

**ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT  
PROGRAMME REPORT FOR PROPOSED SAMANCOR CHROME LTD MILLSSELL AND  
WATERKLOOF SECTIONS OPENCAST MINING**

**Portions 54, 112, 113, 218, 231, 253, 262, 270, 296, 336, 341, 459, 513, 528, 577, and RE 55 of  
the farm Waterkloof 305 JQ and Portions 18, 19, 20 and 24 of the farm Waterval 306 JQ.**

**DMRE REF: NW 30/5/1/2/3/2/1/ (236, 260 & 479) EM**

**July 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]**


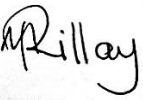
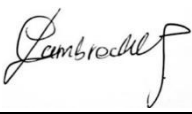
## DOCUMENT HISTORY

### Document Control, Quality Control and Disclaimer

<b>Report</b>	<b>ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT FOR THE SAMANCOR MILLSSELL WATERKLOOF SECTIONS OPENCAST MINING</b>		
<b>Client</b>	Samancor Chrome Ltd: Western Chrome Mines		
<b>Responsible Person</b>	Contact Person: Mpho Mokone Contact nr.: 014 574 6051 Email: Mpho.Mokone@SamancorCr.com		
<b>Report Number</b>	Waterkloof EIA & WULA_06_2022	<b>Report Status</b>	Draft for Public Review 04 August 2023 to 04 September 2023
<b>Draft Report</b>	Public Review	<b>Final Report:</b>	To be confirmed

Report no	Date	Version	Status
0.0	25 July 2023	0.0	Draft

### DOCUMENT COMPILED AND REVIEWED BY

Responsible person	Date	Position
Sonja van de Giessen	25 July 2023	EAP – Senior Specialist (Pr.Sci.Nat) EAPASA
Signature		
Co-author		
Melissa Pillay	25 July 2023	Senior Specialist
Signature		
Reviewer person	Date	Position
Corlien Lambrechts	25 July 2023	EAP – Senior Specialist (Pr.Sci.Nat) EAPASA
Signature		



**mineral resources**

Department:  
Mineral Resources  
**REPUBLIC OF SOUTH AFRICA**

**ENVIRONMENTAL IMPACT ASSESSMENT REPORT  
AND  
ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT**

**FOR LISTED ACTIVITIES ASSOCIATED WITH THE PROPOSED OPENCAST MINING OF THE  
CHROME AT THE MILLSSELL WATERKLOOF SECTIONS**

**PORTIONS 54, 112, 113, 218, 231, 253, 262, 270, 296, 336, 341, 459, 513, 528, 577, AND RE 55  
OF THE FARM WATERKLOOF 305 JQ AND PORTIONS 18, 19, 20 AND 24 OF THE FARM  
WATERVAL 306 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).**

<b>Name of Applicant</b>	<b>Samancor Chrome Ltd</b>
<b>Project</b>	Millsell Waterkloof Sections Opencast Mine
<b>Contact person</b>	Mpho Mokone
<b>Tel No</b>	014 574 6051
<b>Email</b>	Mpho.Mokone@SamancorCr.com
<b>Postal Address</b>	PO Box 245, Mooinooi, 0325
<b>File Reference Numbers</b>	Elemental Ref. : Waterkloof EIA & WULA_06_2022 DMRE REF: NW 30/5/1/2/3/2/1/ (236, 260 & 479) EM

## **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.

## Table of Contents

	Page
<b>1 CONTACT PERSON AND CORRESPONDENCE ADDRESS</b> .....	<b>1</b>
1.1 <i>Details of the EAP</i> .....	1
1.2 <i>Expertise of the EAP</i> .....	1
1.2.1 <i>The Qualifications of the EAP (With Evidence)</i> .....	1
1.2.2 <i>Summary of the EAPs Past Experience (In Carrying Out the Environmental Impact Assessment Procedure)</i> .....	2
<b>2 DESCRIPTION OF THE PROPERTY</b> .....	<b>4</b>
2.1 SITE LOCATION.....	4
2.2 LOCALITY MAP (SHOW NEAREST TOWN, SCALE NOT SMALLER THAN 1:250 000).....	5
<b>3 DESCRIPTION OF THE SCOPE OF THE OVERALL ACTIVITY</b> .....	<b>9</b>
3.1 LISTED AND SPECIFIED ACTIVITIES.....	9
3.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN.....	15
3.2.1 <i>Background</i> .....	15
3.2.2 <i>The Mineral Resource</i> .....	18
3.2.2 <i>The Mineral Resource MAPS</i> .....	19
3.2.3 <i>Mining Method</i> .....	22
3.3 DESCRIPTION OF MINERAL PROCESSING OPERATIONS.....	23
3.3.1 <i>Summary of customer specifications and details of any proposed beneficiation of the products</i> 23	
3.3.3.1.1 <i>Millsell Mine Beneficiation Plant</i> .....	25
3.3.3.1.2 <i>Drying and Bagging Plant</i> .....	25
3.3.3.1.3 <i>WHIMS Plant</i> .....	26
3.3.3.1.4 <i>Extraction of the Associated Minerals</i> .....	27
3.3.2 <i>Summary of infrastructure requirements such as roads, rail, electricity and water</i> .....	28
3.3.3 <i>Tailings Reclamation Plant</i> .....	28
3.3.4 <i>Product</i> .....	28
3.3.5 <i>Markets</i> .....	29
3.4 MINE INFRASTRUCTURE.....	29
3.4.1 <i>General and Hazardous Waste</i> .....	34
3.4.2 <i>Waste classification</i> .....	34
3.4.3 <i>Hazardous Waste</i> .....	34
3.4.4 <i>Potable Water Supply</i> .....	36
3.4.5 <i>Sewage</i> .....	36
3.4.6 <i>Mine Access Road</i> .....	36
3.4.7 <i>Security and Access Control</i> .....	36
3.4.8 <i>Servitudes</i> .....	36
3.4.9 <i>Stormwater management</i> .....	37
3.5 EXISTING AND PROPOSED INFRASTRUCTURE.....	37
<b>4 POLICY AND LEGISLATIVE CONTEXT</b> .....	<b>42</b>
<b>5 NEED AND DESIRABILITY OF THE ACTIVITIES</b> .....	<b>53</b>
<b>6 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED</b> .....	<b>63</b>
6.1 EXPLANATION OF TIMEFRAMES.....	63
6.2 EXPLANATION OF THE PRODUCTION BUILD UP PERIOD ONCE PRODUCTION COMMENCES.....	64
6.3 EXPLANATION OF PRODUCTION DECLINE PERIOD (AS GRADES DETERIORATE).....	65
<b>7 MOTIVATION FOR THE OVERALL PREFERRED SITE, ACTIVITIES AND TECHNOLOGY ALTERNATIVE</b>	

7.1	MOTIVATION FOR THE PREFERRED SITE, ACTIVITIES AND ALTERNATIVES .....	66
7.2	DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED .....	67
7.2.1	Site Alternatives .....	67
7.2.2	The property on which the location or where it is proposed to undertake the activity .....	68
7.2.3	The type of activity to be undertaken .....	68
7.2.3.1	<b>MINING</b> .....	68
7.2.3.2	<b>AGRICULTURE</b> .....	68
7.2.3.2	<b>MIXED LAND USE (AGRICULTURE AND MINING)</b> .....	69
7.2.4	Transport Alternatives .....	69
7.2.5	Processing Technological Alternatives.....	70
7.2.6	The design or layout of the Activity .....	70
7.2.7	No go option.....	71
<b>8</b>	<b>DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED .....</b>	<b>72</b>
<b>8.1</b>	<b>PUBLIC PARTICIPATION .....</b>	<b>72</b>
<b>8.2</b>	<b>LEGAL FRAMEWORK .....</b>	<b>72</b>
8.2.1	<i>Section 39: Activity on Land owned by Person other than the Proponent - Subregulation 1 and 2(a), (b) and (c)</i> .....	73
8.2.2	<i>Section 41: Public Participation Process</i> .....	73
8.2.2.1	Section 41, Subregulation 2 (a) – Site Notices .....	73
8.2.2.2	Section 41, Subregulation 2 (b) – Written Notice.....	73
8.2.2.3	Details of Background Information Document (BID) .....	75
8.2.2.4	Section 41, Subregulation 2 (c), (d) & (e) – Advertisements.....	75
8.2.2.5	Section 41, Subregulation 3.....	76
8.2.2.6	Section 41, Subregulation 4.....	76
8.2.2.7	Section 41, Subregulation 5, 6 & 7 .....	77
8.2.3	<i>Section 42: Register of Interested and Affected Parties</i> .....	78
8.2.3.1	Interested and Affected Party (I&AP) Database .....	78
8.2.4	<i>Section 43: Registered Interested and Affected Parties Entitled to Comment on Reports and Plans</i> 78	
8.2.4.1	Interested and Affected Parties and Commenting Authorities .....	78
8.2.4.2	Decision Making Authorities in terms of the environmental authorisation AND water use licence.....	79
8.2.4.3	<b>ENVIRONMENTAL AUTHORISATION AND SECTION 102 APPLICATION</b> .....	79
8.2.4.4	<i>Section 44: Comments of Interested and Affected Parties to be recorded in reports submitted to competent authority</i> .....	80
8.2.4.4.1	Meetings.....	80
8.2.5	Summary of Issues Raised By I&APs from Public Participation.....	80
<b>8.3</b>	<b>WAY FORWARD</b> .....	<b>114</b>
<b>8.4</b>	<b>DMRE REVIEW OF ENVIRONMENTAL IMPACT ASSESSMENT AND ENVIRONMENTAL MANAGENT REPORT – FINALISED REPORT .....</b>	<b>114</b>
<b>9</b>	<b>THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES .....</b>	<b>114</b>
<b>10</b>	<b>THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE SITES: BASELINE ENVIRONMENT ..</b>	<b>114</b>
10.1	<b>GEOLOGY</b> .....	114
10.1.1	<i>Regional Geology</i> .....	114
10.1.2	<i>Local Geology</i> .....	115
10.2	<b>TOPOGRAPHY</b> .....	116
10.3	<b>CLIMATE</b> .....	117
10.3.1	<i>Temperature</i> .....	117
10.3.2	<i>Precipitation and Evaporation</i> .....	118
10.2.3	<i>Mean Annual Runoff</i> .....	119
10.4	<b>AGRICULTURE AND LAND CAPABILITY ASSESSMENT .....</b>	<b>119</b>

10.4.1	<i>Present Land Uses</i> .....	119
10.4.2	<i>Regional Land Uses</i> .....	121
10.4.3	<i>Soil Properties</i> .....	121
10.4.3	<i>Sensitivity analysis</i> .....	121
10.4.3.1	Ecological Sensitivity– ScreeningTool .....	121
10.4.3.2	Specialist Site Analysis.....	122
10.4.4	<i>Land Use Capability</i> .....	122
10.4.5	<i>Agricultural Compliance Statement</i> .....	124
10.5	TERRESTRIAL ECOLOGY .....	124
10.5.1	<i>Methodology</i> .....	124
10.5.2	<i>Sensitivity Assessment</i> .....	125
10.5.3	<i>Flora (Plant Life)</i> .....	126
10.5.3.1	Biomes .....	126
10.5.3.2	Vegetation Types .....	126
10.5.3.3	Vegetation Conservation Status.....	127
10.5.3.4	POSA Plant Species .....	129
10.5.3.5	Site Evaluation .....	130
10.5.4	<i>Fauna (Animal Life)</i> .....	134
10.5.4.1	Mammals.....	134
10.5.4.2	Avifaunal .....	134
10.5.4.3	Butterflies .....	135
10.5.4.4	Other Invetebrates.....	135
10.5.4.5	Reptiles .....	135
10.5.4.6	Amphibians .....	135
10.5.4.7	Site Evaluation .....	135
10.5.4.8	Species encountered during the field assessment .....	136
10.5.5	<i>Sensitivity</i> .....	137
10.6	SURFACE WATER.....	139
10.6.1	<i>Ecoregion</i> .....	139
10.6.2	<i>Water Management Area</i> .....	141
10.6.3	<i>Strategic Water Resource area</i> .....	141
10.6.4	<i>Drainage Systems</i> .....	142
10.6.5	<i>Riparian Vegetation</i> .....	143
10.6.6	<i>Freshwater Ecosystem Priority Areas</i> .....	144
10.6.7	<i>Resoruce Class</i> .....	145
10.6.8	<i>Mean Annual Runoff and Reserve Determination</i> .....	146
10.6.9	<i>Present Ecological State and Importance</i> .....	146
10.6.10	<i>Characteristics of the Sub-Quaternary Reach</i> .....	147
10.6.11	<i>Surface Water Quality</i> .....	149
10.6.12	<i>IHAS and SASS 5 Assessment</i> .....	150
10.6.13	<i>Surface Water Sensitivity</i> .....	152
10.7	AQUATIC ECOLOGY .....	153
10.7.1	<i>Methodology</i> .....	153
10.7.2	<i>Integrated Unit Analysis and Resources Quality Objectives</i> .....	154
10.7.3	<b><i>Characteristics of the SUB-Quaternary Reach</i></b> .....	159
10.7.4	<b><i>Delineation of Riparian Zones and Indices</i></b> .....	161
10.7.5	<b><i>Sensitivity</i></b> .....	161
10.8	WETLANDS .....	162
10.8.1	<i>Methodology</i> .....	162
10.8.2	<i>Land Use and Ecological State</i> .....	163
10.8.3	<i>Wetland Classification and System Classification</i> .....	163
10.8.4	<i>Wetland Unit Description and DElineation</i> .....	164
10.8.5	<i>Wetland Integrity and Functional Assessment</i> .....	165
10.8.6	<i>Buffer Zone Determination</i> .....	167

10.8.7 Summary of Results .....	167
10.9 HYDROGEOLOGY.....	169
10.9.1 Methodology .....	169
10.9.2 Aquifer Classification .....	169
10.9.3 Hydrocensus.....	169
10.9.4 Groundwater Levels.....	172
10.9.5 Groundwater Quality.....	172
10.9.6 Groundwater Potential Contaminants.....	176
10.10 HYDROPEDOLOGY .....	176
10.10.1 Methodology .....	176
10.10.2 Terrain and Drainage.....	176
10.10.3 Land Types .....	176
10.10.4 Soil Forms.....	178
10.10.5 Hillslope Hydrology.....	179
10.11 AIR QUALITY .....	180
10.11.1 Methodology .....	181
10.11.2 Modelling Scenarios .....	181
10.11.3 Meteorological Overview .....	181
10.11.4 Local Wind Field .....	182
10.11.5 Dust Fallout Rates .....	183
10.11.6 Surrounding Sources of Air Pollution .....	183
10.11.7. Agricultural Activity and Potential Biomass Burning.....	185
10.11.8 Extraction Sites and Waste Resource Dumps .....	185
10.11.9 Vehicle Dust Entrainment on Unpaved Roads .....	186
10.12 NOISE.....	186
10.12.1 Methodology .....	186
10.12.2 Modelled Scenarios .....	186
10.12.3 Baseline Sound Pressure Measurements .....	187
10.12.3.1 Attended Measurements – A01 .....	187
10.12.3.1 Attended Measurements – A02.....	187
10.12.4 Baseline Noise Levels Findings and Identified SANS10103:2008 Rating Level.....	188
10.13 SITES OF ARCHAEOLOGICAL AND CULTURAL INTEREST .....	188
10.13.1 Methodology .....	188
10.13.2 Archaeological and Historical Remains.....	189
10.13.2.1 Stone Age Remains .....	189
10.13.2.2 Iron Age Farmer Remains .....	189
10.13.2.3 Historical Remains .....	189
10.13.2.4 Contemporary Remains .....	190
10.13.2.5 Graves/Burial Sites.....	190
10.13.2.6 Statement of Significance .....	190
10.14 PALEONTOLOGICAL .....	192
10.14.1 Paleontological Sensitivity.....	192
10.15 TRAFFIC .....	192
10.15.1 Methodology .....	192
10.15.2 Existing Road Network .....	193
10.15.3 Road Network.....	193
10.16 VISUAL .....	194
10.16.1 Methodology .....	194
10.16.2 Affected Landscape and Visual Analysis .....	194
10.16.3 Landscape Assessment .....	194
10.16.3.1 Landscape Integrity and Character .....	194
10.16.3.2 Landscape Scenic Quality.....	195
10.16.3.3. Landscape Sensitivity.....	195
10.16.4 Visual Analysis.....	195



10.16.4.1 Viewpoints / Sensitive Receptors .....	195
10.16.4.2 Visual Expsoure and Viewing Distance .....	196
10.16.4.3 Visual Absorption Capacity (VAC).....	198
10.16.4.3 Magnitude of Visual Impact .....	201
10.17 SOCIO ECONOMIC CHARACTERISTICS .....	201
10.17.1 Population Data .....	202
10.17.2 Lanaguage and Race .....	203
10.17.3. Education.....	203
10.17.4. Income .....	204
10.17.5. Employment Per Sector.....	204
10.17.6. Unemployment.....	205
10.17.7 Economic Sectors and Activities .....	205
10.18 BLASTING AND VIBRATION .....	206
10.18.1 Methodology .....	206
10.18.2 Sensitivity Of Project .....	207
10.18.3 Baseline Structure Profile .....	207
<b>11 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE.</b>	<b>208</b>
11.1 ENVIRONMENTAL FEATURES.....	208
11.2 EXISTING INFRASTRUCTURE ON THE STUDY AREA AND IN CLOSE PROXIMITY .....	208
<b>12 DESCRIPTION OF THE CURRENT LAND USES .....</b>	<b>209</b>
12.1 SENSITIVE LANDSCAPES.....	209
<b>13 LIMITATIONS AND ASSUMPTIONS .....</b>	<b>210</b>
13.1 SURFACE WATER AND AQUATIC ECOLOGY ASSESSMENT .....	210
13.2 AQUATIC ECOLOGY .....	210
13.3 TERRESTRIAL ECOLOGY .....	211
13.4 SURFACE WATER AND AQUATIC.....	211
13.5 WETLANDS .....	212
13.6 HYDROGEOLOGY.....	213
13.7 AIR QUALITY .....	213
13.8 NOISE.....	215
13.9 ARCHAEOLOGICAL ASSESSMENT.....	217
13.10 VISUAL ASSESSMENT .....	217
13.11 HYDROPEDOLOGICAL ASSESSMENT .....	217
13.12 BLASTING ASSESSMENT .....	217
13.13 SOCIO-ECONOMIC ASSESSMENT.....	218
<b>14 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 .....</b>	<b>218</b>
14.1 IMPACTS IDENTIFIED FOR THE PROJECT.....	218
14.2 MOTIVATION WHERE NO ALTERNATIVE SITES WERE CONSIDERED .....	219
14.3 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES .....	219
<b>14.4 SPECIALIST INVESTIGATIONS .....</b>	<b>219</b>
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 .....	228
14.5.1 Impact on Geology.....	228
14.5.2 Impacts on Topography.....	228
14.5.3 Impacts on Agriculture .....	228
14.5.4 Aquatic Impacts (Including Aquatic Ecology and Wetlands) .....	228
14.5.5 Impacts on Hydrogeology.....	229

14.5.6	<i>Impacts on Terrestrial Ecology</i> .....	231
14.5.7	<i>Impacts on Hydrogeology</i> .....	232
14.5.8	<i>Visual Impact</i> .....	233
14.5.9	<i>Impacts from Blasting and Vibration</i> .....	234
14.5.10	<i>Traffic Impacts</i> .....	234
14.5.11	<i>Noise Impacts</i> .....	234
14.5.12	<i>Air Quality Impacts</i> .....	235
14.5.13	<i>Heritage Impacts</i> .....	239
14.5.14	<i>Paleontological Impacts</i> .....	239
14.5.15	<i>Socio-Economic Impacts</i> .....	239
14.6	CUMULATIVE IMPACTS .....	239
14.7	METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS .....	240
<b>15</b>	<b>IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS</b> .....	<b>242</b>
15.1	ASSESSMENT OF EACH IDENTIFIED POTENTIALLY SIGNIFICANT IMPACT AND RISK .....	242
15.2	THE POSSIBLE MITIGATION MEASURES THAT COULD BE APPLIED AND THE LEVEL OF RISK .....	280
15.3	SUMMARY OF SPECIALIST REPORTS .....	302
15.4	ENVIRONMENTAL IMPACT STATEMENT .....	309
15.4.1	SUMMARY OF THE KEY FINDINGS OF THE ENVIRONMENTAL IMPACT ASSESSMENT .....	309
15.5	FINAL SITE MAP .....	330
15.6	IMPACT MANAGEMENT OBJECTIVES AND THE IMPACT MANAGEMENT OUTCOMES FOR INCLUSION IN THE EMPR	330
15.7	FINAL ALTERNATIVES .....	347
<b>16</b>	<b>ASPECTS FOR INCLUSION AS CONDITIONS OF AUTHORIZATION</b> .....	<b>347</b>
<b>17</b>	<b>DESCRIPTION OF ANY ASSUMPTION, UNCERTAINTIES AND GAPS IN KNOWLEDGE</b> .....	<b>348</b>
<b>18</b>	<b>REASONED OPINION AS TO WHETHER THE ACTIVITY SHOULD OR SHOULD NOT BE AUTHORISED</b>	<b>348</b>
18.1	REASONS WHY THE ACTIVITY SHOULD BE AUTHORIZED OR NOT .....	348
18.2	CONDITIONS THAT MUST BE INCLUDED IN THE AUTHORIZATION .....	348
18.2.1	Rehabilitation Requirements: Closure Objectives .....	348
18.2.2	Specific Closure Actions .....	349
18.3	PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED .....	353
<b>19</b>	<b>FINANCIAL PROVISION</b> .....	<b>353</b>
19.1	EXPLAIN HOW THE AFORESAID AMOUNT WAS DERIVED .....	353
19.1.1	<i>Methodology</i> .....	354
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 .....	358
19.3	CONFIRM SPECIFICALLY THAT THE ENVIRONMENTAL OBJECTIVES IN RELATION TO CLOSURE HAVE BEEN CONSULTED WITH LANDOWNER AND INTERESTED AND AFFECTED PARTIES .....	358
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 .....	358
19.5	EXPLAIN WHY IT CAN BE CONFIRMED THAT THE REHABILITATION PLAN IS COMPATIBLE WITH THE CLOSURE OBJECTIVES .....	358
19.6	CALCULATE AND STATE THE QUANTUM OF THE FINANCIAL PROVISION REQUIRED TO MANAGE AND REHABILITATE THE ENVIRONMENT IN ACCORDANCE WITH THE APPLICABLE GUIDELINE .....	358
19.7	CONFIRM THAT THE FINANCIAL PROVISION WILL BE PROVIDED AS DETERMINED .....	358
<b>20</b>	<b>DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY</b> .....	<b>358</b>

20.1	DEVIATIONS FROM THE METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF POTENTIAL ENVIRONMENTAL IMPACTS AND RISKS.....	358
20.2	MOTIVATION FOR THE DEVIATION.....	359
<b>21</b>	<b>OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY.....</b>	<b>359</b>
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:.....	359
21.1.1	<i>Impact on the Socio-Economic Conditions of Any Directly Affected Person.....</i>	359
21.1.1.1	Crime, Health and HIV.....	359
21.1.1.2	Land Tenure, Use and Capability.....	359
21.1.1.3	Noise.....	360
21.1.1.4	Air Pollution.....	360
21.1.1.5	Visual Aspects.....	360
21.1.1.6	Economic Opportunities, Infrastructure Development and Employment.....	360
21.1.2	<i>Impact on Any National Estate Referred To In Section 3(2) of the National Heritage Resources Act</i> 360	
21.2	OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT. ....	361
<b>22</b>	<b>UNDERTAKING.....</b>	<b>361</b>
<b>23</b>	<b>REFERENCES.....</b>	<b>362</b>
<b>24</b>	<b>APPENDICES.....</b>	<b>364</b>

## List of Tables

	Page
Table 1: Details and Name of the EAPS .....	1
Table 2: Property description and surveyor codes .....	4
Table 3: Listed and specified activities .....	10
Table 4: Millsell and Waterkloof Section - Mineral Resources – Converted Mining Right NW30/5/1/2/2/260MR, NW30/5/1/2/2/236MR and NW30/5/1/2/2/479MR as of 31 December 2021.....	20
Table 5: Millsell and Waterkloof Section - Mineral Resources – Converted Mining Right NW30/5/1/2/2/260MR of proposed opencast operations on the farm Waterkloof 305 JQ and Waterval 306 JQ.....	21
Table 6: Customer Specifications .....	23
Table 7: List of main action, activities or processes on site and per phase .....	39
Table 8: Policy and Legislative Context.....	42
Table 9: Need and desirability considerations.....	54
Table 10: Summary of issues raised .....	82
Table 11: Mean monthly temperature.....	117
Table 12: Rainfall within the project area .....	118
Table 13:A-pan evaporation (mm).....	118
Table 14: S-Pan Evaporation .....	118
Table 15: Mean Annual Run-off and Reserves for the EWR site and relevant Quaternary Catchments .....	119
Table 16: Explanation of sensitivity ratings .....	125
Table 17: Animal species sighted during site visit.....	136
Table 18: Ecoregion Attributes (DWS, 2005) .....	140
Table 19: Flora species identified in the riparian zone during site survey.....	143
Table 20: Water Resource Class and Ecological Category for the relevant Quaternary Catchments (DWS, 2019) .....	146
Table 21: Mean Annual Run-off and Reserves for the EWR site and relevant Quaternary Catchments (DWS, 2019).....	146
Table 22: Classification of River Health Assessment Classes .....	147
Table 23: PES, EIS and REC for the relevant Quaternary Catchment (DWS, 2019) .....	147
Table 24: Information provided on River Health Programme for the Sub Quaternary Reach (SQR) .....	147
Table 25: National Biodiversity Assessment (2018) Data for the SQR .....	148
Table 26: Baseline sample compared to the RWQO and the TWQR .....	150
Table 27: Integrated Habitat Assessment Survey (IHAS) Results .....	151
Table 28: QHI Findings and Scores .....	151
Table 29: VEGRAI Assessment .....	151
Table 30: South African Scoring System Version 5 (SASS 5) Results .....	151
Table 31: Integrated Unit of Analysis (IUAs) and Resource Quality Objectives (RQOs) as per Quaternary Catchment (EC, MAR & EWR) .....	155
Table 32: Integrated Unit of Analysis (IUAs) and Resource Quality Objectives (RQOs) in priority Resource Units in the Integrated Unit of Analysis 4.....	155
Table 33: Information provided on River Health Programme for the Sub Quaternary Reach (SQR) .....	159
Table 34: National Biodiversity Assessment (2018) Data for the SQR .....	159
Table 35: Description of riparian vegetation zones (Kleynhans et al, 2007) .....	161
Table 36: Classification of the Wetland Units within the 500 m DWS Regulated Area.....	163
Table 37: Description of Wetland Unit 1 .....	164
Table 38: Summary of results of the WET-Health (Version 2) assessment.....	165
Table 39: Results of the Ecosystem Services provided .....	165
Table 40: Table for integrating EI and ES into a composite EIS score (Kotze et al., 2020).....	166
Table 41: Summary of the results of Wetland Assessment.....	167
Table 42: Hydrocensus summary .....	170
Table 43: Showing the groundwater qualities compared to WUL .....	174
Table 44: Groundwater qualities compared to WUL (Hydrocensus boreholes) .....	175

Table 45: The soil texture results for the main soil forms in the project area .....	179
Table 46: Meteorological Data Details.....	182
Table 47: Measurements – Shorter-term measurements – A01 .....	187
Table 48: Measurements – Shorter-term measurements – A02 .....	187
Table 49: Historical Sites .....	189
Table 50: Contemporary Sites.....	190
Table 51: Grave sites.....	190
Table 52: Visual Impact Criteria .....	194
Table 53: Viewpoints selected for representing the surrounding area .....	195
Table 54: Magnitude of Visual Impact Results .....	201
Table 55: Population data.....	203
Table 56: Racial breakdown .....	203
Table 57: Education levels .....	204
Table 58: Income Category .....	204
Table 59: Employment.....	205
Table 60: POI Classification used .....	208
Table 61: Sensitive Landscapes within the Mining Site .....	209
Table 62: Description of aspects assessed by the specialists .....	220
Table 63: Summary of potential impacts during operation – dewatering .....	230
Table 64: Impact Assessment Table (Complete with Ratings used to obtain Significance) .....	244
Table 65: Cumulative Impacts .....	271
Table 66: Summary of the key environmental impacts and Management Objectives and Mitigation Type....	280
Table 67: Specialist Recommendations Summarised.....	302
Table 68: Summary of Key findings in terms of Impact Significance .....	310
Table 69: Impact management objectives and the impact management outcomes for inclusion in the EMPr	331
Table 70:Quantum of Financial Provision – Proposed Millsell Waterkloof Sections.....	355



## Table of Figures

	Page
Figure 1: The regional locality of the proposed project .....	6
Figure 2: WCM mining rights plan indicating Mining Rights NW30/5/1/2/2/236MR, NW30/5/1/2/2/479MR and NW30/5/1/2/2/260MR .....	7
Figure 3: Amendment of plan to incorporate the chrome, associated mineral rights, opencast mining of Waterkloof 305 JQ within Converted Mining Right NW30/5/1/2/2/236MR .....	8
Figure 4: Proposed layout plan of the Millsell and Waterkloof Opencast Mine .....	17
Figure 5: Regional Geology and regional map of the Bushveld Igneous Complex (BIC) .....	18
Figure 6: Life of Mine plan for proposed opencast Millsell and Waterkloof Section .....	22
Figure 7: Millsell Mine plant process flow diagram – Millsell HMS, Crushing and Screening plant .....	24
Figure 8: Millsell Mine plant process flow diagram – Millsell Wash Plant .....	24
Figure 9: Millsell Section drying and bagging plant .....	26
Figure 10: Diagram indicating WHIMS plant process steps .....	26
Figure 11: High level process flow of Sylvania dump retreating operations.....	27
Figure 12: Existing surface layout for the Millsell Section (New Tailings Storage Facility (TSF) not included) .....	32
Figure 13: Surface infrastructure layout at the current Waterkloof Section.....	33
Figure 14: Intersection that will be used to access the site .....	36
Figure 15: Underground and opencast production profile for Millsell and Waterkloof Section .....	64
Figure 16: Opencast production schedule for Millsell Waterkloof Section .....	65
Figure 17: First proposed infrastructure layout.....	71
Figure 18: Regional geology.....	115
Figure 19: Generalized Stratigraphic Sections for the Rustenburg (Millsell) and Marikana (Mooinooi) Sections .....	116
Figure 20: Topography of the proposed opencast mine at the Waterkloof Millsell Section .....	117
Figure 21: Present land uses for the mining right area .....	120
Figure 22: Land uses on the proposed project area .....	120
Figure 23: Results of the Screening Tool .....	121
Figure 24: Land Capability Classes – the shaded areas indicating the suitable land uses .....	122
Figure 25: Land uses of the mining right land .....	123
Figure 26: Land capability description .....	123
Figure 27: Land sensitivity description .....	124
Figure 28: Vegetation types of the proposed Millsell Waterkloof site.....	127
Figure 29: NWBSP Biodiversity areas on the proposed opencast Millsell Waterkloof Section.....	129
Figure 30: Protected and conservation areas .....	129
Figure 31: Delineated Vegetation Units for the proposed opencast Millsell Waterkloof Section .....	131
Figure 32: Thornveld vegetation (VU1) at the Proposed Millsell Waterkloof Section .....	132
Figure 33: Riparian vegetation of VU2 at the Proposed Millsell Waterkloof Section .....	133
Figure 34: Areas of VU3 transformed by crop cultivation.....	133
Figure 35: Environmental Screening Tool map of animal (left) and plant (right) species themes sensitivity ..	138
Figure 36: Environmental Screening Tool map of terrestrial biodiversity theme sensitivity .....	138
Figure 37: Terrestrial ecology sensitivity for the proposed opencast Millsell Waterkloof Section.....	139
Figure 38: Ecoregion Level 1 – Bushveld Basin (8) .....	140
Figure 39: Water management area for the proposed opencast Millsell Waterkloof Sections .....	141
Figure 40: Strategic Water Resource Areas of South Africa (CSIR, 2013).....	142
Figure 41: Surrounding watercourses .....	143
Figure 42: River Freshwater Ecosystem Priority Areas.....	145
Figure 43: Surface Water Sampling Locations .....	150
Figure 44: Bushveld Basin classification for Assessment .....	152
Figure 45: Showing buffers for the surface water features.....	153
Figure 46: Integrated Unit of Analysis – showing area in IUA 4 (Hex/Waterkloofspruit/ Vaalkop Sub Catchment) .....	154

Figure 47: Resource Units (Hydro Nodes) in the WMA.....	154
Figure 48: Sites surveyed during site assessment for viability of biomonitoring .....	160
Figure 49: Aquatic Sensitivity as per Screening Tool Report for the specific section of River – Required to be included based on Regulations (March, October 2020) .....	162
Figure 50: Delineated wetlands within the 500 m and 100 m DWS Regulated Areas .....	164
Figure 51: Scientifically calculated buffer zones for the identified wetland units .....	168
Figure 52: Sensitive areas to be affected by the proposed opencast mining activities.....	168
Figure 53: Hydrocensus map .....	171
Figure 54: Correlation Graph of topography vs available groundwater levels .....	172
Figure 55: The DEM for the project area.....	177
Figure 56: Landtypes within the project area.....	178
Figure 57: Hillslope catena for land type Ea3 (Land Type Survey Staff, 1972 - 2006).....	178
Figure 58: The soil delineation for the project area .....	178
Figure 59: Hillslope hydroopedological classification showing the hydrological soil units for the project area .	180
Figure 60: Hillslope hydrology for hydroopedological soil catena of the project area .....	180
Figure 61: Period Wind Rose Plots for the project site for the period January 2020 - December 2022 .....	183
Figure 62: Identified surrounding emission sources within 10km of the existing Mining Right Area .....	184
Figure 63: Identified surrounding emission sources within 20km of the existing Mining Right Area (proposed opencast project indicated in red).....	185
Figure 64: Measurement localities within the study area .....	188
Figure 65: Showing the heritage structures.....	191
Figure 66:SAHRIS palaeosensitivity map for the site for the Waterkloof Opencast Mine shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = l .....	192
Figure 67: Existing accesses on the R104 to the existing Millsell Waterkloof operations.....	193
Figure 68: Extract North West Road Network Plan .....	193
Figure 69: Surrounding Land Users and Sensitive Receptors (Viewpoints) .....	197
Figure 70: Surrounding Land Users and Sensitive Receptors (Viewpoints) .....	197
Figure 71: Viewshed Model of the 5 km surrounding area.....	198
Figure 72: Digital Elevation Model (DEM) of the terrain in the 10 km surrounding area .....	199
Figure 73: Slope elevation and steepness of the terrain in the 10 km surrounding area .....	200
Figure 74: Viewshed Model of the 5 km surrounding area.....	201
Figure 75: Slope Aspect direction of the terrain in a 10 km surrounding area .....	201
Figure 76: Ward Map.....	202
Figure 77: Employment per sector .....	205
Figure 78: Bojanala District economic sectors: Contribution to GDP .....	206
Figure 79: Identified sensitive areas.....	207
Figure 80: Groundwater drawdown during mining .....	230
Figure 81: Predicted spread of pollution post-closure of mining .....	231
Figure 82:Hillslope hydrology for hydroopedological soil catena T1 for the opencast activity .....	233
Figure 83: Hillslope hydrology for hydroopedological soil catena T1 for the overburden dumps and stockpiling activities .....	233
Figure 84: Predicted Dustfall Rates at the proposed Waterkloof opencast mining area - Construction Phase .....	236
Figure 85: Predicted Annual Average PM <sub>10</sub> Concentrations at the proposed Waterkloof opencast mining area - Construction Phase .....	236
Figure 86: Predicted Annual Average PM <sub>2.5</sub> Concentrations at the proposed Waterkloof opencast mining area - Construction Phase .....	237
Figure 87: Predicted Dustfall Rates at the proposed Waterkloof opencast mining area - Operational Phase	237
Figure 88: Predicted Annual Average PM <sub>10</sub> Concentrations at the proposed Waterkloof opencast mining area - Operational Phase .....	238

Figure 89: Predicted Annual Average PM<sub>2.5</sub> Concentrations at the proposed Waterkloof opencast mining area - Operational Phase ..... 238

## List of Appendices

Appendix 1: Qualifications and Resume of EAP

Appendix 2: Locality Plans

Appendix 3: Layout

Appendix 4: Public Participation Documents

Appendix 5: Specialist report – Agricultural Assessment, Soil and Land Capability Report

Appendix 6: Specialist report – Terrestrial Ecology

Appendix 7: Specialist report – Surface Water & Aquatic Ecology Assessment and Wetland Impact Assessment

Appendix 8: Specialist report – Aquatic Ecology Impact Assessment

Appendix 9: Specialist report – Watercourse Delineation and Functionality Assessment

Appendix 10: Specialist report –Hydrogeological Assessment

Appendix 11: Specialist report – Hydropedological Assessment

Appendix 12: Specialist report – Air Quality Assessment

Appendix 13: Specialist report – Noise Assessment

Appendix 14: Specialist report – Heritage Impact Assessment

Appendix 15: Specialist report - Paleontological Opinion

Appendix 16: Specialist report – Traffic Impact Assessment

Appendix 17: Specialist report – Visual Impact Assessment

Appendix 18: Specialist report – Social Impact Assessment

Appendix 19: Specialist report – Blasting Impact Assessment

Appendix 20: Specialist report – Closure Cost Assessment

Appendix 21: Specialist report – Alien Invasives Management Plan & SOP

Appendix 22: Specialist report – Waste Classification

Appendix 23: Impact Assessment

Appendix 24: Stormwater Management Plan

## ABBREVIATIONS

Abbreviation	Description
<b>ARC</b>	Agricultural Research Council
<b>BoQ</b>	Bill of Quantities
<b>BPEO</b>	Best Practicable Environmental Option
<b>DAFF</b>	Department of Agriculture, Forestry and Fisheries
<b>DFFE</b>	Department of Environment, Forestry and Fisheries
<b>DEA</b>	Department of Environmental Affairs
<b>DESTEA</b>	Free State Department of Economic, Small Business Development, Tourism and Environmental Affairs
<b>DM</b>	District Municipality
<b>DMRE</b>	Department of Mineral Resources and Energy (previously Department of Mineral Resources - DMR)
<b>DSR</b>	Draft Scoping Report
<b>DWS</b>	Department of Water and Sanitation
<b>EAP</b>	Environmental Assessment Practitioner
<b>ECA</b>	Environmental Conservation Act (Act 73 of 1989)
<b>ECO</b>	Environmental Control Officer
<b>EIA</b>	Environmental Impact Assessment
<b>EIR</b>	Environmental Impact Assessment Report
<b>EMPR</b>	Environmental Management Programme
<b>ESMS</b>	Environmental and Social Management System
<b>GNR</b>	Government Notice Regulation
<b>I&amp;APs</b>	Interested and Affected Parties
<b>IDP</b>	Integrated Development Programme
<b>IEM</b>	Integrated Environmental Management
<b>IHAS</b>	Invertebrate Habitat Assessment System
<b>IHIA</b>	Intermediate Habitat Integrity Assessment
<b>IWUL</b>	Integrated Water Use License
<b>IWULA</b>	Integrated Water Use License Application
<b>LED</b>	Local Economic Development
<b>LM</b>	Local Municipality
<b>LOM</b>	Life of Mine
<b>MAMSL</b>	Meter Above Mean Sea Level
<b>MPRDA</b>	Mineral and Petroleum Resources Development Act (Act 28 of 2002)
<b>MRA</b>	Mining Right Application
<b>NAEIS</b>	National Atmospheric Emission Inventory System
<b>NEMA</b>	National Environmental Management Act (Act 107 of 1998)
<b>NEMAQA</b>	National Environmental Management: Air Quality Act, 39 of 2004
<b>NEMBA</b>	National Environmental Management: Biodiversity Act (Act 10 of 2004)
<b>NEMWA</b>	National Environmental Management: Waste Act (Act 59 of 2008)
<b>NFA</b>	National Forest Act (Act 84 of 1998)
<b>NHRA</b>	National Heritage Resources Act (Act 25 of 1999)
<b>NWA</b>	National Water Act (Act 36 of 1998)
<b>PAIA</b>	Promotion of Access to Information Act (Act 2 of 2000)
<b>PAJA</b>	Promotion of Administrative Justice Act (Act 3 of 2000)
<b>PES</b>	Present Ecological State
<b>PGMs</b>	Platinum-Group Metals
<b>PM10</b>	Thoracic Particulate Matter
<b>PM2.5</b>	Inhalable Particulate Matter



<b>PPP</b>	Public Participation Process
<b>ROM</b>	Run of Mine
<b>SAHRA</b>	South African Heritage Resources Agency
<b>SANRAL</b>	South African National Roads Agency Limited
<b>SANS</b>	South African National Standard
<b>SASS</b>	South African Scoring System (Currently Version 5 is utilised)
<b>SIA</b>	Social Impact Assessment
<b>SMME</b>	South African Small, Medium and Micro Enterprise
<b>TPA</b>	Tons Per Annum
<b>TSP</b>	Total Suspended Particulates
<b>WUL</b>	Water Use License
<b>WML</b>	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 EAPS

<b>Name of the Practitioner:</b>	Sonja van de Giessen
<b>Tel No.:</b>	083 388 4633
<b>Fax No.:</b>	None
<b>Email address:</b>	<a href="mailto:sonja@elemental-s.co.za">sonja@elemental-s.co.za</a>
<b>Name of Co-author</b>	Melissa Pillay
<b>Tel No.:</b>	082 642 1852
<b>Fax No.:</b>	None
<b>Email address:</b>	<a href="mailto:melissa@elemental-s.co.za">melissa@elemental-s.co.za</a>
<b>Tel No.:</b>	064 618 2646
<b>Fax No.:</b>	None
<b>Email address:</b>	<a href="mailto:corlien@elemental-s.co.za">corlien@elemental-s.co.za</a>

### 1.2 EXPERTISE OF THE EAP

#### 1.2.1 THE QUALIFICATIONS OF THE EAP (WITH EVIDENCE)

Elemental Sustainability (Pty) Ltd (Elemental) was appointed to assist Samancor Chrome Ltd (Samancor) with the environmental authorisation application in terms of the National Environmental Management Act (Act 108 of 1998), 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 to Mining Right NW 30/5/1//2/2/236 MR to include opencast mining and inclusion of Portion of 528 of the Farm Waterkloof 305 JQ.

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

*Ms Corlien Lambrechts (Pr Sci.Nat, EAPASA, SASAQS, BLSA):*

- University of Pretoria, BSc Hons Zoology – 2016
- University of South Africa, BSc Environmental Management – 2009

Ms Melissa Pillay

- University of KwaZulu-Natal, BSc Hons Geographical Science (Environmental Management & Development) – 2006
- University of KwaZulu-Natal, BSc Geographical Science (Environmental Management & Development) – 2005

## 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 over 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).

**Corlien Lambrechts** completed her (BSc) Environmental Management & Zoology through UNISA and completed practical Zoology courses at the North West University Potchefstroom Campus. She completed her final year Biodiversity Study at Vredefort Dome and an Entomology Project at the Roodeplaat Dam on Avifauna species, *Anhinga rufa* (African Darter). After working as a student at Geo Pollutions Technologies (Pty) Ltd and TUKS University Onderstepoort Campus, she started her career in Environmental Consulting at M2 Environmental Connections (MENCO) in 2013. She moved to the sister company (which is managed under the same Directors) of M2 Environmental Connections cc, namely Prescali Environmental Consultants (Pty) Ltd. In 2015 she enrolled for her Honors degree in Zoology at the University of Pretoria where she completed a project in the Cathedral Peak Drakensberg Mountain range studying differences in community structures of invertebrate species between natural grasslands and grasslands subjected to rehabilitation by South African Environmental Observation Network (SAEON) and in association with the University of Pretoria Centre of Invasion Biology (CIB). Since 2018, she has joined the team of Elemental-S on a permanent basis as a specialist and is also the owner of Enviridi Environmental Consultants (Pty) Ltd. where she specializes in the field of Ecology, Aquatic Ecology Biomonitoring. She has since gained competency and accreditation through the Department of Water and Sanitation (DWS) for aquatic monitoring (SASS5 Accredited) in 2018 and competency re-evaluation in 2021 (every three years). In 2021, she enrolled and completed the Rhodes University: Tools for Wetland Assessment Course and is currently awaiting the results.

She is a Professional Natural Scientist with the South African Council of Natural Scientific Professions (*Pr.Sci.Nat.*: 009135) for Environmental Sciences and registered with EAPASA (2020/935). She is also an active member of the Southern African Society of Aquatic Scientists Registration number (SASAQS Registration number: SASAQS0025) and the South African Bat Assessment Association (Registration number: 0054). She

is a member of Bird Life South Africa (BLSA) (SABAP Citizen scientist number: 20686) and BLSA Membership number: 1041760

**Melissa Pillay** Melissa has fourteen years of experience in the environmental field. Her experience includes the management of enviro-legal compliance of operational mines and licensing of new projects. Rehabilitation and financial provision calculations, problem solving and project management. She has been involved in implementing and developing strategies in line of relevant environmental legislation and stakeholder management.

## 2 DESCRIPTION OF THE PROPERTY

### 2.1 SITE LOCATION

Samancor’s Millsell and Waterkloof Sections form part of the Western Chrome Mines (WCM) and lie within the jurisdiction of the Bojanala Platinum District Council (BPDC) and the Rustenburg Local Municipality (RLM) in the North West Province. Figure 1 below indicates the location of the Millsell and Waterkloof Sections. The Millsell Section is located at latitude 25°42’40” S and longitude 27°17’30” E. The Waterkloof Section is located at latitude 25°42’30” S and longitude 27°17’20” E. The WCM Millsell Section lies 4.5 km from Rustenburg and 0.9 km from Kroondal. The distance from Waterkloof to the neighbouring towns of Rustenburg and Kroondal are 4.3 km and 1.9 km respectively.

There are several informal settlements in and around the towns of Rustenburg and Kroondal. The nearest town to the study area is the informal settlement near Kroondal (located approximately 1.9 km from the Waterkloof Section).

Table 2: Property description and surveyor codes

<b>Farm Name:</b>	The proposed opencast activities will be undertaken on: <ul style="list-style-type: none"> <li>• Portions 54, 112, 113, 218, 231, 253, 262, 270, 296, 336, 341, 459, 513, 577, and RE 55 of the farm Waterkloof 305 JQ and Portions 18, 19, 20 and 24 of the farm Waterval 306 JQ</li> </ul> Property to be included into the Mining Right NW 30/5/1//2/2/236 MR: Portion 528 of the Farm Waterkloof 305 JQ			
<b>Application area (Ha)</b>	<ul style="list-style-type: none"> <li>• Mining Right Area : 886.5327 Ha</li> <li>• Underground mining : approximately 891.1203 Ha</li> <li>• Opencast mining: approximately 120.52ha</li> </ul>			
<b>Magisterial district:</b>	Bojanala Platinum District Council and the Rustenburg Local Municipality			
<b>Distance and direction from nearest town</b>	Millsell Section lies 6 km east from Rustenburg and 0.9 km from Kroondal. The distance from Waterkloof to the neighbouring towns of Rustenburg and Kroondal are 4.3 km and 1.9 km respectively.			
<b>21-digit Surveyor General Code for each farm portion</b>	<b>Farm</b>	<b>Portion</b>	<b>Title Deed</b>	<b>Surveyor General Code</b>
	WK305JQ	PTN 54	T163064/2006	T0JQ00000000030500054
	WK305JQ	PTN RE55	T163064/2006	T0JQ00000000030500054
	WK305JQ	PTN 112	T16248/2005	T0JQ00000000030500112
	WK305JQ	PTN 113	T66919/2008	T0JQ00000000030500113
	WK305JQ	PTN 218	T51712/1984	T0JQ00000000030500218
	WK305JQ	PTN 231	T66921/2008	T0JQ00000000030500231
	WK305JQ	PTN 253	T66923/2008	T0JQ00000000030500253
	WK305JQ	PTN 262	T163064/2006	T0JQ00000000030500262
	WK305JQ	PTN 270	T163064/2006	T0JQ00000000030500270
	WK305JQ	PTN 296	T163064/2006	T0JQ00000000030500296
	WK305JQ	PTN 336	T27322/1975	T0JQ00000000030500336
	WK305JQ	PTN 341	T4782/1993	T0JQ00000000030500341
	WK305JQ	PTN 459	T90395/2002	T0JQ00000000030500459
	WK305JQ	PTN 513	T16055/2004	T0JQ00000000030500513
	WK305JQ	PTN 528	T117758/2004	T0JQ00000000030500528
WK305JQ	PTN 577	T102676/2014	T0JQ00000000030500577	

	WK306JQ	PTN18	T84360/2007	T0JQ00000000030600018
	WK306JQ	PTN19	T84360/2007	T0JQ00000000030600019
	WK306JQ	PTN20	T84360/2007	T0JQ00000000030600020
	WK306JQ	PTN24	T84360/2007	T0JQ00000000030600024

**2.2 LOCALITY MAP (SHOW NEAREST TOWN, SCALE NOT SMALLER THAN 1:250 000)**

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

WCM has Mining Rights (DMRE Ref No's. NW30/7/1/2/3/2/1/236MR, NW30/7/1/2/3/2/1/260MR and NW30/7/1/2/3/2/1/479MR) for the Millsell and Waterkloof Sections for the underground mining of chrome in terms of the MPRDA, as amended (refer to Figure 1). The properties associated with the mining right are as follows:

- Portions: 22 (a portion of portion 2), RE of portion 26 (a portion of portion 2), 24 (a portion of portion 2), RE of portion 16 (RE of portion 2), 50 (a portion of portion 2), RE of portion 52(a portion of portion 2 , 54 (a portion of portion 53), 23 (a portion of portion 2), 17 (a portion of portion 2), 30 (a portion of portion 2), 5, 15 (a portion of portion 2), 27 (a portion of portion 2), 7 (a portion of portion 2), 8 (a portion of portion 2),9 (a portion of portion 2), 156 (a portion of portion 16), 28 (a portion of portion 2), 148 (a portion of portion 52), 149 (a portion of portion 52), 147 (a portion of portion 2), 29 (a portion of portion 2), RE of Portion 157(a portion of portion 26), RE of portion 146, RE of portion 235 (a portion of portion 2), 270 (a portion of portion 55), 262 (a portion of portion 55), RE of portion 55 (a portion of portion 2), 296 (a portion of portion 55), Mineral Area No. 1, of Portion 234, Portion 341 (excluding Mineral Area 1), RE of Portion 111 (a portion of portion 56), 11 (a portion of portion 10), 12 (a portion of portion 2), 88 (a portion of portion 10), 218 (a portion of portion 2), 219(a portion of portion 2), 25(a portion of portion 2), 231 (a portion of portion 109), RE of Portion 113 (a portion of portion 56), RE, 47 (a portion of portion 4), 112 (a portion of portion 56), 112 (a portion of portion 56), 301 (a portion of portion 112), 306 (a portion of portion 12), 253 (a portion of portion 111), 111 (a portion of portion 56) 13 (a portion of portion 2), 11 (a portion of portion 10), 219 (a portion of portion 2), 218 (a portion of portion 2), 371, 53, 78, 79, 80, 83, 86, 87, 116 , 144, 77, 82 and RE of portion 81 of the Farm Waterkloof 305 JQ
- Portions: RE of portion 1, RE of portion 2, 3, 7, 8, 9 10 of the Farm Waterval 307 JQ
- Holding 18, 19, 20 and Portion 24 (a portion of portion 2) of the Farm Waterval 306 JQ
- Portions 25,52,83,84,85,99,129 and 157 of the Farm Kroondal 304 JQ

This amendment application to include opencast mining and Portion 528 of the Farm Waterkloof 305 JQ for underground mining is only for the mining right NW30/7/1/2/3/2/1/236MR. The chrome seams can be found on Portions 54, 112, 113, 218, 231, 253, 262, 270, 296, 336, 341, 459, 513, 577, and RE 55 of the farm Waterkloof 305 JQ and Portions 18, 19, 20 and 24 of the farm Waterval 306 JQ for the opencast mining. Refer to Figure 2 below.

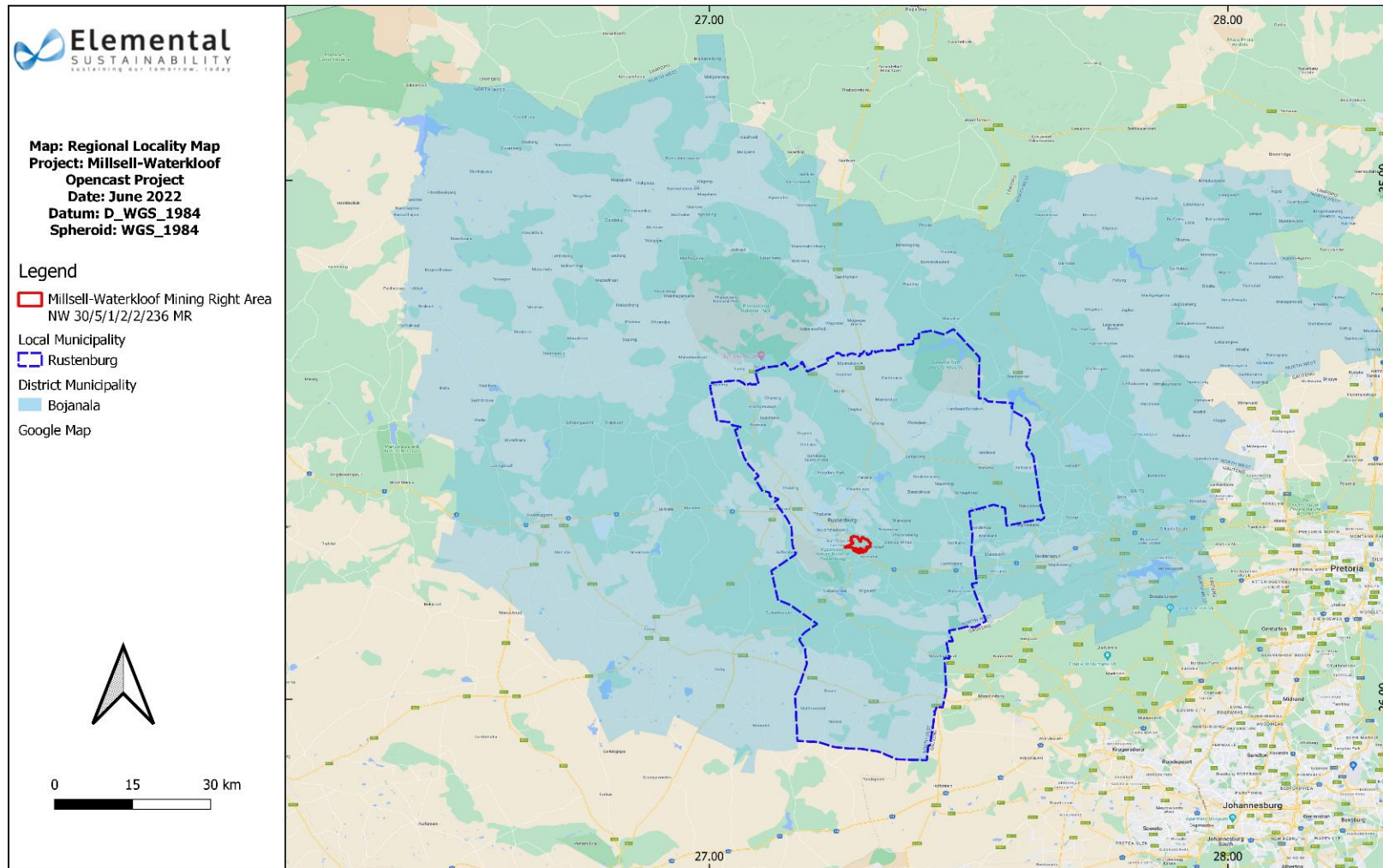


Figure 1: The regional locality of the proposed project



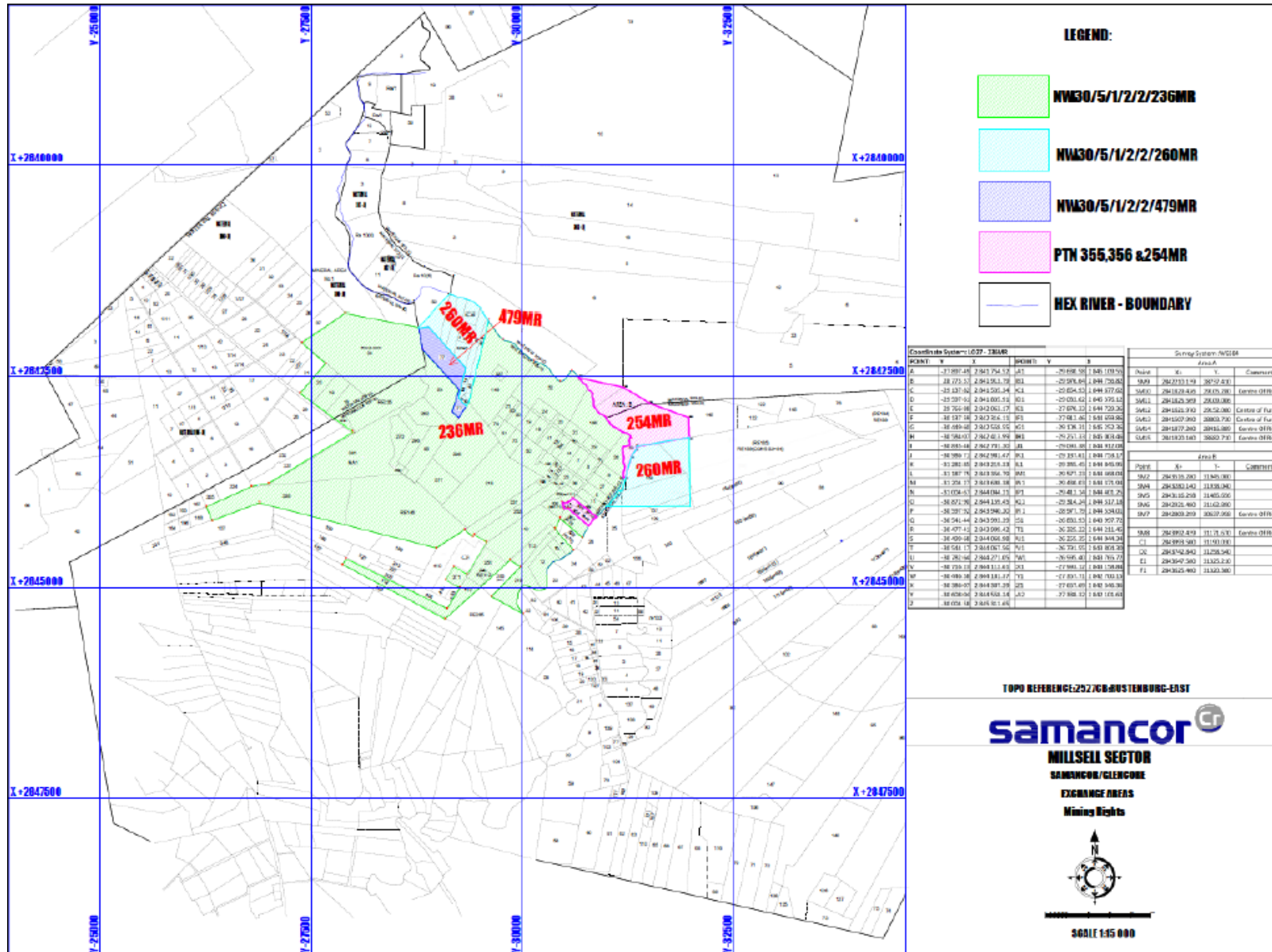


Figure 2: WCM mining rights plan indicating Mining Rights NW30/5/1/2/2/236MR, NW30/5/1/2/2/479MR and NW30/5/1/2/2/260MR



### **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.*

*Refer to Appendix 2.*

Table 3 provides the listed and specified activities that are applicable to the proposed opencast and underground mining at the Millsell and Waterkloof Sections.

Table 3: Listed and specified activities

Relevant legislation	Activity	Type of Authorisation Required	Competent Authority (CA)
<p><b>NEMA and NEM:WA</b></p>	<p><b>Listing Notice 1 (GN 983 of 2014, as amended)</b></p>	<p>Section 102, Environmental Authorisation,  Water Use License, and  Waste Management License for all Stockpiles (permanent or temporary) in terms of NEM: WA.</p>	<p>North West Department Mineral Resources and Energy and Department of Water and Sanitation</p>
	<p><b>Activity 10:</b> 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 (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.</p>		
	<p><b>Activity 19:</b> The infilling or depositing of any material of more than [5] 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than [5] 10 cubic metres from [(i)] a watercourse; [(ii) the seashore; or iii)the littoral active zone, an estuary or a distance of 100 metres inland of the high-water mark of the sea or estuary, whichever distance is the greater—] but excluding where such infilling, depositing, dredging, excavation, removal or moving— a) will occur behind a development setback; b) is for maintenance purposes undertaken in accordance with a maintenance management plan; [or] c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or e) where such development is related to the development of</p>		

Relevant legislation	Activity	Type of Authorisation Required	Competent Authority (CA)
	<p>a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p> <p><b>Activity 21D:</b> 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.</p> <p><b>Activity 24:</b> 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</p> <p><b>Activity 28:</b> 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.</p> <p><b>Activity 30:</b></p>		

Relevant legislation	Activity	Type of Authorisation Required	Competent Authority (CA)
	<p>Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).</p> <p><b>Activity 56:</b> 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 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.</p> <p><b>Listing Notice 2 (GN 984 of 2014, as amended)</b></p> <p><b>Activity 6:</b> 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.</p> <p><b>Activity 15:</b> The clearance of an area of 20 hectares or more of indigenous vegetation (Alternatively more than &gt;1 ha consequently triggering Activities from Listing Notice 1, Activity 27).</p> <p><b>Listing Notice 3 (GN 985 of 2014 as amended)</b></p> <p><b>Activity 4:</b> The development of a road wider than 4 metres with a reserve less than 13,5 metres. (h) North West (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</p>		

Relevant legislation	Activity	Type of Authorisation Required	Competent Authority (CA)
	<p>biodiversity plans adopted by the competent authority;</p> <p>(v) Core areas in biosphere reserves;</p> <p>(vi) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve;</p> <p>(vii) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or</p> <p>(viii) All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999).</p> <p><b>Activity 12:</b> 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.</p> <p>(i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p><b>Activity 18:</b> The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.</p> <p><b>c. North West</b></p> <p>i. (i) A protected area including municipal or provincial nature reserves as contemplated by NEMPAA or other legislation;</p> <p>ii. (ii) Areas within 5 kilometres from protected areas identified in terms of NEMPAA or from a biosphere reserve;</p> <p>iii. (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;</p> <p>iv. (iv) Sites or areas identified in terms of an</p>		



Relevant legislation	Activity	Type of Authorisation Required	Competent Authority (CA)
	<p>international convention;</p> <p>v. (v) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;</p> <p>vi. (vi) Core areas in biosphere reserves;</p> <p>vii. (vii) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose;</p> <p>viii. (viii) All Heritage Sites proclaimed in terms of National Heritage Resources Act, 1999 (Act No. 25 of 1999); or</p> <p>ix. (ix) Areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.</p>		
	<b>NEM:WA GNR 921</b>		
	<p><b>Activity B7:</b> The disposal of any quantity of hazardous waste to land.</p>		
	<p><b>Activity B10:</b> 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).</p>		
	<p><b>Activity B11:</b> 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).</p>		

## 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 Millsell and Waterkloof Sections. 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, through evaluation of the current mineral asset base and chrome market conditions, has identified additional mineral resources to be economically extracted through opencast operations. The additional mineral resources are confined to the current Mining Right boundaries of Converted Mining Right NW30/5/1/2/2/236MR held by Samancor Chrome Limited. Samancor also proposes the inclusion of Portion 528 of the Farm Waterkloof 305 JQ into the current mining right which allow an increase of the resource by approximately 0.42Mt through underground mining. A Section 102 application in terms of the MPRDA was submitted to the DMRE for a change in mining method, i.e. opencast mining, and the inclusion of Portion 528 of the Farm Waterkloof 305 JQ into the mining right NW30/5/1/2/2/236MR for underground mining.

Samancor evaluated potential extraction of the LG and MG successions of chromite seams on Portions 54, 112, 113, 218, 231, 253, 262, 270, 296, 336, 341, 459, 513, 577, and RE 55 of the farm Waterkloof 305 JQ and Portions 18, 19, 20 and 24 of the farm Waterval 306 JQ through opencast operations. Samancor also proposes the inclusion Portion of 528 of the Farm Waterkloof 305 JQ to the Mining Right NW30/5/1/2/2/236MR.

The combined mineral resources included in Mining Right NW30/5/1/2/2/236MR, with the added opencast mineral resources will amount to a total consolidated mineable resource of 20.89 Million Tonnes (MT) *in situ* in the LG and MG successions. This includes current underground operations. With the addition of the approximated resources on Portions 54, 112, 113, 218, 231, 253, 262, 270, 296, 336, 341, 459, 513, 577, and Remainder portion 55 of the farm Waterkloof 305 JQ and Portions 18, 19, 20 and 24 of the farm Waterval 306 JQ, the total mineable opencast mineral resources will amount to 11.94 MT.

Samancor's mining is limited to the MG and LG chromitite seams, excluding the Upper Group 2 (UG2) and Merensky reefs on the relevant properties which includes cobalt, copper, gold, iridium, nickel, osmium, palladium, rhodium, ruthenium and silver as per the approved and executed Mining Right.

As a result of the mineralogical nature of the ore bodies and the chemical composition, additional minerals, entrenched in the economic horizons, may be extracted during typical mining operations. These minerals cannot be separated or excluded during the above-mentioned operations and will therefore be contemporaneously extracted.

Historically and currently only the LG6 and LG6A seams were exploited in opencast and underground

operations for economic extraction. Recent vicissitudes in local and international markets, with improvements in technological advancement and beneficiation processes has allowed for the potential economic extraction of the additional chromitite seams, included in both the LG and MG successions.

Other seams developed on the same property can now be exploited economically by means of revived opencast mining operations. These seams include, but are not limited to the LG5, MG1, MG2, MG3, MG4 and MG4A, with a total consolidated mineable opencast resource of 11.94 MT *in situ*. Pending further optimization strategies additional seams confined to the MG and LG succession within the Mining Right boundaries may be evaluated for eventual economic extraction. These economic horizons include the LG1, LG2, LG3, LG4, LG7 and MG0 seams. The combined underground and opencast mineable resources earmarked for current economic extraction, including the available mineral resources on Portions 54, 112, 113, 218, 231, 253, 262, 270, 296, 336, 341, 459, 513, 577, and Remainder of portion 55 of the farm Waterkloof 305 JQ and Portions 18, 19, 20 and 24 of the farm Waterval 306 JQ, consequently amount to approximately 20.89 MT.

The current Millsell and Waterkloof Sections are established mining operations having been mined for a number of years, across all three mining rights. The infrastructure is, therefore, well established including electricity and water supply.

The proposed surface infrastructure required for the mining activity is presented in Figure 4.

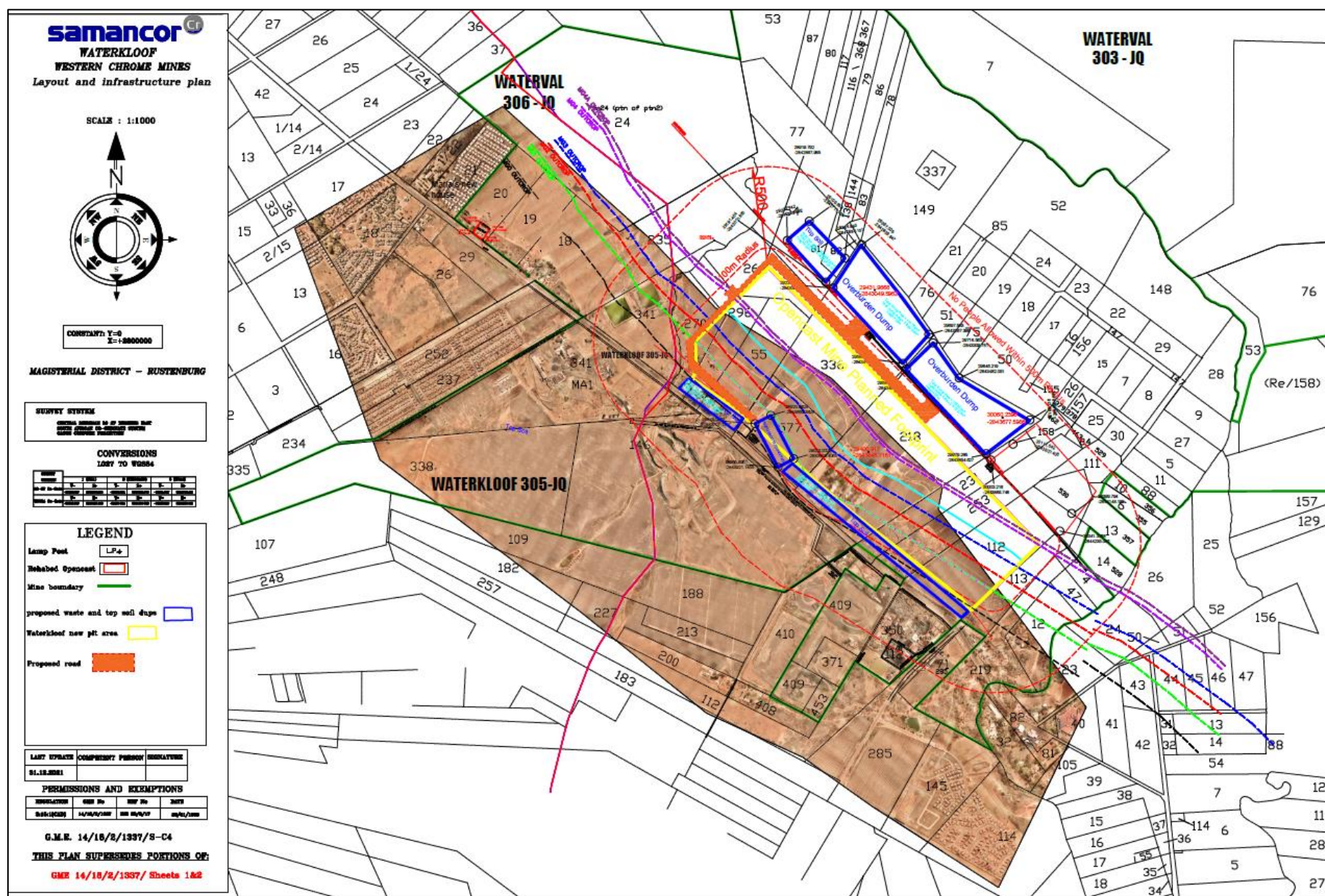


Figure 4: Proposed layout plan of the Millsell and Waterkloof Opencast Mine  
Elemental Sustainability (Pty) Ltd.



