scale (bigger than the REV, Representative Elemental Volume) this assumption should hold reasonably well.

13.6 ARCHAEOLOGICAL (HERITAGE) IMPACT ASSESSMENT

The majority of the area to the north of the current mining activities is characterised by patches of dense vegetation cover, especially in the north-eastern and north-western corners (Figures 12 & 13). The initial survey during April 2021 was generally characterised by denser vegetation compared to the survey in September 2021. A boundary fence that roughly followed the area disturbed by previous mining activity also prevented access to a small section near the north-eastern corner of the disturbed section. No field assessment occurred since 2021 and the current condition of the demarcated area is unknown. The updated recommendations are therefore based on satellite imagery dating to 2023. Also, since the project area boundary was altered, the southernmost section was not inspected during the survey.

13.7 ENVIRONMENTAL NOISE IMPACT ASSESSMENT

• MEASUREMENTS

There are limitations and uncertainties regarding acoustical measurements. Noise levels have the potential to fluctuate based on numerous components, including:

- The noise level may change from day to day due to activities within a community (e.g. road traffic fluctuations, see point below) or even at a singular dwelling itself. Dwelling related infrastructure (e.g. air-conditioning units, swimming pool pumps etc.) that has the potential to influence noise levels in terms of decibels.
- Seasonal changes have the potential to influence sound levels directly (e.g. rain) or indirectly (influence from faunal communication, see point below).
- Faunal communication measurement fluctuations due to seasonal, time of day or night etc. Certain fauna communicates during certain hours e.g. cicada may only be audible during night hours, crepuscular birds are only audible during evening or night hours, crickets may be more audible active as seasons get hotter etc.
- Measurements near mining and industries fluctuate depending on equipment in use, capacity load in use, unforeseen equipment in care and maintenance. Certain equipment may not be running optimally, with the consequence being excessive elevated noise levels (e.g. gas leaks, conveyor pulley roller squeaking, excessive vibrations (and associated noise) from unmaintained dampers on equipment etc.
- Road traffic noise fluctuates due to time of measurement investigation (e.g. peak traffic morning or evening conditions, early morning hours etc.); and
- Metrological conditions can influence noise measurements. These include inversion and diffraction in the temperature layer, change in temperature and humidity etc.

• MODELLED SCENARIOS

The assessment of the noise impact of the sites on the surrounding receptors is based on a worst-case approach. The simulation conditions and variables were configured as follows:

- The noise point sources were positioned at approximate geometric centre of mass of the equipment above the ground plane (DGM in SoundPLAN) and approximate altitudes (e.g. rooftop condenser units).

If the noise sources are situated closer to the ground, the impact may be less than if the sources are raised higher off the ground.

- The ground effect was considered by modelling the ground at each site with a sound absorption coefficient of 0.75 across mid-high frequencies. This approximation was made considering that the Concawe method suggests a fully absorptive (absorption coefficient of ‘1’) characteristic for ground that consists of dense vegetation, with moist conditions. At the other end of the spectrum (‘0’), a reflective characteristic is suggested where hard surfaces and minimal vegetation exist with dry conditions.
- To simulate the worst-case condition when low atmospheric sound absorption can be expected (for low to mid frequencies), the following parameters were used in the simulations: air temperature of 20 °C; atmospheric pressure of 1013.25 mbar and humidity of 80 %.
- Dynamic factors such as meteorological conditions, which include wind velocity, temperature inversion and clouds, have not been considered in the simulations. Static calculations are presented only.
- Under temperature inversion conditions, sound propagation can extend much further afield. This condition is however difficult to cater for due to the number of variables and was not factored in during the simulation. An increase of up to 6 dBA from the predicted noise levels could result due to such conditions. The ground was modelled with elevation contours of 50 m intervals. These intervals provide sufficient detail over the distances encountered for modelling purposes.
- The presented noise contours are only one scenario based on an over engineered principal of the maximum capacity of the project. The contours will not be applicable during all times and is only a tool to assist with the potential worst-case impact assessment.
- Sound Power Levels (SPL) sourced for the modelled scenario made use of online resources, no measurements were conducted to determine the SPL of equipment.
- SPL used will likely represent a worst-case maximum output from the loudest point on the equipment (i.e. an exhaust port from a FEL) at maximum full load capacity. As such the modelled noise sources are a worst-case scenario for each piece of equipment; and
- Many models consider noise contours in a hemispherical fashion. Noise sources can be directional e.g. speakers or exhaust ports.

- **PROJECT SPECIFICATION LIMITATIONS**

Project specific limitations included:

- Only one safe measurement area could be found (nearby security of project offices)

13.8 SOCIAL IMPACT ASSESSMENT

The assumptions and limitations regarding the Social Impact Assessment are as follows:

- Baseline socio-economic data for this SIA Report was obtained from various sources, which include Census 2011, Community Survey (CS) of 2016, municipal planning documents and specialist studies conducted as part of the Project. In instances where contradictory statistics were found, and wherever relevant, it was highlighted in the report. Data was nevertheless adequate to develop a community

profile at a sufficient level of detail for this SIA.

- Sources (primary and secondary) are not exhaustive and additional information can still come to the fore that can influence the contents and findings of the SIA study. Additional inputs from stakeholders, where relevant, will be included and could still affect the rating of social and socio-economic impacts.
- Information pertaining to a low-cost housing development adjacent to the mine, with an approved EA, could not be confirmed. The requested supporting information has not been received at the time of writing this report.
- Technical and other information provided by the client is assumed to be correct.
- The assessment of the impact on sense of place is mainly based on the specialist's opinion, as sense of place is a personal experience and is not easily measured.

13.9 SURFACE WATER ASSESSMENT

The study area was assumed to be as indicated in the layout map. Use was made of aerial photographs, digital satellite imagery as well as provincial and national databases to identify areas of interest before the field survey. Although all possible measures were undertaken to ensure all drainage lines were identified and assessed, some smaller ephemeral drainage lines may have been overlooked. Aquatic and riparian ecosystems are dynamic and complex. Some aspects of the ecology of these systems, some of which may be important may have been overlooked. The findings of this study were largely based on a single site visit. A more reliable assessment would have required that seasonal assessments take place. The site survey for the surface water and aquatic ecology assessment was undertaken within the dry season (May 2022). The seasonal constraints on the comprehensiveness of the findings are considered to be moderate.

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and Red Kite Environmental Solutions and its staff reserve the right to modify aspects of the report including the recommendations when new information may become available from on-going research or further work in this field or pertaining to this investigation. Although Red Kite Environmental Solutions exercises due care and diligence in rendering services and preparing documents, Red Kite Environmental Solutions accepts no liability and the client, by receiving this document, indemnifies Red Kite Environmental Solutions and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expensed arising from or in connection with services rendered, directly or indirectly by Red Kite Environmental Solutions and by the use of the information contained in this document.

13.10 TRAFFIC IMPACT ASSESSMENT

The follow assumptions are made for the purpose of this study:

Morning shift:

In the morning staff comes to work and there is no shift change during this hour. The modal split are as follows:

- 20 workers own transport (vehicles occupancy 1)
- 208 workers 20% own transport (vehicles occupancy 2)
- Directional split (In/Out) 90:10 morning peak hour (own transport) 10:90 afternoon peak hour (own transport)
- 208 workers 80% public transport (40% buses and 40% taxis) vehicles occupancy 15/taxi and 65/bus= 40/vehicle average) Vehicles drop and leave

Afternoon shift:

During the afternoon peak hour the morning shift workers leave and the night shift workers come to work. The modal splits are as follows:

- 20 workers own transport (vehicles occupancy 1)
- 208 workers 20% own transport (vehicles occupancy 2)
- Directional split (In/Out) 90:10 Morning peak hour & 10:90 Afternoon peak hour (morning shift) 10:90 Afternoon peak hour 10:90 after 02:00 (night shift)
- 208 workers 80% public transport (40% buses and 40% taxis) vehicles occupancy 15/taxi and 65/bus= 40/vehicle average) Vehicles drop pick up and leave

Worse-case traffic impact scenario will be when peak traffic hours of the mining operations correspond with peak traffic hours on the surrounding road network.

13.11 WATERCOURSE DELINEATION AND WATERCOURSE ASSESSMENT

The fieldwork component of the assessment comprised of one assessment only, during the dry season, after a high rainfall (wet) season (20th of May 2022). Therefore, no temporal trends for the respective seasons have been assessed.

- The term “study site” refers to the Buffelsfontein West application area and the 500 m surrounding area.
- No wetlands were identified within 500 m of the Buffelsfontein West Section.
- The study focussed on the identification, delineation and functional assessment of wetlands found within/along the neighbouring project footprint area. Although all wetlands occurring within 500 m of the activities were mapped at a desktop level in fulfilment of Regulation GN509 of the NWA, the field assessment was confined to only the identified wetlands and did not include an assessment of the drainage lines and the Kareespruit. This was assessed by another specialist as part of the Surface Water Impact Assessment.
- Whilst every effort was made to ensure that all wetland features potentially within the 500 m DWS Regulated Area were identified and delineated, less distinct features within these access-controlled areas may not have been identified. Specifically, access to the Buffelsfontein West Section was limited due to the mine being in full operation. All means possible was done to identify and map wetlands in the inaccessible areas via desktop methodologies.
- The assessment was conducted on the portions of the study site as originally defined by the client, any

changes in the project boundary subsequent to this may negatively impact the robustness of this report.

- Formal vegetation sampling was not done by the specialist as it is not a requirement. All vegetation information recorded was based on the onsite visual observations of the author. Furthermore, only dominant, and noteworthy plant species were recorded. Thus, the vegetation information provided has limitations for true botanical applications.
- The impact of the proposed activities on wetland ecosystems was conducted for the construction, operational and decommissioning phases. Impacts to river ecosystems, drainage areas and other water resources were not assessed (as previously mentioned).
- Description of the depth of the regional water table, geohydrological and hydrogeological processes falls outside the scope of the current assessment.
- Deriving a 100% factual report based on field collecting and observations can only be done over several years and seasons to account for fluctuating environmental conditions and migrations. Since environmental impact studies deal with dynamic natural systems additional information may come to light at a later stage.
- The specialist responsible for this study reserves the right to amend this report, recommendations and/or conclusions at any stage should any additional or otherwise significant information come to light.
- The realistic good mitigation scenario for the impact assessment assumes that all the mitigation measures recommended in Section 5.3 of the report will be adhered to.

11 FULL DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE (IN RESPECT OF THE FINAL SITE LAYOUT PLAN) 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 (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.)

14.1 IMPACTS IDENTIFIED FOR THE PROJECT

The following cultural, environmental and socio-economic impacts associated with the Buffelsfontein West Opencast Section have been assessed in this document.

Potential impacts that may be caused by the development will be identified using input from the following:

- Views of I&APs;
- Existing information;
- Specialist investigations;
- Site visit with the project team; and
- Legislation.

The following potential major direct, indirect and cumulative impacts were identified:

- Land degradation (where surface impacts are expected);

- Potential to alter the topography (where surface impacts are expected);
- Loss of soil characteristics - erosion and compaction (where surface impacts are expected);
- Potential for alien invasive establishment;
- Potential pollution to water resources (surface and groundwater);
- Increased dust and emissions;
- Increased noise levels;
- Damage to property/infrastructure from blast events;
- Potential damage to heritage sites (grave and/or archaeological artefacts);
- Influx of job seekers to the area;
- Potential increased traffic – haulage;
- Health and safety impacts;
- Potential injury and loss of health and life of humans; and
- Altered Socio-Economic Environment (Positive or negative).

14.2 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED

Minerals can only be mined where identified and verified, therefore it was not practical to select any other sites. This fact guided the proposed positioning of the opencast and related infrastructure as well as utilising the transformed/impacted existing areas, which will limit surface impacts for the project (refer to Section 7 above for details of alternatives).

14.3 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES

A Comments and Response Report was compiled for the scoping phase of the project. This will be updated for EIA phase of the project (refer to Appendix 4).

14.4 SPECIALIST INVESTIGATIONS

Several specialist investigations formed part of the EIA Phase of the Buffelsfontein West Opencast project as outlined in the table below.

Table 35: Description of aspects assessed by the specialists

Aspect	Specialist Study	Specialist	Terms of Reference
Surface water	Surface Water Assessment	Red Kite Environmental Solutions (Pty) Ltd	<p>The Surface Water Assessment was undertaken for the footprint of the proposed activities, as provided by the client, and surface water resources within the 100 m extended project area (buffer). The Scope of Work for the surface water baseline and impact assessment study was to:</p> <ul style="list-style-type: none"> • Conduct a desktop assessment on available information for the proposed area, including satellite images, databases, and specialist studies performed for the area. • Establish the water quality baseline by assessing water quality in affected watercourses around the operation area and comparing it to national water quality standards. • Field visit to survey the affected watercourses; • Delineate rivers and streams within the 100 m extended project footprint buffer; • Developing a sensitivity map based on field visits and supported by appropriate regional information to inform the impact assessment; • Determination of acceptable water qualities (RWQO) for the affected watercourses and compare to existing water quality data. • Determination of watercourses buffers as per the Buffer Zone Guidelines for Wetlands, Rivers, and Estuaries. • Undertake an impact assessment of the proposed activities on the surface water environment for the construction, operation and closure phases of the project; • Recommendation of site-specific mitigation measures; and • Compilation of a specialist assessment report detailing the methodology and findings of the assessment. <p>The Scope of Work for the Surface Water Assessment Report did not include flood volumes, wetland assessment, floodline delineation, water balance and storm water management.</p> <p>The overall purpose of the surface water assessment report was to evaluate the impacts and potential impacts that the infrastructure and associated activities have or might have on the surface water on the property.</p> <p>The impacted water resources, with their accompanying catchments, and sub-catchment areas were noted as well as setting forth information on which measures and legislation will be applicable to the said property and to the amendments set forth in the scope of the operation.</p>
Groundwater	Hydrogeological Impact Assessment	Geo Pollution Technologies - Gauteng (Pty) Ltd (GPT)	<p>The purpose of the study was to determine the hydrogeological impact of the development of the opencast pit for Buffelsfontein West. Groundwater impact modelling of mining for the proposed Buffelsfontein West Operation was to determine the impact of mining on the surrounding area including dewatering and the spread of pollution.</p> <p>The project objectives within the scope of work for the groundwater study aimed to address the following:</p> <ul style="list-style-type: none"> • Quantify the current groundwater status quo. • Groundwater impact predictions. • Groundwater risk assessment. • Groundwater management options and mitigation measures.

Aspect	Specialist Study	Specialist	Terms of Reference
Aquatic Ecology	Aquatic Ecology Impact Assessment	Enviridi Environmental Consultants (Pty) Ltd	<p>The main purpose of the study was to obtain information on normal flow rates, river health and potential factors that could influence the surface water environment and thereby the aquatic ecology:</p> <ul style="list-style-type: none"> To obtain an impression of the study area and surroundings; To define the characteristics of all the drainage patterns and containment of surface water in the area; To obtain an impression of the catchment i.e. the size, shape and slope and baseline conditions; To obtain the baseline aquatic ecological baseline for the river system and feasibility of future monitoring; and To obtain an impression of the practical implications of managing the surface water environment.
Watercourses	Watercourse Delineation and Functionality Assessment	Elemental Sustainability (Pty) Ltd	<p>The Terms of Reference (ToR) for this study included the following:</p> <ul style="list-style-type: none"> Review available desktop data for the baseline receiving environment (site specific study area, as well as the general surroundings) (Bioregional Conservation Plans, NFEPA). Undertake a desktop delineation of all wetlands within the footprint of the application area and within the extended 500 m DWS Regulated Area. Undertake a site visit to delineate wetland boundaries in the field as per the DWAF Wetland Delineation Guidelines (DWAF, 2005; 2008). Typing of the wetlands according to their hydro-geomorphic setting using the wetland classification system most recently modified for use in South African conditions by Ollis <i>et al.</i> (2013). Determine the Present Ecological State (PES) using WET-Health (Version 2) and conduct a Level 2 Rapid Field-based Assessment (Macfarlane <i>et al.</i>, 2020). Determine the Ecological Importance and Sensitivity (EIS) of all verified wetlands by using the recently revised WET-EcoServices Tool (Version 2). An overall ecological importance (EI) score is derived and integrated with the ecological sensitivity (ES) score to produce an overall EIS score. Undertake a functional assessment using the WET-EcoServices Tool (Version 2), a technique for rapidly assessing ecosystem services supplied by wetlands and riparian areas (Kotze <i>et al.</i>, 2020) considering the landscape setting and information recorded on site. Identification and description of existing impacts. Undertake a Risk Assessment as specified in General Notice 267 of 24 March 2017. Conduct an Impact Assessment as specified by the Environmental Impact Assessment Regulations of 2014 (As amended) to determine the impact of the project on the wetland/s; Discuss appropriate mitigation and management procedures relevant to conserving wetland areas on site. Compilation of a detailed watercourse delineation and functionality assessment report.
Blasting	Blasting Impact Assessment	Blast Management & Consulting	<p>The objectives of the report were to outline the expected environmental effects that blasting operations could have on the surrounding environment; and proposing the specific mitigation measures that will be required. The study investigated the related influences of expected ground vibration, air blast and fly rock. These effects were investigated in relation to the</p>

Aspect	Specialist Study	Specialist	Terms of Reference
			<p>blast site area and surrounds and the possible influence on nearby private installations, houses and the owners or occupants.</p> <p>The objectives were dealt with whilst taking specific protocols into consideration. The protocols applied in the report were based on the author’s experience, guidelines taken from literature research, client requirements and general indicators in the various appropriate pieces of South African legislation. There is no direct reference in the following acts to requirements and limits on the effect of ground vibration and air blast and some of the aspects addressed in the report:</p> <ul style="list-style-type: none"> • National Environmental Management Act No. 107 of 1998 as amended; • Mine Health and Safety Act No. 29 of 1996 as amended; • Mineral and Petroleum Resources Development Act No. 28 of 2002 as amended; • Explosives Act No. 15 of 2003. <p>The guidelines and safe blasting criteria were based on internationally accepted standards and specifically criteria for safe blasting for ground vibration and recommendations on air blast published by the United States Bureau of Mines (USBM). There are no specific South African standards and the USBM is well accepted as standard for South Africa.</p> <p>The scope of the study was determined by the terms of reference to achieve the objectives. The terms of reference can be summarised according to the following steps taken as part of the EIA study with regards to ground vibration, air blast and fly rock due to blasting operations.</p> <ul style="list-style-type: none"> • Background information of the proposed site. • Blasting Operation Requirements. • Site specific evaluation of blasting operations according to the following: <ul style="list-style-type: none"> ○ Evaluation of expected ground vibration levels from blasting operations at specific distances and on structures in surrounding areas; ○ Evaluation of expected ground vibration influence on neighbouring communities; ○ Evaluation of expected blasting influence on national and provincial roads surrounding the blasting operations if present; ○ Evaluation of expected ground vibration levels on water boreholes if present within 1500 m from blasting operations; ○ Evaluation of expected air blast levels at specific distances from the operations and possible influence on structures; ○ Evaluation of fly rock unsafe zone;

Aspect	Specialist Study	Specialist	Terms of Reference
			<ul style="list-style-type: none"> ○ Discussion on the occurrence of noxious fumes and dangers of fumes; ○ Evaluation the location of blasting operations in relation to surrounding areas according to the regulations from the applicable Acts. <ul style="list-style-type: none"> ● Impact Assessment. ● Mitigations. ● Recommendations. ● Conclusion.
Air Quality and Dust Emissions	Air Quality Impact Assessment	Eco Elementum (Pty) Ltd	<p>The purpose of the study was to:</p> <ul style="list-style-type: none"> ● Study the available information relevant to the pre and post-development ambient air quality pollution concentrations in the environment; ● Identify the major existing air emission sources in the environment; ● Identify the existing sensitive air pollution areas in the environment; ● Estimate by means of measurements and integration of the results with those of any relevant existing information the present ambient air quality climate; ● Identify the mining related processes and equipment that will cause the major contribution to the future air quality impact; ● Consider, evaluate and rate the potential air quality impacts; and ● Propose relevant management and mitigation measures to lessen the anticipated impacts.
Heritage	Phase 1 Archaeological Impact Assessment	Tobias Coetzee, MA (Archaeology) (UP)	<p>The purpose of the study was to examine the demarcated study area in order to determine if any archaeological resources of heritage value will be impacted by the proposed Buffelsfontein West Opencast Section, as well as to archaeologically contextualise the general study area in terms of the National Heritage Resource Act No.25 of April 1999.</p>