### 3.2.2 THE MINERAL RESOURCE

The Proposed opencast Millsell and Waterkloof Sections is situated in the North West Province in the Magisterial District of Rustenburg on the farms Waterkloof 305 JQ, Waterval 306 JQ, Waterval 307 JQ, Kroondal 304 JQ and Waterval 303 JQ as shown on the locality plan - Figure 1 and Figure 2, and amendment plan –Figure 3.

The mineral currently being mined at Millsell and Waterkloof is chromite and in particular the LG6 and LG6A chromitite seams. The converted Mining Right NW30/5/1/2/2/236MR over the farms Waterkloof 305 JQ, Waterval 306 JQ, Waterval 307 JQ, Kroondal 304 JQ and Waterval 303 JQ includes the minerals associated with the mining of chromitite ore, more specifically including platinum, palladium, rhodium, ruthenium, iridium and osmium, gold, silver, copper, nickel and cobalt, which may be extracted from normal mining of Chromite in the Middle Group (MG) and Lower Group (LG) seams. Figure 5 illustrates the regional geology of the Bushveld Igneous Complex (BIC) in relation to the Rustenburg Layered Suite (RLS) and major settlements.

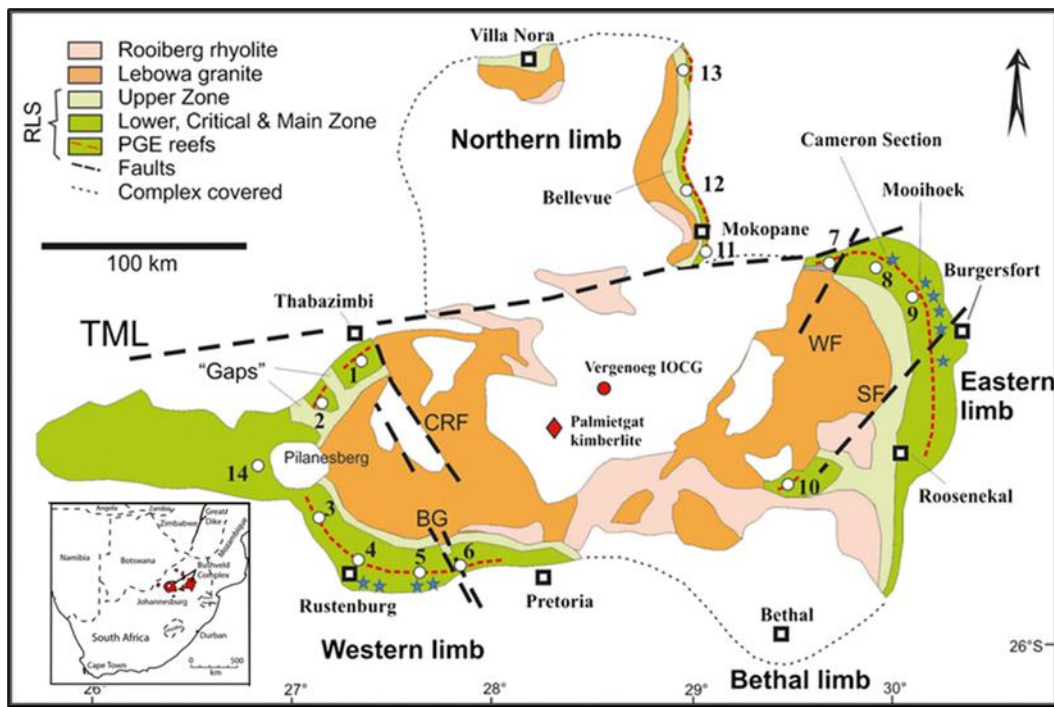


Figure 5: Regional Geology and regional map of the Bushveld Igneous Complex (BIC)

Chromitite layers occur throughout the Critical Zone, usually, but not always, at the base of crystallisation cycles. The chromitite seams have been classified into 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 millimetres to several

metres and named chromitite layers may comprise multiple, composite layers of chromitite separated by interlaminated silicate rocks.

The target area of this application is underlain by rocks of the Lower Critical Zone and Upper Critical Zone of the BC, consisting of chromitite interlayered with pyroxenite, norite, anorthosite norite, and mottled anorthosite

### 3.2.2 THE MINERAL RESOURCE MAPS

The mineral resources of the chromitite seams present in the Millsell and Waterkloof Section are shown in Table 4 and Table 5 below. As can be seen there is little variability in the quality of the chromitite seams. The underground mineral resources of the entire Millsell and Waterkloof Section consist of all three converted Mining Rights:

- NW 30/5/1/2/2/260MR,
- NW 30/5/1/2/2/236MR, and
- NW 30/5/1/2/2/479MR.

The underground resources, comprising of LG6 and LG6A chromitite seams, amounts to 10 Mt of chromite and includes all three categories of resources (measured, indicated and inferred).

The Life of Mine (LOM) for the underground mine is estimated to be 5.9 years, based on an *in situ* Mineral Resource of 9.98 Mt at a planned production rate of 1.134 Mt per year. The LOM for the opencast resource is estimated to be 12 years, based on an *in situ* mineral resource of 13.96 Mt, mined at a production rate of 1.134 Mt per year.

Figure 6 schematically illustrates the LOM plan for the Proposed opencast Millsell and Waterkloof Sections

Table 4: Millsell and Waterkloof Section - Mineral Resources – Converted Mining Right NW30/5/1/2/2/260MR, NW30/5/1/2/2/236MR and NW30/5/1/2/2/479MR as of 31 December 2021

Resource Category	Site	Seam	SG (t/m <sup>3</sup> )	Seam Thickness (m)	DIP (°)	Cr <sub>2</sub> O <sub>3</sub> (%)	FeO (%)	SiO <sub>2</sub> (%)	Cr:Fe	Tonnes (Mt)	Geological Loss (%)
<b>Underground Mineral Resources of Kroondal 304 JQ as at December 2021</b>											
Measured	Kroondal 304 JQ	LG6/LG6A	4.32	1.15	10.00	42.76	24.12	4.43	1.57	1.21	2.20
	<b>Total Measured</b>		-	-	-	-	-	-	-	<b>1.21</b>	
Indicated	Kroondal 304 JQ	LG6/LG6A	4.32	1.17	10.00	43.25	24.26	4.26	1.57	1.74	0.71
	<b>Total Indicated</b>		-	-	-	-	-	-	-	<b>1.74</b>	
Inferred	Kroondal 304 JQ	LG6/LG6A	4.32	1.14	10.00	42.59	24.01	4.85	1.59	0.20	
	<b>Total Inferred</b>		-	-	-	-	-	-	-	<b>0.20</b>	
	<b>Grand Total</b>		-	-	-	-	-	-	-	<b>3.15</b>	
<b>Underground Mineral Resources of Waterkloof 305 JQ as at 31 December 2021</b>											
Measured	Waterkloof 305 JQ	LG6/LG6A	4.16	1.15	10.00	42.64	23.99	5.08	1.56	3.26	1.17
	<b>Total Measured</b>		-	-	-	-	-	-	-	<b>3.26</b>	
Indicated	Waterkloof 305 JQ	LG6/LG6A	4.16	1.07	10.00	42.18	23.40	4.80	1.59	1.01	0.15
	<b>Total Indicated</b>		-	-	-	-	-	-	-	<b>1.01</b>	
Inferred	Waterkloof 305 JQ	LG6/LG6A	4.15	1.11	10.00	42.12	23.39	4.66	1.59	0.28	
	<b>Total Inferred</b>		-	-	-	-	-	-	-	<b>0.28</b>	
	<b>Grand Total</b>		-	-	-	-	-	-	-	<b>4.55</b>	
<b>Underground Mineral Resources of Waterval 303 JQ as at 31 December 2021</b>											
Measured	Waterval 303 JQ	LG6/LG6A	4.34	1.07	10.00	42.89	22.59	4.61	1.50	0.12	2.07
	<b>Total Measured</b>		-	-	-	-	-	-	-	<b>0.12</b>	
Indicated	Waterval 303 JQ	LG6/LG6A	4.39	1.09	10.00	42.13	22.12	4.83	1.45	0.35	0.00
	<b>Total Indicated</b>		-	-	-	-	-	-	-	<b>0.35</b>	



Resource Category	Site	Seam	SG (t/m <sup>3</sup> )	Seam Thickness (m)	DIP (°)	Cr <sub>2</sub> O <sub>3</sub> (%)	FeO (%)	SiO <sub>2</sub> (%)	Cr:Fe	Tonnes (Mt)	Geological Loss (%)
Inferred	Waterval JQ 303	LG6/LG6A									
<b>Total Inferred</b>			-	-	-	-	-	-	-	<b>0.00</b>	
<b>Grand Total</b>			-	-	-	-	-	-	-	<b>0.47</b>	
<b>Underground Mineral Resources of Waterval 306 JQ as at 31 December 2021</b>											
Measured	Waterval JQ 306	LG6/LG6A	4.10	1.24	10.00	41.45	24.29	6.28	1.50	0.54	1.15
	<b>Total Measured</b>									<b>0.54</b>	
Indicated	Waterval JQ 306	LG6/LG6A	4.14	1.18	10.00	41.76	24.07	6.04	1.53	0.24	
	<b>Total Indicated</b>									<b>0.24</b>	
Inferred	Waterval JQ 306	LG6/LG6A									
<b>Total Inferred</b>										<b>0.00</b>	
<b>Grand Total</b>										<b>0.78</b>	

Table 5: Millsell and Waterkloof Section - Mineral Resources – Converted Mining Right NW30/5/1/2/2/260MR of proposed opencast operations on the farm Waterkloof 305 JQ and Waterval 306 JQ

<b>Open Cast Mineral Resources of Waterkloof 305 JQ and Waterval 306 JQ as at 31 December 2021</b>											
Resource Category	Site	Seam	SG	Seam thickness	DIP	Cr <sub>2</sub> O <sub>3</sub>	FeO	SiO <sub>2</sub>	Cr:Fe	Tonnes	Geological Loss
			(t/m <sup>3</sup> )	(m)	(°)	(%)	(%)	(%)(%)	Ratio	Mt	(%)
Inferred	Waterval 306 JQ	LG5	4.10	0.43	10	39.97	22.59	7.56	1.53	0.14	10
		LG6	4.14	0.97	10	42.27	24.02	5.51	1.53	0.27	10
		LG6A	4.15	0.27	10	42.18	24.11	5.49	1.52	0.08	10
		MG1	4.12	0.69	10	39.47	23.01	6.67	1.45	0.72	10
		MG2	3.97	0.48	10	36.85	23.85	8.68	1.33	0.57	10
		MG3	3.90	1.05	10	33.32	22.99	12.12	1.25	1.46	10
		MG4	3.91	1.11	10	33.50	23.21	11.73	1.28	4.62	10
		MG4A	3.90	1.01	10	33.46	23.06	13.44	1.25	4.08	10
<b>Total Inferred</b>			-	-	-	-	-	-	-	<b>11.94</b>	
<b>Grand Total</b>			-	-	-	-	-	-	-	<b>11.94</b>	

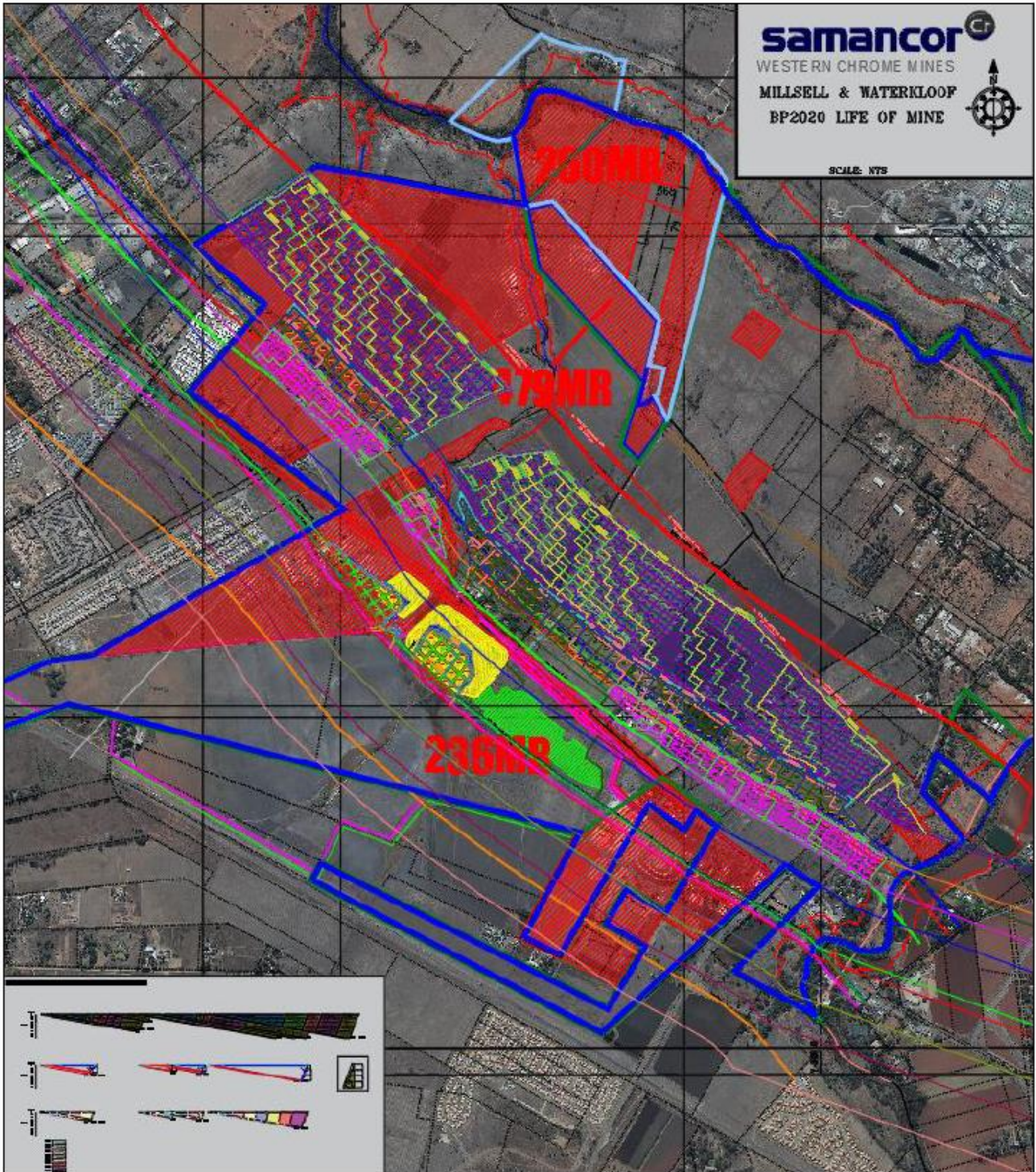


Figure 6: Life of Mine plan for proposed opencast Millsell and Waterkloof Section

### 3.2.3 MINING METHOD

A bord-and pillar mining method is currently applied in the existing Millsell and Waterkloof underground section. This mining method that will be used for the proposed underground mining at the Millsell Waterkloof Section. This method requires primary and secondary development to be excavated on-reef by means of trackless mobile machinery. The mining height in the trackless development sections are reef dependent and are not less



than 1.7 m for all drives. Chairlift declines are developed at a minimum mining height of 3 m to facilitate the chairlift infrastructure height. Drill rigs are utilized for blast hole drilling, while handheld drills are utilized in sections where the total channel width is less than 1.6 m. Support holes are primarily drilled with remote controlled handheld drills.

Opencast operations will be facilitated by specialised mining contractors. The ore outcropping on surface below topsoil will be mined by opencast method due to the shallow nature of ore and so as to make the ore available as early as possible. The primary equipment consists of trucks / excavators & excavator mounted hydraulic rippers to ensure that the chrome ore can be removed with minimum dilution and losses. This mining method is fully mechanised. Drilling will be conducted using drill rigs and cleaning with excavators and hauling with dump trucks. A safe high wall height pending economic viability for the opencast mining method will be applied.

### 3.3 DESCRIPTION OF MINERAL PROCESSING OPERATIONS

#### 3.3.1 SUMMARY OF CUSTOMER SPECIFICATIONS AND DETAILS OF ANY PROPOSED BENEFICIATION OF THE PRODUCTS

Run of mine (ROM) ore will be processed through an already established beneficiation plant at Samancor’s Millsell Mine. The Millsell plant forms part of the WCM’s facilities. The plant is situated next to the shaft at Millsell. The plant comprises of four subsections namely the heavy medium separation (HMS) Wemco section, the HMS cyclone plant, the wash plant section and the spiral plant (-1 mm). The design capacity of the total plant is 110 000 tpm. The Millsell plant produces five products namely; lumpy, small lumpy, chips, metallurgical grade and foundry grade. A foundry drying and bagging plant is also on site and is a separate plant located at the old Waterkloof plant.

A recent addition to the plant streamline is a Whims high density separator. Installed between the Sylvania beneficiation plant and the slimes dams. The plant is designed to treat material in the -1 mm size fraction to extract maximum value from the processing operations. Table 6 below lists the customer specifications considered during beneficiation processes at Millsell plant.

Table 6: Customer Specifications

Product Name	[Cr <sub>2</sub> O <sub>3</sub> %]	[SiO <sub>2</sub> %]
Lumpy	≥38	≤11.5
Small lumpy	≥38	≤11.5
Chips	≥38	≤12
Metallurgical Fines Concentrate	≥42	≤6
Foundry Grade	≥46	≤1

Figure 7 and Figure 8 below describes the process flow for the Millsell plant. The ROM product is delivered to the Heavy Medium Separator (HMS), crushing and screening plant. The material progresses through a double screen process where -2 mm material is separated and delivered to the wash plant.

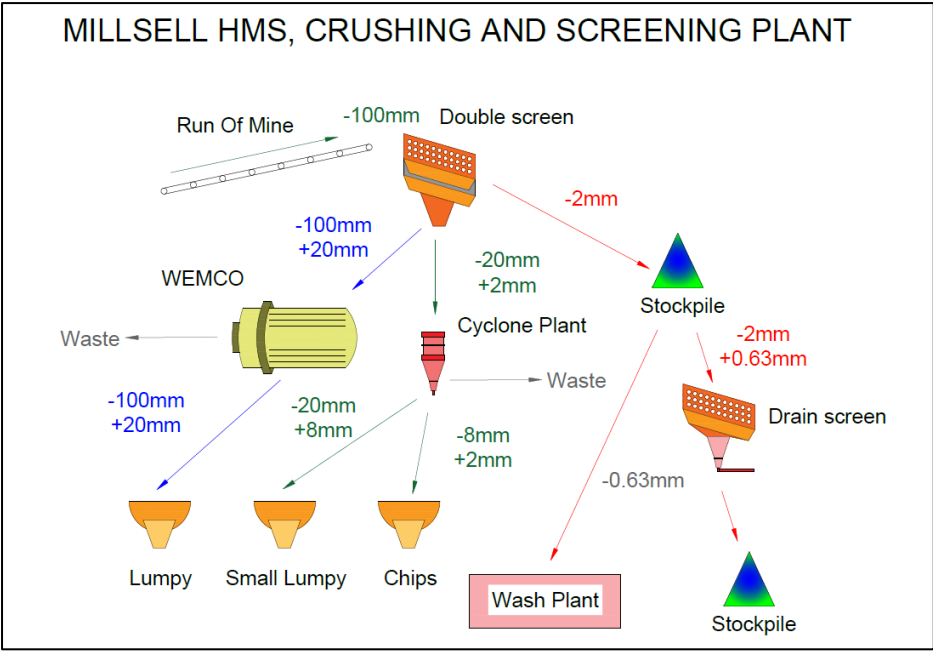


Figure 7: Millsell Mine plant process flow diagram – Millsell HMS, Crushing and Screening plant

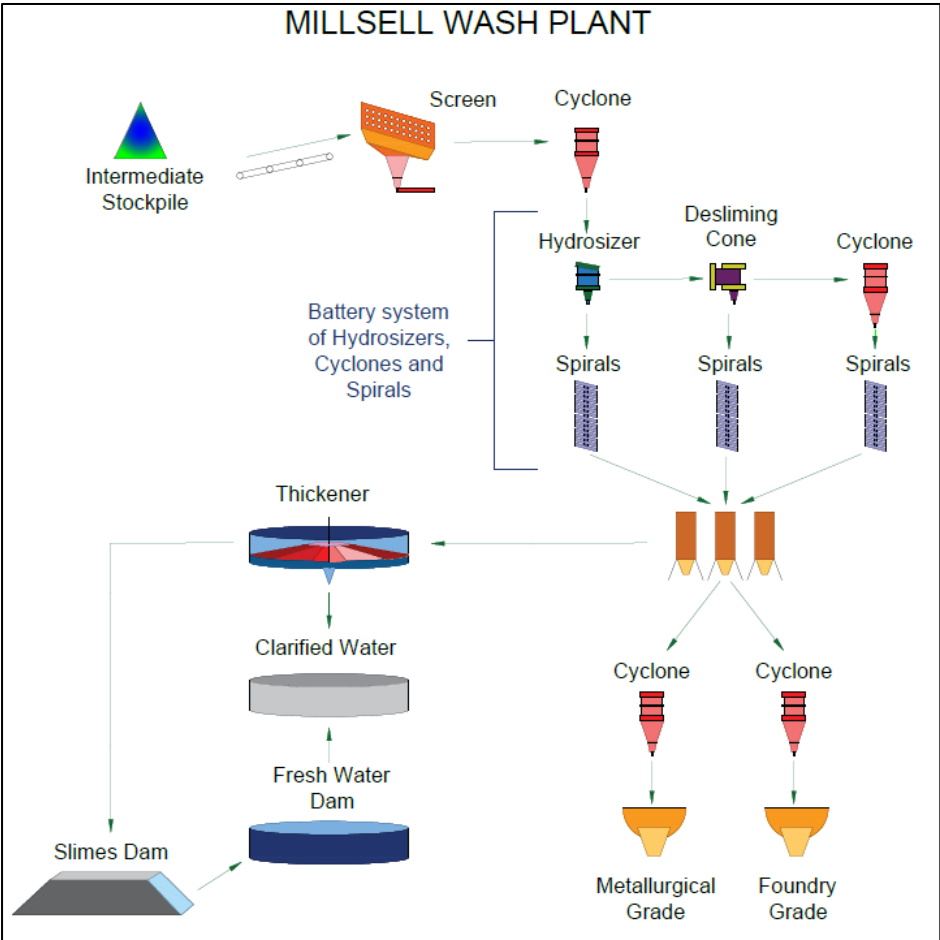


Figure 8: Millsell Mine plant process flow diagram – Millsell Wash Plant

### 3.3.3.1.1 MILLSSELL MINE BENEFICIATION PLANT

The -100 mm material is conveyed into the plant and fed into a double deck screen. The +20 mm-100 mm material is fed into the Wemco drum where the material is separated by means of HMS. The heavy medium (SG 3.6) in the HMS, Wemco and cyclone plants is made up with 14-16% atomized ferrosilicon. The product is at a grade of >38% [Cr<sub>2</sub>O<sub>3</sub>%].

The +2 mm, -20 mm material is conveyed to the cyclone plant. The material is separated through a cyclone and the products are 38% [Cr<sub>2</sub>O<sub>3</sub>%] chips (+2 mm, -8 mm), and 38% [Cr<sub>2</sub>O<sub>3</sub>%] small lumpy (+10 mm, -20 mm).

The -0.63 mm fines fraction is pumped to the wash plant where the foundry grade - 46% [Cr<sub>2</sub>O<sub>3</sub>%] and metallurgical grade - 42% [Cr<sub>2</sub>O<sub>3</sub>%] are produced. The wash plant consists of a series of spirals which processes the material by means of gravity separation. The +0.63 mm, -2 mm fraction is pumped to a drain screen and the material is conveyed to a stockpile.

The process waste is disposed of at the existing waste dump. All the water in the plant is pumped to a thickener where it is clarified using flocculent and re-used in the plant. The underflow of the thickener is pumped to the existing slimes dam.

### 3.3.3.1.2 DRYING AND BAGGING PLANT

To add value to the product and to meet customer requirements Samancor constructed the Waterkloof Drying and Bagging plant with sufficient storage facilities in 2000. Wet foundry sand is transported from Millsell Section to the Waterkloof Section, where the wet foundry sand is discharged into a feed bin. From the feed bin the material is distributed to the dryer plant with an additional surge bin installed to regulate feed volumes.

The dryer is defined as a fluidized bed dryer. A diesel like fuel (Cat light) is burned into a large volume airflow which keeps the foundry sand in suspension. A large portion of the air is introduced into the vessel from the bed through a fluor plate. The dryer acts as a prop flow reactor, the rate at which the foundry sand enters the vessel and the rate at which it leaves the vessel are equal. The dry sand exits the dryer still in a hot/dry air suspension (fluidized), into the cooler. The cooler is also a fluid bed air flow reactor, only without any burning fuel introduced into the flow. The dry sand exits the cooler in cool/dry air suspension (fluidized) onto a scalping screen and then to the bagging plant feed conveyor.

In the bagging plant the foundry sand is bagged using batch weighing systems into 1-ton bags (bulker bags) and 30 kg bags. A dry bulk facility also exists whereby, the bagging facility can be bypassed, and 5 silos filled for truck loading. The bagging facility is additionally equipped with a properly demarcated storage facility, for subsequent loading into containers and onto trucks. Control of logistics is done through the weighbridge on site.

**Error! Reference source not found.** below graphically illustrates the process flow of the drying and bagging plant.

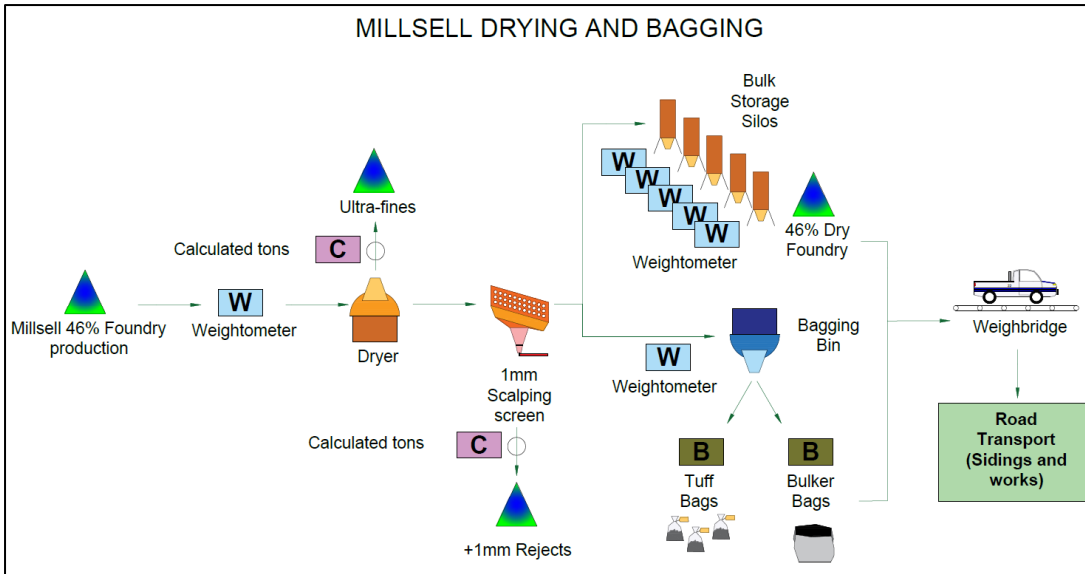


Figure 9: Millsell Section drying and bagging plant

### 3.3.3.1.3 WHIMS PLANT

Further beneficiation takes place when the fines tailings from the wash plant is treated through a high intensity magnetic separation process for further recovery of the chrome ore. Incorporation of the WHIMS plant is intended to optimize efficiency of the process and maximize fines recoveries.

The combined tails from the Sylvania plant are fed into a cluster cyclone (4 x 250 mm). The overflow of the cyclone report to the thickener whereas the underflow to the feed screen. The oversize of the screen reports to final tails and the screen undersize to the LIMS (Low Intensity Magnetic Separator). The magnetic contaminants are washed off to final tails and the “non-magnetic” slurry are fed to the Rougher WHIMS. The Rougher WHIMS tails report to final tails where the product report to the Cleaner WHIMS. The Cleaner WHIMS product is the final product and the tails report to the thickener. All the spillages in the plant are pumped to the thickener. The thickener underflow reports to the feed screen, joining the Sylvania plant tails.

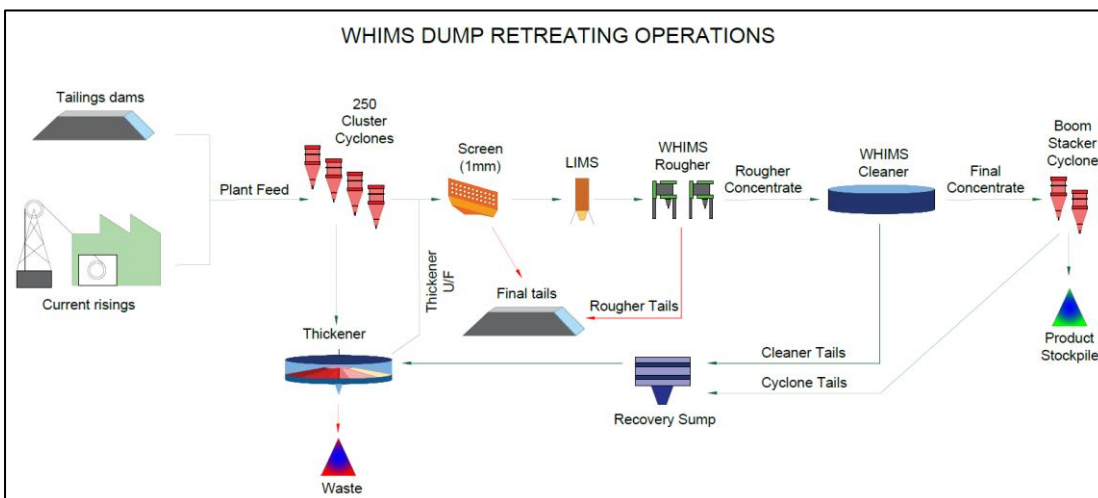


Figure 10: Diagram indicating WHIMS plant process steps

### 3.3.3.1.4 EXTRACTION OF THE ASSOCIATED MINERALS

The PGE content of the chromitite seams has always been considered to be too low and chrome contaminated to be exploited for their PGE contents. However, these PGEs have conveniently been concentrated in the tailings of the chrome mines which exploit these seams.

After extracting the chrome from the current risings and dumps and returning it to Millsell at nominal cost, Sylvania uses flotation cells to produce the PGM concentrate which is sold to various PGM smelters. The Sylvania dump operations process flow is depicted in Figure 11 below.

The mining value chain at Millsell Section involves six stages, the first of which is mining and plant beneficiation processes that extracts chromite and produces tailings. This is followed by classification with material larger than 10 cm rejected. The milling stage, which incorporates a ball mill, grinds the material to +0.63 mm diameter size fraction. The fines bypass the mill, reporting directly to the next stage. The tailings and dump material, due to their fine particle size, mean that the coarse material accounts for approximately 28% of the total with the rest being free issue. The retreated material contains approximately 28%  $[Cr_2O_3\%]$  at this stage. The Sylvania plant at Millsell processes some 60 to 70 tonnes per hour of material.

The material proceeds in slurry to the gravity separation stage, where the coarser material is separated from the fines by spirals. This stage is followed by thickening where all the thickener underflow proceeds to the flotation stage while the water is reclaimed for re-use. The process uses 360 litres of water per ton, and this water is recycled, the end result being that less water finds its way to the final tailings site. Evaporation accounts for approximately 30% of the total water used and must be replaced.

At the Millsell Section the feed for the plant is blended from five different sources to produce a 180 g/t to 200 g/t concentrate that is sold to a smelter, in this case the off-taker being Anglo Platinum. After that, it will continue processing of ROM material. Sylvania aims to achieve a 50% to 60% recovery rate, with a 43% recovery rate currently reported at Millsell Sylvania.

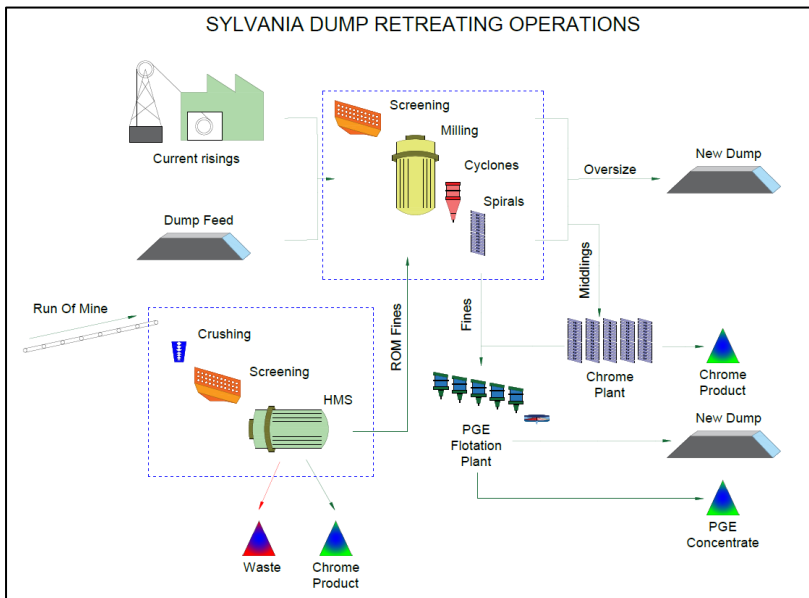


Figure 11: High level process flow of Sylvania dump retreatating operations



### **3.3.2 SUMMARY OF INFRASTRUCTURE REQUIREMENTS SUCH AS ROADS, RAIL, ELECTRICITY AND WATER**

Product for the domestic market is dispatched to the smelter either by means of road tipper trucks or rail transport from the Rustenburg Siding. An access and haul roads will be required from the proposed opencast area to the processing plant. The current Millsell and Waterkloof Section is an established mining operation having been mined for a number of years, across all three mining rights. The infrastructure is, therefore, well established including electricity and water supply. No *in situ* mineral resources will be mined on Portion 410 of the farm Waterkloof 305 JQ, which comprises a tailings storage facility and waste rock dump extension area.

### **3.3.3 TAILINGS RECLAMATION PLANT**

Tailings are received from the current operations into the PGM plant, while the existing Millsell Section tailings dam is reworked by means of a hybrid system of hydraulic mining and a loading and hauling of the feed material to the classification plant where it is pumped to the spiral chrome concentrator plant to remove the fine chrome before the tailings are pumped to the PGM flotation plant. The old tailings dam at the Waterkloof Section has been completely reworked and the area will be rehabilitated.

A three-stage flotation process is used to recover a PGM rich concentrate ( $\pm 300$  g/t (grams per ton)) in a slurry format. Once processed the tailings from the re-treatment processes is discarded on the current Millsell Section's operational tailings dams.

Certain sections of the plant are bunded to control any possible spillages. The plant residue is thickened and pumped to the tailings dam. The return water is recovered by means of the penstock system. Excess water that is not lost by means of evaporation or seepage is pumped to the return water dams (RWD) from where it is re-used in the plant. Water captured in the seepage trenches is gravitated to the RWDs.

The only way by which the processing may affect the groundwater and surface water quality is by means of the wastewater which is generated in the processing plant. Should spillage of this water occur either in the transportation system or in the area where it is stored and/or recycled, it could impact on the geo-hydrological environment to a certain extent. Special care must therefore be taken whenever any wastewater leaves the processing plant to where it can enter the natural environment.

Areas in the plants that can cause excess noise (not in excess of 85 dB (decibels)) include the jaw crusher, cone crushers, vibrating screens, the vibrating feeders, pumps, crushers and the loading and transfer of lumpy (>6 mm) ore. Air pollution occurs at the crushers and the drying and bagging plants as a result of vehicular movements.

### **3.3.4 PRODUCT**

Products from the Millsell plant are produced from the refining of chromitite and are for two major markets. The different products produced all consists of varying concentrations of the chrome spinel chromite. The products

are essentially determined based on size and chrome content. Typical specifications for the different grades are as follows:

- Foundry/Chemical grade. A broad range of foundry sands having a silica content below 1% and chromium content above 46.0% and specify AFS (American Foundry Standard) ranges between 46 to 60 with typical acid demands between 5 and 3 and pH between 3 to 5. The pH of the foundry grades is typically between 8 and 9.5; and
- Metallurgical grade. Concentrates have Cr:Fe ratios of between 1.5 to 1.6, a silica content of less than 3.0%, and phosphorus and sulphur contents below 50 ppm and 20 ppm (parts per million) respectively. These products are well-suited to producers of charge chrome. Coarse products (Lumpy, Small Lump and Chips) are produced at a minimum Chromium content of 38%.

### **3.3.5 MARKETS**

Approximately 70% of the products from Millsell Section are sold in the domestic market, having been trucked from the operation with the main customers being the following:

- Ferrometals, IC3, located in eMalahleni, Mpumalanga Province;
- Ferroveld, Joint Venture with Highveld Steel located in eMalahleni, Mpumalanga Province;
- Middelburg Ferrochrome and Middelburg Technochrome located in Middelburg, Mpumalanga Province; and
- Tubatse Ferrochrome located in the Steelpoort area of the Mpumalanga Province.

The remaining portion is exported internationally through the Durban and Richards Bay terminals. Reclamation of the tailings dams will result in chromite concentrate and PGM rich concentrate.

### **3.4 MINE INFRASTRUCTURE**

Mining has taken place at the current Millsell and Waterkloof Section since 1957. Therefore, there is existing infrastructure that will be used for the proposed project. During the development of the opencast pit, the topsoil and overburden will be placed on the proposed overburden and topsoil stockpiles. The waste rock from the proposed project area will be transported to the existing waste rock dump at the existing operations. The mined chrome from the proposed Millsell Waterkloof Sections will be crushed and screened on site and thereafter taken to the existing Millsell plant for washing.

Below is an outline of the current activities at the operational Waterkloof and Millsell Sections:

- Conveyor belt;
- Explosives magazine;
- Incline shafts and vents;
- Infrastructure:

- Roads;
- Power lines;
- Telephone lines; and
- Pipelines
- Mine residue disposal sites:
  - Tailings dams (being reclaimed);
  - Operational tailings dam with a dam, paddocks and trenches;
  - Expansion of tailings dam as currently proposed;
  - Waste Rock dump (overburden);
- Mineral processing plant;
- Power substation;
- Salvage yard (Scrap yard);
- Filtration plant (Proxa Plant currently out of use);
- Stockpile areas (Chrome dumps, chip dump and concentrate);
- Topsoil stockpiles;
- Underground mining section;
- Water control system including trenches, other dams and pipelines;
- Water pollution management facilities:
  - Storm water drains and dams;
  - Sewage treatment plant;
  - Pollution control dams, paddocks and evaporation dams;
  - Process water supply system;
- Administration and other buildings:
  - Offices;
  - Hostel (Buildings and soccer field);
  - Workshops; and
  - Paint and oil stores.

A surface outlay of the infrastructure at the current Millsell and Waterkloof Section is provided in Figure 12.

Infrastructure for the proposed Millsell Waterkloof Sections include the following:

- Opencast pit;
- Access and haul roads;

- Topsoil stockpiles;
- Overburden Dumps;
- Crushing and screening pad with the Rom pads; and
- Stormwater management infrastructure.

Refer to Figure 4 for the layout.

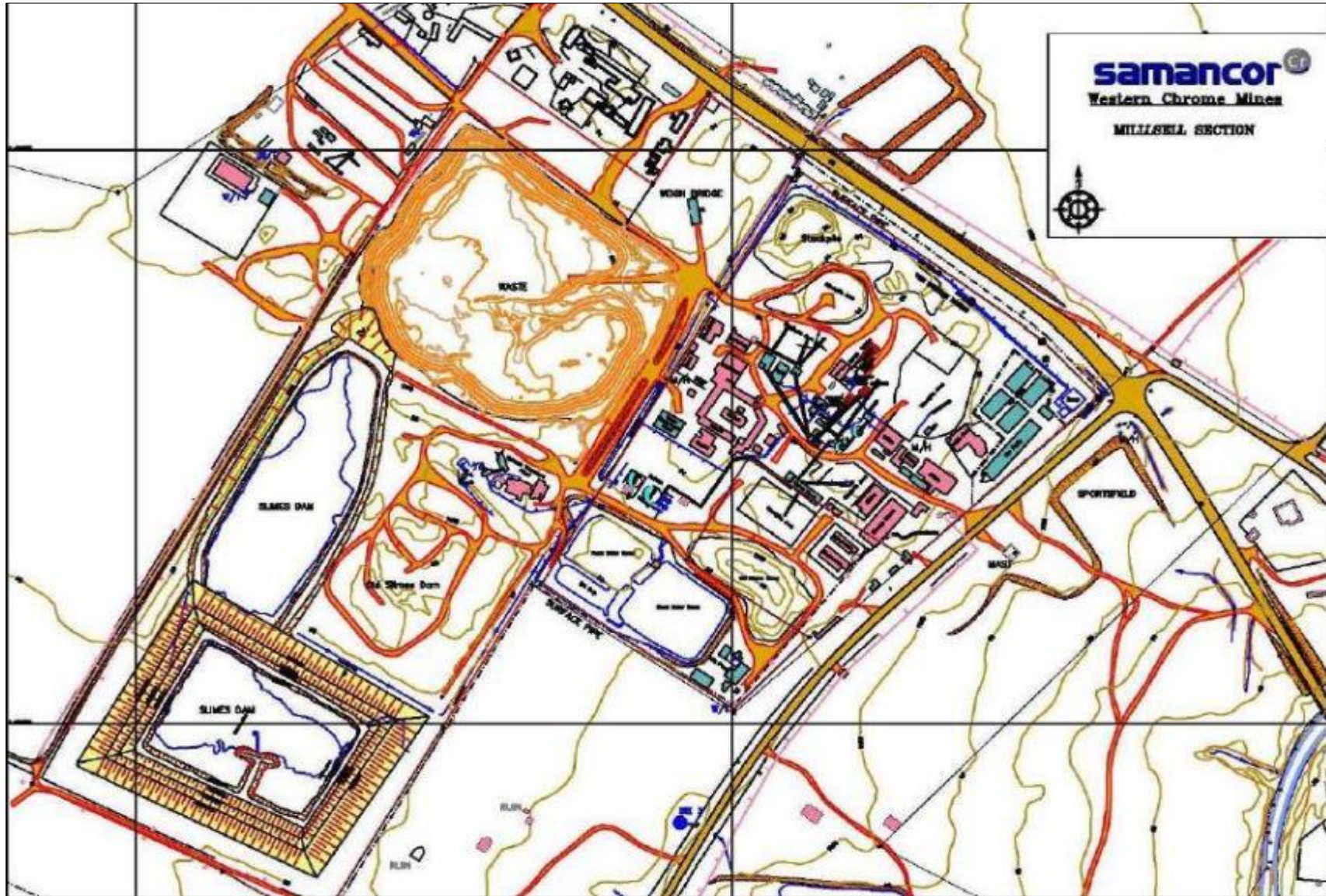


Figure 12: Existing surface layout for the Millsell Section (New Tailings Storage Facility (TSF) not included)



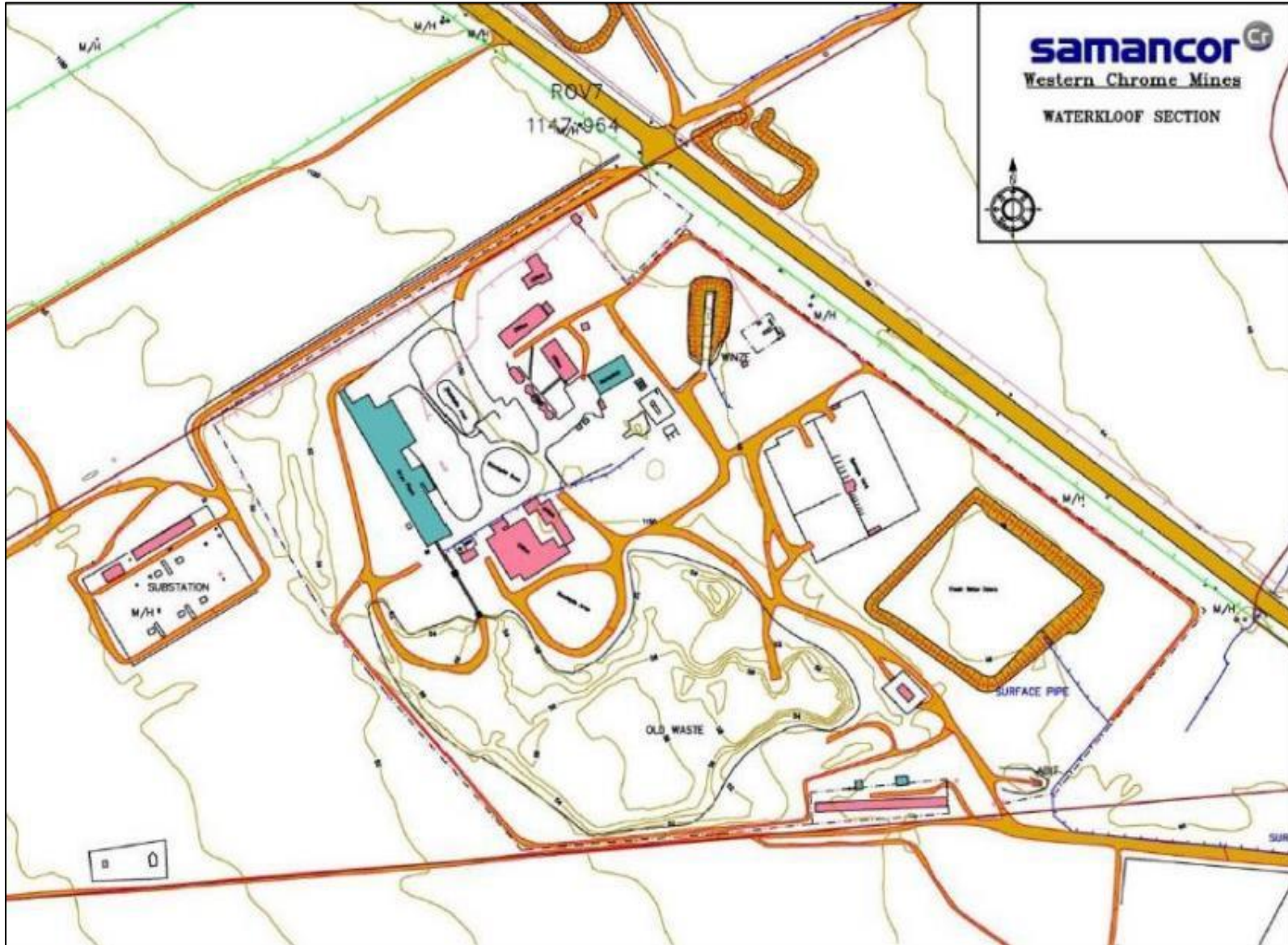


Figure 13: Surface infrastructure layout at the current Waterkloof Section



### 3.4.1 GENERAL AND HAZARDOUS WASTE

The key waste streams that will be generated include:

- Sewage from offices; and
- Dirty storm water.

### 3.4.2 WASTE CLASSIFICATION

General waste (NEM:WA) 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, and includes non-hazardous substances, materials or objects within business, domestic, inert, building and demolition wastes.

Domestic wastes that could occur on site are:

- Garden waste;
- Municipal waste; and
- Food waste.

Business wastes that could occur on site are:

- Oil wastes and waste of liquid fuels:
- Oil wastes not classified as hazardous wastes;
- Other wastes not specified in the list:
- 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 not classified as hazardous waste;
  - Waste from electrical and electronic equipment not classified as hazardous waste A;
  - Wastes from off-specification batches and unused products not classified as hazardous waste;
- Food wastes;
- Wastes from waste management facilities; and
- Inert wastes that could occur on site are:
  - Discarded concrete, bricks, tiles and ceramics;
  - Discarded glass; and
  - Discarded soil, stones and dredging spoil.

### 3.4.3 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;
- Oil wastes and waste of liquid fuels (except edible oils);
- 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; and
  - Oxidising substances wastes.
- Construction waste:
  - Wastes from bituminous mixtures, coal tar and tarred products;
  - Discarded metals;
  - Waste soil (including excavated soil from contaminated sites);
  - 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;
- Wastes from waste management facilities;
- Residue deposits: that will occur on site are:

### 3.4.4 POTABLE WATER SUPPLY

Potable water is sourced from the Rand Water Board.

### 3.4.5 SEWAGE

It is proposed to use mobile restroom units (Bloo Loo) for the proposed opencast project, from where these units will be connected via a proposed 25mm diameter HDPE pipeline to the exiting Waterkloof Sewage treatment works. Sewage water to be treated from the proposed site is approximately 13 578 m<sup>3</sup>/annum.

### 3.4.6 MINE ACCESS ROAD

Access to the site will be from the R104 and the existing Waterkloof mine. Refer to Figure 14.



Figure 14: Intersection that will be used to access the site

### 3.4.7 SECURITY AND ACCESS CONTROL

The mine will implement security and access control at all times.

### 3.4.8 SERVITUDES

The following servitudes can be found:

- There is an existing power substation at the Waterkloof Section with power lines distributing electricity to the site;
- Petroleum SA;
- Transnet; and
- Sewage.

### 3.4.9 STORMWATER MANAGEMENT

The run-off water from the proposed overburden dumps that is Type 4 waste (refer to Appendix 22) and can be defined as relatively clean water, only with a higher silt load. The water from the overburden dumps will be managed with grassed lined earth channels and berms. The channels and berms will 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.

The 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 as yet. To ensure that siltation of the existing streams is negligible this water will be captured in an earth silt trap/dam with a dispersion type erosion control overflow structure. Silt from the water will drop to the bottom of the trap and the water can be used for dust control etc.

Water run-off from the opencast pit and the proposed haul roads will be pumped to the Pollution Control Dams with an existing capacity of 17 000 m<sup>3</sup> each.

### 3.5 EXISTING AND PROPOSED INFRASTRUCTURE

The following activities were authorised previously that will be used for the proposed project:

- Underground mining;
- Processing of minerals; and
- Stormwater management infrastructure.

Refer to Section 3.4.8 for list of existing servitudes.

New activities proposed for the Millsell Waterkloof Section include:

- Opencast mining and associated boxcut;
- Topsoil stockpile 1:
  - Area: 38 995m<sup>2</sup>
  - Capacity: 974 889m<sup>3</sup>
- Topsoil stockpile 2:
  - Area: 23 294m<sup>2</sup>
  - Capacity: 572 372m<sup>3</sup>
- Topsoil stockpile 3:
  - Area: 58 640m<sup>2</sup>
  - Capacity: 1 466 m<sup>3</sup>
- Overburden dump 1:

- Area: 114 769m<sup>2</sup>
- Capacity: 2 869 225m<sup>3</sup>
- Overburden dump 2:
  - Area: 116 535 m<sup>2</sup>
  - Capacity: 2 913 375 m<sup>3</sup>
- Crushing pad with ROM pad;
- Pollution control dam 1: 17 000m<sup>3</sup>
- Pollution control dam 2: 17 000m<sup>3</sup>
- Access and haul roads;
- Stormwater infrastructure (e.g. Dirty and clean water channels); and
- Inclusion of Portion 528 of the Farm Waterkloof 305 JQ within the mining right

The main mining actions, activities and process that are planned to take place on site are listed in Table 7. All actions, activities and processes have been grouped into each of the relevant project phases namely: pre-construction, construction, operation, decommissioning, rehabilitation and closure. For this report, the following broad definitions apply:

- Pre-construction refers to the phase in which planning takes place;
- Construction refers to the phase in which the site is prepared, and infrastructure is established;
- Operation refers to the phase in which physical mining and production takes place;
- Decommissioning refers to the phase in which infrastructure is removed and rehabilitation efforts are applied, and their success monitored; and
- Closure refers to the phase in which maintenance and rehabilitation monitoring are undertaken to ensure that the mine's closure objectives are met.

Table 7: List of main action, activities or processes on site and per phase

Main Activity/Action/Process	Ancillary Activity	Pre-Construction	Construction	Operation	Decommissioning	Closure
<b>Site preparation</b>	Vegetation clearance for the establishment of infrastructure and opencast pit.		As required	As required	As required	
	Planned placement of infrastructure		At start of phase	As required		
<b>Human resource management</b>	Employment/recruitment ( if required)		At start of phase	As required	As required	As required
	I&AP consultations		At start of phase	On-going	On-going	On-going
	CSI initiatives		At start of phase	On-going	On-going	On-going
	Skills development programmes (if required)	At start of phase	On-going	On-going	On-going	On-going
	Environmental awareness training		At start of phase	On-going	On-going	As required
	HIV/AIDS Awareness programmes		At start of phase	On-going	On-going	
	Integration with Municipalities' strategic long-term planning	At start of phase	On-going	On-going	On-going	
<b>Earthworks</b>	Stripping and stockpiling of soils (Ventilation shaft)		At start of phase	As required	As required	
	Cleaning, grubbing and bulldozing		At start of phase	As required	As required	
	PCD		At start of phase	As required	As required	
	Removal of cleared vegetation		At start of phase	As required		
	Digging trenches and foundations		At start of phase	As required	As required	
	Civil Blasting		As required	As required	As required	
	Maintenance of storm water management measures		At start of phase	As required	As required	
	Maintenance of firebreak		At start of phase	As required	As required	
<b>Civil Works</b>	Maintenance of infrastructure and services		At start of phase	As required		
	Mixing of concrete and concrete works		As required	As required		
	Establishment of dewatering pipelines		At start of phase	As required		



Main Activity/Action/Process	Ancillary Activity	Pre-Construction	Construction	Operation	Decommissioning	Closure
	Sewage and sanitation		At start of phase	On-going	On-going	
	Fuel storage area		Ongoing			
	Chemical storage area		Ongoing			
	General waste area		Ongoing	On-going		
	Access control and security		Ongoing	As required	As required	
	General site management		On-going	On-going	On-going	On-going
<b>Opencast Mining</b>	Drilling		As required	As required		
	Blasting		As required	As required		
	Excavations		As required	As required		
	Removal of overburden by dozing and load haul			As required		
	Establishment of internal haul roads			As required	As required	
	Removal of ore			On-going		
	Use of crushing and ROM pads		Ongoing	As required	As required	
	Use of Product Stockpiles			On-going	On-going	
	De-watering of opencast working			On-going	On-going	
	Pumping of water to PCD			On-going	On-going	
	Overburden dumps for backfilling			On-going	On-going	
	Soil management		On-going	On-going	On-going	On-going
	Water management		On-going	On-going	On-going	On-going
	Concurrent rehabilitation			On-going	On-going	On-going
<b>Infrastructure removal</b>	Dismantling and demolition of infrastructure				As required	
	Blasting				As required	
	Safety control				On-going	On-going
<b>Rehabilitation</b>	Backfilling of opencast pit			On-going	On-going	
	Slope stabilisation			On-going	On-going	On-going
	Erosion control			On-going	On-going	On-going
	Landscaping			On-going	On-going	On-going
	Replacing topsoil			On-going	On-going	On-going
	Removal of alien/invasive vegetation			On-going	On-going	On-going
	Re-vegetation			On-going	On-going	On-going

<b>Main Activity/Action/Process</b>	<b>Ancillary Activity</b>	<b>Pre-Construction</b>	<b>Construction</b>	<b>Operation</b>	<b>Decommissioning</b>	<b>Closure</b>
	Restoration of natural drainage patterns				On-going	On-going
	Remediation of ground and surface water			On-going	On-going	On-going
	Rehabilitation of external roads				On-going	On-going
<b>Maintenance</b>	Initiate maintenance and aftercare program				At end of phase	On-going
	Environmental aspect monitoring			On-going	On-going	On-going
	Monitoring of rehabilitation					On-going

#### 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 8: 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"> <li>• Section 24</li> </ul> <p>Environment: Everyone has the right-</p> <ul style="list-style-type: none"> <li>• to an environment that is not harmful to their health or well-being; and</li> <li>• to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that-                             <ul style="list-style-type: none"> <li>i) prevent pollution and ecological degradation;</li> <li>ii) promote conservation; and</li> </ul> </li> </ul> <p>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</p>	<p>The proposed opencast 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"> <li>• Section 28 (1)</li> </ul> <p>Duty of Care and responsibilities to minimise and remediate environmental degradation.</p>	<p>The Applicant is the developer and overall responsibility of the mine rests with the company, especially in terms of liabilities associated with the operational phase.</p>
<p>EIA Regulations, 2014 (Government Notices 982 -985) [as amended]</p> <p>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:</p> <p>Listing Notice 1, 2 &amp; 3 have been triggered as well as GN633 for several waste activities requiring a Waste License as well.</p>	<p>The proposed opencast project requires an application for an amendment to the EMPr and an EA.</p> <p>An integrated NEMA and NEM:WA application were launched with the DMRE .</p>
<p>EIA Regulations, 2014 (Government Notices 982 -985)</p> <p>Chapter 6: Regulation 39 to 44: Public Participation;</p> <p>Chapter 4: Application for Environmental Authorisation:</p> <p>Part 3 Scoping and Environmental Impact Report (S&amp;EIR)</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>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
<p>Appendix 2: Scoping Report  Appendix 3: Environmental Impact Assessment Report  Appendix 4: Environmental Management Programme  Appendix 5: Closure Plan  Appendix 6: Specialist Reports</p>	<p>The content of specialist reports and closure plans are also provided.</p>
<p>EIA Regulations, 2017 (Government Notice 1816)  Reinstatement of Regulation 39(2) of the EIA Regulations, 2014, as amended, as it was prior to 11 June 2021.</p>	<p>The Applicant is exempt from obtaining landowner consent as the application is related to extraction of minerals.</p>
<p>Mineral and Petroleum Resources Development Act, 2002 (Act. 28 of 2002) [as amended]:</p>	<p>A Section 102 amendment was submitted to the DMRE.</p>
<p>National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) [as amended]</p> <ul style="list-style-type: none"> <li>• Section 16</li> </ul> <p>General duty in respect of waste management;</p> <ul style="list-style-type: none"> <li>• Section 17;</li> </ul> <p>Reduction, re-use, recycling and recovery of waste;</p> <ul style="list-style-type: none"> <li>• Section 18; and</li> </ul> <p>Extended producer responsibility; and</p> <ul style="list-style-type: none"> <li>• Section 21</li> </ul> <p>General requirements for storage of hazardous and general waste.</p>	<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"> <li>• Section 3</li> </ul> <p>Regulation of flow and control of all water</p> <ul style="list-style-type: none"> <li>• Section 19</li> </ul> <p>Prevention of pollution to watercourses</p> <ul style="list-style-type: none"> <li>• Section 21</li> </ul> <p>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:  Section 21: (g) disposing of waste in a manner which may detrimentally impact on a water resource.  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</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"> <li>- Section 21 (a): Taking water from a water resource.</li> <li>- Section 21 (c): Impeding or diverting the flow of water in a watercourse.</li> <li>- Section 21(g): Disposing of water in a manner which may detrimentally impact on a water resource</li> <li>- Section 21 (i): Altering the bed, banks, courses or characteristics of a watercourse.</li> <li>- Section 21(j): Removing, discharging or disposing of water found underground.</li> </ul> <p>The application for a Water Use License is in the process of being submitted on the online Electronic Water Use Licence Authorisation Application System (eWULAAS) system.</p> <p>Water management on the mine will be in line with the requirements of the site specific WUL and GN R704 National Water Act, 1998 (Act No. 36 of 1998).</p>
<p>Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals published in terms of</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</p>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
<p>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>determine the impact of the proposed Millsell Waterkloof opencast and underground mining on the wetland areas. The C&amp;I 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"> <li>• Chapter 2, Sections 2 – 4</li> </ul> <p>Responsibilities of owner</p> <ul style="list-style-type: none"> <li>• Chapter 2, Sections 5 – 13</li> </ul> <p>Responsibilities of manager;</p> <ul style="list-style-type: none"> <li>• Chapter 2, Sections 14 – 18;</li> </ul> <p>Documentation requirements;</p> <ul style="list-style-type: none"> <li>• Chapter 2, Section 19 – 20 and 22 to 24</li> </ul> <p>Employee's rights and duties; and</p> <ul style="list-style-type: none"> <li>• Chapter 2, Section 21</li> </ul> <p>Manufacturer's and supplier's duty for health and safety.</p>	<p>The proposed project activities may create an environment that is not safe and healthy for workers 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. WCM has a Safety, Health, Environment and Quality Policy in place and has an existing framework in setting Safety, Health, Environmental and Quality objectives.</p>
<p>National Heritage Resources Act, 1999 (Act No. 25 of 1999)</p> <ul style="list-style-type: none"> <li>• Section 44 (1);</li> </ul> <p>Preservation and protection of heritage resources;</p> <ul style="list-style-type: none"> <li>• Section 3 Types and ranges of heritage resources (i) (i);</li> </ul> <p>Objects recovered from the soil or waters of South Africa, including archaeological and palaeontological objects and material, meteorites and rare geological specimens.</p>	<p>Protection of indigenous heritage resources on the property. An Archaeological and Cultural Heritage assessment was conducted for the project and the documents will be distributed to SAHRA for comment.</p>
<p>National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) [as amended]</p> <ul style="list-style-type: none"> <li>• Section 32</li> </ul> <p>Control of dust</p> <ul style="list-style-type: none"> <li>• Section 34</li> </ul> <p>Control of noise</p>	<p>Impacts on surrounding landowners need to be managed through dust and noise mitigation measures. An Air Quality &amp; Noise Impact Assessment was undertaken at the onset of the project and the details provided in this report.</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 opencast mining activities will not trigger any of the activities under NEM:AQA.</p>
<p>National Dust Control Regulations, 2013 (Government Notice 827 of 2013)</p> <ul style="list-style-type: none"> <li>• Section 3</li> </ul> <p>Dust fall standard</p> <ul style="list-style-type: none"> <li>• Section 4</li> </ul> <p>Dust fall monitoring program</p> <ul style="list-style-type: none"> <li>• Section 6</li> </ul> <p>Measures for control of dust</p> <ul style="list-style-type: none"> <li>• Section 7</li> </ul> <p>Ambient air quality monitoring (PM10)</p> <ul style="list-style-type: none"> <li>• Section 8</li> </ul> <p>Offences</p>	<p>Dust fallout must 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
<ul style="list-style-type: none"> <li>Section 9</li> </ul> Penalties	
National Greenhouse Gas Emission Reporting Regulations, published in terms of NEM:AQA in Government Notice of July 2017	During operational phase the proposed opencast mine will be required to report in the prescribed format.
Veld and Forest Fire Act, 1998 (Act No. 101 of 1998) [as amended] <ul style="list-style-type: none"> <li>Section 12 (1)</li> </ul> <i>Duty of the landowner to prevent fire from spreading to neighbouring properties.</i>	Cautionary steps in avoiding the spread of fires to and from neighbouring properties.
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) [as amended] <ul style="list-style-type: none"> <li>Section 9</li> </ul> Norms and standards <ul style="list-style-type: none"> <li>Section 27</li> </ul> Delegation of power and duties <ul style="list-style-type: none"> <li>Section 30</li> </ul> Financial accountability <ul style="list-style-type: none"> <li>Section 43</li> </ul> Biodiversity management plans.	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.  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.
Alien and Invasive Species Regulations (Government Notice 598 of 2014) and Alien and Invasive Species List, 2016 in terms of NEMBA (Government Notice 864 of 2016) <ul style="list-style-type: none"> <li>Notice 2</li> </ul> Exempted Alien Species in terms of Section 66 (1) <ul style="list-style-type: none"> <li>Notice 3</li> </ul> National Lists of Invasive Species in terms of Section 70(1) – List 1, 3-9 & 11 <ul style="list-style-type: none"> <li>Notice 4</li> </ul> Prohibited Alien Species in terms of Section 67 (1) – List 1, 3-7, 9-10 & 12	It is the responsibility of the Applicant to ensure that all prohibited plant and animal species are eradicated as far as possible.
Conservation of Agricultural Resources Act (no. 43 of 1983) <ul style="list-style-type: none"> <li>Section 5</li> </ul> Prohibition of spreading of weeds <ul style="list-style-type: none"> <li>Section 12</li> </ul> Maintenance of soil conservation works and maintenance of certain states of affairs <ul style="list-style-type: none"> <li>Section 16</li> </ul> Regional Conservation Committees	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.
Mining and Biodiversity Guideline (2013)	The Act, regulation and guideline have informed project planning and will be taken into account in the assessment and mitigation of impacts.
National Biodiversity Offset Guideline, 2023	Not applicable to this project.
Hazardous Substances Act, 1973 (Act 15 of 1973) [as amended]	The Applicant must ensure the safety of people working with hazardous chemicals (specifically fuels), as well as



Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
<ul style="list-style-type: none"> <li>• Section 2</li> </ul> Declaration of grouped hazardous substances; <ul style="list-style-type: none"> <li>• Section 4</li> </ul> Licensing; <ul style="list-style-type: none"> <li>• Section 16</li> </ul> Liability of employer or principle <ul style="list-style-type: none"> <li>• Section 9 (1)</li> </ul> Storage and handling of hazardous chemical substances <ul style="list-style-type: none"> <li>• Section 18</li> </ul> Offences	<p>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) <ul style="list-style-type: none"> <li>• Section 4</li> </ul> Duties of persons who may be exposed to hazardous chemical substances <ul style="list-style-type: none"> <li>• Section 9A (1)</li> </ul> Penalties	<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 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>The proposed opencast operations 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 the proposed overburden dumps. Waste Classification was conducted and a Waste Management License is required for the mine for the establishment of Waste/ Residue Stockpiles.</p> <p>An integrated NEMA and NEM:WA application has been launched with the DMRE (this application).</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"> <li>a. Provide a uniform national approach relating to the management of waste storage facilities.</li> <li>b. Ensure best practice in the management of waste storage facilities; and</li> <li>c. Provide minimum standards for the design and operation of ne waste storage facilities.</li> </ol> <p>Management of the waste storage facility will be in line with the requirements.</p>
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	<p>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 overburden 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.</p>
Guideline on the Need and Desirability, Department of Environmental Affairs, 2017	<p>This guideline has been taken into account as part of project planning. The 2017 Guideline has been used within this process.</p>
NEMA: Government Notice. 805 Companion	<p>The application for EA is submitted in terms of the EIA</p>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
Guideline on the Implantation of the Environmental Impact Assessment Regulations, 2010, October 2012.	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, 2021	This guideline has informed the public participation process for the project.
<p>Regulations Pertaining to the Financial Provision for Prospecting, Exploration, Mining or Production Operations, 2015 (Notice 1147 of 2015)</p> <ul style="list-style-type: none"> <li>• Regulation 5: Scope of financial provision</li> <li>• Regulation 6: Method for determining financial provision</li> <li>• Regulation 12: Preparation and submission of plans and reports</li> </ul>	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.
<p>Regulations on use of Water for Mining and Related Activities Aimed at the Protection of Water Resources, 1999 (Notice 704 of 1999).</p> <ul style="list-style-type: none"> <li>• Regulation 4: Restrictions on location of mining activities</li> <li>• Regulation 7: Protection of water resources</li> <li>• Regulation 12: Technical investigation and monitoring.</li> </ul>	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)	<p>The regulations define the following</p> <ul style="list-style-type: none"> <li>• Controlled areas; and</li> <li>• Disturbing noise</li> </ul> <p>Limits are provided for rating levels for outdoor noise. To be utilised by the Noise specialist to determine the impact and mitigation measures.</p>
<p>NEM:AQA: GNR 283. National Atmospheric Emissions Reporting Regulations, 2015.</p> <p>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.</p> <p>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.</p>	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 environmental authorisation, published in terms of NEMA in Government Notice 86 of 2018	This guideline has been taken into account as part of project planning.
Restitution of Land Rights Amendment Act, 2014	The validity of the amendment Act was challenged in the

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
(Act 15 of 2014). The act deals with Land claims.	<p>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. 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 (NSSD 1) 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"> <li>• enhance systems for integrated planning and implementation;</li> <li>• sustain ecosystems and use natural resources efficiently;</li> <li>• move towards a green economy;</li> <li>• build sustainable communities; and</li> <li>• respond effectively to climate change.</li> </ul> <p>The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project will be taken into account in the assessment and mitigation of impacts during the EIA phase.</p>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
National Spatial Development Perspectives (NSDP)	<p>The NSDP (2006) provides a framework for a focused intervention by the State in equitable and sustainable development. It represents a key instrument in the State's drive towards ensuring greater economic growth, buoyant and sustained job creation and the eradication of poverty. It provides:</p> <ul style="list-style-type: none"> <li>• a set of principles and mechanisms for guiding infrastructure investment and development decisions;</li> <li>• a description of the spatial manifestations of the main social, economic and environmental trends that should form the basis for a shared understanding of the national space economy; and</li> <li>• an interpretation of the spatial realities and the implications for government intervention.</li> </ul> <p>The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project and have been taken into account in the assessment and mitigation of impacts.</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"> <li>• housing, water, electricity and sanitation;</li> <li>• safe and reliable public transport;</li> <li>• quality education and skills development;</li> <li>• safety and security;</li> <li>• quality health care;</li> <li>• social protection;</li> <li>• employment;</li> <li>• recreation and leisure;</li> <li>• clean environment; and</li> <li>• adequate nutrition</li> </ul> <p>The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project was taken into account in the assessment and mitigation of impacts.</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>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
	<ul style="list-style-type: none"> <li>• infrastructure development and extension: Public works and housing projects;</li> <li>• agricultural development with a focus on rural development and specifically</li> <li>• “Agro-Processing”;</li> <li>• mining value chains;</li> <li>• manufacturing and industrial development (IPAP);</li> <li>• knowledge and green economy;</li> <li>• tourism and services; and</li> <li>• informal sector of economy</li> </ul> <p>The Act, development plans, development frameworks and bylaws have informed project planning and the need and desirability of the project will be taken into account in the assessment and mitigation of impacts during the EIA phase.</p> <p>The Minister of Economic Development presented on the New Growth Path preliminary medium-term review. He stated that prior to the adoption of the NGP employment stood at 13 638 000 jobs, after the NGP the statistics showed 15 545 000 jobs that have been created thus far. Therefore, since the adoption of the NGP the net jobs created were 1.9 million. Of the number of new jobs created the private sector contributed 1 146 000 and government and its utilities contributed just about 749 000 jobs. The NGP focused on channelling growth in various sectors in the economy, infrastructure absorbing a significant amount of funding to secure jobs and create new ones. Through the investment funding of R109.1 billion 200 000 direct jobs in projects monitored by the PICC resulted. In the agricultural sector, R1.2 billion was invested by DRDLR last year to recapitalise 414 land reform farms and support 1 357 poor farmers. Drought relief was provided by government to 53 607 smallholders farmers (R795 million) and 78 863 farmers, Coca-Cola also set up a fund for emerging farmers to procure at least 80% apples, pears and grapes for fruit used to make Appletizer.</p> <p>In Mining, 56% increase in investment was made for the six-year period post the NGP compared to pre-GDP in real terms, therefore, the total jobs in mining increased by 118 000 to 329 000. Steel production fell by 33% between 2008 and 2015 due to the slow global growth rate and strained labour relations. In the manufacturing sector jobs declined by 293 000 between 2008 and 2010 as the result of the 2008 financial crisis, but the sector has been growing slowly linked to the global market recovery.</p>

Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
	<p>However, the release of the StatsSA's Quarterly Labour Force Survey today revealed that the South African official unemployment rate has increased to 27.6%, and the expanded unemployment rate increased to 38%, translating to 9.9 million unemployed people in South Africa. While the increase is marginal, it is indicative of an economy which is stagnant and shedding jobs at an alarming rate.</p>
<p>National Framework for Sustainable Development (2008)</p>	<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>
<p>National Spatial Development Perspective (2006)</p>	<p>The NSDP 2006 provides a framework for a focused intervention by the State in equitable and sustainable development. It represents a key instrument in the State's drive towards ensuring greater economic growth, buoyant and sustained job creation and the eradication of poverty. Employment opportunities, direct and in-direct will be provide by the proposed mine.</p>
<p>Bojanala District Municipality IDP (2020/2021)</p>	<p>Mining, especially of the Platinum Group Metals (PGM) remains one of the provinces key economic sectors, realising the contestation of resources through mining the negative impacts require management and positive mitigation interventions – environment, water, air pollution and agricultural land.</p> <p>The development frameworks have informed project planning and the need and desirability of the project, and were taken into account in the assessment and mitigation of impacts.</p>
<p>Rustenburg Local Municipality IDP (2022-2027)</p>	<p>Important sectors in this area include agriculture, mining, urban development and tourism. The economic, social and physical characteristics of Rustenburg are largely determined by the presence of mining activities within its Municipal Area. In 2020, the mining sector was the largest within Rustenburg Local Municipality accounting for R 52.1 billion or 76.6% of the total Gross Value Added (GVA) in the local municipality's economy. The mining sector is estimated to be the largest sector within the Rustenburg Local Municipality in 2025, with a total share of 65.3% of the total GVA (as measured in current prices), growing at an average annual rate of 3.9%. The Rustenburg Municipal Area lies on the western edge of the BIC and is one of the most heavily mineralised districts of the world. The Merensky Reed and the UG2 chromitite layers are renowned for their PGM content and together they are the world's largest depository of PGMs.</p>



Applicable Legislation and Guidelines Used to Compile the Report	Reference Where Applied
	The development frameworks have informed project planning and the need and desirability of the project and were taken into account in the assessment and mitigation of impacts.
All other relevant national, provincial, district and local municipality legislation and guidelines that may be applicable to the application.	

## 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 mining activities at the Millsell Waterkloof Sections:

- 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;
- Provision of continued employment opportunities to employees already skilled within the area;
- Continued skills development associated with mining;
- Continued upliftment of living standards and the health and safety of the local community;
- Continued economic mining of a known resource; and
- 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, in order to describe the need for a development, it must be determined 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 9.

Table 9: Need and desirability considerations

Securing ecological sustainable development and use of natural resources		
<p>1.1.1</p> <p>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?</p> <p>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 were conducted in support of this application:</p> <ul style="list-style-type: none"> <li>• Soil and Land capability, including Agricultural Potential;</li> <li>• Landscape/visual Impact Assessment;</li> <li>• Archaeological and Cultural Heritage Impact Assessment;</li> <li>• Palaeontology Impact Assessment;</li> <li>• Terrestrial Fauna and Flora (Biodiversity) Assessment (Plant and Animal Assessment);</li> <li>• Surface Water (Hydrology) Assessment and Aquatic Assessment;</li> <li>• Geohydrological Impact Assessment;</li> <li>• Noise Assessment;</li> <li>• Traffic Impact Assessment;</li> <li>• Geotechnical Investigation;</li> <li>• Socio-Economic Impact Assessment;</li> <li>• Air Quality Impact Assessment;</li> <li>• Blasting and Vibration Assessment;</li> <li>• Wetland Delineation and Functionality Assessment;</li> <li>• Hydropedological Assessment;</li> <li>• Closure and Rehabilitation Plans (including Financial Provisioning) – GNR 1147; and</li> <li>• Waste Classification.</li> </ul> <p>The following engineering work was conducted in support of this application:</p> <ul style="list-style-type: none"> <li>• Stormwater Management Plan (Engineer Designed), including Detailed Designs; and</li> <li>• Water Balance.</li> </ul> <p>The conclusions of these studies, and the identified impacts and mitigation measures stemming there are included in this EIA and EMP. The need of the project in terms of the Bojanala District Municipal SDF is also considered in this EIA and EMP.</p>	
<p>1.2</p> <p>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</p>	<p>Refer to ecological information in Section 10, and the impact assessment and mitigation measures in Section 15 of this report.</p>	

Securing ecological sustainable development and use of natural resources		
	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?	
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?	Refer to the ecological information in in Section 10, and the impact assessment and mitigation measures in Section 15 of this report. These sections includes the results and recommendations of the specialist studies conducted.
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?	General waste and hazardous waste 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 will be prescribed in the EMPr.
1.5	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?	An Archaeological and Cultural Heritage Impact Assessment was undertaken for the proposed project. Refer to Section 10 of this report.
1.6	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>The operation will remove a known resource (chrome ore – limited resource) within the designated area. This cannot be reversed. The study area has been transformed and the chrome ore mining already in the vicinity.</p> <p>Through implementing of good practice environmental management measures and mitigation measures, it will ensure that both humans and the environment are not negatively affected by the development.</p>
1.7	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	<p>Renewable natural resources may be the use of borehole water, to a limited amount, on-site. Washing and screening (Primary processing) that was previously approved will take place. Water requirements have been described above and all new water uses will be licensed in terms of the National Water Act.</p> <p>Stormwater management, and the water stemming from the primary processing, will be captured in the PCD infrastructure and re-used and recycled into the process, and</p>

Securing ecological sustainable development and use of natural resources	
<p>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-materialised 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>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. Water may also be needed to be removed from the opencast pit section during the project and this will also be re-utilised where possible. No discharges into the environment will be applied, or proposed, for the project.</p>
<p>1.8 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 are included and discussed in Section 13 of this report.</p> <p>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.</p> <p>The mitigation measures associated with the impacts have been determined and are included in Section 15.</p>
<p>1.9 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, 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</p>	<p>Refer to the impacts described in Section 14, the impact assessment and proposed mitigation measures included in Section 15.</p>

<b>Securing ecological sustainable development and use of natural resources</b>		
	to enhance positive impacts?	
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 report.
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 this EIA/EMPr phase of the project.
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, Section 14 and Section 15 for the advantages and disadvantages of the proposed activity, of this report.
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 EIA and EMPr
<b>"Promoting justifiable economic and social development"</b>		
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 ore mining is already an ongoing and historic activity within the area and within the North West Province and therefore may not compromise the integrity of the surrounding land uses and neighbouring properties.</p> <p>According to the Rustenburg IDP (2022-2027), Rustenburg's economy is largely concentrated in the PGM (especially platinum and chrome) mining industries, which contributed 76.6% to provincial GVA in 2020. The economic, social and physical characteristics of Rustenburg are largely determined by the presence of mining activities within its Municipal Area</p> <p>This indicates 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</p>	<p>Also refer to the comments made above.</p> <p>The proposed opencast 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</p>



Securing ecological sustainable development and use of natural resources		
	<p>initiatives (such as local economic development (LED) initiatives), or skills development programs? 2.2.2. Implementation on Social labor Plan (SLP)</p>	<p>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 project will make continued use of current workers and service providers, and this must be recorded, to ensure local economic development (as will be recommended in the EMPr).</p> <p>The Applicant has an existing SLP and the local community will have continued benefits through the implementation of the SLP which will provide bursaries, learnership and internship opportunities as part of the human resources development programme.</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&amp;APs during the process will be reasonably addressed and incorporated into the final EIA/EMPr submitted to the DMRE. Local economic growth and work opportunities will be 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 report.</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 14 and 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, 2.5.2. reduce the need for transport of people and goods, 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), 2.5.4. compliment other uses in the area, 2.5.5. be in line with the planning for the area, 2.5.6. for urban related development, make use of under-utilised land available with the urban edge, 2.5.7. optimise the use of existing resources and infrastructure, 2.5.8. opportunity costs in terms of bulk infrastructure expansions in</p>	<p>Alternatives have been assessed during the process and the best suited alternative will be described within this application and depicted in the EIA Phase. Refer to Section 7 and 15.7 for details of alternative considered.</p>

Securing ecological sustainable development and use of natural resources		
	<p>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 area, and</p> <p>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?</p>	
2.6	<p>How were a risk-averse and cautious approach applied in terms of socio-economic impacts?</p> <p>2.6.1. What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?</p> <p>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?</p> <p>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?</p>	<p>Specialist studies were undertaken for the project. All gaps in knowledge have been identified and are included in Section 13 and 17 of this report.</p> <p>While the expected potentially significant impacts have been preliminarily identified as part of EIA process and quantified in Section 15.1 of this EIA report.</p> <p>The mitigation measures associated with the impacts have been determined in Section 15.</p>
2.7	<p>How will the socio-economic impacts, resulting from this development impact, on people's environmental right in terms following:</p> <p>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</p>	<p>Refer to the impact assessment and mitigation measures in Section 14 and 15 of this report and the EMPr.</p> <p>A Socio-Economic Impact Assessment and a Landscape and Agricultural Impact Assessment were undertaken for the proposed project.</p>

Securing ecological sustainable development and use of natural resources		
	avoidance is not possible, to minimise, manage and remedy negative impacts? 2.7.2. Positive impacts. What measures were taken to enhance positive impacts?	
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.)?	The area where the converted mining right is located, is currently utilised for mining and agricultural activities. A Landscape, Soil and Agricultural Assessment study was undertaken. Refer to the impact assessment and mitigation measures in Section 14 and 15 of this report.
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 report.
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 14 and 15 of this 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 EIA 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 EIA 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 The EIA and EMPr specify timeframes within which mitigation measures must be implemented.
2.13	What measures were taken to: 2.13.1. ensure the participation of all interested and affected parties, 2.13.2. provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation, 2.13.3. ensure participation by vulnerable and disadvantaged persons, 2.13.4. promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the	Refer to Section 8 of this EIA which describes the public participation process undertaken for the proposed project.  A copy of the Public Participation Process have been included in Appendix 4.

Securing ecological sustainable development and use of natural resources		
	<p>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>	
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 EIA, describing the public participation process implemented for the proposed project.</p> <p>The Applicant has an existing SLP for the proposed project, which will further address 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>WCM has an existing Safety, Health, Environment and Quality Policy in place, which will regulate activities on the chromitite opencast 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 Socio-Economic Impact Assessment and Soils and Land Capability, including Agricultural Potential was undertaken as part of the EIA process. Refer to the Section 15.</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</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"> <li>Amendment to the Mining Right with a Section 102 Application (this</li> </ul>

Securing ecological sustainable development and use of natural resources		
	environment, and 2.17.2. that actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures?	application). <ul style="list-style-type: none"> <li>• EA and WML (this application).</li> <li>• WULA (Department of Water and Sanitation –DWS – will be submitted on the online eWULAAS system).</li> <li>• All legislation that has been incorporated within these processed were discussed within Section regarding Policy and Legislative Content above.</li> </ul>
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 <b>Error! Reference source not found.</b> of this EIA which describes the public participation process to be implemented for the proposed project, as well Section 15 and 21 in the EIA. (the impact on any national estate).  The Applicant has an approved SLP 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 EIA.
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 EIA.
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 15 of this report.

## 6 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED

The life of mine of the proposed project is fifteen years. This includes site establishment, ramp up and rehabilitation of all disturbed areas. Total period applied for is 15 years.

### 6.1 EXPLANATION OF TIMEFRAMES

The development of the proposed opencast mine and associated activities are as follows:

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

The Associated Minerals that can be economically extracted from the current risings. Chrome Ore mined from the above seams will be extracted for the economic LOM. The average recovery for the Millsell operation for the current risings is approximately 1.8 grams per ton in the following ratios: 59% Platinum, 24% Rhodium, 16.5% Ruthenium and 0.5% Gold.

Mining and box-cut development will be initiated from sub outcrop positions progressing gradually to a maximum high wall position. Samancor is in process of landowner negotiations for proposed open cast operations. Existing infrastructure at Millsell will allow for a reduced development and production build up. Existing servitudes and constructed gravel roads already connect operations within the boundaries of the Mining Right allowing for immediate hauling of material. Securing of the proposed opencast area can be facilitated by contracted security personnel enabling immediate extraction of the mineral resource in an access-controlled environment.

The mineral resources extracted from Portion 528 of the Farm Waterkloof 305 JQ will be included in Mining Right area NW 30/5/1/2/2/236MR. Infrastructure development will extend from current mining excavations to access the mineral resources through a bord- and pillar mine design. Equipment and employees can be internally transferred from existing mining sections to initiate mining of Portion 528 of the Farm Waterkloof 305 JQ. The time taken to commence and develop this section is as follows:

- Planning for extension of current underground infrastructure - Month 1;
- Drilling of prospect boreholes from existing underground workings - Month 1 (continuation throughout LOM);
- Initiation of mining development on Portion 528 of the Farm Waterkloof 305 JQ;



- Build-up of production profile to steady state production - Month 3 to Month 4;
- Steady state production - Month 5 to Month 68; and
- Production down scaling – Month 69 to Month 72.

## 6.2 EXPLANATION OF THE PRODUCTION BUILD UP PERIOD ONCE PRODUCTION COMMENCES

The production profile for the proposed mining activities shows a roll-over period in which a gradual transition from underground to opencast mining will occur. The roll-over period will allow Samancor to maintain a continuous stream of ore delivered to the plant. The underground and opencast production for the Millsell Mine is shown in Figure 15 below.

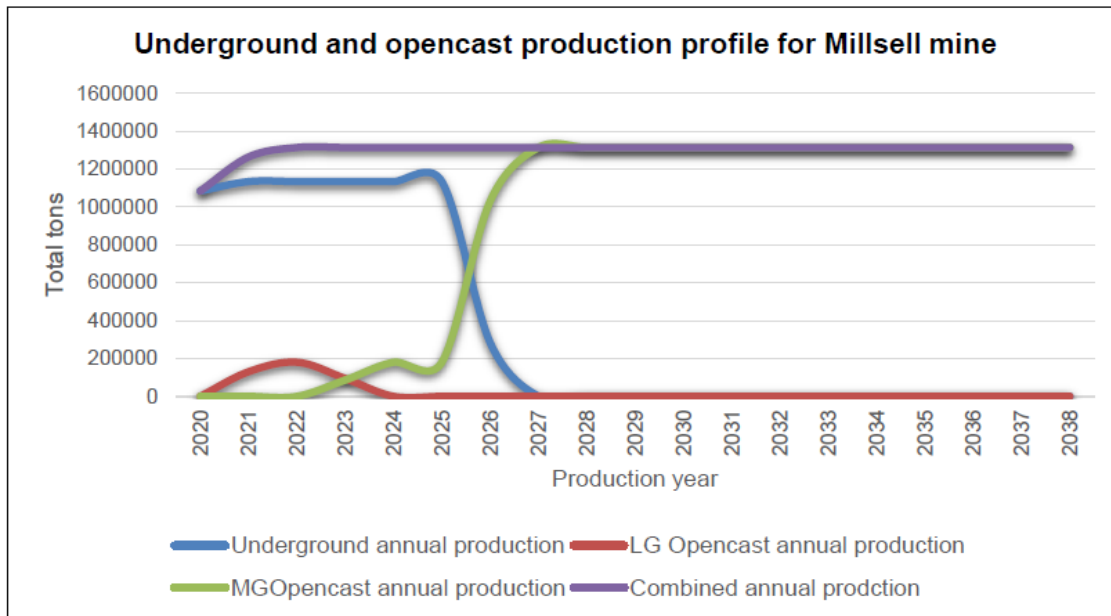


Figure 15: Underground and opencast production profile for Millsell and Waterkloof Section

The full production for the opencast mining will be reached within six (6) months. The production forecast will depend on market conditions. The opencast production schedule is shown in Figure 16.

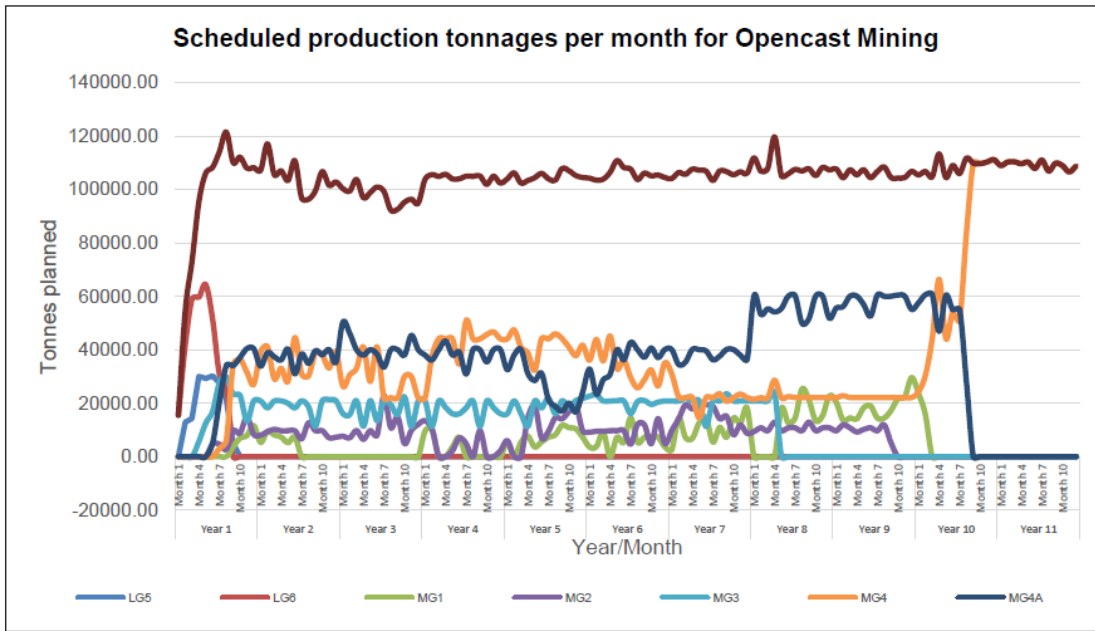


Figure 16: Opencast production schedule for Millsell Waterkloof Section

### 6.3 EXPLANATION OF PRODUCTION DECLINE PERIOD (AS GRADES DETERIORATE)

An annual production rate of 1.134 million tons of ROM will be maintained for at least 5.9 years for the underground section, based on current production rates and remaining mineral reserves. No decline in production as result of the deterioration of grade or quality are foreseen, as the chromite seams are characterized by a homogenous distribution in grade.

As production underground declines the opencast mining will replace the balance to sustain production. Opencast mining will commence once all legal approvals are in place at 15000 tonnes per month to increase overall production and decrease unit cost. Opencast production will cease once the opencast-able resource has been mined out to economical strip ratios and along strike in the designated mining application area.

## **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.*

The identification of alternatives is a key aspect of the success of the process. All reasonable and feasible alternatives must be identified and screened to determine the most suitable alternatives to consider and assess in the EIA phase. 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 MOTIVATION FOR THE PREFERRED SITE, ACTIVITIES AND ALTERNATIVES**

The site for the opencast and underground 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 and underground mining of the current mining area has to be taken into consideration for economic viability and practicality as well as the location of the resource to be mined. The proposed opencast mining also includes areas that are already included in the existing Mining Right of WCM Waterkloof and Millsell sections. A Section 102 application in terms of the

MPRDA is applied for to include the underground mining into the existing mining right. The property that is property that is proposed for the underground mining is located adjacent to the existing mining right and opencast area.

The land use of the proposed mine area consists predominantly of agricultural land. Samancor currently holds a mining right over the proposed project area and, therefore, there is a practical development alternative for the future mining area. The proposed project will take into consideration economic viability and practicality, as well as the location of the chrome resource.

## 7.2 DETAILS OF THE DEVELOPMENT FOOTPRINT ALTERNATIVES CONSIDERED

*With reference to the site plan provided as Appendix 3 and the location of the individual activities on site, provide details of the alternatives considered with respect to:*

- (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.*

According to DEA (2017), Guideline on Need and Desirability and Guidelines on Assessment of Alternatives and Impacts, Department of Environmental Affairs, feasible and reasonable alternatives must be identified for a development as required by the NEMA EIA Regulations and applicable to EIA. Each alternative is to be accompanied by a description and comparative assessment of the advantages and disadvantages that such development and activities will pose on the environment and socio-economy. Alternatives form a vital part of the initial assessment process through the consideration of modifications to prevent and/or mitigate environmental impacts associated with a particular development. Alternatives are to be amended when the development's scope of work is amended. It is vital that original as well as amended alternative identification, investigation and assessment together with the generation and consideration of modifications and changes to the development and activities are documented.

Although an array of alternatives could be investigated for each project, such alternatives will not necessarily be applicable to each project and/or project phase. However, there must always be strived to seek alternatives that maximises efficient and sustainable resource utilisation and minimise any negative impacts on the bio-physical and socio-economic environments. The following alternatives were considered as part of the Environmental Authorisation Process for the proposed project:

### 7.2.1 SITE ALTERNATIVES

The proposed application consists of areas that are approved in the existing Mining Right. The inclusion of Portion 528 of the Farm Waterkloof 305 JQ into the existing mining right area will allow for the continued underground mining of chrome as the property is situated on the border of the mining right area. No other alternatives were considered with regards to the consideration of property.

## **7.2.2 THE PROPERTY ON WHICH THE LOCATION OR WHERE IT IS PROPOSED TO UNDERTAKE THE ACTIVITY**

The proposed locations are the best option, for the following reasons:

- The mining right already belongs to Samancor WCM,
- There are proven chrome reserves on the properties for opencast and underground mining;
- There are already significant operational and process infrastructure available close by;
- Access to the site will be easy;
- The property proposed for underground mining is located on the border of the current mining right area; and
- The proposed underground mining will take place through the existing infrastructure established for the current underground mining.

## **7.2.3 THE TYPE OF ACTIVITY TO BE UNDERTAKEN**

The land use of the proposed opencast area consists predominantly of agricultural land. Samancor currently holds a mining right over the proposed project area and, therefore, there is a practical development alternative for the future mining area. The proposed project will take into consideration economic viability and practicality, as well as the location of the chrome resource. Agricultural production will not be impacted by underground mining as there will be no surface impacts.

### **7.2.3.1 MINING**

Mining is one of the predominant land uses within the surrounding area. Several active mines are located within the vicinity of the project area including the Bleskop Mine and Klipfontein Mine, amongst others.

The mining operations located in the surrounding area can be categorised as open cast and underground operations with surface access nodes. The exploration work to date forms the basis for the current evaluation. Samancor will allow for the optimum mining and usage of mineral resources within the project area, and a supply of chrome to the required markets. As such, mining can be considered a feasible land use alternative within both the application area and surrounding area.

### **7.2.3.2 AGRICULTURE**

There are agricultural activities within the surrounding area. The desktop analysis of the Soils, Land Use and Land Capability identified soils on site that are suited to arable agriculture. Agricultural potential, based exclusively on soils, indicates that agriculture is a potential feasible alternative. It is also important to note that the agricultural potential of the soils can be returned to conditions suitable for cultivation and grazing, as long as rehabilitation is undertaken as per the recommendations of the relevant specialist. The proposed underground mining will not result

in the loss of high potential land and agricultural potential as the surface will not be disturbed and hence the productivity of the land will not be affected.

### **7.2.3.2 MIXED LAND USE (AGRICULTURE AND MINING)**

Mining and agriculture have been identified as the predominant land uses within the immediate and surrounding area. The character of the application area confirms this finding, with agriculture being the dominant land use on site. As a land use, mining is often viewed as directly competing and eventually replacing existing land uses. However, an opportunity in which both feasible land uses, namely agriculture and mining can potentially be conducted concurrently. The practicalities of undertaking two concurrent, demanding land uses such as agriculture and mining are likely to require detailed management of operations to ensure the feasibility of both land uses, but it is potentially possible.

### **7.2.4 TRANSPORT ALTERNATIVES**

There are several product transport 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 – Rail. This option would involve transport of chrome to the domestic market by means existing rail transport.
- Transport Alternative T2b – 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 WCM Millsell and Waterkloof access roads.
- Transport Alternative T2c – 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 close proximity to the mine.

T2b technology is the “preferred Alternative”, the chrome ore will be trucked from the beneficiation operation to the main customers (Ferrometals, Middelburg Ferrochrome, TC Smelter, and Dikwena Chrome) for processing and transported by road to be sold to local ferrochrome producers. As a result of inefficient rail service, material that was planned on rail is being forced to transport on road. Export product from the Millsell Section is transferred to the Rustenburg siding, where it is loaded onto rail trucks for rail bound delivery to Richards Bay or Durban Ports.



### 7.2.5 PROCESSING TECHNOLOGICAL ALTERNATIVES

Technology Alternative T1a – Crushing and Screening configuration: The existing Millsell 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.

This is the “preferred alternative” as 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. No other process alternatives will be investigated.

### 7.2.6 THE DESIGN OR LAYOUT OF THE ACTIVITY

The topsoil stockpile for the proposed Millsell Waterkloof Section was located on a portion of Portions 262, 270 and 296 of the Farm Waterkloof 305. The location of the topsoil stockpile was moved due to the following:

1. The delineation of wetlands for the proposed project area resulted in an amendment to the position of the topsoil stockpile. It was found that the topsoil stockpile was located directly within the CVB wetland (refer to Figure 17).
2. From the Heritage Impact Assessment conducted, cemetery F05 was found at the centre of the topsoil stockpile location (refer to Figure 65).

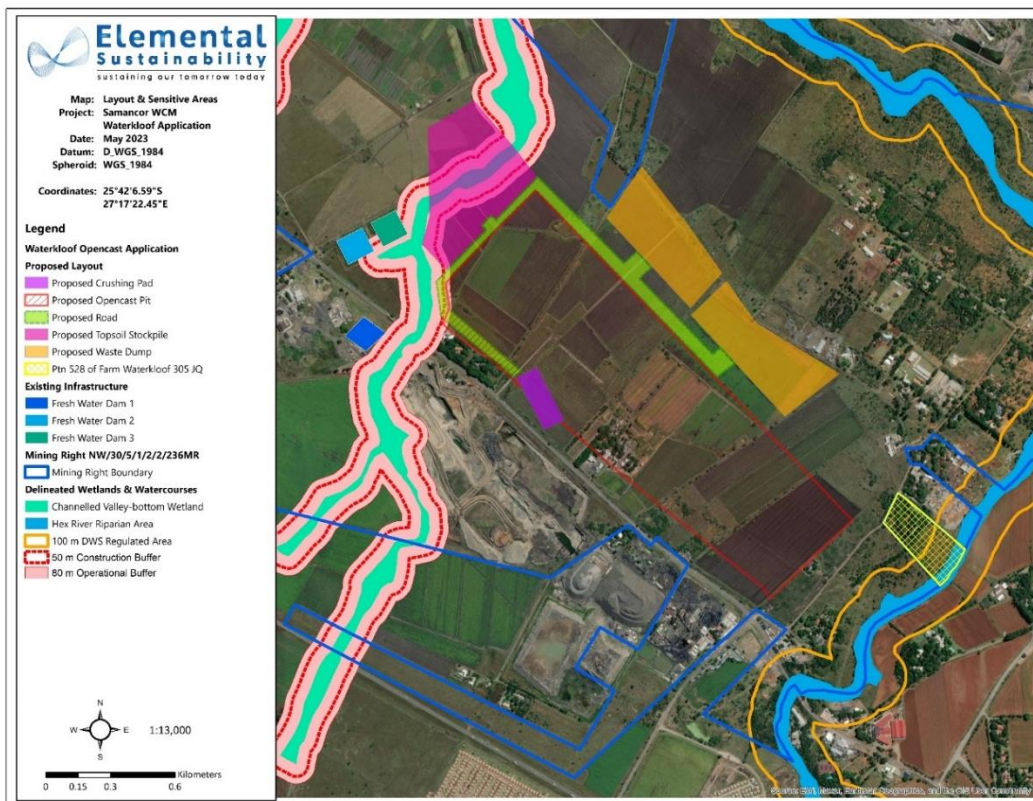


Figure 17: First proposed infrastructure layout

The topsoil stockpile was relocated and placed on areas that did not encroach onto the wetlands and cemetery. The preferred layout for the proposed project can be found in Figure 4.

### **7.2.7 NO GO OPTION**

The no-go option refers to the alternative of the proposed project not going ahead with the project at all. This alternative will avoid potentially positive and negative impacts on the environment and the status quo of the area would remain, which is the conditions of the current WCM Millsell and Waterkloof Section without any deviations or expansions. The implications of the no-go option were evaluated as part of the EIA, focusing on comparing potential impacts from the proposed project with the status quo and will be particularly relevant should it be found, that detrimental impacts cannot be managed to an acceptable level.

## 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.*

As the application is for mining related activities, the proponent is not 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.*

Six (6) site notices were erected within and surrounding the proposed project area during the scoping phase. 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 locations that were erected during the scoping 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 have been provided with a written notice (refer to Appendix 4), together with a background information document (BID) (refer to Appendix 4 for a copy of the BID). Written notices were sent to the municipality that has jurisdiction in the area and all organs of state as preidentified and that register for the project. This includes the following:

- South Africa Heritage Resource Agency (SAHRA);
- Department of Roads and Transport;
- North West Department: Economic Development, Environment, Conservation and Tourism;
- North West Department: Agriculture and Rural Development;
- Department of Agriculture Forestry and Fisheries (DAFF – now grouped with Environmental Affairs, forming DFFE since March 2021);
- Department of Mineral Resources and Energy (DMRE);
- Department of Water and Sanitation (DWS);
- 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;
- Bakwena Platinum;
- Provincial Heritage Authority;
- Eskom Holdings SOC Limited;
- Rustenburg Local Municipality;
- Bojanala District Municipality; and
- Ward Councillors.

### 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;
- 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. Copies of the BID were also sent to potential I&APs.

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);
- Department of Land Affairs;
- Bojanala District Municipality; and
- Rustenburg 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 can be found in Appendix 4.

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

- c) *placing an advertisement in—*
- i. *one local newspaper; or*
  - ii. *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—*
- i. *illiteracy;*
  - ii. *disability; or*
  - iii. *any other disadvantage.*



Copies of the BID were emailed to the current landowners and adjacent landowners. Copies of the BID were also sent to potential I&APs.

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);
- Department of Land Affairs;
- Bojanala District Municipality; and
- Rustenburg 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 can be found in Appendix 4.

#### **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 8.2.2.3 and Section 8.2.2.4 above, both the site notice and the adverts included all information as per the requirements of Section 41, subregulation 3. The EAPs contact number and email address were 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.*

Six (6) site notices were erected around the boundary of the proposed Millsell Waterkloof Sections and were at least 60 cm by 42 cm. The format was Arial and the font size is 17. A locality map was included on the site notice. A copy of the site notice is attached in Appendix 4.

#### **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.*

Subregulation 5 is not applicable to the project, as the Application is a new Application for the proposed project and does not include any revised reports.

- 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, will be made available to potential I&APs. Both the Scoping Report and the EIAr with the EMPr will be made available for public review and comment for a period of 30 days each.

- 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 the NEMA, a Section 102 application in terms of the MPRDA and a water use licence application in terms of the NWA, the public participation process is combined with all notification documentation and other public participation opportunities referring to all three authorisation/permit or licence.

## **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 was developed and will be continuously updated for the project. A copy of the database to date is included as Appendix 4.

## **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 includes 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 DFFE since 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 attended the public meetings and /or submitted contact details were registered on the I&AP database. At the public meeting held on 20 April 2023, the attendance registers were taken by an I&AP and were returned in May 2023. The database will be updated on an on-going basis throughout the process and included as an Appendix to the Scoping Report and the EIAR, as well as the Integrated Water and Waste Management Plan.

#### **8.2.4.3 ENVIRONMENTAL AUTHORISATION AND SECTION 102 APPLICATION**

- Notification:

All potential I&APs were notified by means of 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 had the opportunity to comment on the Draft Scoping Report, which was made available for public review for 30 days. Registered I&APs were notified of the availability of the Draft Scoping Report. The report was made available electronically via a downloadable link and a hard copy of the report was made available at Millsell-Waterkloof office;
  - Hard copies of the draft Scoping Report were submitted to stakeholders (Rustenburg Local Municipality), and government departments (DMRE, DWS and North West Department: Economic Development, Environment, Conservation and Tourism) for review; and

- All comments received during the scoping phase are included in the Comments and Responses Report in Appendix 4.
- Environmental Impact Assessment Phase:
  - The draft EIAr will also be made available for public review for 30 days from **4 August 2023 to 4 September 2023**.
  - Registered I&APs will be notified of the availability of the EIAr. The report will be made available electronically via a downloadable link.
  - A hard copy of the report will be made available at the following locations:
    - Samancor Millsell Waterkloof Section office; and
    - Rustenburg Local Municipality.
  - 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 MEETINGS**

A meeting was held with ward councillors on 5 April 2023. Copies of the minutes can be found in Appendix 4.

Two public meetings were held on the 19 and 20 April 2023 at the Old Town Hall in Rustenburg and Kroondal Primary School respectively. The purpose of the meetings was to introduce the project and to get the potential I&APs to register, as well as raise any concerns or issues that the I&APs may have with regards to the proposed Millsell Waterkloof project

At the public meeting held on 20 April 2023, approximately 70 people were in attendance. The attendance registers were taken by an I&AP at the meeting and returned in May 2023.

At the meeting, a presentation was conducted by Elemental. At the end of the presentation, I&APs were given the opportunity to provide their comments and concerns. Whilst comments were provided, the I&APs became disgruntled and insisted that the meeting should end. The I&APs at the meeting became hostile and intimidating, creating a security risk. The attendees forced the Applicant and Elemental Sustainability to leave the meeting venue.

During the EIAr phase Zoom or Skype meetings, and/or phone calls with landowners, stakeholders and other I&APs may be undertaken.

#### **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 Comments and Responses 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 10.



**Summary of issues raised by I&APs**

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

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

Table 10: Summary of issues raised

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>					
<b>Interested and Affected Parties</b>	<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>	
<b>List the names of persons consulted in this column, and</b>	<b>Comments Received</b>				
<b>Mark with an X where those who must be consulted were in fact consulted.</b>					
<b>AFFECTED PARTIES</b>					
<b>Landowner/s</b>					
Mr & Mrs Du Plessis (received email from representative Andries Troskie) Portion 528 of the Farm Waterkloof	X	6 May 2023	<p>Good day</p> <p>I am representing the owners of portion Waterkloof 582 JQ (Mr &amp; Mrs Du Plessis) mentioned in your document as a proposed inclusion into the mining right NW30/5/1/2/2/236 as per your document.</p> <p>For clarity purposes could you please elaborate on what this entails and how the property will be affected.</p> <p>Thank You</p>	<p>Good morning Andries,</p> <p>Thank you for the email and telephone call.</p> <p>Please be advised that Elemental has sent your queries to Samancor and is awaiting feedback. As soon as Samancor has sent the information, Elemental will advise.</p>	Section 2 Appendix 4
				<p>Good day Andries,</p> <p>Please find below the response to the email and telephone calls with regards to Portion 528 of the farm Waterkloof 305 JQ.</p>	Section 10 & 14 Appendix 4



Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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>In the case of Portion 528 of the Farm Waterkloof , there are chrome bearing reefs that underly the property at depth of 164 meters below the surface on the northern boundary, ranging to a depth of 110 meters below surface on the southern boundary property. Underground mining methods are proposed to extract the chrome.</p> <p>The impacts of the proposed project are currently being assessed through the following specialist studies:</p> <ul style="list-style-type: none"> <li>• Soil and Land Capability, including Agricultural Potential;</li> <li>• Visual Impact Assessment;</li> <li>• Archaeological and Cultural Heritage Impact Assessment;</li> <li>• Palaeontology Impact Assessment;</li> <li>• Terrestrial Fauna and Flora (Biodiversity) Assessment;</li> <li>• Surface Water (Hydrology) Assessment and Aquatic Assessment;</li> <li>• Wetland Delineation and Functionality Assessment;</li> <li>• Geohydrological Impact Assessment;</li> <li>• Noise Assessment;</li> <li>• Traffic Impact Assessment;</li> <li>• Geotechnical investigation;</li> <li>• Social Economic Impact Assessment;</li> <li>• Air Quality Impact Assessment;</li> <li>• Blasting and Vibration Assessment;</li> <li>• Waste Classification;</li> <li>• Water Balance;</li> </ul>	

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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.					
				<ul style="list-style-type: none"> <li>Residue stockpile design for overburden;</li> <li>Storm Water Management Plan (including floodlines and topography); and</li> <li>Closure and Rehabilitation Plans (including Financial Provisioning) – GNR 1147.</li> </ul> <p>The outcomes of the specialist studies and recommendations will be included in the Environmental Impact Assessment Report which will be circulated to all interested and affected parties for the review. Please be advised that the Applicant also intends to apply for a water use licence and that a condition of the water use licence will include monitoring of water quality and quantity and that if either of impact on as a result of mining alternative water sources will need to be provided to the landowners affected.</p> <p>Should you have further queries, please do not hesitate to contact me.</p>	
Mr & Mrs Du Plessis (received email from representative Andries Troskie) Portion 528 of the Farm Waterkloof	X	06 June 2023	<p>Hi Melissa</p> <p>I have been informed by the landowner of Portion 528 that they will be opposing the new mining activity based on the following that could possibly affect their health conditions.</p> <ol style="list-style-type: none"> <li>Noise</li> <li>Air quality</li> <li>Blasting activity</li> <li>Residue</li> </ol> <p>They will be acting in good faith but would</p>	<p>Good morning Andries,</p> <p>The comments and objection below are noted and will be sent to the Applicant. The objection will be included in the Comments and Responses Report that forms part of the Final EIA for submission to the Department of Mineral Resources and Energy for their decision.</p>	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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>also consider to sell their property if your client would be interested.</p> <p>Regards</p> <p>Andries Troskie on behalf of Mr &amp; Mrs Du Plessis the owners of portion 528 Waterkloof 305 JQ Cell : 082 441 7881</p>	<p>The following specialist studies were commissioned for the proposed project to assess the impact on the surrounding environment:</p> <ul style="list-style-type: none"> <li>• Soil and Land Capability, including Agricultural Potential;</li> <li>• Visual Impact Assessment;</li> <li>• Archaeological and Cultural Heritage Impact Assessment;</li> <li>• Palaeontology Impact Assessment;</li> <li>• Terrestrial Fauna and Flora (Biodiversity) Assessment;</li> <li>• Surface Water (Hydrology) Assessment and Aquatic Assessment;</li> <li>• Wetland Delineation and Functionality Assessment;</li> <li>• Geohydrological Impact Assessment;</li> <li>• Noise Assessment;</li> <li>• Traffic Impact Assessment;</li> <li>• Geotechnical investigation;</li> <li>• Social Economic Impact Assessment;</li> <li>• Air Quality Impact Assessment;</li> <li>• Blasting and Vibration Assessment;</li> <li>• Waste Classification;</li> <li>• Water Balance;</li> <li>• Residue stockpile design for overburden;</li> <li>• Storm Water Management Plan (including floodlines and topography); and</li> <li>• Closure and Rehabilitation Plans (including Financial</li> </ul>	

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>					
<b>Interested and Affected Parties</b>		<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>
<b>List the names of persons consulted in this column, and</b>		<b>Comments Received</b>			
<b>Mark with an X where those who must be consulted were in fact consulted.</b>					
				Provisioning) – GNR 1147.  The results of the studies as well as the mitigation measures will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	
<b>Lawful occupier/s of the land</b>					
	X		No response received to date.		
<b>Landowners or lawful occupiers on adjacent properties (Please see under other)</b>					
Jan de Flamingh (received email from Dreyer & Dreyer Attorneys)	X	17 April 2023	Good day Melissa,  I refer to the above.  Will you kindly assist us in determining in which ward our client falls?  It is for Dr. Jan de Flamingh.	18 April 2023  Good day,  On our database your client is referenced to Portion 109 and 182 of the Farm Waterkloof 305 JQ. Please confirm if this is correct.  Kind Regards, Melissa Pillay	Section 10 & 14 Appendix 4
Jan de Flamingh (received email from Dreyer & Dreyer Attorneys)	X	18 April 2023	Hi Melissa,  That's correct.  Kind regards / Vriendelike groete	18 April 2023  Good day,  Thank you for the below. Your client can attend the meeting on the 19 <sup>th</sup> or 20 <sup>th</sup> of April 2023.  Kind Regards, Melissa	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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.					
Natalie and Hudson Klerck (Portion 12 and 219 of the Farm Waterkloof 305 JQ)	X	19 April 2023	<p>Good morning Melissa</p> <p>Unfortunately we are not able to attend the public meetings or send someone to attend in our place Can we not attend via Teams Meeting?</p> <p>We are interested and affected party as our properties (2 areas) are next to the planned area We are Sect 219 and Sect 12</p> <p>I will email you our concerns and maybe like to speak to you via phone or email or electronic meeting eg teams To discuss our concerns regarding our current concerns regarding safety and possible land invasion This happened during Covid and 3 seperate incidents in the last 2 years that are extremely concerning to us The last was about 2 weeks ago</p> <p>Will send our email with next hour</p> <p>Kindly could you email us your presentation and discussion today and at tomorrows meeting as well as the minutes of both meetings</p> <p>Kind Regards Natalie and Hudson Klerck</p>	<p>19 April 2023</p> <p>Thank you for the email below. Unfortunately, you will not be able to attend the public meeting on Teams. Can you please provide me with the full property descriptions for Sect 219 and 12?</p> <p>Please see attached a copy of the presentation that will be used for today and tomorrow's meetings. Once the minutes are ready, they will be made available to you.</p> <p>You are more than welcome to contact me to discuss the project further.</p>	Section 2 Appendix 4
Natalie and Hudson Klerck (Portion 12 and 219 of the Farm Waterkloof 305 JQ)	X	19 April 2023	<p>Good morning Melissa</p> <p>Herewith in detail Sect 219 of Waterkloof 305JQ Arnoldstad Kroondal And Sect 12 of Waterkloof 305JQ Arnoldstad</p>	<p>19 April 2023</p> <p>Good day,</p> <p>Thank you for the information below.</p>	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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.					
			Kroondal We are opposite the Mine next to soccer field And then next to the dirt road joining the little piece the Mine owns where the Landgrab took place Also known as Drum 1 Regards Natalie	Kind Regards, Melissa Pillay	
Natalie and Hudson Klerck (Portion 12 and 219 of the Farm Waterkloof 305 JQ)	X	19 April 2023	Good afternoon Melissa and Sonja  Herewith our comments concerns and inputs with regards to the proposed project	19 April 2023 and 26 April 2023  Good day,  Thank you very much for your email below. I will pass it onto the Applicant as well.  The proposed application is only for the opencast mining of chrome. All other concerns / comments on the proposed project will be addressed in the specialist studies and the EIA. The EIA will be made available for review.	Section 3 & 8 Appendix 4
Natalie and Hudson Klerck (Portion 12 and 219 of the Farm Waterkloof 305 JQ)	X		Firstly the areas that are my property and that fall within the Mining Rights area as indicated with a blue line in the presentation are Section 219 of Waterkloof 305JQ Arnoldistad Kroondal and Section 12 of Waterkloof 305JQ Arnoldistad Kroondal. We have been in contact and meetings with Shane Laubscer and various of the managers and mine managers etc of the Mine and currently we do speak to Derek from time to time with issues that do arise for e.g. Recent issue with people wanting to dig again on Sect 12 in an area next to the soccer field opposite the mine.	Your comments and concerns are noted and will be included in the Comments and Responses Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy for their decision.  The proposed opencast mining activities occurs will not take place on Portions 12 and 219 of the Farm Waterkloof 305 JQ.  The background information provided is noted and a copy of the comments will be sent to the Applicant.	Section 3 & 8 Appendix 4 & D6
Natalie and	X		Current outstanding issues	The background information provided is noted and a	Appendix D5

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>				
<b>Interested and Affected Parties</b>	<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>
<b>List the names of persons consulted in this column, and</b>	<b>Comments Received</b>			
<b>Mark with an X where those who must be consulted were in fact consulted.</b>				
Hudson Klerck (Portion 12 and 219 of the Farm Waterkloof 305 JQ)		<p>1) Since 2010 outstanding issue of rehabilitation of the area in Sect 12 that was waterlogged by the Mine - to date not finalised Sent you some of the minutes and meetings 2010 and 2011 on WhatsApp We did have session with Shane as well - apparently the Mine does not have the finances to complete the Project? The work done there now to date has been our own and got a fine because we tried filling up and leveling on our own</p> <p>2)Currently we have a list of Issues that we regularly discuss with Shane Noise, Dust, the road, water etc. Our safety with regards to a person and local community members wrt illegal mining and various threats that are made These recordings have been sent to Derek and Shane</p>	copy of the comments will be sent to the Applicant. These concerns will be included in the Comments and Responses Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy for their decision.	
Natalie and Hudson Klerck (Portion 12 and 219 of the Farm Waterkloof 305 JQ)	X 19 April 2023	<p>Current Issues and risks</p> <p>3) Local Community and person/s wrt Illegal mining on our property at various sites</p> <p>4) Seem to have access to where the reef is as well as old tailings Safety and Security concern</p> <p>5) possible Land Grab as during Covid period</p> <p>6) 3 separate occasions that Sept 2019 then April 2022 and now March 2023 Individual and local community members as well as possible investors Gaining access and then treating with</p>	The background information provided is noted and a copy of the comments will be sent to the Applicant. These concerns will be included in the Comments and Responses Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy for their decision.	Appendix D5



Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
		various actions		
Natalie and Hudson Klerck (Portion 12 and 219 of the Farm Waterkloof 305 JQ)	X 19 April 2023	<p>New Proposed Development</p> <p>7) Issues such as dust Noise Access to our property</p> <p>8) Trucking or conveyor belt of material to plant? Impact i.e. roads Noise etc</p> <p>9) Increased risk of community members wanting to mine on our land as they know where to dig for the reef</p> <p>10) where are the underground Mining activities going to take place Don't see it on the presentation</p> <p>11) Impact on our Property valuation , Income, resale value etc. Decrease in property values? People not wanting to rent?</p> <p>12) Current Millsell plant going to be used for proposed mining activities Currently we have issues wrt Noise of plant The crushing and Screening The hooters and sirens The truck reverse hooters and dumping We hear every rock falling How is this going to improve?? Or worsen or what will be put in place.</p> <p>The water overflow on the corner of the Mine is a problem especially during the rainy season Overflows down the road into or property Sect 12</p> <p>E.g. Our outstanding issue not resolved since 2010 of our waterlogged property that</p>	<p>A Noise and Air Quality Assessment was commissioned for the proposed project. The specialist will assess the impact of the proposed project on the air quality and noise levels in the area.</p> <p>Trucks will be used to transport chrome from the opencast pit to the existing plant at Millsell. Existing roads will be used.</p> <p>A Social Economic Impact Assessment was commissioned for the proposed project which will assess the impact proposed project has on the social environment.</p> <p>The proposed project is only for opencast mining activities. Please see attached layout showing the opencast pit.</p> <p>The impact of the proposed project on property values will be assessed in the Social Impact Assessment.</p> <p>The chrome will be processed at the existing Millsell plant. The current issues raised will be sent to the Applicant and will be included in the Comments and Responses Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy for their decision.</p> <p>The current issues raised will be sent to the Applicant and will be included in the Comments and Responses</p>	Section 9 & 14

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
		has not been rehabilitated by the Mine as instructed by Department We will gladly assist with any queries and more information if needed	Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy for their decision.  The results of all the specialist studies as well as the mitigation measures will be included in the Environmental Impact Assessment report. The Environmental impact Assessment report will also be circulated to all interested and affected parties for their comment.	
Natalie and Hudson Klerck (Portion 12 and 219 of the Farm Waterkloof 305 JQ)	X 20 April 2023	Please just make sure wrt the Chrome on our 2 properties On Portion12 the chrome tailings are accessible and they know where it is On Portion 219 the have twice now dug with a back actor They offload the machine precisely where the reef outcrop is When they start digging it is in the right place This we cannot explain As well as the concern we have ito possible land invasion and for our safety.	Opencast mining of chrome will not take place on Portion 12 and 219 of the Farm Waterkloof 305 JQ. This comment on the chrome reef, land invasion and safety will be sent to the Applicant. The comments will also be included in the Comments and Responses Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy for their decision.	Section 3 Appendix D6
Seth and Lucretia van Niekerk ( JQ305   Plot 305 Arnoldiststad Drum 32)	X 20 April 2023	Draft Scoping Report for the Millsell Waterkloof Section Available from 17 March 2023 to 19 April 2023 for 30-day public review period on the link: <a href="https://www.dropbox.com/scl/fo/4au029uw0s7d32t2a4hrx/h?dl=0&amp;rlkey=m2oj7omatw5ujcu6sbbbdoxyx">https://www.dropbox.com/scl/fo/4au029uw0s7d32t2a4hrx/h?dl=0&amp;rlkey=m2oj7omatw5ujcu6sbbbdoxyx</a>	The objection is noted. Your comments and concerns and will be included in the Comments and Responses Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy for their decision.	Appendix D6

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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><b>OFFICIAL OBJECTION FROM AFFECTED PARTY</b>  <b>Seth and Lucretia van Niekerk Farm &amp; Land Owners</b>  <b>JQ305   Plot 305 Arnoldiststad Drum 32</b></p> <p>We, Seth and Lucretia van Niekerk, the Farm and Land Owners of JQ305   Plot 305 Arnoldiststad, Drum 32, do hereby lodge our OFFICIAL OBJECTION to any Open Cast Mining Activities by ANY of SAMCOR CHROME LTD, the Company, its Management, Employees, third party representatives and any other persons affiliated with the Company or this Project, including any family-related members of any of the representatives of this Project.</p>			
Seth and Lucretia van Niekerk ( JQ305   Plot 305 Arnoldiststad Drum 32)	X	20 April 2023	<p>Our Objections are supported by Scientific historical environmental impact studies of the same mining activities both in and outside South Africa. Furthermore, documented news articles are listed below to support our Objection. Please see the following references:</p> <ul style="list-style-type: none"> <li>- <a href="http://www.scielo.org.za/scielo.php?script=sci_arttext&amp;pid=S0038-23532011000300002">http://www.scielo.org.za/scielo.php?script=sci_arttext&amp;pid=S0038-23532011000300002</a></li> <li>- <a href="https://www.wits.ac.za/news/sources/cals-news/2022/state-and-">https://www.wits.ac.za/news/sources/cals-news/2022/state-and-</a></li> </ul>	<p>The objection is noted. The following specialist studies were commissioned for the proposed project to assess the impact on the surrounding environment:</p> <ul style="list-style-type: none"> <li>• Soil and Land Capability, including Agricultural Potential;</li> <li>• Visual Impact Assessment;</li> <li>• Archaeological and Cultural Heritage Impact Assessment;</li> <li>• Palaeontology Impact Assessment;</li> <li>• Terrestrial Fauna and Flora (Biodiversity) Assessment;</li> <li>• Surface Water (Hydrology) Assessment and Aquatic Assessment;</li> <li>• Wetland Delineation and Functionality Assessment;</li> <li>• Geohydrological Impact Assessment;</li> <li>• Noise Assessment;</li> </ul>	Section 9 & 14

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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><a href="https://link.springer.com/article/10.1007/s13201-018-0849-9">mining-houses-both-failed-marikana-community.html</a></p> <ul style="list-style-type: none"> <li>- <a href="https://link.springer.com/article/10.1007/s13201-018-0849-9">https://link.springer.com/article/10.1007/s13201-018-0849-9</a></li> <li>- <a href="https://www.iol.co.za/saturday-star/news/residential-mining-raises-questions-15276591">https://www.iol.co.za/saturday-star/news/residential-mining-raises-questions-15276591</a></li> </ul>	<ul style="list-style-type: none"> <li>• Traffic Impact Assessment;</li> <li>• Geotechnical investigation;</li> <li>• Social Economic Impact Assessment;</li> <li>• Air Quality Impact Assessment;</li> <li>• Blasting and Vibration Assessment;</li> <li>• Waste Classification;</li> <li>• Water Balance;</li> <li>• Residue stockpile design for overburden;</li> <li>• Storm Water Management Plan (including floodlines and topography); and</li> <li>• Closure and Rehabilitation Plans (including Financial Provisioning) – GNR 1147.</li> </ul> <p>The results of the studies as well as the mitigation measures will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.</p>		
Seth and Lucretia van Niekerk (JQ305   Plot 305 Arnoldiststad Drum 32)	X	20 April 2023	The Objection is simple: All water supplied to our farm and our residence is from borehole water. Underground water which WILL be affected by this mining activity.	A Geohydrological Impact Assessment for the proposed opencast mine was commissioned. The specialist study will investigate the impacts of the proposed project on the groundwater in the area. Mitigation measures will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
			Also, our houses have started cracking due to the continued blasting currently happening underground	A Blasting and Vibration Assessment was commissioned. The specialist study will investigate the impacts of blasting on the surrounding environment. Mitigation measures will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
Seth and Lucretia van Niekerk	X	20 April 2023	Couple this with severe power failures now occurring on a daily basis directly because	The impact of the current mining operations on the power supply in the area will require further input from the Applicant.	Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
JQ305   Plot 305 Arnoldistad Drum 32)		<p>of the mining activities, we cannot accept your Company presence any longer. We therefore ask you, respectfully, to remove yourselves and all mining activities from our ARNOLDISSTAD AREA with immediate effect.</p> <p>We will also attend the Meeting on 20 April 2023, Time: 15h00 to 17h00, Venue: Kroondal Primary School, by Melissa Pillay (<a href="mailto:melissa@elemental-s.co.za">melissa@elemental-s.co.za</a>) to lodge our OBJECTION BY AFFECTED PARTY.</p>	The objection is noted.	
Christa Snyman	X	<p>24 April 2023</p> <p>Good day Sonja and Melissa,</p> <p>Herewith I would like to lodge my concern about this project.</p> <p>We are portion 529 Waterkloof 305JQ, land owner.</p> <p>As landowner I, Christa Snyman, would like to say we oppose this project as it will negatively impact my income and living conditions.</p>	Your objection is noted.	Appendix 4
Christa Snyman	X	<p>24 April 2023</p> <p>Our concerns is about:</p> <p>We only use borehole water as Arnoldistad do not have a pipeline supplying us with Randwater or Municipal water. Should the mine start to disturb the natural water it might cause our borehole water to be polluted or even stop completely.</p>	A Geohydrological Impact Assessment for the proposed opencast mine was commissioned. The specialist study will investigate the impacts of the proposed project on the groundwater in the area. The results of the assessment and mitigation measures will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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.					
Christa Snyman	X	24 April 2023	We already hear every afternoon blasting from the mine. With open cast mining I am sure the sound will be much loader and it might mean we need to evacuate. We are operating our business from our land and we cannot stop all operations.	A Blasting and Vibration Assessment was commissioned for the proposed opencast project. The specialist study will assess the impact of the proposed opencast project on the surrounding environment. The results of the assessment and mitigation measures will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
			The electricity supply to the small holdings is very sensitive. It trips for the smallest issue which mean we might be affected even more	Comment noted.	Appendix 4
Christa Snyman	X	24 April 2023	From friends living in Waterval we know from experience that houses crack and will definitely also happen here.	A Blasting and Vibration Assessment was commissioned for the proposed opencast project. The specialist study will assess the impact of the proposed opencast project on the surrounding environment. The results of the assessment and mitigation measures will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
Christa Snyman	X	24 April 2023	It will also mean the area will have more informal traders erecting their shops all over and more unwanted people will be roaming around	A Social Economic Impact Assessment was commissioned for the proposed project. The specialist study will assess the impact of the proposed project on the social and economic environment in the area. The results of the assessment and mitigation measures from the studies will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
Seth van Niekerk	X	27 April 2023	Thank you kindly Melissa for your quick response and organizing the response in a logical manner.  Please would you add <b>one</b> further	3 March 2023  Good morning Seth,  You are welcome.	Appendix 4  Section 9 & 14

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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>objection:</p> <p>Should SAMANCOR CHROME LTD and its affiliates, including all specialists consultants involved in the Proposed Open Cast Mining Waterkloof Sections divert any of Arnoldistad's natural water supplies, we require fresh portable drinking water supplied to every single home on a daily basis to the size of a full water tank currently on the plots.</p>	<p>Thank you for the additional comments below. The objection is noted and will be included in the Comments and Responses Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy.</p> <p>Kind Regards, Melissa Pillay</p> <p>4 May 2023</p> <p>The specialists and Elemental Suitability (Pty) Ltd are independent and are only responsible for the respective enviro-legal applications.</p> <p>The Applicant for the proposed project, Samancor Chrome Ltd, will be responsible for the implementation of the approved Environmental Management Programme and Integrated Water and Waste Management Plan, should the proposed project be approved by the relevant competent authorities. The results from the Geohydrological Impact Assessment will be included in the above-mentioned management plans for implementation.</p> <p>The request for fresh water for Arnoldistad will be sent to the Applicant for further input.</p>	
Seth van Niekerk	X	27 April 2023	<p>This requirement will be in force from the start of the Project until a period of 100 years has passed or until the underground natural water resources are successfully rehabilitated. Independent surveyors</p>	<p>This request is noted and sent to the Applicant for further input.</p>	Appendix 4



Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
		appointed by the community will complete the assessments.		
Seth van Niekerk	X 27 April 2023	Due to the severity of fresh drinking water required and the obvious implications on the community not having access to daily water supplies, this will be enforced by legal action on behalf of the community .	This comment is noted.	Appendix 4
Seth van Niekerk	X 27 April 2023	A specialized environmental law firm will be engaged detailing the specifics of this guarantee to be included in a formal, legally binding, agreement BEFORE proceeding.	This comment is noted and sent to the Applicant for further input.	Appendix 4
Seth van Niekerk	X 27 April 2023	We will hold SAMANCOR and every single person, including every Specialist Consultant and their staff personally liable in any event that may jeopardize our borehole water supplies.	The specialists and Elemental Suitability (Pty) Ltd are independent and are only responsible for the respective enviro-legal applications.  The Applicant for the proposed project, Samancor Chrome Ltd, will be responsible for the implementation of the approved Environmental Management Programme and Integrated Water and Waste Management Plan, should the proposed project be approved by the relevant competent authorities.	Appendix 4 Section 9 & 14
Seth van Niekerk	X 27 April 2023	In this way, we have absolute assurance that as a Community, we can live and survive on our farms, plots, homes and living places.  Greatly appreciate you updating the form please Melissa.  Kindest regards  Seth	This comment is noted.	Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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.					
Municipality					
Rustenburg Local Municipality Kelebogile Mekgoe	X	28 March 2023	<p>Good Morning Sonia/ Melissa</p> <p>According to the Rustenburg Municipality records, the property is registered in private owners name, and not in Samancor mine's name.</p> <p>There is an approved residential township application on site, which was handled by Maxim Planning Solution. Contact person Mr Dawie Bos- (014) 592 9489/ 082 781 2385. Has the township approval, withdrawn, to allow for the application of opencast mining for Samancor??</p> <p>It is our view that, the issue of ownership of property, be resolved before we can comment on the draft Scoping Report application (Millsell Waterkloof Section).</p> <p>See also, the e-mail below, from Ronette-Unit: Estates and Land Administration.</p> <p>Warm regards</p>	<p>29 March 2023</p> <p>Good day,</p> <p>Thank you for the email below. I did contact Mr Dawie Bos who provided the history of the residential township application.</p> <p>Can you please provide a list of properties that will be impacted upon by the proposed opencast mine?</p> <p>Kind Regards,</p>	Section 10 & 14 Appendix 4
Rustenburg Local Municipality Kelebogile Mekgoe	X	30 March 2023	<p>Good day Melissa</p> <p>I just spoke to Ronette Barnard (Estates and Land Administration), she is going to respond to your e-mail, regarding the list of properties that will be impacted upon by the proposed opencast mine.</p> <p>Apparently, they have the records, for that township establishment.</p>	<p>30 March 2023</p> <p>Good day,</p> <p>Thank you for getting back to me. I will await the information from Ronette Barnard.</p> <p>Kind Regards,</p>	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
Rustenburg Local Municipality – Ronnette Barnard	X	31 March 2023	<p>5 April 2023</p> <p>Good day Ronnette,</p> <p>Apologies for the delay. Please see attached map showing the proposed project and surrounding properties.</p> <p>Kind Regards,</p> <p>13 April 2023</p> <p>Good day Ronnette,</p> <p>The email I sent through last week with the map has bounced back. It was sitting in my Junk Mailbox.</p> <p>Please use the following link to download the map: <a href="https://www.dropbox.com/s/ed52lje6pq8nm77/Millsell_Waterkloof_Layout%20%26%20Properties%20Map_Zomed%20Out.jpg?dl=0">https://www.dropbox.com/s/ed52lje6pq8nm77/Millsell_Waterkloof_Layout%20%26%20Properties%20Map_Zomed%20Out.jpg?dl=0</a></p> <p>2 May 2023</p> <p>Good day Ronnette,</p> <p>Reference is made to the email below. Can you please get back to me on the properties that form part of the township application.</p> <p>Kind Regards, Melissa Pillay</p>	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)					
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.					
Rustenburg Local Municipality – Ronnette Barnard	X	4 May 2023	<p>Melissa</p> <p>The properties are:</p> <p>Waterkloof East 36 : Ptn 54(53)                      Waterkloof East 305 JQ                      Waterkloof East 35: Ptn 336 (146)                      Waterkloof 305 JQ                      Waterkloof East 33: Ptn 218(2) Waterkloof 305 JQ                      Waterkloof East 32: Ptn 218(2) Waterkloof 305 JQ                      Waterkloof East 34 Ptn 336(1460)                      Waterkloof 305 JQ                      Waterkloof East 7 :Remainder of Ptn 55/                      Ptn 262 Ptn 270/Remainder 296 and PTn 459 Waterkloof 305 JQ</p> <p>Ronette</p>	<p>4 Amy 2023</p> <p>Good day Ronnette,</p> <p>Thank you very much.</p> <p>Regards,                      Melissa Pillay</p>	Appendix 4
Rustenburg Local Municipality – Kelebogile Mekgoe	X	17 April 2023	<p>Morning Melissa</p> <p>I have noted the invite for public participation for the abovementioned project.</p> <p>However, you have not included Ronette Barnard, Irene Maema and Mmami Motsisi from Planing and Human Settlement. I think they are, the main interested and affected parties in this regard.</p> <p>Did Ronette identify the affected portions as per your last correspondence.</p> <p>Warm regards</p>	<p>17 April 2023</p> <p>Good day,</p> <p>Thank you for the below. I will send the invites to those mentioned in your email.</p> <p>The matter regarding the potions has not been finalised. I did send through the map, however the email bounced back to the size of the it. I resent it last week. I am waiting for a response from Ronette.</p> <p>Kind Regards                      Melissa Pillay</p>	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
Rustenburg Local Municipality - Mmami Motsisi	X	<p>17 April 2023</p> <p>Good Day</p> <p>The land in question are currently zoned <b>Agricultural</b> in terms of the Rustenburg Land Use Scheme,2021.</p> <p>Please advice your client to adhere to the provisions of the Rustenburg Local Municipality Spatial Planning and Land Use Management By-law,2018 read with the Spatial Planning and Land Use Management Act,16 of 2013 and the provision of the Rustenburg Land Use Scheme,2021 accordingly.</p> <p>Basically, what this means is, it is required by law to submit a land development application and obtain approval of the land development application for change of zoning from the Local Municipality prior operation of the proposed Mine, failure to which will be guilty of an offence.</p> <p>Regards Mmami Motsisi Directorate Planning and Human Settlement Unit Development Planning Section Manager: Future Planning and Urban Renewal Rustenburg Local Municipality</p>	<p>17 April 2023 Good day Mmami,</p> <p>Thank you for the email below. I will forward this to the client.</p> <p>Kind Regards, Melissa Pillay</p>	Section 10 & 14 Appendix 4
Bonjanala District Municipality	X	No response received to date.		Section 10 & 14 Appendix 4
<b>Organs of state (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS)</b>				

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>					
<b>Interested and Affected Parties</b>		<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>
<b>List the names of persons consulted in this column, and</b>		<b>Comments Received</b>			
<b>Mark with an X where those who must be consulted were in fact consulted.</b>					
Eskom	X		No comments received to date		Section 10 & 14 Appendix 4
Bakwena Platinum	X		No comments received to date		
<b>Department of Agriculture, Land Reform and Rural Development</b>					
Constance N	X	16 March 2023	No comments received to date		Section 10 & 14 Appendix 4
Mashudu Marubini					
<b>Department of Economic Development, Environment, Conservation and Tourism</b>					
Tshegofatso Lekgari	X	16 March 2023	No comments received to date		Section 10 & 14 Appendix 4
<b>Traditional Leaders</b>					
<b>Dept. Environmental Affairs</b>					
	X		No comments received to date		Appendix 4
<b>Competent Authorities affected</b>					
Department of Mineral Resources and Energy (DMRE)	X	-	No comments received to date		Section 10 & 14 Appendix 4
Department Water and Sanitation	X	16 March 2023	SamancorCr Western Chrome Mines (Pty) Ltd Elandskraal P.O Box 245 Mooinooi 0325  <b>Attention:</b> Sonja van de Gies Melissa Pillay / Mpho Mokoene NW30/5/1/2/3/2/1 (236, 260, 479) EN	17 March 2023  Good day  Thank you very much.	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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><b>Waterkloof EIA &amp; WULA_06_2022</b></p> <p><b>Draft Scope Report – Waterkloof EIA WULA_06_2022 – Samancor West Chrome Mine - Millsell &amp; Waterk Sections</b></p> <p>This office acknowledges the receipt of documents regards to the above-mentioned 23 16 March 2023 (<b>Task T140/2023</b>). The one responsible for this area is: <b>Mr Herbert Kuta</b> and can be contacted at 083-308-0293.</p> <p>Comments would be forwarded in due time.</p> <p>Thank you. <b>Ms C THEUNISSEN</b> <b>CHIEF ADMIN CLERK</b></p>		
OTHER AFFECTED PARTIES				
Olifantsnek Irrigation Board	23 March 2023	<p>Dear Sonja</p> <p><b>REF NUMBER: WATERKLOOF EIA&amp;WULA_06_2022</b></p> <p>The Olifantsnek Irrigation Board is an interested and affected party with regards to the above. We would like to request the following:</p> <ol style="list-style-type: none"> <li>1. Please note that Olifantsnek Irrigation Board has servitudes on the listed properties which must be respected.</li> <li>2. No buildings may be erected on said servitude.</li> <li>3. Samancor will be held liable for any</li> </ol>	<p>23 March 2023</p> <p>Good day,</p> <p>Thank you very much for your comment. Can you please provide Elemental with a kmz/kml of the servitudes and water canals mentioned in your letter?</p> <p>Kind Regards, Melissa Pillay</p>	Sections 8 Appendix 4



Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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>damages to the water infrastructure.</p> <p>4. Should Samancor not be aware of the location of said servitude, we are more than willing to indicate the location of our servitude and water canals.</p> <p>Secretary GJ Volschenk</p>		
Olifantsnek Irrigation Board	13 April 2023	<p>Good day Melissa</p> <p>Hope you are well.</p> <p>Apologies for the delay.</p> <p>We've noted you listed 21 properties; out of these we have obtained transport deed 84360/07.</p> <p>Please refer to highted sections on pages 10,11,12,13,16,17 &amp; 18.</p> <p>Trust this will be of any help.</p> <p>Vriendelike Groete/ Kind Regards,</p> <p>OLIFANTSNEK BESPROEINGSRAAD OLIFANTSNEK IRRIGATION BOARD</p> <p>Erika Weideman / Office</p>	<p>26 April 203</p> <p>Good day,</p> <p>Thank you very much for the email below.</p> <p>Regards, Melissa Pillay</p>	Section 10 & 14 Appendix 4
Louis Viljoen	18 March 2023	<p>Good day,</p> <p>Please register me as a interested and affected party on above mentioned project.</p> <p>Mr. L.J. Viljoen</p>	<p>22 March 2023</p> <p>Good day Mr. Viljoen,</p> <p>Elemental Sustainability (Pty) Ltd. has registered you an Interested and Affected Party.</p>	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
			Kind regards Sonja van de Giessen	
Louis Viljoen	19 March 2023	<p>Good day Sonja</p> <p>I trust you are well. would you please be so kind to capture my information.</p> <p>Thank you very much kindly add me to the open cast group.</p>	<p>22 Mach 2023</p> <p>Good day Tino,</p> <p>Thank you for the email. You have been registered as an Interested and Affected Party for the Waterkloof EIA&amp;wula 06 2022.</p> <p>The draft scoping report for the proposed Waterkloof Opencast Project is available for a 30-day review and comment period, from 17 March 2023 to 19 April 2023. A copy of the draft scoping report can be downloaded from the following electronic link: <a href="https://www.dropbox.com/scl/fo/4au029uw0s7d32t2a4hrx/h?dl=0&amp;rlkey=m2oj7omatw5ujcu6sbbbdoxyx">https://www.dropbox.com/scl/fo/4au029uw0s7d32t2a4hrx/h?dl=0&amp;rlkey=m2oj7omatw5ujcu6sbbbdoxyx</a>.</p> <p>A hard copy of the report will also be made available at the Millsell Waterkloof Office.</p> <p>Should you have any queries, please do not hesitate to contact me.</p> <p>Kind regards</p> <p>Sonja van de Giessen</p>	Section 10 & 14 Appendix 4
Johannie Du Plesiss	6 April 2023	<p>Interested and effected party. Samancor Millsell opencast</p> <p>Johannie du Plessis Please register me Thank you</p>	<p>6 April 2023</p> <p>Good day Johannie,</p> <p>Thank you for the email.</p>	Section 10 & 14 Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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>You have been registered as an interested and affected party.</p> <p>Please be advised that the draft scoping report is available for a 30 day review and comment period, from <b>17 March 2023 to 19 April 2023</b> and can be downloaded from the following electronic link:  <a href="https://www.dropbox.com/scl/fo/4au029uw0s7d32t2a4hrx/h?dl=0&amp;rlkey=m2oj7omatw5ujcu6sbbbdoxyx">https://www.dropbox.com/scl/fo/4au029uw0s7d32t2a4hrx/h?dl=0&amp;rlkey=m2oj7omatw5ujcu6sbbbdoxyx</a>. A hard copy of the report is available at the Millsell Waterkloof Office..</p> <p>Any comments can be sent to myself or Melissa Pillay (<a href="mailto:melissa@elemental-s.co.za">melissa@elemental-s.co.za</a>).</p> <p>Kind regards</p> <p>Sonja van de Giessen</p>	
Louis Viljoen	13 April 2023	<p>Good afternoon Melissa,</p> <p>Which day should I attend?                      Which ward would i be in!                      I live at drum 17, Arnoldstad, also known as portion 7, a portion of portion 2, of the farm Waterkloof, 305 JQ.</p> <p>Thank you,                      Louis Viljoen.</p>	<p>14 April 2023</p> <p>Good day,</p> <p>You can attend the meeting scheduled for the 19 April 2023.</p> <p>Kind Regards,                      Melissa Pillay</p>	Section 10 & 14 Appendix 4
Natalie Jacobs	17 April 2023	<p>Good morning Melissa,</p> <p>Herewith the contact details of Nyala Rock Estate Body Corporate, +27145928697. I do not have the email address of Nyala</p>	<p>17 April 2023</p> <p>Good day Natalie,</p> <p>Thank you very much.</p>	Section 10 & 14 Appendix 4