<p>Terrestrial Biodiversity</p>	<p>Terrestrial Ecology Assessment</p>	<p>Red Kite Environmental Solutions (Pty) Ltd</p>	<p>The Assessment consisted of a desktop study and the field assessment, which included the following:</p> <ul style="list-style-type: none"> • A desktop vegetation study, which included: <ul style="list-style-type: none"> ○ Classification of the main biome and description of the dominant vegetation type; ○ Investigation of the dominant indigenous species within this region; ○ Listing the endemic species; ○ Listing species of conservation concern; and ○ Determining the medicinal species. • A desktop faunal study, which included determining the: <ul style="list-style-type: none"> ○ Endemic species; ○ Baseline occurrences of species within the area; ○ Virtual Museum and Animal Demographic Unit consultation; and ○ Listing species of conservation concern. • A field survey was conducted to determine the: <ul style="list-style-type: none"> ○ General condition and composition of terrestrial ecology aspects associated with the study area; ○ Likelihood of ecologically significant flora species, invertebrates and mammals occurring in the area based on status of the environment; ○ Presence of endemic species; ○ Presence of exotic and invasive species; ○ Presence of IUCN Red Data species; and ○ Presence of culturally significant species. <p>The information from both the desktop and field survey was used to report on the following:</p> <ul style="list-style-type: none"> • General description of the biodiversity components in the study area. • Description and mapping of the broad vegetation units (if more than one) identified in the study area. • Identify sensitive areas and species that should be avoided by the proposed development. • Make use of the South African Biodiversity Institute Database to obtain specialised information and previous surveys within the area. • Summarise legislation pertaining to the project with regard to biodiversity. • Highlight major concern or fatal flaws of the project with regard to biodiversity. • Identify potential impacts to terrestrial ecology aspects and determine the potential significance of these impacts. • Provide relevant mitigations and recommendations to limit and minimise the impacts the activities may have on the fauna and flora of the area.
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Aspect	Specialist Study	Specialist	Terms of Reference
Noise	Environmental Noise Impact Assessment	EnviroRoots (Pty) Ltd	<p>The noise impact study comprised an investigation of:</p> <ul style="list-style-type: none"> The measurements of existing noise levels at the noise sensitive site/s. The subsequent determination of the baseline setting (SANS 10103:2008 Rating Level) within the study area. The estimated noise emission from the project. Calculated potential for a noise impact or disturbing noise (National Noise Control Regulations GN R154). Mitigation requirements and recommendations where applicable. Conclusions and recommendations as well as statement whether the project should be authorised (in terms of noise). <p>The study was done in terms of guidelines SANS10302:2008, SANS10103:2008 and National Noise Control Regulations GNR154 criteria. Reference is also made in terms of Appendix 6 of the National Environmental, Management Act, 1998 (Act No. 107 of 1998) and International Finance Corporation (IFC) guidelines (Table 1.7.1- Noise Level Guidelines).</p>
Agriculture, Land Use and Soil Capability	Agricultural Assessment: Compliance Statement	Index (Pty) Ltd - Dr Andries Gouws	<p>The purpose of the Agricultural Assessment is to ensure that the sensitivity of the site in relation to agriculture and soil impacts is sufficiently considered. Also, that the information provided in this report, enables the Competent Authority to come to a sound conclusion on the impact of the proposed project.</p> <p>To meet this objective, site sensitivity verification must be conducted of which the results must meet the following objectives:</p> <ul style="list-style-type: none"> It must confirm or dispute the current land use and the environmental sensitivity as was indicated by the National Environmental Screening Tool. It must contain proof of the current land use and environmental sensitivity pertaining to the study field. All data and conclusions are submitted together with the Environmental Impact Assessment report for the proposed Buffelsfontein West Opencast Section. <p>According to GN320, the Agricultural Assessment that is submitted must meet the following requirements:</p> <ul style="list-style-type: none"> It must identify the extent of the impact of the proposed development on the agricultural resources. It must indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site, and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.
Palaeontology	Palaeontological Exemption Letter	Professor Marion Bamford (University of Witwatersrand)	<p>The Terms of Reference (ToR) for this study were to undertake a PIA and determine the palaeosensitivity for the Buffelsfontein West section.</p> <p>The methods employed included:</p> <ul style="list-style-type: none"> Consultation of geological maps, literature, paleontological databases, published and unpublished records to determine the likelihood of fossils occurring in the affected areas. Sources included SAHRA databases;

Aspect	Specialist Study	Specialist	Terms of Reference
			<ul style="list-style-type: none"> • Where necessary, site visits by a qualified paleontologist to locate any fossils and assess their importance (<i>not applicable to this assessment</i>); • Where appropriate, collection of unique or rare fossils with the necessary permits for storage and curation at an appropriate facility (<i>not applicable to this assessment</i>); and • Determination of fossils' representivity or scientific importance to decide if the fossils can be destroyed or a representative sample collected (<i>not applicable to this assessment</i>).
Socio-Economic	Social Impact Assessment	INDEX Social Consulting Services	<p>The primary purpose of the Social Impact Assessment (SIA) was to determine and analyze the likely impacts of a proposed development or event on a specific group of people or a community's way of life, character and social cohesion. This was done by assessing and analyzing the probable social and socio-economic impacts before the development takes place. The aim is for the proponent to realize and optimize the Project's benefits and implement mitigation measures that would minimize its possible negative impacts.</p> <p>The SIA Report provided the following:</p> <ul style="list-style-type: none"> • Broad overview of the Project, design and activities to be undertaken; • Purpose of a SIA; • Legal guidelines and policies within which this Project should function from a social and economic perspective; • Gaps, assumptions and limitations of the study; • Study scope of work, methodology and the impact significance rating method used; • Definition of the study area / Project area of influence; • Identification of sensitive receptors within the site-specific study area; • The socio-economic profile of the region and the social characteristics of the affected environment; • Anticipated positive and negative social and socio-economic impacts for the construction, operational and decommission phases and their significance ratings; • Mitigation and management measures for each impact category; • Recommendations from a socio-economic perspective; and • Social Management Plan for implementation.
Traffic	Traffic Impact Assessment	Corli Havenga Transportation Engineers	<p>The specific objectives of the Traffic Impact Assessment were to determine:</p> <ul style="list-style-type: none"> • The local impact of a proposed change in land use on the road and transportation system surrounding the proposed development.

Aspect	Specialist Study	Specialist	Terms of Reference
			<ul style="list-style-type: none"> • Whether it is possible to accommodate the proposed change in land use, with or without the implementation of mitigation measures within acceptable norms specified in the manual. • The mitigation measures and improvements that may be required to accommodate the proposed change, including: <ul style="list-style-type: none"> ○ Demand side mitigation measures aimed at reducing traffic generation, such as mixed-use developments and reducing the size or changing the type of the development. ○ Supply side mitigation measures aimed at improving transportation infrastructure, such as roads and public transport infrastructure. ○ The estimated cost of the required improvements and services.
Stormwater Management and Water Balance	Stormwater Management and Water Balance Report	GFK Consulting Engineers	The main objective was the establishment of stormwater management measures and water balance for the proposed Buffelsfontein West Opencast Section for requirements of the WUL.
Closure and Rehabilitation	Closure Cost Assessment	Elemental Sustainability (Pty) Ltd	The main objectives of the closure cost assessment are to: <ul style="list-style-type: none"> – Develop an itemised plan indicating an inventory of closure aspects based on the proposed mine schedule and discussions with mine personnel. – Define specific rehabilitation actions for each, through reviewing specialist studies, impact assessment outcomes, industry guidelines, conceptual modelling and rehabilitation experience. – Calculate monitoring and maintenance costs, and – Compile a dedicated closure spreadsheet to determine the closure costs of the quantified actions through applicable rates. All quantities have been provided by the mine.

14.5 THE POSITIVE AND NEGATIVE IMPACTS THAT THE ACTIVITY (IN TERMS OF THE INITIAL SITE LAYOUT) AND ALTERNATIVES WILL HAVE ON THE ENVIRONMENT AND THE COMMUNITY THAT MAY BE AFFECTED

(Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

General impacts are provided below as per specialist investigations (refer to Appendix 5 – 17). The specialist investigations which included modelling, such as groundwater, noise, aquatic ecology, air quality and blasting, included the modelling results below as per relevant heading.

14.5.1 IMPACT ON GEOLOGY

No geological impacts such as sterilisation of mineral resources are expected as the proposed project is being planned in a manner that allows for the maximum extraction of the targeted commodities within the project area.

14.5.2 IMPACTS ON TOPOGRAPHY

The topography of the project area would be altered by project related activities. The topography of the site could be altered through:

- Opencast mining; and
- Alteration of drainage patterns.

14.5.3 IMPACTS ON AGRICULTURE AND SOIL

- Loss of high potential land: There is no high potential land on the site, hence, there is no impact.
- Loss of agricultural production: There is no cultivated land on the property and the vacant land is not used for grazing purposes.
- Loss of Agricultural infrastructure: The site is fenced and contain no farming infrastructure.
- Loss of soil due to erosion: The soil is not erodible because of the high clay content and highly developed structure. It is also on evenly sloped land where erosion is not expected.

14.5.4 AQUATIC ECOLOGY IMPACTS

- Loss of Biodiversity and Ecological function - Riparian zone impacts.
- Loss of Biodiversity and Ecological function.
- Interference with Ecological Corridor functioning. Leading to decrease and changes in water quantity and availability in the Ecological Reserve.
- Deterioration of water quality in the Kareespruit River due to contaminated soil and storm water runoff affecting aquatic communities found within water systems and may lead to death and shifts in community structures occurring.

- Nutrient enrichment and leading to decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found within the areas if flow is present.
- If the river is negatively affected, it may lead to a deterioration of the Present Ecological Status (PES).
- Impacts to Streamflow Regulation

14.5.5 IMPACTS ON HYDROGEOLOGY AND SURFACE WATER

The identified groundwater risks for the operational phase are as follows:

- During the operational phase, it is expected that the main impact on the groundwater environment will be de-watering of the surrounding aquifer.
- Although the Martlwana and Kareespruit rivers are found in the vicinity of the site, the groundwater level in this area is relatively deep and streams serve as stormwater runoff channels with no connection to the groundwater. Therefore, these streams would not be impacted by the mining.
- The flow in the aquifer will be directed towards the mine at this stage and no groundwater pollution is thus expected to be transported from the immediate area of the site.

The identified groundwater risks post-mining are as follows:

- Following closure of the mine, the groundwater level will rise to an equilibrium that will differ from the pre-mining level due to the disturbance of the bedrock.
- The rise in groundwater level is predicted to be relatively slow and the water levels are expected to recover only in about 10 - 20 years.
- Groundwater within the mined areas is expected to deteriorate due to chemical interactions between the geological material and the groundwater. The resulting groundwater pollution plume is expected to commence with downstream movement.
- There are no predicted potential impacted receptors based on the model.
- There is a possibility of nitrate contamination resulting from blasting during mining. However, as there are no monitoring data yet the contamination levels cannot be predicted with any certainty.
- Due to the depth of the rest groundwater levels below surface, no decanting is predicted by the model.

Surface water impacts during the construction phase:

- Sedimentation of surface water resources leading to water siltation and deteriorating water quality.
- Potential proliferation of alien invasive species, especially to downstream watercourses.
- Impacts to biodiversity and ecological function – including riparian zone activities or activities within buffer zones or regulated zones.
- Loss of hydrological connectivity due to infrastructure impeding drainage lines and/or the flow of water.
- Reduced surface water infiltration and baseflow as a result of soil compaction.
- Alteration in surface water drainage patterns.
- Hydrocarbon contamination from heavy machinery and vehicles.
- Diversion of clean water areas, altering the drainage patterns.

- Containment of dirty water areas reducing the runoff to receiving surface water resources.
- Reduced surface water infiltration and baseflow as a result of impervious surfaces.
- Increased velocity in surface water runoff leading to erosion and consequent sedimentation of surface water resources.

Surface water impacts during the operational phase:

- Potentially contaminated runoff into downstream surface water resources resulting in water contamination, sedimentation and the deterioration of the water quality.
- Possible sedimentation of water resources due to erosion, leading to nutrient enrichment and decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found in flowing watercourses.
- Reduction of catchment yield as dirty water runoff within the project area will be contained in the environment.
- Alteration of drainage patterns, leading to decrease and changes in water quantity and availability.
- Deterioration of water quality in the downstream surface water resources due to contaminated storm water runoff.
- Loss of biodiversity and ecological function of surface water features. Interference with ecological corridor functioning.
- Potential proliferation of AIP species.
- If rivers are negatively affected, this may lead to a deterioration of the Present Ecological Status (PES).

14.5.6 IMPACTS ON TERRESTRIAL ECOLOGY

Construction

- Most of the impacts on plant species will occur during the construction phase when removal of plant communities will take place on site, which will also impact on the animals that use the area as habitat.
- The construction activities may result in impacts to the natural environment due to increased traffic and personnel to the area. Heavy machinery and vehicles will result in compaction of the soil and removal of vegetation and topsoil.
- Loss of biodiversity and ecological function due to impacts to sensitive areas and specialised niche habitats, such as the watercourse areas, will occur as a result of the proposed project. This could lead to destruction and degradation of habitats and food associated with these specialised habitat areas.
- Vegetation clearance and construction activities will lead to possible invasive and / or exotic species establishing in the area and edge-effects occurring surrounding the area of activity. Bare areas may become vulnerable to Alien and Invasive Plant species and these may compete with indigenous species, likely leading to the migration of sensitive species from the site to more favourable habitat.
- Protected and/or SCC species could possibly occur within the area of construction and would then be destroyed without proper knowledge and/or mitigation measures.
- Anthropogenic influence stemming from staff and contractors that infiltrate the natural veld areas may damage and impact on species communities within these areas.

- The continuous human activity over a longer-term period may further impact on the faunal communities within the area. Associated noise, waste, the smell of humans and physical infiltration into remaining natural areas are problematic and may lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavorable).
- This proposed project activity could lead to further fragmentation of habitats, impairing ecological corridors between other natural areas and fragment ranges that certain animals may need to sustain adequate foraging and breeding grounds.

Operational

- The operational activities may result in impacts to the natural environment due to increased traffic and personnel to the area. Heavy machinery and vehicles will result in compaction of the soil and removal of vegetation and topsoil.
- Operational activities will lead to possible invasive and / or exotic species establishing in the area and edge-effects occurring surrounding the project activities. Bare areas may become vulnerable to Alien and Invasive Plant species and these may compete with indigenous species, likely leading to the migration of sensitive species from the site to a more favourable habitat.
- Anthropogenic influence stemming from staff and contractors that infiltrate the natural veld areas may damage and impact on species communities within these areas.
- The continuous human activity over a longer-term period may further impact on the faunal communities within the area. Associated noise, waste, the smell of humans and physical infiltration into remaining natural areas are problematic and may lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavorable).
- Protected and/or SCC species could possibly occur in and around the project area and may be negatively impacted by the on-going operational activities.

Decommissioning

- Once the operation has been decommissioned, final steps in the rehabilitation process will take place. It is, however, possible that the rehabilitation plans are not feasible or only implemented and planned at a late stage, hindering successful rehabilitation.

14.4.7 IMPACTS ON WATERCOURSES

The following impacts are expected:

- Alteration of the flow regime and water input of the wetlands.
- Alteration of water quality (pollution of wetlands):
 - Nutrient inputs from runoff
 - Seepage from the mine
 - Improper maintenance of machinery and/or infrastructure
 - Oil and diesel leaks and spills
- Changes to the physical structure of the wetland:

- Loss and disturbance of wetland habitat
- Wetland fauna fatalities
- Introduction and spread of alien and invasive vegetation:
- Alteration of the amount of sediment entering the water resource and associated change in turbidity:
 - Erosion
 - Sedimentation
 - Disturbance and degradation/loss of wetland areas

14.5.8 VISUAL IMPACT

The assessment of visual impacts takes the following issues into account: the pre-mining visual resource and the visibility, visual intrusion, sensitivity of viewing receptors, and visual exposure, associated with the mine. The following can be described as sensitive receptors in terms of visual impacts of the study area and surrounding area:

- Travelers on the R104 road (running approximately 2.4km south of the site).
- Travelers on the N4 national road (just south (\pm 1.2km) of the site).
- Travelers on the provincial road D2170 (bordering the southern corner of Buffelsfontein West).
- Surrounding land users within 2 km from the study area.

However, as the mine is existing and additional infrastructure will be within the existing operation, no further Visual impacts are expected.

14.5.9 IMPACTS FROM BLASTING AND VIBRATION

The mining method involves drilling and blasting. Blasting activities have the potential to impact on people, animals and structures located in the vicinity of the proposed project area. Issues such as ground vibration, fly rock and dust emissions are some of the impacts of blasting. The potential impact could have a medium to high severity in the unmitigated scenario. In the mitigated scenario, this severity will be medium to low. A number of measures can be taken to control blasts and associated impacts.

14.5.10 TRAFFIC IMPACTS

Mining projects contribute to increased traffic and introduce mine-related trucks on public road networks which can result in an inconvenience to current road users, higher accidents (for people and animals) decreased road service levels and/or increased road damage. This in turn can put pressure on the relevant roads authority to increase the maintenance programmes and/or upgrade the roads. As Buffelsfontein is an existing mine, no additional traffic impacts are expected. Recommendations to control traffic volumes and reduce safety risks are included in the Traffic Impact Assessment (Appendix 16).

14.5.11 NOISE IMPACTS

Buffelsfontein is an existing mine, therefore, the proposed activities are not expected to create additional significant noise impacts.

14.5.12 IMPACTS ON AIR QUALITY

Buffelsfontein West is an existing mine and dust monitoring is undertaken. No additional impacts on air quality are expected due to the proposed activities. Fugitive dust and particulate matter emissions are monitored and mitigated.

14.5.13 HERITAGE IMPACTS

Historical structures are defined by Section 34 of the National Heritage Resources Act, 1999, while other historical and cultural significant sites, places and features, are generally determined by community preferences. A fundamental aspect in the conservation of a heritage resource relates to whether the sustainable social and economic benefits of a proposed development outweigh the conservation issues at stake. There are many aspects that must be taken into consideration when determining significance, such as rarity, national significance, scientific importance, cultural and religious significance, and not least, community preferences. When, for whatever reason the protection of a heritage site is not deemed necessary or practical, its research potential must be assessed and if appropriate mitigated in order to gain data / information which would otherwise be lost. Such sites must be adequately recorded and sampled before being destroyed. Some of the impacts associated with the proposed project include the potential damage to surface / subsurface remains and potential damage to subsurface culturally significant material. All sites should include a field rating in order to comply with section 38 of the National Heritage Resources Act (Act No. 25 of 1999). The field rating and classification for the heritage sites at Buffelsfontein West are shown below.

Rating	Field Rating/Grade	Significance	Recommendation
National	Grade 1		National site
Provincial	Grade 2		Provincial site
Local	Grade 3 A	High	Mitigation not advised
Local	Grade 3 B	High	Part of site should be retained
General protection A	4 A	High/Medium	Mitigate site
General Protection B	4 B	Medium	Record site
General Protection C	4 C	Low	No recording necessary

Figure 89: Field Ratings

14.5.14 PALEONTOLOGICAL IMPACTS

There is no chance of finding fossils in the project footprint and this is confirmed by the grey colour-coding in the SAHRIS palaeosensitivity map (Figure 82). The DFFE Screening map (Figures 83) indicates that the site is moderately sensitive (yellow), but this is incorrect because fossils are not preserved in volcanic intrusive rocks. Based on the geology and the more accurate SAHRIS map, it is apparent that no further palaeontological impact assessment is required for the Buffelsfontein West Opencast Section.

14.5.15 SOCIO-ECONOMIC IMPACTS

Mining projects have the potential to have positive and/or negative impacts on the following, regardless of the alternatives that are selected:

- Continued employment for current workers;
- The local and national economy;
- Social structures within communities;
- Increased pressure on basic services;
- Quality of life and health related issues; and
- Livelihoods of businesses.

Socio-economic impacts would occur during all project phases. In the absence of mitigation that focuses on enhancing positive impacts and reducing negative impacts, the severity of unmitigated impacts would be medium for negative impacts and medium (positive) for positive impacts. The related unmitigated significance could be medium to high. Where the project planning takes into account and applies the necessary mitigation to avoid, minimises or remedy impacts in line with the mitigation hierarchy, the significance of potential negative impacts can be reduced and potential positive impacts can be increased.

14.6 CUMULATIVE IMPACTS

A cumulative impact may result from an additive impact i.e. where it adds to the impact which is caused by other similar impacts or an interactive impact i.e. where a cumulative impact is caused by different impacts that combine to form a new kind of impact. Interactive impacts may either be countervailing (net adverse cumulative impact is less than the sum of the individual impacts) or synergistic (net adverse cumulative impact is greater than the sum of the individual impacts).

The assessment of cumulative impacts on a study area is complex; especially if many of the impacts occur on a much wider scale than the site being assessed and evaluated. It is often difficult to determine at which point the accumulation of many small impacts reaches the point of an undesired or unintended cumulative impact that should be avoided or mitigated. There are often factors which are uncertain when potential cumulative impacts are identified.

The anticipated impacts resulting from the additional activities at Buffelsfontein West Opencast could potentially result in cumulative effects such as:

- Increase in impacts to the environment already present from the existing land uses;
- Additional risk of soil, air and water pollution due to all the combined chrome mining activities of the region.

Regarding the hydrological environment, cumulative impacts in association with adjacent mines in the region will be mitigated by the implementation of appropriate management measures to ensure sensitive downstream water users are not detrimentally impacted. The following cumulative impacts for the Buffelsfontein West Opencast Section were identified in specialist studies:

Terrestrial Ecology

- AIPs are reported to be one of the greatest threats to biodiversity and are closely associated with disturbance, being able to colonise disturbed areas rapidly. If AIP species are not controlled, or if disturbed areas are not sufficiently rehabilitated, these species can continue to spread across the landscape, resulting in a cumulative loss of indigenous floral species and potential permanent displacement of SCC.
- The proposed mining activities could result in ongoing mining development and increased human populations associated with the proposed mining activities. This will place additional pressure on floral habitat as a result of potential increases in the collection of plant material for medicinal purposes, the introduction of AIP species, increases in fire frequency risks and ultimately, without effective rehabilitation, could lead to a cumulative loss of natural vegetation in the region.
- Destruction of surface water resources or impact thereto have cumulative impacts in terms of downstream water quantity and quality, habitat availability and loss of ecosystem functions and services related to these features.
- The proposed activities will result in clearance of indigenous vegetation both within and outside of the proposed active mining areas. This will lead to the further displacement of faunal species currently inhabiting these areas, pushing them out into the surrounding vegetated areas. This is likely to result in an increased abundance of species within the surrounding habitats, leading to increased competition for territories, breeding sites and food resources. As such, there is likely to be a knock-on dispersal affect, leading to increased resource competition and possible increased mortality rates, resulting in a decreased species abundance and possible further loss of species diversity. This will lead to further habitat and species loss with far reaching ecological impacts beyond that of the mining operations.
- Incremental losses of habitat are one of the more serious cumulative impacts in terms of fauna and flora.

Air Quality

- Project site localised cumulative impacts – These are the cumulative impacts that result from mining operations in the immediate vicinity of the project site. Project site localised cumulative impacts include the cumulative effects from operations that are close enough to potentially cause additive effects on the environment or sensitive receivers. These include mainly dust deposition. From this air impact assessment conducted for the proposed project the modelling indicates the cumulative pollution plume emanating from this site as a combination of activities and shows that the impacts will be mainly localised around and in the vicinity of the operation.
- Regional cumulative impacts – Regional cumulative impacts include the project's contribution to impacts that are caused by mining operations throughout the region. The cumulative effect on air quality in the region may warrant consideration. The mining industry in South Africa is undergoing steady growth, driven by the increasing demand for various types of ore materials. Consequently, this project will further contribute to the regional impact that is anticipated.
- Global cumulative impacts – The only potentially global impact of the project is the generation of

greenhouse gas emissions. However, the levels of emissions from the project represents a very minor and insignificant contribution at this scale.

Aquatic Ecology

Cumulative impacts will likely be low based on the scale of the project and direct impacts associated with the activities. However, impacts that could reach the catchment and result in cumulative impacts are related to the possible predicted impacts to the river, which will in turn impact downstream water users, the catchment, ecological reserve and many more. Destruction and impacts to wetlands will also be a threat to prevent as the area has been classified as a floodplain wetland in the wetland study conducted.

Surface Water

- The cumulative impacts associated with the proposed project are the same as discussed above for the aspects of the activities being undertaken. The rating will be higher compared to the individual component ratings as the water quality impacts will most likely have long-term impacts over a greater spatial extent. With the implementation of the proposed mitigation measures as set out in this report, the EMPr, the geohydrological assessment and the wetland assessment, it is not anticipated that the cumulative impact on the watercourses will exceed Medium significance.
- Negative water quality impacts result in the deterioration of downstream surface water resources. The majority of the runoff from the project area (without the implementation of storm water management) will drain toward the Kareespruit and Maretswana rivers.
- Surface water pollution will impact negatively on the environment, especially sensitive receptors such as rivers and dams. Due to high pollution loads in certain areas, there will be increased water treatment costs incurred by Water Service Providers, specifically for water with high salinity and turbidity.
- The aquatic environment will be negatively impacted in terms of high pollution loads by means of degradation of the riparian ecology, with a resultant loss of biodiversity. Crops irrigated with high salinity water may result in reduced crop productivity and diversity.
- Nutrients such as nitrates will impact recreational water users with respect to the lowering of the aesthetic value of the water resource due to algal blooms (eutrophication) and polluted water.
- The surrounding streams and rivers are already severely impacted from mining, agriculture and rural developments, and the Samancor Chrome: Western Chrome Mines – Buffelsfontein West Opencast Section impacts, as determined, will further degrade the current situation.

Watercourses (including wetlands)

Several cumulative impacts are expected. Further loss of hydrological and geomorphological function of the wetland habitat are two of the more serious impacts, as this cannot be reversed and may result in the loss of broad-scale ecological processes, cumulative habitat loss and/or connectivity. Given the largely degraded state of the study site and surrounds, the characteristics and sensitivity of the affected area, the importance of the wetland area and the nature of the activities, the potential for cumulative impacts are expected to be low - moderate as the activities and thus the impacts will increase, but fully implemented mitigation measures can prevent possible cumulative impacts. Possible cumulative impacts should be fully understood and strategically managed to avoid long-term environmental changes.

14.7 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The Environmental Impact Assessment (EIA) 2014 Regulations [as amended] promulgated in terms of Sections 24 (5), 24M and 44 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) [as amended] (NEMA), requires that all identified potential impacts associated with the project be assessed in terms of their overall potential significance on the natural, social and economic environments. The criteria identified in the EIA Regulations (2014) include the following:

- Nature of the impact;
- Extent of the impact;
- Duration of the impact
- Probability of the impact occurring;
- Degree to which impact can be reversed;
- Degree to which impact may cause irreplaceable loss of resources;
- Degree to which the impact can be mitigated; and
- Cumulative impacts.

The impact assessment methodology used to determine the significance of impacts prior and after mitigation is presented below.






Extent of the impact		
The EXTENT of an impact is the physical extent/area of impact or influence.		
Score	Extent	Description
1	Footprint	The impacted area extends only as far as the actual footprint of the activity.
2	Site	The impact will affect the entire or substantial portion of the site/property.
3	Local	The impact could affect the area including neighbouring properties and transport routes.
4	Region	Impact could be widespread with regional implication.
5	National	Impact could have a widespread national level implication.
Duration of the impact		
The DURATION of an impact is the expected period of time the impact will have an effect.		
Score	Duration	Description
1	Short term	The impact is quickly reversible within a period of less than 2 years, limited to the construction phase, or immediate upon the commencement of floods.
2	Short to medium term	The impact will have a short term lifespan (2–5 years).
3	Medium term	The impact will have a medium term lifespan (6 – 10 years)
4	Long term	The impact will have a medium term lifespan (10 – 25 years)
5	Permanent	The impact will be permanent beyond the lifespan of the development
Intensity of the impact		
The INTENSITY of an impact is the expected amplitude of the impact.		

Score	Intensity	Description
1	Minor	The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.
2	Low	The activity will have a low impact on the affected environment.
3	Medium	The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.
4	High	The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.
5	Very High	The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

Reversibility of the impact		
The REVERSIBILITY of an impact is the severity of the impact on the ecosystem structure		
Score	Reversibility	Description
1	Completely reversible	The impact is reversible without any mitigation measures and management measures
2	Nearly completely reversible	The impact is reversible without any significant mitigation and management measures. Some time and resources required.
3	Partly reversible	The impact is only reversible with the implantation of mitigation and management measures. Substantial time and resources required.
4	Nearly irreversible	The impact is can only marginally be reversed with the implantation of significant mitigation and management measures. Significant time and resources required to ensure impact is on a controllable level.
5	Irreversible	The impact is irreversible.

Probability of the impact		
The PROBABILITY of an impact is the severity of the impact on the ecosystem structure		
Score	Probability	Description
1	Improbable	The possibility of the impact occurring is highly improbable (less than 5% of impact occurring).
2	Low	The possibility of the impact occurring is very low, due either to the circumstances, design or experience (5% to 30% of impact occurring).
3	Medium	There is a possibility that the impact will occur to the extent that provision must be made therefore (30% to 60% of impact occurring).
4	High	There is a high possibility that the impact will occur to the extent that provision must be made therefore (60% to 90% of impact occurring).
5	Definite	The impact will definitely take place regardless of any prevention plans, and there can only be relied on migratory actions or contingency plans to contain the effect (90% to 100% of impact occurring).

Calculation of Impacts – Significance Rating of Impact
Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the Irreplaceability (Magnitude, Extent, Duration, and Intensity) multiplied by the Probability of the impact. The significance of an impact is rated according the scores a presented below:
<i>Equation 1:</i>
<i>Significance = Irreplaceability (Reversibility + Intensity + Duration + Extent) X Probability</i>
Significance Rating

Score	Significance	Colour Code
1 to 20	Very low	
21 to 40	Low	
41 to 60	Medium	
61 to 80	High	
81 to 100	Very high	

Mitigation Efficiency	
Degree to which the impact can be mitigated: <i>The effect of mitigation measures on the impact and its degree of effectiveness:</i>	
<i>Equation 2:</i>	
<i>Significance Rating = Significance x Mitigation Efficiency</i>	
High	0,2
Medium to High	0,4
Medium	0,6
Low to Medium	0,8
Low	1,0

Confidence rating: *Level of certainty of the impact occurring.*

- **Certain**
- **Sure**
- **Unsure**

Cumulative impacts: *The effect the combination of past, present and “reasonably foreseeable” future actions have on aspects.*

- Very Low cumulative impact
- Low cumulative impact
- Medium cumulative impact
- High cumulative impact

12 IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS

(Provide a list of the potential impacts identified of the activities described in the initial site layout that will be undertaken, as informed by both the typical known impacts of such activities, and as informed by the consultations with affected parties together with the significance, probability, and duration of the impacts. Please indicate the extent to which they can be reversed, the extent to which they may cause irreplaceable loss of resources, and can be avoided, managed or mitigated)

15.1 ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK

(This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties).

Please refer to discussions on identified impacts as well as to Table 37 for relevant Management Objectives and Mitigation types for each aspect. Mitigation measures are prescribed within the Environmental Management Programme (EMPR).

Table 36: Impact Assessment Table (Complete with Ratings used to obtain Significance)

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Opencast mining and infrastructure establishment	Geology and Soils	Soil erosion and soil compaction.	Construction and operational	Site	2 Medium term	3 Medium	3 Nearly irreversible	4 12	High 4	Medium 48	Medium 0,6	Low 28,8
Site preparation for infrastructure	Geology and Soils	Loss of topsoil.	Construction	Site	2 Medium term	3 Medium	3 Partly reversible	3 11	High 4	Medium 44	Medium 0,6	Low 26,4
Opencast mining and related activities	Geology and Soils	Contamination of soils through disposal of waste; and spillage of hydrocarbon-based fuels and oils or lubricants spilled from vehicles.	Operational	Site	2 Short term	1 Medium	3 Partly reversible	3 9	Medium 3	Low 27	Medium to high 0,4	Very low 10,8
Opencast mining and related infrastructure	Agricultural, Land Use and land Capability	Direct occupation / loss of land	Construction and operational phase	Site	2 Long term	4 Low	1 Partly reversible	3 10	Medium 3	Low 30	Medium 0,6	Very Low 18
Site preparation for infrastructure establishment and opencast mining	Agricultural, Land Use and land Capability	Loss of grazing land	Construction and operational phase	Site	2 Long term	4 Low	1 Partly reversible	3 10	Medium 3	Low 30	Medium 0,6	Very Low 18

Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	<ul style="list-style-type: none"> • Development related activities will lead to damage or degradation of habitats and vegetation communities and overall loss of biodiversity and ecosystem function within the clearance area. • This proposed project activity could lead to further fragmentation of habitats, impairing ecological corridors between other natural areas and fragment ranges that certain animals may need to sustain adequate foraging and breeding grounds. • As a result of the construction and 	Construction and operational	Region	4	Long term	4	Medium	3	Partly reversible	3	14		4	Medium	56	Medium	0,6	Medium	33,6
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ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
		operational activities degradation or compression may occur if heavy vehicles are not kept to the demarcated roads and/or development footprint.										

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation	
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	Construction, human and vehicle movement and introduction of foreign material e.g. soils may lead to the introduction of alien invader species, impacting on the floral characteristics of the project site and adjacent natural areas.	Construction and operational	Region	4 Long term	4 Medium	3 Partly reversible	3 14	4 High	4 Medium	56 Medium	0,6 Medium	33,6 Low

Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	Protected and/or SCC species could possibly occur within the area of construction and would then be destroyed without proper knowledge and/or mitigation measures. Although no SCC were found to occur on the project footprint, a number of fauna and flora SCC species may potentially occur or used habitat on the project footprint. The mining and related activities may impact on the watercourse due to direct effects as well as edge effects. This could lead to destruction and degradation of habitats and food associated with these	Construction and operational	Region	4	Long term	4	High	4	Nearly irreversible	4	16		4	High	64	Medium	0,6	Low	38,4
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ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
		specialised habitat areas.										

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	The continuous human activity over a longer-term period may further impact on the faunal communities within the area. Associated noise, waste, the smell of humans and physical infiltration into remaining natural areas are problematic and may lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavourable)	Construction and operational	Region	4	Medium term	3	Medium	3	Partly reversible	3	13	High	4	Medium	52	Medium	0,6	Low	31,2

Site rehabilitation and removal of infrastructure	Terrestrial Ecology	Rehabilitation could be ineffective if measures are not appropriately complied to or rehabilitation is not planned well in advance. Without the necessary mitigation measures, rehabilitation will be unsuccessful and the environment will not be self-sustaining. Without mitigation the alien invasive species will increase and result in a degraded veld condition making the property less viable for post-closure land use activities such as wilderness, grazing and agriculture. The results may be positive if rehabilitation has been done	Closure / decommissioning	Region	4	Long term	4	High	4	Partly reversible	3	15		5	75		0,4	30
													Definite	High	Medium to high		Low	

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
		correctly and the site may be rehabilitated back to a natural landscape.										

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Opencast mining and related infrastructure / activities	Surface Water	Surface water quality - Sedimentation and pollution of surface water resources resulting in the deterioration of water quality	Construction, Operation and Closure	Local	3	Long term	4	High	4	Partly reversible	3	14	High	4	Medium	56	Low to medium	0,8	Medium	44,8
Opencast mining and related infrastructure / activities	Surface Water	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained within the operation	Operational	Local	3	Long term	4	Medium	3	Partly reversible	3	13	Medium	3	Low	39	Low to medium	0,8	Low	31,2
Opencast mining and related infrastructure / activities	Surface Water	Surface water quantity - alteration of flow due to the diversion of clean water areas	Construction and operational	Local	3	Long term	4	Medium	3	Nearly irreversible	4	14	High	4	Medium	56	Low to medium	0,8	Low	44,8
Opencast mining and related infrastructure / activities	Surface Water	AIP proliferation within sensitive riparian and wetland zones	Construction, Operation and Closure	Local	3	Long term	4	Medium	3	Partly reversible	3	13	High	4	Medium	52	Medium	0,6	Low	31,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Site rehabilitation and removal of infrastructure	Surface Water	Surface water quantity - Reinstatement of surface drainage patterns (Positive Impact)	Closure / decommissioning	Local	3	Medium term	3	Medium	3	Partly reversible	3	12	Medium	3	Low	36	Medium	0,6	Low	21,6
Site preparation and activities in close proximity or proximity to buffer zones of water resources	Aquatic Ecology	Site preparation, clearing and activities in proximity or within buffer zones of water resources	Construction and Operational	Local	3	Medium term	3	Medium	3	Partly reversible	3	12	High	4	Medium	48	Medium	0,6	Low	28,8
Alteration of drainage patterns by activities within and in close proximity of river	Aquatic Ecology	Decrease and changes in water quantity and availability in the Ecological Reserve	Construction and Operational	Local	3	Long term	4	Low	2	Partly reversible	3	12	Medium	3	Low	36	Medium to high	0,4	Very Low	14,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent		Duration		Intensity		Reversibility		Irreplaceability		Probability		Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Pollution and sedimentation due to unmanaged soil and stormwater runoff bringing forth water quality impacts	Aquatic Ecology	Deterioration of water quality in the Kareespruit River due to contaminated soil and storm water runoff affecting aquatic communities found within water systems and may lead to death and shifts in community structures occurring	Construction and Operational	Local	3	Long term	4	Low	2	Partly reversible	3	12	Medium	3	Low	36	Low to medium	0,8	Low	28,8	
Erosion and sedimentation caused by mining within close proximity to the Kareespruit river.	Aquatic Ecology	Nutrient enrichment and leading to decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found within the areas if flow is present.	Construction and Operational	Local	3	Long term	4	Low	4	Partly reversible	3	14	Low	2	Low	28	Low to medium	0,8	Low	22,4	

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Insufficient Stormwater management impacting surface water quality and therefore aquatic ecological functioning (changes in PES).	Aquatic Ecology	If river is negatively affected and may lead to a deterioration of the Present Ecological Status (PES).	Construction and Operational	Local	3	Long term	4	Medium	3	Partly reversible	3	13	High	4	Medium	52	Medium to high	0,4	Very Low	20,8
Changing water inflow/flow patterns and reducing water available to sustain Aquatic diversity. Interference with subsurface flows by opencast development mining activities.	Aquatic Ecology	Impacts to Streamflow Regulation	Construction and Operational	Region	4	Long term	4	Low	2	Partly reversible	3	13	Low	2	Low	26	Medium to high	0,4	Very Low	10,4
Decommissioning impacts resulting in impacts to Biodiversity and Ecological function – including Riparian zone activities or activities within bufferzones or regulated zones	Aquatic Ecology	Decommissioning and material movement in proximity or within buffer zones of water resources	Decommissioning and Closure	Local	3	Short to medium term	2	Low	2	Partly reversible	3	10	Medium	3	Low	30	Medium to high	0,4	Very Low	12

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Alteration of drainage patterns after or during removal of the infrastructure	Aquatic Ecology	Leading to decrease and changes in water quantity and availability in the Ecological Reserve	Decommissioning and Closure	Local	3	Short to medium term	2	Low	2	Partly reversible	3	10	Low	2	Very Low	20	High	0,2	Very Low	4
Water quality impacts due to improper waste management during decommissioning and removal of infrastructure	Aquatic Ecology	Deterioration of water quality in the Kareespruit River due to contaminated soil and storm water runoff affecting aquatic communities found within water systems and may lead to death and shifts in community structures occurring	Decommissioning and Closure	Local	3	Short term	1	Low	2	Nearly completely reversible	2	8	Low	2	Very Low	16	High	0,2	Very Low	3,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation							
Sedimentation of water resources due to erosion and impacts in areas with steep topography (OC)	Aquatic Ecology	Nutrient enrichment and leading to decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found within the areas if flow is present.	Decommissioning and Closure	Local	3	Short to medium term	2	Low	2	Partly reversible	3	10	2	Very Low	20	High	0,2	Very Low	4
Deterioration in surface water quality and changes in PES	Aquatic Ecology	If river is negatively affected and may lead to a deterioration of the Present Ecological Status (PES) which could lead to other cumulative impacts.	Decommissioning and Closure	Local	3	Short term	1	Low	2	Partly reversible	3	9	3	Low	27	Medium to high	0,4	Very Low	10,8
Site preparation for infrastructure establishment and opencast mining	Wetlands	Changes in wetland flow regimes resulting in water quantity alterations in wetlands	Construction and operational	Local	3	Long term	4	Medium	3	Nearly completely reversible	2	12	3	Low	36	Medium	0,6	Low	21,6

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Site preparation for infrastructure establishment and opencast mining	Wetlands	Potential contamination of wetlands with machine oils and construction materials from water runoff reducing water quality	Construction and operational	Local	3	Long term	4	Medium	3	Partly reversible	3	13	Medium	3	Low	39	Medium	0,6	Low	23,4
Site preparation for infrastructure establishment and opencast mining	Wetlands	Hardened surfaces creating the potential for increased stormwater runoff leading to Increased erosion and sedimentation.	Construction and operational	Local	3	Long term	4	Medium	3	Partly reversible	3	13	Low	2	Low	26	Medium	0,6	Very Low	15,6
Site preparation for infrastructure establishment and opencast mining	Hydrogeology	Dewatering Impacts on groundwater from opencast mining and associated activities	Construction and operational	Local	3	Long term	4	Medium	3	Nearly irreversible	4	14	High	4	Medium	56	Medium	0,6	Low	33,6
Site preparation for infrastructure establishment and opencast mining	Hydrogeology	Proposed Opencast - Water Quality Impacts During Mining	Construction and operational	Site	2	Long term	4	Low	2	Nearly completely reversible	2	10	Low	2	Very Low	20	Low to medium	0,8	Very Low	16

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Site rehabilitation and removal of infrastructure	Hydrogeology	Proposed Opencast - Water Quality Impacts Post Mining	Closure / decommissioning	Site	2	Permanent	5	Low	2	Nearly completely reversible	2	11	3	Medium	Low	33	Medium	0,6	Very Low	19,8
Site clearing - Clearing of vegetation and earthworks for opencast mining	Air Quality	Fugitive dust and particulate matter emissions	Construction	Local	3	Long term	4	Minor	1	Partly reversible	3	11	3	Medium	Low	33	Medium to high	0,4	Very Low	13,2
Transport of construction materials	Air Quality	Fugitive dust and particulate matter emissions	Construction	Local	3	Short to medium term	2	Minor	1	Nearly completely reversible	2	8	3	Medium	Low	24	Medium to high	0,4	Very Low	9,6
Drilling and blasting during opencast mining	Air Quality	Fugitive dust and particulate matter emissions	Operational	Local	3	Long term	4	Minor	1	Nearly completely reversible	2	10	3	Medium	Low	30	Medium to high	0,4	Very Low	12
Opencast mining (Includes Bulldozing) and material handling	Air Quality	Fugitive dust and particulate matter emissions	Operational	Local	3	Long term	4	Minor	1	Nearly completely reversible	2	10	3	Medium	Low	30	Medium	0,6	Very Low	18
ROM transport	Air Quality	Fugitive dust and particulate matter emissions	Operational	Region	4	Long term	4	Medium	3	Partly reversible	3	14	4	High	Medium	56	Low to medium	0,8	Medium	44,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Rehabilitation - Demolition and Removal of Infrastructure	Air Quality	Fugitive dust and particulate matter emissions	Closure / decommissioning	Local	3	Short to medium term	2	Low	2	Nearly completely reversible	2	9	2	Low	Very Low	18	Medium to high	0,4	Very Low	7,2
Rehabilitation of landform	Air Quality	Fugitive dust and particulate matter emissions	Closure / decommissioning	Local	3	Short to medium term	2	Minor	1	Nearly completely reversible	2	8	3	Medium	Low	24	Medium	0,6	Very Low	14,4
Buildings/Structures	Blasting	Ground Vibration	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	4	High	Medium	56	Medium to high	0,4	Low	22,4
Farm Buildings/Structures	Blasting	Ground Vibration	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	5	Definite	High	70	Medium to high	0,4	Low	28
Heritage Site	Blasting	Ground Vibration	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	5	Definite	High	70	Medium to high	0,4	Low	28
Grave/Cemetery	Blasting	Ground Vibration	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	4	High	Medium	56	Medium to high	0,4	Low	22,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Hydrocencus Borehole	Blasting	Ground Vibration	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	High	4	Medium	56	Medium to high	0,4	Low	22,4
Informal Housing	Blasting	Ground Vibration	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	High	4	Medium	56	Medium to high	0,4	Low	22,4
Monitoring Borehole	Blasting	Ground Vibration	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	High	4	Medium	56	Medium to high	0,4	Low	22,4
Buildings/Struct ures	Blasting	Air Blast	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	High	4	Medium	56	Medium to high	0,4	Low	22,4
Farm Buildings/Struct ures	Blasting	Air Blast	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	Definite	5	High	70	Medium to high	0,4	Low	28
Heritage Site	Blasting	Air Blast	Operational	Local	3	Medium term	3	High	4	Partly reversible	3	13	High	4	Medium	52	Medium	0,6	Low	31,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Industrial Buildings/Structures	Blasting	Air Blast	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	High	4	Medium	56	Medium to high	0,4	Low	22,4
Informal Housing	Blasting	Air Blast	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	Definite	5	High	70	Medium to high	0,4	Low	28
Mine Buildings/Structures	Blasting	Air Blast	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	High	4	Medium	56	Medium to high	0,4	Low	22,4
Buildings/Structures	Blasting	Fly Rock	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	Definite	5	High	70	Medium to high	0,4	Low	28
Heritage Site	Blasting	Fly Rock	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	Definite	5	High	70	Medium to high	0,4	Low	28
Grave/Cemetery)	Blasting	Fly Rock	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	Definite	5	High	70	Medium to high	0,4	Low	28