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>				
<b>Interested and Affected Parties</b>	<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>
<b>List the names of persons consulted in this column, and</b>	<b>Comments Received</b>			
<b>Mark with an X where those who must be consulted were in fact consulted.</b>				
		<p>Rock Estate's administrator.</p> <p>Kind regards</p>	<p>Kind Regards, Melissa Pillay</p>	
Tanja Tonsing	18 April 2023	<p>TO WHOM IT MAY CONCERN</p> <p>We the owners of Portion 50 of portion 2 Farm 305 Waterkloof, would hereby like to register as an interested and affected party, with regards to the above mentioned Proposed Mining Operation.</p> <p>Our concerns and objections relate to the following:</p> <p>1. The proposed mining could adversely effect our water supplies (purity and amount)</p>	<p>19 April 2023</p> <p>Good day Tanja,</p> <p>Thank you for the comments. You have been registered as interested and affected party. Your concerns below will be addressed by the specialist studies which will be included in the EIA phase.</p> <p>Kind Regards, Melissa Pillay</p> <p>3 May 2023</p> <p>You have been registered as an interested and affected party.</p> <p>A Geohydrological Impact Assessment for the proposed opencast mine was commissioned. The specialist study will investigate the impacts of the proposed project on the groundwater in the area. The results and mitigation measures will be included in the Environmental Impact Assessment Report which will be circulated to the interested and affected parties for comment.</p>	<p>Section 10 &amp; 14 &amp; 9 Appendix 4</p>
Tanja Tonsing	18 April 2023	<p>2 Blasting – damage it could cause to our houses and buildings</p>	<p>A Blasting and Vibration Assessment was commissioned. The specialist study will investigate the impacts of blasting on the surrounding environment. The results and mitigation measures will be included in the Environmental Impact Assessment Report which will be</p>	

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>				
<b>Interested and Affected Parties</b>	<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>
<b>List the names of persons consulted in this column, and</b>	<b>Comments Received</b>			
<b>Mark with an X where those who must be consulted were in fact consulted.</b>				
			circulated to the interested and affected parties for comment.	
Tanja Tonsing	18 April 2023	3 Dust and noise could also negatively effect our standard of living	A Noise and Air Quality Assessment was commissioned for the proposed project. The specialist will assess the impact of the proposed project on the air quality and noise levels in the area. The results and mitigation measures will be included in the Environmental Impact Assessment Report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
Tanja Tonsing	18 April 2023	4 The value of our property will be effected negatively	A Social Economic Impact Assessment was commissioned for the proposed project. The specialist study will assess the impact of the proposed project on the social and economic environment in the area. This includes the impact on property values. The results and mitigation measures from the study will be included in the Environmental impact Assessment Report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
De Wet Mouton	18 April 2023	Hi Melissa,  Thank you for your mail.  Please remove my address from your mailing list as the farm has been sold.  God bless,  De Wet Mouton	14 April 2023  Good day De Wet,  Thank you for notifying me. I will remove your details from the database.  Kind Regards, Melissa Pillay	Section 10 & 14 Appendix 4
Ms J Visser – Kroondal and Wards Environmental Forum (KWEF)	19 April 2023	Good day Ms Pillay  Please could you provide a street address, as the old town hall is far from the Rustenburg Municipality. Is the old town hall at 2 Molen Street, Rustenburg North?	19 April 2023  Good day,  It is the Old Town Hall that is next to the Rustenburg Municipal Building.	Section 10 & 14 Appendix 4

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>				
<b>Interested and Affected Parties</b>	<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>
<b>List the names of persons consulted in this column, and</b>	<b>Comments Received</b>			
<b>Mark with an X where those who must be consulted were in fact consulted.</b>				
		Thank you.  Kind regards Ms J. Visser (KWEF)	Kind Regards, Melissa Pillay	
Piet van Wyk	20 April 2023	Water contamination : Depletion of water resources.	A Geohydrological Impact Assessment and Surface Water Assessment was commissioned for the proposed project. The specialist will assess the impact of the proposed project on the surface and ground water. Mitigation measures from the studies will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
Piet van Wyk	20 April 2023	Road demolishing	Internal haul roads will be used and minimal transport of ore will be on regional roads. The production at the plant will not increase as the opencast activities will replace the production from the underground mine. The quantity of trucks on the road should not increased.	Appendix 4
Piet van Wyk	20 April 2023	Property value drop	A Social Economic Impact Assessment was commissioned for the proposed project. The specialist study will assess the impact of the proposed project on the social and economic environment in the area. This includes the impact on property values. Mitigation measures from the studies will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
Piet van Wyk	20 April 2023	Noise and dust pollution	A Noise and Air Quality Assessment was commissioned for the proposed project. The specialist will assess the impact of the proposed project on the air quality and noise levels in the area. Mitigation measures from the studies will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.	Section 9 & 14
Piet van Wyk	20 April	Will this be the end of the opencast or will it	The proposed opencast mining of the chrome will only	Section 2.3

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>				
<b>Interested and Affected Parties</b>	<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>
<b>List the names of persons consulted in this column, and</b>	<b>Comments Received</b>			
<b>Mark with an X where those who must be consulted were in fact consulted.</b>				
	2023	extend to the river	take place on the area that has been demarcated and applied for. Should the mine want to mine other areas on the current mining right area, a new application must be lodged with the relevant competent authorities.	
Hetta Muller	20 April 2023	<p>To whom it may concern</p> <p>I say no to opencast mining in my backyard!!</p> <p>My family and I are staying on: portion 16 Waterkloof, JQ 305. Arnoldstad plots near Kroondal</p> <p>You cannot destroy a whole community's silence and livelihood just for the sake of money!!</p>	<p>26 April 2023</p> <p>The objection is noted. Your comments and concerns and will be included in the Comments and Responses Report that forms part of the Final Scoping Report for submission to the Department of Mineral Resources and Energy for their decision.</p>	Appendix D6
Hetta Muller	20 April 2023	Our water will no longer be suitable for human use, or borehole will run dry, blasting will crack our houses!	<p>A Geohydrological Impact Assessment for the proposed opencast mine was commissioned. The specialist study will investigate the impacts of the proposed project on the groundwater in the area. A Blasting and Vibration Assessment was commissioned. The specialist study will investigate the impacts of blasting on the surrounding environment.</p> <p>The results and mitigation measures from the studies will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.</p>	Section 9 & 14
Hetta Muller	20 April 2023	<p>Concerns:</p> <ol style="list-style-type: none"> <li>1. Blasting sounds</li> <li>2. Trucks working</li> <li>3. Dust in air</li> <li>4. No more peace and quiet</li> </ol>	<p>The following specialist studies were commissioned for the proposed project to assess the impact on the surrounding environment:</p> <ul style="list-style-type: none"> <li>• Soil and Land Capability, including Agricultural Potential;</li> <li>• Visual Impact Assessment;</li> </ul>	Section 9 & 14



Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
		5. No more good water 6. Cracked houses 7. More than 500 resident will be affected	<ul style="list-style-type: none"> <li>• Archaeological and Cultural Heritage Impact Assessment;</li> <li>• Palaeontologic Impact Assessment;</li> <li>• Terrestrial Fauna and Flora (Biodiversity) Assessment;</li> <li>• Surface Water (Hydrology) Assessment and Aquatic Assessment;</li> <li>• Wetland Delineation and Functionality Assessment;</li> <li>• Geohydrological Impact Assessment;</li> <li>• Noise Assessment;</li> <li>• Traffic Impact Assessment;</li> <li>• Geotechnical investigation;</li> <li>• Social Economic Impact Assessment;</li> <li>• Air Quality Impact Assessment;</li> <li>• Blasting and Vibration Assessment;</li> <li>• Waste Classification;</li> <li>• Water Balance;</li> <li>• Residue stockpile design for overburden;</li> <li>• Storm Water Management Plan (including floodlines and topography); and</li> <li>• Closure and Rehabilitation Plans (including Financial Provisioning) – GNR 1147.</li> </ul> <p>The results of the studies as well as the mitigation measures will be included in the Environmental impact Assessment report which will be circulated to the interested and affected parties for comment.</p>	
Hetta Muller	20 April 2023	Landowners will not stand for this.  Me and my family are staying on this property for almost 32 years!!  You cannot do this to a widower and her family of 15 all staying on this property.... Where must we go!!  I hope you will consider not going ahead	The objection is noted.	Appendix 4

Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)				
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.				
		whit is project in our area!		
Lejaka Mefane	20 April 2023	<p>Good evening</p> <p>My name is Lejaka Mefane, from I749 Ikemeleng section, Kroondal.</p> <p>I hope you are well, i attended the meeting though i left it while you were taking questions, for i had anticipated the outcome of the meeting i personally, applaud the move, and i know that the project shall go on smoothly, my community always feel entitled to everything.</p> <p>They forget that this is an informal settlement, that was made a favour by the mines around, just maybe in the light that their employees be close by their work place.</p> <p>I suggest that you get a liaising officer, that understands this community very well.</p> <p>My reason being that;</p> <ol style="list-style-type: none"> <li>1. They need to understand that your company runs a business that needs to be successful and beat its competitors.</li> <li>2. That you are in business not a charity, hence if they seek opportunities from you they must comply fully with the land laws and/ be proficient on their work</li> </ol> <p>Lastly merge with the companies that will transfer relevant skills in their line of business.</p>	<p>21 April 2023</p> <p>Good day,</p> <p>Thank you for the comments below and offer to be the liaising officer. I have registered you as an interested and affected party for the project.</p> <p>Unfortunately, Elemental does not require the services of a liaising officer for the proposed project.</p>	Appendix 4

<b>Proposed Opencast Mine at the Millsell-Waterkloof Section (Comments and Response Table)</b>				
<b>Interested and Affected Parties</b>	<b>Date</b>	<b>Issues raised</b>	<b>EAPs response to issues as mandated by the applicant</b>	<b>Section and paragraph reference in this report where the issues and or response were incorporated.</b>
<b>List the names of persons consulted in this column, and</b>	<b>Comments Received</b>			
<b>Mark with an X where those who must be consulted were in fact consulted.</b>				
		<p>I should hope that you were able to end the meeting amicably.</p> <p>I am offering myself to be that liaising officer, i am currently working as a casual farm worker at Golden wheat farms and during working hours i am not available on my phone.</p> <p>Kind regards</p> <p>L. Mefane</p>		
Simphiwe Mkhola	20 April 2023	<p>Good morning</p> <p>I just want to confirm something where does 34 enters I think I want clarity.</p> <p>Regards Clr Mkholwa</p>	<p>26 April 2023</p> <p>Good day,</p> <p>Please see attached map which shows that the proposed projects falls within Ward 34 of the Rustenburg Local Municipality.</p> <p>Should you have any queries or would like to discuss this further, please feel free to contact me.</p> <p>Regards,</p>	Appendix 4
Lejaka Mefane	21 April 2023	Thank you for the feedback.		Appendix 4

### **8.3 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 (Appendix 4), in the final EIA to be submitted to the Competent Authority (CA). Any additional comments received after submission will be forwarded to the DMRE (if received after commenting period).

### **8.4 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)*

Most of the study site is demarcated as commercial annual crops rain-fed according to the National Land Cover classes (DEA, 2020). The area has been transformed, with the wetland sections severely degraded. The area is drained by the Hex River in the north and east.

There are multiple heritage features located on the site including graves, buildings of heritage significance and demolished structures.

## **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 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. This information has been sourced from existing information available for the area, as well as specialist reports undertaken for the proposed Millsell Waterkloof project.

### **10.1 GEOLOGY**

#### **10.1.1 REGIONAL GEOLOGY**

The Bushveld Igneous Complex contains the chromite ore resources in South Africa. This complex is a saucer-like intrusive igneous mass extending for about 400 km from east to west and roughly the same distance north to south as shown in Figure 18.

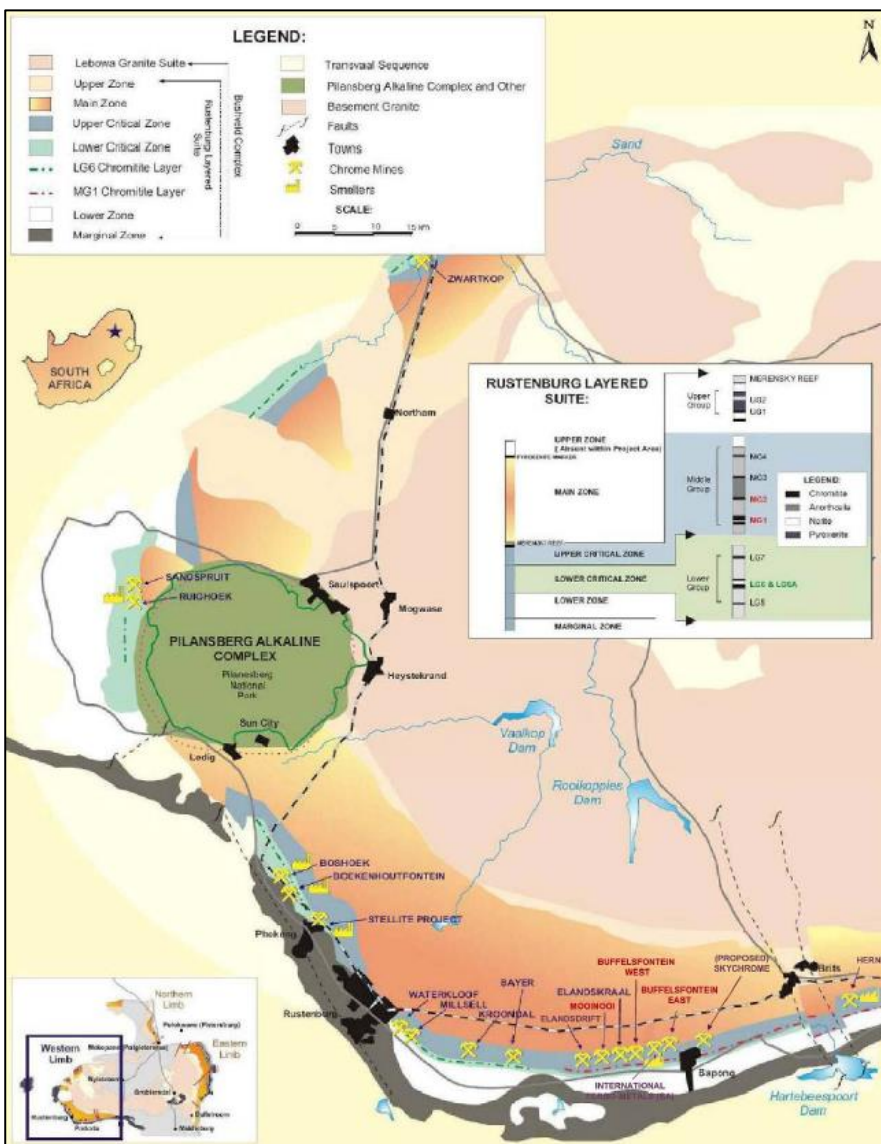


Figure 18: Regional geology

### 10.1.2 LOCAL GEOLOGY

The predominant rock types that occur in the Millsell Waterkloof area are anorthosite, norite, pyroxenite and chromitite. The host rock type that contains the Lower chromitite seams is mainly pyroxenite. The surface area is mostly covered by black vertisolic clay locally referred to as ‘turf’. The rocks of the Critical, Lower and Marginal Zones of the Rustenburg Layered Suite outcrop here and occur below the turf.

Figure 19 below illustrates the relationship between chromitite seams intersected in the Millsell Waterkloof section and the Marikana section. The comparative stratigraphic sections illustrate the variability between mineral resources of the different mining business units operating under WCM.

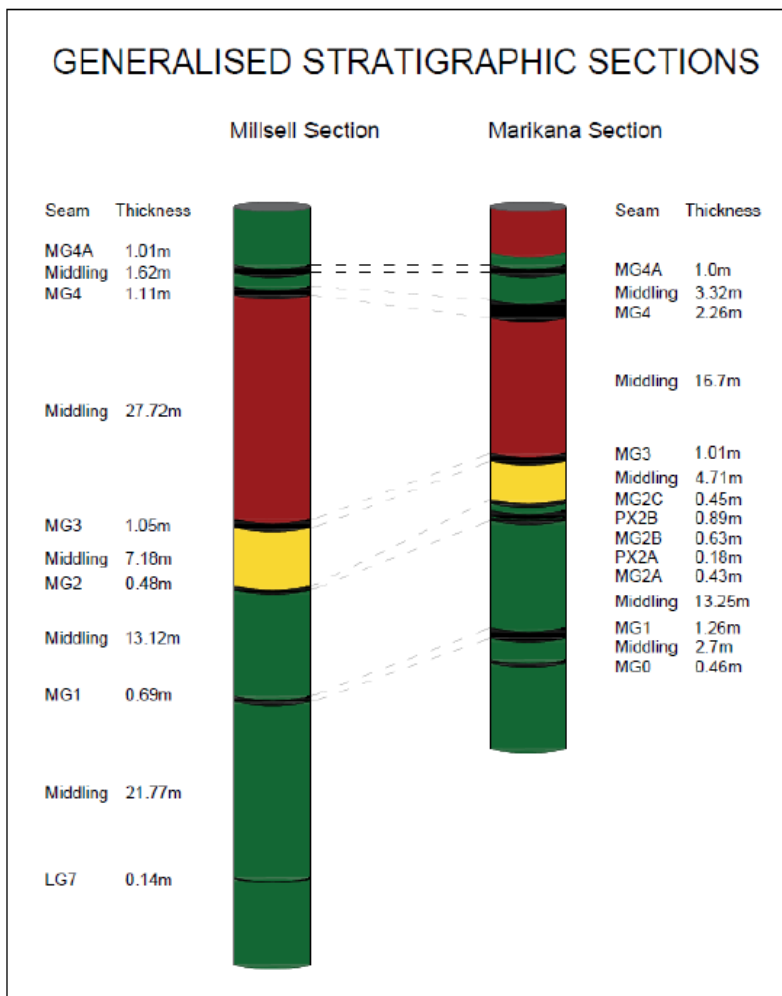


Figure 19: Generalized Stratigraphic Sections for the Rustenburg (Millsell) and Marikana (Mooinooi) Sections

The deposit sub-outcrops below the black turf on the farms Waterkloof 305 JQ and Waterval 306 JQ, and dip north-eastwards. On the farm Kroondal 304 JQ the depth of the deposit in the north-western extent is estimated at approximately 540m below surface. On the farm Waterval 307 JQ the depth of the deposit is estimated at approximately 660m below surface in the northern extent of the farm. The mineral resource on the farm Waterkloof 305 JQ extends to a maximum approximate depth of 390m below surface. The mineral resource on the farm Waterval 303 JQ extends to a maximum approximate depth of 450m below surface.

## 10.2 TOPOGRAPHY

The general topography of the proposed project area can be described as flat with a slight downward slope towards the north-east. The highest point is located on the southern border of the mine at 1160 mamsl (meters above mean sea level), while the lowest point is located on the northern side with a 1140 mamsl.

The project site is found north of the base of the Magaliesberg Mountain range where the topography flattens out with the gradual decline towards the Hex River towards the north and north-east.





Figure 20: Topography of the proposed opencast mine at the Waterkloof Millsell Section

### 10.3 CLIMATE

The proposed project is situated within the Highveld climatic zone and the main features are a warm temperate climate with annual average precipitation of 632.1 mm /year consisting mainly of thunderstorms in the summer months.

The average annual evaporation for the catchment is reported as 1 761.7 mm The winter months are normally dry as about 85% of the annual rainfall falls in the summer months. the Crocodile River, while the Marico catchment contributes 20% and the Upper Molopo catchment 5%.

#### 10.3.1 TEMPERATURE

The average daily maximum temperature is roughly 27°C in January and 17°C in July but may rise to 38°C and 26°C respectively. Average daily minima range from about 13°C in January to 0°C in July, whereas extremes can sink to 1°C and -13°C respectively. The period during which frost is likely to form lasts on the average for about 120 days from May to September. Sunshine duration in summer is about 60% and in winter about 80% of the time.

Table 11: Mean monthly temperature

Month	Average daily maximum temperature (°C)	Average daily minimum temperature (°C)
January	31.8	17.4
February	30.8	18.7
March	29.6	14.3
April	29.1	12.8
May	25.0	6.5



Month	Average daily maximum temperature (°C)	Average daily minimum temperature (°C)
June	20.1	4.4
July	21.8	1.7
August	23.7	7.4
September	27.2	9.2
October	30.1	13.4
November	30.5	14.8
December	29.7	17.3

### 10.3.2 PRECIPITATION AND EVAPORATION

The winter months are normally dry as about 85% of the annual rainfall falls in the summer months, rain of 124 mm to 150 mm have been recorded to fall within one day. This region has about the highest hail frequency in South Africa as 4 to 7 occurrences may be expected annually at any one spot. Refer to Table 12 for the minimum, average and maximum rainfall.

Table 12: Rainfall within the project area

Rainfall (mm)	2015	Minimum	Average	Maximum	2017
January	75.7	0	150.46	366.7	136.7
February	59.9	0	118.08	290	154.8
March	53.3	0	90.15	293.8	7.4
April	16.5	0	47.61	246.2	20.3
May	0	0	16.84	167.7	10.4
June	0	0	7.27	54.5	0
July	0	0	2.45	28.3	1.4
August	0	0	7.49	60.8	0.4
September	58	0	22.58	178	4.1
October	ND	0	59.43	164.2	44.4
November	ND	20.7	95.98	249.4	118.8
December	ND	0	117.59	332.6	158.9
Annual	263.4	263.4	714.41	1,121.2	657.6

Potential A-pan evaporation figures for the area exceed the rainfall in the area indicating the level of water deficiency in the area. A-pan, and S-pan Evaporation data is indicated in Table 13 and

Table 14.

Table 13:A-pan evaporation (mm)

Month	A-pan evaporation (mm)	Month	A-pan evaporation (mm)
January	199	July	157
February	214	August	129
March	210	September	141
April	204	October	113
May	250	November	115
June	193	December	155

Table 14: S-Pan Evaporation

S-Pan	2015	Minimum	Average	Maximum
January	155.2	68.6	157.10	213.4
February	137.4	94.7	137.94	198.7
March	143.2	87.4	121.18	174.2
April	111	58	94.10	139

S-Pan	2015	Minimum	Average	Maximum
May	99	57.4	82.39	161.6
June	69	49	65.48	109.1
July	ND	51.8	73.91	128.8
August	91	65	103.49	138.5
September	143	87.1	137.18	165.1
October	ND	118	157.85	189.4
November	ND	91.9	157.69	221.4
December	ND	76	162.53	229.8
Annual	948.8	948.8	1434.84	1,740.2

### 10.2.3 MEAN ANNUAL RUNOFF

The NWA adopted in 1998, is implemented by means of the National Water Resource Strategy (NWRS). The NWRS provides the framework for the management of the water resources. Some of the protective measures are designated Resource Directed Measures such as the establishment of the Reserve. The NWA establishes the 'Reserve' consisting of an unallocated portion of water that is not subject to competition with other water uses. It refers to both the quality and quantity of water and is made up from two distinct parts, namely the basic human needs reserve and the Ecological Reserve.

Node HN25 is used for reserve, importance, and quality determination. This site falls in the A22H quaternary catchment, covering the Hex River from the Olifantsnek Dam to the Bospoort Dam. The data below was sourced from the Determination of Water Resource and Resource quality Objectives for Mokolo, Matlabas, Crocodile (West) and Marico Catchments.

The HN25 node's MAR equates to 12.11 million m<sup>3</sup>/a, with 15.26% allocated for the Ecological Reserve as indicated in the table below.

Table 15: Mean Annual Run-off and Reserves for the EWR site and relevant Quaternary Catchments

EWR/Node	Catchment	Ecological Reserve (%NMAR)	NMAR (MCM)
HN25	A22H	15.26%	12.11

## 10.4 AGRICULTURE AND LAND CAPABILITY ASSESSMENT

Index (Pty) Ltd. was appointment by Elemental to undertake the Agricultural Impact Assessment for the proposed project. A copy of the report is included in Appendix 5. The assessment was conducted in terms of Notice No. 320 Government Gazette 43110 20 March 2020.

### 10.4.1 PRESENT LAND USES

The area is mainly mining land with vacant grazing land the dominant land use. There are some settlements in the central southern part. Large portions of the deeper clay soils of the mining right area are cultivated and planted to sunflowers. However, the western portion has not been cultivated for some time and has reverted to grassland. Refer to Figure 21 and Figure 22 below.

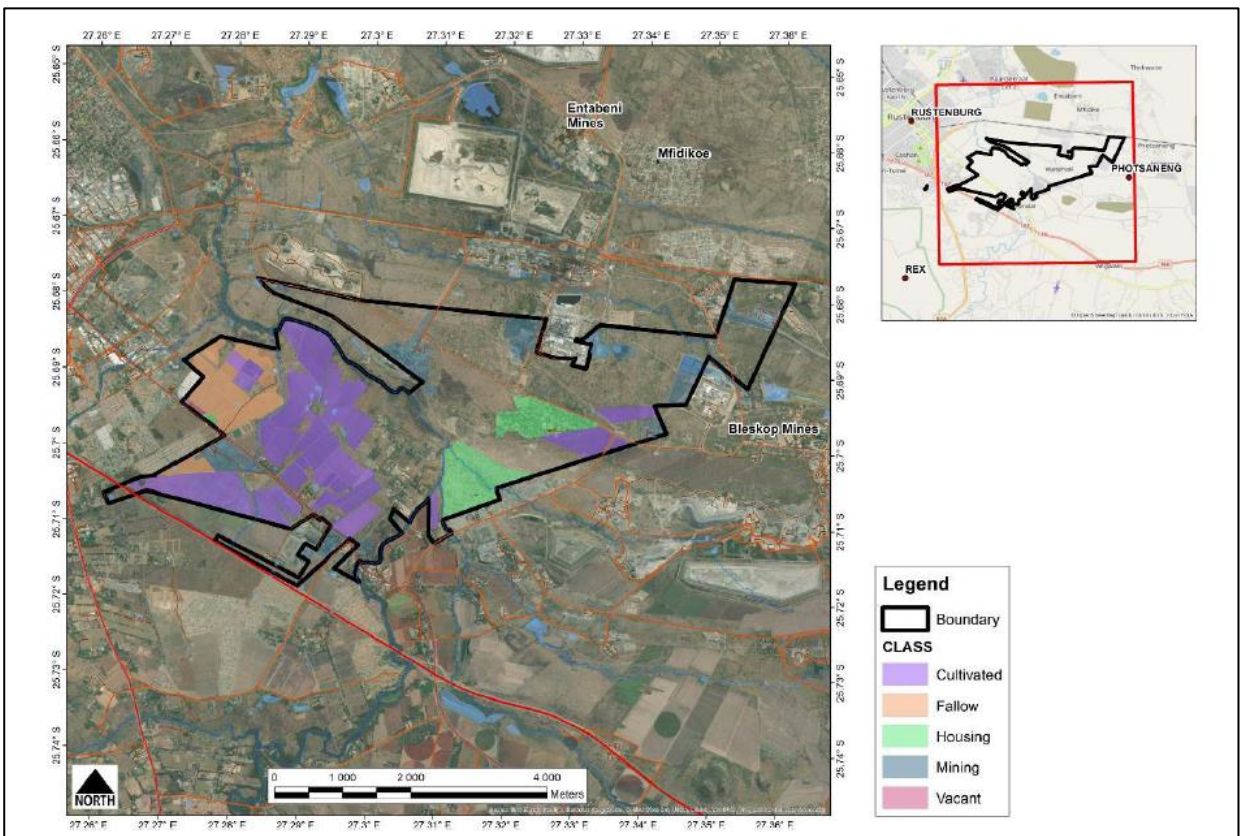


Figure 21: Present land uses for the mining right area

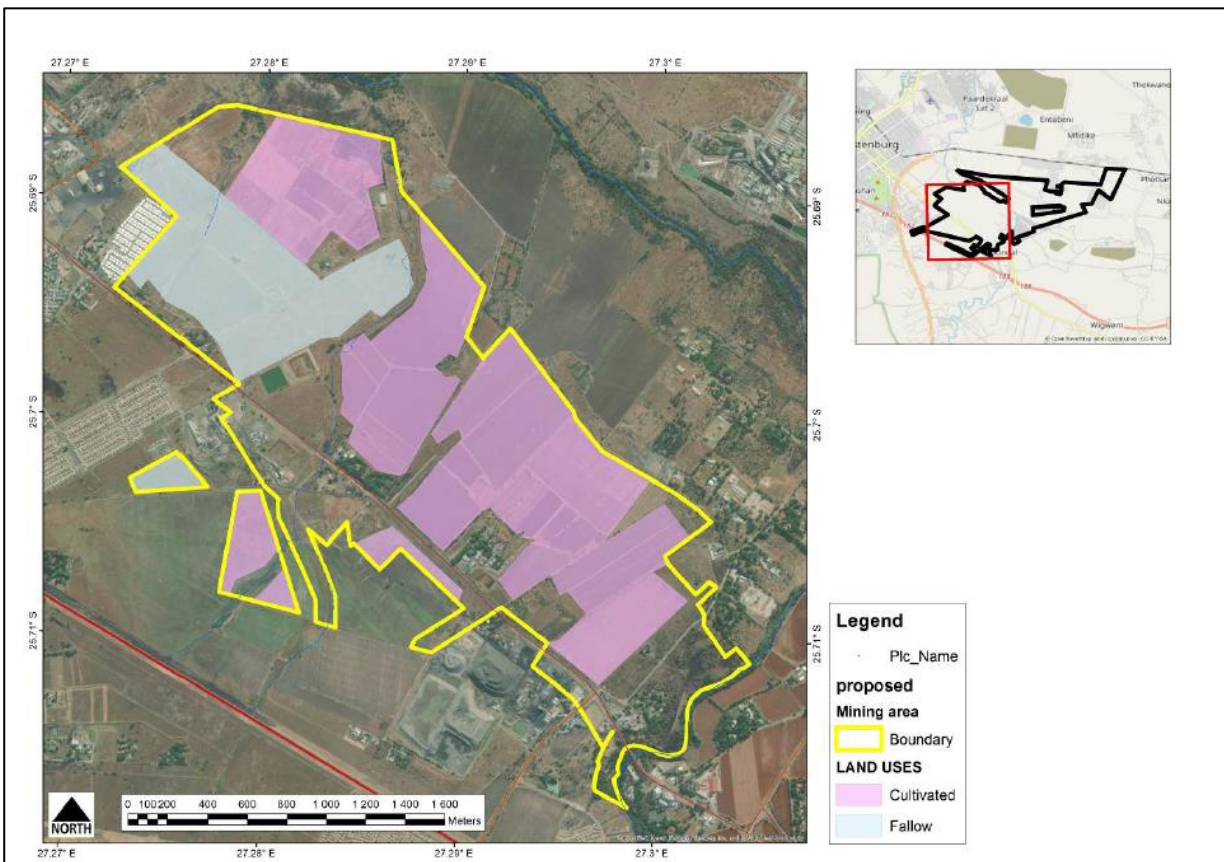


Figure 22: Land uses on the proposed project area



### 10.4.2. REGIONAL LAND USES

General land uses within 5km of the site include mining, housing, grazing and horticulture. Most of the land in the area mentioned is mining land. The deeper red coloured soil at Kroondal is irrigated land used for cash crops and vegetable production. To the west is urban areas.

### 10.4.3 SOIL PROPERTIES

The underlying rock is norite of the Rustenburg Layered Suite of the Bushveld Complex with:

- Vertic clays soils were encountered on most of the property. It consists of moderately deep black and dark grey clay soils. These soils have strongly developed expansive properties with prismatic structure.
- Norite outcrops are common in the northern parts and as a consequent is not arable.

### 10.4.4 VEGETATION

Veld condition is moderate to good. A large proportion of the veld is in climax state with increaser species such as *Cenchrus ciliaris* are dominant. The veld's grazing capacity is estimated by the Department of Agriculture as 10 ha per large livestock unit (LSU).

### 10.4.3 SENSITIVITY ANALYSIS

#### 10.4.3.1 ECOLOGICAL SENSITIVITY– SCREENINGTOOL

According to the screening tool (Figure 23), the site in general has very high sensitivity for the land that was previously under irrigation, high sensitivity for all cultivated fields and medium sensitivity for the vacant and the grazing land. The dataset extracted from the tool indicates the high sensitivity land as medium, and only a small portion on the far western edge as high.

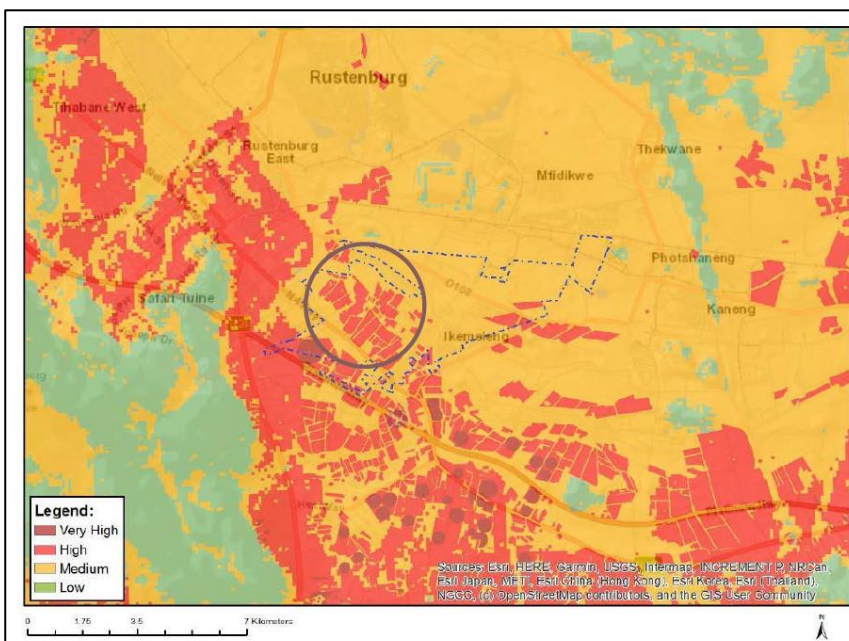


Figure 23: Results of the Screening Tool

**10.4.3.2 SPECIALIST SITE ANALYSIS**

According to the guidelines of the protocol, for the assessment and minimum report content for EIA impacts on agricultural resources, the following applies:

- The development is on medium and low sensitive land, which is a variation to the findings of the screening tool.

A detailed assessment found that the sensitivity is low or medium and not high or very high as found with the tool. Provision 1.1.3 in the Protocol applies, which requires the specialist to submit an *Agricultural Compliance Statement*. This statement is provided in Section 10.4.4.

**10.4.4 LAND USE CAPABILITY**

The soil on the property is arable but no water is available for irrigation. Land capability classes are interpretive groupings of land with similar potential and limitations or similar hazards. Land capability is classified according to guidelines published by the National Department of Agriculture in AGIS. It is determined by the collective effects of soil, terrain and climate features and shows the most intensive long-term use of land. It indicates the permanent limitations associated with the different land-use classes (Figure 24).

- Order A: Arable land – high potential land with few limitations (Classes i and ii);
- Order B: Arable land – moderate to severe limitations (Classes iii and iv);
- Order C: Grazing and forestry land (Classes v, vi and vii);
- Order D: Land not suitable for agriculture (Class viii).

LAND CAPABILITY			Wildlife	Grazing and Forestry			Crop production			
Order		Class		Forestry	Veld	Pastures	Limited	Moderate	Intensive	Very intensive
Arable	A	i								
		ii								
	B	iii								
		iv								
Non arable	C	v								
		vi								
		vii								
	D	viii								

Figure 24: Land Capability Classes – the shaded areas indicating the suitable land uses

The following was found for proposed project:

- There is no irrigated land on the mining right land or on the proposed open cast mining land.
- The entire open cast mining area was classified as Map unit Ar600: Medium capability cropping land (Class iv). The soil is moderately deep but with a clay content of more than 55%.
- The balance is low capability (Classes v and lower).
  - Map unit Ar/R: Moderately deep and uneven vertic soils with norite boulders. They are normally not suitable for commercial scale cultivation.
  - Map units Mining, Smallholdings and urban: These are not arable due to the infrastructure on the land portion.

- Roads, excavations, existing infrastructure and rubble dumps are not available for farming and automatically are rated as low capability and not sensitive.

The land capability was used to determine the agricultural sensitivity. The land uses, land capability and land sensitivity description can be found in Figure 25, Figure 26 and Figure 27 respectively.

Soil type	Capability	Capability rating	Flood	Erosion	Depth	Texture	Drain	Arability (rocks)
Ar/R	v	Low	0	0	3	3	0	3
Ar600	iv	Moderate	0	0	3	3	0	0
Mining	vii	None	0	0	5	3	0	4
Small hold	vii	None	0	0	5	3	0	4
Urban	vii	None	0	0	5	3	0	4

Figure 25: Land uses of the mining right land

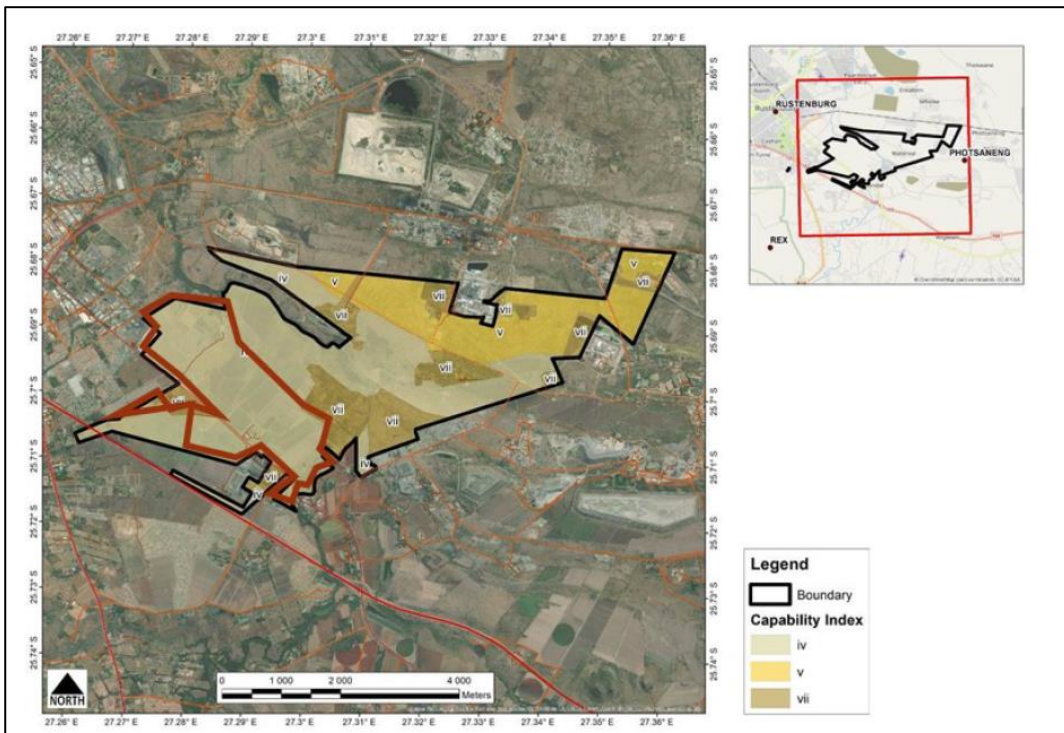


Figure 26: Land capability description

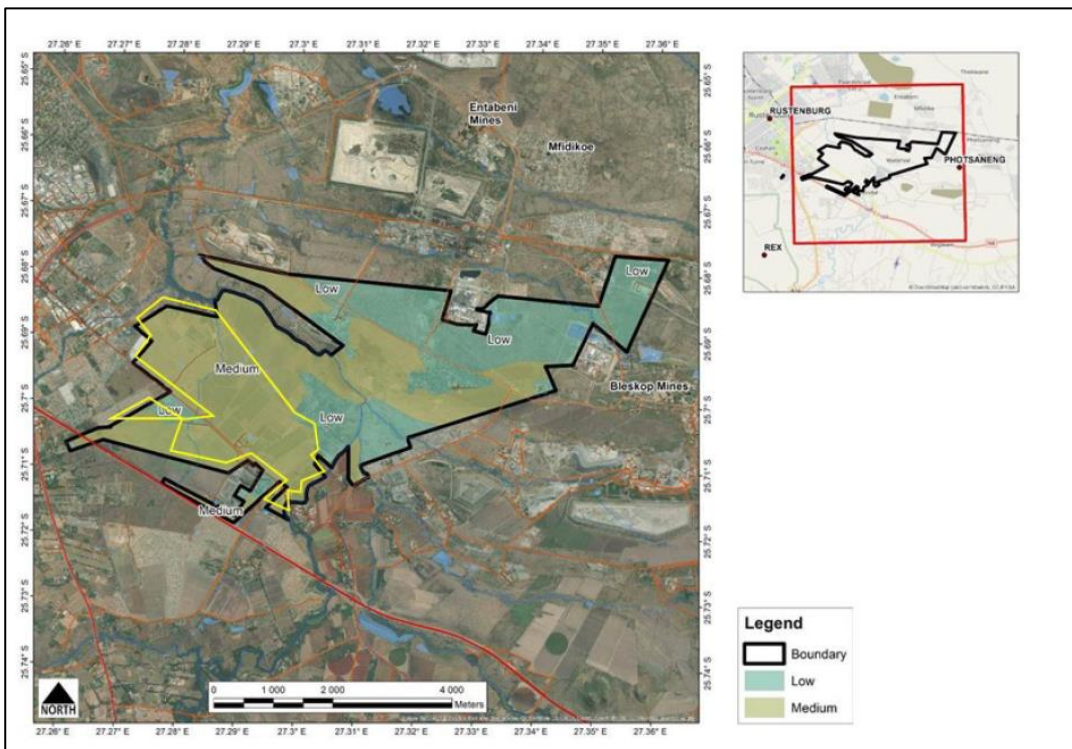


Figure 27: Land sensitivity description

#### 10.4.5 AGRICULTURAL COMPLIANCE STATEMENT

The specialist declaration includes the following in terms of Agricultural Compliance on site:

- The site is of *low* or *medium* sensitivity for agriculture.
- The proposed development will have a low to medium impact on the agricultural production capability.
- The site is not located on any high potential land. The site survey also found that the grazing land is fragmented portions that is and vacant because it falls into the larger mining land. Therefore, no reason can be found to not allow the mining. It is our recommendation that the project be allowed to be implemented.
- There are no conditions to which the statement is subjected.
- Stormwater runoff measures should be put in place to ensure that erosion of the soil does not occur
- The survey took place at a period when crop residue was still on the field. It was, therefore possible to assess the soil's productivity and also the present state of the grazing land. No gaps in knowledge or data were found.

#### 10.5 TERRESTRIAL ECOLOGY

A Terrestrial Ecology Assessment was undertaken by Red Kite Environmental Solutions (Pty) Ltd. 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.

A site survey was undertaken to supplement and confirm several findings indicated during the desktop analysis. The following data was recorded during the site verification:

- All identifiable indigenous and exotic fauna and flora species; and
- General ecological and habitat data that may assist in the description of the terrestrial ecology context of the study area.

As part of the site verification a Species of Conservation Concern (SSC) scan was undertaken for SCC floral species identified during the desktop assessment. A plotless sampling method was used to record data. Flora and fauna species observed in the study area during the time of the study were recorded and included in the species lists. Plant species identification was done following the checklist of Germishuizen & Meyer (2003).

### 10.5.2 SENSITIVITY ASSESSMENT

The purpose of producing a habitat sensitivity map is to provide information on the location of potentially sensitive features in the study area. This was compiled by taking the following into consideration:

- The general status of the vegetation of the study area was derived by compiling a landcover data layer for the study area (Fairbanks et al. 2000) using available satellite imagery and aerial photography. From this it can be seen which areas are likely to be transformed versus those that are still in a natural status. This status stratification was then verified in the field using on-the-ground information on species composition and vegetation structure.
- Various Provincial, Regional or National level conservation planning studies have been undertaken in the area. The mapped results from these were taken into consideration in compiling the habitat sensitivity map.
- Habitats in which various species occur that may be protected or are considered to have high conservation status are considered to be sensitive.

An explanation of the different sensitivity classes is given in Table 16. Areas containing untransformed natural vegetation that is important for Red List organisms are considered potentially sensitive. In contrast, any transformed area that has no importance for the functioning of ecosystems is considered to potentially have low sensitivity.

Table 16: Explanation of sensitivity ratings

Sensitivity	Factors contributing to sensitivity
No-go areas	Indigenous natural areas that are highly positive for the following: <ul style="list-style-type: none"> <li>• Presence of habitats critical for the survival of populations of threatened species (Critically Endangered, Endangered, Vulnerable).</li> </ul>
High	Indigenous natural areas that are highly positive for any of the following: <ul style="list-style-type: none"> <li>• Presence of threatened species (Critically Endangered, Endangered, Vulnerable).</li> </ul> And may also be positive for the following:

Sensitivity	Factors contributing to sensitivity
	<ul style="list-style-type: none"> <li>High intrinsic biodiversity value (high species richness and/or turnover, unique habitat).</li> <li>Presence of habitat highly suitable for threatened species (Critically Endangered, Endangered, Vulnerable species).</li> <li>Low ability to respond to disturbance (low resilience, dominant species very old).</li> </ul>
Medium	<ul style="list-style-type: none"> <li>Other indigenous natural areas in which factors listed above are of no particular concern.</li> <li>May also include natural buffers around ecologically sensitive areas and natural links or corridors in which natural habitat is still ecologically functional.</li> <li>Degraded or disturbed indigenous natural vegetation. May also include secondary vegetation in an advanced stage of development in which habitat is still ecologically functional and which could potentially provide habitat for species of concern.</li> </ul>
Low	No natural habitat remaining.

### 10.5.3 FLORA (PLANT LIFE)

#### 10.5.3.1 BIOMES

The proposed 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).

#### 10.5.3.2 VEGETATION TYPES

According to SANBI (2006 – 2018), the project footprint lies within the Marikana Thornveld (SVcb6). 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 28: Vegetation types of the proposed Millsell Waterkloof site

### 10.5.3.3 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 proposed 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 majority of the proposed project footprint is categorised as ESA2, with smaller sections located on areas categorised as CBA2 in terms of the NWBSP. The majority (89%) of the footprint had been transformed by crop cultivation, with the remainder of the vegetation on the project footprint being moderately to heavily disturbed by activities such as historic agriculture and related activities.

No National Protected Areas Expansion Strategy (NPAES) areas are located within 10 km of the proposed 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 4 km south-west of the project footprint. The proposed project footprint is located approximately 1.2 km north of the transition zone of the Magaliesberg Biosphere. The proposed project footprint is not located in an area designated as a FEPA.

According to the Mining and Biodiversity Guideline (2013), the proposed project footprint is located on areas categorised as High Biodiversity Importance (high risk for mining).



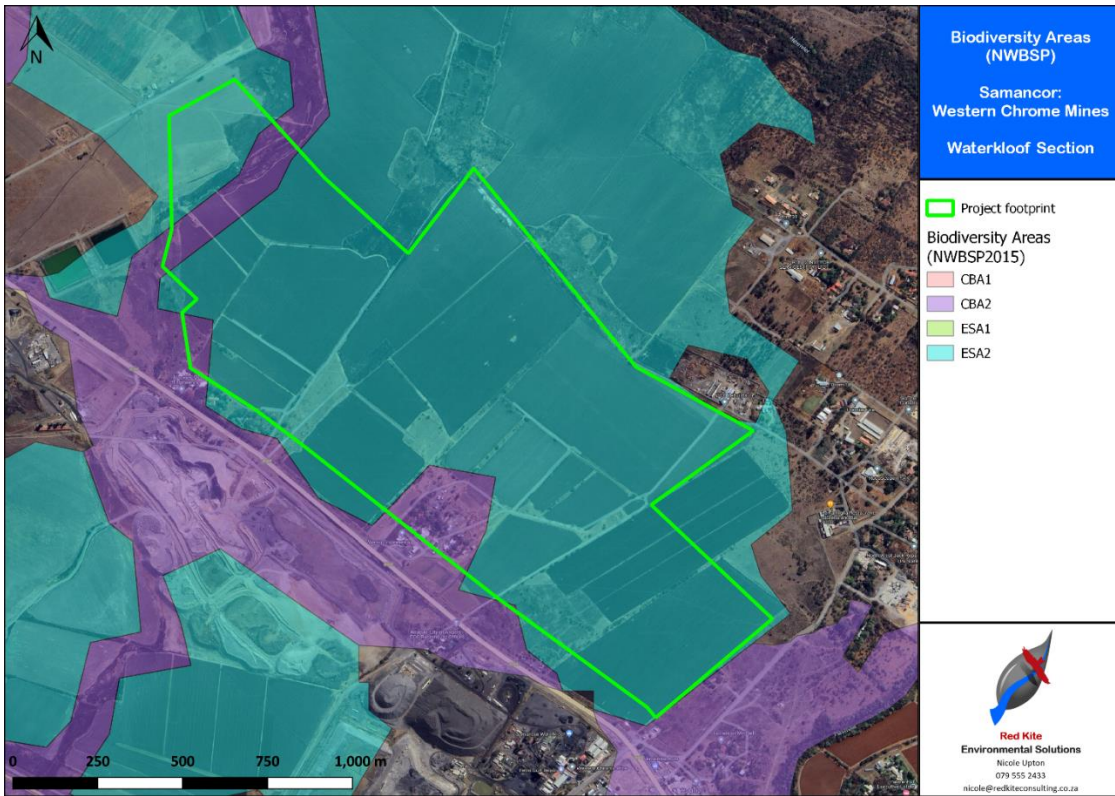


Figure 29: NWBSP Biodiversity areas on the proposed opencast Millsell Waterkloof Section

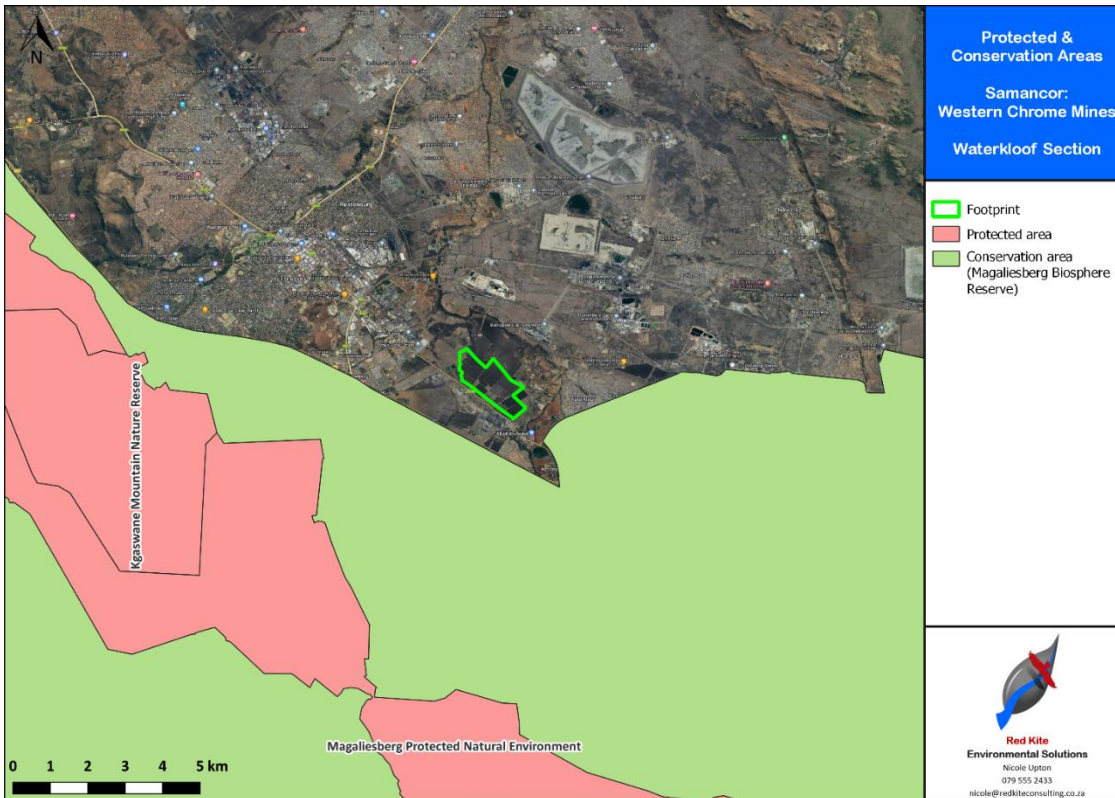


Figure 30: Protected and conservation areas

**10.5.3.4 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 of the specialist report. The results indicate that 52 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:

- *Adromischus umbraticola* subsp. *umbraticola* (Red List Status: NT): Occurs on south-facing rock crevices on ridges, restricted to Gold Reef Mountain Bushveld in the northern parts of its range, and Andesite Mountain Bushveld in the south. This species is unlikely to have occurred on the project footprint.

No plant species were listed for the proposed project area in the Environmental Screening Tool Report. None of the species previously recorded on the area queried are protected in terms of the ToPS List, the NFA or the NWBMA. One of the plant species is known to have medicinal uses and four of the flora species are endemic to South Africa.

#### 10.5.3.5 SITE EVALUATION

One site survey was conducted on 20 May 2022 for the proposed project area which has an extent of 167ha. The vegetation located on the project footprint largely consists of heavily disturbed vegetation or transformed areas, as depicted by the vegetation units delineated in **Error! Reference source not found.** Impacts to the ecology of the project footprint and immediately surrounding area include adjacent mining and related activities; agricultural activities (crop production and livestock grazing); residences; roads and associated human and vehicle traffic; and proliferation of AIP.

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 proposed project footprint:

1. Degraded indigenous Thornveld (VU1)
2. Riparian vegetation (VU2)
3. Transformed (VU3)

The vegetation units, as identified during site visit, databases and aerial imagery are indicated in the Figure 31 below.

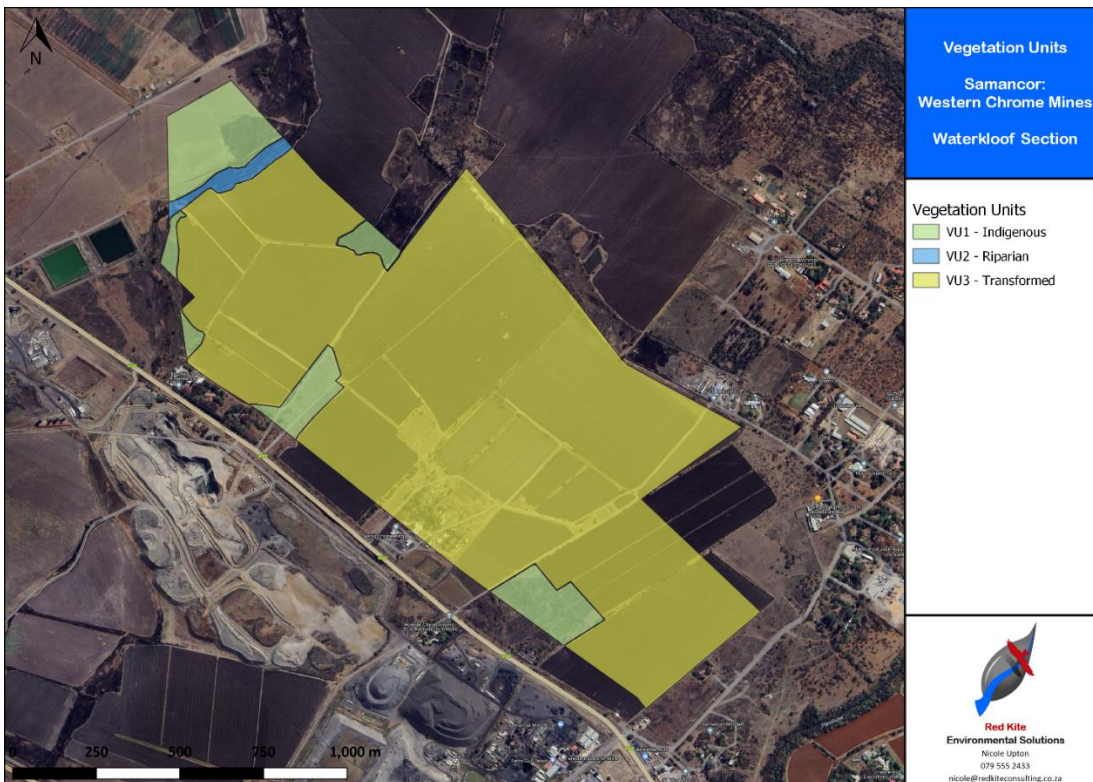


Figure 31: Delineated Vegetation Units for the proposed opencast Millsell Waterkloof Section

#### 10.5.3.5.1 Vegetation Unit 1 – Thornveld

Vegetation Unit (VU)1 consists largely of thornveld which is moderately to heavily impacted by current and historic activities in the area. VU1 was 17.2 ha in extent. Although the vegetation composition bears some resemblance to the Marikana Thornveld vegetation type (refer to section 10.5.3.2), 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 crop cultivation; adjacent developments and mining activities; and human and vehicle movement. The vegetation unit was highly fragmented by the aforementioned activities.

Plant species diversity for VU1 is considered to be moderate, with the vegetation composition homogenous. The vegetation is dominated by the following tree species: *Peltophorum africanum* (African-wattle), *Vachellia tortilis* (Umbrella thorn), *Vachellia nilotica* (Scented-pod thorn), *Searsia pyroides* (Firethorn crowberry) and *Searsia lancea* (Willow crowberry). Dominant shrubs include: *Dichrostachys cinerea* (Sickle bush), *Ehretia rigida* (Puzzlebush), *Grewia flava* (Brandybush) and *Asparagus laricinus* (Cluster-leaf asparagus). Dominant grass species included: *Setaria sphacelata* (Bristle grass), *Heteropogon contortus* (Spear grass), *Bothriochloa insculpta* (Pinhole grass), *Andropogon schirensis* (Stab grass), *Panicum maximum* (White buffalo grass)

Six exotic species were identified to occur in low densities in VU1, especially along road verges and the edges of cropland. Of these six species, two are classified as Alien and Invasive Plant (AIP) species in terms of the NEMBA, i.e. *Tithonia rotundifolia* (Red sunflower) and *Populus x canescens* (Grey poplar). No species of conservation concern were identified to occur in 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 ESA in the NWBSP.



Figure 32: Thornveld vegetation (VU1) at the Proposed Millsell Waterkloof Section

#### 10.5.3.5.2 Vegetation Unit 2 (VU2) – Riparian

The watercourse running through the north-western section of the proposed project area is non-perennial and has been significantly altered through the surrounding activities, including road crossings, 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 zone, upstream of the proposed project footprint. Vegetative cover was found to be good with moderate species diversity. VU2, as delineated and is 1.8 ha in extent.

Thirty (30) flora species were identified in the wetland and riparian areas, some of which are obligate and facultative wetland species. Dominant species include: *Andropogon schirensis*, *Panicum maximum*, *Sorghum versicolor* and *Phragmites australis*. Other obligate species identified to occur in the riparian zone include: *Berkheya radula*, *Dichanthium annulatum*, *Eragrostis gummiflua* and *Persicaria lapathifolia* (exotic).

Six (6) exotic species were identified to occur in low densities within the riparian and wetland zones. Of these six species, one is classified as Alien and Invasive Plant (AIP) species in terms of the NEMBA, i.e. *Tithonia rotundifolia* (Red sunflower). As expected, exotic species density and diversity was found to be higher along road verges, the edges of crop fields and in proximity to residences.

Although this VU 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. VU2 is located on areas designated as CBA in terms of the NWBSP and within an ecosystem categorised as Vulnerable in terms of the NEMBA.





Figure 33: Riparian vegetation of VU2 at the Proposed Millsell Waterkloof Section

#### 10.5.3.5.3 Vegetation Unit 3 (VU3) - Transformed

Vegetation Unit 3 occurs on the areas which have been totally transformed, i.e. land that has been transformed for crop cultivation, roads and residences. This habitat is considered to have very low ecosystem service provision capabilities. The majority (148 ha or 89%) of the project footprint is located in VU3.

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 34: Areas of VU3 transformed by crop cultivation

#### 10.5.3.5.4 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 VU3. 88% (57 of 65) of the recorded plant species are indigenous to South Africa. Eight exotic species were recorded as occurring on the study area, of which two are listed as AIP in terms of the NEMBA.

From available literature it was established that at least six of the recorded plant species in the study area

are to some extent used for medicinal purposes. Two 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.

#### 10.5.4 FAUNA (ANIMAL LIFE)

##### 10.5.4.1 MAMMALS

Forty-five (45) mammal species were found to possibly occur within the QDS, four of which have been categorised as National Red Data species:

- Black-footed Cat - *Felis nigripes* - Vulnerable (2016)
- Leopard - *Panthera pardus* - Vulnerable (2016)
- Brown Hyena - *Hyaena brunnea* - Near Threatened (2015)
- Schreibers's Long-fingered Bat - *Miniopterus schreibersii* - Near Threatened

Two additional SCC were included in the Environmental Screening Tool Report for the project:

- *Crocidura maquassiensis* - *Makwassie musk shrew* - VU(2016), NWBMA: Protected
- *Dasymys robertsii* - *African Marsh Rat* - EN, NWBMA: Protected

The large mammals (leopard and hyena) listed are not supported by the associated habitat and the habitat remaining, unless occasionally as part of their large ranges. Only the smaller mammalian species listed above could feasibly occur.

##### 10.5.4.2 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 a single pentad: 2540\_2715. Two hundred and sixty-three (263) bird species were recorded for this area.

Seven (7) avifaunal have been indicated as SCC based on National importance:

- Duck, Maccoa - *Oxyura maccoa* - NT (Regional), VU (Global)
- Falcon, Lanner - *Falco biarmicus* - VU (Regional), LC (Global)
- Painted-snipe, Greater - *Rostratula benghalensis* - NT (Regional), LC (Global)
- Pratincole, Black-winged- *Glareola nordmanni* - NT (Regional), NT (Global)
- Stork, Yellow-billed - *Mycteria ibis* - EN (Regional), LC (Global)
- Tern, Caspian - *Hydroprogne caspia* - VU (Regional), LC (Global)
- Secretarybird - *Sagittarius serpentarius* - VU (Regional), VU (Global)

The site falls adjacent (1 km to the south) to the Magaliesberg Important Birding Area (IBA) (refer to Figure 30). 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 40 km towards the east and

south-east of the proposed project footprint.

#### 10.5.4.3 BUTTERFLIES

Forty-seven (47) butterfly species were found for the 2527CB, all of which are categorized as Least Concern by SANBI (refer to Appendix D of the specialist report found in Appendix 6). Butterflies from the Charaxes family are Provincially listed in terms of Schedule 2 of the NWBA.

#### 10.5.4.4 OTHER INVETEBRATES

Nineteen (19) species of Odonata and forty-nine (49) Dungbeetle species were recorded for the QDS in historical records, all have a Least Concern rating (refer to Appendix D of the specialist report found in Appendix 6). It should be noted that all Dung beetles are listed under Schedule 2 of the North West Biodiversity Act (NWBA).

#### 10.5.4.5 REPTILES

Thirty-five (35) reptile species were recorded for the QDS, none of which are categorised as SCC (refer to Appendix D of the specialist report found in Appendix 6).

However, the following species are listed as protected in terms of the NWBMA:

Cordylus vittifer	-	Common Girdled Lizard	-	Schedule 2 NWBMA
Gerrhosaurus flavigularis	-	Yellow-throated Plated Lizard	-	Schedule 2 NWBMA
Varanus niloticus	-	Water Monitor	-	Schedule 2 NWBMA

#### 10.5.4.6 AMPHIBIANS

Sixteen (16) amphibian species were listed within this QDS, none of which are categorised as SCC (refer to Appendix D of the specialist report found in Appendix 6).

#### 10.5.4.7 SITE EVALUATION

A site assessment was conducted on the 20th of May 2022. The site and surrounding land consisted of various land uses and impacts occurred to various degrees:

- Mining and other completely transformed areas;
- Agricultural and farming lands;
- Tributaries (non-perennial); and
- Transformed secondary habitat and vegetation.

##### 10.5.4.7.1 Completely Transformed Areas

Sections of the proposed project area consisted of mining activities, mining roads, rural communities, farmstead and other areas where habitat had been completely transformed with minimal opportunities available to animals, but will serve as edge habitat to the remaining habitat still available in the area, albeit impacted to an extent.

10.5.4.7.2 Secondary Transformed Areas

The habitat which remains between the current mining and agricultural areas are impacted by activities. Some areas seem to have been historically mined, cleared or used for infrastructure and have been rehabilitated. A wetland associated with a drainage line, leading towards the river system to the south-west, occurs on the proposed project footprint and represents fair quality habitat available in the area.

The bulk of the footprint proposed project falls on agricultural sections, which constitute secondary habitat available in the area and serve as buffers and corridors between remaining natural areas.

10.5.4.8 SPECIES ENCOUNTERED DURING THE FIELD ASSESSMENT

Twenty-two (22) faunal species were sighted during the site survey. The species sighted mostly occurred in the natural areas towards the south east within the study area, 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 17: Animal species sighted during site visit

Family	Species	Common Name	Sighting/Finding	Status and IUCN
<b>Invertebrates and Butterflies</b>				
Pisauridae	<i>Perenethis simoni</i>	Nursery web spider	Sightings	LC
Nymphalidae	<i>Byblia ilithyia</i>	Spotted Joker	Sighting	LC
Nymphalidae	<i>Danaus chrysippus</i>	African Monarch	Sighting	LC
Nymphalidae	<i>Junonia hierta</i>	Yellow Pansy	Sightings	LC
<b>Reptiles</b>				
No reptile species observed				
<b>Amphibian</b>				
No amphibian species observed				
<b>Mammalians</b>				
Leporidae	<i>Lepus saxatilis</i>	Scrub hare	Sightings of dung	LC (2016)
Equidae	<i>Equus caballus</i>	Horses	Sighted and Droppings	Domestic
Bovidae	<i>Bos taurus</i>	Cattle	Sightings and Dung	Domestic
<b>Avifaunal</b>				
Strigidae	<i>Asio capensis</i>	Marsh owl	Sighted at southern wetland section	LC
Anatidae	<i>Alopochen aegyptiaca</i>	Egyptian goose	Sighted at dam	LC
Ardeidae	<i>Ardea cinerea</i>	Grey Heron	Sighted at dam	LC
Coraciidae	<i>Coracias caudatus</i>	Lilac-breasted Roller	Sightings along road	LC
Accipitridae	<i>Elanus caeruleus</i>	Black-Shouldered Kite	Sighting	LC
Turnicidae	<i>Turnix sylvaticus</i>	Common buttonquail	Sightings	LC
Leiothrichidae	<i>Turdoides jardineii</i>	Arrow-marked Babbler	Sightings	LC
Estrildidae	<i>Estrilda astrild</i>	Common waxbill	Sightings at river crossing	LC
Numididae	<i>Numida meleagris</i>	Helmeted guineafowl	Feathers, Sightings	LC
Ploceidae	<i>Ploceus intermedius</i>	Lesser masked weaver	Sighted	LC
Ploceidae	<i>Euplectes afer</i>	Yellow-crowned bishop	Sighted	LC



Family	Species	Common Name	Sighting/Finding	Status and IUCN
Charadriidae	<i>Vanellus armatus</i>	Lapwing, Blacksmith	Sightings	LC
Hirundinidae	<i>Riparia cincta</i>	Martin, Banded	Sightings	LC
Ploceidae	<i>Ploceus velatus</i>	Masked-weaver, Southern	Sightings	LC
Burhinidae	<i>Burhinus capensis</i>	Thick-knee, Spotted	Sightings	LC

### 10.5.5 SENSITIVITY

The Marikana Thornveld vegetation type occurring on the proposed 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 majority of the proposed project footprint is categorised as CBA2 and ESA2 in terms of the NWBSP. These areas have been transformed by the mining activities. However, prior to the mining activities the majority of the footprint had been transformed by crop cultivation, with the remainder appearing heavily disturbed by historic agriculture and related activities, and infrastructure developed to support the existing Waterkloof Section.

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 4 km west of the proposed project footprint. The footprint is located approximately 300 m north-east of the transition zone of the Magaliesberg Biosphere. According to the Mining and Biodiversity Guideline (2013), the proposed project footprint is located on areas categorised as High Biodiversity Importance (high risk for mining).

Two non-perennial streams are located adjacent to the project footprint, which are associated with riparian zones. Rivers, streams and wetlands serve as ecological corridors, enable site and landscape level connectivity, and support ecological processes and are therefore considered to be of high ecological sensitivity.

A number of fauna SCC are listed as having the potential of occurring on the proposed project area. However, no fauna SCC species were identified to occur on the project footprint. No flora SCC are likely to occur on the project footprint and none were identified during the site survey.