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Hydrocencus Borehole	Blasting	Fly Rock	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	High	4	Medium	56	Medium to high	0,4	Low	22,4
Informal Housing	Blasting	Fly Rock	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	Definite	5	High	70	Medium to high	0,4	Low	28
Monitoring Borehole	Blasting	Fly Rock	Operational	Local	3	Medium term	3	High	4	Nearly irreversible	4	14	High	4	Medium	56	Medium to high	0,4	Low	22,4
Site preparation for infrastructure establishment	Noise	Establishment of infrastructure and activities in preparation for mining	Construction	Local	3	Medium term	3	Medium	3	Nearly completely reversible	2	11	Medium	3	Low	33	Medium	0,6	Very Low	19,8
Opencast mining and related activities	Noise	Noise generation from trucks, blasting and other mining activities resulting in disturbances for communities in close proximity to the site	Operational	Local	3	Long term	4	High	4	Partly reversible	3	14	Medium	3	Medium	42	Medium	0,6	Low	25,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Site rehabilitation and removal of infrastructure	Noise	Rehabilitation activities have the potential to generate noise however the impact will be low	Closure / decommissioning	Local	3	Medium term	3	Low	2	Nearly completely reversible	2	10	2	Low	Very Low	20	Medium	0,6	Very low	12
Stone Walling & Potsherds	Archaeology	Distrubance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Site	2	Medium term	3	Medium	3	Nearly irreversible	4	12	4	High	Medium	48	Medium	0,6	Low	28,8
Potsherds	Archaeology	Distrubance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Site	2	Medium term	3	Low	2	Nearly irreversible	4	11	3	Medium	Low	33	Medium	0,6	Very Low	19,8
Potsherds	Archaeology	Distrubance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Site	2	Medium term	3	Low	2	Nearly irreversible	4	11	3	Medium	Low	33	Medium	0,6	Very Low	19,8
Potsherds	Archaeology	Distrubance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Site	2	Medium term	3	Low	2	Nearly irreversible	4	11	3	Medium	Low	33	Medium	0,6	Very Low	19,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Stone Tool	Archaeology	Distrubance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Site	2	Medium term	3	Low	2	Nearly irreversible	4	11	Medium	3	Low	33	Medium	0,6	Very Low	19,8
Stone Walling	Archaeology	Distrubance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Site	2	Medium term	3	Low	2	Nearly irreversible	4	11	Medium	3	Low	33	Medium	0,6	Very Low	19,8
Stone Walling	Archaeology	Distrubance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Site	2	Medium term	3	Low	2	Nearly irreversible	4	11	Medium	3	Low	33	Medium	0,6	Very Low	19,8
Building ruin	Archaeology	Distrubance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Site	2	Medium term	3	Low	2	Nearly irreversible	4	11	Low	2	Low	22	Medium	0,6	Very Low	13,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation	
Site preparation, infrastructure establishment and opencast mining	Palaeontology	It is unlikely that any fossils would be preserved in the intrusive volcanic rocks found on site as they do not preserve fossils and this is confirmed by the grey colour-coding in the SAHRIS palaeosensitivity map. The impact is considered to be low.	Construction and operational	Site	2 Short term	1 Low	2 Nearly completely reversible	2 7	Low	2 Very low	14 Medium to high	0,4 Very low	5,6
Site preparation, infrastructure establishment and opencast mining	Traffic	Increased traffic volumes from construction vehicles entering and exiting the site increasing risk for accidents, nuisance and noise	Construction	Local	3 Medium term	3 High	4 Partly reversible	3 13	Medium	3 Low	39 Medium	0,6 Low	23,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation		
Opencast mining and related activities	Traffic	Increased traffic volumes from ROM transportation and trucks used for mining activities	Operational	Local	3 Long term	4 High	4 Partly reversible	3 14	4 High	4 Medium	56	0,6	Low	33,6
Opencast mining and related activities	Traffic	Potential to impact ecology through air and noise pollution and an increase in greenhouse gas emissions.	Construction and Operational	Region	4 Long term	4 Medium	3 Nearly irreversible	4 15	3 Medium	4 Medium	45	0,8	Low	36
Site preparation and establishment of infrastructure	Visual	Negative impacts on aesthetics	Construction	Site	2 Short to medium term	2 Low	2 Partly reversible	3 9	4 High	4 Low	36	0,8	Low	28,8
Site preparation and establishment of infrastructure	Visual	Negative impact on visibility from sensitive receptors/Vie wpoints	Construction	Site	2 Short to medium term	2 Medium	3 Nearly irreversible	4 11	4 High	4 Medium	44	0,8	Low	35,2
Site preparation and establishment of infrastructure	Visual	Landscape visual change	Construction	Site	2 Short to medium term	2 Medium	3 Nearly completely reversible	2 9	4 High	4 Low	36	0,6	Low	21,6

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Opencast mining and related activities	Visual	Negative impacts on aesthetics	Operational	Site	2 Long term	4 Medium	3 Partly reversible	3 12	Medium 3	Low 36	Low to Medium 0,8	Low 28,8
Opencast mining and related activities	Visual	Negative impact on visibility from sensitive receptors/Vie wpoints	Operational	Site	2 Long term	4 Low	2 Partly reversible	3 11	Medium 3	Low 33	Medium 0,6	Very low 19,8
Opencast mining and related activities	Visual	Landscape visual change	Operational	Site	2 Long term	4 Low	2 Partly reversible	3 11	High 4	Medium 44	Low to Medium 0,8	Low 35,2
Site preparation and infrastructure establishment	Socio-economic	Positive impacts of construction employment	Construction	Local	3 Medium term	3 Medium	3 Nearly completely reversible	2 11	High 4	Medium positive 44	Low 1	Medium positive 44
Site preparation and infrastructure establishment	Socio-economic	Local procurement targets being met and application of the existing Procurement Policy will be applied for the duration of construction.	Construction	Local	3 Medium term	3 Medium	3 Partly reversible	3 12	Definite 5	Medium positive 60	Low to medium 0,8	Medium positive 48

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Site preparation and infrastructure establishment	Socio-economic	Local economic contribution and induced impacts	Construction	Region	4	Short to medium term	2	Medium	3	Partly reversible	3	12	High	4	Medium positive	48	Low	1	Medium positive	48
Site preparation and infrastructure establishment	Socio-economic	Influx of jobseekers / an outside workforce	Construction	Site	2	Short to medium term	2	Low	2	Nearly completely reversible	2	8	Low	2	Very Low	16	Medium	0,6	Very Low	9,6
Site preparation and infrastructure establishment	Socio-economic	Intrusion impacts	Construction	Site	2	Short to medium term	2	Low	2	Nearly completely reversible	2	8	Low	2	Very Low	16	Medium	0,6	Very Low	9,6
Site preparation and infrastructure establishment	Socio-economic	Security risks	Construction	Site	2	Medium term	3	Medium	3	Partly reversible	3	11	High	4	Medium	44	Medium	0,6	Low	26,4
Site preparation and infrastructure establishment	Socio-economic	Community health and safety risks	Construction	Region	4	Long term	3	Very High	5	Nearly irreversible	4	16	High	4	High	64	Low to medium	0,8	Medium	51,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Opencast mining and related activities	Socio-economic	The chance of employment is high and likely to manifest for direct and downstream industries with benefits for the region.	Operational	Region	4	Long term	4	Medium	3	Partly reversible	3	14	High	4	Medium positive	56	Low	1	Medium positive	56
Opencast mining and related activities	Socio-economic	Local procurement	Operational	Local	3	Long term	4	Medium	3	Nearly completely reversible	2	12	Definite	5	Medium positive	60	Low to Medium	0,8	Medium positive	48
Opencast mining and related activities	Socio-economic	Local economic contribution and induced impacts	Operational	Region	4	Long term	4	Medium	3	Partly reversible	3	14	High	4	Medium positive	56	Low to Medium	0,8	Medium positive	44,8
Opencast mining and related activities	Socio-economic	Impacts on livelihoods	Operational	Local	3	Short to medium term	2	Low	2	Partly reversible	3	10	Low	2	Very Low	20	High	0,2	Very Low	4
Opencast mining and related activities	Socio-economic	Capacity building and training	Operational	Local	3	Long term	4	Medium	3	Partly reversible	3	13	High	4	Medium positive	52	Low to Medium	0,8	Medium positive	41,6

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
Opencast mining and related activities	Socio-economic	LED / Infrastructure projects	Operational	Local	3	Long term	4	Medium	3	Partly reversible	3	13	High	4	Medium positive	52	Low to Medium	0,8	Medium positive	41,6
Opencast mining and related activities	Socio-economic	Direct land use impacts associated with the opencast mining	Operational	Site	2	Long term	4	Low	2	Partly reversible	3	11	Low	2	Low	22	Low	1	Low	22
Opencast mining and related activities	Socio-economic	Resource use impacts	Operational	Site	2	Medium term	3	Low	2	Nearly completely reversible	2	9	Low	2	Very Low	18	Low to Medium	0,8	Very Low	14,4
Opencast mining and related activities	Socio-economic	Tourism impacts	Operational	Region	4	Short to medium term	2	Low	2	Partly reversible	3	11	Low	2	Low	22	Medium	0,6	Very Low	13,2
Opencast mining and related activities	Socio-economic	Impacts on future developments	Operational	Site	2	Long term	4	Medium	3	Partly reversible	3	12	High	4	Medium	48	Low to Medium	0,8	Low	38,4
Opencast mining and related activities	Socio-economic	Impacts on sense of place	Operational	Local	3	Short to medium term	2	Low	2	Partly reversible	3	10	Low	2	Very Low	20	Medium	0,6	Very Low	12

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability	Probability	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
No-Go Option	Socio-economic	Reduced contribution towards community upliftment and positive impacts for the community	N/A	Region	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
No-Go Option	Socio-economic	Reduced benefits on the economic environment, by job provision and obtaining supplies for and from local residents and businesses.	N/A	Region	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Medium	45	N/A	1	Medium	45
No-Go Option	Socio-economic	No negative impacts imposed by the development on I&APs or surrounding land users	N/A	Region	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Positive Medium	45	N/A	1	Positive Medium	45
No-Go Option	Surrounding natural environment and water bodies	No negative impacts imposed by the development on the environment	N/A	Region	4	Long term	4	High	4	Partly reversible	3	15	Medium	3	Positive Medium	45	N/A	1	Positive Medium	45

15.2 THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK

(With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered).

Management Objectives and Mitigation types for each aspect is provided here. Mitigation measures are prescribed within the Environmental Management Programme (EMPR).

Table 37: Summary of the key environmental impacts and Management Objectives and Mitigation Type

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
No-go option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure.	No Additional Management Objectives if Project does not proceed	N/A	Medium	45
No-Go Option	Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	No Additional Management Objectives if Project does not proceed	N/A	Medium	45
No-Go Option	Socio-Economic	Positive: No additional negative impacts on I&APs or surrounding land users	No Additional Management Objectives if Project does not proceed	N/A	Positive Medium	45
No-Go Option	Natural Environment and Wetlands	Positive: No additional negative impacts on the environment	No Additional Management Objectives if Project does not proceed	N/A	Positive Medium	45

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
Opencast mining and infrastructure establishment	Geology and Soils	Soil erosion and soil compaction.	To prevent soil erosion and compaction.	Ensure mining activities are only conducted in approved areas and ensure rehabilitation is conducted.	Low	28,8
Site preparation for infrastructure	Geology and Soils	Loss of topsoil.	Prevention of the loss of topsoil.	Any topsoil removed must be stored properly and covered to prevent erosion and damage. The amount of topsoil removed must be limited to the project footprint.	Low	26,4
Opencast mining and related activities	Geology and Soils	Contamination of soils through disposal of waste; and spillage of hydrocarbon-based fuels and oils or lubricants spilled from vehicles.	To prevent contamination of soil by implementing mitigation measures.	Any contaminated soil must be removed immediately and disposed in a registered landfill. Drip trays must be used to ensure leaks are contained.	Very low	10,8
Opencast mining and related infrastructure	Agricultural, Land Use and land Capability	Direct occupation / loss of land	Prevent loss of livelihoods through loss of land.	Ensure the approved layout is used and adhered to in order to prevent unnecessary loss of land.	Very Low	18
Site preparation for infrastructure establishment and opencast mining	Agricultural, Land Use and land Capability	Loss of grazing land	Prevent loss of grazing land ensuring livestock can be maintained and livelihoods are not lost.	Adhere to the approved layout.	Very Low	18
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	<ul style="list-style-type: none"> Development related activities will lead to damage or degradation of habitats and vegetation communities and overall loss of biodiversity and ecosystem function within the clearance area. This proposed project activity could lead to further fragmentation of habitats, impairing ecological corridors between other natural areas and fragment ranges that certain animals may need to sustain adequate foraging and breeding grounds. As a result of the construction and operational activities degradation or compression may occur if heavy vehicles are not kept to the demarcated roads and/or 	<ul style="list-style-type: none"> Prevent the needless loss of or damage to fauna and flora, particularly with regard to SCC. Prevent the needless death, injury or hindrance to fauna, particularly with regard to protected species. Prevent or limit significant alteration to the ecosystems in the area. Prevent or limit the loss of sensitive habitats. 	<ul style="list-style-type: none"> A control of access should be implemented for all remaining natural areas, especially the watercourses, to prevent unnecessary destruction of habitats or disturbance of species. No additional/unnecessary fragmentation should occur. All roads should be clearly demarcated and kept to without any exceptions. No vehicles or personnel are permitted outside of these demarcated roads. The vegetation removal during the construction phase should be controlled, very specific and the clearance area kept as small as possible. Demarcate specific areas to be developed and remain clear of other areas where activities are not necessary. To minimize potential impacts to animal species, animals (wildlife and domestic 	Medium	33,6

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
		development footprint.		animals) may under no circumstances be handled, removed, killed or interfered with. <ul style="list-style-type: none"> Prevent impacts from reaching downstream water resources by ensuring installation and proper functioning of stormwater systems and drains to prevent contaminated water entering the natural environment. Continuous rehabilitation of the areas impacted which are outside of the development footprint should occur during construction, where re-vegetation practices should be prioritised. 		
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	Construction, human and vehicle movement and introduction of foreign material e.g. soils may lead to the introduction of alien invader species, impacting on the floral characteristics of the project site and adjacent natural areas.	<ul style="list-style-type: none"> Prevent the needless loss of or damage to fauna and flora, particularly with regard to SCC. Prevent the needless death, injury or hindrance to fauna, particularly with regard to protected species. Prevent or limit significant alteration to the ecosystems in the area. Prevent or limit the loss of sensitive habitats. 	<ul style="list-style-type: none"> A management plan for the control of invasive and exotic plant species needs to be implemented. Specialist advice should be used in this regard. This plan should include pre-treatment, initial treatment and follow-up treatment. Annual AIP monitoring to be undertaken for the duration of the construction and operational phases of the project. Removal of alien and invasive species must be undertaken as per the recommendations of the AIP Management and Control Plan. 	Low	33,6
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	Protected and/or SCC species could possibly occur within the area of construction and would then be destroyed without proper knowledge and/or mitigation measures. Although no SCC were found to occur on the project footprint, a number of fauna and flora SCC species may potentially occur or used habitat on the project footprint. The mining and related activities may impact on the watercourse due to direct effects as well as edge effects. This could lead to destruction and degradation of habitats and food associated with	<ul style="list-style-type: none"> Prevent the needless loss of or damage to fauna and flora, particularly with regard to SCC. Prevent the needless death, injury or hindrance to fauna, particularly with regard to protected species. Prevent or limit significant alteration to the ecosystems in the area. Prevent or limit the loss of sensitive habitats. 	<ul style="list-style-type: none"> All footprint areas should remain as small as possible. This can be achieved by fencing footprint areas to contain all activities within designated areas. If any SCC are encountered within the subject property in the future, the following should be ensured: <ul style="list-style-type: none"> If any threatened species will be disturbed, ensure effective relocation of individuals to suitable offset areas or within designated open space on the subject property. All rescue and relocation plans should be overseen by a suitably qualified specialist. Obtain relevant permits/consent, if applicable, for each protected or endangered species identified within the proposed development area that will be disturbed / 	Low	38,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
		these specialised habitat areas.		<p>destroyed.</p> <ul style="list-style-type: none"> • The watercourses and associated buffer areas must be considered as sensitive areas and ideally these sensitive areas would be avoided by the mining and related activities. • A stormwater management system must be implemented to collect all dirty water and to ensure clean water is separated. • All mine residue stockpiles and handling areas must comply to DWS requirements. • Emergency spill plans and procedures must be in place and implemented should overspill of waste water facilities occur. • All vehicles and equipment must be regularly maintained to avoid any oil/fuel leaks or spills. If any spill or leak does occur, it must be ensured that it is properly cleaned up as soon as possible to avoid significant effects. 		
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	The continuous human activity over a longer-term period may further impact on the faunal communities within the area. Associated noise, waste, the smell of humans and physical infiltration into remaining natural areas are problematic and may lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavourable).	<ul style="list-style-type: none"> • Prevent the needless loss of or damage to fauna and flora, particularly with regard to SCC. • Prevent the needless death, injury or hindrance to fauna, particularly with regard to protected species. • Prevent or limit significant alteration to the ecosystems in the area. • Prevent or limit the loss of sensitive habitats. 	<ul style="list-style-type: none"> • Animals may get used to movement by people in designated areas if the it is predictable. A control of access should be implemented for all remaining natural areas to prevent infiltration of remaining natural habitats or disturbance of species. • Noise impacts should be monitored and kept in accordance with the regulated standard prescribed for the zoning of the area. • Prevent impacts and waste from reaching the various water environment and areas outside the footprint areas. • Hazardous wastes should be stored in impermeable and banded areas. Domestic waste and other waste should be managed in the appropriate manner and apply good housekeeping practices will aid this issue. 	Low	31,2
Site rehabilitation and removal of infrastructure	Terrestrial Ecology	Rehabilitation could be ineffective if measures are not appropriately complied to or rehabilitation is not planned well in advance. Without the necessary mitigation			Low	30

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
		measures, rehabilitation will be unsuccessful and the environment will not be self-sustaining. Without mitigation the alien invasive species will increase and result in a degraded veld condition making the property less viable for post-closure land use activities such as wilderness, grazing and agriculture. The results may be positive if rehabilitation has been done correctly and the site may be rehabilitated back to a natural landscape.				
Opencast mining and related infrastructure / activities	Surface Water	Surface water quality - Sedimentation and pollution of surface water resources resulting in the deterioration of water quality	To reduce or prevent current and potential impacts of the Samancor Chrome: Western Chrome Mines – Buffelsfontein West Proposed Opencast Project and related infrastructure on the receiving surface water environment.	<ul style="list-style-type: none"> • Ensure that effective separation of clean and dirty water systems is implemented, as designed by an engineer. No contaminated (“dirty”) water should be allowed to enter the natural environment, clean water systems or water resources. • Ensure that all the dirty water emanating from the dirty water areas is collected via silt traps before entering a PCD for re-use within the operation, to prevent unnecessary discharge into the environment. • The dirty water collection trenches/culverts should be cleaned regularly to reduce the build-up of silt material and to ensure they are able to accommodate and convey the 1:50 year peak flows. • Residue stockpiles need to be licenced and constructed as per the requirements of the Competent Authority. • Seepage or discharge of waste water from the waste water containment facilities should be prevented to reduce pollution of surface water resources as well as to improve water conservation. • Roads should be maintained regularly to ensure that surface water drains freely off the 	Medium	44,8
Opencast mining and related infrastructure / activities	Surface Water	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained within the operation			Low	31,2
Opencast mining and related infrastructure / activities	Surface Water	Surface water quantity - alteration of flow due to the diversion of clean water areas			Low	44,8
Opencast mining and related infrastructure / activities	Surface Water	AIP proliferation within sensitive riparian and wetland zones			Low	31,2
Site rehabilitation and removal of infrastructure	Surface Water	Surface water quantity - Reinstatement of surface drainage patterns (Positive Impact)			Low	21,6

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				road preventing erosion. • Water quality should be monitored on the mine (PCDs) and receiving watercourses and waterbodies. This ensures that pollution sources are monitored during the operational phase and in the unlikely event of any spillages the downstream impacts can be determined. • Implement erosion prevention measures and structures. If excessive erosion is observed, soil management and erosion protected structures and measures should be implemented. • Limit refuelling and maintenance of machinery and vehicles to specified locations and ensure the appropriate spill prevention and incident management measures are in place. • Where feasible, rehabilitate disturbed areas as soon as possible after construction and include the areas in and around wetland features. • Proliferation of alien and invasive species is expected within any disturbed areas. AIP species should be eradicated and controlled to prevent their spread within or beyond the footprint. An AIP Control Plan should be compiled and implemented for the proposed project. • Corridor movement and hydrological connectivity associated with water resources should not be hampered by the development. No sections of the streams/rivers should be cordoned off.		
Site preparation and activities in close proximity or proximity to buffer zones of water resources	Aquatic Ecology	Site preparation, clearing and activities in proximity or within buffer zones of water resources	Reduce impacts on aquatic ecosystems and organisms.	• Avoidance of unnecessary disturbance or destruction of natural habitat is an important mitigation tool for flora and thereby associated fauna. • Avoid encroaching on natural areas directly adjacent to proposed activities in close proximity or within buffer areas.	Low	28,8
Alteration of drainage patterns by activities	Aquatic Ecology	Decrease and changes in water quantity and availability in the			Very Low	14,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
within and in close proximity of river		Ecological Reserve				
Pollution and sedimentation due to unmanaged soil and stormwater runoff bringing forth water quality impacts	Aquatic Ecology	Deterioration of water quality in the Kareespruit River due to contaminated soil and storm water runoff affecting aquatic communities found within water systems and may lead to death and shifts in community structures occurring		<ul style="list-style-type: none"> Implement rehabilitation features as proposed by the formal rehabilitation programme. Rehabilitation must include planting of indigenous local species as per Plant species plan, preferably suitable riparian species if banks and beds are affected and as per approved rehabilitation plan for Section 21 (c) & (i) activities - focussing on species native to the river. Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread within or beyond the footprint. A management plan and proper follow-up strategy for the prevention of the establishment and/or further spread of new populations of such species should be developed and enforced. To prevent the erosion of soil, management measures may include structures to protect areas and soil from areas susceptible to erosion. Water control structures should be constructed and well maintained to minimize erosion and to create a favourable habitat for the establishment of vegetation. Corridor movement associated with water resources should not be hampered by the development. No sections of the river should be cordoned off (only during construction if it will help prevent access and impacts). Unnecessary movement of workers need to be prevented at the site during all phases of the mining development. Continuous monitoring is important to ensure the baseline environmental condition is not impacted. To minimize potential impacts to animal species, animals (wildlife and domestic 	Low	28,8
Erosion and sedimentation caused by mining within close proximity to the Kareespruit river.	Aquatic Ecology	Nutrient enrichment and leading to decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found within the areas if flow is present.			Low	22,4
Insufficient Stormwater management impacting surface water quality and therefore aquatic ecological functioning (changes in PES).	Aquatic Ecology	If river is negatively affected and may lead to a deterioration of the Present Ecological Status (PES).			Very Low	20,8
Changing water inflow/flow patterns and reducing water available to sustain Aquatic diversity. Interference with subsurface flows by opencast development mining activities.	Aquatic Ecology	Impacts to Streamflow Regulation			Very Low	10,4
Decommissioning impacts resulting in impacts to Biodiversity and Ecological function – including Riparian zone activities or activities	Aquatic Ecology	Decommissioning and material movement in proximity or within buffer zones of water resources			Very Low	12

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
within bufferzones or regulated zones				animals) may under no circumstances be handled, removed, killed or interfered with by the Contractor, his employees, his Sub-Contractors or his Sub-Contractors' employees. • Activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962). Workers should also be advised on the penalties associated with the needless destruction of wildlife, as set out in this act. • No fishing, hunting or trapping should be allowed by the employees or other parties and the land should be closely monitored regularly. • No waste will be disposed of in or around the project area, which can attract rodents or other types of fauna; waste will be managed correctly. • Implement the formal rehabilitation programme to combat and prevent additional erosion in the areas identified as priority areas. • Erosion protection and appropriate energy dissipation structures should be implemented at the applicable stretch of the Kareespruit river, thereby stabilising and protecting the banks where applicable. • Decreased Dissolved Oxygen downstream will also result if nutrients increase and impacts reach water resources, leading to possible eutrophication and algae and a decline in PES, which will decrease the aquatic ecology integrity and thereby further affecting the river. • Monitor Water Quality and continue with monitoring programme as per WUL or revised if changes are required to ensure the riverbed remains protected. • Protect soil resource, beds and banks therefore preventing erosion and increased		
Alteration of drainage patterns after or during removal of the infrastructure	Aquatic Ecology	Leading to decrease and changes in water quantity and availability in the Ecological Reserve			Very Low	4
Water quality impacts due to improper waste management during decommissioning and removal of infrastructure	Aquatic Ecology	Deterioration of water quality in the Kareespruit River due to contaminated soil and storm water runoff affecting aquatic communities found within water systems and may lead to death and shifts in community structures occurring			Very Low	3,2
Sedimentation of water resources due to erosion and impacts in areas with steep topography (OC)	Aquatic Ecology	Nutrient enrichment and leading to decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found within the areas if flow is present.			Very Low	4
Deterioration in surface water quality and changes in PES	Aquatic Ecology	If river is negatively affected and may lead to a deterioration of the Present Ecological Status (PES) which could lead to other cumulative impacts.			Very Low	10,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				<p>sedimentation in the resource. This will prevent increased sedimentation and smothering of aquatic ecosystems.</p> <ul style="list-style-type: none"> • There will be no discharges of dirty water and according to the information received, no discharges is included in the applications to be made. Adherence to this needs to be monitored and audited to ensure compliance. • Avoid contamination of soils and implement appropriate remedial measures if incidents of spillage occur. • Protect and prevent unnecessary impacts within the riparian and buffer zone of the watercourse, except for the areas where active rehabilitation is proposed and approved in the WUL to be obtained. • Rehabilitate affected areas immediately to prevent sedimentation and protect against erosion. <ul style="list-style-type: none"> • Rehabilitation must include planting of indigenous local species, preferably suitable riparian species if banks and beds are affected and as per approved rehabilitation plan for Section 21 (c) & (i) activities - focussing on species native to the river. • Appoint a specialist to assist in riverbank or wetland rehabilitation as necessary. All river (including non-perennial) crossings will need to be authorised and remediated in accordance with approved WUL and Section 21(c) &(i) rehabilitation for beds and banks. • Proliferation of alien and invasive species is expected within any disturbed areas. These species should be eradicated and controlled to prevent their spread within or beyond the footprint. A management plan and a proper follow-up strategy for the prevention of the establishment and/or further spread of new populations of such species should be developed and enforced. 		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				<ul style="list-style-type: none"> • Adherence to the Engineered Storm Water Management Plan as compiled by an accredited engineer is crucial and it is recommended that the stormwater management systems remain in place during decommissioning of infrastructure. • No waste will be disposed of in or around the project area; waste will be managed correctly. • Monitor Water Quality and Aquatic Health (Biomonitoring) regularly - every month (quality) and Aquatic Health bi-annually (wet and dry season). • Protect soil resource, beds and banks therefore preventing erosion and increased sedimentation in the resource. This will prevent increased sedimentation and smothering of aquatic ecosystems. • Protect and prevent unnecessary impacts within the riparian and 32m zone (or otherwise delineated buffer as per surface water assessment) of the watercourse. • Rehabilitate affected areas immediately to prevent sedimentation and protect against erosion. 		
Site preparation for infrastructure establishment and opencast mining	Wetlands	Changes in wetland flow regimes resulting in water quantity alterations in wetlands	To prevent impacts on wetlands by preventing contamination, changes in water quality and quantity and flow.	<ul style="list-style-type: none"> • Implement best practice during construction. • Skips for waste management should be available at construction camp sites. • All parked construction vehicles in the construction camp site, must always have drip trays beneath them or should be parked on an impermeable surface. • Vegetation clearance should take place systematically. • Removed topsoil and subsoil must be stored in a bunded area, in which topsoil must be stored separately from subsoil. • Prevent establishment of alien plants, 	Low	21,6
Site preparation for infrastructure establishment and opencast mining	Wetlands	Potential contamination of wetlands with machine oils and construction materials from water runoff reducing water quality		<ul style="list-style-type: none"> • Vegetation clearance should take place systematically. • Removed topsoil and subsoil must be stored in a bunded area, in which topsoil must be stored separately from subsoil. • Prevent establishment of alien plants, 	Low	23,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
Site preparation for infrastructure establishment and opencast mining	Wetlands	Hardened surfaces creating the potential for increased stormwater runoff leading to increased erosion and sedimentation.		especially on topsoil stockpiles. <ul style="list-style-type: none"> • Areas where indigenous vegetation has been removed, must be revegetated, and rehabilitated to its natural condition. • Prevent sediment pollution in the wetlands/watercourses. 	Very Low	15,6
Site preparation for infrastructure establishment and opencast mining	Hydrogeology	Dewatering Impacts on groundwater from opencast mining and associated activities	To reduce the impact of mining on the surrounding area including dewatering and the spread of pollution.	<ul style="list-style-type: none"> • Update the numerical and geochemical model against monitored data during operations. • Nitrate concentrations in the monitoring network should be closely monitored and should this data indicate a potential nitrate plume, this should be included in future models. • Water quantity and quality data should be collected on a regular, ongoing basis during operations. These data will be used to recalibrate and update the water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA. • The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts. 	Low	33,6
Site preparation for infrastructure establishment and opencast mining	Hydrogeology	Proposed Opencast - Water Quality Impacts During Mining			Very Low	16
Site rehabilitation and removal of infrastructure	Hydrogeology	Proposed Opencast - Water Quality Impacts Post Mining			Very Low	19,8
Site clearing - Clearing of vegetation and earthworks for opencast mining	Air Quality	Fugitive dust and particulate matter emissions	To reduce air pollution by managing dust emissions.	Stop site clearing when windy and clear only areas that are necessary.	Very Low	13,2
Transport of construction materials	Air Quality	Fugitive dust and particulate matter emissions	To reduce air pollution by managing dust emissions.	Dust suppression on roads	Very Low	9,6
Drilling and blasting during opencast mining	Air Quality	Fugitive dust and particulate matter emissions	To reduce air pollution by managing dust emissions.	Drilling with water	Very Low	12

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
Opencast mining (Includes Bulldozing) and material handling	Air Quality	Fugitive dust and particulate matter emissions	To reduce air pollution by managing dust emissions.	Water spray, dust suppression on roads	Very Low	18
ROM transport	Air Quality	Fugitive dust and particulate matter emissions	To reduce air pollution by managing dust emissions.	Sealed or Salt-Encrusted roads	Medium	44,8
Rehabilitation - Demolition and Removal of Infrastructure	Air Quality	Fugitive dust and particulate matter emissions	To reduce air pollution by managing dust emissions.	Dust suppression on roads	Very Low	7,2
Rehabilitation of landform	Air Quality	Fugitive dust and particulate matter emissions	To reduce air pollution by managing dust emissions.	Dust suppression on roads Revegetate finished land forms as quickly as possible	Very Low	14,4
Buildings/Structures	Blasting	Ground Vibration	To reduce impacts associated with blasting.	Specific blast design to be done, shorter blast holes, smaller diameter blast hole, using electronic initiation and single hole firing.	Low	22,4
Farm Buildings/Structures	Blasting	Ground Vibration			Low	28
Heritage Site	Blasting	Ground Vibration			Low	28
Grave/Cemetery	Blasting	Ground Vibration			Low	22,4
Hydrocencus Borehole	Blasting	Ground Vibration			Low	22,4
Informal Housing	Blasting	Ground Vibration			Low	22,4
Monitoring Borehole	Blasting	Ground Vibration			Low	22,4
Buildings/Structures	Blasting	Air Blast			To prevent or reduce negative impacts associated with blasting.	Specific blast design to be done, shorter blast holes, smaller diameter blast hole, use of specific stemming materials to manage air blast, increased stemming lengths to reduce
Farm Buildings/Structures	Blasting	Air Blast	Low	28		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
Heritage Site	Blasting	Air Blast		air blast effect. Used of specific stemming to manage fly rock - crushed aggregate of specific size. Re-design with increased stemming lengths.	Low	31,2
Industrial Buildings/Structures	Blasting	Air Blast			Low	22,4
Informal Housing	Blasting	Air Blast			Low	28
Mine Buildings/Structures	Blasting	Air Blast			Low	22,4
Buildings/Structures	Blasting	Fly Rock	To prevent or reduce negative impacts associated with blasting.	Specific blast design to be done, shorter blast holes, smaller diameter blast hole, use of specific stemming materials to manage air blast, increased stemming lengths to reduce air blast effect. Used of specific stemming to manage fly rock - crushed aggregate of specific size. Re-design with increased stemming lengths.	Low	28
Heritage Site	Blasting	Fly Rock			Low	28
Grave/Cemetery)	Blasting	Fly Rock			Low	28
Hydrocencus Borehole	Blasting	Fly Rock			Low	22,4
Informal Housing	Blasting	Fly Rock			Low	28
Monitoring Borehole	Blasting	Fly Rock			Low	22,4
Site preparation for infrastructure establishment	Noise	Establishment of infrastructure and activities in preparation for mining		Construction crew must conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise. Should a noisy construction activity occur off the project footprint and near a receptor, the Environmental Coordinator should inform the receptor prior to the activity. Should noisy night-time activity occur (after 9pm, e.g. concrete pouring) the Environmental Coordinator should make receptors aware of the activity prior to the occurrence.	Very Low	19,8
Opencast mining and related activities	Noise	Noise generation from trucks, blasting and other mining activities resulting in disturbances for communities in close proximity to the site		Where feasible noisy equipment should be enclosed. These enclosures could be double brick building units, concrete or steel. Units that are enclosed should have minimal apertures (openings) facing receptors. The developer must implement and maintain	Low	25,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				berms around the opencast pits when operating within the pits. Where feasible, noisy equipment and areas (crushing, screening and specifically tipping points and conveyor feeds) should not be raised at high elevations. The noisy equipment and areas should be considered as low as possible for acoustical berms and surrounding buildings/stockpiles to act as noise shields. The mine must be made aware that reverse alarms will cause a noise nuisance during night if not operating behind a solid aggregate berm of sufficient height and maintained at all ends. Stockpiles could consist of topsoil, hards, softs, ROM etc. Stockpiles themselves may act as an acoustical shield in relation to receptors. Stockpiles should be designed sloped away from receptors on the western footprint and used to obscure operations on the site. The Environmental Noise Measurement Programme (Monitoring Programme) needs to be implemented.		
Site rehabilitation and removal of infrastructure	Noise	Rehabilitation activities have the potential to generate noise however the impact will be low		The Closure and Post-Closure Phases are usually less busy and noisier. The Post-Closure Phase may require infrequent activities to maintain rehabilitation and would be the least noisy Phase for consideration. Mitigation measures included in the EMPr for noise must be implemented.	Very low	12
Stone Walling & Potsherds	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	To prevent the loss or disturbance heritage resources due to the proposed mining project.	Should the proposed surface impact areas be changed, a qualified archaeologist must conduct a pedestrian survey on the new areas and amend the report accordingly. Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as	Low	28,8
Potsherds	Archaeology	Disturbance of heritage sites by the proposed opencast mining project			Very Low	19,8
Potsherds	Archaeology	Disturbance of heritage sites by the proposed opencast mining project			Very Low	19,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
Potsherds	Archaeology	Disturbance of heritage sites by the proposed opencast mining project		soon as possible. As archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the construction and development phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority must be contacted (See National Heritage Resources Act, No. 25 of 1999 section 36 (6)).	Very Low	19,8
Stone Tool	Archaeology	Disturbance of heritage sites by the proposed opencast mining project			Very Low	19,8
Stone Walling	Archaeology	Disturbance of heritage sites by the proposed opencast mining project			Very Low	19,8
Stone Walling	Archaeology	Disturbance of heritage sites by the proposed opencast mining project			Very Low	19,8
Building ruin	Archaeology	Disturbance of heritage sites by the proposed opencast mining project			Very Low	13,2
Site preparation, infrastructure establishment and opencast mining	Palaeontology	It is unlikely that any fossils would be preserved in the intrusive volcanic rocks found on site as they do not preserve fossils and this is confirmed by the grey colour-coding in the SAHRIS palaeosensitivity map. The impact is considered to be low.	To prevent the disturbance or loss of fossils that may be discovered during construction and operational phases.	The entire area lies entirely on non-fossiliferous volcanic and metamorphosed rocks of the Rustenburg Layered Suite (Bushveld Igneous Complex) on the Ruighoek Pyroxenite. Intrusive volcanic rocks do not preserve fossils. In addition, the Bushveld Igneous Complex was emplaced about 2055 million years ago which precedes the evolution of macroscopic life forms. There is no chance of finding fossils in the project footprint and this is confirmed by the grey colour-coding in the SAHRIS palaeosensitivity map. The DFFE Screening maps indicate that the sites are moderately sensitive (yellow) but this is incorrect because fossils are not preserved in volcanic intrusive rocks.	Very low	5,6
Site preparation, infrastructure establishment and opencast mining	Traffic	Increased traffic volumes from construction vehicles entering and exiting the site increasing risk for accidents, nuisance and noise	To prevent negative impacts from increased traffic volumes and reduce the safety risks associated with traffic.	Intersection 1: D2170 and D314 > 45m right turns lanes on both approaches of the D314 (geometric upgrade) > Traffic signal	Low	23,4
Opencast mining and related activities	Traffic	Increased traffic volumes from ROM transportation and trucks used for mining activities		Access Point 1 on the road between Safety Shaft Sibanye Stillwater and the Marikana Road, formalise the access by providing the following:	Low	33,6
Opencast mining and related activities	Traffic	Potential to impact ecology through air and noise pollution and			Low	36

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
		an increase in greenhouse gas emissions.		<ul style="list-style-type: none"> > 60m tapers > Construct a section of the access road > Road makings > Road signage <p>Access Point 4 on the road between Safety Shaft Sibanye Stillwater and the Marikana Road, formalise access by providing the following:</p> <ul style="list-style-type: none"> > 60m tapers > Construct a section of the access road > Road makings > Road signage 		
Site preparation and establishment of infrastructure	Visual	Negative impacts on aesthetics	To reduce negative impacts on aesthetics.	Adhere to the approved layout to minimize significant changes in aesthetics.	Low	28,8
Site preparation and establishment of infrastructure	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	To reduce negative impacts on visibility.	Keep infrastructure at acceptable heights to prevent negative impacts on viewpoints and visibility.	Low	35,2
Site preparation and establishment of infrastructure	Visual	Landscape visual change	To prevent major changes in the landscape.	Adhere to the approved layout to reduce further impacts on the landscape.	Low	21,6
Site preparation and infrastructure establishment	Socio-economic	Positive impacts of construction employment	Increase positive socio-economic impacts to benefit local communities and businesses.	<ul style="list-style-type: none"> • Liaise with local ward councillors and make use of the existing community-based Local Business Forum and the Formal Unemployment Structure to source local labour. • Maximise the local content of the construction phase by strictly implementing the requirements of the Procurement Plan. • Do a Value-chain analysis of services required (directly and indirectly related to construction such as transport, laundry, catering, uniform supplies, etc.). Communicate this to the Madibeng LM LED Department and to the local communities prior to the tender process commencing. • Do skills development and training for the SMME's, if feasible, to ensure that SMMEs / contractors are prepared and equipped to 	Medium positive	44
Site preparation and infrastructure establishment	Socio-economic	Local procurement targets being met and application of the existing Procurement Policy will be applied for the duration of construction.			Medium positive	48
Site preparation and infrastructure establishment	Socio-economic	Local economic contribution and induced impacts			Medium positive	48

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				<p>take part in the tender processes.</p> <ul style="list-style-type: none"> Require larger suppliers to form partnerships with HDSAs and local SMMEs to provide mentorship and ensure skills transfer. Include minimum thresholds in the Contractor Social Management Plans (CSMPs) in terms of local employment, BEE procurement, SMME targets, etc. Monitor the social performance of contractors and implement relevant measures should the contractors not comply with the social management plans they submitted (impose penalties, termination where necessary, review of future prospective work, etc.). 		
Site preparation and infrastructure establishment	Socio-economic	Influx of jobseekers / an outside workforce	To prevent negative impacts associated with an influx of jobseekers.	<ul style="list-style-type: none"> Contractually obligate contractors and subcontractors to employ temporary workers and service providers through the labour desk/job seeker registration database and make this fact known to the communities. Liaise with local ward councillors and make use of the existing community-based Local Business Forum and the Formal Unemployment Structure to source local labour. Recruitment of temporary workers at the access to the construction site is not allowed. As part of their CSMPs, contractors to provide a transport and housing plan. No workers to be housed on site nor in informal housing/settlements. Draw up an Action Plan in conjunction with the Madibeng LM to address illegal occupation of land immediately when it occurs. 	Very Low	9,6
Site preparation and infrastructure establishment	Socio-economic	Intrusion impacts	To prevent negative impacts associated with safety risks and intrusions.	<p>Awareness and communications:</p> <ul style="list-style-type: none"> Ensure that the CLO is familiar to local customs and fluent in the local languages. Consider circulating summaries of monitoring results (dust, ambient noise levels, etc.) to the local Councillors and landowners, especially those that raised 	Very Low	9,6
Site preparation and infrastructure establishment	Socio-economic	Security risks		<ul style="list-style-type: none"> Consider circulating summaries of monitoring results (dust, ambient noise levels, etc.) to the local Councillors and landowners, especially those that raised 	Low	26,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				<p>complaints.</p> <ul style="list-style-type: none"> • Make use of the Environmental Monitoring Committee (EMC) to distribute information. • Provide a schedule of the construction activities to key stakeholders and relevant I&APs. • Ensure that stakeholders are aware of procedures to raise complaints, such as a complaints register at the entrance to the construction site, and attend to issues as a matter of priority. • Erect signboards indicating accesses to the construction site. • Display a contact number on the construction vehicles where motorists can report reckless driving. • Comply with all regulations of the Occupational Health and Safety Act. <p>Air Quality and Noise:</p> <ul style="list-style-type: none"> • Implement all relevant mitigation measures as proposed by the respective Specialists to address noise and air quality impacts. • Ensure that all construction machinery has the required silencers. • Dust alleviation methods: Vehicles carrying dusty materials should be securely covered before leaving the site; water spray gravel and dirt roads regularly; wind breaks; temporarily cover earthworks if possible and minimize drop heights; monitor the dust fall out concentrations as stipulated by the AQIA; etc. • Construction activities should, as far as possible, be kept to normal working hours e.g. from 7 am until 5 pm during weekdays. This would however not always be realistic, as deadlines and specific construction activities could take 12+ hours. <p>Security risks:</p>		