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

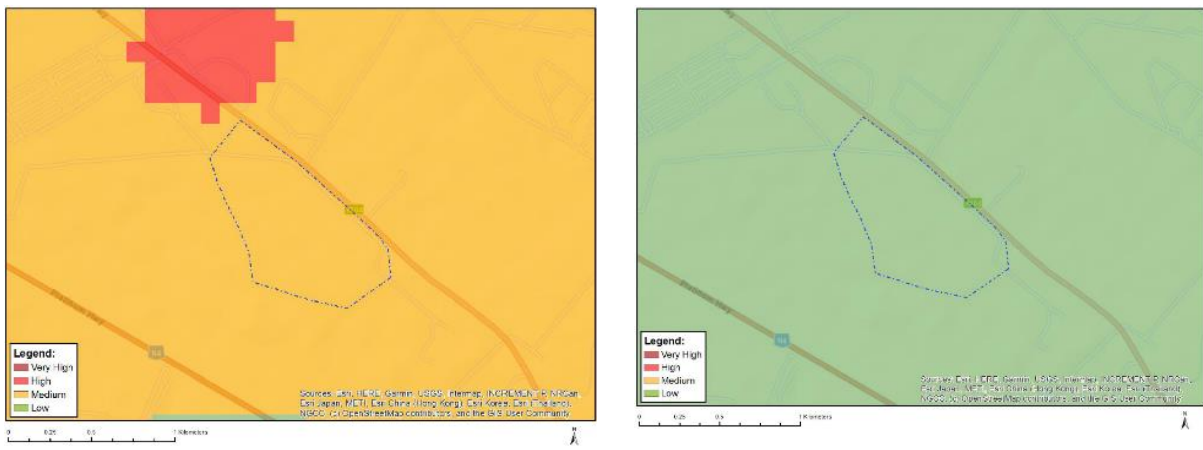


Figure 35: Environmental Screening Tool map of animal (left) and plant (right) species themes sensitivity

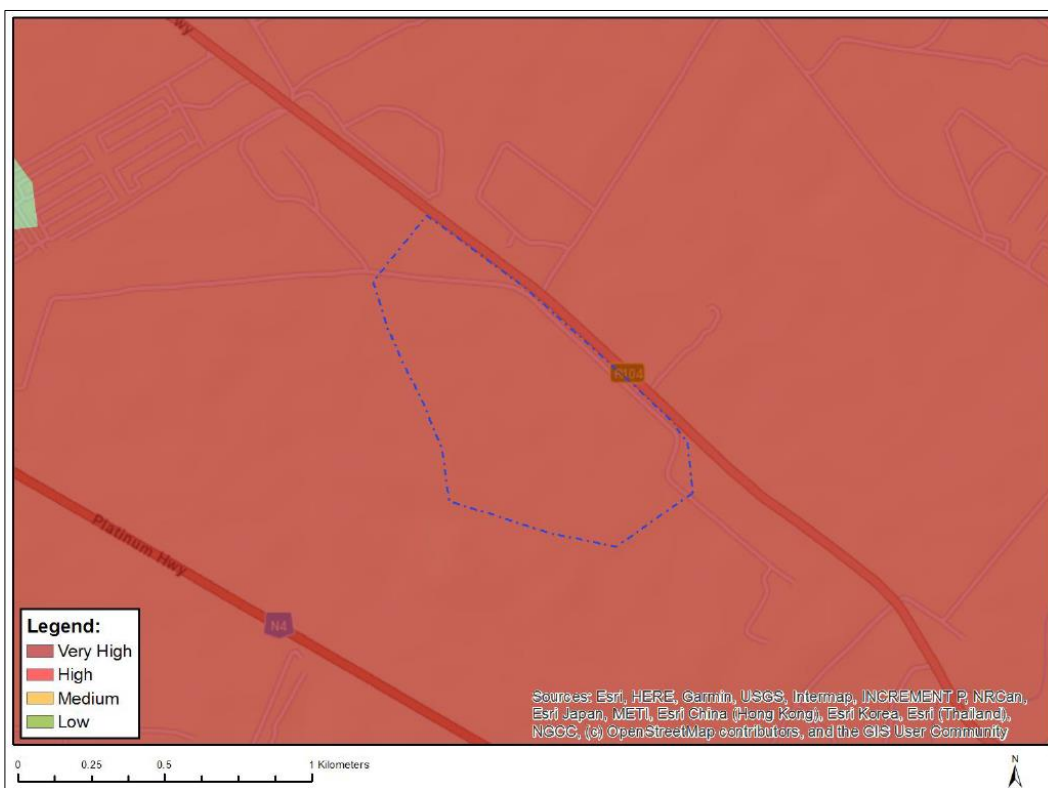


Figure 36: Environmental Screening Tool map of terrestrial biodiversity theme sensitivity

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

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 a CBA in the NWBSP.
2. Riparian vegetation (VU2) - Although this VU 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. VU2 is located on areas designated as CBA in terms of the NWBSP and within an ecosystem categorised as Vulnerable in terms of the NEMBA.



3. Transformed (VU3) - 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.

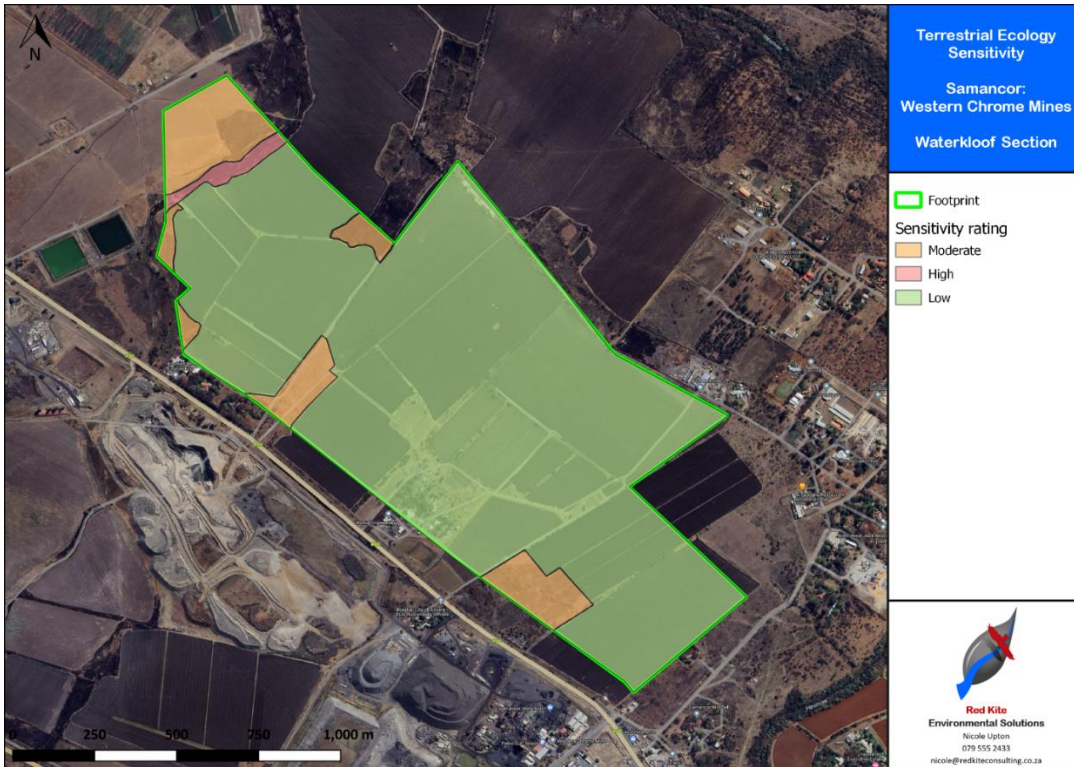


Figure 37: Terrestrial ecology sensitivity for the proposed opencast Millsell Waterkloof Section

## 10.6 SURFACE WATER

Red Kite Environmental Solutions (Pty) Ltd. conducted a Surface Water and Aquatic Ecology Assessment. A copy of the report can be found in Appendix 7.

### 10.6.1 ECOREGION

According to the delineation provided by Dallas (2007), the Level 1 Ecoregion of the area is the Bushveld Basin Ecoregion (8) (DWS, 2005). This region consists predominantly of plains with a low relief with Mixed Bushveld being the definitive vegetation type. In the east plains with a moderate relief and lowlands with a moderate relief occur. Several perennial rivers traverse the region, e.g. the Marico, Elands (West), Crocodile (West), Pienaars and Olifants. Virtually no perennial tributaries arise in the region.

Other general characteristics of the Ecoregion are as follows:

- Mean annual precipitation: Moderate to low.
- Coefficient of variation of annual precipitation: Moderate
- Drainage density: Low.
- Stream frequency: Low to medium.
- Slopes <5%: >80%. Few areas 20-50% and 50-80%.
- Median annual simulated runoff: Moderately low to moderate.
- Mean annual temperature: Generally high.

- Size = 32460.1 km<sup>2</sup>

Table 18: Ecoregion Attributes (DWS, 2005)

Main Attributes	Ecoregion Level 1: Eastern Escarpment Mountains (15)
Terrain Morphology: Broad division	Plains; Low Relief; Plains; Moderate Relief; Lowlands; Hills and Mountains: Moderate and High Relief; Open Hills; Lowlands; Mountains: Moderate to High Relief; Closed Hills; Mountains: Moderate and High Relief (limited)
Vegetation types (Primary)	Mixed Bushveld; Clay Thorn Bushveld; Waterberg Moist Mountain Bushveld (limited)
Altitude (mamsl)	700-1700 (1700-1900 very limited)
MAP (mm)	400 to 6000
Coefficient of variation (% of annual precipitation)	25 to 35
Rainfall concentration index	55 to >65
Rainfall seasonality	Early to mid-summer
Mean annual temp (°C)	14 to 22
Mean daily max temp (°C) February	22 to 32
Mean daily max temp (°C) July	14 to 24
Mean daily min temp (°C) February	12 to 20
Mean daily min temp (°C) July	0 to 6
Median annual simulated runoff (mm) for quaternary catchment	20 to 100

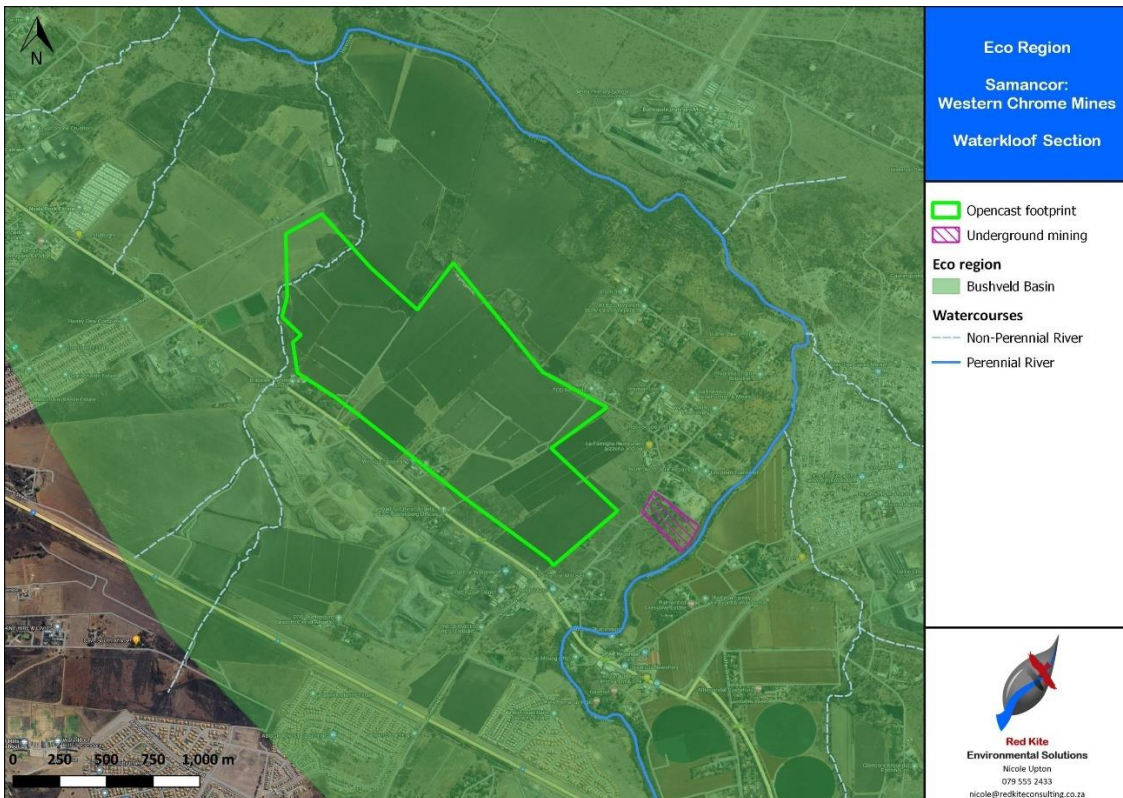


Figure 38: Ecoregion Level 1 – Bushveld Basin (8)

## 10.6.2 WATER MANAGEMENT AREA

The proposed project 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 A22 tertiary catchment, and more specific, the A22H quaternary catchment (Hex River, Olifantsnek to Bospoort Dam). Figure 39 below depicts the catchments as described above.

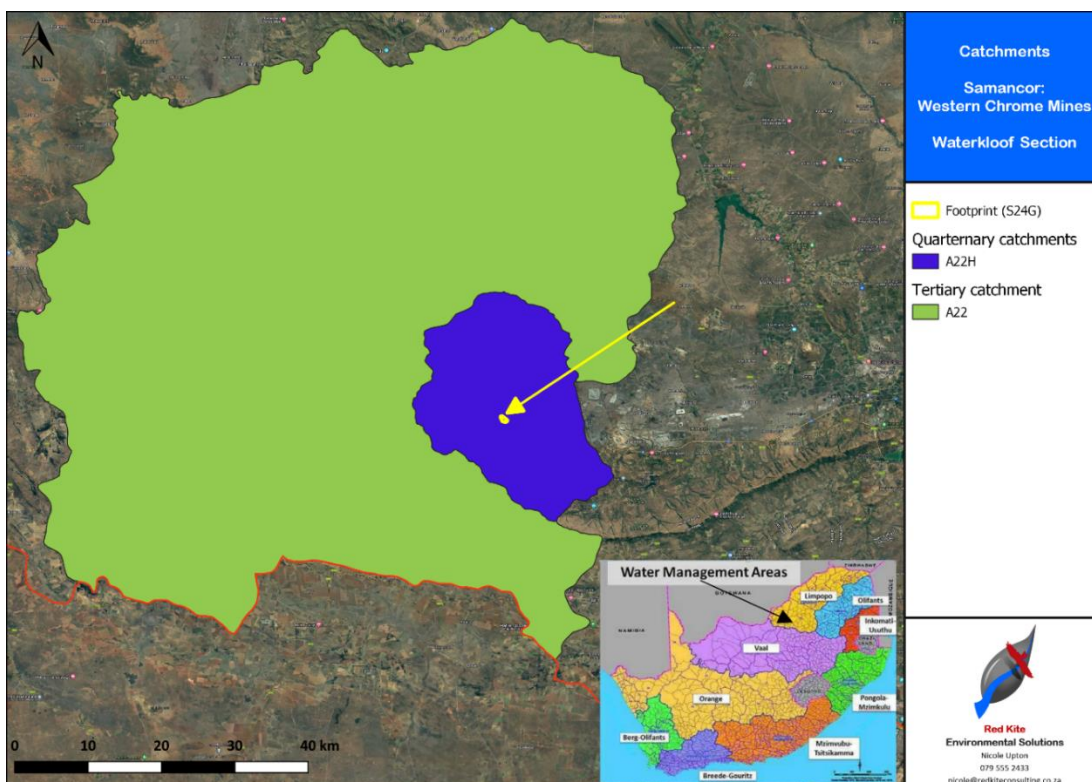


Figure 39: Water management area for the proposed opencast Millsell Waterkloof Sections

## 10.6.3 STRATEGIC WATER RESOURCE AREA

Strategic Water Source Areas (SWSAs) are now defined as areas of land that either: (a) supply a disproportionate (i.e. relatively large) quantity of mean annual surface water runoff in relation to their size and so are considered nationally important; or (b) have high groundwater recharge and where the



groundwater forms a nationally important resource; or (c) areas that meet both criteria (a) and (b).

The proposed project falls within the groundwater SWSAs. The newly defined groundwater SWSAs cover around 9% of the land surface of South Africa (see Figure 40). They account for up to 42% of the river baseflow generated by these water source areas and have a key role in sustaining surface water flows during the dry season.

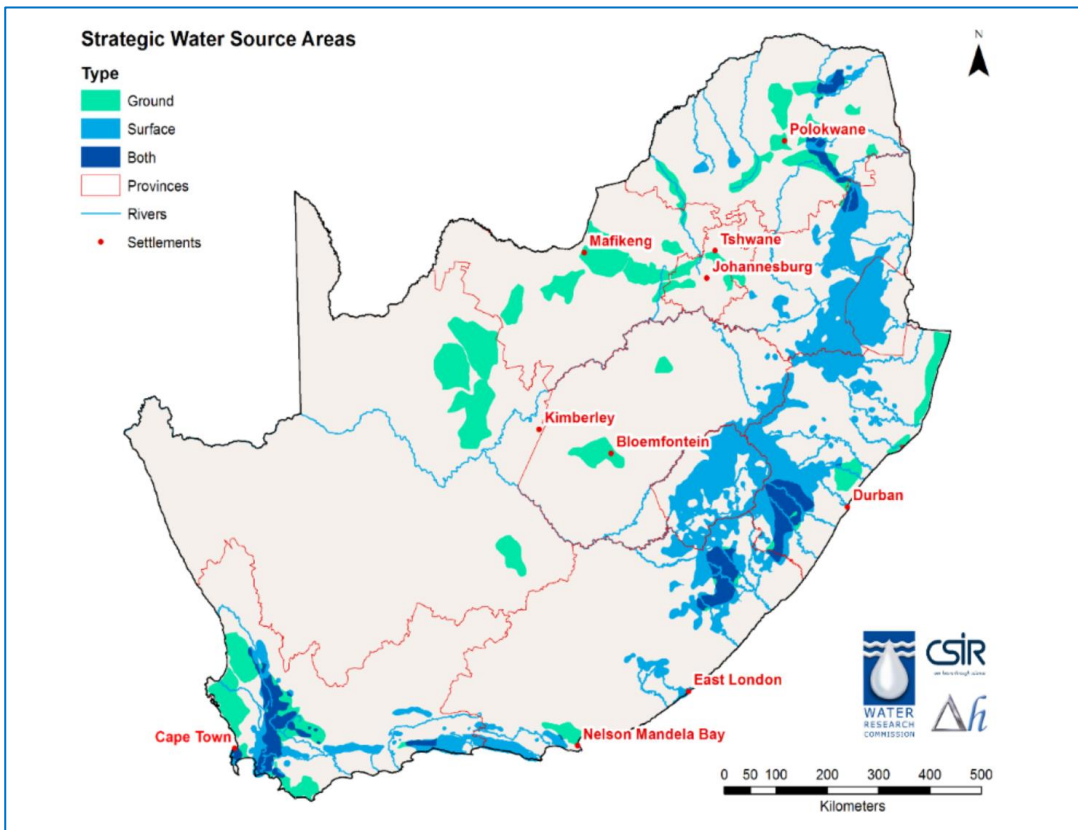


Figure 40: Strategic Water Resource Areas of South Africa (CSIR, 2013)

#### 10.6.4 DRAINAGE SYSTEMS

A site survey of the affected surface water resources was undertaken on 19 May 2022. The watercourses draining the proposed project area are non-perennial to the west and perennial to the north and east. These systems have been significantly altered through the surrounding activities.

The non-perennial watercourse flows from south to north through the proposed project area where it combines with the perennial Hex River, draining the proposed site to the east and north. The Hex River continues north through the eastern side of Rustenburg.

Further downstream, the Hex River turns north-east to the Bospoort Dam, north-east of Rustenburg. The Hex River continues north-east and joins with the Elands River at the Vaalkop Dam. The system continues as the Elands River up to the Crocodile River.



Figure 41: Surrounding watercourses

### 10.6.5 RIPARIAN VEGETATION

Vegetative cover was found to be good with moderate species diversity. Thirty (30) flora species were identified in the wetland and riparian areas, some of which are obligate and facultative wetland species. Dominant species include: *Andropogon schirensis*, *Panicum maximum*, *Sorghum versicolor* and *Phragmites australis*. Other obligate species identified to occur in the riparian zone include: *Berkheya radula*, *Dichanthium annulatum*, *Eragrostis gummiflua* and *Persicaria lapathifolia* (exotic).

Six exotic species were identified to occur in low densities within the riparian and wetland zones. Of these six species, one is classified as Alien and Invasive Plant (AIP) species in terms of the NEMBA, i.e. *Tithonia rotundifolia* (Red sunflower). As expected, exotic species density and diversity was found to be higher along road verges, the edges of crop fields and in proximity to residences.

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. The table below lists the flora species identified in the riparian zones associated with the proposed project area during the site survey.

Table 19: Flora species identified in the riparian zone during site survey

Species	Common name	Red List Status	Ecology / Conservation
<i>Albuca virens</i>	Bosui	LC	
<i>Aloe davyana</i>	Grasalwyn	-	Endemic
<i>Amaranthus spinosus</i>	Thorny pigweed	-	Exotic

Species	Common name	Red List Status	Ecology / Conservation
<i>Andropogon schirensis</i>	Stab grass	LC	
<i>Aristida adscensionis</i>	Annual three-awn	LC	
<i>Asparagus larycinus</i>	Cluster-leaf asparagus	LC	
<i>Berkheya radula</i>	Boesmanrietjie	LC	Obligate wetland
<i>Bidens pilosa</i>	Common blackjack	-	Exotic
<i>Bothriochloa insculpta</i>	Pinhole grass	LC	
<i>Cynodon dactylon</i>	Couch grass	LC	
<i>Dichanthium annulatum</i>	Vlei finger grass	LC	Obligate wetland
<i>Dichrostachys cinerea</i>	Sickle bush	NE	Medicinal
<i>Eragrostis gummiflua</i>	Gum grass	LC	Obligate wetland
<i>Eragrostis patentipilosa</i>	Footpath love grass	LC	
<i>Grewia occidentalis</i>	Crossberry	LC	Medicinal
<i>Hyperthelia dissoluta</i>	Yellow thatching grass	LC	
<i>Ledebouria revoluta</i>	Common African hyacinth	LC	
<i>Panicum maximum</i>	White buffalo grass	LC	
<i>Persicaria lapathifolia</i>	Spotted knotweed	-	Exotic. Obligate wetland
<i>Phragmites australis</i>	Common reed	LC	Obligate wetland
<i>Schkuhria pinnata</i>	Dwarf marigold	-	Exotic
<i>Searsia lancea</i>	Willow crowberry	LC	
<i>Searsia leptodictya</i>	Mountain karee	NE	
<i>Sesbania bispinosa</i>	Spiny sesbania	NE	Exotic
<i>Setaria incrassata</i>	Vlei bristle grass	LC	Facultative wetland
<i>Setaria sphacelata</i>	Bristle grass	LC	
<i>Sorghum versicolor</i>	Black-seed sorghum	LC	
<i>Themeda triandra</i>	Red grass	LC	
<i>Tithonia rotundifolia</i>	Red sunflower	-	NEMBA: AIP Category 1b
<i>Ziziphus mucronata</i>	Buffalo thorn	LC	Medicinal

### 10.6.6 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 project has three inter-related components:

- A technical component to identify a national network of freshwater conservation areas;



- A national governance component to align DFFE and DWS policies and approaches for conserving freshwater ecosystems; and
- A sub-national governance and management component that conducts case studies to demonstrate how NFEPA outcomes can be implemented (Neill et al, 2011).

The relevant sections of river do not intercept with a FEPA area. Refer to Figure 42.

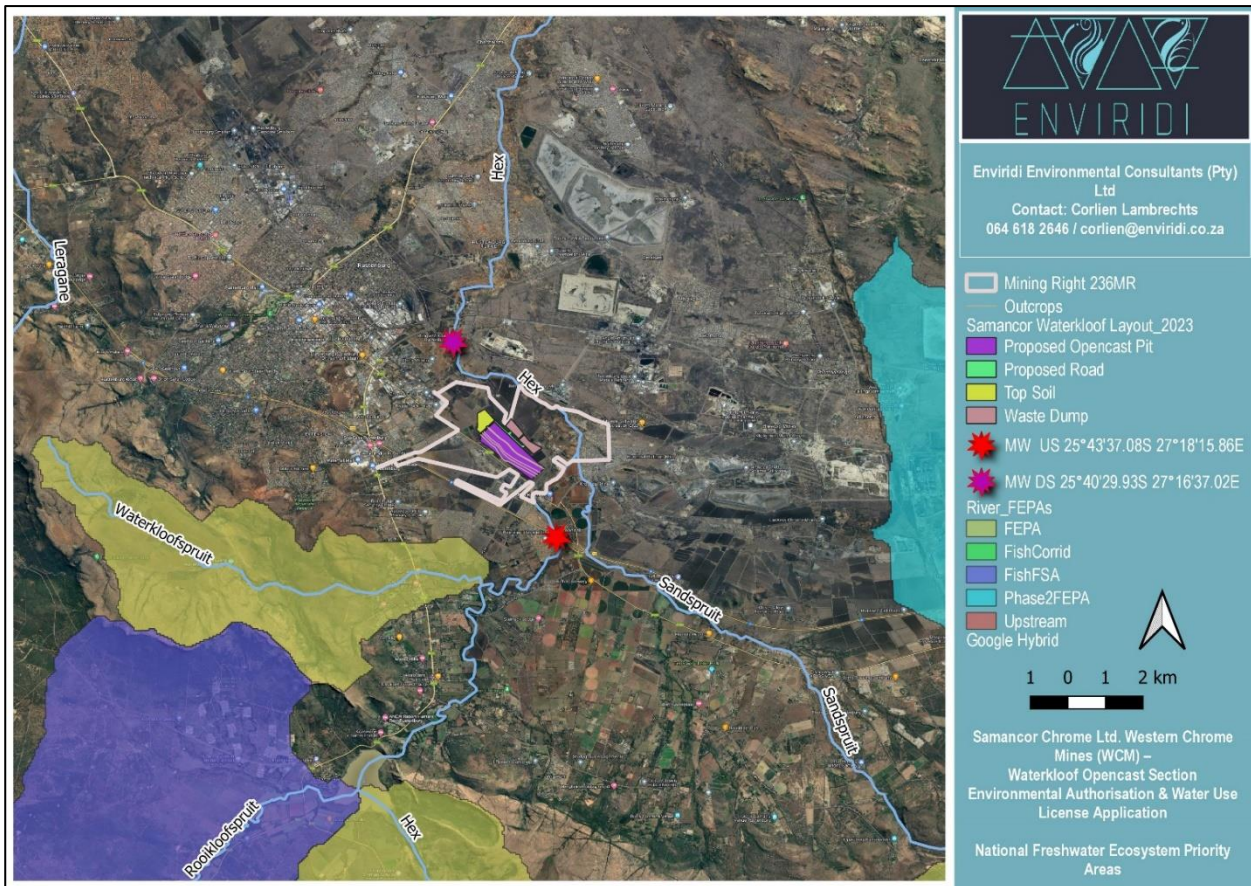


Figure 42: River Freshwater Ecosystem Priority Areas

### 10.6.7 RESORUCE 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 20: Water Resource Class and Ecological Category for the relevant Quaternary Catchments (DWS, 2019)

IUA	Water Resource Class	Biophysical Node Name	Quaternary Catchments	Major River Name
4 Hex/ Waterkloofspruit/ Vaalkop	II	HN25	A22H	Hex from Olifantsnek Dam to Bospoort Dam, Sandspruit

### 10.6.8 MEAN ANNUAL RUNOFF AND RESERVE DETERMINATION

The South African NWA adopted in 1998, is implemented by means of the National Water Resource Strategy. The NWRS provides the framework for the management of the water resources. Some of the protective measures are designated Resource Directed Measures such as the establishment of the Reserve. The NWA establishes the 'Reserve' consisting of an unallocated portion of water that is not subject to competition with other water uses. It refers to both the quality and quantity of water and is made up from two distinct parts, namely the basic human needs reserve and the Ecological Reserve.

Node HN25 is used for reserve, importance, and quality determination. This site falls in the A22H quaternary catchment, Covering the Hex River from the Olifantsnek Dam to the Bospoort Dam. The data below was sourced from the Determination of Water Resource and Resource quality Objectives for Mokolo, Matlabas, Crocodile (West) and Marico Catchments (DWS, October 2019).

The HN25 node's MAR equates to 12.11 million m<sup>3</sup>/a, with 15.26% allocated for the Ecological Reserve as indicated in the table below.

Table 21: Mean Annual Run-off and Reserves for the EWR site and relevant Quaternary Catchments (DWS, 2019)

EWR/Node	Catchment	Ecological Reserve (%NMAR)	NMAR (MCM)
HN25	A22H	15.26%	12.11

### 10.6.9 PRESENT ECOLOGICAL STATE AND IMPORTANCE

Studies undertaken by the DWS assessed all quaternary catchments as part of the Resource Directed Measures for Protection of Water Resources. In these assessments, the Ecological Importance and Sensitivity (EIS), Present Ecological State (PES) and Target Ecological Category (TEC) were defined, and it serves as a useful guideline in determining the importance and sensitivity of the aquatic ecosystems. The results are summarised in the table below as per the Determination of Water Resource and Resource quality Objectives for Mokolo, Matlabas, Crocodile (West) and Marico Catchments (DWS, October 2019).

As per the table below, node HN25 has a Present Ecological State (PES) of D (largely modified), which is recommended to be maintained.

Table 22: Classification of River Health Assessment Classes

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

Table 23: PES, EIS and REC for the relevant Quaternary Catchment (DWS, 2019)

EWR	Catchment/s	Resource	EIS	PES	TEC
HN25	A22H	Hex from Olifantsnek Dam to Bospoort Dam, Sandspruit	N/A	D	D

### 10.6.10 CHARACTERISTICS OF THE SUB-QUATERNARY REACH

The following data of the catchment forms part of the literature available for the specific streams utilised for SASS5 monitoring. The Sub-Reach falls within the Hex/Waterkloofspruit/Vaalkop sub-water management area, within the Hex River.

Table 24: Information provided on River Health Programme for the Sub Quaternary Reach (SQR)

SQ Reach	PES Category Median	Mean EI Class	Mean ES Class	Length Km	Stream Order	Default EC
<b>Hex- A22H040000</b>						
A22H040000 (NBA 2018) A22H-01076 (RHP)	Class D – Largely Modified	Moderate	Moderate	7.74	2.0	C

The Sub Quaternary Reach (SQR) associated with the monitoring points fall within the Hex (SQR) itself and is labelled A22H-01076. The reach is characterized by the following:

- The Reach spans an area of 7.7 km;
- The Present Ecological State (PES) has been rated Largely Modified (Class D);
- The Ecological Importance of the reach has been rated Moderate; 7 species of fish are expected in the reach;
- The Ecological sensitivity is rated High with invertebrate responses to changes in velocity/water level and stream flow cited as the most prominent influencing parameters;
- The relevant sections of river do not intercept with a FEPA areas,
- Large instream modifications have been recorded in the reach;
- Historic anthropogenic impacts recorded in the reach include:
  - CRITICAL: None,
  - SERIOUS: Agricultural fields, Irrigation,
  - LARGE: Abstraction, Algal growth, Small (farm) dams, Roads, Runoff/effluent: Irrigation,
  - MODERATE: Bed and Channel disturbance, Erosion, Alien vegetation, Vegetation removal,
  - SMALL: Low water crossings, Inundation, Sedimentation,

<p>Fish species recorded within this reach:</p> <ul style="list-style-type: none"> <li>• <i>Labeobarbus marequensis</i> (Largescale yellowfish) – Least Concern</li> <li>• <i>Barbus paludinosus</i> (Straightfin barb) – Least Concern</li> <li>• <i>Barbus trimaculatus</i> (Threespot barb) – Least Concern</li> <li>• <i>Barbus unitaeniatus</i> (Slender barb) – Least Concern</li> <li>• <i>Clarias gariepinus</i> (African sharptooth catfish) – Least Concern</li> <li>• <i>Pseudocrenilabrus Philander</i> (Southern mouth-brooder) – Least Concern</li> <li>• <i>Tilapia Sparrmanii</i> (Banded tilapia) – Least Concern.</li> </ul>
--

Table 25: National Biodiversity Assessment (2018) Data for the SQR

Field Name	Description	Hex River (NBA 2018)
<b>Representative Points Sampled</b>		<b>US Point &amp; DS Points A22H040000 / A22J020000</b>
Order	River order	2
Mainstem	Mainstem = 1 is a quaternary mainstem; the rest of the 1:500,000 rivers are tributaries that are nested within quaternary catchments	1
Flow	Flow variability	Ephemeral (Permanent from site visit)
Geozone	Geozone Score	E
PES 1999	Present ecological state 1999 with desktop modification	Class C: Moderately Modified
River Condition	River condition used by NFEPA A or B is considered intact and able to contribute towards river ecosystem biodiversity targets.	D
FFRREGION	The lumped ecoregion into which free-flowing rivers fall, used to achieve representation of free-flowing rivers across the country	N/A
Flagship Status	Flagship free-flowing rivers as identified through an expert review process	Not marked as a Flagship River
PES 2018	NBA 2018 Ecological condition category. The process involved using the Department of Water and Sanitation (DWS, 2014). Present Ecological State/Ecological Importance/Ecological Sensitivity (PES/EI/ES), also referred to as PES/EIS data, which included mainstems and tributaries at a sub-quaternary level. This desktop data was updated with data that became available between 2011 and 2017 from Reserve or Ecological Water Requirement (EWR) and Water Resource Classification System (WRCS) studies.	Class E – Seriously Modified PES as per NBA 2018 Assessment
NBA 2018 ETS	Ecosystem threat status (ETS) of river ecosystem types: this was based on the extent to which each river ecosystem type had been altered from its natural condition.	Critically Threatened (CR) Ecosystem threat status (ETS)
NBA 2018 EPL	Ecosystem protection level (EPL) of river ecosystem types: river ecosystem types in protected areas needed to be in good condition rivers (A or B ecological category) to be considered as protected.	Not protected (NP)

### 10.6.11 SURFACE WATER QUALITY

During the field survey upstream and downstream water samples were taken and analysed by a SANAS accredited laboratory. Samples are taken to provide baseline for water quality in order to assist in determining current and future impacts of the operation. The tables below provide details regarding the sampling points and the associated Resource Water Quality Objectives (RWQO) as stipulated in the Determination of Water Resource and Resource quality Objectives for Mokolo, Matlabas, Crocodile (West) and Marico Catchments (DWS, October 2019), as well as the National Target Water Quality Range (TWQR) as stipulated in the South African Water Quality Guidelines, Vol. 7: Aquatic Ecosystems (Second Edition, 1996).

The biophysical node HN25 RWQO and national TWQR compared with the water quality analysis of the samples are detailed in the table below. Slightly elevated levels ammonia and ammonium were found, but these are constant both upstream and downstream. Ammonia and ammonium are reduced forms of inorganic nitrogen, and their relative proportions are controlled by water temperature and pH. Both forms can exist as dissolved ions and can be adsorbed onto suspended material. Inorganic nitrogen is primarily of concern due to its stimulatory effect on aquatic plant growth and algae. Most aquatic organisms are sensitive to the toxic effects of ammonia.

Elevated levels are found for nitrate and nitrite downstream. Nitrite is the inorganic intermediate and nitrate the end product of the oxidation of organic nitrogen and ammonia. Nitrate is the more stable of the two forms and is usually far more abundant in the aquatic environment. In view of their co-occurrence and rapid inter-conversion, nitrite and nitrate are usually measured and considered together. Inter-conversions between the different forms of inorganic nitrogen are part of the nitrogen cycle in aquatic ecosystems. Level less than 5 mg/l are oligotrophic conditions; usually moderate levels of species diversity; usually low productivity systems with rapid nutrient cycling; no nuisance growth of aquatic plants or the presence of blue-green algal blooms. The inorganic nitrogen concentration for a specific system must be based on the existing trophic status of the system. It is undesirable to allow inorganic nitrogen concentrations to rise to a level which will change the trophic status of the system. Target levels should be derived only after prolonged case- and site-specific studies.

The upstream and downstream turbidity level are also flagged as the difference between the two sampling points exceeds the variation recommended by more than 10%. The higher the intensity of scattered light, the higher the turbidity. Material that causes water to be turbid include clay, silt, very tiny inorganic and organic matter, algae, dissolved coloured organic compounds, and plankton and other microscopic organisms. The increase in turbidity can lower amounts of sunlight reaching underwater plants called submerged aquatic vegetation. Less sunlight results in less plant growth, and because plants produce oxygen, this reduces the oxygen available to aquatic life. It can harm fish and other aquatic life by reducing food supplies, degrading spawning beds, and affecting gill function.

Seasonal baseline samples should be acquired to note the fluctuations of concentrations across multiple surface water flow cycles.

Table 26: Baseline sample compared to the RWQO and the TWQR

Variable	Measurement	RWQO	TWQR	MS-WK US	MS-WK DS
pH	@ 25 °C	6.5 - 8.5	<5% var.	7.85	7.86
Conductivity	mS/m	<85	N/A	15.1	52.2
Oxygen Dissolved (DO)	O2 mg/l	>6	N/A	6.78	6.32
Turbidity	NTU	<10% var.	N/A	13.2	18.1
Chloride	Cl mg/l	<120	N/A	4.03	34.3
Ammonia and Ammonium	N mg/l	<0.1	N/A	<0.45	<0.45
Nitrate and Nitrite (TON)	N mg/l	<1.0	N/A	<0.35	9
Nitrite	N mg/l	<0.07	N/A	<0.03	<0.03
Sulphate	SO4 mg/l	<120	N/A	10,80	49,10
Chromium	Cr mg/l	<0.105	0.01	<0.01	<0.01
E. coli	/100ml	<130	N/A	8	70



Figure 43: Surface Water Sampling Locations

**10.6.12 IHAS AND SASS 5 ASSESSMENT**

Upstream and downstream points were utilized for the purpose of determining the current conditions, i.e. US 1 and DS 1. The tables below provide the assessment results for the sample points used.



Table 27: Integrated Habitat Assessment Survey (IHAS) Results

Site	End of Low Flow 2022		
	Score	Suitability	Flow
US	Flow to be sampled Score: 65	Habitat diversity and structure is adequate for supporting a diverse aquatic invertebrate community.	Moderate Flow
DS	Flow to be sampled Score: 67	Habitat diversity and structure is adequate for supporting a diverse aquatic invertebrate community.	Moderate Flow

Table 28: QHI Findings and Scores

Site	Desktop Habitat Integrity	Instream EC%	Instream EC	Vegetation Rating (0-5)	Ecotatus %	Ecotatus EC	Confidence (1-5)
US	57,0	62,3	C	3	61,6	C/D	3: Moderate
DS	55,0	62,5	C	3	58,3	C/D	3: Moderate

Table 29: VEGRAI Assessment

<b>Level 3 Assessment US</b>	<b>Rank</b>
Level 3 VEGRAI (%)	46.3
<b>VEGRAI EC</b>	<b>D</b>
<b>Level 3 Assessment DS</b>	<b>Rank</b>
Level 3 VEGRAI (%)	48.4
<b>VEGRAI EC</b>	<b>D</b>

Table 30: South African Scoring System Version 5 (SASS 5) Results

Sampling Point	SASS Score	No of Taxa	ASPT	SASS 5 Results
US	33	6	5.5	Class B: Largely Natural
DS	64	13	4.92	Class C: Moderately Modified

**Summary of results:**

Upstream (US) and downstream (DS) points were sampled, both sites had consistent and sufficient flow for the purposes of the assessment;

- US scored a PES of Class B: Largely Natural, while DS scored a Class C: Moderately Modified;
- These results are slightly higher than the NBA 2018 scores which rates the Hex River as Class E: Seriously Modified system. This could be as a result of the above average rainfall experienced within the wet season, with uncharacteristic rainfall experienced during the dry season as well, up until the date of assessment and afterwards. These climatic conditions could have an effect on the aquatic ecological workings and water conditions at the time of assessment. The scores obtained in the May 2022 assessment rather correspond to DWS River Health Programme and 2017 RQOs for the specific reach, which was Class B/C and D.
- QHI and VEGRAI both indicated a PES of Class C/D for the specific stretch of the Hex River, which is slightly higher than the 2018 DWS PES of Class E determined for the Hex River overall; therefore, the taking all findings into account, the REC given in this assessment as Class C. This corresponds well to the RQOs which require the PES to be the same or better than a Class D.



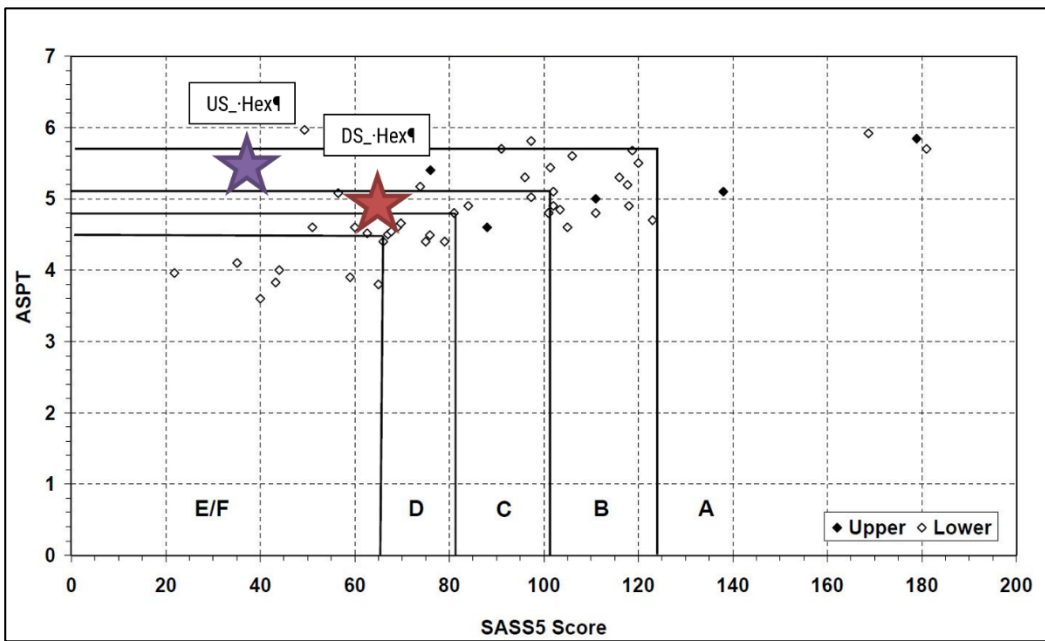


Figure 44: Bushveld Basin classification for Assessment

### 10.6.13 SURFACE WATER SENSITIVITY

The watercourses draining the proposed project area are non-perennial and have been significantly altered through the surrounding activities (present and historical) and the current mining activities by Samancor. The buffer zones identified serves to highlight an ecologically sensitive area in which activities should be conducted with this sensitivity in mind. As most of the streams and rivers related to the proposed project are associated with riparian/wetland zones, the buffer zones used for delineated wetland zones were obtained from the Wetland Assessment undertaken for the project. Refer to the Wetland Assessment in Appendix 9 compiled for the proposed project for details relating to the delineation of the wetlands and the determined buffer zones.

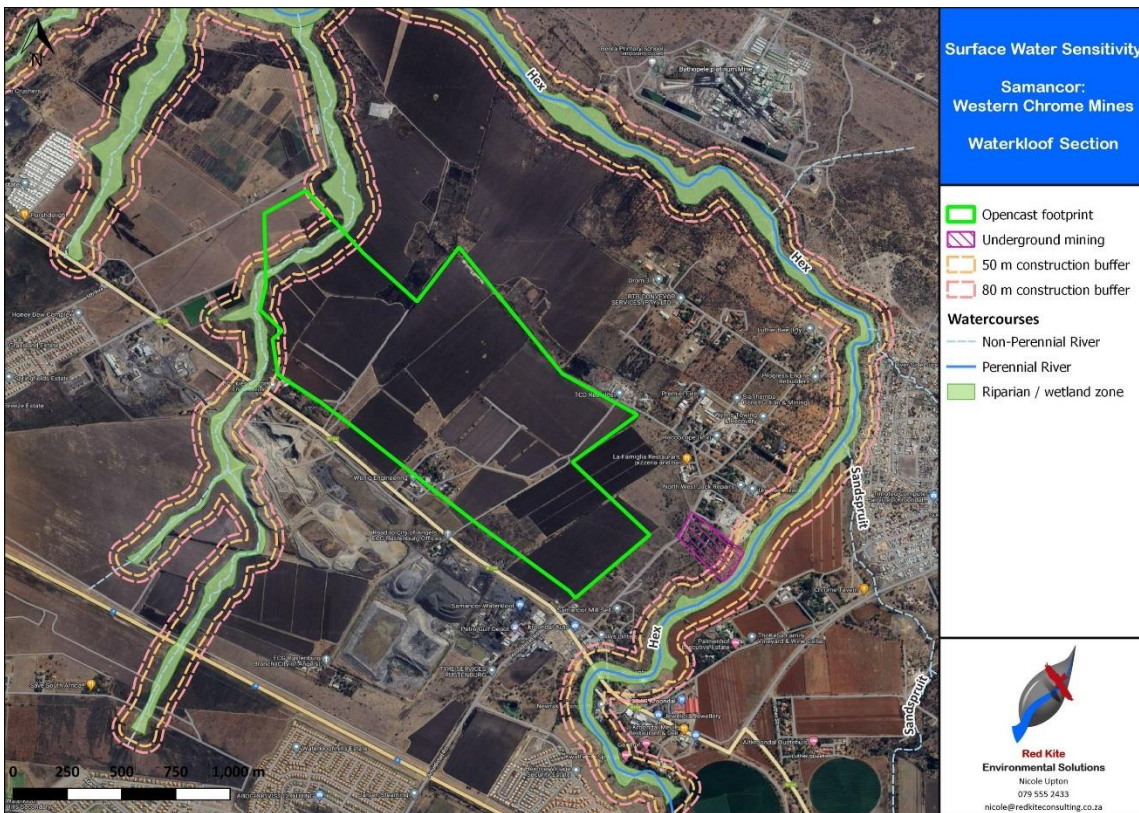


Figure 45: Showing buffers for the surface water features

## 10.7 AQUATIC ECOLOGY

An Aquatic Ecology Assessment and an Aquatic Ecology Impact Assessment was conducted by Enviridi Environmental Solutions (Pty) Ltd. A copy of the report can be found in Appendix 8.

### 10.7.1 METHODOLOGY

A holistic approach was followed and an attempt was made to link local hydrological, water quality and environmental studies to regional and national concerns, regulations and management strategies.

A site visit was conducted on 20 May 2022 to obtain information on normal flow rates, river health and potential factors that could influence the surface water environment and thereby the aquatic ecology:

- 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;
- To obtain an impression of the practical implications of managing the surface water environment.

The following Legislative documents were incorporated into the study:

- National Environmental Management Act, 1998 (Act No. 108 of 1998) as amended;
- National Water Act, 1998 and Government Gazette No. 32935 of 12 February 2010: No. R.77 which replaced Government Notice 704 (GN704) of 4 June 1999;

- Contents of Specialist Reports as described by various applicable Government Notices promulgated.

### 10.7.2 INTEGRATED UNIT ANALYSIS AND RESOURCES QUALITY OBJECTIVES

The proposed site falls within the IUA 4 Integrated Unit of Analysis (refer to Figure 46 and Table 31) and 4\_6 RU (refer to Figure 47 and Table 32).

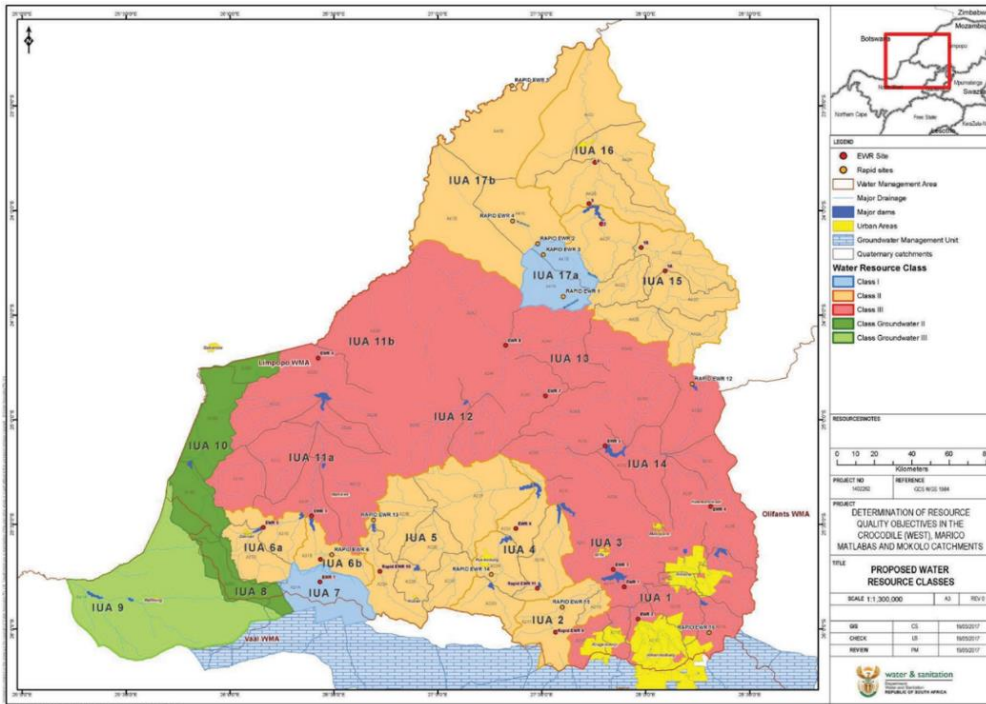


Figure 46: Integrated Unit of Analysis – showing area in IUA 4 (Hex/Waterkloofspruit/ Vaalkop Sub Catchment)

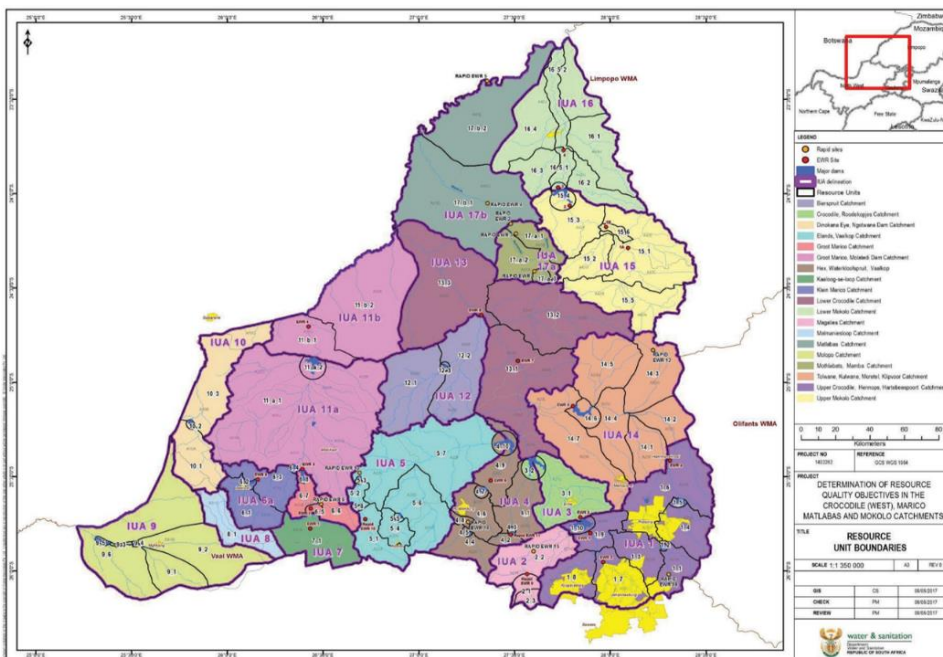


Figure 47: Resource Units (Hydro Nodes) in the WMA

Table 31: Integrated Unit of Analysis (IUAs) and Resource Quality Objectives (RQOs) as per Quaternary Catchment (EC, MAR & EWR)

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 Hex (source) to Olifantsnek Dam, Rooikloofspruit	C
		CROC Rapid_EWR14	A22H	4_8 Waterkloofspruit to confluence with Hex	B/C
		HN25	A22H	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

Table 32: Integrated Unit of Analysis (IUAs) and Resource Quality Objectives (RQOs) in priority Resource Units in the Integrated Unit of Analysis 4

IUA	Class	River	Resource Unit	Ecological Category	Component	Sub- component	RQO	Indicator	Numerical Limit		
4: HEXWATERKLOOFSPRUIT/VAA	II	Hex river from Olifantsnek Dam to inflow Bospoort Dam, Sandspruit (A22H)	4_6	C	Quantity	Low Flows	EWR maintenance low and drought flows: Hex River (at new W-component) in NMAR = 12.11x10m <sup>3</sup> A22H REC=D category	Base flows  Maintenance flows and drought flows  (Node on Hex River downstream Olifantsnek Dam. Monitoring at new W-component of the dam		Maintenance Low flows (m3/s)	Drought flows (m3/s)
									Oct	0.013	0.011
									Nov	0.014	0.012
									Dec	0.015	0.013
									Jan	0.019	0.016
									Feb	0.028	0.023
Mar	0.026	0.022									



IUA	Class	River	Resource Unit	Ecological Category	Component	Sub- component	RQO	Indicator	Numerical Limit		
							The maintenance low flows and drought flows must be attained so that the environmental flows requirements are met to support a healthy condition for the ecosystem and users.		Apr	0.020	0.017
									Ma y	0.017	0.015
									Jun	0.017	0.014
									Jul	0.015	0.013
									Aug	0.014	0.012
									Sep	0.014	0.012
					Quality	Nutrients	Instream concentration of nutrients must be improved to sustain aquatic ecosystem health and the water quality requirements of the water users are met. Nutrient management required to ensure sustainability of the system. Water quality must be improved to improve present ecological state from E to D ecological category.	Orthophosphate (PO 4-) as Phosphorus	≤ 0.125 milligrams/litre (mg/l) (50th percentile)		
								Nitrate (NO 3-) & Nitrite (NO 2-) as Nitrogen	≤1.0 milligrams/litre (50th percentile)		
						Salts	Salinity levels are significantly high. Instream salinity must be improved to support the aquatic ecosystem and the water quality requirements of the water users. Water quality must be improved to improve present ecological state from E to D ecological category.	Electrical Conductivity	≤ 85 milliSiemens/metre (mS/m) (95th percentile)		
					Sulphate			≤ 120 milligrams/litre (95th percentile)			
					Chloride			≤ 120 milligrams/litre (95th percentile)			

IUA	Class	River	Resource Unit	Ecological Category	Component	Sub- component	RQO	Indicator	Numerical Limit
						Pathogens	The presence of pathogens should pose no risk to human health.	<i>Escherichia coli (E.coli)</i>	130 counts/100 millilitres (ml) (95th percentile)
						System Variables	pH range must be maintained within limits specified to support the aquatic ecosystem and water user requirements.	pH range	6.5 (5th percentile) and 8.5 (95th percentile)
							A baseline assessment to determine the present state instream turbidity is required.	Turbidity	A 10% variation from background concentration is allowed.
						Toxics	The concentrations of toxins must be maintained at levels that are not toxic to aquatic organisms and a threat to human health	Ammonia as N	≤ 0.1 milligrams/litre (mg/l) (95th percentile)
								Aluminium (Al)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)
								Manganese (Mn)	≤ 0.15 milligrams/litre (mg/l) (95th percentile)
								Iron (Fe)	≤ 0.3 milligrams/litre (mg/l) (95th percentile)
								Lead (Pb) hard	≤ 0.0095 milligrams/litre (mg/l) (95th percentile)
								Copper (Cu) hard	≤ 0.0073 milligrams/litre (mg/l) (95th percentile)
								Nickel (Ni)	≤ 0.07 milligrams/litre (mg/l) (95th percentile)
								Atrazine	≤ 0.078 milligrams/litre (mg/l)
								Mancozeb	0.009 milligrams/litre (mg/l)
						Glyphosate	0.7 milligrams/litre (mg/l)		



IUA	Class	River	Resource Unit	Ecological Category	Component	Sub- component	RQO	Indicator	Numerical Limit
								Endosulfan	0.13 micrograms/litre (ug/l)
					Habitat	Instream	Habitat diversity should be improved from a D ecological category to a C category to support the overall ecological integrity of the system.	Index of Habitat Integrity, Rapid Habitat Assessment Method and Model (RHAMM)	Instream Habitat Integrity EC = C ≥ 62%
						Riparian habitat	Riparian vegetation should be maintained at a D ecological category.	Index of Habitat Integrity	VEGRAI EC = D ≥ 42%
					Biota	Fish	Fish community should be maintained at a D ecological category or improved upon. Flow should be adequate for flow dependant species.	Fish Response Assessment Index (FRAI)	Fish ecology category = D FRAI ≥ 42%
						Semi aquatic biota	The suitability of this stretch of river to serve as a habitat for aquatic bird and mammal populations must be maintained through proper habitat management. Riparian zone habitat must be improved.	Aquatic birds/Indicator mammal species	A baseline assessment should be conducted to determine the aquatic bird community and representative mammal species along the river reach. There is a need to set a numerical RQO for density of animals/birds based on the available/collected data.
						Aquatic macroinvertebrates	Macroinvertebrate assemblage must be maintained within a D ecological category or improved upon.	Macroinvertebrate Response Assessment Index, and the South African Scoring System Version 5 (SASS5).	MIRAI EC = D ≥ 42% SASS ≥ 70 ASPT ≥ 4.2 (SiteA2HEX-PAARD)

### 10.7.3 CHARACTERISTICS OF THE SUB-QUATERNARY REACH

Table 33 below provides literature available for the specific river utilised for SASS5 monitoring. The Sub-Reach falls within the Hex/Waterkloofspruit/Vaalkop Sub water management area, within the Hex River.

Table 33: Information provided on River Health Programme for the Sub Quaternary Reach (SQR)

SQ Reach	PES Category Median	Mean EI Class	Mean ES Class	Length Km	Stream Order	Default EC
<b>Hex- A22H040000</b>						
<b>A22H040000 (NBA 2018)</b> <b>A22H-01076 (RHP)</b>	Class D – Largely Modified	Moderate	Moderate	7.74	2.0	C
<p>The Sub Quaternary Reach (SQR) associated with the monitoring points fall within the Hex (SQR) itself and is labelled A22H-01076. The reach is characterized by the following:</p> <ul style="list-style-type: none"> <li>• The Reach spans an area of 7.7 km;</li> <li>• The Present Ecological State (PES) has been rated Largely Modified (Class D);</li> <li>• The Ecological Importance of the reach has been rated Moderate; 7 species of fish are expected in the reach;</li> <li>• The Ecological sensitivity is rated High with invertebrate responses to changes in velocity/water level and stream flow cited as the most prominent influencing parameters;</li> <li>• The relevant sections of river do not intercept with a FEPA area, refer <b>Error! Reference source not found.</b>;</li> <li>• Large instream modifications have been recorded in the reach;</li> <li>• Historic anthropogenic impacts recorded in the reach include: <ul style="list-style-type: none"> <li>○ CRITICAL: None,</li> <li>○ SERIOUS: Agricultural fields, Irrigation,</li> <li>○ LARGE: Abstraction, Algal growth, Small (farm) dams, Roads, Runoff/effluent: Irrigation,</li> <li>○ MODERATE: Bed and Channel disturbance, Erosion, Alien vegetation, Vegetation removal,</li> <li>○ SMALL: Low water crossings, Inundation, Sedimentation,</li> </ul> </li> </ul> <p>Fish species recorded within this reach:</p> <ul style="list-style-type: none"> <li>• <i>Labeobarbus marequensis</i> (Largescale yellowfish) – Least Concern</li> <li>• <i>Barbus paludinosus</i> (Straightfin barb) – Least Concern</li> <li>• <i>Barbus trimaculatus</i> (Threespot barb) – Least Concern;</li> <li>• <i>Barbus unitaeniatus</i> (Slender barb) – Least Concern;</li> <li>• <i>Clarias gariepinus</i> (African sharptooth catfish) – Least Concern;</li> <li>• <i>Pseudocrenilabrus Philander</i> (Southern mouth-brooder) – Least Concern;</li> <li>• <i>Tilapia Sparrmanii</i> (Banded tilapia) – Least Concern.</li> </ul>						

According to the NBA2018 data, the following has been provided within a table for the SQR:

Table 34: National Biodiversity Assessment (2018) Data for the SQR

Field Name	Description	Data Applicable for Hex (NBA 2018)
<b>Representative Points Sampled</b>		<b>US Point &amp; DS Points within same stretch A22H040000 / A22J020000</b>
Order	River order	2
Mainstem	Mainstem = 1 is a quaternary mainstem; the rest of the 1:500,000 rivers are tributaries that are nested within quaternary catchments	1
Flow	Flow variability	Ephemeral – although site visit findings indicated permanent flow
Geozone	Geozone Score	E

Field Name	Description	Data Applicable for Hex (NBA 2018)
<b>Representative Points Sampled</b>		<b>US Point &amp; DS Points within same stretch A22H040000 / A22J020000</b>
PES 1999	Present ecological state 1999 with desktop modification	Class C: Moderately Modified
River Condition	River condition used by NFEPA A or B is considered intact and able to contribute towards river ecosystem biodiversity targets.	D
FFRREGION	The lumped ecoregion into which free-flowing rivers fall, used to achieve representation of free-flowing rivers across the country	N/A
Flagship Status	Flagship free-flowing rivers as identified through an expert review process	Not marked as a Flagship River
PES 2018	NBA 2018 Ecological condition category. The process involved using the Department of Water and Sanitation (DWS, 2014). Present Ecological State/Ecological Importance/Ecological Sensitivity (PES/EI/ES), also referred to as PES/EIS data, which included mainstems and tributaries at a sub-quaternary level. This desktop data was updated with data that became available between 2011 and 2017 from Reserve or Ecological Water Requirement (EWR) and Water Resource Classification System (WRCS) studies.	Class E – Seriously Modified PES as per NBA 2018 Assessment
NBA 2018 ETS	Ecosystem threat status (ETS) of river ecosystem types: this was based on the extent to which each river ecosystem type had been altered from its natural condition.	Critically Threatened (CR) Ecosystem threat status (ETS)
NBA 2018 EPL	Ecosystem protection level (EPL) of river ecosystem types: river ecosystem types in protected areas needed to be in good condition rivers (A or B ecological category) to be considered as protected.	Not protected (NP)

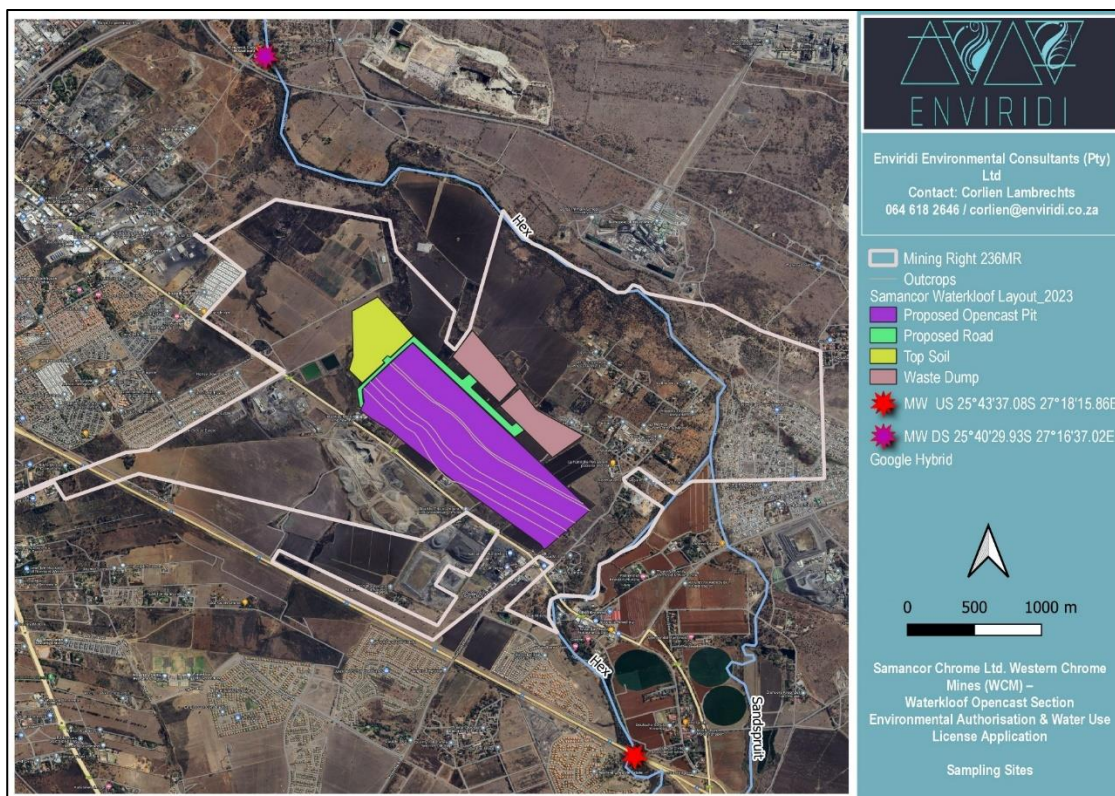


Figure 48: Sites surveyed during site assessment for viability of biomonitoring

### 10.7.4 DELINEATION OF RIPARIAN ZONES AND INDICES

A description of the riparian vegetation zones is provided in Table 35 below.

Table 35: Description of riparian vegetation zones (Kleynhans et al, 2007)

	Marginal	(Non-marginal) Lower	(Non-marginal) Upper
<b>Alternative descriptions</b>	Active features Wet bank	Seasonal features Wet bank	Ephemeral features Dry bank
<b>Extends from</b>	Water level at low flow	Marginal zone	Lower zone
<b>Extends to</b>	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.
<b>Characterized by</b>	<ul style="list-style-type: none"> <li>Refer to above;</li> <li>Moist substrates next to the water's edge;</li> <li>Water loving- species usually vigorous due to near permanent access to soil moisture</li> </ul>	<ul style="list-style-type: none"> <li>Geomorphic features that are hydrologically activated (inundated or moistened) on a seasonal basis.</li> <li>May have different species than marginal zone</li> </ul>	<ul style="list-style-type: none"> <li>Geomorphic features that are hydrological activated (inundated or moistened) on an Ephemeral basis.</li> <li>Presence of riparian and terrestrial species</li> <li>Terrestrial species with increased stature</li> </ul>

### 10.7.5 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 a 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 as Figure 49.



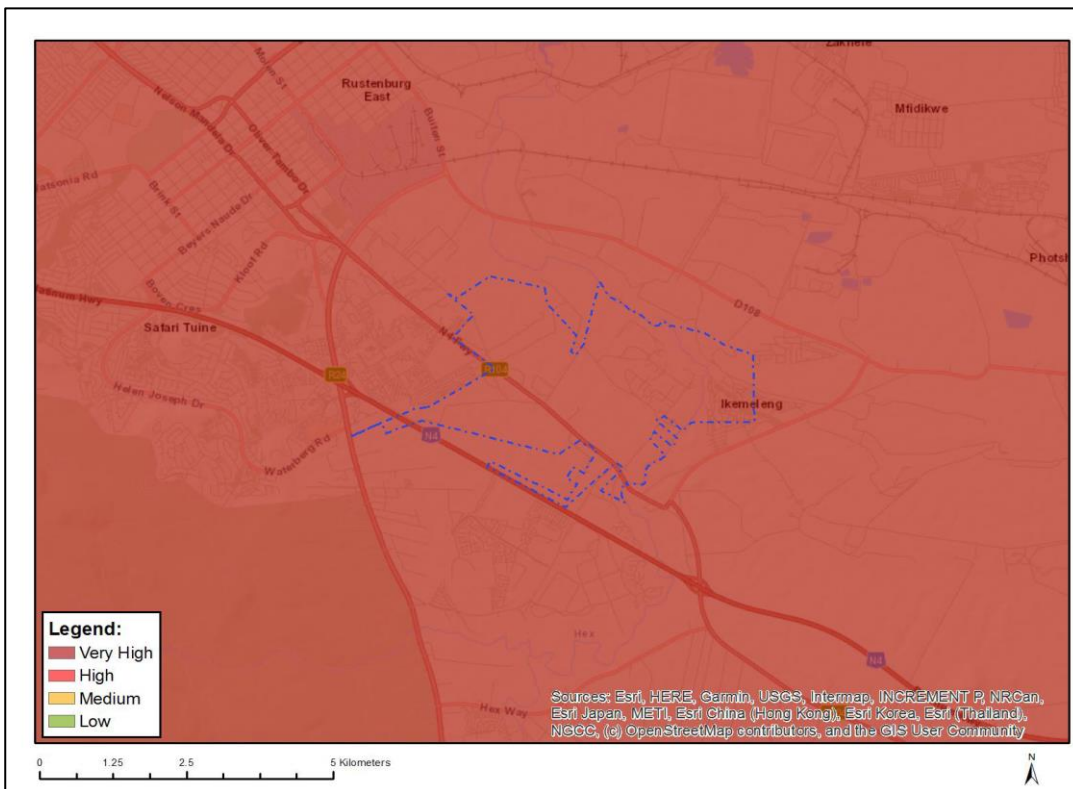


Figure 49: Aquatic Sensitivity as per Screening Tool Report for the specific section of River – Required to be included based on Regulations (March, October 2020)

## 10.8 WETLANDS

A wetland delineation assessment was undertaken by Elemental. A copy of the report is included in Appendix 9.

### 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 20<sup>th</sup> of May 2022 to supplement and confirm the findings of the desktop analysis. A walkover field survey of the site was conducted where accessible. Verification of the wetlands identified during the desktop assessment, and their current status was also included

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). The same approach of classifying wetlands in terms of a functional unit was followed.

### 10.8.2 LAND USE AND ECOLOGICAL STATE

The study site and its surrounding area has been severely transformed over the years. The dominant land use in the area is crop cultivation, both irrigated and non-irrigated and mining related activities. The larger surrounding area has been built-up, consisting of dense residential and commercial properties.

The wetland unit identified and assessed on site is a Channelled Valley-bottom drained by the Hex River (Figure 50). However, due to historical agricultural practices and other anthropogenic developments it has become severely fragmented, with some sections no longer resembling channelled valley-bottom wetland characteristics. A clear loss of wetland habitat due to mining establishment and crop cultivation was observed.

The R104 road traverses both the study site and the wetland system, 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 nutrient loading, especially increased levels of phosphates, nitrates, and sedimentation from the surrounding agricultural activities, exposed soil surfaces and dirt roads. Increased lateral water input from the surrounding activities have severely impacted on the wetland's hydrological and geomorphological functioning. Severe 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 CLASSIFICATION

The wetland assessment focussed on the wetland units on and within 500 m of the proposed Opencast Mining Project area (refer to Figure 50). Within the assessment area, the wetland totals approximately 46.95 ha in size.

One (1) Wetland Units (WU) was identified (refer to Table 36 and Figure 50). The riparian area of the Hex River was also delineated but assessed as part of another study. The impacts of activities such as mining, crop production, erosion, road networks, and infilling within the greater catchment were taken into consideration during the assessment.

Table 36: Classification of the Wetland Units within the 500 m DWS Regulated Area.

Wetland Unit (WU)	Size within 500 m Regulated Area (ha)	Level 3: Landscape Unit	Level 4: Hydrogeomorphic (HGM) Unit
WU1	46.95 ha	Valley Floor	Channelled Valley Bottom (CVB)
<b>Total</b>	<b>46.95</b>		



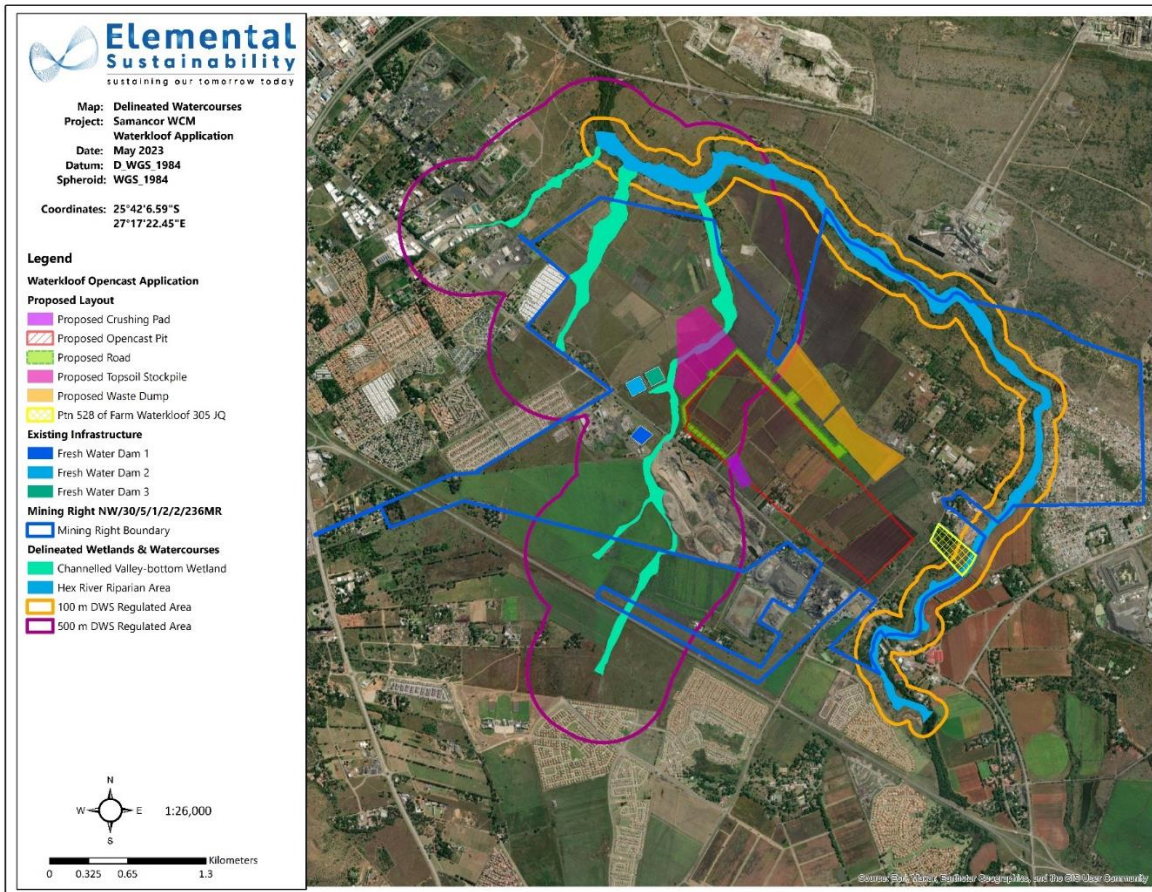


Figure 50: Delineated wetlands within the 500 m and 100 m DWS Regulated Areas

### 10.8.4 WETLAND UNIT DESCRIPTION AND DELINEATION

Table 37 provides a description of Wetland Unit 1.

Table 37: Description of Wetland Unit 1

Feature	Assessment
<b>Wetland Type</b>	Channelled Valley-bottom
<b>Current Impacts and Downstream Features</b>	The wetland system is severely fragmented and totally transformed in some sections. The wetland receives its water mainly from lateral surface runoff and increased input from the surrounding land uses (i.e. irrigated and non-irrigated crop cultivation, mining, etc.). Various alien and invasive species were identified within and surrounding the wetland, especially in areas of pooling <i>Typha capensis</i> and <i>Phragmites australis</i> was evident. The surrounding areas are dominated by agricultural activities, mining, and built-up areas. The wetland hydrological and geomorphological structure showed clear signs of transformation with severe erosion occurring and fragmentation undoubtedly visible.
<b>Other Input Sources</b>	Runoff from irrigated crop fields and input from the topographically defined upstream catchment.
<b>Vegetation Characteristics</b>	Vegetation is dominated by a mix of grasses and sedges. Reed beds were visible in areas of sediment deposition. <i>Typha capensis</i> (Bullrush) were present in permanent wet zones. Large stands of alien invasive vegetation occurred along the wetland.
<b>Aquatic Fauna</b>	Some avifauna (bird) species occur in and around the wetland.
<b>Depth Characteristics</b>	Very deep pooled areas in some sections of the channel and in severely transformed areas no surface water visible. Shallow flow was observed in some sections where the channel remains intact.

<b>Soil Hydrogeomorphic features</b>	Soils with mottling present.
--------------------------------------	------------------------------

### 10.8.5 WETLAND INTEGRITY AND FUNCTIONAL ASSESSMENT

#### 10.8.5.1 WET Health Assessment

The results of the Wet-Health (Version 2) assessment indicate that the Channelled Valley-bottom Wetland falls within a combined Ecological Category (EC) Category of D, having obtained an overall score of 5.6 (44%).” 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 56% 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 38: Summary of results of the WET-Health (Version 2) assessment

PES Assessment	Hydrology	Geomorphology	Water Quality	Vegetation
Impact Score	5,8	5,6	4,0	6,8
PES Score (%)	42%	44%	60%	32%
<b>Ecological Category</b>	<b>D</b>	<b>D</b>	<b>D</b>	<b>E</b>
<b>Combined Impact Score</b>	5,6			
<b>Combined PES Score (%)</b>	44%			
<b>Combined Ecological Category</b>	<b>D</b>			

#### 10.8.5.2 Ecosystem Services

The WET-EcoServices Version 2 evaluation indicates that the Channelled Valley-bottom Wetland provides a high degree of Regulating and Supporting Services, especially a very high amount of sediment trapping and a high amount of phosphate assimilation (Refer to Table 39)

Table 39: Results of the Ecosystem Services provided

ECOSYSTEM SERVICE		Present State			
		Supply	Demand	Importance Score	Importance
<b>REGULATING AND SUPPORTING SERVICES</b>	Flood attenuation	1,5	0,1	0,1	Very Low
	Stream flow regulation	0,5	0,7	0,0	Very Low
	<b>Sediment trapping</b>	<b>4,0</b>	<b>3,0</b>	<b>4,0</b>	<b>Very High</b>
	Erosion control	1,0	1,0	0,0	Very Low
	<b>Phosphate assimilation</b>	<b>3,4</b>	<b>2,3</b>	<b>3,1</b>	<b>High</b>
	Nitrate assimilation	2,2	2,3	1,8	Moderate
	<b>Toxicant assimilation</b>	<b>3,1</b>	<b>1,5</b>	<b>2,3</b>	<b>Moderately High</b>
	Carbon storage	0,9	2,7	0,7	Very Low

ECOSYSTEM SERVICE		Present State			
		Supply	Demand	Importance Score	Importance
PROVISIONING SERVICES	Biodiversity maintenance	0,3	4,0	0,8	Low
	Water for human use	1,0	0,3	0,0	Very Low
	Harvestable resources	0,5	0,3	0,0	Very Low
	Food for livestock	2,0	0,3	0,7	Very Low
	Cultivated foods	2,3	0,3	1,0	Low
CULTURAL SERVICES	Tourism and Recreation	0,1	0,0	0,0	Very Low
	Education and Research	0,1	0,0	0,0	Very Low
	Cultural and Spiritual	0,0	0,0	0,0	Very Low

10.8.5.3 Ecological Sensitivity (ES)

The Ecological Sensitivity (Kotze *et al.*, 2020) provided by the wetland on the study site is summarised in Table 39. These scores are based on the Ecosystem Services and are described as follow:

- Biodiversity Maintenance Importance: 0.8 (Low)
- **Regulating Services Importance: 4.0 (High)**
- Provisioning and Cultural Services Importance: 1.0 (Low)

10.8.5.4 Ecological Importance (EI)

The Ecological Importance (DWAF, 1999; Rountree & Kotze, 2013) provided by the wetland on the study site is described below:

- **Ecological Importance & Sensitivity: 2.0 (Moderate)**
- Hydro-Functional Importance: 1.5 (Low-Moderate)
- Direct Human Benefits: 0.2 (Low)

10.8.5.5 Ecological Importance and Sensitivity (EIS)

The highest EI score of 2.0 (Moderate) and the highest ES score of 4.0 (Very High) places the score in the **3.0 – High** Category. The importance of services supplied is high relative to that supplied by other wetlands.

Table 40: Table for integrating EI and ES into a composite EIS score (Kotze et al., 2020)

		Ecological Importance (EI)				
		Very Low	Low	Moderate	High	Very High
Ecological Sensitivity (ES)		0	1	2	3	4
Very Low	0	0.00	0.00	1.00	2.00	3.00

Low	1	0.00	0.50	1.50	2.50	3.50
Moderate	2	0.00	1.00	2.00	3.00	4.00
High	3	0.50	1.50	2.50	3.50	4.00
Very High	4	1.00	2.00	3.00	4.00	4.00

#### 10.8.5.6 Recommended Ecological Category (REC)

The REC score is set at a C/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 mine situated towards the south 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 mine, and this proposed Opencast Mining Project. Therefore, the REC is set at the current PES (Rountree et al., 2013).

#### 10.8.6 BUFFER ZONE DETERMINATION

Calculated buffer zones were based on industry worst case scenarios and were calculated as follows (Macfarlane et al. 2016) (Figure 51 & Figure 52):

- Construction Buffer: 50 m
- Operational Buffer: 80 m

The buffer zone identified serves to highlight an ecologically sensitive area in which activities should be conducted with this sensitivity in mind. It is imperative that the footprint of the proposed activities take place outside of the recommended buffer areas to prevent further degradation, and that the sensitivity of the watercourses be kept in mind when activities take place.

#### 10.8.7 SUMMARY OF RESULTS

The results recorded for the wetland affected by the surrounding land uses are summarised in Table 41 below:

Table 41: Summary of the results of Wetland Assessment

Assessment	Score
<b>Classification</b>	Channelled Valley-bottom
<b>Wetland Condition / Present Ecological State (PES)</b>	<b>D - Largely Modified.</b> The change in ecosystem processes and loss of natural habitat and biota is great, but some remaining natural habitat features are still recognizable.
<b>Ecosystem Services Assessment</b>	<b>Highest Scores:</b> Sediment Trapping (4.0) – Very High Phosphate Assimilation (3.1) – High Toxicant Assimilation (2.3) – Moderately High
<b>Ecological Importance and Sensitivity (EIS)</b>	<b>High.</b> The importance of services supplied is high relative to that supplied by other wetlands
<b>Recommended Ecological Category (REC)</b>	Maintain at a D



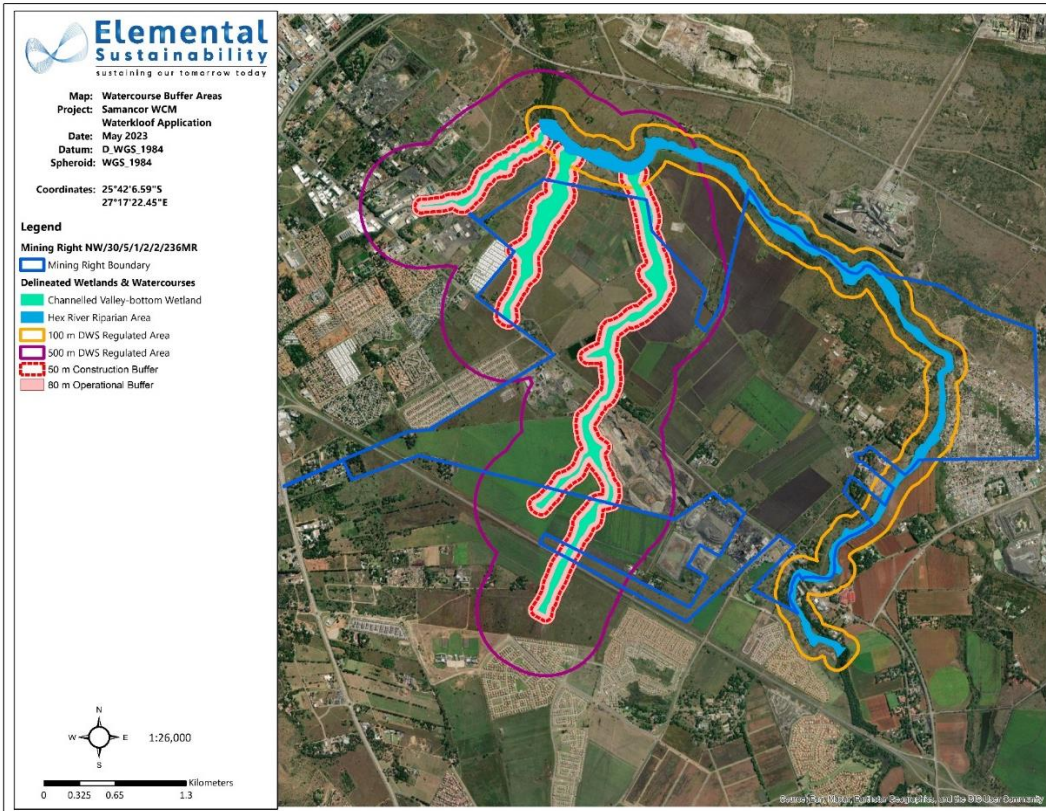


Figure 51: Scientifically calculated buffer zones for the identified wetland units

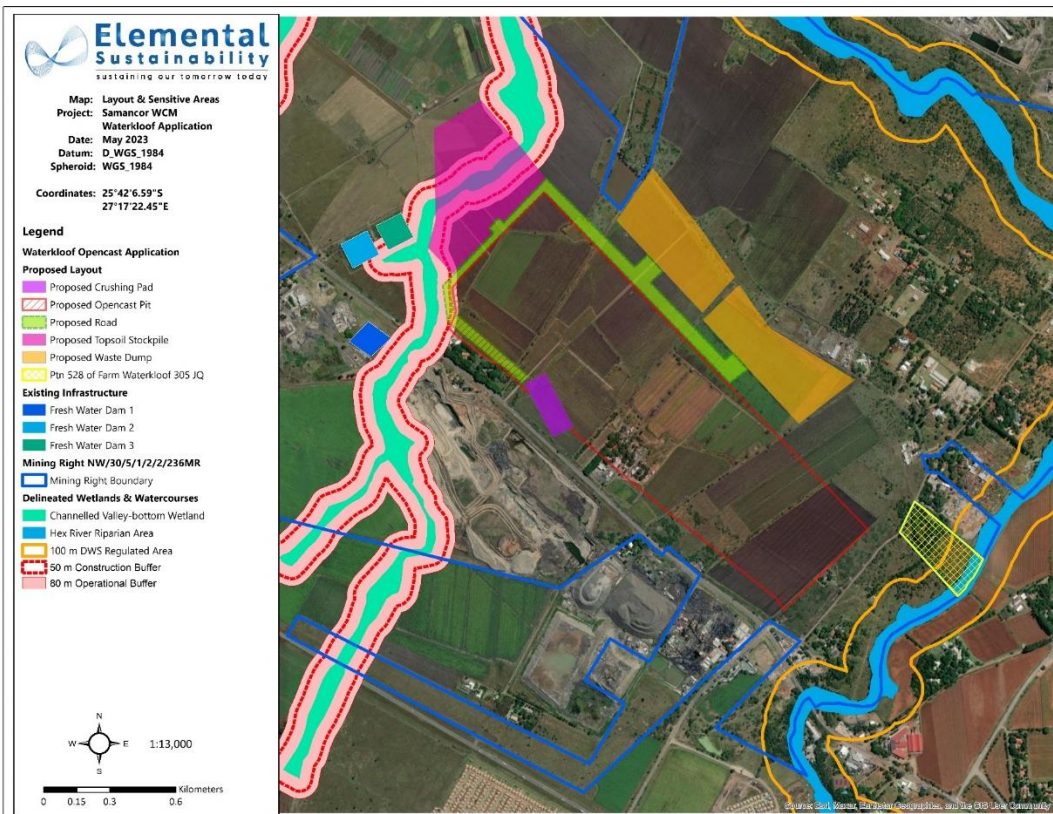


Figure 52: Sensitive areas to be affected by the proposed opencast mining activities

## **10.9 HYDROGEOLOGY**

Geo Pollution Technologies – Gauteng (Pty) Ltd. (GPT) was appointed to conduct the Hydrogeological Impact Assessment. A copy of the report is attached in Appendix 10.

### **10.9.1 METHODOLOGY**

The following was conducted for the study:

- Desktop study;
- Hydrocensus;
- Sampling and chemical analysis;
- Surface water sampling;
- Groundwater sampling;
- Groundwater recharge calculations;
- Groundwater modelling; and
- Numerical modelling.

### **10.9.2 AQUIFER CLASSIFICATION**

Based on information collected during the hydrocensus it can be concluded that the aquifer system in the study area can be classified as a “Minor Aquifer System”, based on that even though these aquifers seldom produce large quantities of water, they are important for local supplies and in supplying base flow for rivers.

A Groundwater Quality Management Index of 4 was estimated for the study area 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 Hex River and its tributaries.

### **10.9.3 HYDROCENSUS**

During the hydrocensus, twenty-nine (29) boreholes were identified. Table 42 and

Figure 53 provides the list of boreholes and location respectively.



Table 42: Hydrocensus summary

ID	Latitude	Longitude	Elevation	Static water level (mbgl)	Static water level (mamsl)
<b>Groundwater</b>					
MWG01	27.29314	-25.71593	1155	5.87	1149.130
MWG02	27.29305	-25.71672	1153	1.62	1151.380
MWG03	27.29736	-25.71402	1147	7.8	1139.200
MWG06	27.28763	-25.71241		Locked	
MWG07	27.29191	-25.71431	1159	3.72	1155.280
MWG11	27.29423	-25.70573	1150	Bees	
MWG12	27.29015	-25.71655	1159	3.39	1155.610
MWG13	27.28787	-25.71554	1162	4.78	1157.220
MWG14	27.28876	-25.71416	1160	Demolished	
MWG15	27.29631	-25.71267	1154	17.08	1136.920
MWG16	27.29198	-25.7103	1157	18.95	1138.050
MWG17	27.29065	-25.70972	1157	Damaged	
MWG18	27.2888	-25.71071	1158	10.71	1147.290
MWG19	27.28829	-25.71139	1158	6.17	1151.830
MWG20	27.28771	-25.71219	1159	4.94	1154.060
MWG21	27.28724	-25.71301	1160	4.58	1155.420
MWG22	27.28668	-25.71403	1161	Hidden	
MWG23	27.28633	-25.71485	1162	4.78	1157.220
WKG01	27.28137	-25.70237	1148	16.91	1131.090
His Vision Church	27.27079	-25.69309	1154	Tap sample	
EUB-01	27.28548	-25.69533	1138	20.04	1117.960
NW Concrete	27.28357	-25.70188	1148	Tap sample	
Steenkamp	27.28566	-25.70279	1149	17.93	1131.070
Dirk Huyesman	27.28627	-25.71563	1162	10.6	1151.400
Du Plessis	27.30391	-25.70849	1151	Tap sample	
Mr Mac Concrete	27.30403	-25.70719	1150	15	1135.000
ARC 1	27.29182	-25.72752	1165	8.68	1156.320
ARC 3	27.29307	-25.72829	1163	8	1155.000
ARC 5	27.2964	-25.7351	1158	11.45	1146.550

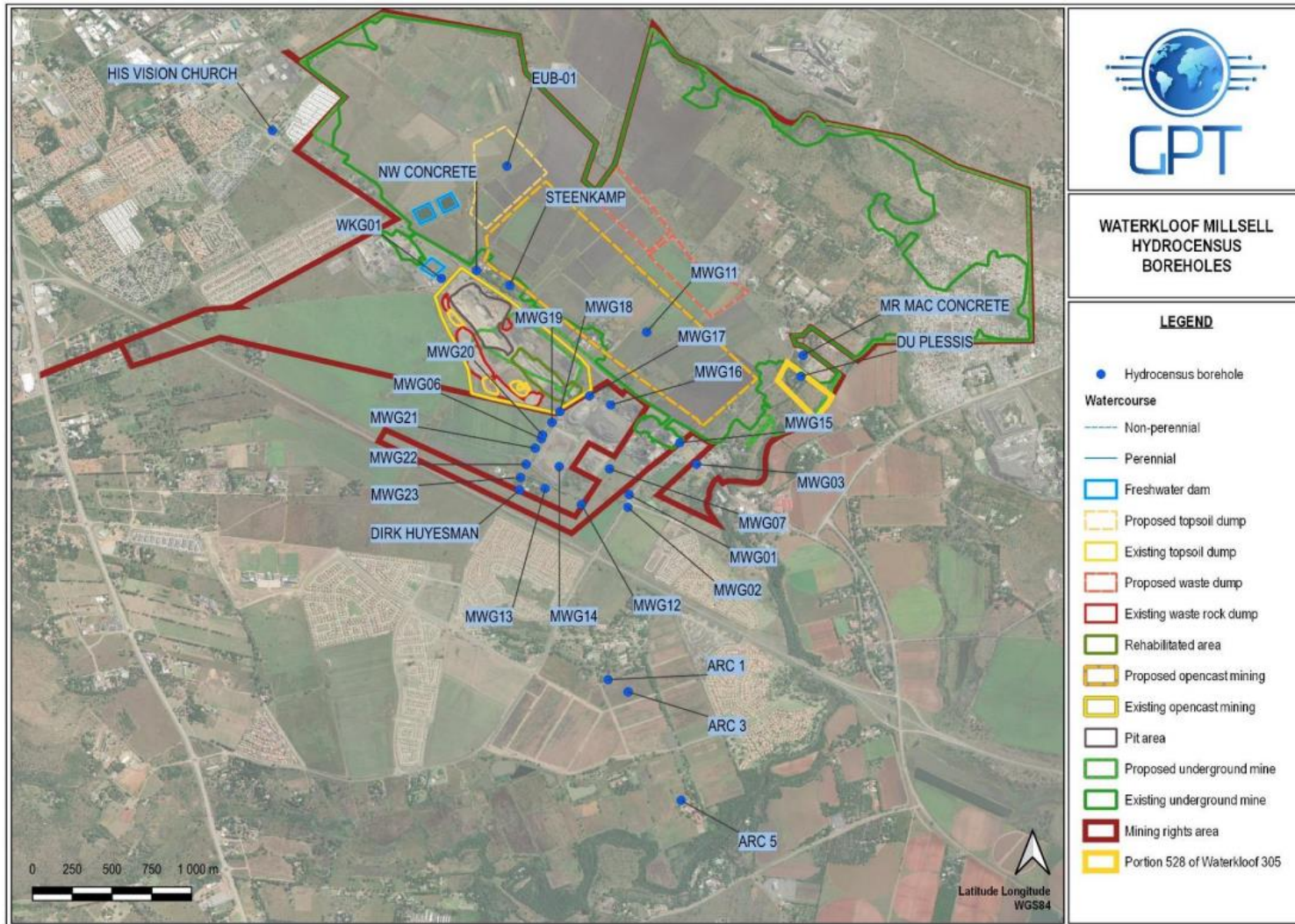


Figure 53: Hydrocensus map

#### 10.9.4 GROUNDWATER LEVELS

During the hydrocensus, 29 boreholes were available for groundwater level measurement. The groundwater levels varied between a minimum of 1.62 mbgl and a maximum of 17.93 mbgl below ground level. Generally, a good relationship exists between the topography and the groundwater level (refer to Figure 54), however the following boreholes had anomalous groundwater levels: MWG01, MWG02, MWG03, MWG16.

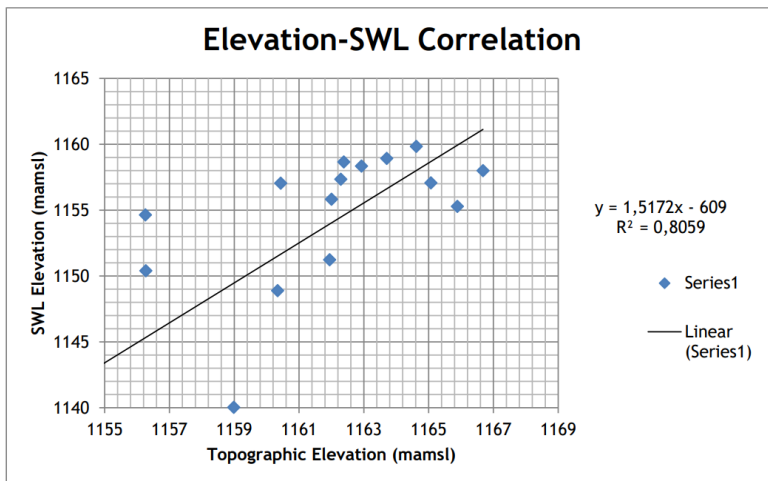


Figure 54: Correlation Graph of topography vs available groundwater levels

#### 10.9.5 GROUNDWATER QUALITY

Groundwater quality results were obtained from the report; Samancor WCM-Millsell/Waterkloof Operations – Quarterly Water Quality Report, May to July 2022; produced by Aquatico (Pty) Ltd and made available by the client. The water quality is compared with the Integrated Water Use Licence, No. 03/A22H/ABFGJ/2766 – 27/2/2/A822/12/1 (IWUL, 2015).

The groundwater quality when compared to the WUL follows:

- EC exceeds the assessment 1 limit in MWG02, MWG10, MWG13, MWG16, Steenkamp and Du Plessis and the assessment 2 limit in MWG07, MWG15, MWG18, MWG19 and MWG20.
- TDS exceeded the assessment 1 limit in Du Plessis and the assessment 2 limits in MWG15, MWG18 and MWG19.
- Calcium exceeded the assessment 1 limit in MWG02, MWG19 and Du Plessis.
- Magnesium exceeded the assessment 1 limit in MWG02, MWG07, MWG10, MWG13, MWG15, MWG18, MWG19, MWG20, His Vision Church, Steenkamp, Dirk Huyseman, Du Plessis and VD Westhuizen.
- Sodium exceeded the assessment 1 limits in MWG07, MWG15 MWG16 and Du Plessis.
- Chloride exceeded the assessment 1 limits in MWG02, MWG07, MWG13, MWG15, MWG16, MWG18, MWG19, MWG20, Steenkamp and Du Plessis.
- Sulphate exceeded the assessment limits in MWG02, MWG07, MWG10, MWG13, MWG15, MWG16, MWG18, MWG19, MWG20, His Vision Church, Steenkamp, Dirk Huyseman, Du Plessis

and VD Westhuizen. • Fluoride exceeded the assessment 1 limits in His Vision Church, Dirk Huyseman, VD Westhuizen.

- Nitrate exceeded the assessment 2 limits in MWG02, MWG07, MWG10, MWG13, MWG15, MWG18 and Steenkamp.
- Manganese exceeds the assessment2 limits in MWG18 and MWG19.
- Hexavalent Chromium exceeded the assessment 2 MWG10.



Table 43: Showing the groundwater qualities compared to WUL

Determinant		Unit	Assessment 1	Assessment 2	MWG02	MWG03	MWG07	MWG10	MWG12	MWG13	MWG15	MWG16	MWG18	MWG19	MWG20	MWG21	MWG23	WKG01
pH at 25 °C		pH	5.0/9.6	5.0/9.7	7.79	8.43	9.23	8.22	8.03	8.27	7.61	7.88	8.39	8.69	8.45	8.24	8.29	7.91
Conductivity at 25 °C	25 °C	mS/m	118.80	170.00	169	52	191	126	30.8	127	249	143	224	266	181	183	166	98.7
Total dissolved solids		mg/l		1200.00	1166	297	1145	823	185	740	1461	858	1276	1569	1149	1103	932	558
Total hardness		mg CaCO3/l	-	-	932	237	601	703	162	634	1036	114	1045	1353	976	913	824	487
Total alkalinity		mg CaCO3/l	-	-	503	280	261	463	151	253	223	105	670	841	584	570	604	385
Temperature		°C			20.6	20.5	20.6	20.7	20.6	20.6	20.5	20.6	20.7	20.4	20.9	20.9	20.9	20.9
Calcium	(Ca)	mg/l	110.75	-	114	19.6	4.66	46.6	25.8	46.9	47.2	32.6	35.5	106	36.8	53.5	74.5	39.5
Magnesium	(Mg)	mg/l	68.82	-	157	45.5	143	142	23.7	126	223	8.03	232	264	215	189	155	94.3
Sodium	(Na)	mg/l	63.20	200.00	19	26.3	181	14.9	5.9	14	91.3	236	49.5	25.4	14.9	18.1	20	20.2
Potassium	(K)	mg/l	-	-	0.538	2.84	2.19	0.905	2.83	1.25	0.898	14.9	8.86	31.8	8.42	6.23	10.4	1.29
Chloride	(Cl)	mg/l	47.65	300.00	64	25.2	156	40.6	7.95	60.7	146	209	175	144	97.8	83.1	120	25.2
Sulphate	(SO4)	mg/l	51.30	500.00	288	4.96	407	186	20.6	128	278	288	197	428	369	389	167	102
Fluoride	(F)	mg/l	0.16	1.50	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Nitrite	(NO <sub>2</sub> )-N	mg/l	-	0.90	BDL	BDL	6.47	BDL	BDL	BDL	BDL	BDL	0.076	0.448	0.195	BDL	BDL	BDL
Nitrate	(NO <sub>3</sub> )-N	mg/l	15.95	11.00	48.9	BDL	18.3	24.6	1.47	47.4	122	0.781	36.4	9.66	8.58	BDL	BDL	9.09
Ammonium	(NH <sub>4</sub> )-N	mg/l	-	1.50	0.074	0.97	7.55	0.213	0.175	0.139	0.181	1.44	5.78	11.4	10.1	12.5	12.7	0.243
Total inorganic nitrogen		mg/l	-	-	49.1	1.05	32.4	24.9	1.69	47.5	122	2.26	42.3	21.5	18.9	12.5	12.7	9.35
Orthophosphate	(PO <sub>4</sub> )-P		-	-	0.006	0.005	0.92	0.117	0.076	0.491	3.18	6.18	4.49	2.86	2.5	0.021		
Dissolved oxygen		mg/l	-	-	3.88	2.18	2.95	6.73	5.48	6.8	6.13	4.14	2.26	2.01	2.21	3.4	1.1	6.22
Aluminium	(Al)	mg/l	-	0.30	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Iron	(Fe)	mg/l	-	0.30	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Manganese	(Mn)	mg/l	-	0.10	0.041	BDL	BDL	BDL	BDL	BDL	BDL	0.057	0.222	0.199	0.051	0.107	0.04	BDL
Cadmium	(Cd)	mg/l	-	0.00	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Copper	(Cu)	mg/l	-	2.00	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	0.021	0.023
Nickel	(Ni)	mg/l	-	0.07	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Lead	(Pb)	mg/l	-	0.01	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Zinc	(Zn)	mg/l	-	5.00	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Chromium	(Cr <sup>3+</sup> )	mg/l	-	-	BDL	BDL	BDL	0.022	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Hexavalent chromium	(Cr <sup>6+</sup> )	mg/l	-	0.05	BDL	BDL	BDL	0.068	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL

Table 44: Groundwater qualities compared to WUL (Hydrocensus boreholes)

Determinant		Unit	Assessment 1	Assessment 2	His Vision Church	Steenkamp	Dirk Huyseman	Du Plessis	ARC 5	VD Westhuizen
pH at 25°C		pH	5.0/9.6	5.0/9.7	7,7	7,4	7,6	7,5	7,5	7,4
Conductivity at 25 °C	25°C	mS/m	118,8	170	96,6	153	101	69,3	42,9	83,5
Total dissolved solids		mg/l		1200	647	1025	677	464	287	559
Total hardness		mg CaCO3/l	-	-	416	428	384	256	224	248
Calcium	(Ca)	mg/l	110,75	-	37	66	47	25	9	41
Magnesium	(Mg)	mg/l	68,82	-	116	173	114	72	50	95
Sodium	(Na)	mg/l	63,2	200	9	24	15	11	9	16
Potassium	(K)	mg/l	-	-	1,5	2,1	1,8	1,2	1,3	1,8
Chloride	(Cl)	mg/l	47,65	300	32	83	30	38	9	24
Sulphate	(SO4)	mg/l	51,3	500	62	150	99	38	17	112
Fluoride	(F)	mg/l	0,16	1,5	0,2	BDL	0,2	BDL	BDL	0,2
Nitrite	(NO <sub>2</sub> )	mg/l	-	0,9	BDL	BDL	BDL	BDL	BDL	BDL
Nitrate	(NO <sub>3</sub> )	mg/l	15,95	11	6,9	31	7,8	7,8	0,6	9,9
Ammonia	(NH <sub>3</sub> )	mg/l	-	-	0,3	0,2	0,2	0,2	0,1	0,2
Orthophosphate	(PO <sub>4</sub> )		-	-	0,2	BDL	BDL	BDL	0,2	BDL
Aluminium	(Al)	mg/l	-	0,3	BDL	BDL	BDL	BDL	BDL	BDL
Iron	(Fe)	mg/l	-	0,3	BDL	BDL	BDL	BDL	BDL	BDL
Zinc	(Zn)	mg/l	-	5	0,131	BDL	BDL	BDL	0,046	0,028
Chromium	(Cr <sup>3+</sup> )	mg/l	-	-	BDL	0,041	BDL	BDL	BDL	BDL
Hexavalent chromium	(Cr <sup>6+</sup> )	mg/l	-	0,05	0,014	0,043	0,01	0,014	0,01	0,01



## 10.9.6 GROUNDWATER POTENTIAL CONTAMINANTS

The type and quantity of potential groundwater contaminants result from the mining process as well as anthropogenic contaminants originating from operations during the construction, operational and decommissioning phases of the mine.

Potential contaminants from the proposed mine:

- Overburden dumps;
- Backfilled opencast pit;
- Underground mining activities;
- Pollution control dams.

Operational (anthropogenic) contaminants include:

- Organic contaminants such as fuels and oils from machinery spillages and workshops.
- Anthropogenic contaminants such as solid waste and sewage. These contaminants include coliforms (e.g. *Escherichia coli*), bacteria viruses, ammonia, phosphate, sulphate and nitrate.

## 10.10 HYDROPEDOLOGY

A Hydropedological Assessment was compiled by Eco Assist Environmental Consulting. A copy of the report can be found in Appendix 11.

### 10.10.1 METHODOLOGY

For the assessment the following was conducted:

- Desktop assessment;
- Literature review
- Site visit;
- Identification of soil types and hydrological soil types; and
- Modelling

### 10.10.2 TERRAIN AND DRAINAGE

The terrain analysis was conducted using the spatial analyst tools within the ArcGIS mapping software. These tools were used to determine the Digital Elevation Model (DEM) (see Figure 55).

### 10.10.3 LAND TYPES

The project footprint falls within land type Ea3 (refer to Figure 56). This land type is dominated by the midslope and crest landscape positions and consists largely of the Vertic Arcadia soils. There are some Shortlands and Hutton soil forms present as well. The slopes for this land type range from 0% to 6%. Clay content is estimated at between 15% and 68%. The shape of the landscape catena is shown in Figure 57.

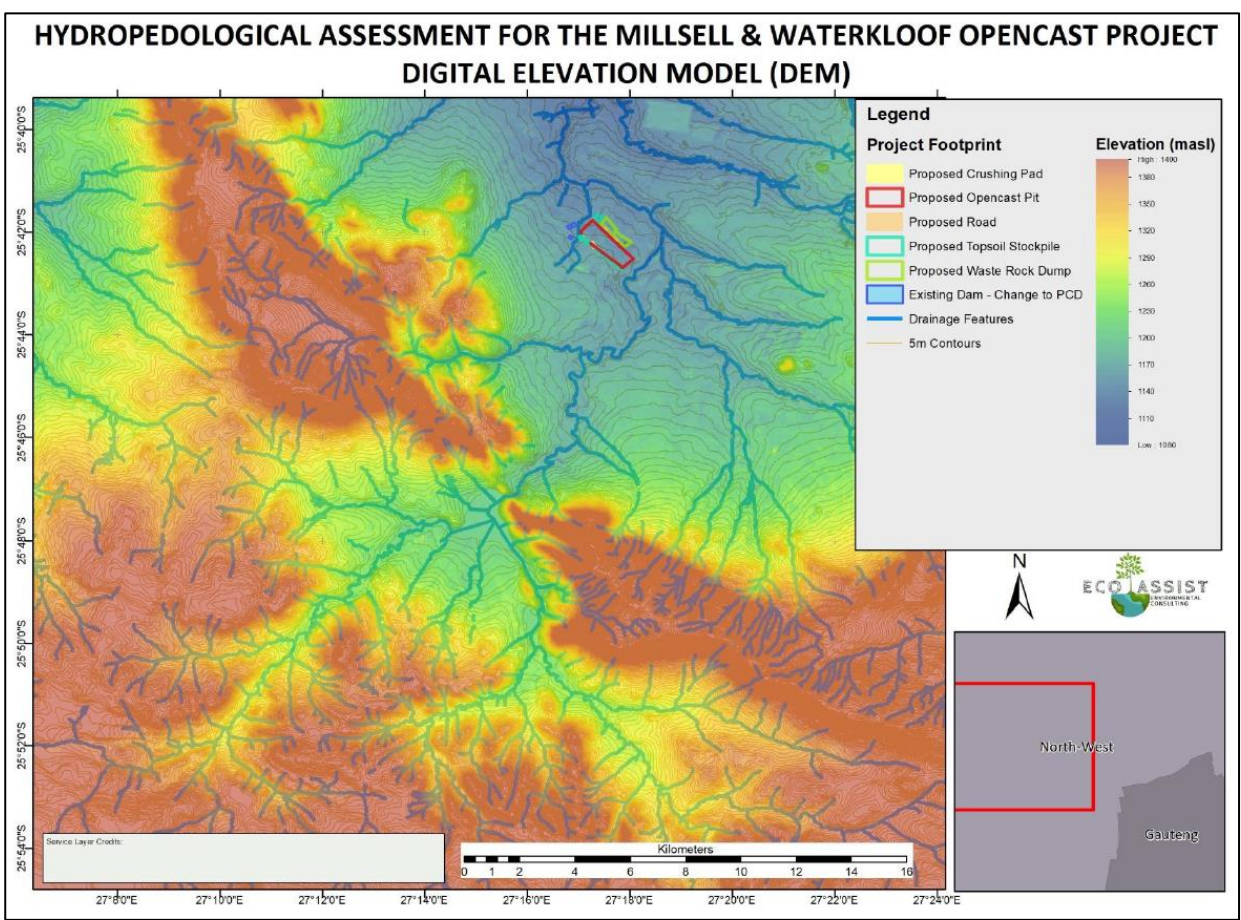


Figure 55: The DEM for the project area.

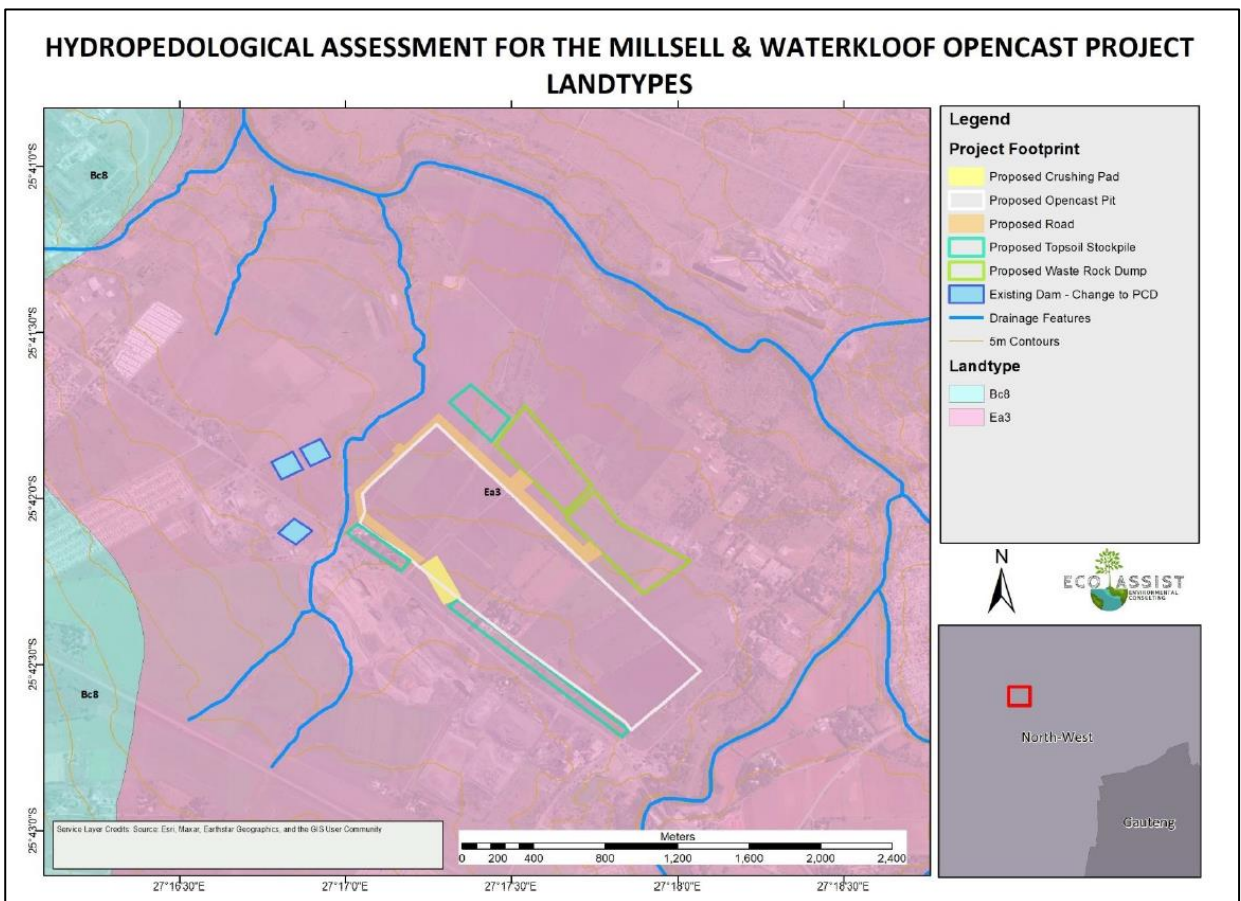


Figure 56: Landtypes within the project area.

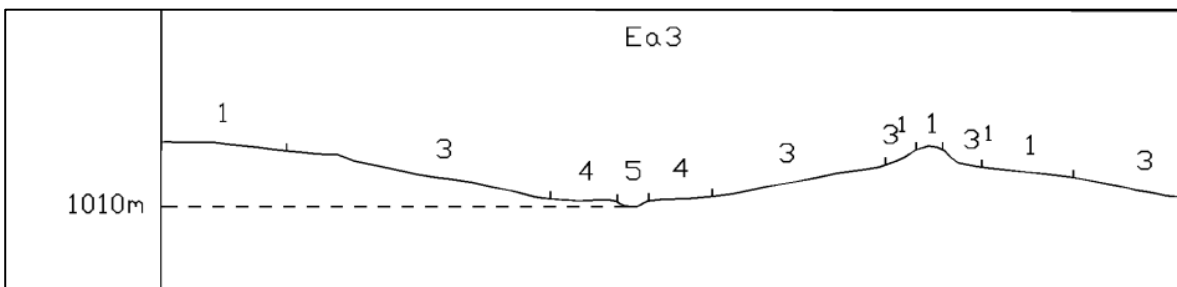


Figure 57: Hillslope catena for land type Ea3 (Land Type Survey Staff, 1972 - 2006).

### 10.10.4 SOIL FORMS

The following soil forms were identified on-site (refer to Figure 58):

- Arcadia (Vertic topsoil down to a rock limiting layer);
- Rensburg (Vertic topsoil over a gleyed horizon);
- Shortlands (Orthic A-horizon over a red structured B-horizon);
- Valsrivier (Orthic A-horizon over a Pedocutanic B-horizon); and
- Katspruit (Orthic topsoil over a Gley horizon).

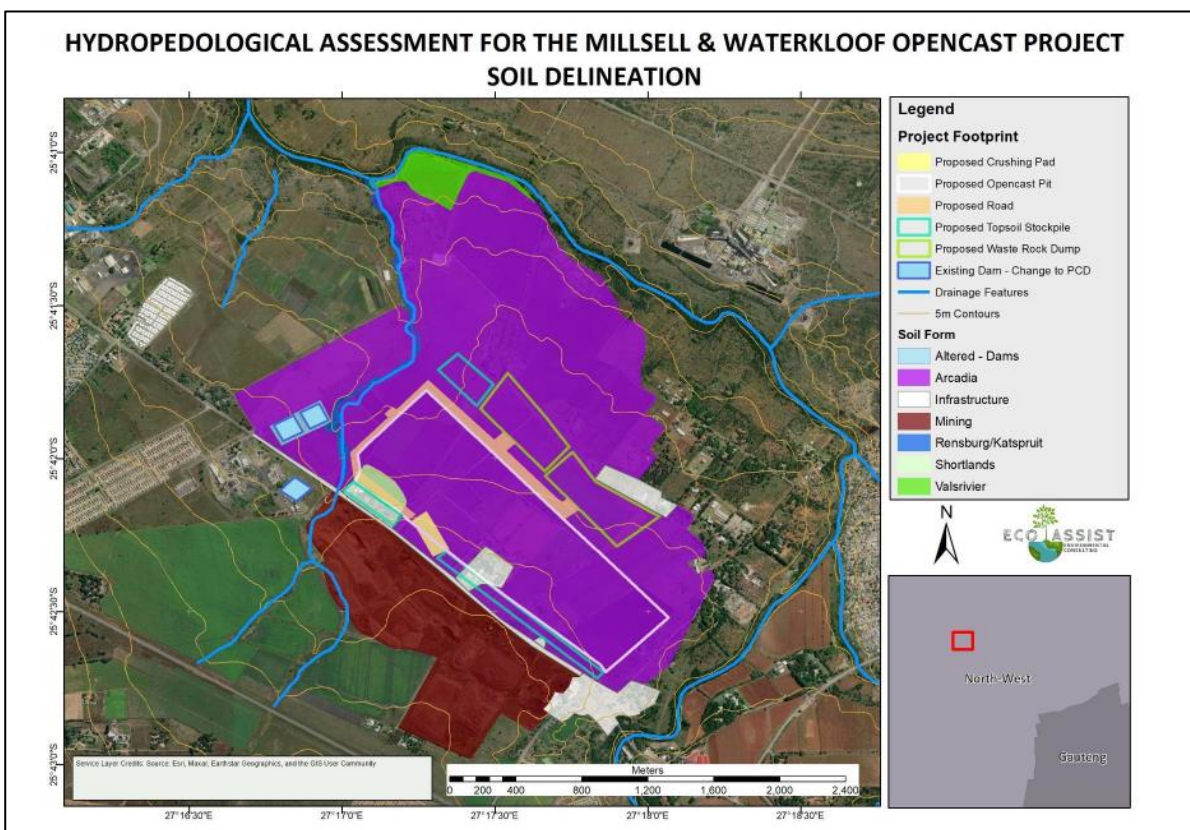


Figure 58: The soil delineation for the project area

The dominant soil form across the project area was classified as the Arcadia soil form. The depths ranged from 300mm to over 1200mm. The arcadia soils showed evidence of calcareous nodules in some locations indicating that the region is evaporation dominant with salts being drawn to the surface instead of being leached into deeper profile zones.



When the wet season starts, the initial precipitation event will have little to no runoff from the surface due to water pouring into these cracks. As the soil starts to saturate the clay particles become hydrated and start to expand (swell) this gradually closes the cracks to the point where the surface is sealed. The Vertic soil then becomes dominated by runoff as the soil profile becomes virtually impermeable.

The area close to the river was classified as Valsrivier with a flood deposited alluvial layer deposited approximately 200mm deep over the soil form. The small area adjacent to the homesteads, next to the road was classified as Shortlands soil form.

### 10.10.5 HILLSLOPE HYDROLOGY

The hydrogeological soil types classified during are shown in Figure 59. The hillslope was determined to be a recharge hydrogeological soil group for most of the year, however during the rainy season this can change to a runoff dominated hillslope with shallow responsive properties. One (1) dominant hillslope hydrogeological class was identified. The crest to foot slope landscape positions are dominated by Arcadia soils which will have recharge properties into the soil profile. Water is held in the high clay content soils where it evaporates. The soil texture for the main soil categories were analysed as shown in Table 45

The area was mainly classified as having a clay texture with areas adjacent to the river having a sandy clay loam texture (as a result of bank overtopping). The heavy clay soils show very low hydraulic conductivity values and the dominant flow path will be runoff.

Table 45: The soil texture results for the main soil forms in the project area

Reference	Lat.	Long.	Clay%	Silt%	sand%	Textural Class	Hydraulic Conductivity (mm/h)
Water 1A	25°42'4.05"S	27°17'23.91"E	58.5	22.6	19.9	Clay	0.5
Water 1B	25°42'4.05"S	27°17'23.91"E	59.8	25.1	15.4	Clay	0.5
Water 2A	25°41'3.01"S	27°17'12.53"E	21.5	11.6	67.6	Sandy Clay Loam	3.5
Water 3A	25°42'26.73"S	27°17'50.00"E	52.5	22.6	24.9	Clay	0.8
Water 3B	25°42'26.73"S	27°17'50.00"E	53.8	25.1	21.4	Clay	0.8

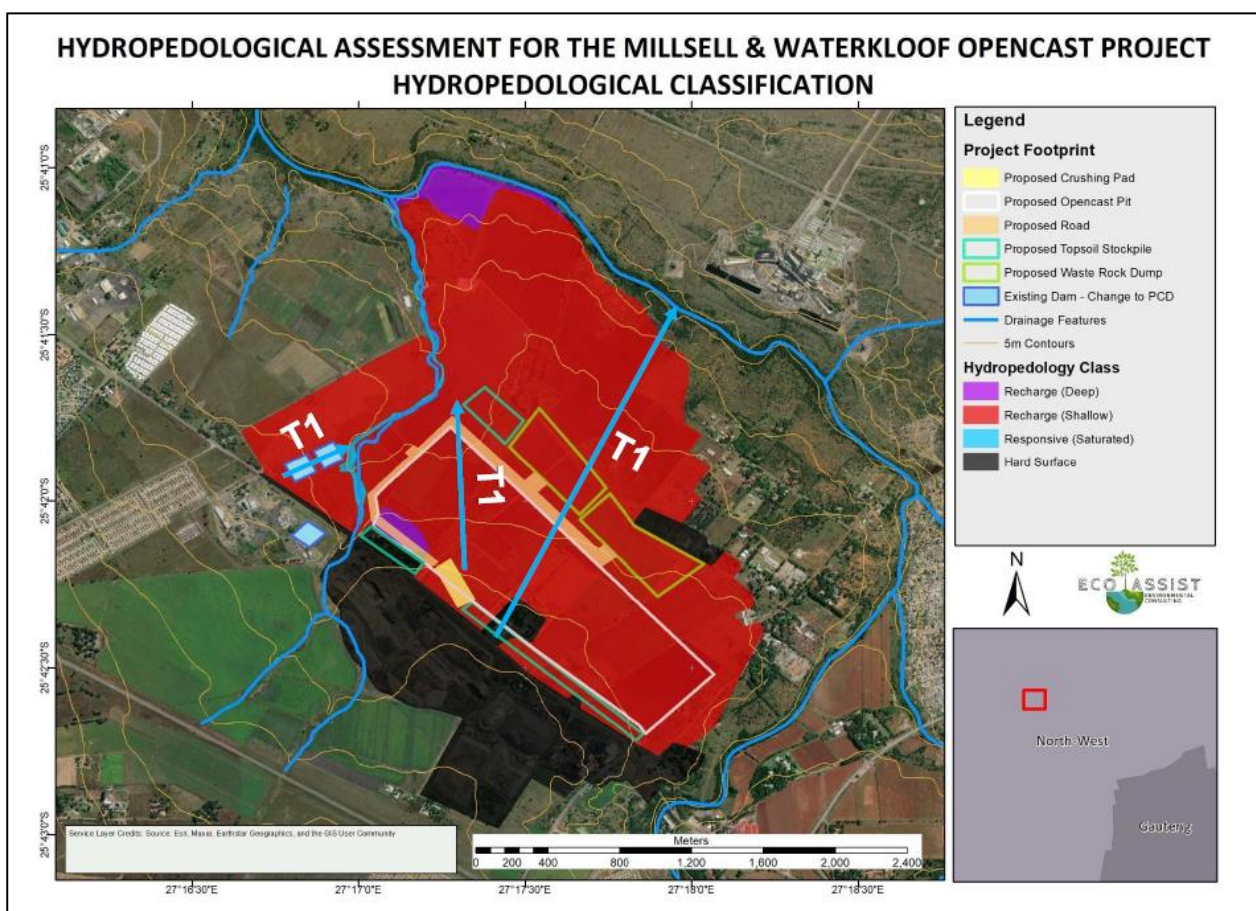


Figure 59: Hillslope hydrological classification showing the hydrological soil units for the project area

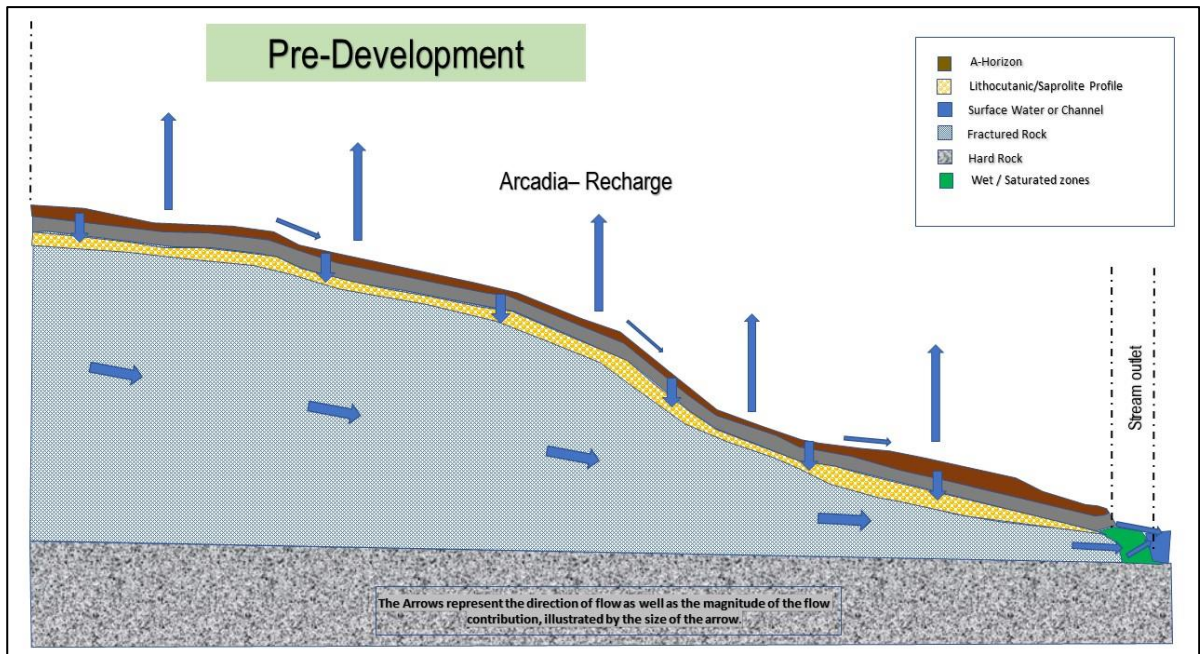


Figure 60: Hillslope hydrology for hydopedological soil catena of the project area

**10.11 AIR QUALITY**

The Air Quality Impact Assessment for the proposed was compiled by Rayten Engineering Solutions. A copy of the report can be found in Appendix 12.

### **10.11.1 METHODOLOGY**

A baseline air quality assessment was undertaken through a review of meteorological monitoring data, available air quality monitoring data, air quality legislation and the identification of nearby sensitive receptors and existing emission sources surrounding the project site. The potential impact of emissions from the mining activities associated with the proposed project on air quality was evaluated through the compilation of an emissions inventory and subsequent dispersion modelling simulations using AERMOD.

### **10.11.2 MODELLING SCENARIOS**

For the proposed project two scenarios were modelled:

- a) The construction phase scenario, where emissions associated with construction activity due to the development of infrastructure associated with the proposed operations, were modelled.
- b) The actual operating scenario, where emissions from surface mining activities associated with the proposed opencast mining operations at the mine were modelled. This scenario represents the potential impacts if the opencast mine were emitting under normal operating conditions.

The closure phase was not assessed, however, the impacts associated with closure should be similar to those observed for the construction phase. Thus, the incremental concentrations projected, and isopleth plots created for the construction phase in the assessment are considered as applicable to the closure phase.

### **10.11.3 METEOROLOGICAL OVERVIEW**

Table 46 provides the meteorological data for the area.



Table 46: Meteorological Data Details

Meteorological Data Details	
Met Data Information	Description
Met data type	MM5 AERMET-Ready (Surface & Upper Air Data)
Datum	WGS 84
Closest Town	Rustenburg - South Africa
Co-ordinates of centre of met grid:	
Latitude	25.700407°S
Longitude	27.289289°E
Time zone	UTC +2 hours
Period of record	January 2020 - December 2022
Met Station Parameters	Description
Anemometer height	14 m
Station base elevation	1222 m
Upper air adjustment	-2 hours
Grid Cell Information	Description
Cell centre	25.700407°S, 29.289289°E
Cell dimension	12km * 12km
Surface Met Data	Description
File format	SAMSON file
Output interval	Hourly
Upper Air Data	Description
Format	TD-6201- Fixed Length
Reported in	GMT
Output interval	00Z and 12Z
Models used to process met data	
Model used to process data for wind roses	WR Plot
Model used to process data for AERMOD	AERMET

#### 10.11.4 LOCAL WIND FIELD

Figure 61 provides the period wind rose plot for the project site for the period January 2020 to December 2022. The predominant wind directions for the period are observed from the east-northeast (~11.7% of the time), east (~11% of the time) and north-east (~9.4% of the time). Wind speeds for the three-year period were generally moderate to fast with calm conditions, defined as wind speeds less than 1 m/s, observed for 4.67% of the time.

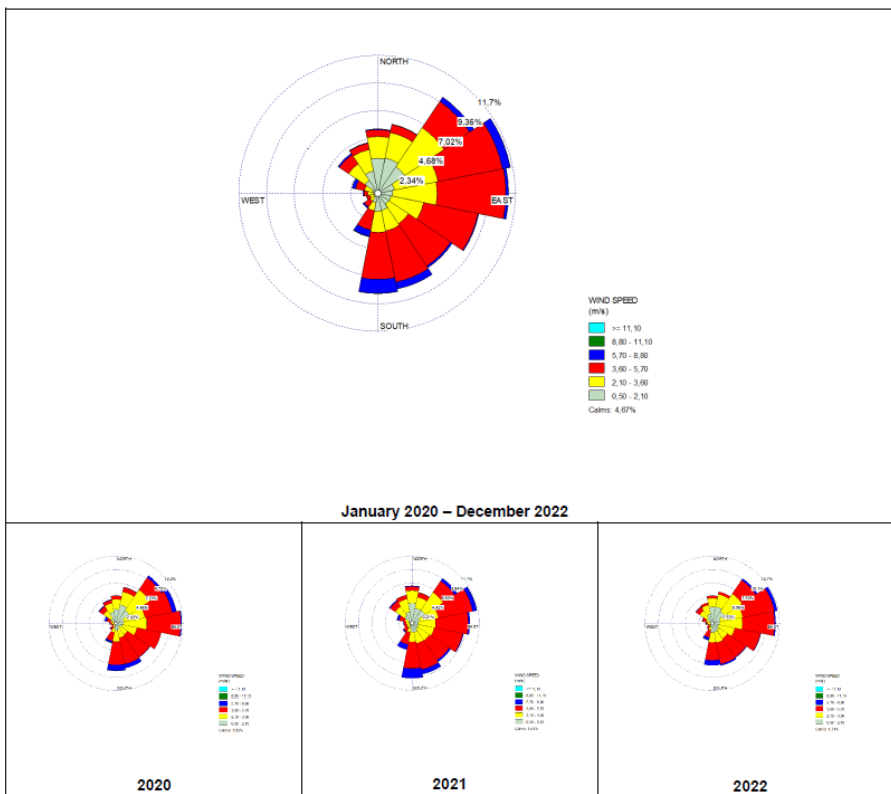


Figure 61: Period Wind Rose Plots for the project site for the period January 2020 - December 2022

### 10.11.5 DUST FALLOUT RATES

Out of 100 dustfall rates recorded at the Waterkloof Section for the April 2021 – January 2023 monitoring period, only one exceedance of the residential area standard of 600 mg/m<sup>2</sup>/day was recorded at site PM-MK W in February 2022. At the Millsell Section, out of 98 dustfall rates recorded, two exceedances of the non-residential area standard of 1 200 mg/m<sup>2</sup>/day were recorded at sites PM-MS NE and PM-MS NE in January 2023 and August 2022, respectively.

In terms of the National Dust Control Regulations, 2013, a total of two non-consecutive exceedances of the residential and non-residential area limits are permitted within a calendar year. Thus, based on dustfall monitoring data for the April 2021 – January 2023 monitoring period, Samancor is compliant with the Dust Control Regulations at the Waterkloof and Millsell Sections.

### 10.11.6 SURROUNDING SOURCES OF AIR POLLUTION

Existing key sources of air pollution surrounding the opecast project site and Mining Right Area (refer to Figure 62) were identified during a desktop exercise and include:

- Agricultural activity and potential biomass burning (surrounding areas);
- Extraction sites and waste & resource dumps (north-northwest to east of project site); and
- Vehicle dust entrainment on unpaved roads (surrounding areas).

Industrial activities, small holdings and informal settlements were identified as additional sources of air pollution within a 20km radius but to a lesser extent. Informal settlements are normally associated with solid fuel combustion for cooking and indoor heating purposes, which results mainly in emission of carbon monoxide (CO) and particulates. If coal is being used, sulphur dioxide (SO<sub>2</sub>) and hydrogen sulphide might also be emitted in relatively smaller quantities. Industrial areas are emitters of particulates, Volatile Organic Compounds (VOCs), and gaseous pollutants, which are produced from chemical treatment and processing activities, furnaces, fuel combustion installations, stacks, etc.

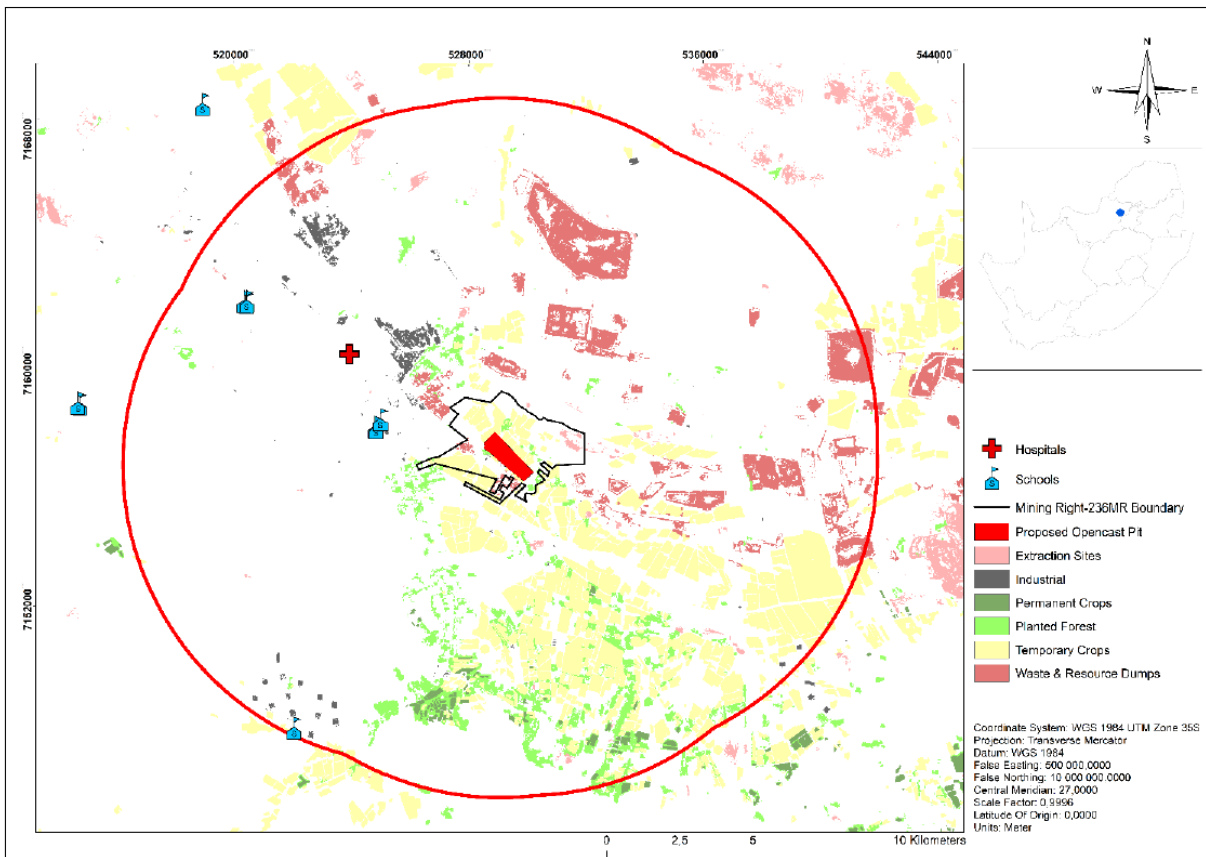


Figure 62: Identified surrounding emission sources within 10km of the existing Mining Right Area and proposed opencast project area (indicated in red)

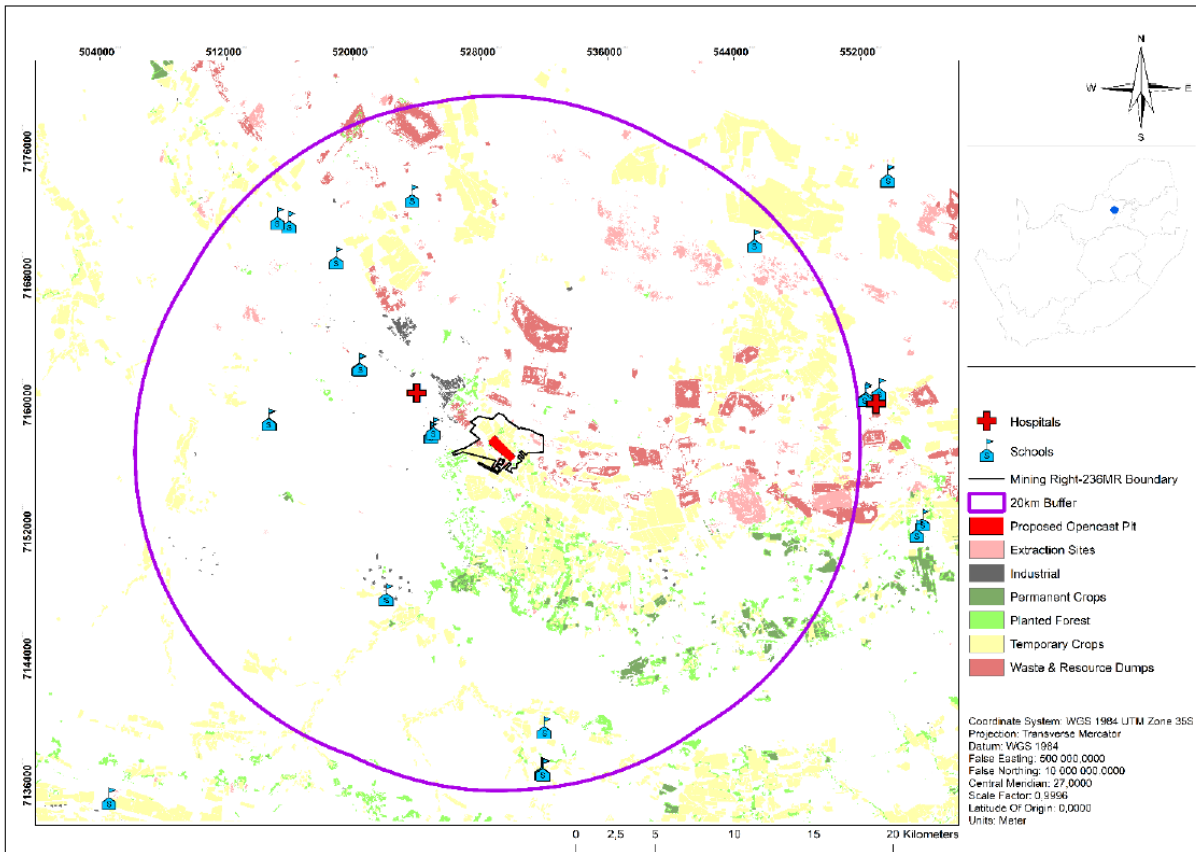


Figure 63: Identified surrounding emission sources within 20km of the existing Mining Right Area (proposed opencast project indicated in red)

### 10.11.7. AGRICULTURAL ACTIVITY AND POTENTIAL BIOMASS BURNING

Emissions from agricultural activities are difficult to control due to the seasonality of emissions and the large surface area producing emissions. Expected emissions resulting from agricultural activities include particulates associated with wind erosion and burning of crop residue, chemicals associated with crop spraying, and odiferous emissions resulting from manure, fertilizer and crop residue. Dust associated with agricultural practices may contain seeds, pollen and plant tissue, as well as agrochemicals, such as pesticides. The application of pesticides during temperature inversions increases the drift of the spray and the area of impact.

Dust entrainment from farming vehicles travelling on gravel roads may also cause increased particulates in an area. Dust from traffic on gravel roads increases with higher vehicle speeds, more vehicles and lower moisture conditions. The seasonal burning of the veld from July to September for field clearing in preparation for planting is also a source of smoke. The nature of the activity has a potential impact on air quality in the area.

### 10.11.8 EXTRACTION SITES AND WASTE RESOURCE DUMPS

Extraction sites (i.e. mining areas) as well as waste and resource dumps are identified mainly north-northwest to east of the project site and the Mining Right Area. Wind erosion from extraction sites as well as waste and resource dumps such as open stockpile areas is a key source of dust and particulate matter,

while decomposition at landfill sites is a main source of gaseous pollutants such as CO<sub>2</sub>, methane, hydrogen sulphide and several other non-methane VOCs.

### **10.11.9 VEHICLE DUST ENTRAINMENT ON UNPAVED ROADS**

Vehicle-entrained dust emissions from the surrounding unpaved roads in the area potentially represent a key source of fugitive dust. When a vehicle or truck travels on an unpaved road, the force of the wheels on the road surface causes the pulverisation of surface material. Particles are lifted and dropped from the rolling wheels, and the road surface is exposed to strong air currents in turbulent shear with the surface. The turbulent wake behind the vehicle continues to act on the road surface after the vehicle has passed.

### **10.12 NOISE**

A Noise Impact Assessment was compiled by EnviroRoots (Pty) Ltd. A copy of the report can be found in Appendix 13.