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				<ul style="list-style-type: none"> • Fence off the development footprint of the construction site and activate on-site security (24-hour guards) prior to the commencement of site clearing and other construction activities. • Construction material to be stored and safeguarded in order not to create an opportunity for theft or unlawful usage of mining and other equipment. • Limit all activities to the development footprint of the proposed construction site. • Provide workers with identity tags and instate strict security measures at the access points to discourage unauthorised people entering the construction sites. • Workers should not be allowed to remain in the construction area when they are off duty. • Should crime levels rise significantly, consider establishing a local policing forum together with the local community. 		
Site preparation and infrastructure establishment	Socio-economic	Community health and safety risks	To prevent health and safety risks associated with the proposed project.	<ul style="list-style-type: none"> • Comply with all the provisions of the Occupational Health and Safety Act (Act No. 85 of 1993) in order to mitigate potential health and safety issues. • A Fire/Emergency Management Plan and associated communication channels should be developed and implemented (in conjunction community leaders). • Dispose of the various types of waste generated in the appropriate manner at licensed waste landfill sites at regular intervals. Comply with the waste management plan compiled for the construction phase. • Store any materials away from sensitive locations in fenced-off areas. • Accommodation and facilities of security guards and any other personnel that may be on site for long periods should comply with health and safety standards. • Inform the Municipalities and emergency 	Medium	51,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				<p>services if harmful substances are spilled.</p> <ul style="list-style-type: none"> • Designate a suitable area for cooking fires (if required). • Fence off the construction area and any excavations and display warning and 'no trespass' signs at appropriate localities in various local languages. • 24-hour access control to the construction site. 		
Opencast mining and related activities	Socio-economic	The chance of employment is high and likely to manifest for direct and downstream industries with benefits for the region.	To maximize positive socio-economic impacts for surrounding communities.	<ul style="list-style-type: none"> • In the case of new recruitment, give preference to locals that reside in the project's direct sending area. • Regularly update the Procurement Policy with industry best practices and within the changing regulatory framework. The possibility of breaking down larger contracts into smaller manageable contract portions to be awarded to HDSAs can be investigated. • Liaise with local ward councillors and make use of the existing community-based Local Business Forum and the Formal Unemployment Structure to source local labour. • Work with the municipality's LED Unit to identify and train local SMMEs and HDSAs that would be required during the course of the operational phase. • Where possible, supply a Value Chain Analysis and needs requirement to the Rustenburg LM so that they can assist in preparing the Youth, women and entrepreneurs. • Provide feedback to the communities, LED Units and Ward Councillors when tenders have been awarded to ensure transparency throughout the process. 	Medium positive	56
Opencast mining and related activities	Socio-economic	Local procurement			Medium positive	48
Opencast mining and related activities	Socio-economic	Local economic contribution and induced impacts			Medium positive	44,8
Opencast mining and related activities	Socio-economic	Impacts on livelihoods	To prevent loss of livelihoods of surrounding landowners, communities and farmers.	<ul style="list-style-type: none"> • Implement all the mitigation and management measures as proposed in the Specialist Assessments done for the EIA to address intrusion and pollution impacts (visual, noise, dust/air, water pollution, etc.) 	Very Low	4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				that could result in degradation of farm land, natural areas, negative impacts on water resources and intrusion impacts for small scale farmers. <ul style="list-style-type: none"> Encourage surrounding and directly impacted farmers and business to provide historic, current and future data to the mine that relate to crop yields, turnovers, job numbers, cutbacks, etc. This data could indicate if mining activities have had negative impacts on livelihoods and would encourage the mine to address any issues proactively. 		
Opencast mining and related activities	Socio-economic	Capacity building and training	To promote capacity building and training.	Ensure the SLP objectives are executed.	Medium positive	41,6
Opencast mining and related activities	Socio-economic	LED / Infrastructure projects	To ensure the proposed project contributes to LED / infrastructure projects.	Ensure SLP objectives are executed.	Medium positive	41,6
Opencast mining and related activities	Socio-economic	Direct land use impacts associated with the opencast mining	To reduce negative social and environmental impacts to ensure surrounding land users and communities are not negatively affected.	<ul style="list-style-type: none"> Implement a Groundwater Management and Monitoring Programme as required by the Geohydrologist and as stipulated in the conditions of the WUL. Implement mitigation measures as proposed by the respective Specialists to address anticipated intrusion issues as a result of the mining operations and traffic. Have discussions with the Developer / Landowners of the Housing project to determine the way forward. Fire breaks to prevent the spreading of veld fires where required. Fencing of the opencast pits and general mining areas. Danger warning signboards in English and the local languages on the periphery of the mine area, open pits, and at the access roads leading to the infrastructure. Maximize the employment of locals as far as possible. The mine could assist in surveying and documenting existing health conditions of the Project affected communities. 	Low	22
Opencast mining and related activities	Socio-economic	Resource use impacts			Very Low	14,4
Opencast mining and related activities	Socio-economic	Tourism impacts			Very Low	13,2
Opencast mining and related activities	Socio-economic	Impacts on future developments			Low	38,4
Opencast mining and related activities	Socio-economic	Impacts on sense of place			Very Low	12

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MITIGATION MEASURES	Significance with mitigation	
				<ul style="list-style-type: none"> • Implement a community health awareness plan amongst employees. • Monitor driver conduct and impose penalties to enforce compliance to traffic rules. • Inspect trucks and other heavy vehicles on a regular basis to avoid oil spillages and un-roadworthy vehicles that could lead to accidents. • Roads within close proximity to schools and other sensitive receptors to be avoided. • Do regular road maintenance and upgrades to accesses that lead to the mine area. 		

15.3 SUMMARY OF SPECIALIST REPORTS

(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form):

Table 38: Specialist Recommendations Summarised

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
Agricultural Impact Assessment: Compliance Statement	<p>The land on which the mining is proposed is low potential cropping land that has a low sensitivity in in terms of Notice 320 of the National Environmental Management Act in May 2020 of the Department of Environmental Affairs.</p> <p>The outcome of the site sensitivity verification found the following:</p> <ul style="list-style-type: none"> • There is no cultivated land at Buffelsfontein West. • The land environmental sensitivity according to the tool is indicated as moderate. This is the case; the soil is shallow and rocky with many outcrops that renders the site as not arable and only suitable for grazing. There are no irrigation rights nor is there any land under irrigation. 	X	Baseline Environment (Section 10.4), (Appendix 5)

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<p>Sensitivity verification was undertaken by desk top analysis using satellite imagery and a site visit that took place in June 2023. The outcome of the site sensitivity verification of Buffelsfontein West found that:</p> <ul style="list-style-type: none"> • According to guidelines in AGIS (DALRRD), the land has a low arable potential. This is because of the shallow soils and rock outcrops. According to the criteria in AGIS the land is not arable and more suitable for livestock grazing. • The site visit found very little deep arable soils that is without rock outcrops. • No land can be regarded as high potential for cropping that warrants protection because it is highly sensitive for farming purposes. <p>Therefore, no reason can be found not to allow the development. It is the recommendation of the specialist that the project be allowed to be implemented.</p>		
Terrestrial Ecology Impact Assessment	<p>The Marikana Thornveld vegetation type occurring on the project footprint is listed in the “National List of Ecosystems that are Threatened and need of protection”, as Vulnerable and as Endangered by the 2018 National Biodiversity Assessment. The entire Buffelsfontein West project footprint is located on areas categorised as ESA1 in terms of the NWBSP.</p> <p>The Magaliesberg Protected Environment, which is protected in terms of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003) (NEMPAA), is situated approximately 6 km south of the project footprint. The project footprint is located within the transition zone of the Magaliesberg Biosphere.</p> <p>Information on plant species previously recorded for the project area was extracted from the POSA online database hosted by SANBI. The results indicate that 27 plant species have been recorded in the area queried. One of the flora species previously recorded for the area is a Species of Conservation Concern (SCC) in terms of its Red List status, i.e. <i>Stenostelma umbelluliferum</i> (Red List Status: NT). This species has a moderate likelihood of occurrence on the project footprint. One additional flora species was listed for the project area in the Environmental Screening Tool Report, i.e. Sensitive species 1248 (Red List Status: VU).</p>	X	Baseline Environment (Section 10.5), (Appendix 6)

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<p>None of the flora species previously recorded on the area queried are protected in terms of the ToPS List, the NFA or the NWBMA. Two of the plant species is known to have medicinal uses and two of the flora species are endemic to South Africa. A baseline assessment was conducted to establish whether any potentially sensitive fauna species/receptors might occur on site. The South African National Biodiversity Institute’s (SANBI) online biodiversity tool and the Virtual Museum and Animal Demography Unit (ADU) was used to query species lists (2527DA QDS). The following summary of findings are provided:</p> <ul style="list-style-type: none"> • Mammals: 33 mammal species were found to possibly occur, of which four are categorised as SCC and two could potentially occur on-site. • Avifaunal: 231 bird species were recorded for the area queried, six of which are categorised as SCC. • Butterflies: 87 butterfly species were found for the 2527DA QDS, all of which are categorized as Least Concern. • Other Invertebrates: One species of Dung beetle, five species of Odonata and one species of Scorpion were recorded for the QDS in historical records, all of which are categorized as Least Concern. • Reptiles: 12 reptile species were recorded for the QDS, all of which are categorized as Least Concern. • Amphibians: 15 amphibian species were listed within the QDS, of which none are categorised as SCC <p>Based on the desktop assessment and findings of the site survey, the sensitivity of the delineated vegetation units were rated as follows:</p> <ol style="list-style-type: none"> 1. Degraded indigenous Thornveld (VU1) - VU1 has been provided a sensitivity rating of medium, considering the Vulnerable categorisation of the Marikana Thornveld vegetation type in terms of the NEMBA and the area being categorised as an CBA and ESA in the NWBSP. 2. Stream of VU1 - Although the stream and associated vegetation is considered to be moderately to highly disturbed, watercourses and wetlands are considered high sensitivity due to their importance for ecosystem services and corridor functions, among others. 3. Transformed (VU2) - The vegetation unit is classified as having a low sensitivity due to the transformed state of the vegetation composition of the vegetation unit or lack of vegetation. 		

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<p>Impacts were generally found to be Medium to High without the consideration of the implementation of mitigation measures. With the implementation of the recommended mitigation measures, the impacts are rated Low to Medium significance. It is the opinion of the specialists that the development may continue without severe impacts to terrestrial ecology, if all recommended mitigation measures are implemented.</p>		
<p>Surface Water Assessment</p>	<p>The physical characteristics of the associated rivers and streams, as well as the biological indices, indicated that the system is largely altered by the anthropogenic activities in the catchment. A 20 m operational buffer around the watercourses is recommended. The watercourses and associated buffer areas must be considered as sensitive areas and ideally these sensitive areas should be avoided by the mining and related activities.</p> <p>The primary surface water impacts associated with the operation are the potential impacts on water quantity and quality degradation due to the lack of proper storm water containment. As well as the risk of contamination from spills and transportation of product and waste during operation. It is important that the operation aim to limit impacts on the aquatic resources as far as possible in order to maintain its current basic ecosystem functions. All activities should aim at improving and maintaining the health class of the affected streams to a Class C/D.</p> <p>It is the opinion of the specialists that the development may continue without severe impacts to the surface water environment, if all recommended mitigation measures are implemented.</p>	<p>X</p>	<p>Baseline Environment (Section 10.6) (Appendix 10)</p>
<p>Aquatic Ecology Impact Assessment</p>	<p>The project site falls within Drainage Region A. Limpopo North West Water Management Area (WMA), the A21K Quaternary Catchments. The site was visited during the end of the low-flow season and the Kareespruit River and tributaries did not have sufficient flow for the purposes of the aquatic assessment and monitoring. Other indices were utilised to determine the current condition.</p> <p>The relevant sections of river that was sampled (Kareespruit) do not intercept with a FEPA area. Catchment A21K (Buffelsfontein West) does intercept with a Fish Support Area (FSA).</p>	<p>X</p>	<p>Baseline Environment (Section 10.7) (Appendix 7)</p>

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<p>The area is located within the Marikana Thornveld Vegetation Group (SVcb6), which has been included in the National Biodiversity Assessment (NBA 2011) as Vulnerable (VU). In 2018, the NBA rates Marikana Thornveld Vegetation as Poorly Protected and Endangered (EN).</p> <p>Summary of results for 2022 Low Flow sampling:</p> <ul style="list-style-type: none"> • The scores indicate a lower score when compared to the RQOs requiring the PES to be Class D – Largely Modified (PES as per NBA 2018 Assessment) and this should be set as the REC, since the current PES is Class F. • If future monitoring is conducted, it is recommended that all sites be revisited and monitored seasonally. Points should be investigated during bi-annual monitoring of water resources. <p>The applicant needs to develop an Environmental Management Programme / Plan which describe in detail how identified impacts will be managed on site to ensure that impacts are minimised. The EMPr must then be approved by the relevant government agencies. The management measures must be implemented where applicable.</p> <p>The findings should be confirmed during several seasons, since the results of one assessment cannot be taken as a standard. Therefore, several baseline follow-up assessments should be undertaken before the project starts with activities to ensure a trend has already been established as a baseline (ideally across both seasons).</p> <p>It is the reasoned opinion of the specialist that the development may continue if all management features are implemented from the onset of the project.</p>		
Watercourse Delineation and Functionality Assessment	The wetland assessment focussed on the wetlands situated within 500 m of the Buffelsfontein West opencast mining area. The ecological integrity of the wetland system near Buffelsfontein West has been largely transformed. No wetlands occur at the Buffelsfontein West Section.	X	Baseline Environment (Section 10.8) (Appendix 8)

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
Hydrogeological Assessment	<p>Groundwater qualities show exceedances above the SANS 241 recommended limit in conductivity, TDS, NO₃ as N, SO₄, Cl, Na, Cr, Pb and Mn. The sulfate values show significant exceedances in a number of monitoring positions with values ranging between below detection limit to 1978 mg/l. Although NO₃ as N values show exceedances, these exceedances are not significant. The majority of the boreholes are sulphate dominated. The boreholes to the north-east of the site have a mixed signature and have higher proportions of Cl⁻, Ca²⁺, K⁺ and Na⁺.</p> <p>The GDT calculated a vulnerability value of 55%, which is medium. The study area can be classified as a “Minor Aquifer System”, since these aquifers can be fractured or potentially fractured rocks which do not have a high primary permeability, or other formations of variable permeability. According to the Groundwater Quality Management Index a medium level groundwater protection is required for the aquifer. Reasonable and sound groundwater protection measures should be taken to protect the underlying aquifer as well as the Kareespruit River and the Maretswana River.</p> <p>As Buffelsfontein West is an existing mine, there is an existing groundwater monitoring network in place. The existing groundwater monitoring network covers the areas of the proposed opencast pit. However, a monitoring network should be dynamic. This means that the network should be extended over time to accommodate the migration of contaminants through the aquifer as well as the expansion of infrastructure and/or addition of possible pollution sources. Additionally, an audit on the monitoring network should be conducted annually. The current monitoring network does not cover the northern reaches of the proposed pit where the migration of contaminants are expected and therefore additional boreholes are recommended. Three geophysical traverses are recommended for the identification of suitable drilling locations for additional boreholes. These boreholes can be utilised for water level monitoring during operations, as well as groundwater quality monitoring after decommissioning of the site.</p> <p>Recommendations: Based on the impact assessment for the study area and the results obtained, the following actions are recommended:</p> <ul style="list-style-type: none"> • Update the numerical and geochemical model against monitored data during operations. 	X	Baseline Environment (Section 10.9), (Appendix 9)

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<ul style="list-style-type: none"> • Nitrate concentrations in the monitoring network should be closely monitored and should this data indicate a potential nitrate plume, this should be included in future models. • Water quantity and quality data should be collected on a regular, ongoing basis during operations. These data will be used to recalibrate and update the water management model, to prepare monitoring and audit reports, to report to the regulatory authorities against the requirements of the IWWMP and other authorisations and as feedback to stakeholders in the catchment, perhaps via the CMA. • The hydrocensus and risk assessment should at least be repeated once before closure to evaluate any impacts. <p>In adherence to the requirement of Appendix 6 of the EIA regulations, GPT is of the opinion that the information collected and analysed supports the continuation/commencement of the proposed Buffelsfontein West Mining project given that the suggested management and mitigation measures be implemented for the operations and there are no deviations from the planned mining activities.</p>		
Air Quality Impact Assessment	<p>Based on the results presented in the impact assessment the following further recommendations by the assessors are outlined:</p> <ul style="list-style-type: none"> • It is recommended that ambient air quality monitoring be extended in order to assess the level at which the proposed operation is noted to impact on the ambient air quality. • Fallout monitoring should be continued for the life of mine to better assess the level of nuisance dust associated with mining related operations. Sampling of fallout should be undertaken within the neighbouring areas as well as on-site. Dust fallout monitoring is recommended. • If it is found that dust levels are measured to be exceeding limits, it is highly recommended: <ul style="list-style-type: none"> ○ Increase the mitigation on the Haul roads with a chemical binding additive and; ○ To establish a Real-Time indicative monitoring network to quantitatively help identify the sources and to assist in the management of the mitigation of these sources. <p>The impacts from dust fallout and Particulate matter can be reduced by implementing dust control measures. The highest intensity of the construction work should be carried out during the summer months and not over the harsh winter months as can</p>	X	Baseline Environment (Section 10.10), (Appendix 11)

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<p>result in increased dispersion of fugitive dust. The mine should ensure that unpaved roads are continuously watered and treated with dust binding additive products to reduce the volume of fugitive dust emitted from unpaved roads.</p> <p>Mitigation and management measures for the mining operation as discussed in the report and evaluated by the assessors should be sufficient to ensure the mining operation can be conducted with minimal impact on the receiving environment and therefore not have a detrimental effect and can go ahead.</p>		
Blasting	<p>The location of structures around the Pit area is such that the charge evaluated showed possible influences due to ground vibration. The closest structures observed are the Road, Heritage Sites, Power Lines/Pylons, Mine Buildings/Structures, and Buildings/Structures. The ground vibration levels predicted for these POI's ranged between 0.5 mm/s and very high for structures surrounding the open pit area. The expected levels of ground vibration for some of these structures are high and will require specific mitigations in the way of adjusting charge mass per delay to reduce the levels of ground vibration. Ground vibration at structures and installations other than the identified problematic structures is well below any specific concern for inducing damage.</p> <p>Air blast predicted showed greater concerns for opencast blasting. The current accepted limit on air blast is 134 dBL. Damages are only expected to occur at levels greater than 134dB. It is maintained that if stemming control is not exercised this effect could be greater with greater range of complaints or damage. The pits are located such that "free blasting" – meaning no controls on blast preparation – will not be possible.</p> <p>The current accepted limit on air blast is 134 dBL. Damages are only expected to occur at levels greater than 134 dBL. Prediction shows that air blast will be greater than 134 dB at distance of 425 m and closer to pit boundary. Infrastructure at the pit areas such as roads and power lines/pylons, are present, but air blast does not have any influence on these installations.</p> <p>Fly rock remains a concern for blasting operations. Based on the drilling and blasting parameters values for a possible fly rock range with a safety factor of 2 was calculated to be 570 m. The absolute minimum unsafe zone is then the 570 m. This calculation</p>	X	Baseline Environment (Section 10.11), (Appendix 13)

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<p>is a guideline and any distance cleared should not be less. The occurrence of fly rock can however never be 100% excluded. Best practices should be implemented at all times. The occurrence of fly rock can be mitigated but the possibility of the occurrence thereof can never be eliminated.</p> <p>Specific actions will be required for the pit area such as Mine Health and Safety Act requirements when blasting is done within 500 m from structures and mining with 100 m for structures. The Mine Buildings/Structures, Power Lines/Pylons, Road and Heritage Sites falls within the 500 m range from the pit area.</p> <p>There is no reason to believe that this operation cannot continue if attention is given to the recommendations made.</p>		
Environmental Noise Impact Assessment	Noise impacts were not found to be at high significant levels for Buffelsfontein West. Mitigation measures to reduce impacts associated with noise are included in the EMPr.	X	Baseline Environment (Section 10.12), (Appendix 12)
Phase 1 Archaeological Impact Assessment	<p>The following recommendations are made in terms with the National Heritage Resources Act (Act No. 25 of 1999) in order to avoid the destruction of heritage remains associated with the area demarcated for development:</p> <ul style="list-style-type: none"> The demarcated B01 sensitive area (Figure 30), delineated from a combination of field observations and georeferenced historical topographical maps, is associated with a relatively dense concentration of angular and circular stone-walled enclosures and potsherds that might include unmarked graves. The layout of the site, however, could not be determined due to dense vegetation cover and the dilapidated state of the stone walling. Although the site appears to be historic, certain elements might be older. Since additional impact appears to have occurred since 2021, current activities impacting the demarcated B01 area should be ceased and due to the high sensitivity of the general area, it is recommended that the area be fenced-off. Should further impact to the demarcated sensitive area be unavoidable, a Phase 2 AIA must be conducted. Site B05 consist of a single LSA artefact in a disturbed context. The site is not considered to be highly significant and the recording done during the Phase 1 AIA is considered to be sufficient. 	X	Baseline Environment (Section 10.13), (Appendix 14)

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<ul style="list-style-type: none"> • Site B06, consisting of stone walling that appears to form part Site B01, falls outside of the demarcated project area and is unlikely to be impacted by the proposed mining development. No further action is therefore required. • Sites B02, B03, B04 and B07 consist of undecorated potsherds and a section of dilapidated stone walling. These sites fall outside of the sensitive area, appear in a disturbed context and are not considered to be highly significant. The recording done during the Phase 1 AIA is considered to be sufficient. • Site B08, remnants of a contemporary mining shaft and building, is not considered to be significant from a heritage perspective and no further action is required. <p>General Recommendations</p> <ul style="list-style-type: none"> • The recommendations are based on the specific project activities and extents as indicated in the figures of this report. Should the proposed surface impact areas be changed, a qualified archaeologist must conduct a pedestrian survey on the new areas and amend the report accordingly. • Should uncertainty regarding the presence of heritage remains exist, or if heritage resources are discovered by chance, it is advised that the potential site be avoided and that a qualified archaeologist be contacted as soon as possible. • As archaeological artefacts generally occur below surface, the possibility exists that culturally significant material may be exposed during the construction and development phases, in which case all activities must be suspended pending further archaeological investigations by a qualified archaeologist. Also, should skeletal remains be exposed during development and construction phases, all activities must be suspended and the relevant heritage resources authority must be contacted (See National Heritage Resources Act, No. 25 of 1999 section 36 (6)). <p>The proposed Buffelsfontein West Mining Development will consist of opencast mining activities and surface infrastructure impacting approximately 114 ha. The project area is associated with a combination of LSA and LIA/Historic remains, some which could be protected by legislation. Should the recommendations made in this study be adhered to and with the approval of the South African Heritage Resources Agency, the proposed Buffelsfontein West Mining Development may proceed.</p>		

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
<p>Palaeontology (Letter of exemption)</p>	<p>The entire area lies entirely on non-fossiliferous volcanic and metamorphosed rocks of the Rustenburg Layered Suite (Bushveld Igneous Complex), in particular, on the Ruighoek Pyroxenite. Intrusive volcanic rocks do not preserve fossils. In addition, the Bushveld Igneous Complex was emplaced about 2055 million years ago (Cawthorne et al., Zeh et al., 2020) which precedes the evolution of macroscopic life forms.</p> <p>There is no chance of finding fossils in the project footprint and this is confirmed by the grey colour-coding in the SAHRIS palaeosensitivity map. The DFFE Screening maps indicate that the sites are moderately sensitive (yellow) but this is incorrect because fossils are not preserved in volcanic intrusive rocks.</p> <p>Based on the geology and the more accurate SAHRIS map, we request, therefore, that no further palaeontological impact assessment be required for the Buffelsfontein West Opencast Section.</p>	<p>X</p>	<p>Baseline Environment (Section 10.14), (Appendix 15)</p>
<p>Traffic Impact Assessment</p>	<p>The Samancor Western Chrome Mine’s Buffelsfontein West Opencast Mine application can be supported from a traffic flow point of view. These are the recommendations:</p> <p>Intersection 1: D2170 and D314</p> <ul style="list-style-type: none"> • 45m right turns lanes on both approaches of the D314 (geometric upgrade) • Traffic signal <p>Access Point 1 on the road between Safefy Shaft Sibanye Stillwater and the Marikana Road, formalise the access by providing the following:</p> <ul style="list-style-type: none"> • 60m tapers • Construct a section of the access road • Road makings • Road signage 	<p>X</p>	<p>Baseline Environment (Section 10.15), (Appendix 16)</p>