#### **10.12.1 METHODOLOGY**

The procedures, as detailed in SANS 10328:2008 and SANS10103:2008 have been applied to the noise impact assessment. Field assessments in and around the site were undertaken on the 13 to 15 June 2023. 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).

Baseline measurements were conducted on the 13 June 2023 at a total of two (2) localities. Measurements were analysed to compile a subjective and objective determination of the Rating levels (LReq) based on the LAeq measurements. Measurements were a minimum of 10-minutes.

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.

#### **10.12.2 MODELLED SCENARIOS**

The modelled scenario was designed and based on the layout. The significant noise sources were identified, and noise contours developed. The modelled scenario took into consideration the following:

- Corrections for ground conditions (obtained from Environmental Potential Altus, site observations) and metrological conditions.
- Ground elevation contours (if available).

- Building facades (if information available). Onsite investigations will be compiled to determine the design and acoustical corrections (both development and receptors) based on dwelling layouts/specifications (if feasible).
- Noise modelling based on future predicted noise climate. Sound Power Levels (SPL) will be sourced online.
- Numerous methodologies will be incorporated/considered for modelling and calibration (increased confidence in findings). These include CoRTN: 1996 (UK), RLS90 (German), ISO 9613-2, SANS 10357:2008, CoRN Calculation of Railway Noise (1995 - Department of Transport, UK) etc.
- Contours represented illustrate LAeq,T. If any corrections were considered, it will be stated within the modelled scenario namely:
  - T = correction for a  $k_n$  night correction.
  - Specified adjustments for tonal character, impulsiveness (impulsive or highly impulsive).
  - LReq,n and LReq,d.
- Noise contour representation will be developed focusing on pre-mitigation and post-mitigation effectiveness (if required).

### 10.12.3 BASELINE SOUND PRESSURE MEASUREMENTS

#### 10.12.3.1 ATTENDED MEASUREMENTS – A01

The area was mostly noisy (use of a lower Rating worst-case). Subsequent analysis of the data, desktop information and onsite investigations concluded:

- Calculated LAeq was 47,4 dBA – The 30-minute measurements, onsite investigations and desktop assessment reflected a developed suburban area (community, local traffic and business-related sounds measured); and
- Measurements and site observations indicated a suburban (or higher Rating).

Table 47: Measurements – Shorter-term measurements – A01

Point	Locality	Measured LAeq,10min (dBA)
A01	Project footprint day	LAeq,30min = 47.4

#### 10.12.3.1 ATTENDED MEASUREMENTS – A02

The area was mostly noisy (use of a lower Rating worst-case). Subsequent analysis of the data, desktop information and onsite investigations concluded:

- A02 Calculated LAeq was 45,7 dBA and 41,1 dBA – The measurements, onsite investigations and desktop assessment reflected a developed suburban area or higher (community, local traffic and business-related sounds measured).

Table 48: Measurements – Shorter-term measurements – A02

Point	Locality	Measured LAeq,10min (dBA)
A02	South Day	LAeq,10min = 45.7



	South Night	L <sub>A</sub> eq,10min = 41.1
--	-------------	--------------------------------

### 10.12.4 BASELINE NOISE LEVELS FINDINGS AND IDENTIFIED SANS10103:2008 RATING LEVEL

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.
- Many receptors are themselves business (light industrial).

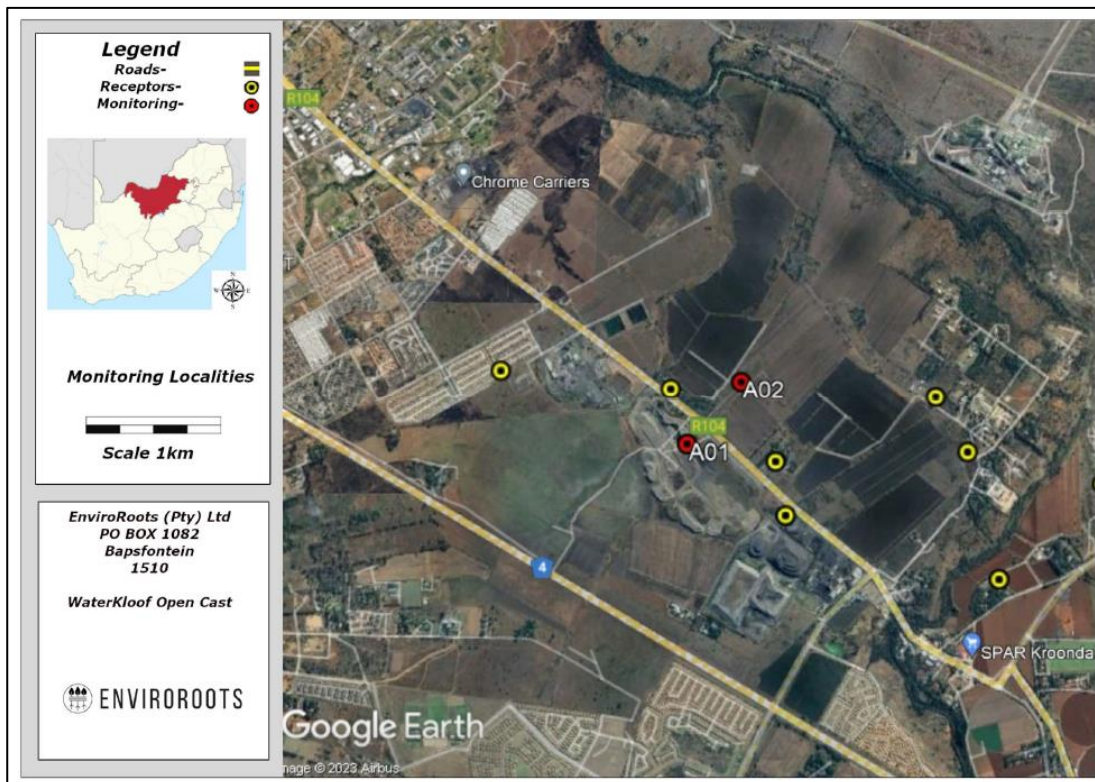


Figure 64: Measurement localities within the study area

The impact significance is provided in Table 64 and the management/ mitigation measures are provided in Table 66.

### 10.13 SITES OF ARCHAEOLOGICAL AND CULTURAL INTEREST

Agri Civils Geo-Tech and Heritage undertook a Phase 1 Archaeological Impact Assessment for the proposed project. A copy of the report is included in Appendix 14

#### 10.13.1 METHODOLOGY

Archaeological reconnaissance of the study was conducted during July 2022 through unsystematic pedestrian and vehicular survey of the demarcated study area. General site conditions were recorded via photographic record. Google Earth, historical topographical maps, and historical aerial imagery were inspected to identify potential heritage remains

## 10.13.2 ARCHAEOLOGICAL AND HISTORICAL REMAINS

### 10.13.2.1 STONE AGE REMAINS

No Stone Age archaeological remains were located within the demarcated study area. Although no such artefacts were observed, Stone Age artefacts may occur in the area. Archaeological studies conducted in the surrounding areas also did not locate Stone Age artefacts.

### 10.13.2.2 IRON AGE FARMER REMAINS

No Iron Age Farmer remains were located within the demarcated study area. The heritage study conducted by Pistorius (2003) mentions the presence of densely populated Late Iron Age sites in the general area. Accordingly, these sites are mostly associated with the Fokeng people. The heritage study conducted by Matakoma-Arm (Fourie 2008), recorded a scatter of Late Iron Age Moloko sequence potsherds. Research has also shown that Molokwane and Boitsêmagano, two Tswana stone-walled archaeological sites that were occupied from AD c. 1600 by the Bakwena Bamodimosana, are located to the west of the study area (Pistorius 1994).

### 10.13.2.3 HISTORICAL REMAINS

Nineteen (19) potential sites dating to the Historic Period were noted on historical aerial imagery and topographical maps. Table 49 provides a list of the historical sites and Figure

Table 49: Historical Sites

Name	Type	Source	Year / Age	Surface Indications
B01	Building	Aerial	1955	Foundation Remains
B02	Building	Aerial	1955	Bricks
B03	Building	Aerial	1955	No
B04	Building	Aerial	1955	New Building
B05	Building	Aerial	1955	Ruin
B06	Building	Aerial	1955	Ruin
B07	Building	Aerial	1955	Intact building
B08	Building	Aerial	1955	Intact building
B09	Building	Aerial	1955	Intact building
B10	Building	Aerial	1955	Intact building
B11	Building	Aerial	1955	Foundation Remains
B12	Building	Aerial	1963	Foundation Remains
B13	Building	Aerial	1963	Foundation Remains
B14	Building	Aerial	1963	No
B15	Building	Aerial	1963	Intact building
B16	Building	Aerial	1963	Ruin
B17	Building	Aerial	1963	Unknown
B18	Building	Aerial	1963	Unknown
B19	Building	Aerial	1968	Foundation Remains

#### 10.13.2.4 CONTEMPORARY REMAINS

Eighteen (18) sites dating to contemporary times were noted on aerial imagery, topographical maps and during the site inspection (Refer to Table 50 and Figure 65). Twelve (12) of the sites are intact, while 6 have been demolished. Five (5) of the contemporary sites also intersect the proposed impact area, four (4) which have been demolished.

Table 50: Contemporary Sites

Name	Type	Source	Year / Age	Surface Indications
B20	Building 1982	Topo	1982	Ruin
B21	Building 1983	Aerial	1983	Foundation Remains
B22	Building 1983	Aerial	1983	Intact building
B23	Building 1983	Aerial	1983	Intact building
B24	Building 1996	Topo	1996	Ruin
B25	Building 1996	Topo	1996	No
B26	Building 1996	Topo	1996	Intact building
B27	Building 1996	Topo	1996	Intact building
B28	Building 2004	Aerial	2004	Intact building
B29	Building 2004	Aerial	2004	Intact building
B30	Building 2010	Topo	2010	Foundation Remains
B31	Building 2010	Topo	2010	Foundation Remains
B32	Building 2010	Topo	2010	Intact building
B33	Building 1996	Topo	1996	Foundation Remains
B34	Building 2004	Aerial	2004	Intact building/structure
F01	Building Contemporary	Field	Contemporary	Ruin
F06	Building Contemporary	Field	Contemporary	Intact building
F07	Building Contemporary	Field	Contemporary	Intact building

#### 10.13.2.5 GRAVES/BURIAL SITES

Four (4) graves / cemeteries were identified during the site inspection (Table 51 and Figure 65). One of the cemeteries fall within the proposed impact area.

Table 51: Grave sites

Name	Type	Source	Year/Age	Current Status	No of graves
F02	Cemetery	Field	Historical	Intact	±17
F03	Grave	Field	Contemporary	Intact	1
F04	Graves	Field	Unknown	Intact	±5
F05	Graves	Field	Unknown	Intact	±4

#### 10.13.2.6 STATEMENT OF SIGNIFICANCE

The general region is associated with a combination of Late Iron Age and historical remains, as well as graves and cemeteries. On a local scale, the project area is associated with historical infrastructure and graves / cemeteries. The demarcated impact area is partially located within 500 m of rivers/streams, a zone that is generally associated with a higher heritage site probability. The majority of the area, however, has been disturbed by cultivated land that significantly lowers the sensitivity in terms of heritage resources. A few small sections that appear not to have been disturbed by cultivation were noted and plotted as well. Stone Age and Iron sites, as well as burial sites are therefore more likely to occur in these undisturbed areas.



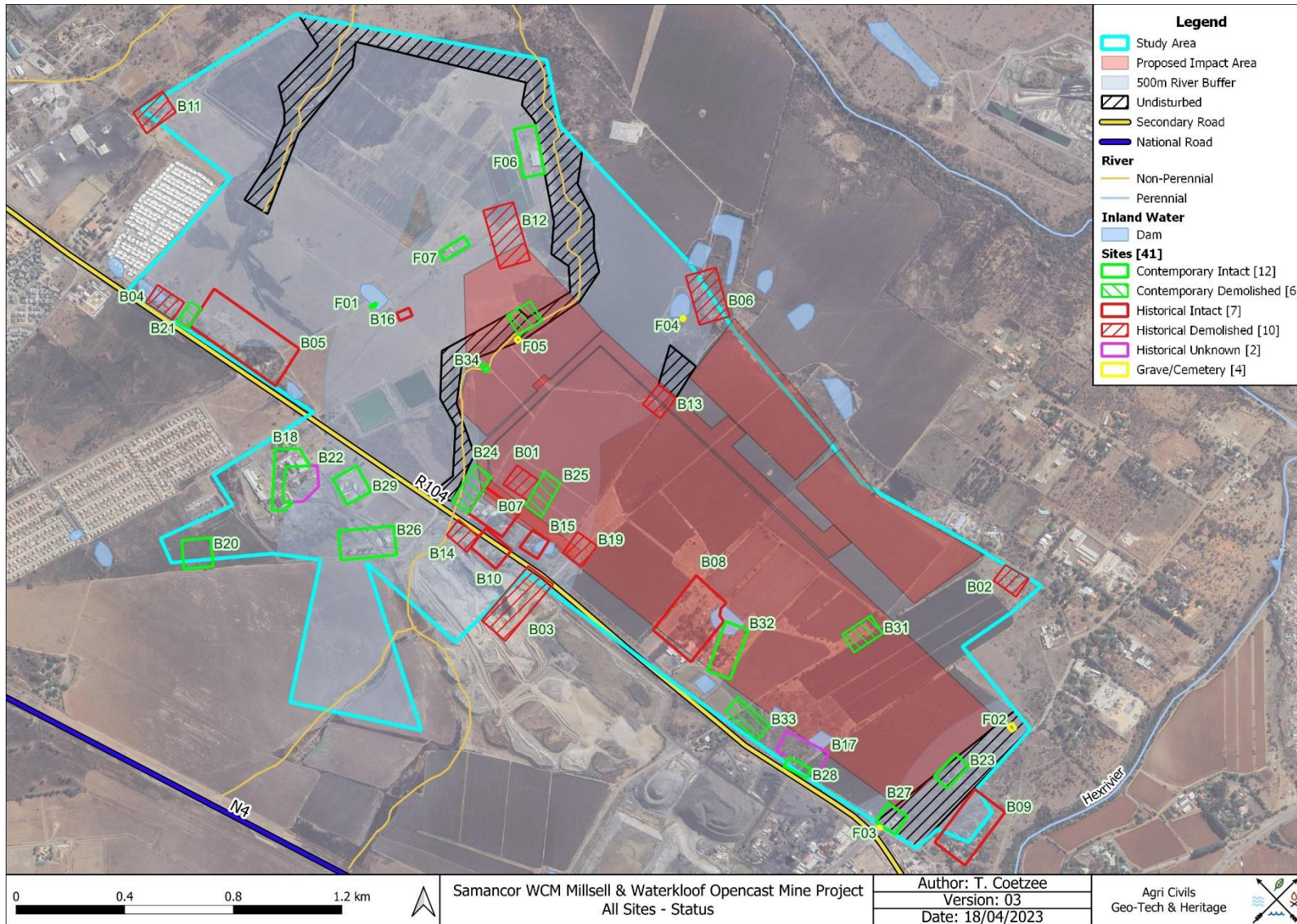


Figure 65: Showing the heritage structures

## 10.14 PALEONTOLOGICAL

Professor Marion Bamford from the University of Witwatersrand compiled an opinion. Refer to Appendix 15.

### 10.14.1 PALEONTOLOGICAL SENSITIVITY

The entire area is on non-fossiliferous rocks of the Pyramid Gabbro-norite and Mathlagame Norite-anorthosite, Rustenburg Layered Suite, Bushveld Igneous Complex. These rocks are volcanic rocks that intruded through the Transvaal Supergroup rocks and subsequently have been metamorphosed (Cawthorne et al., 2006). Since these rocks are about 2061 million years old (Schroder et al., 2016) they pre-date the evolution of plants and animals, and they are of volcanic origin, there is no chance of fossils of any kind, not even microbes, occurring in these rocks. This is supported by the grey colour-coding (zero palaeosensitivity) in the SAHRIS map (Figure 66).



Figure 66:SAHRIS palaeosensitivity map for the site for the Waterkloof Opencast Mine shown within the yellow rectangle. Background colours indicate the following degrees of sensitivity: red = very highly sensitive; orange/yellow = high; green = moderate; blue = l

## 10.15 TRAFFIC

A Traffic Impact Assessment was compiled by Corli Havenga Transportation Engineers (Pty) Ltd for the proposed project. A copy of the report can be found in Appendix 16.

### 10.15.1 METHODOLOGY

The study was done in accordance with the South African Traffic Impact and Site Traffic Assessment Manual.



### 10.15. 2 EXISTING ROAD NETWORK

The existing accesses to the current Millsell and Waterkloof operations on Road 104 is shown in Figure 67.



Figure 67: Existing accesses on the R104 to the existing Millsell Waterkloof operations

### 10.15.3 ROAD NETWORK

The proposed site is shown in an extract of the North West Road Network Plan in Figure 68.

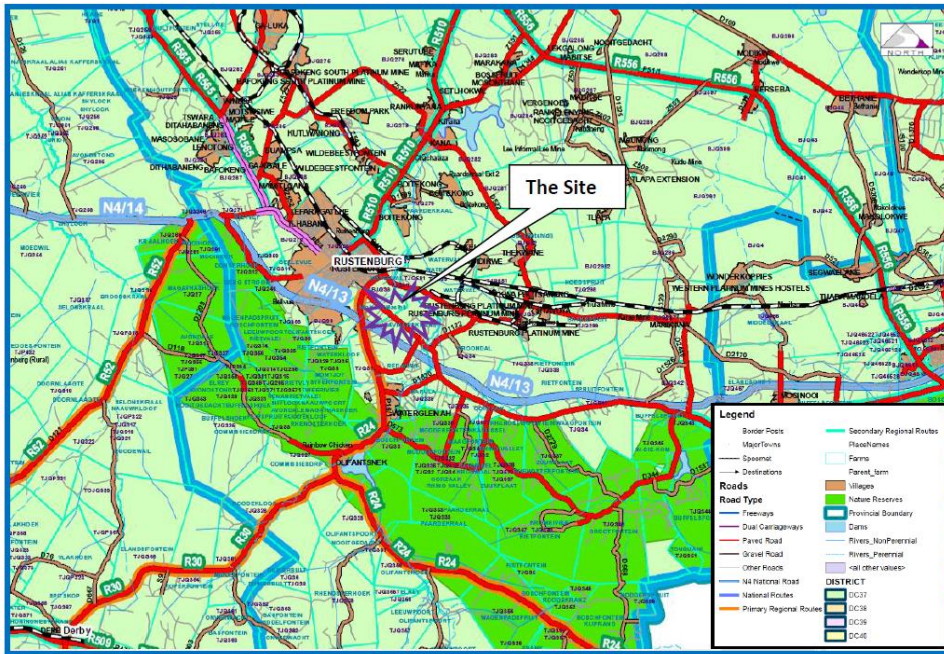


Figure 68: Extract North West Road Network Plan

Road R104, running through the mining right area is Provincial Road P2/4. National Road N4/13 cuts through the south-western section of the mining right area. Provincial Road D108 runs just north of the site.



## 10.16 VISUAL

A Visual Impact Assessment (VIA) for the proposed opencast project was compiled by Elemental Sustainability (Pty) Ltd. A copy of the report can be found in Appendix 17.

### 10.16.1 METHODOLOGY

The VIA was undertaken in accordance with the Guidelines for Involving Visual and Aesthetic Specialists in EIA process, as issued by the Western Cape Government's Department of Environmental Affairs and Development Planning (DEADP) during 2005. These guidelines were used to evaluate the visual effects that may occur because of the proposed activities.

### 10.16.2 AFFECTED LANDSCAPE AND VISUAL ANALYSIS

The proposed Waterkloof opencast mine and its associated activities fall within the Category 5 development, with a **Very High** visual impact expected (refer to Table 52). The proposed opencast pit and stockpile areas (i.e. Overburden Dumps, Topsoil Stockpiles and RoM Stockpile) potentially having a significant effect and a noticeable change on the quality and scenic appearance of the immediate environment.

Table 52: Visual Impact Criteria

Visual impact criteria	
Very high visual impact expected:	Potentially significant effect on wilderness quality or scenic resources; Fundamental change in the visual character of the area; Establishes a major precedent for development in the area.
High visual impact expected:	Potential intrusion on protected landscapes or scenic resources; Noticeable change in visual character of the area; Establishes a new precedent for development in the area.
Moderate visual impact expected:	Potentially some effect on protected landscapes or scenic resources; Some change in the visual character of the area; Introduces new development or adds to existing development in the area
Minimal visual impact expected	Potentially low level of intrusion on landscapes or scenic resources; Limited change in the visual character of the area; Lowkey development, similar in nature to existing development
Little or no visual impact expected:	Potentially little influence on scenic resources or visual character of the area; Generally compatible with existing development in the area; Possible scope for enhancement of the area.

### 10.16.3 LANDSCAPE ASSESSMENT

#### 10.16.3.1 LANDSCAPE INTEGRITY AND CHARACTER

The towns / informal settlements of Rustenburg, Kroondal, Waterkloof, Rustenburg Rural and several extensions of Rustenburg are located near the proposed opencast mining area. The project footprint and its surrounding area has been severely transformed over the years. The immediate surrounding area is characterised by a mix of land uses, including cultivation (subsistence and commercial farming), degraded areas, mining activities and urban built-up areas. The remainder of the project footprint area and surrounds consist of bare areas, drainage and wetland areas and dirt roads. A few major roads, including the N4 and R104, also passes the study site.

Please refer to Section 10.13 for the heritage sites identified for the proposed project.

The study site is situated in an area of the landscape that consist mainly of undulating plains, with a relatively flat topography. To the south and west of the study site, is the Magaliesberg Mountain and its slopes. Surface elevations at the study site range between 1130 and 1169 m above mean sea level (mamsl). A steady decline in elevation towards the North, Northeast and East is evident. Several drainage areas occur in the vicinity and the area is drained by the Hex River towards the north and north-east of the project footprint area.

### 10.16.3.2 LANDSCAPE SCENIC QUALITY

The scenic quality of the landscape is based on its value as a visual resource. The visual resource value of the study site is rated as **Moderate**, which is defined by a common landscape that exhibits some positive character, but which has evidence of alteration / degradation / erosion of features resulting in areas of more mixed character. The site is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with, but change may not require special or particular attention to detail.

### 10.16.3.3. LANDSCAPE SENSITIVITY

The landscape sensitivity indicates a landscape of **Low** sensitivity, which refers to a “Landscape of lower scenic quality, with few distinctive elements or valued characteristics and considered tolerant of a large degree of change e.g., out with any designated areas or within a degraded landscape”. This is mostly attributed to the large transformation and severe degradation of the surrounding area.

## 10.16.4 VISUAL ANALYSIS

### 10.16.4.1 VIEWPOINTS / SENSITIVE RECEPTORS

Several Viewpoints (VP) were identified (refer to Table 53), however, not all are sensitive receptors that will be negatively impacted. Reference points of the sensitive receptors (Viewpoints) are indicated in Figure 70. These reference points were selected based on their distance and as central viewpoint of the specific receptor area.

The Viewpoints were identified as residents of the surrounding residential estates, informal settlements and smallholdings, a few overnight hotels/accommodations and its associated guests, and road users of the area, specifically along the N4, R104 and R24. The sensitivity of the receptors rated **High**.

Viewpoints were selected within 5 km radius around the study site due to their proximity. Viewpoints 1 to 3 is situated within one (1) kilometre from the study site. Between 1 and 2 km from the study site, Viewpoints 4 to 11 occur. Viewpoints 12 to 20 situated within 5 km from the proposed mining operations.

Table 53: Viewpoints selected for representing the surrounding area

Viewpoint Number	Specific Receptor	Coordinates (In Decimal Degrees)
VP1	Residential Estate	--25.700125° 27.274617°

Viewpoint Number	Specific Receptor	Coordinates (In Decimal Degrees)
VP2	R104 Road Users	-25.704497° 27.286793°
VP3	Residential Estate	-25.720343° 27.296348°
VP4	Residents of Waterkloof	-25.705067° 27.312353°
VP5	Residents of Nyala Rock Estate	-25.693294° 27.273160°
VP6	Residents of a Retirement Estate	-25.695074° 27.269538°
VP7	Residential Estates	-25.699773° 27.266390°
VP8	Residential Estate	-25.703526° 27.269155°
VP9	N4 Road Users	-25.713189° 27.278354°
VP10	Residents of Waterkloof Hills Estate	-25.717618° 27.285326°
VP11	Commercial and Industrial Buildings	-25.725741° 27.290952°
VP12	Kindergarten	-25.711447° 27.259220°
VP13	Residential Smallholdings	-25.713303° 27.267165°
VP14	Residential Estate	-25.718609° 27.264280°
VP15	Waterkloof Hills Primary and Secondary School	-25.720877° 27.270535°
VP16	Residential Estate	-25.721397° 27.275146°
VP17	R24 Road Users	-25.729024° 27.264150°
VP18	Hotel / Accommodation	-25.740816° 27.267648°
VP19	Residential Housing	-25.735245° 27.256521°
VP20	Kgaswane Mountain Reserve	-25.727951° 27.243935°

#### 10.16.4.2 VISUAL EXPSOURE AND VIEWING DISTANCE

A 10 km Zone of Influence was determined for the study site, and all proposed infrastructure. It is evident from the viewshed map (refer to Figure 71) that the surface infrastructure visibility will diminish as the distance from the site increases, apart from the higher lying areas which have some degree of visibility. Most of the Viewpoints appear to have limited visibility of the proposed mining operations, possibly due to the flat topography of the area. Some of the Viewpoints (VP3, VP4, VP17, and VP19) have moderate visibility which can be attributed to their position in the landscape and higher lying topography.



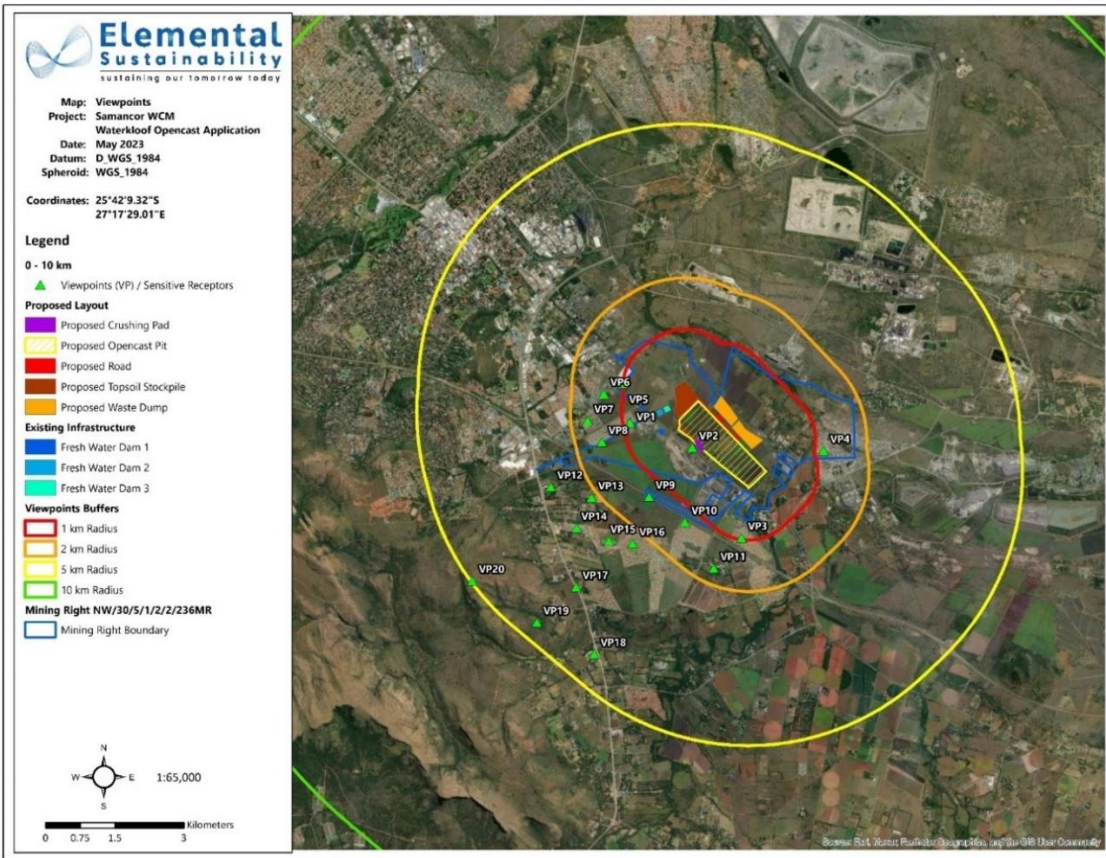


Figure 69: Surrounding Land Users and Sensitive Receptors (Viewpoints)

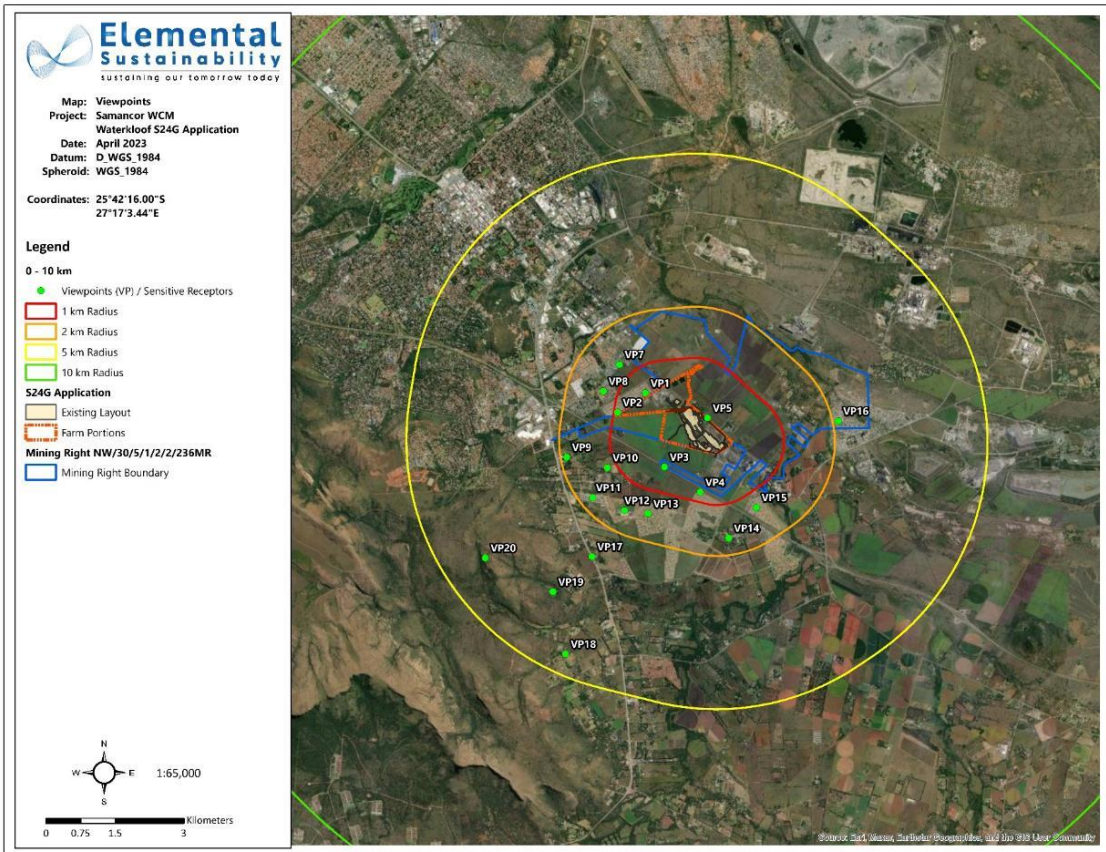


Figure 70: Surrounding Land Users and Sensitive Receptors (Viewpoints)



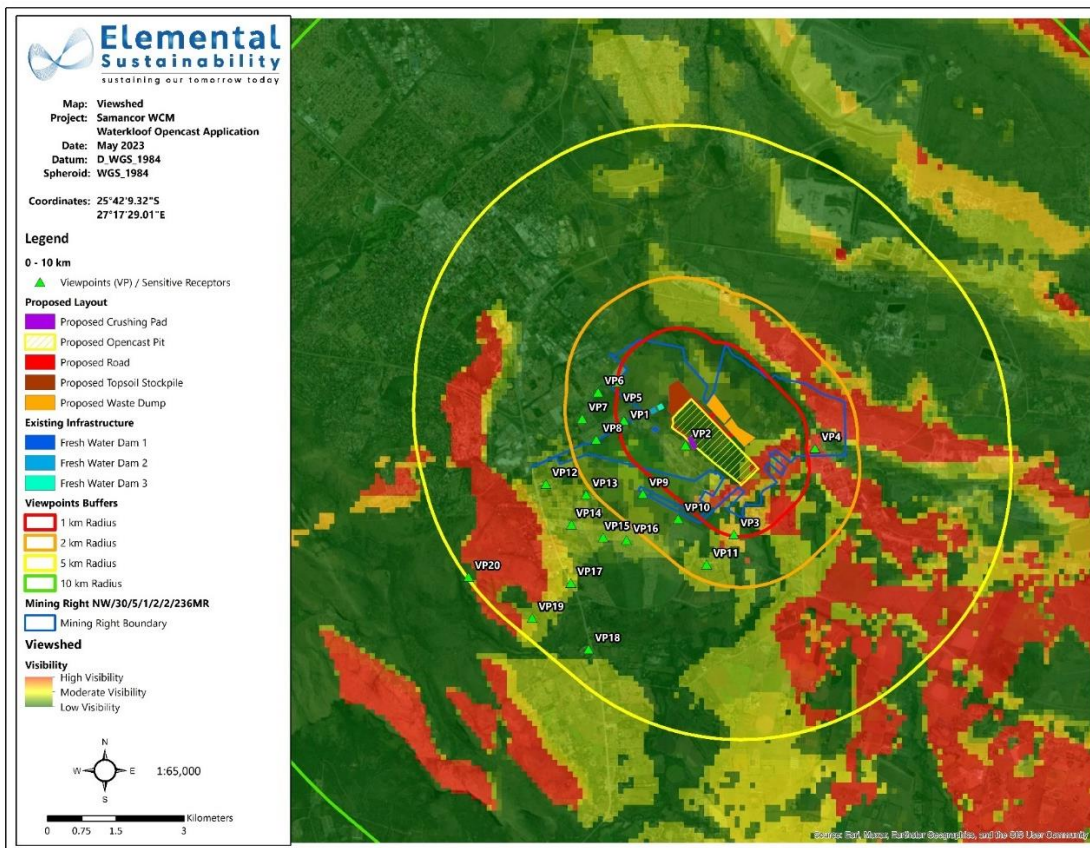


Figure 71: Viewshed Model of the 5 km surrounding area

From the Digital Elevation Model (DEM), it is evident that the study site and immediate surrounding area falls within an area with relatively flat topography, with some hillslopes and mountainous peaks occurring in the west within a 10 km radius (refer to Figure 72). Due to the surrounding topography, visibility is expected to be low to moderate. Not many slopes can be observed impacting on the visibility of viewpoints (refer to Figure 72). A Viewshed was developed and is presented in Figure 74. Factors, such as slope elevation, steepness and slope aspect also contributed to the Viewshed analysis (refer to Figure 73 and Figure 75). The visibility of the infrastructure is categorised as Low due to the visibility covering less than 25% of the 10 km zone of influence.

#### 10.16.4.3 VISUAL ABSORPTION CAPACITY (VAC)

The study site, as well as the 5 km immediate surrounding area, falls within the Savanna Biome, which is dominated by grass species, shrub layers and well-developed trees. The site overlaps with the Marikana Thornveld (SVcb 6) vegetation type (Mucina & Rutherford 2006/2018). This vegetation type 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. However, the surrounding area has been largely transformed to crop cultivation or build-up areas, and alien invasive plants occur localised in high densities, especially along the drainage lines. Therefore, vegetation does not contribute much to limiting the visual impact of the activities.

The Visual Absorption Capacity (VAC) of the receiving environment is deemed to be **Moderate to High** due to the following:

- **Low** - By virtue of the lack of natural vegetation found on and surrounding the study site. Mostly sunflower and maize fields occur in the surrounding areas, along with bare areas and alien vegetation. Existing natural vegetation mainly consists of grasses and sparsely distributed trees. Therefore, the vegetation does not contribute much to act as visual and noise barriers.
- **Moderate** - In terms of the position of the site relative to elevation and slope of terrain. The study site is situated on a relatively flat area with undulating topographical features in the immediate surrounding valley.
- **Low** - In terms of existing built environment, most of the larger area surrounding the study site, especially in the south, west and east consist of high-density residential estates and housing. The immediate surrounding area, consist of crop fields and other mining activities.
- **Low** - The topography of the study site itself does not limit the view for surrounding land users. Topography will only have an impact on visibility more than 2 km away from the site.
- **Moderate** - The colour and contrast of the mining operations is in contrast with the current natural colour of the area, however, several existing mining operations and activities (infrastructure) are visible in the surrounding area.
- **High** - The natural landscape and associated environment has been largely transformed and disturbed over the years.
- **High** - The mining activities are not entirely new to the area and is only intrusive to road users (which is of short duration) and to some residential areas where visibility is not obscured.

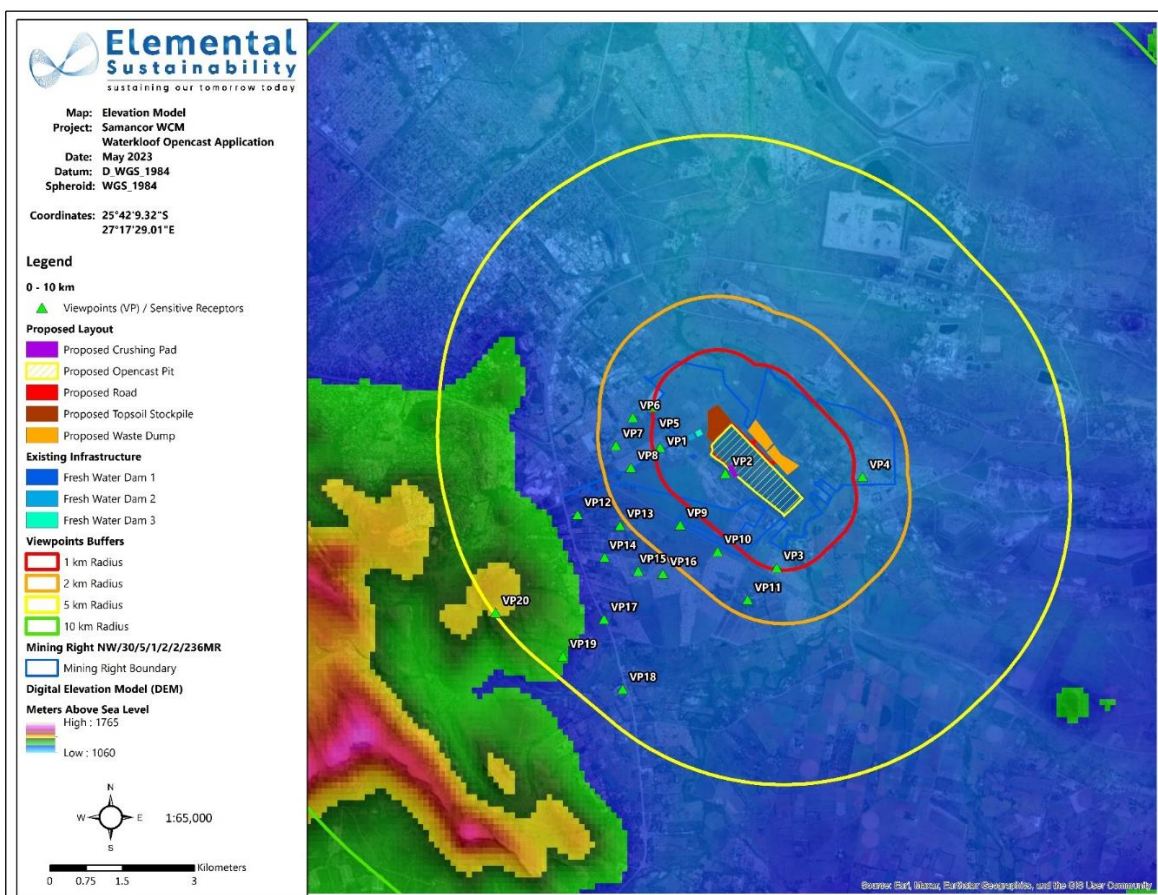


Figure 72: Digital Elevation Model (DEM) of the terrain in the 10 km surrounding area



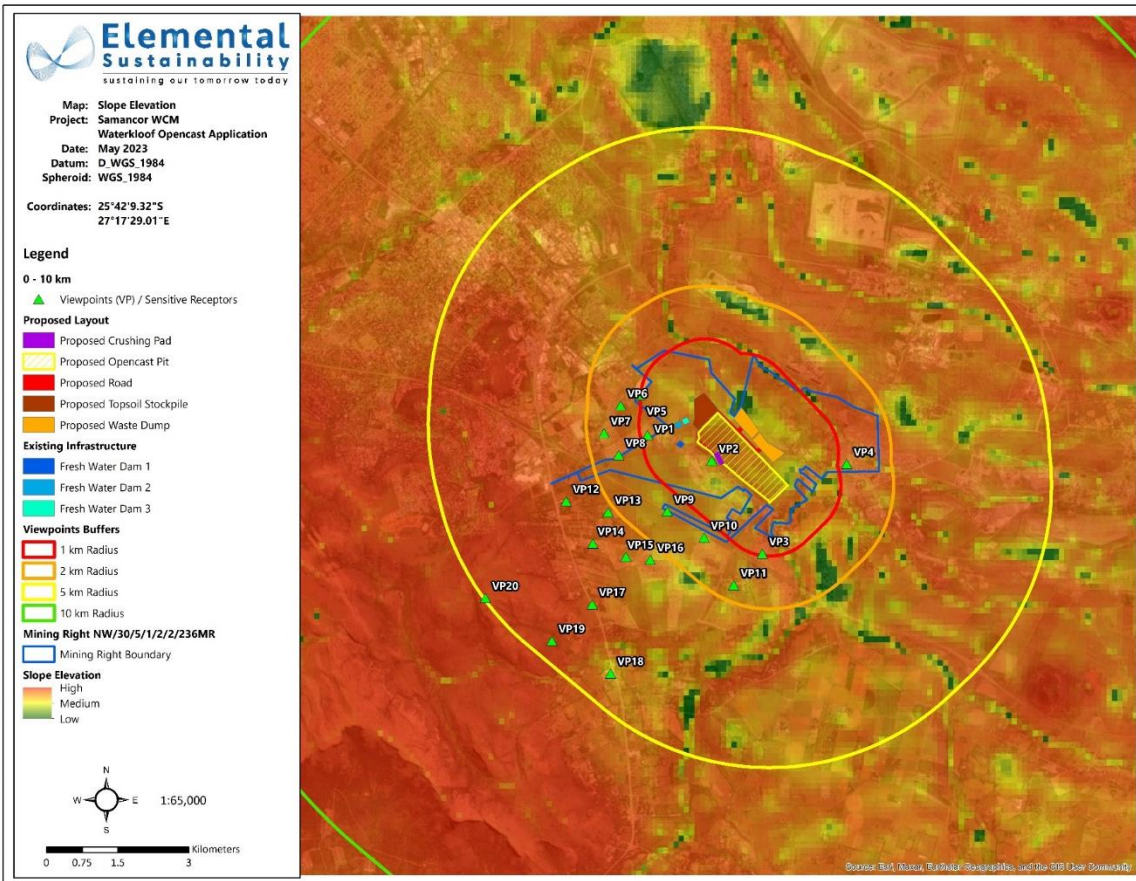


Figure 73: Slope elevation and steepness of the terrain in the 10 km surrounding area

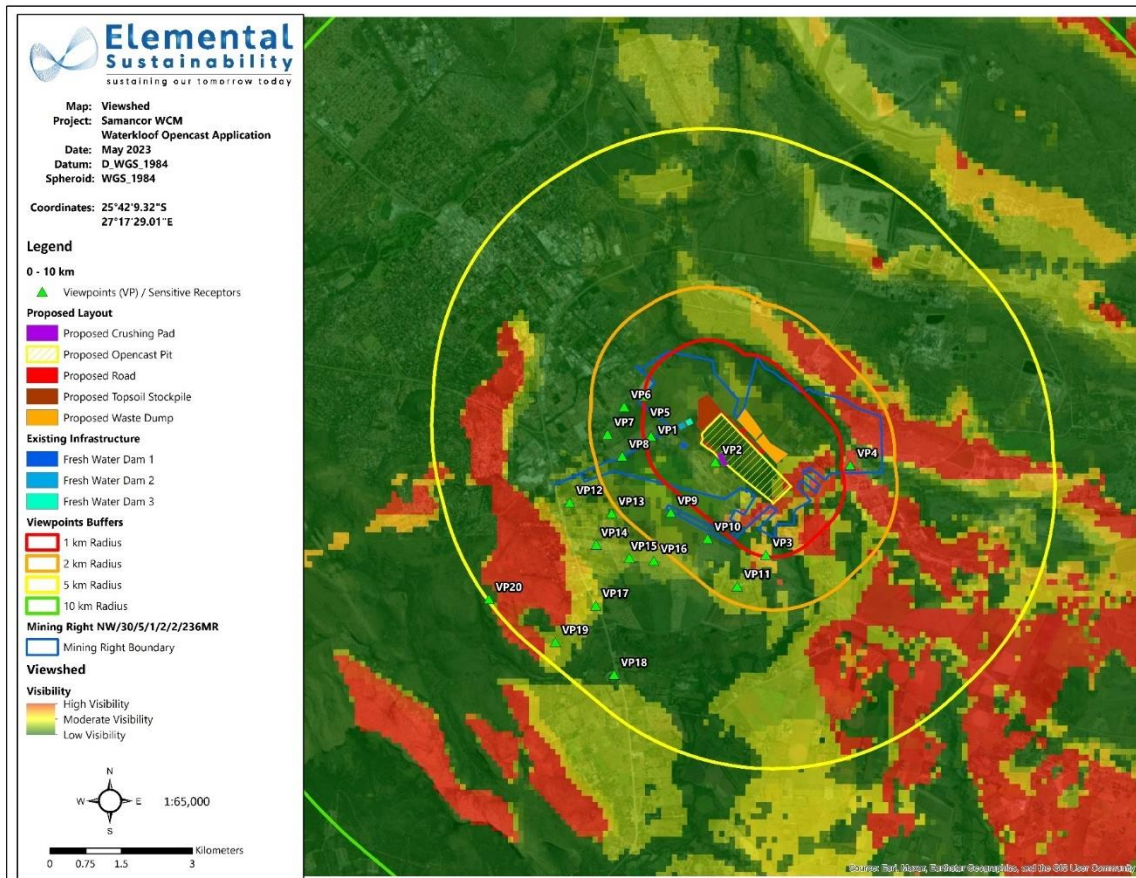




Figure 74: Viewshed Model of the 5 km surrounding area

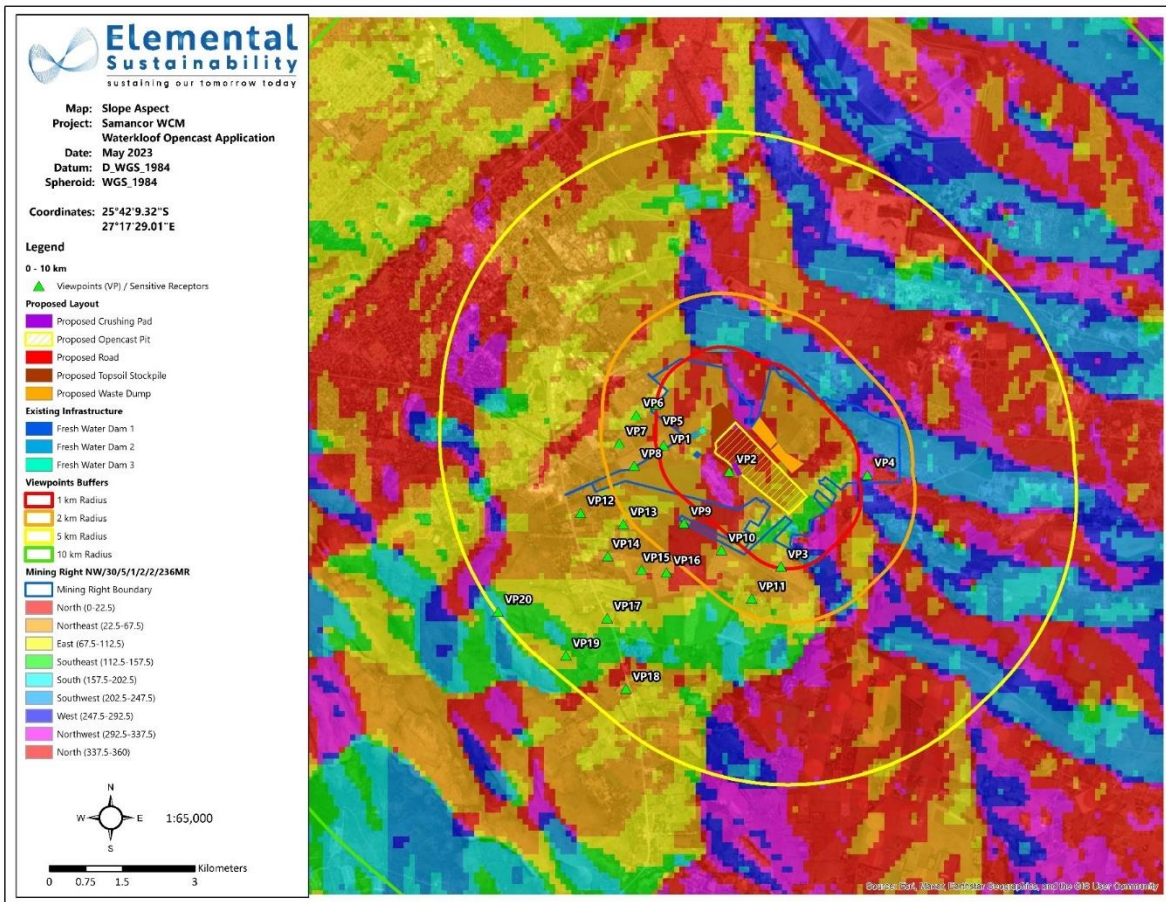


Figure 75: Slope Aspect direction of the terrain in a 10 km surrounding area

### 10.16.4.3 MAGNITUDE OF VISUAL IMPACT

In synthesising the criteria used to establish the magnitude of visual impact, a numerical or weighting system is avoided. This table is arrived at by combining the ratings of each of the sections above (viewshed, viewing distance, visual absorption capacity, and sensitivity receptors). The ratings for each of these criteria are indicated in (Table 54) The visual impact is **Moderate to High** before mitigation measures are implemented.

Table 54: Magnitude of Visual Impact Results

Triggers & Category of Environment	Viewshed Analysis Results	Viewing Distance & Visual Exposure Results	Sensitive Receptors / Viewpoints	Visual Absorption Capacity Results
<b>Very High</b> visual impact expected	<b>Low</b> >25% of zone of influence is visible	<b>Moderate to High</b> - Various sensitive receptors within 2 km from the study site	<b>High</b> - Residents and Road Users	<b>Moderate to High</b>

### 10.17 SOCIO ECONOMIC CHARACTERISTICS

A Socio-Economic Impact Assessment was compiled by Index Social Services (Pty) Ltd. A copy of the

report can be found in Appendix 18.

The Proposed opencast Millsell and Waterkloof Sections is situated near Rustenburg, approximately 100 km West of Pretoria, on the Western Limb of the Bushveld Igneous Complex, North West Province. The proposed project within municipal boundaries of the Bojanala District Municipality and the Rustenburg Local Municipality (RLM) (Ward 34) (refer to Figure 76).

Rustenburg Local Municipality (RLM) is accessible to a number of major South African urban centres including Johannesburg and Tshwane with Rustenburg being in close proximity to a number of smaller centres. It further act as a gateway to many regional tourist destinations, including the Pilanesberg National Park, Madikwe Game Reserve, Sun City and Lost City Resort, and the Cradle of Humankind. The Magaliesberg Mountain Range borders Rustenburg to the south-west with the Kgaswane Game Reserve located against the northern slopes of the Magaliesberg. RLM is known for its high concentration of mining activities especially within the PGM mining industry, and its agricultural sector.

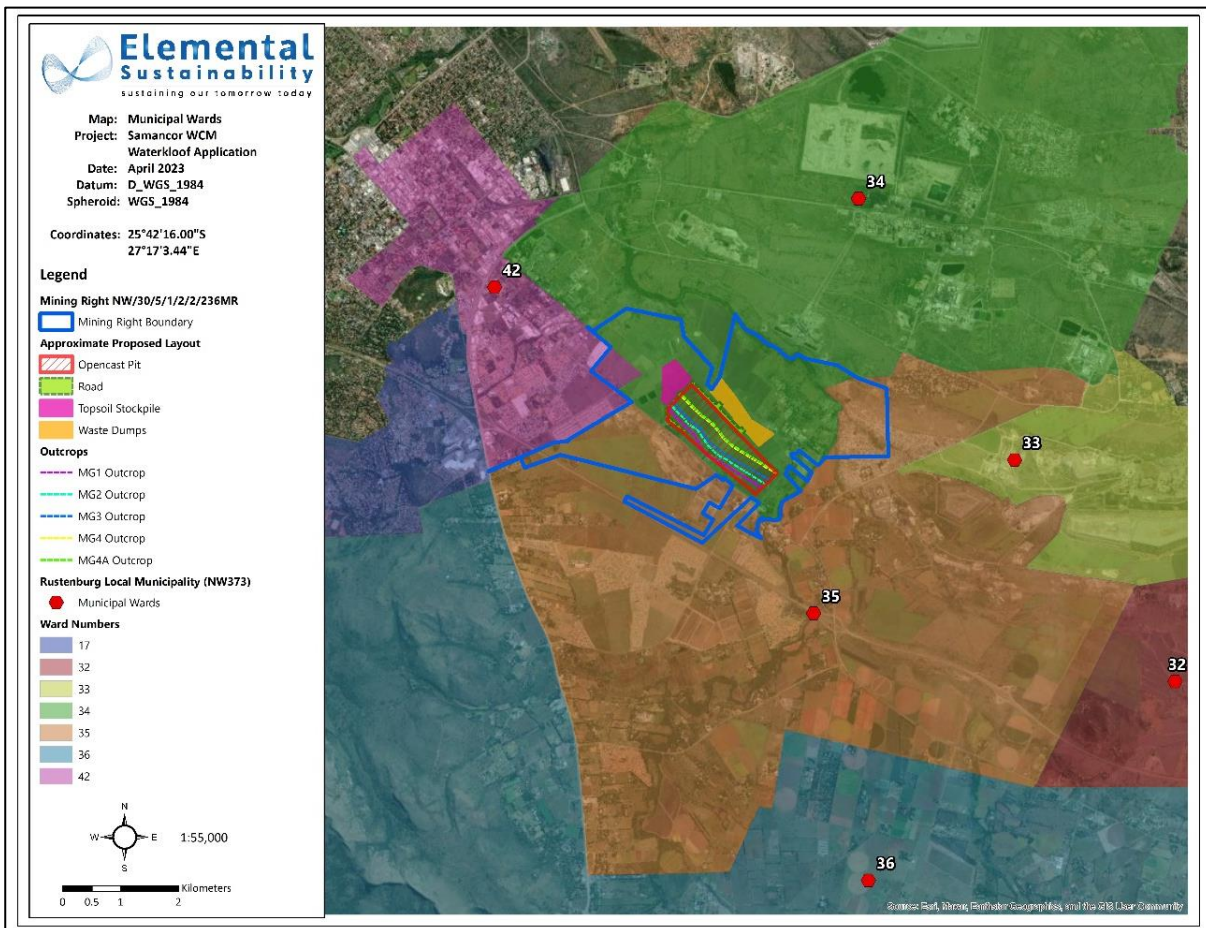


Figure 76: Ward Map

### 10.17.1 POPULATION DATA

Population data for can be found in Table 55 below as per the Census 2011 and Community Survey (CS) 2016.

Table 55: Population data

Demographics	Bojanala Platinum DM (2016)	Rustenburg LM	
		Rustenburg LM (2016)	Ward 34 (2011)
Population	1 657 149	626 522	10 692
Households	611 145	262 576	4 999
Average household size	2.7	2.4	2.1
People per km <sup>2</sup>	89.6	183	195
Age structure (2016)			
- Under 18 years	36 %	34 %	21 %
- 19 to 64 years	59 %	63 %	78 %
- Over 65 years	5 %	3 %	1 %
Population growth per annum (2016)	2.15 %	2.98%	Not Available
Male : Female ratio	53 : 47	55 : 45	62 : 38

Ward 34 had a population of 10 692 in 2011 (Census 2011). More recent statistics could not be obtained at this stage, but it can be expected that its population has also grown significantly most likely as a result of the mines.

### 10.17.2 LANGUAGE AND RACE

The majority of the citizens in BPDM and RLM speak Setswana as first language (65% and 64%), followed by a variety of other languages, such as Isixhosa (5% and 10%), Sesotho (4% and 5%) and Afrikaans (5% and 6%) (CS 2016).

The language trend looks different in Ward 34, where the dominating language is IsiXhosa (39%), followed by Setswana (16%) and Xitsonga (11%) (Census 2011). Table 56 provides the racial breakdown.

Table 56: Racial breakdown

	Black	Coloured	White
Bojanala DM	94%	1%	5%
Rustenburg LM	93%	1%	6%
Ward 34	95%	0%	4%

### 10.17.3. EDUCATION

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).

Within the RLM the individuals with no schooling decreased with a lower rate than that of BPDM, with only a 0.7% decrease between 2011 and 2016. The number of individuals with Matric within the RLM increased with 3.6%, which is also lower than the increase in the district. There was also a significant decrease within the RLM in the number of individuals with a Higher education, which shows 1.5% fewer individuals having obtained a Higher education (refer Table 57).

Education levels in Ward 34 are significantly lower, as only 23% of the population received a Matric and 1% some form of Higher education (Census 2011).

Table 57: Education levels

Education	Bojanala Platinum DM		Rustenburg LM		
			Rustenburg LM		Ward 34
	2011	2016	2011	2016	2011
- No schooling	7.5%	5.5%	5.4%	4.7%	5%
- Matric	28.5%	32.5%	31%	34.6%	23%
- Higher education	7.4%	6.5%	8.9%	7.4%	1%

Source: wazimap.co.za; Census 2022; CS 2016; [www.municipalities.co.za](http://www.municipalities.co.za)

#### 10.17.4. INCOME

Despite the disparities between education levels in the wider study area and Ward 34, income levels are fairly on par with each other, which could possibly be as a result of readily available employment opportunities (refer Table 58).

Table 58: Income Category

Income Category	Bojanala Platinum DM	Rustenburg LM	
		Rustenburg LM	Ward 34 (2011)
No income	8%	7%	7%
Below lower poverty line (R20 000 per annum)	24%	18%	17%
More than R75 000 per annum	20%	25%	19%

Source: [www.wazimap.co.za](http://www.wazimap.co.za); Census 2011

#### 10.17.5. EMPLOYMENT PER SECTOR

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 77).



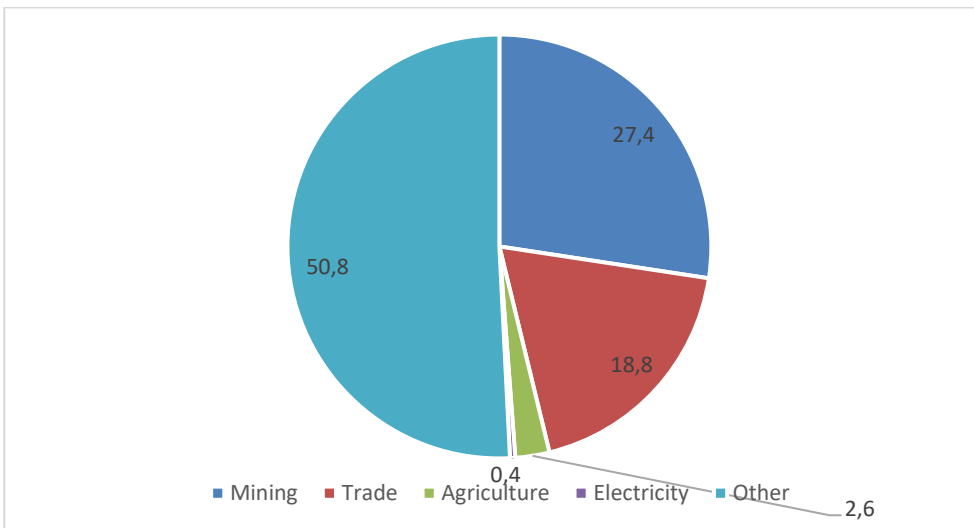


Figure 77: Employment per sector

### 10.17.6. UNEMPLOYMENT

The North West province recorded an unemployment rate of 35.7% in the third quarter of 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](http://www.iol.co.za)).

Table 59 reflects Census 2011 data for the study area and indicates that 19% of BPDM, 18% of RLM and 25% of Ward 34's population were unemployed.

Table 59: Employment

Demographics	Bojanala Platinum DM	Rustenburg LM	
		Rustenburg LM	Ward 34
Unemployment 2011 (official)	19%	18%	25%
Employed (2011)	42%%	49%	45%
Youth Unemployment 2011	39.1%	34.7%	Not Available

### 10.17.7 ECONOMIC SECTORS AND ACTIVITIES

Between 2013 and 2017, the BPDM experienced economic growth in the majority of its sectors, including Manufacturing, Electricity, Construction, Trade, Transport, Finance and Community services. Mining experienced the highest growth, contributing 50.8% to the Gross Domestic Product in 2017, while Agriculture had the smallest contribution at 1.2%. Despite its comparative advantage in Mining, the district faces a disadvantage in the other sectors, which are considered underdeveloped and non-competitive at the Provincial level (BPDM IDP, 2022). Refer Figure 78 in this regard.



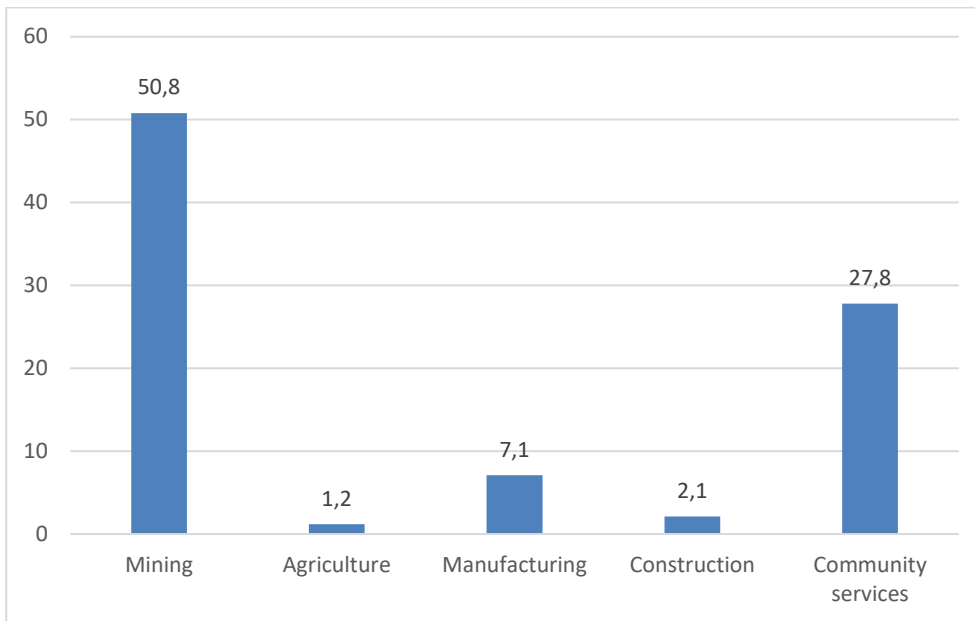


Figure 78: Bojanala District economic sectors: Contribution to GDP

The mining sector has been on an upward trend since 2002 due to the increased demand for platinum. The district has the two largest platinum producing mines, i.e. Impala Mine and Marikana Mine, and other minerals mined include tin, chrome, granite, lead, and slate. In addition to employment, mines also provide markets for local Small Medium and Micro Enterprises (SMME), opportunities for forwarding linkages, and opportunities for small-scale mining of construction minerals to engage in first economy activities, thereby narrowing the gap between the two economies (BPDM IDP, 2022).

Even though Agriculture is one of the smallest economic contributors in the BPDM, it remains a significant industry, especially in the Madibeng and Kgetleng Rivier municipal areas. Agriculture accounts for about 1.2% of the total GDP (BPDM IDP, 2022). In addition, the agricultural subsistence sector in the communal areas is an important contributor to livelihoods.

Tourism is important for the development of commercial organizations and improving the economy, and it can contribute significantly to the well-being and prosperity of residents. BPDM has many tourist attractions, such as Sun City/Lost City Complex, Pilanesberg Game Park, and Hartbeespoort dam, which host recreational activities. In 2013, there were 2.9 million domestic tourists and 1.5 million international tourists, but the number of domestic tourists declined between 2013 and 2017, while international tourists increased (BPDM IDP, 2022).

## 10.18 BLASTING AND VIBRATION

A Blast Impact Assessment was compiled by Blast Management and Consulting (Pty) Ltd. A copy of the report can be found in Appendix 19.

### 10.18.1 METHODOLOGY

The plan of study consisted of the following:

- Site visit.
- Identifying surface structures / installations that are found within reason from project site.
- Base line influence or Blast Monitoring.
- Site evaluation.
- Reporting.

### 10.18.2 SENSITIVITY OF PROJECT

Three different areas were identified:

- A highly sensitive area of 500m around the mining area;
- An area of 500m to 1500m around the pit can be considered as being a medium sensitive area; and
- An area greater than 1500m is considered low sensitivity.

Figure 79 shows the sensitivity mapping with the identified points of interest (POI) in the surrounding area of the proposed project area.

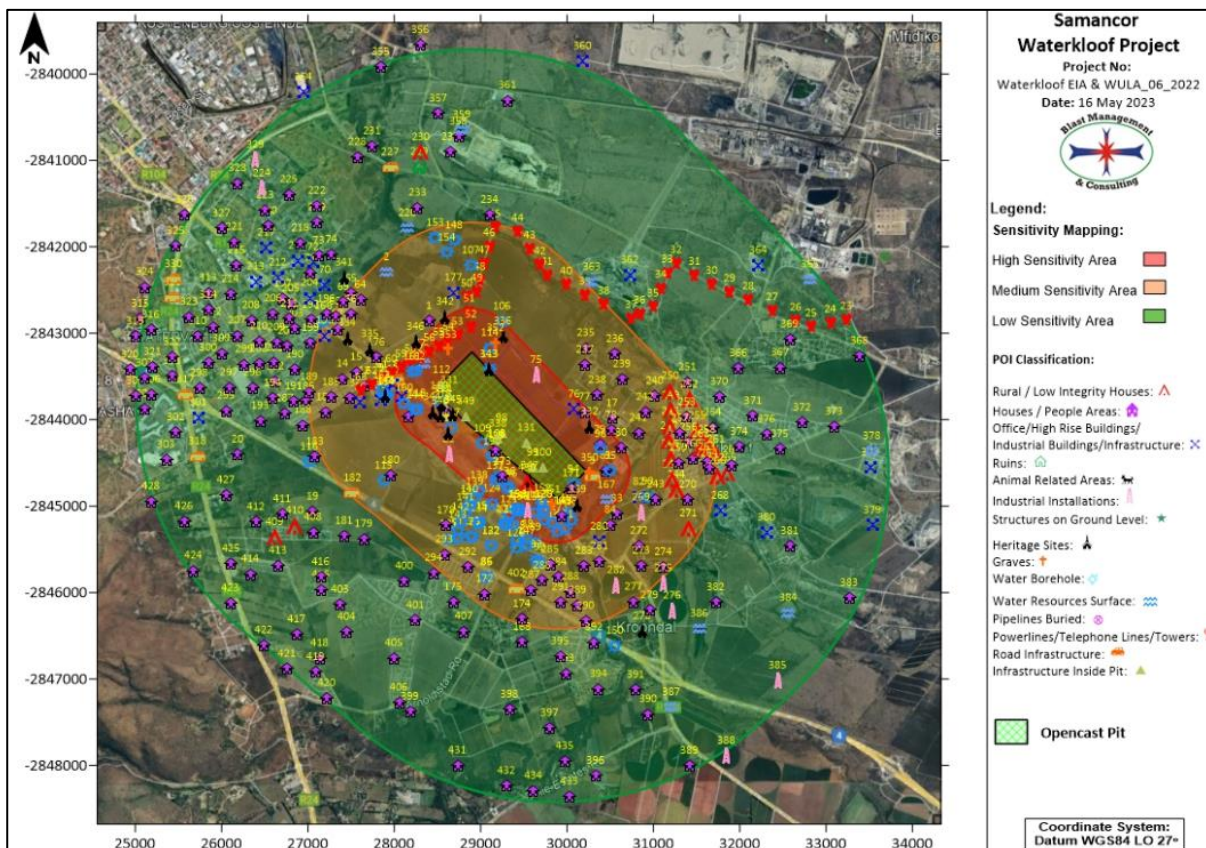


Figure 79: Identified sensitive areas

### 10.18.3 BASELINE STRUCTURE PROFILE

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 Table 60 below.

A list of structure locations was required to determine the allowable ground vibration limits and air blast limits. Figure 79 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 60. The classification used is a BMC classification and does not relate to any standard or national or international code or practice. Table 60 shows the descriptions for the classifications used.

Table 60: 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

A list of all POIs can be found in Table 6 of the specialist report attached as Appendix 19.

## 11 DESCRIPTION OF SPECIFIC ENVIRONMENTAL FEATURES AND INFRASTRUCTURE ON THE SITE

### 11.1 ENVIRONMENTAL FEATURES

The proposed Millsell-Waterkloof Section is located outside of the Magaliesberg Biosphere Reserve and the Important Bird Area. As per the North West Biodiversity Sector Plan, the largest portion of the project area falls within a terrestrial CBA2 area, with sections indicated as an aquatic ESA2.

The proposed Millsell Waterkloof Section is located within the Kroondal / Marikana Strategic Groundwater Source Area. It also lies within SANBI’s Bushveld Bankenveld Biodiversity Priority Area. A channelled valley bottom wetland is also located within the project area. The project area is located close north-east of the Kgaswane Nature Reserve and North of the Magaliesberg Natural Protected Environment.

### 11.2 EXISTING INFRASTRUCTURE ON THE STUDY AREA AND IN CLOSE PROXIMITY

There is existing mining infrastructure for the Millsell Waterkloof Sections in the project area, as described

in Section 3. Other existing infrastructure includes residential areas, farmhouses and other agricultural infrastructure. The N4 highway and the R104 lie in close proximity to the project area.