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
	<p>Access Point 4 on the road between Safety Shaft Sibanye Stillwater and the Marikana Road, formalise access by providing the following:</p> <ul style="list-style-type: none"> • 60m tapers • Construct a section of the access road • Road makings • Road signage <p>The “informal” access points should be closed in such a way to stop vehicles from using it after the formal access points are constructed.</p>		
Social Impact Assessment	<p>Sensitive receptors and land uses located within the 1 000 m buffers from the opencast areas and mining infrastructure include agricultural land uses (crops, grazing areas), formal and informal housing (Modderspruit), the R556 and various local access roads.</p> <p>Positive employment (direct and induced) and economic impacts of moderate significance are anticipated to manifest for the region. Perceived negative impacts (low to moderate significance) are those typically associated with construction activities, are short-term, and can generally be mitigated successfully. It is however noted that existing intrusion impacts in the study area already occur due to current mining and agricultural land uses, high traffic volumes and gravel roads. Should the construction process not be managed adequately, fatalities could occur in the event of illegal trespassing, traffic and on-site accidents (community health and safety risks), resulting in a high negative significance rating, which can be mitigated to moderate.</p> <p>No fatal flaws have been identified in the assessment and based on the findings of this SIA, it is the opinion of the Specialist that the proposed Buffelsfontein West Opencast Section may proceed, provided that the mitigation, management measures and requirements as set out in this report be incorporated in the EMPr and implemented wherever applicable.</p>	X	Baseline Environment (Section 10.17), (Appendix 17)

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
Stormwater Management and Water Balance Report	<p>Final designs and construction of stormwater infrastructure will be based on the Infrastructure Designs (Report still to be submitted). Upon commencement of mining the following basic procedures will be followed for the duration of the operations:</p> <ul style="list-style-type: none"> • Keep dirty and clean water separate by ensuring infrastructure remains intact as constructed, with as-built plans signed-off by a Professional Engineer, as finally designed in accordance to the Water Use Licence. • Keep channels and culverts clean in order to maintain their design capacity. • Keep grass cover on grass covered infrastructure in good condition. Ensure that no erosion occur by regular monitoring of stormwater infrastructure and repair and upgrade where required. • Clean silt traps regularly as required. • Maintain the emergency spillway of the PCDs and do not allow any obstruction in the spillway. • Protect the clean water catchment areas by preventing, movement of vehicles, veld fires, cutting of trees, etc. <p>Upon closure, existing stormwater structures must be considered for the closure designs to be either utilized or removed.</p>	X	Appendix 18
Closure Cost Assessment	<p>This closure plan was compiled in alignment to the NEMA GNR.1147 Regulations, the NEMA Appendix 5 (Closure Plan) and based on information provided by Client, and specialist work. It is recommended that the next update of this closure plan be annually, after approval. Closure and rehabilitation are a continuous series of activities that begin with planning prior to the project's design and construction, and end with achievement of long-term site stability and the establishment of a self-sustaining ecosystem. Not only will the implementation of this concept result in a more satisfactory environmental conclusion, but it will also reduce the financial burden of closure and rehabilitation. Rehabilitation and closure objectives have been tailored to the project at hand with the objective of assisting Buffelsfontein West Opencast Section in carrying out successful rehabilitation.</p>	X	Baseline Environment (Section 10.17), (Appendix 19)

Attach copies of Specialist Reports as appendices.

15.4 ENVIRONMENTAL IMPACT STATEMENT

15.4.1 Summary of the Key Findings of the Environmental Impact Assessment

The findings of the specialist studies undertaken for this EIA/EMP process provide an assessment of both the benefits and potential negative impacts anticipated as a result of the proposed project. The findings conclude that, provided that the recommended mitigation and management measures are implemented, there are no environmental fatal flaws that should prevent the proposed project from proceeding.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA/EMP will form part of the contract with the contractors appointed to construct and maintain the mine and associated infrastructure. The EIA/EMP would be used to ensure compliance with environmental specifications and management measures. The implementation of this EIA/EMP for key cycle phases (i.e. operation and closure/decommissioning) of the project is considered to be fundamental in achieving the appropriate environmental management standards as detailed for this project.

For a detailed impact assessment layout specifying all the ratings used to obtain Significance of impacts with and without mitigation, refer to Table 37. Impacts have been discussed in Section 14.5. Refer to Table 39 below for impact significance with and without mitigation.

Table 39: Summary of Key findings in terms of Impact Significance

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
No-go option	Socio-Economic	Reduced period of development and upliftment of the surrounding communities and infrastructure.	N/A	Medium	45	N/A	1	Medium	45
No-Go Option	Socio-Economic	Reduced period of development of the economic environment, by job provision and sourcing supplies for and from local residents and businesses.	N/A	Medium	45	N/A	1	Medium	45
No-Go Option	Socio-Economic	Positive: No additional negative impacts on I&APs or surrounding land users	N/A	Positive Medium	45	N/A	1	Positive Medium	45
No-Go Option	Natural Environment and Wetlands	Positive: No additional negative impacts on the environment	N/A	Positive Medium	45	N/A	1	Positive Medium	45
Opencast mining and infrastructure establishment	Geology and Soils	Soil erosion and soil compaction.	Construction and operational	Medium	48	Medium	0,6	Low	28,8
Site preparation for infrastructure	Geology and Soils	Loss of topsoil.	Construction	Medium	44	Medium	0,6	Low	26,4
Opencast mining and related activities	Geology and Soils	Contamination of soils through disposal of waste; and spillage of hydrocarbon-based fuels and oils or lubricants spilled from vehicles.	Operational	Low	27	Medium to high	0,4	Very low	10,8
Opencast mining and related infrastructure	Agricultural, Land Use and land Capability	Direct occupation / loss of land	Construction and operational phase	Low	30	Medium	0,6	Very Low	18

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Site preparation for infrastructure establishment and opencast mining	Agricultural, Land Use and land Capability	Loss of grazing land	Construction and operational phase	Low	30	Medium	0,6	Very Low	18
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	<ul style="list-style-type: none"> • Development related activities will lead to damage or degradation of habitats and vegetation communities and overall loss of biodiversity and ecosystem function within the clearance area. • This proposed project activity could lead to further fragmentation of habitats, impairing ecological corridors between other natural areas and fragment ranges that certain animals may need to sustain adequate foraging and breeding grounds. • As a result of the construction and operational activities degradation or compression may occur if heavy vehicles are not kept to the demarcated roads and/or development footprint. 	Construction and operational	Medium	56	Medium	0,6	Medium	33,6
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	Construction, human and vehicle movement and introduction of foreign material e.g. soils may lead to the introduction of alien invader species, impacting on the floral characteristics of the project site and adjacent natural areas.	Construction and operational	Medium	56	Medium	0,6	Low	33,6
Site preparation for infrastructure establishment and	Terrestrial Ecology	Protected and/or SCC species could possibly occur within the area of construction and would then be	Construction and operational	High	64	Medium	0,6	Low	38,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
opencast mining		destroyed without proper knowledge and/or mitigation measures. Although no SCC were found to occur on the project footprint, a number of fauna and flora SCC species may potentially occur or used habitat on the project footprint. The mining and related activities may impact on the watercourse due to direct effects as well as edge effects. This could lead to destruction and degradation of habitats and food associated with these specialised habitat areas.							
Site preparation for infrastructure establishment and opencast mining	Terrestrial Ecology	The continuous human activity over a longer-term period may further impact on the faunal communities within the area. Associated noise, waste, the smell of humans and physical infiltration into remaining natural areas are problematic and may lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavourable).	Construction and operational	Medium	52	Medium	0,6	Low	31,2
Site rehabilitation and removal of infrastructure	Terrestrial Ecology	Rehabilitation could be ineffective if measures are not appropriately complied to or rehabilitation is not planned well in advance. Without the necessary mitigation measures, rehabilitation will be unsuccessful and the environment will not be self-	Closure / decommissioning	High	75	Medium to high	0,4	Low	30

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
		sustaining. Without mitigation the alien invasive species will increase and result in a degraded veld condition making the property less viable for post-closure land use activities such as wilderness, grazing and agriculture. The results may be positive if rehabilitation has been done correctly and the site may be rehabilitated back to a natural landscape.							
Opencast mining and related infrastructure / activities	Surface Water	Surface water quality - Sedimentation and pollution of surface water resources resulting in the deterioration of water quality	Construction, Operation and Closure	Medium	56	Low to medium	0,8	Medium	44,8
Opencast mining and related infrastructure / activities	Surface Water	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained within the operation	Operational	Low	39	Low to medium	0,8	Low	31,2
Opencast mining and related infrastructure / activities	Surface Water	Surface water quantity - alteration of flow due to the diversion of clean water areas	Construction and operational	Medium	56	Low to medium	0,8	Low	44,8
Opencast mining and related infrastructure / activities	Surface Water	AIP proliferation within sensitive riparian and wetland zones	Construction, Operation and Closure	Medium	52	Medium	0,6	Low	31,2
Site rehabilitation and removal of infrastructure	Surface Water	Surface water quantity - Reinstatement of surface drainage patterns (Positive Impact)	Closure / decommissioning	Low	36	Medium	0,6	Low	21,6
Site preparation and activities in close proximity or proximity to buffer zones of water resources	Aquatic Ecology	Site preparation, clearing and activities in proximity or within buffer zones of water resources	Construction and Operational	Medium	48	Medium	0,6	Low	28,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Alteration of drainage patterns by activities within and in close proximity of river	Aquatic Ecology	Decrease and changes in water quantity and availability in the Ecological Reserve	Construction and Operational	Low	36	Medium to high	0,4	Very Low	14,4
Pollution and sedimentation due to unmanaged soil and stormwater runoff bringing forth water quality impacts	Aquatic Ecology	Deterioration of water quality in the Kareespruit River due to contaminated soil and storm water runoff affecting aquatic communities found within water systems and may lead to death and shifts in community structures occurring	Construction and Operational	Low	36	Low to medium	0,8	Low	28,8
Erosion and sedimentation caused by mining within close proximity to the Kareespruit river.	Aquatic Ecology	Nutrient enrichment and leading to decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found within the areas if flow is present.	Construction and Operational	Low	28	Low to medium	0,8	Low	22,4
Insufficient Stormwater management impacting surface water quality and therefore aquatic ecological functioning (changes in PES).	Aquatic Ecology	If river is negatively affected and may lead to a deterioration of the Present Ecological Status (PES).	Construction and Operational	Medium	52	Medium to high	0,4	Very Low	20,8
Changing water inflow/flow patterns and reducing water available to sustain Aquatic diversity. Interference with subsurface flows by opencast development mining activities.	Aquatic Ecology	Impacts to Streamflow Regulation	Construction and Operational	Low	26	Medium to high	0,4	Very Low	10,4
Decommissioning impacts resulting in impacts to Biodiversity and Ecological	Aquatic Ecology	Decommissioning and material movement in proximity or within buffer zones of water resources	Decommissioning and Closure	Low	30	Medium to high	0,4	Very Low	12

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
function – including Riparian zone activities or activities within bufferzones or regulated zones									
Alteration of drainage patterns after or during removal of the infrastructure	Aquatic Ecology	Leading to decrease and changes in water quantity and availability in the Ecological Reserve	Decommissioning and Closure	Very Low	20	High	0,2	Very Low	4
Water quality impacts due to improper waste management during decommissioning and removal of infrastructure	Aquatic Ecology	Deterioration of water quality in the Kareespruit River due to contaminated soil and storm water runoff affecting aquatic communities found within water systems and may lead to death and shifts in community structures occurring	Decommissioning and Closure	Very Low	16	High	0,2	Very Low	3,2
Sedimentation of water resources due to erosion and impacts in areas with steep topography (OC)	Aquatic Ecology	Nutrient enrichment and leading to decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found within the areas if flow is present.	Decommissioning and Closure	Very Low	20	High	0,2	Very Low	4
Deterioration in surface water quality and changes in PES	Aquatic Ecology	If river is negatively affected and may lead to a deterioration of the Present Ecological Status (PES) which could lead to other cumulative impacts.	Decommissioning and Closure	Low	27	Medium to high	0,4	Very Low	10,8
Site preparation for infrastructure establishment and opencast mining	Wetlands	Changes in wetland flow regimes resulting in water quantity alterations in wetlands	Construction and operational	Low	36	Medium	0,6	Low	21,6

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Site preparation for infrastructure establishment and opencast mining	Wetlands	Potential contamination of wetlands with machine oils and construction materials from water runoff reducing water quality	Construction and operational	Low	39	Medium	0,6	Low	23,4
Site preparation for infrastructure establishment and opencast mining	Wetlands	Hardened surfaces creating the potential for increased stormwater runoff leading to Increased erosion and sedimentation.	Construction and operational	Low	26	Medium	0,6	Very Low	15,6
Site preparation for infrastructure establishment and opencast mining	Hydrogeology	Dewatering Impacts on groundwater from opencast mining and associated activities	Construction and operational	Medium	56	Medium	0,6	Low	33,6
Site preparation for infrastructure establishment and opencast mining	Hydrogeology	Proposed Opencast - Water Quality Impacts During Mining	Construction and operational	Very Low	20	Low to medium	0,8	Very Low	16
Site rehabilitation and removal of infrastructure	Hydrogeology	Proposed Opencast - Water Quality Impacts Post Mining	Closure / decommissioning	Low	33	Medium	0,6	Very Low	19,8
Site clearing - Clearing of vegetation and earthworks for opencast mining	Air Quality	Fugitive dust and particulate matter emissions	Construction	Low	33	Medium to high	0,4	Very Low	13,2
Transport of construction materials	Air Quality	Fugitive dust and particulate matter emissions	Construction	Low	24	Medium to high	0,4	Very Low	9,6
Drilling and blasting during opencast mining	Air Quality	Fugitive dust and particulate matter emissions	Operational	Low	30	Medium to high	0,4	Very Low	12
Opencast mining (Includes Bulldozing) and material handling	Air Quality	Fugitive dust and particulate matter emissions	Operational	Low	30	Medium	0,6	Very Low	18
ROM transport	Air Quality	Fugitive dust and particulate matter emissions	Operational	Medium	56	Low to medium	0,8	Medium	44,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Rehabilitation - Demolition and Removal of Infrastructure	Air Quality	Fugitive dust and particulate matter emissions	Closure / decommissioning	Very Low	18	Medium to high	0,4	Very Low	7,2
Rehabilitation of landform	Air Quality	Fugitive dust and particulate matter emissions	Closure / decommissioning	Low	24	Medium	0,6	Very Low	14,4
Buildings/Structures	Blasting	Ground Vibration	Operational	Medium	56	Medium to high	0,4	Low	22,4
Farm Buildings/Structures	Blasting	Ground Vibration	Operational	High	70	Medium to high	0,4	Low	28
Heritage Site	Blasting	Ground Vibration	Operational	High	70	Medium to high	0,4	Low	28
Grave/Cemetery	Blasting	Ground Vibration	Operational	Medium	56	Medium to high	0,4	Low	22,4
Hydrocencus Borehole	Blasting	Ground Vibration	Operational	Medium	56	Medium to high	0,4	Low	22,4
Informal Housing	Blasting	Ground Vibration	Operational	Medium	56	Medium to high	0,4	Low	22,4
Monitoring Borehole	Blasting	Ground Vibration	Operational	Medium	56	Medium to high	0,4	Low	22,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Buildings/Structures	Blasting	Air Blast	Operational	Medium	56	Medium to high	0,4	Low	22,4
Farm Buildings/Structures	Blasting	Air Blast	Operational	High	70	Medium to high	0,4	Low	28
Heritage Site	Blasting	Air Blast	Operational	Medium	52	Medium	0,6	Low	31,2
Industrial Buildings/Structures	Blasting	Air Blast	Operational	Medium	56	Medium to high	0,4	Low	22,4
Informal Housing	Blasting	Air Blast	Operational	High	70	Medium to high	0,4	Low	28
Mine Buildings/Structures	Blasting	Air Blast	Operational	Medium	56	Medium to high	0,4	Low	22,4
Buildings/Structures	Blasting	Fly Rock	Operational	High	70	Medium to high	0,4	Low	28
Heritage Site	Blasting	Fly Rock	Operational	High	70	Medium to high	0,4	Low	28
Grave/Cemetery)	Blasting	Fly Rock	Operational	High	70	Medium to high	0,4	Low	28
Hydrocencus Borehole	Blasting	Fly Rock	Operational	Medium	56	Medium to high	0,4	Low	22,4
Informal Housing	Blasting	Fly Rock	Operational	High	70	Medium to high	0,4	Low	28

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Monitoring Borehole	Blasting	Fly Rock	Operational	Medium	56	Medium to high	0,4	Low	22,4
Site preparation for infrastructure establishment	Noise	Establishment of infrastructure and activities in preparation for mining	Construction	Low	33	Medium	0,6	Very Low	19,8
Opencast mining and related activities	Noise	Noise generation from trucks, blasting and other mining activities resulting in disturbances for communities in close proximity to the site	Operational	Medium	42	Medium	0,6	Low	25,2
Site rehabilitation and removal of infrastructure	Noise	Rehabilitation activities have the potential to generate noise however the impact will be low	Closure / decommissioning	Very Low	20	Medium	0,6	Very low	12
Stone Walling & Potsherds	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Medium	48	Medium	0,6	Low	28,8
Potsherds	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Low	33	Medium	0,6	Very Low	19,8
Potsherds	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Low	33	Medium	0,6	Very Low	19,8
Potsherds	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Low	33	Medium	0,6	Very Low	19,8
Stone Tool	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Low	33	Medium	0,6	Very Low	19,8
Stone Walling	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Low	33	Medium	0,6	Very Low	19,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Stone Walling	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Low	33	Medium	0,6	Very Low	19,8
Building ruin	Archaeology	Disturbance of heritage sites by the proposed opencast mining project	Construction, Operation and Closure	Low	22	Medium	0,6	Very Low	13,2
Site preparation, infrastructure establishment and opencast mining	Palaeontology	It is unlikely that any fossils would be preserved in the intrusive volcanic rocks found on site as they do not preserve fossils and this is confirmed by the grey colour-coding in the SAHRIS palaeosensitivity map. The impact is considered to be low.	Construction and operational	Very low	14	Medium to high	0,4	Very low	5,6
Site preparation, infrastructure establishment and opencast mining	Traffic	Increased traffic volumes from construction vehicles entering and exiting the site increasing risk for accidents, nuisance and noise	Construction	Low	39	Medium	0,6	Low	23,4
Opencast mining and related activities	Traffic	Increased traffic volumes from ROM transportation and trucks used for mining activities	Operational	Medium	56	Medium	0,6	Low	33,6
Opencast mining and related activities	Traffic	Potential to impact ecology through air and noise pollution and an increase in greenhouse gas emissions.	Construction and Operational	Medium	45	Low to medium	0,8	Low	36
Site preparation and establishment of infrastructure	Visual	Negative impacts on aesthetics	Construction	Low	36	Low to Medium	0,8	Low	28,8
Site preparation and establishment of infrastructure	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	Construction	Medium	44	Low to Medium	0,8	Low	35,2
Site preparation and establishment of infrastructure	Visual	Landscape visual change	Construction	Low	36	Medium	0,6	Low	21,6

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
infrastructure									
Opencast mining and related activities	Visual	Negative impacts on aesthetics	Operational	Low	36	Low to Medium	0,8	Low	28,8
Opencast mining and related activities	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	Operational	Low	33	Medium	0,6	Very low	19,8
Opencast mining and related activities	Visual	Landscape visual change	Operational	Medium	44	Low to Medium	0,8	Low	35,2
Site preparation and infrastructure establishment	Socio-economic	Positive impacts of construction employment	Construction	Medium positive	44	Low	1	Medium positive	44
Site preparation and infrastructure establishment	Socio-economic	Local procurement targets being met and application of the existing Procurement Policy will be applied for the duration of construction.	Construction	Medium positive	60	Low to medium	0,8	Medium positive	48
Site preparation and infrastructure establishment	Socio-economic	Local economic contribution and induced impacts	Construction	Medium positive	48	Low	1	Medium positive	48
Site preparation and infrastructure establishment	Socio-economic	Influx of jobseekers / an outside workforce	Construction	Very Low	16	Medium	0,6	Very Low	9,6
Site preparation and infrastructure establishment	Socio-economic	Intrusion impacts	Construction	Very Low	16	Medium	0,6	Very Low	9,6
Site preparation and infrastructure establishment	Socio-economic	Security risks	Construction	Medium	44	Medium	0,6	Low	26,4
Site preparation and infrastructure establishment	Socio-economic	Community health and safety risks	Construction	High	64	Low to medium	0,8	Medium	51,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Opencast mining and related activities	Socio-economic	The chance of employment is high and likely to manifest for direct and downstream industries with benefits for the region.	Operational	Medium positive	56	Low	1	Medium positive	56
Opencast mining and related activities	Socio-economic	Local procurement	Operational	Medium positive	60	Low to Medium	0,8	Medium positive	48
Opencast mining and related activities	Socio-economic	Local economic contribution and induced impacts	Operational	Medium positive	56	Low to Medium	0,8	Medium positive	44,8
Opencast mining and related activities	Socio-economic	Impacts on livelihoods	Operational	Very Low	20	High	0,2	Very Low	4
Opencast mining and related activities	Socio-economic	Capacity building and training	Operational	Medium positive	52	Low to Medium	0,8	Medium positive	41,6
Opencast mining and related activities	Socio-economic	LED / Infrastructure projects	Operational	Medium positive	52	Low to Medium	0,8	Medium positive	41,6
Opencast mining and related activities	Socio-economic	Direct land use impacts associated with the opencast mining	Operational	Low	22	Low	1	Low	22
Opencast mining and related activities	Socio-economic	Resource use impacts	Operational	Very Low	18	Low to Medium	0,8	Very Low	14,4
Opencast mining and related activities	Socio-economic	Tourism impacts	Operational	Low	22	Medium	0,6	Very Low	13,2
Opencast mining and related activities	Socio-economic	Impacts on future developments	Operational	Medium	48	Low to Medium	0,8	Low	38,4
Opencast mining and related activities	Socio-economic	Impacts on sense of place	Operational	Very Low	20	Medium	0,6	Very Low	12

15.5 FINAL SITE MAP

Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers. Attach as Appendix.

Please refer to Appendix 2 and Appendix 3.

15.6 IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR

Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorization.

Specialist recommendations which could be included as conditions have been discussed in Table 38. Specialist management measures including impact management objectives as well as the significance of the impacts prior and post mitigation are provided Table 39 and contained in the respective studies.

15.7 FINAL ALTERNATIVES

(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)

Alternatives have been described within Section 7. The positioning of the mining area was informed by the position of the mineable resource and ensuring a feasible access point to the mineable resource.

13 ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORIZATION

Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorization.

Refer to Table 37 for conditions which could possibly be included in the Environmental Authorisation. The Mitigation measures as specified within the **Error! Reference source not found.** and within Part B: EMPr are to be included in the Environmental Authorisation.

To ensure compliance with, and implementation of the EMPr by:

- Appointing of a suitably qualified individual to oversee implementation of the EMPr during all phases of the project; and
- Appointing a suitably qualified Environmental Control Officer to undertake audits on a regular basis throughout the construction phase.

To ensure that all staff, contractors and sub-contractors are aware of and understand the requirements of the EMPr and environmental issues in relation to their individual areas of work by:

- Developing an induction and training program covering the EMPr, environmental awareness, dealing with environmental incidents and waste management; and
- Advising staff commissioned during pre-construction and construction, including sub-contractors, of EMPr

requirements through the induction program as well as on notice boards at the contractor's camps during construction and notice boards during operation. These notice boards should cover the EMPR, environmental awareness, dealing with emergencies and waste management.

Submission of a Water Use License Application and the undertaking of all relevant specialist studies for that purpose (WUL in process). A detailed water balance will need to be produced before commencement and needs to include all water uses, volumes and rates. It is recommended that the groundwater monitoring network improvements as mentioned in Part B: EMPR be implemented. It is recommended that the numerical groundwater model and transport model be updated annually. A specialist Aquatic Environmental Control Officer (AECO) must be on site for the duration of the process of the river diversion and rehabilitation.

The proposed mine has to be held accountable for any environmental damage caused as a result of their mining process as prescribed by the need for environmental liability financial provision. The Air Quality Monitoring Programme needs to be continued with as per the current monitoring programme. SASS needs to be implemented at the mine as indicated in Part B: EMPR. The Surface Water monitoring programme needs to be implemented. The recommendations made by the Heritage Specialist in terms with the National Heritage Resources Act (25 of 1999) in order to avoid the destruction of heritage remains associated with the areas demarcated for development need to be included.

14 DESCRIPTION OF ANY ASSUMPTION, UNCERTAINTIES AND GAPS IN KNOWLEDGE

(Which relate to the assessment and mitigation measures proposed?)

Please refer to Section 13 giving a description of all the "Limitations and Assumptions" of the study. No other uncertainties are known at this stage relating to the assessment or the mitigation measures.

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

18.1 REASONS WHY THE ACTIVITY SHOULD BE AUTHORIZED OR NOT

Please refer to Section 15.4 for the impact statement. The findings conclude that, provided that the recommended mitigation and management measures are implemented, there are no environmental fatal flaws that post the provided mitigation, should prevent the proposed project from proceeding. The proposed Buffelsfontein West Opencast and associated infrastructure can, therefore, go ahead.

18.2 CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORIZATION

Please refer to Section 16, which states the conditions which could possibly be included.

18.2.1 Rehabilitation Requirements: Closure Objectives

Adhere to the Closure and Rehabilitation Plan (Appendix 19). The following broadly accepted principles have

been adopted to guide the preliminary closure planning for Buffelsfontein West Opencast Section:

- Providing the vision, objectives, targets, and criteria for final rehabilitation, decommissioning and closure of the project.
- Outlining the design principles for closure.
- Explaining the risk assessment approach and outcomes and linking closure activities to risk rehabilitation.
- Detailing the closure actions that clearly indicate the measures that will be taken to mitigate and/or manage identified risks and describes the nature of residual risks that will need to be monitored and managed post-closure.
- Committing to a schedule, budget, roles, and responsibilities for final rehabilitation, decommissioning and closure of each relevant activity or item of infrastructure.
- Identifying knowledge gaps and how these will be addressed and filled.
- Detailing the full closure costs for the life of project at increasing levels of accuracy as the project develops and approaches closure in line with the final land use proposed, and
- Outlining monitoring, auditing, and reporting requirements.

According to the NEMA GNR 1147 the objective of the final rehabilitation, decommissioning and closure plan, is to identify a post-mining land use that is feasible.

- Rehabilitation and Closure Planning must comply with relevant legislation, as well as with generally accepted good practices.
- Closure objectives must be realistic and achievable.
- Closure related rehabilitation of land disturbed by mining must be conducted to allow for pre-determined post-mining land uses, as agreed with stakeholders. In this regard, the rehabilitated areas must be safe, stable, and non-polluting for integration into the existing land uses.
- Closure actions / measures conceptualised and implemented must limit the potential adverse effects of the closed mine site on the receiving environment, and thereby ensure that the quality of life of the surrounding / resident communities is not compromised after closure by possible threats to the health and safety of people and their animals.
- Closure measures must be sustainable under foreseeable natural events.
- Priority must be given to the use of locally available natural materials and / or vegetation as opposed to imported / synthetic material and / or exotic vegetation. The measures provided must be appropriate for the site-specific conditions.
- Manage activities within the study area in order to maintain and/ or improve ecological integrity of the study area.
- Maximise the service provision and ecological function of the watercourse.
- The success, performance and sustainability of the closure measures must be demonstrated and confirmed by suitable monitoring and measurement for an adequate period post-closure.
- A site with limited residual care-and-maintenance requirements must be sought. In this regard, proven sustainable passive measures must be favoured over measures that require ongoing maintenance and / or active care post-closure.

- Involvement of stakeholders must be undertaken in a meaningful manner to inform closure planning by reflecting local requirements, priorities, and preferences, as well as the requirements as stipulated in local and provincial planning as well as the municipal Integrated Development Plans / frameworks, and
- Closure should be achieved as efficiently and cost effectively as possible.

18.2.2 SPECIFIC CLOSURE ACTIONS

The closure actions related to the Buffelsfontein West Opencast Section are as follows:

Table 40: Closure Actions

Aspect	Closure Action
Physical Stability	<ul style="list-style-type: none"> – Manage available soil carefully during the life of mine to limit the damage to an already scarce and denuded resource. – Design constructs a post-mining landform to specified elevations, ensuring a free-draining topography. – Benches to be created in the slope to break a single continuous slope. Steep sections to be protected with rocks. – Replace topsoil to specified depths on prepared areas and rip with an agricultural ripper to alleviate compaction and revegetate, and – Ensure that all rehabilitated areas on the mine site are free-draining.
Environmental Quality	<ul style="list-style-type: none"> – Clean up sources of possible surface water contamination still present on the mine site to protect the downstream receiving environment. – Ensure that the rehabilitated project site is free-draining. – Demonstrate by means of suitable sampling and analysis that the rehabilitated area is not causing contamination, and – Monitor surface and groundwater against water quality limits and baseline to determine if any pollution plume is developing or if surface decant is taking place.
Health and Safety	<ul style="list-style-type: none"> – Limit dust generation on the rehabilitated mine site that could cause nuisance and / or health effects to surrounding communities. – Revegetate all bare areas as soon as possible, and – Demonstrate by means of suitable sampling and analysis that the threshold levels of wind-borne dust and associated contaminants are acceptable.
Land Capability Land Use	<ul style="list-style-type: none"> – Ensure that the rehabilitated portions of the project site are safe and physically and chemically stable in the long-term. – Limit the loss of topsoil by stripping all areas to be disturbed and the pit fringes. – Replace soils to specified depths. – Define physical and chemical amelioration based on soil fertility analysis and interpretation by a suitable qualified professional. – The area will be restored to agricultural land use. – Conduct rehabilitation monitoring of soils and vegetation for three (3) years, and

Aspect	Closure Action
	<ul style="list-style-type: none"> – Conduct a post-closure land use and capability assessment after year 3 to demonstrate the achieved end land use.
Landscape viability	<ul style="list-style-type: none"> – Establish rehabilitated slopes on post-mining landform to preserve vital resources such as growth medium and nutrients, as far as possible, and stabilising disturbed areas to prevent erosion in the short- to medium-term until a suitable vegetation cover has established. – Benches to be established to limit erosion. – Replace soils to specified depths, and – Establish vegetation based on dedicated fertility sampling, analysis, and specifications.
Biodiversity	<ul style="list-style-type: none"> – Monitor, control, eradicate and manage declared Category 1, 2 and 3 invader plant species. – Establish a biodiversity management plan for rehabilitation, and – Establish viable self-sustaining vegetation communities that will encourage the reintroduction of local natural fauna as far as possible.
Socio-economic	<ul style="list-style-type: none"> – Manage the implementation and the expectations of various stakeholders. – Update SLP to include structure/s that will be handed over to the community during final closure.

18.3 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The Buffelsfontein West Opencast Section is an existing operation. The proposed opencast will extend the Life of Mine for a further 5 – 6 years.

16 FINANCIAL PROVISION

Environmental management infrastructure that is required at the outset will be financed out of the project capital. On-going environmental management and rehabilitation as identified in this document and as set out in the EMP will be funded from working costs during the life of the project.

19.1 EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED

This section provides details on the closure cost. The outlined assumptions and limitations also underpin the basis of this closure cost determination. It is important to note that the estimation is based on existing information. The closure cost calculation has been performed in accordance with NEMA GNR 1147 financial provision, in the transitional period.

19.1.1 METHODOLOGY

Table 41: Calculation of the Financial Provision required for rehabilitation of the Buffelsfontein West Opencast Section

Calculation of the Scheduled Quantum for Samancor Chrome (Pty) Ltd: Western Chrome Mines (Pty) Ltd Proposed Buffelsfontein West Opencast Section							
Company:	Samancor Chrome (Pty) Ltd: WCM	Location		North-West Province			
Mining Right:	NW 30/5/1/2/2/480 MR; NW 30/5/1/2/2/482 MR;	Date		2023/08/23			
Operation:	Proposed Buffelsfontein West Opencast	Estimated Year of Closure		2028			
Farm Portions:	Portion 139 and the remaining extent of portion 35 of the farm Buffelsfontein 465 JQ	LoM		5 Years			
Prepared by:	Elemental Sustainability (Pty) Ltd	Year of Assessment		FY 2023			
Risk Class:	C						
Area Sensitivity:	Medium						
		BOQ			Scheduled Closure Liability		
Component No.	Description	Unit	A1	B	C	D	E1 = A1*B*C*D
			Quantity scheduled	Master rate	Multiplication factor	Weighting factor 1	Scheduled Closure Liability
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m ³	-	R17,95	1	1	R -
2(A)	Demolition of steel buildings and structures:	m ²	265	R250,02	1	1	R66 178,51
2(B)	Demolition of reinforced concrete buildings and structures	m ²	924	R368,45	1	1	R340 388,97
3	Rehabilitation of access roads	m ²	2 200	R44,74	1	1	R98 427,76
4(A)	Demolition and rehabilitation of electrified railway lines	m	-	R434,24	1	1	R -

4(B)	Demolition and rehabilitation of non-electrified railway lines	m	-	R236,86	1	1	R	-
5	Demolition of housing and/or administration facilities	m ²	29	R500,03	1	1		R14 450,98
	Sub Total for Infrastructure Areas							R519 447,22
6	Opencast rehabilitation including final voids and ramps	ha	22	R254 491,02	0,52	1		R2 851 707,25
7	Sealing of shafts, adits and inclines	m ³	144,00	R134,22	1	1		R19 327,63
8(A)	Rehabilitation of overburden and spoils	ha	-	R174 748,74	1	1	R	-
8(B)	Rehabilitation of processing waste deposits and evaporation ponds (basic salt-producing waste)	ha	1	R217 646,40	1	1		R147 564,26
8(C)	Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)	ha	-	R632 148,32	0,66	1	R	-
9	Rehabilitation of subsided areas	ha	-	R146 325,76	1	1	R	-
	Sub Total for Mining Areas							R3 018 642,67
10	General surface rehabilitation:	ha	48	R138 430,48	1	1		R6 652 521,19
11	River diversions	ha	-	R138 430,48	1	1	R	-
12	Fencing	m	4 395	R157,91	1	1		R693 994,64
13	Water management	ha	22	R52 635,16	0,25	1		R292 484,40
14	2 to 3 years of maintenance and aftercare	ha	70	R1 842,23	1	1		R129 479,47
15(A)	Specialist study	Sum	1	R60 006,41	1	1		R60 006,41
15(B)	Specialist studies (soil remediation)	Sum	-	R69 217,04	1	1	R	-
	Sub Total for General Areas							R7 828 476,91
				Sum of items 1 - 15 above				R11 366 566,81

				Total Premature
SubTotal 1 Multiply by Weighting Factor 2		1,00		R11 366 566,81
	Preliminary and General	Add 6% of Subtotal 1 if Subtotal 1 R 100,000,000.00		-
		Add 12% of Subtotal 1 if Subtotal 1 R 100,000,000.00		R1 363 988,02
	Contingency		10% of Sub Total 1	R1 136 656,68
	Sum of management and contingency (excl. VAT)		SubTotal 2	R2 500 644,70
		Sub Total 3	R13 867 211,51	
		Add 15% VAT	R2 080 081,73	
		GRAND TOTAL (incl. VAT)	R15 947 293,23	

19.2 DESCRIBE THE CLOSURE OBJECTIVES AND THE EXTENT TO WHICH THEY HAVE BEEN ALIGNED TO THE BASELINE ENVIRONMENT DESCRIBED UNDER REGULATION 22 (2) (D) AS DESCRIBED IN 2.4 HEREIN

Adhere to the Closure and Rehabilitation Plan compiled for the specific project (Appendix 19) and refer to Objectives provided in Section 18.2.1. above.

19.3 CONFIRM SPECIFICALLY THAT THE ENVIRONMENTAL OBJECTIVES IN RELATION TO CLOSURE HAVE BEEN CONSULTED WITH LANDOWNER AND INTERESTED AND AFFECTED PARTIES

The environmental objective in relation to closure have been made available to all registered I&APs for comment. All comments received and the relevant meeting minutes will be appended to this report.

19.4 PROVIDE A REHABILITATION PLAN THAT DESCRIBES AND SHOWS THE SCALE AND AERIAL EXTENT OF THE MAIN MINING ACTIVITIES, INCLUDING THE ANTICIPATED MINING AREA AT THE TIME OF CLOSURE

Refer to Section 18.2.1 above. All infrastructure established will be removed and rehabilitated in accordance with the approved Closure Plan and Final Land use. Also refer to Appendix 19.

19.5 EXPLAIN WHY IT CAN BE CONFIRMED THAT THE REHABILITATION PLAN IS COMPATIBLE WITH THE CLOSURE OBJECTIVES

The rehabilitation plan will be compiled in accordance with the objectives and goals according to the Mine and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) as amended and GNR 1147 of the National Environmental Management Act, 1988 (Act No. 107 of 1998). A preliminary Closure Plan has been drafted and is included in Appendix 19.

19.6 CALCULATE AND STATE THE QUANTUM OF THE FINANCIAL PROVISION REQUIRED TO MANAGE AND REHABILITATE THE ENVIRONMENT IN ACCORDANCE WITH THE APPLICABLE GUIDELINE

The quantum of the financial provision required to manage and rehabilitate the environment is calculated in Section 19.1.1 above. An amount of R15 947 293,23 was determined as the financial provision required for rehabilitation.

19.7 CONFIRM THAT THE FINANCIAL PROVISION WILL BE PROVIDED AS DETERMINED

Samancor Chrome Ltd. will provide the amount/financial guarantee as specified to the DMRE. These guarantees are audited on a yearly basis and need to be updated on a yearly basis.

17 DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

20.1 DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS

(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation).

There were no comments, inputs or changes during the scoping phase that resulted in the deviations from the methodology used in determining the significance of potential environmental impacts and risks. The opencast mining extent increased and now goes to the grey line indicated as Final Highwall. The purple line next to the Final Highwall is where the pit will end (refer to Figure 2). This change however did not result in deviations from the methodology used in determining the significance of potential environmental impacts and risks.

20.2 MOTIVATION FOR THE DEVIATION

There were no comments, inputs or changes during the scoping phase that resulted in the deviations from the methodology used in determining the significance of potential environmental impacts and risks.

18 OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

21.1 COMPLIANCE WITH THE PROVISIONS OF SECTIONS 24(4)(A) AND (B) READ WITH SECTION 24 (3) (A) AND (7) OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) THE EIA REPORT MUST INCLUDE THE FOLLOWING:

21.1.1 IMPACT ON THE SOCIO-ECONOMIC CONDITIONS OF ANY DIRECTLY AFFECTED PERSON

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as Appendix.

Samancor Chrome Limited's Buffelsfontein Mine is an existing mine with an SLP in place. The proposed activities will extend the Life of Mine and ensure the job security of the existing workers.

21.1.1.1 CRIME, HEALTH AND HIV

As the mine is existing no additional influx of foreigners and job seekers should occur started no further negative social impacts such as crime, alcoholism and prostitution in and around the project area are expected. A medium to low or low negative impact is expected, with several positive impacts as well.

21.1.1.2 LAND TENURE, USE AND CAPABILITY

The land tenure and land capability will not be further impacted as the proposed activities will occur within the existing mining right boundary area.

21.1.1.3 NOISE

The impact of noise from various aspects (including blasting) and equipment of the mining operation will be of medium to low negative significance. Recommendations have been made for mitigation measures to ensure that impacts will be low, managed and monitored.

21.1.1.4 AIR POLLUTION

According to the Air Quality Impact Assessment, In both the mitigated and unmitigated scenarios, it is predicted that sensitive receptors will exceed the monthly dust fallout limit. The impacts from dust fallout and Particulate matter can be reduced by implementing dust control measures. The mine should ensure that unpaved roads are continuously watered and treated with dust binding additive products to reduce the volume of fugitive dust emitted from unpaved roads.

21.1.1.5 LIGHT AND VISUAL ASPECTS

Light and visual impacts will be of low significance overall. Visual impacts, like any other will affect sensitive receptors identified close by more than those on a local scale. The project is located in an area already dominated by existing mining activities and visual impacts are not expected to be significant.

21.1.1.6 ECONOMIC OPPORTUNITIES, INFRASTRUCTURE DEVELOPMENT AND EMPLOYMENT

To fulfill social responsibility, and in line with the mine's employment strategy, workers are sourced from the host communities located closest to the Project and in cases where the required skills cannot be sourced, workers are recruited from the wider province and/or nationally. At this stage 79% permanent employees and 85% contractors originate from the North West Province. In addition, further employment will be created through production and consumption induced effects at downstream and supporting industries.

The construction activities can improve local income levels with subsequent higher spending benefits to local businesses. In addition to direct salaries and wages during the five-year construction period, which are estimated at R3 million (Buffelsfontein West MWP), the mine's Enterprise Development Strategy focuses on SMME's from affecting communities, which in turn will create employment opportunities. It is anticipated that a large proportion of the wage bill (direct and induced) would be spent within the local municipal area and district, resulting in local and regional economic benefits with subsequent indirect spin-offs for local businesses. Further downstream opportunities for suppliers will be created due to the increased need in e.g. fuel, construction materials, equipment and so forth.

21.1.2 IMPACT ON ANY NATIONAL ESTATE REFERRED TO IN SECTION 3(2) OF THE NATIONAL HERITAGE RESOURCES ACT

(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as Appendix 2.19.2 and confirm that the applicable mitigation is reflected in 2.5.3; 2.11.6.and 2.12.herein).

The Archaeological Impact Assessment for the proposed Buffelsfontein West Opencast Section and associated infrastructure was undertaken by Tobias Coetzee. Mitigation measures have been included in this EIAR and the specialist assessment is included in the impact management tables and EMP. The proposed activities will not impact on heritage features.

21.2 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT.

(the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist.)

Please refer to Section 7 where alternatives have been discussed in detail.

19 UNDERTAKING

Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Environmental Impact Assessment Report and the Environmental Management Programme report.

The signed undertaking is included in Section 11 of Part B and is valid for both the Environmental Impact Assessment (Part A) and the Environmental Management Programme (Part B).

23. REFERENCES

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- Samancor Chrome Limited. 2022. Mining Work Programme.

24 APPENDICES

Appendix 1: Qualifications and Resume of EAP

Appendix 2: Locality Plans (A3)

Appendix 3: Master layout plan (A3)

Appendix 4: Public Participation Documents

Appendix 5: Specialist report – Agricultural Assessment: Compliance Statement

Appendix 6: Specialist report – Terrestrial Ecology Assessment

Appendix 7: Specialist report – Aquatic Ecology Impact Assessment

Appendix 8: Specialist report – Watercourse Delineation and Functionality Assessment

Appendix 9: Specialist report – Hydrogeological Impact Assessment

Appendix 10: Specialist report – Surface Water Assessment

Appendix 11: Specialist report – Air Quality Impact Assessment

Appendix 12: Specialist report – Environmental Noise Impact Assessment

Appendix 13: Specialist report – Blasting Assessment

Appendix 14: Specialist report – Phase 1 Archaeological Impact Assessment

Appendix 15: Specialist report – Palaeontological Impact Assessment

Appendix 16: Specialist report – Traffic Impact Assessment

Appendix 17: Specialist report – Social Impact Assessment

Appendix 18: Stormwater Management and Water Balance Report

Appendix 19: Closure Cost Assessment

Appendix 20: Waste Classification Report