## 12 DESCRIPTION OF THE CURRENT LAND USES

*(Show all environmental and current land use features)*

The Millsell Waterkloof Section is situated on an existing mining right area. Land uses associated with the mining right are:

- Underground mining,
- The existing Millsell Waterkloof operations,
- Mixed land uses (subsistence and commercial farming),
- Degraded and bare areas,
- Drainage and wetland areas,
- Dirt roads, and
- Major road (R104).

Land uses associated within the proposed opencast project area include:

- Farming and commercial activities,
- Drainage and wetland areas,
- Informal cemetery (Site F05), and
- Buildings.

### 12.1 SENSITIVE LANDSCAPES

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

Table 61: Sensitive Landscapes within the Mining Site

Types of Sensitive Landscapes	Occurrence at the Mining Site
<b>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.</b>	Ecological assessments have been conducted on the proposed mining areas.  Refer to Sections 10.5, 10.6 10.7, 10.8 and 10.10 above for the assessment and baseline findings regarding the ecological assessment, aquatic ecology, wetlands found on site, hydrogeological and hydrogeological updates found and assessed on-site (and within 500 m of the project area).
<b>Sensitive physical environments - such as unstable soils and geotechnically unstable areas.</b>	A Hydrogeological assessment was undertaken. Refer to Section 10.10 above for baseline findings.
<b>Important natural resources - river systems, groundwater systems, high potential agricultural land.</b>	All of these aspects have been assessed by specialists and is described in the baseline environment section (Section 10).
<b>Sites of special scientific interest</b>	None known.
<b>Sites of social significance - including sites of</b>	Refer to Section 10.13 and 10.14.

<b>archaeological, historic, cultural, spiritual or religious importance and burial sites.</b>	
<b>Sites of outstanding natural beauty, panoramic views and scenic drives</b>	The area has already been impacted by mining activities, roads and agricultural activities.
<b>Green belts or public open space in municipal areas</b>	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 and may be viewed there.

#### 13.1 SURFACE WATER AND AQUATIC ECOLOGY 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.

#### 13.2 AQUATIC ECOLOGY

- 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.

### **13.3 TERRESTRIAL ECOLOGY**

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.

### **13.4 SURFACE WATER AND AQUATIC**

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.

### **13.5 WETLANDS**

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). A site visit was also undertaken during August 2021, where dry conditions and burning was evident, but no functionality assessment was undertaken at the time. Therefore, no temporal trends for the respective seasons have been assessed.

- The study focussed on the identification, delineation and functional assessment of wetlands found within/along the 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 Channelled Valley-bottom wetlands and did not include an assessment of the downstream Hex River. This was assessed by another specialist as part of the Aquatic Ecology Impact Assessment.
- Sampling by its nature means that the entire study area cannot be assessed. Only a few 100 m x 100 m transects were studied and extrapolation (based on aerial imagery) was used for the areas in-between transects. Therefore, the assessment findings are only applicable to the areas sampled and extrapolated to the rest of the study site.
- It is noted that the soil in the temporary zone of the channelled valley bottom wetland was disturbed in various areas as a result of agricultural and mining activities, and therefore the determination of the outer boundary of the temporary zone was difficult. Thus, the wetland boundary was determined

to be the surrounding land uses (agricultural and mining activities) in certain areas.

- 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.
- 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 will be adhered to.

## 13.6 HYDROGEOLOGY

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.

## 13.7 AIR QUALITY

### Assumptions

- Data/information provided by the client and used as input into the model were assumed to be accurate and complete at the time of modelling;
- Construction was assumed to occur during the day for 10 hours a day for 7 days a week, 180 days

a year, based on information provided by the client.

- Construction will be done using a phased approach and was thus assumed to take place mainly over areas designated for surface infrastructure associated with the proposed Waterkloof opencast mining activities (including the haul road, crushing pad, topsoil, waste/overburden dump areas, etc). Thus, a total of five different areas/sections were considered for the initial phase of construction.
- All mining activities, except drilling and blasting, were assumed to occur for 20 hours a day for 7 days a week, based on information provided by the client;
- Drilling was assumed to occur five days a week (as confirmed by the client) between 08:00 – 16:00 (hours of operations assumed);
- Blasting was assumed to occur for 2 hours a day for 2 days a week (based on information provided by the client);
- A total of 30 drill holes were estimated as information on the number of drill holes was not known at the time of modelling;
- Blasting area size was assumed to be 5 000m<sup>2</sup> (100m x 50m) as information on blast area size was not known at the time of modelling. This was based on blasting area size at a similar mine;
- Material throughputs were based on the information provided by the client and include:
  - o A maximum annual production rate of 1,134,000 tonnes of ROM from the proposed Waterkloof opencast pit at the mine;
  - o A maximum annual production rate of ~3,969, 000 tonnes of overburden from the proposed Waterkloof opencast pit at the mine (assuming a ROM: Overburden strip ratio of 1:3.5, based on operations at a similar mine, since the exact quantity of overburden was unknown at the time of modelling);
  - o An hourly throughput of 220 tonnes of ROM tipped into the primary crusher; and
  - o An hourly production rate of 220 tonnes of crushed material from the primary crusher.
- Mitigation measures that were considered in this study were limited to measures confirmed by the applicant (Samancor) at the time of the dispersion modelling exercise and included:
  - o water spraying on the unpaved haul route, assumed to achieve 40% control efficiency (i.e. route from pit area to overburden and ROM stockpiles).
- The location, dimensions - including maximum heights for stockpile areas, and exact footprints for the modelled sources were assumed based on the information provided by client. Where information was unknown, assumptions were made;
- Design capacities and models of equipment sources (trucks, excavators and bulldozers) were assumed based on information provided by the client.

#### Limitations

- Detailed information for each emission source is required for input into the model, such as the dimensions, material throughputs, material characteristics and the exact locality of the sources. In some instances, not all these details are known. To account for the emissions, assumptions and estimates were made where necessary.
- The study is limited by the amount of detailed information that could be provided at the time of modelling.

## Exclusions

Activities that are not associated with the project and occur outside the scope of the proposed Waterkloof opencast mining area were not included in the assessment. These may include any potential background emission sources. Background sources are excluded as detailed information for these is required for input into the model and is not readily available. Furthermore, the assessment focused on the impact of emissions attributable to emission source activities associated with the proposed Waterkloof opencast mining project, specifically.

## **13.8 NOISE**

### 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 dB.
- 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
- Meteorological conditions can influence noise measurements. These include inversion and diffraction in the temperature layer, change in temperature and humidity etc.
- No longer-term measurements could be conducted as no safe area exists to conduct longer term measurements. 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.

### Modelled Scenarios:



The assessment of the noise impact of the site 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 center 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 Specific Limitations

Project specific limitations included:

Longer-term measurements (as well as night measurements and 48-hour measurements) are unfeasible due to safety issues of equipment and consultant. Site investigations, measurements (in terms of the SANS10103:2008) and desktop assessment is deemed as sufficient to determine the Rating level. Implementing equipment near a security would also be unfeasible due to the influence of extraneous security noises.

### **13.9 ARCHAEOLOGICAL ASSESSMENT**

Several sections of the study area are associated with dense vegetation that prohibited free movement and visibility. The majority of these areas, however, do not intersect the proposed impact area. A few fenced-off sections located along the border of the study area were noted as well. Also, three of the grave/cemetery sites (F02, F04, F05) are overgrown by dense vegetation that prevented the identification of all graves.

### **13.10 VISUAL ASSESSMENT**

Visual perception is by nature a subjective experience, as it is influenced largely by personal opinions and world views. For instance, what one viewer may experience as an intrusion in the landscape, another may regard as positive. Such differences in perception are greatly influenced by culture, education, and socio-economic background. A degree of subjectivity is therefore bound to influence the rating of visual impacts. To limit such subjectivity, combinations of quantitative and qualitative assessment methods were used. A high degree of reliance was placed on GIS-based analysis viewshed and visibility analysis, and on making transparent assumptions and value judgements where such assumptions or judgements are necessary.

The viewshed generated with Geographic Information Systems (GIS) and Google Earth Pro are not 100% accurate due to unknown developments and modification of the natural environment and presents a limitation. Site visits are therefore used to verify the physical land conditions, such as natural vegetation, topography and or recent building or construction developments.

### **13.11 HYDROPEDOLOGICAL ASSESSMENT**

The following aspects were considered as limitations of the assessment:

- The assessment is based on the design and layout information provided by the client;
- Only the slopes affected by the proposed development have been assessed;
- It has been assumed that the extent of the development area provided by the responsible party is accurate;
- The GPS used for ground truthing is accurate to within five meters. Therefore, the observation site's delineation plotted digitally may be offset by up to five meters to either side; and
- Only a soil auger was used for this assessment, no open pits were dug, and the hydraulic conductivity of the landscape has been inferred based on the soil properties.

### **13.12 BLASTING 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.

### **13.13 SOCIO-ECONOMIC ASSESSMENT**

- Baseline socio-economic data for this SEIA 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 SEIA.
- 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 SEIA study. Additional inputs from stakeholders, where relevant, will be included and could still affect the rating of social and socio-economic impacts.
- 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.

## **14 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 project have been assessed in this document.

Potential impacts that may be caused by the proposed project have been 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;

- Reduced flow to downstream water catchment;
- Potential pollution to water resources (surface and groundwater);
- Drawdown cone from dewatering activities (groundwater quantity);
- 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;
- Decrease in property values;
- 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 will have guided the proposed positioning as well as utilising the transformed/impacted areas, which will limit surface impacts for the project (refer to Section 7 above).

#### **14.3 ISSUES RAISED BY INTERESTED AND AFFECTED PARTIES**

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

#### **14.4 SPECIALIST INVESTIGATIONS**

Several specialist investigations formed part of the in the EIA Phase of the project.

Table 62: Description of aspects assessed by the specialists

Aspect	Specialist Study	Specialist	Terms of Reference
Surface water and Aquatic Ecology	Surface Water (Hydrology) Assessment	Red Kite Environmental Solutions (Pty) Ltd.	<p>The scope of the surface water baseline and impact assessment study will be to:</p> <ul style="list-style-type: none"> <li>• A desktop review of available information for the project area, including satellite images, databases and specialist studies performed for the areas;</li> <li>• Identify impactable water resources, with their accompanying catchments, and sub-catchment areas as well as setting forth information on which measures and legislation will be applicable to the project;</li> <li>• A field visit to survey the affected watercourses;</li> <li>• If site conditions allow, two monitoring sites in the potentially affected rivers / streams will be assessed for the aquatic assessment, the following methodology will be used:               <ul style="list-style-type: none"> <li>○ SASS5 (South African Scoring System version 5),</li> <li>○ IHAS (Invertebrate Habitat Assessment system), and</li> <li>○ Upstream and downstream water quality sampling (2 samples).</li> </ul> </li> <li>• Determine or recommend ranges of acceptability for water quality for affected watercourses and compare to existing water quality monitoring data;</li> <li>• Describe riparian vegetation associated with identified surface water resources;</li> <li>• Determination of watercourse buffers as per Buffer Zone Guidelines for Wetlands, Rivers and Estuaries by Macfarlane and Bredin (2017);</li> <li>• Surface Water Assessment Report describing the affected surface water environment and condition;</li> <li>• NEMA 2014 impact assessment;</li> <li>• Developing a sensitivity map based on field visits and supported by appropriate regional information to inform the impact assessment;</li> <li>• Recommendation of site-specific mitigation measures; and</li> <li>• Compilation of a specialist surface water and aquatic ecology assessment report for the development footprint and associated buffers detailing the methodology and findings of the assessments, in compliance with the procedures for assessment and reporting on aquatic biodiversity as per GN320 of 20 March 2020.</li> </ul>
Water Balance	Water Balance Report	GFK Consulting Engineers (Pty) Ltd.	<p>The approach as contained in the Department of Water and Sanitation’s “Best Practice Guideline G2: Water and Salt Balances”, with the following Scope of Work to be undertaken:</p> <ul style="list-style-type: none"> <li>• Define water balance boundaries;</li> <li>• Identify water circuits and develop schematic flow diagram;</li> <li>• Data collection;</li> <li>• Solve water balance for identified units; and</li> </ul>



Aspect	Specialist Study	Specialist	Terms of Reference
Air Quality	Ambient Air Quality Impact Assessment	Tikotech (Pty) Ltd.	<ul style="list-style-type: none"> <li>• Compile conceptual water balance report.</li> </ul> <p>The air quality impact assessments (AQIA) will entail the following steps:</p> <ul style="list-style-type: none"> <li>• Desktop analysis, using amongst others satellite imagery. Consider the location, the airshed priority, the background air quality, the surrounding land use and existing sources and the receptors within a 10km radius of the site.</li> <li>• Site visit and on-site inspection.</li> <li>• Draft a site sensitivity verification report in line with the site sensitivity requirements where a specialist assessment is required but no specific assessment protocol has been prescribed as set out in Government Notice (GN) Number 320, in Government Gazette (GG) 43110.</li> <li>• Understand of the nature and extent of the operation and the air pollutants of concern.</li> <li>• Further investigate the nature and extent of the environment surrounding the operation (such as topography and weather).</li> <li>• Develop an emission inventory. The emission inventory will be developed based on emission factors and any available emission sampling reports (where available). Where emission factors are not available, emissions will be estimated based on reasoned assumptions. The emission inventory will be limited to criteria pollutants related to the activities.</li> <li>• Identify appropriate regulatory requirements, standards and guidelines.</li> <li>• Determine the assessment level and choose an appropriate model.</li> <li>• Plan the study.</li> <li>• Set the model up for the chosen scenarios.</li> <li>• Run model on software for different chosen scenarios.</li> <li>• Simulate the dispersion of the air pollutants for the chosen scenarios.</li> <li>• Review any warning and informational messages within modelling output files.</li> <li>• Compare the simulated ground level concentrations to the national ambient air quality standards and international guidelines.</li> <li>• Conduct a risk assessment using the Environmental Assessment Practitioner’s risk assessment methodology.</li> <li>• Prepare a report that follows the requirements as set out in the regulations prescribing the format of the Atmospheric Impact Report, GN R284 of 2015 under NEM: AQA and in Appendix 6 of the EIA Regulations, GN 982 of 2014 under NEMA (as amended).</li> </ul>
Noise	Environmental Noise Impact Assessment	EnviroRoots (Pty) Ltd.	<p>The study will determine the potential noise impact on the surrounding environment due to the proposed project. The purpose of this study will be to:</p> <ul style="list-style-type: none"> <li>• Establish baseline conditions of the area;</li> <li>• Model noise generated by proposed activities through Measurements conducted at</li> </ul>

Aspect	Specialist Study	Specialist	Terms of Reference
			<p>receptors (I&amp;APs or noise sensitive developments) in terms of SANS10103:2008, National environmental Act (Act No. 107 OF 1998), GN NO. 326 and GN R154 (National Noise Control Regulation) methodology. A minimum of 10-minute day and night measurements will be conducted (day/night as per SANS10103:2008).;</p> <ul style="list-style-type: none"> <li>• Determine impact of activities;</li> <li>• Identify gaps and limitations; and</li> <li>• Establish mitigation and management measures.</li> </ul>
Visual	Landscape/Visual Impact Assessment	Elemental Sustainability (Pty) Ltd.	<p>The scope of work for this Visual Impact Assessment will include:</p> <ul style="list-style-type: none"> <li>• Describe the existing visual characteristics of the proposed sites and its environs;</li> <li>• Viewshed and viewing distance using GIS analysis up to 15 km from the proposed structures;</li> <li>• Visual Exposure Analysis;</li> <li>• Consider, evaluate and rate the potential visual impacts; and</li> <li>• Propose relevant management and mitigation measures to lessen the anticipated impacts.</li> </ul>
Blasting and Vibration	Blasting and Vibration Impact Assessment	Blast Management & Consulting (Pty) Ltd.	<p>The following scope of work is suggested and reported.</p> <ul style="list-style-type: none"> <li>• Site Review and Information Capture</li> <li>• Modelling and report</li> <li>• A detailed EIA study report will be prepared and presented using data captured and information provided. The following aspects will be considered and presented as different sections in a final report:</li> </ul> <ol style="list-style-type: none"> <li>1 Introduction</li> <li>2 Background information of the proposed site</li> <li>3 Mining operations and / or Blasting Operation Requirements</li> <li>4 Site specific aspects applicable:               <ol style="list-style-type: none"> <li>a. Ground vibration explanation, prediction, modelling and related impacts</li> <li>b. Air blast explanation, prediction, modelling and related impacts</li> <li>c. Fly-rock explanation, prediction, modelling and related impacts</li> <li>d. Noxious fumes Information</li> </ol> </li> <li>5 Impact Evaluation</li> <li>6 Mitigations and recommendations</li> <li>7. Conclusion</li> </ol>
Groundwater	Geohydrological Impact Assessment	Geo Pollution Technologies – Gauteng (Pty) Ltd.	<p>The following scope of work as per the requirements for water use license applications is foreseen:</p> <ul style="list-style-type: none"> <li>• Hydrocensus of the area and aquifer testing of three (3) available boreholes.</li> </ul>

Aspect	Specialist Study	Specialist	Terms of Reference
			<ul style="list-style-type: none"> <li>• Model update based on available data (water quality, levels and geochemical information).</li> <li>• Water quality report and impact assessment based on available data and modelling.</li> </ul> <p>Existing data will be used to quantify the potential impact on the receiving environment. A geohydrological report will be drafted which can be submitted to regulators.</p> <p>A hydro census covering at least an area of 1 km surrounding the proposed opencast will be done to gain water quality and water level information. This will be followed by aquifer testing using an 8 hour constant discharge test of three (3) identified boreholes.</p> <p>Predictive modelling using available data for impact prediction will be done to quantify potential impacts from mining:</p> <ul style="list-style-type: none"> <li>• Groundwater flow, transport modelling to predict the impacts of the mining on groundwater quantity and quality in the region of the mine (Positive and negative).</li> <li>• A groundwater management and a monitoring network plan will be included in the report.</li> <li>• The report can be discussed with the client and relevant authorities.</li> <li>• Further drilling and aquifer tests might be required on completion of the impact predictions to quantify the impacts.</li> </ul> <p>A report detailing the findings of the study will provided in the format of regulations regarding the procedural requirements for water use license applications and appeals, specialist groundwater study (published, March 2017). A final report can be made available 12 weeks from date of appointment.</p>
Waste Classification	Waste Classification	Elemental Sustainability (Pty) Ltd.	The overall objective of the assessment will be to perform a waste classification as per the General National Regulation 635 of the Waste Act 59 of 2008.
Heritage	Archaeological and Cultural Heritage Impact Assessment	Mr. Tobias Marais	Phase 1 Heritage Impact Assessment (HIA) for the proposed application.
Biodiversity (Fauna and Flora) Assessment	Terrestrial Biodiversity Impact Assessment	Enviridi environmental (Pty) Ltd.	<p>The terms of reference for this impact assessment study will be as follows:</p> <ul style="list-style-type: none"> <li>• A baseline assessment is conducted to establish whether any potentially sensitive species/receptors might occur on the study sites.</li> <li>• A desktop review of the conservation context of the site in relation to areas of biodiversity importance based on available conservation planning for the</li> </ul>

Aspect	Specialist Study	Specialist	Terms of Reference
			<p>Province/Municipal area;</p> <ul style="list-style-type: none"> <li>• A field visit to survey habitats (concentrating on untransformed areas) in order to obtain an indication of the current status of mapped vegetation units (vegetation composition, condition of habitats, etc.);</li> <li>• Searching out of potential breeding zones and sensitive habitat types required for optimal biodiversity or sensitive species that might inhabit these areas;</li> <li>• An assessment of the potential of habitats to support key flora and fauna species of conservation concern identified as potentially occurring on the site;</li> <li>• Developing a terrestrial biodiversity sensitivity map for each of the project areas based on field visits and supported by appropriate regional information to inform the impact assessment;</li> <li>• An assessment of potential impacts, including cumulative impacts, to terrestrial biodiversity of the project area;</li> <li>• Recommendation of site-specific mitigation measures; and</li> <li>• Compilation of a specialist terrestrial ecology assessment report for the development footprint and associated buffers detailing the methodology and findings of the assessments, in compliance with the procedures for assessment and reporting on terrestrial biodiversity as per GN320 of 20 March 2020.</li> </ul> <p>The terms of reference for the Vegetation Assessment will be as follows:</p> <ul style="list-style-type: none"> <li>• Describe the affected floristic environment from available literature and by means of a desktop study to identify a list of possible floral species that are likely to occur on site.</li> <li>• List and record endangered, red data and protected plant species found on site.</li> <li>• List exotic and invasive plant species found on site.</li> <li>• List plants found on site with medicinal properties.</li> <li>• Identification of anticipated impact of the proposed project on the vegetation and ecosystem services.</li> <li>• Provide proposals for mitigation of identified impacts.</li> <li>• Draw up a sensitivity map indicating all sensitive areas, transformed areas and buffers around sensitive features.</li> </ul> <p>The main objectives of the fauna study will be as follows:</p> <ul style="list-style-type: none"> <li>• To provide a description of the potentially affected fauna habitat by making use of available literature resources, and in so compiling a list of fauna species likely to occur on site;</li> </ul>

Aspect	Specialist Study	Specialist	Terms of Reference
			<ul style="list-style-type: none"> <li>To list and record endangered, red data or protected fauna species found or likely to occur on site;</li> <li>To assess the condition of suitable habitat on site for sensitive fauna species;</li> <li>To compile a sensitivity map indicating sensitive or non-sensitive or transformed areas and relevant buffer zones;</li> <li>To identify anticipated impacts of the proposed development on fauna species; and</li> <li>To provide mitigation measures to limit and/or eliminate the anticipated impacts.</li> </ul>
Social Assessment	Socio-Economic Impact Assessment	Index Social Services	<p>The purpose of a SIA is to identify and assess any possible and probable socio-economic related impacts that could manifest as a result of the proposed development; and then to propose workable mitigation measures to alleviate the negative impacts and enhance positive outcomes of the project. However, a SIA cannot be done in isolation and is highly dependent on inputs from the community and key role-players through the EIA public participation process (PPP) and where applicable impacts are aligned with Specialist studies done for the EIA. The analysis and rating of impacts further require input from the mining company through the SLP, MWP and other sources. Since the SIA is reliable on community perceptions and expectations, the information obtained through public and individual consultation is key to the rating process and for the formulation mitigation measures.</p>
Traffic	Traffic Impact Assessment	Corli Havenga (Pty) Ltd.	<p>This study would be conducted by traffic specialists from the consulting engineering firm Corli Havenga Transportation Engineer. The study would establish the baseline traffic volumes by means of traffic counts, calculate project-related contributions to baseline traffic volumes, evaluate the performance and layout of intersections, provide input on road conditions and the design of the access point, assess potential impacts associated with each of the project phases, recommend any road and safety improvements and develop a traffic management plan.</p>
Geotechnical Assessment	Geotechnical Impact Assessment	GFK Consulting Engineers (Pty) Ltd.	<p>Geotechnical assessment: will provides the results of the geotechnical investigation and provides recommendations in terms of subgrade materials, foundations, slope stability, excavatability, earthworks, stormwater drainage, and material usage.</p>
Soil and Land Capability	Soils and Land Capability, including Agricultural Potential	Index (Pty) Ltd.	<ul style="list-style-type: none"> <li>The Millsell Waterkloof area will be assessed using available desktop data.</li> <li>The desktop survey will inform the most suitable options for the conveyor belt alignment. The three best possible options will be selected for detailed site assessment.</li> <li>The assessment includes: <ul style="list-style-type: none"> <li>The site survey will be conducted by physical soil classification at a survey point every 150 m apart. The information, together with other data such as contours, will be used to classify the area into land capability classes following both the DAFF system as well as the guidelines outlined by the South African Chamber of Mines.</li> </ul> </li> </ul>



Aspect	Specialist Study	Specialist	Terms of Reference
			<ul style="list-style-type: none"> <li>- Six soil samples will be collected for soil analysis of basic soil fertility parameters and also to inform the soil monitoring recommendations.</li> <li>- The agricultural potential of the area will be determining using the baseline soil properties as well as climate data. The area will also be assessed for other agricultural production options such irrigated agriculture and livestock production.</li> <li>- The report will be compliant with the NEMA regulations for specialist studies as well as other legislation relevant to the fields of soil and agricultural potential.</li> </ul> <p>For the impact assessment, a methodology recommended by Elemental Sustainability (Pty) Ltd will be used.</p>
Wetland	Delineation and Functionality Assessment	Elemental Sustainability (Pty) Ltd.	<ul style="list-style-type: none"> <li>• Review available desktop data for the baseline receiving environment (site specific study area, as well as the general surroundings) (Bioregional Conservation Plans, NFEPA).</li> <li>• Undertake a desktop delineation of all wetlands within the footprint of the application area and within the extended 500 m DWS Regulated Area.</li> <li>• Undertake a site visit to delineate wetland boundaries in the field as per the DWAF Wetland Delineation Guidelines (DWAF, 2005; 2008).</li> <li>• 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 et al. (2013).</li> <li>• Determine the Present Ecological State (PES) using WET-Health (Version 2) and conduct a Level 2 Rapid Field-based Assessment (Macfarlane et al, 2020).</li> <li>• 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.</li> <li>• 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 et al, 2020) considering the landscape setting and information recorded on site.</li> <li>• Identification and description of existing impacts.</li> <li>• Conduct an Impact Assessment as specified by the Environmental Impact Assessment Regulations of 2014 (As amended) to determine the possible impact of the project on the wetland/s;</li> <li>• Discuss appropriate mitigation and management procedures relevant to conserving wetland areas on site.</li> <li>• Compilation of a detailed wetland delineation and functionality assessment report.</li> </ul>

Aspect	Specialist Study	Specialist	Terms of Reference
Closure and Rehabilitation	Closure and Rehabilitation Plans including Financial Provision – GNR 1147	Elemental Sustainability (Pty) Ltd.	The financial provision for the proposed project will be determined by Elemental Sustainability and would be determined in accordance with the NEMA Regulations (1147 of 2015) pertaining to the financial provision for mining operations.
Floodline Determination and Engineering Designs	Stormwater Management Plan, for plant, tailings dam facility and Engineering Designs Hydrology Assessment and Floodlines	GFK Consulting Engineers (Pty) Ltd.	<ul style="list-style-type: none"> <li>• Determination of floodlines for streams crossing the project area;</li> <li>• Clean and dirty water separation berms;</li> <li>• Preliminary Pollution Control Dam designs;</li> <li>• Preliminary overburden, ROM and Stockpile pad designs;</li> <li>• Preliminary domestic water and sewage disposal designs;</li> <li>• Preliminary drawings for access control, fences and roads; and</li> <li>• Preliminary design report for WULA.</li> </ul>
Hydropedology	Hydropedological Modelling and Impact Assessment	Eco Assist Environmental Consulting	The hydropedological impact assessment will be conducted. Hydropedological surveys aim to characterise dominant surface and sub-surface flowpaths of water through the landscape to wetlands and streams or groundwater and how the proposed project impacts this.

## **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 – 22). The specialist investigations which included modelling, such as groundwater, noise, visual, air 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**

The impacts on agriculture and soils follows:

- There will be no loss of high potential land. No impact and no mitigation required.
- 1 100 ha of grazing land will be lost. The impact is low.
- 438 ha of rainfed cultivated land may be lost and will have medium impact.
- 1100 ha of grazing land can potentially be lost for the duration of the mining operation. This is sufficient for a herd of approximately 100 large livestock. The annual loss in income is estimated at about R850 000.
- The number of employees on the present farming activities is estimated at 10. These can be absorbed by mines or be employed in the region.

### **14.5.4 AQUATIC IMPACTS (INCLUDING AQUATIC ECOLOGY AND WETLANDS)**

During construction the following impacts will be experienced:

- 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.
- Alteration in surface water drainage patterns.
- Increased velocity in surface water runoff leading to erosion and consequent sedimentation of surface water resources.

During operations the following impacts will be experienced:

- Potentially contaminated runoff into downstream surface water resources resulting in water contamination, and the deterioration of the water quality.
- Reduction of catchment yield as dirty water runoff within the project area will be contained in the environment.
- 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 leading to decrease and changes in water quantity and availability.
- Nutrient enrichment and leading to decline of Dissolved Oxygen (DO), thereby impacting the aquatic invertebrate communities found in flowing watercourses.
- If rivers are negatively affected, this may lead to a deterioration of the Present Ecological Status (PES).

During decommissioning and closure the following impacts may occur:

- Demolition and removal of all infrastructures, including transporting materials off site.
- Rehabilitation, including shaping, spreading of soil and re-vegetation.
- Removing of roads and 100 mm of underlying material.
- Clearing of stockpile areas and subsequent general surface rehabilitation.
- Removal of the storm water management infrastructure.
- Updating and implementing a monitoring programme appropriate for the closure phase.

#### **14.5.5 IMPACTS ON HYDROGEOLOGY**

During mining the following impacts were identified for the opencast and underground mining:

- Several boreholes in the area surrounding the mine could be affected by the drawdown of the groundwater table, in that their yield might decrease (refer to Table 63 and Figure 80).
- The groundwater table at the Hex River is predicted to decline by about 10 meters. However, it is deduced from the numerical groundwater model that the river is separated from the groundwater by

several metres. If that is indeed the case, no reduction in base flow to the river or additional losses from the river is expected. Confirmation of this prediction is needed through observations at the river.

Table 63: Summary of potential impacts during operation – dewatering

Mining Area	Maximum Drawdown (m)	Cone of depression from pit (m)	Estimated Groundwater Inflow (m3/day)	Potential Impacted Receptor
Opencasts	35	2 500	1 200	Boreholes
Underground	5	1 300	2 500	Hex River

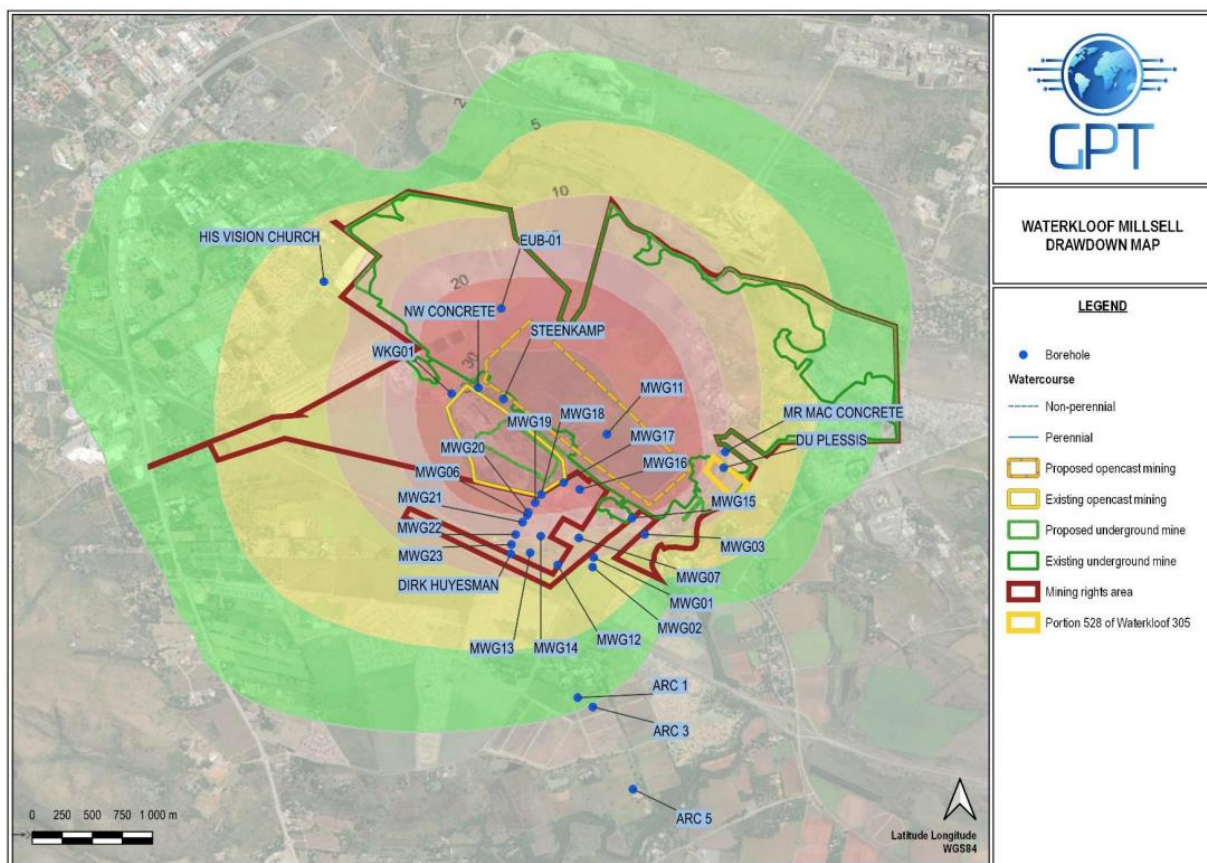


Figure 80: Groundwater drawdown during mining

Post mining impacts:

- No decant from the opencast and underground is predicted by the model, mainly due to the depth to the groundwater level and the flat topography in the area.
- Several boreholes surrounding the mine could be affected by the contaminating emerging from the opencasts in the long term, although the contamination is not expected to exceed the DWS drinking



water standards. This will nevertheless also have to be attended to.

- Although the contamination plume seems to reach the Hex River in about 50 years after closure (Refer to Figure 81) of the mine, the model indicates that the plume will flow below the river in the aquifer without seeping contamination to the river. This will have to be verified.

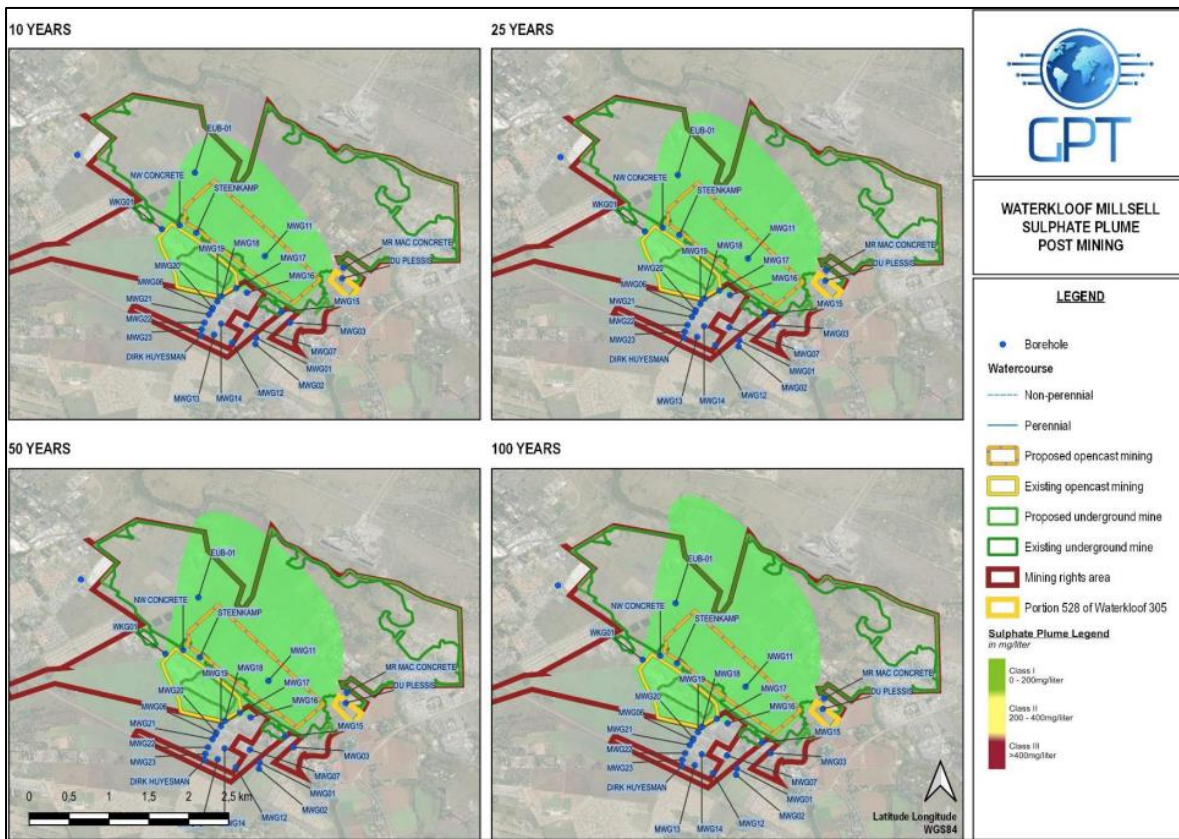


Figure 81: Predicted spread of pollution post-closure of mining

### 14.5.6 IMPACTS ON TERRESTRIAL ECOLOGY

During construction and operational phases similar impacts will be experienced. The impacts are outlined below:

- 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. This could lead to destruction and degradation of habitats and food associated with these specialised habitat areas.
- 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).
- 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.

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.

#### **14.5.7 IMPACTS ON HYDROPEDOLOGY**

The proposed Millsell Waterkloof Sections takes place on one (1) hydroopedological soil transects and will impact the recharge zones (refer to Figure 82 and Figure 83). The impacts were assessed by flow driver risks as well as contamination risks as each risk will have a varied impact on the hydroopedological flow drivers either in impact type or impact magnitude.

- Alteration of landscape through mining and the alteration of flow drivers as a whole.
- Alteration of water quality.

Transect 1 (T1) (refer to Figure 59) was dominated by recharge soils. The soil does not recharge groundwater, but merely stores the water, where it is lost through evapotranspiration. The rainfall is sufficiently low to not cause large amounts of surface runoff and the water holding capacity of the Vertic clays prevents any lateral flows. Therefore, the mining activity does not impact on any groundwater recharge zones, nor does it impact on the surface water or sub-surface water flows. The only concern would be the potential contamination of water within the pits.

The alteration of flow dynamics within the landscape will potentially change to surface runoff dominant systems. These increase flow peaks and flow volumes. The impact is considered Moderate after mitigation. The pit will fill with contaminated water and runoff from roads and other infrastructure will potentially impact surface water resources as well as groundwater resources. This impact was rated to be Moderate after mitigation. The stockpiles will create increased impervious areas, which will promote runoff and erosion. The eroded material may cause contamination downslope. The stockpiles will reduce evaporative loss on the areas utilised. This impact was rated to be Moderate after mitigation.

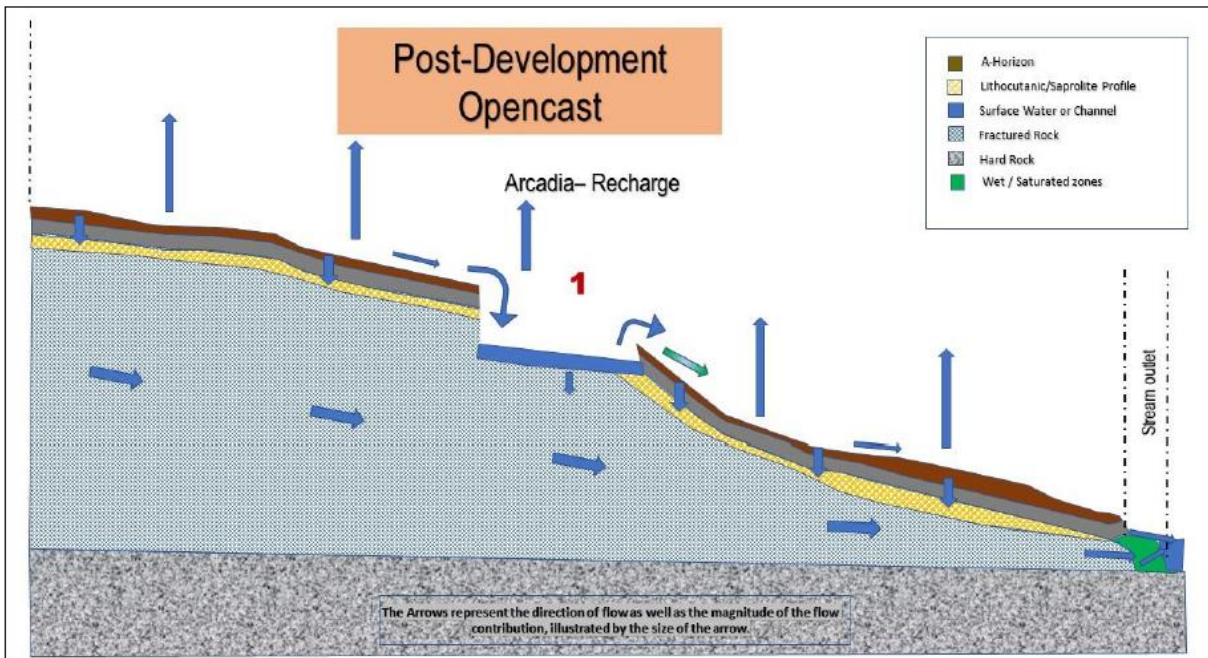


Figure 82: Hillslope hydrology for hydropedological soil catena T1 for the opencast activity

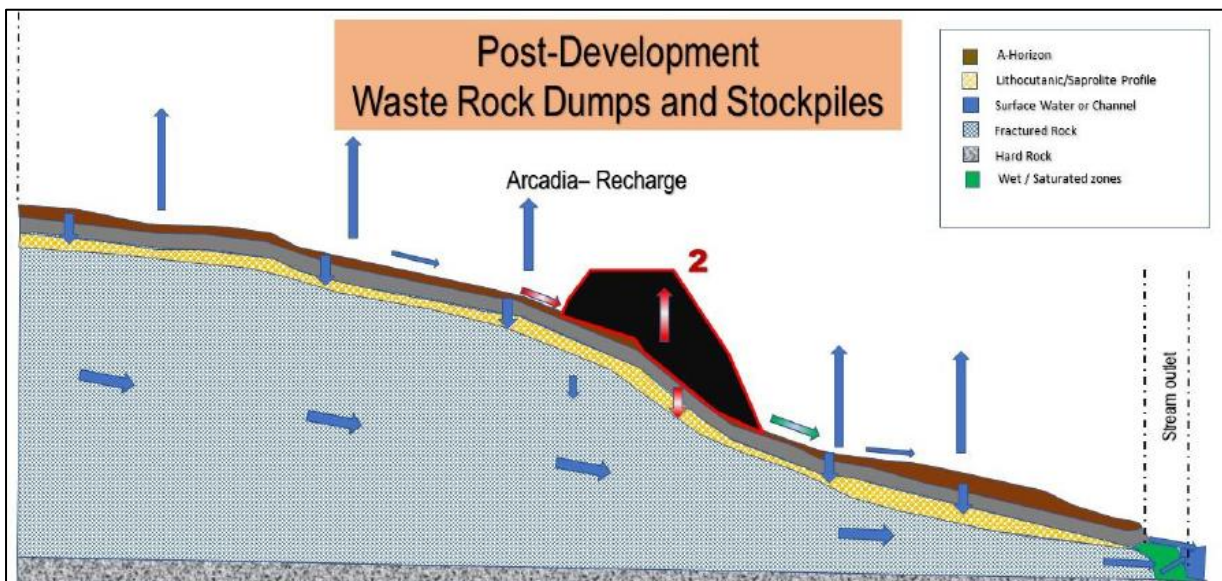


Figure 83: Hillslope hydrology for hydropedological soil catena T1 for the overburden dumps and stockpiling activities

### 14.5.8 VISUAL IMPACT

During construction the following impacts will be experienced:

- Negative impact on aesthetics;
- Negative impact on visibility from sensitive receptors/Viewpoints;
- Change of visual character from a natural landscape to a built/mining landscape; and

- Landscape visual change

During operations the following impacts will be experienced:

- Negative impacts on aesthetics;
- Negative impact on visibility from sensitive receptors/Viewpoints;
- Change of visual character;
- Light pollution (Glare, spill light, sky glow); and
- Landscape visual change.

#### **14.5.9 IMPACTS FROM BLASTING AND VIBRATION**

The location of structures around the Pit area is such that the charge evaluated showed possible influences due to ground vibration. The ground vibration levels predicted for these POI's ranged between 0.4 mm/s and very high for structures surrounding the open pit areas. Ground vibration at structures and installations other than the identified problematic structures is well below any specific concern for inducing 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 468 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.

Based on the drilling and blasting parameters values for a possible fly rock range with a safety factor of 2 was calculated to be 145 m. The absolute minimum unsafe zone is then the 145 m.

#### **14.5.10 TRAFFIC IMPACTS**

During construction nuisance, health and safety risks caused by increased traffic on and adjacent to the proposed area by cars and heavy vehicles. Once the mine is operational, there will be a change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.

#### **14.5.11 NOISE IMPACTS**

The following activities will be noise generating during the construction phase:

- Removal of topsoil or preparation of stockpile;
- General and civil construction; and
- Noisy construction equipment.

For the construction phase, the noise impacts during the day (without mitigation measures) will have a moderate environmental consequence for the receptors R2, R3 and R4 (Refer to Figure 64).

The following activities will be noise generating during the operational phase:

- Blasting for the opencast mining; and
- Loading, hauling and stockpiling of overburden and ROM.

During operations phase, the noise impacts during the day and night will have moderate environmental consequences for the receptor R3 (Refer to Figure 64).

#### **14.5.12 AIR QUALITY IMPACTS**

Based on the dispersion model output plots for the construction phase, predicted incremental dustfall rates, PM<sub>10</sub> and PM<sub>2.5</sub> concentrations are moderately high but mostly in compliance with the applicable limits over the project area. Higher concentrations, including exceedances of applicable standards, are predicted inside the boundary of the proposed Millsell Waterkloof Sections opencast pit area mainly towards the north-east and north-west for dustfall, PM<sub>2.5</sub> and annual PM<sub>10</sub>, and near to the proposed material stockpile areas and haul road. The projected exceedances also extend to nearby surrounding areas located primarily north-west to north-east of the proposed Millsell Waterkloof Sections opencast mining area, but within maximum radii of 820m for dustfall, 1.1km and 600m for daily and annual PM<sub>2.5</sub>, respectively, and 800m for annual PM<sub>10</sub>.

For the operational phase, predicted incremental dustfall rates and PM (PM<sub>10</sub> and PM<sub>2.5</sub>) concentrations are moderately high, but still comply with applicable standards over most of the project area modelled. The predicted concentrations are indicated to exceed the applicable standards near to the proposed surface mining activities associated with the proposed project, and at offsite locations surrounding the opencast mining area towards the north-west, north-east and south-west.

At offsite locations situated south-east of the proposed mining area, predicted incremental concentrations are indicated to mostly comply with applicable standards for all pollutants except daily PM<sub>10</sub>, for which exceedances are projected. Projected exceedances of applicable standards at offsite areas surrounding the proposed mining section are restricted to maximum extents of 720m for dustfall, 1.1km and 6km for daily and annual PM<sub>10</sub>, respectively, & 350m and 1.1km for daily and annual PM<sub>2.5</sub>, respectively.



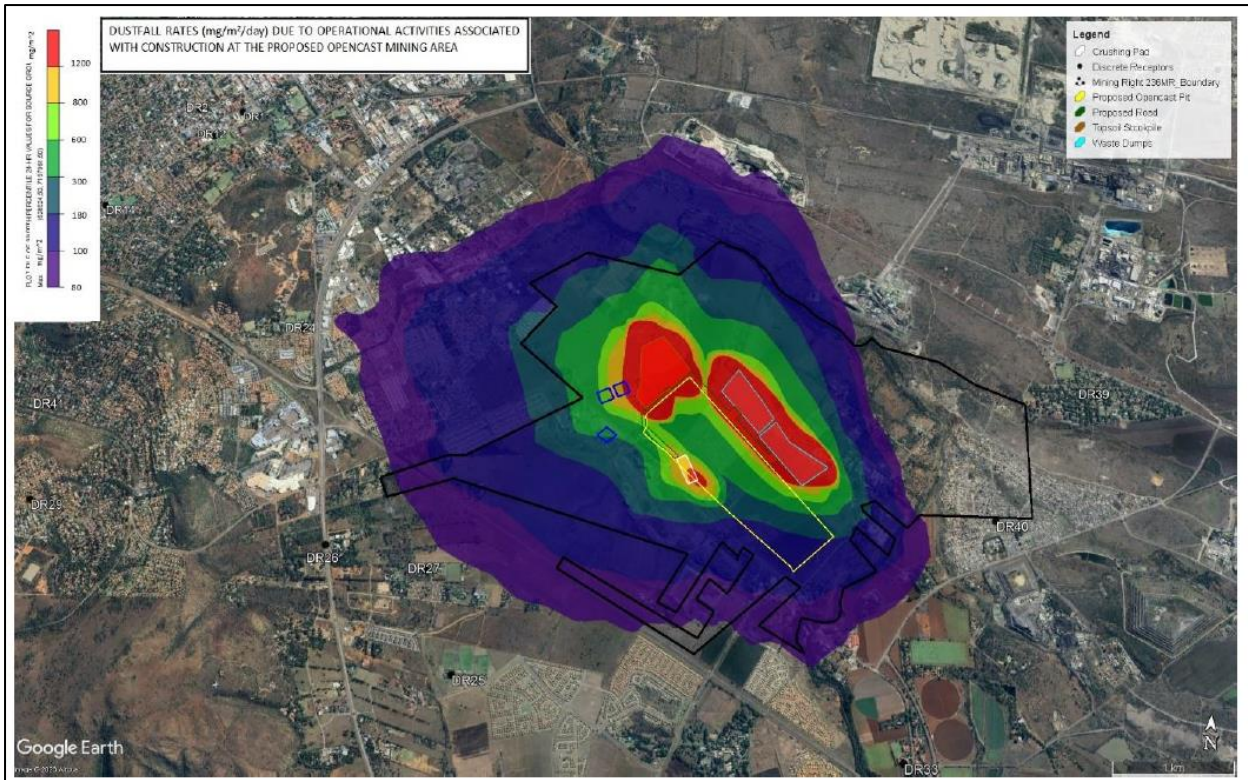


Figure 84: Predicted Dustfall Rates at the proposed Waterkloof opencast mining area - Construction Phase

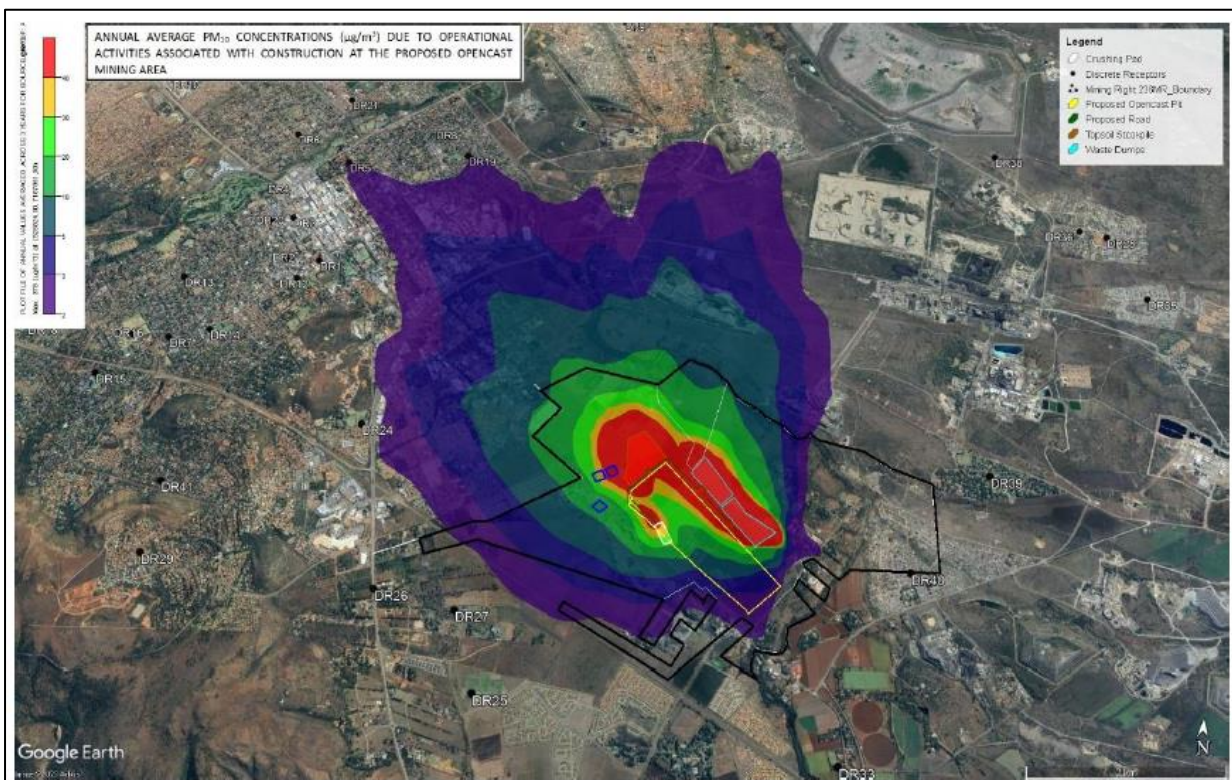


Figure 85: Predicted Annual Average PM<sub>10</sub> Concentrations at the proposed Waterkloof opencast mining area - Construction Phase



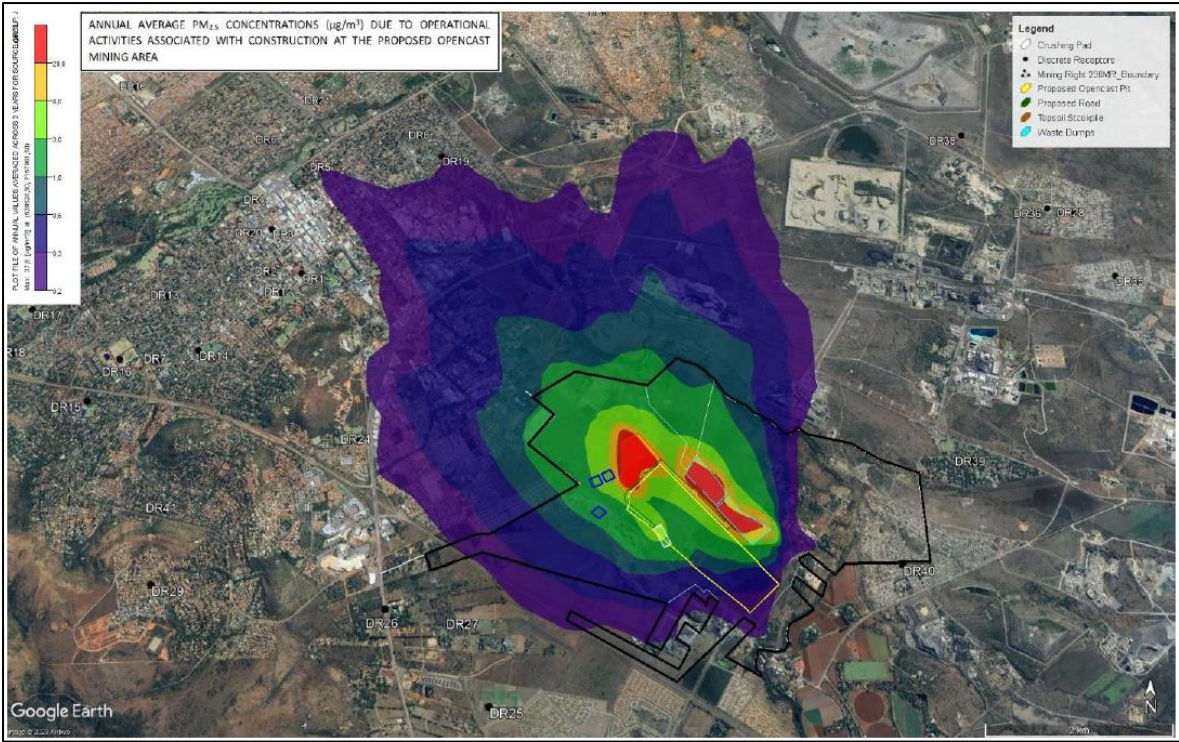


Figure 86: Predicted Annual Average PM<sub>2.5</sub> Concentrations at the proposed Waterkloof opencast mining area - Construction Phase

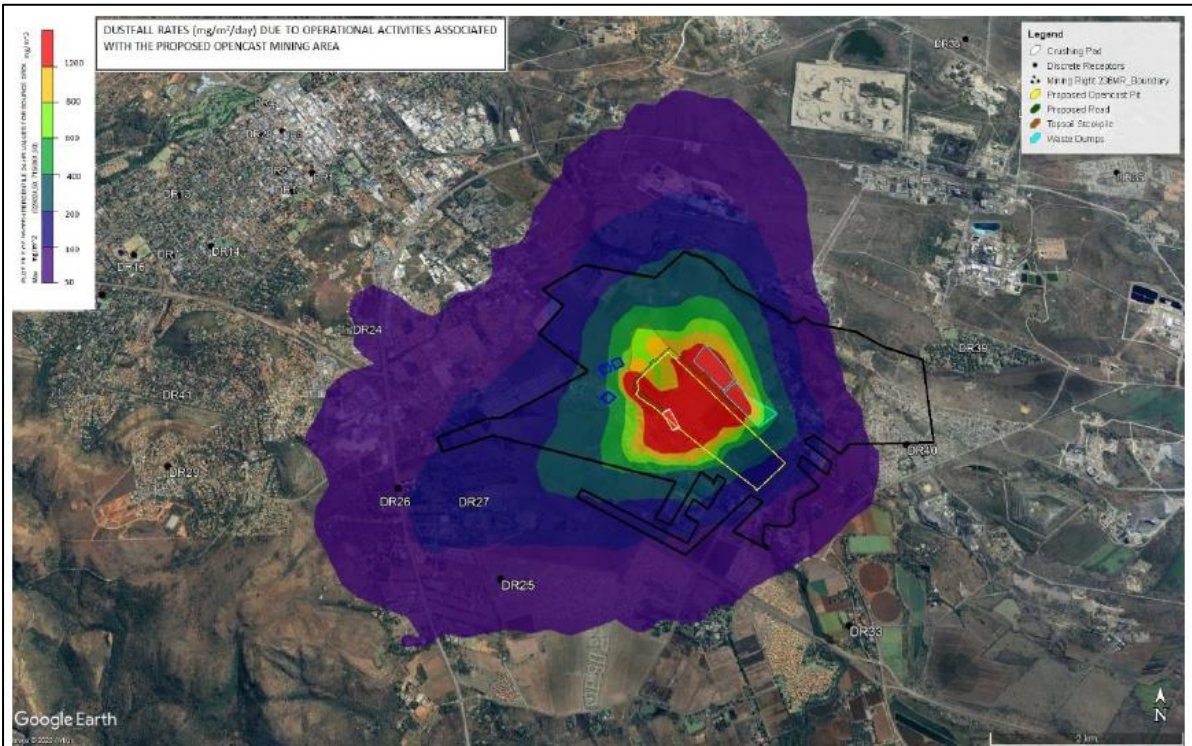


Figure 87: Predicted Dustfall Rates at the proposed Waterkloof opencast mining area - Operational Phase



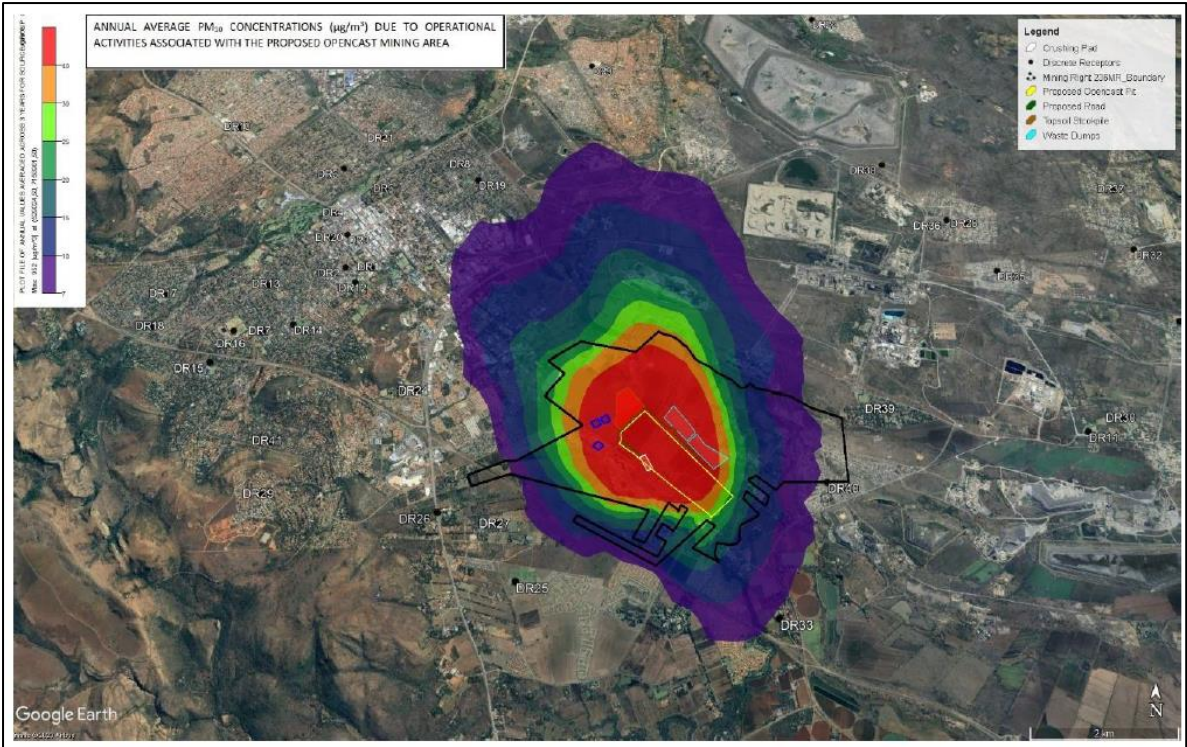


Figure 88: Predicted Annual Average PM<sub>10</sub> Concentrations at the proposed Waterkloof opencast mining area - Operational Phase

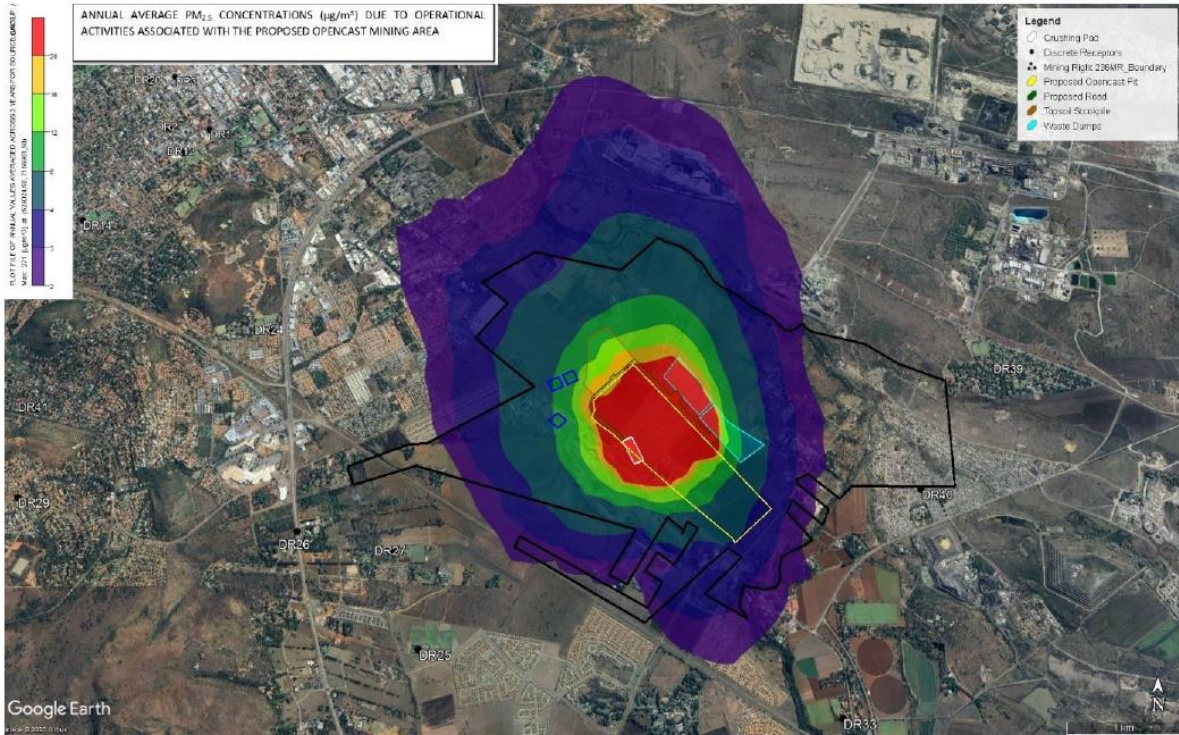


Figure 89: Predicted Annual Average PM<sub>2.5</sub> Concentrations at the proposed Waterkloof opencast mining area - Operational Phase

### **14.5.13 HERITAGE IMPACTS**

The proposed project area is generally associated with cultivated land and a few built-up areas. A total of 41 heritage sites were noted on historical aerial imagery, on topographical maps and during the site inspection: Four cemeteries, 19 historical building sites, and 18 contemporary building sites. The sensitive sites that could be impacted by the proposed mining development are: Two cemeteries (Sites F02 & F05), three intact historical building sites (Sites B07, B08, B15), and four demolished historical building sites (Sites B01, B12, B13, B19).

### **14.5.14 PALEONTOLOGICAL IMPACTS**

No fossils were found on area the proposed project is located. There are no paleontological impacts.

### **14.5.15 SOCIO-ECONOMIC IMPACTS**

Positive impacts associated with the opencast mining project mainly relate to indirect employment and induced economic impacts for the region (low to moderate significance). Whereas sensitive receptors and communities located in close proximity to the Project will mostly be the recipients of the predicted negative impacts, some of which cannot be mitigated easily (sense of place, direct and indirect relocations, devaluation of property values) (low to moderate significance). Impacts on human health and the possibility of fatalities (illegal trespassing, etc.) resulted in the rating of community health and safety risks as high negative, but it can be mitigated.

## **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 proposed Millsell Waterkloof sections 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 mining activities of the region.

An assessment of the cumulative impacts can be found in Table 65.

## 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.

<b>Extent of the impact</b>		
The EXTENT of an impact is the physical extent/area of impact or influence.		
<b>Score</b>	<b>Extent</b>	<b>Description</b>
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.
<b>Duration of the impact</b>		
The DURATION of an impact is the expected period of time the impact will have an effect.		
<b>Score</b>	<b>Duration</b>	<b>Description</b>
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
<b>Intensity of the impact</b>		



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 to the scores as presented below:

*Equation 1:*

$$\text{Significance} = \text{Irreplaceability (Reversibility + Intensity + Duration + Extent)} \times \text{Probability}$$

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>		
<p><i>Equation 2:</i></p> $\text{Significance Rating} = \text{Significance} \times \text{Mitigation Efficiency}$		
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

**15 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 in Section 14 as well as to Table 64 and relevant Management Objectives and Mitigation types for each aspect is provided within Table 66. Mitigation measures are prescribed within the Environmental Management Programme (EMPr). The cumulative impact assessment is provided in Table 65.

The supporting impact assessment conducted by the EAP must be attached as an appendix. (Considerations used to inform the impact assessment was included in the section above Section 14).

Refer to Appendix 23.

Table 64: Impact Assessment Table (Complete with Ratings used to obtain Significance)

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation									
<b>Socio Economic</b>																			
No-go option	Reduced period of development and upliftment of the surrounding communities and infrastructure.	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	Reduced period of development of the economic environment, by job provision and sourcing 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	<b>Positive:</b> No additional negative impacts on I&APs or surrounding land users	N/A	Region	4	Permanent	5	High	4	Partly reversible	3	16	Medium	3	Positive Medium	48	N/A	1	Positive Medium	48
<b>Natural Environment &amp; Wetlands</b>																			
No-go option	<b>Positive:</b> No additional negative impacts on the environment	N/A	Region	4	Permanent	5	High	4	Partly reversible	3	16	Medium	3	Positive Medium	48	N/A	1	Positive Medium	48
<b>Agriculture</b>																			
Opencast Mining (including access/haul roads, Overburden dumps,	Loss of high potential land	Construction and operation	Footprint	1	Short term	1	Minor	1	Completely reversible	1	4	Improbable	1	Very low	4	High	0, 2	Very low	0,8

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
topsoil stockpile, crushing pad/ ROM)										
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Loss of grazing land	Construction and operation	Footprint	1 Short to medium term	2 Low	2 Nearly completely reversible	2 7 High	4 Low 28	Medium to high 0, 4	Very low 11, 2
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Loss of crop production	Construction and operation	Site	2 Short term	1 High	4 Nearly irreversible	4 11 Definite	5 Medium 55	Medium 0, 6	Low 33
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Loss of animal production	Construction and operation	Footprint	1 Long term	4 High	4 Nearly irreversible	5 14 Definite	5 Medium 70	Medium 0, 6	Medium 42
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Loss of agriculture infrastructure	Construction and operation	Footprint	1 Short term	1 Minor	1 Completely reversible	1 4 Improbable	1 Very low 4	High 0, 2	Very low 0,8
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Loss of jobs from farming	Operation	Site	1 Permanent	5 Minor	1 Completely reversible	1 8 Definite	1 Very low 8	High 0, 2	Very low 1,6
<b>Terrestrial Ecology</b>										

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Damage and degradation of habitats and vegetation communities. Overall loss of biodiversity and ecosystem function within clearance area. Fragmentation of habitats - impeding ecological corridors. Degradation of compression of areas.	Construction and operation	Local	3 Long term	4 Medium	3 Partly reversible	3 13 High	4 Medium 52	Medium 0, 6	Low 31, 2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	May lead to the introduction of alien invader species, impacting on the floral characteristics.	Construction and operation	Local	3 Long term	4 Medium	3 Partly reversible	3 13 High	4 Medium 52	Medium 0, 6	Low 31, 2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Protected and/or SCC species could possibly occur within the area of construction and would then be destroyed. The mining and related activities may impact on the watercourse (VU2) due to direct effects as well as edge effects. This could lead to destruction and degradation of habitats and food associated with	Construction and operation	Local	3 Long term	4 Medium	3 Partly reversible	3 13 Definite	5 High 65	Medium 0, 6	Medium 39

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation								
	these specialised habitat areas.																	
Continuous human activity. Associated noise, waste, the smell of humans and physical infiltration	Impact on the faunal communities within the area. May lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavourable).	Construction and operation	Local	3	Medium term	3	Medium 3	Partly reversible	3	12	Definite	5	Medium	60	Medium	0, 6	Low	36
Rehabilitation conducted ineffectively.	Environmental will not be self-sustaining. Increase in alien invasive species. Property will become less viable for post-closure activities.	Closure and Decommissioning	Local	3	Medium term	3	High 4	Partly reversible	4	14	Medium	3	Medium	42	Medium	0, 6	Low	25, 2
<b>Surface Water</b>																		
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dumps and ROM. Storm water management. Mining and related operational activities.	Surface water quality - Sedimentation and pollution of surface water resources resulting in the deterioration of water quality	Construction, Operation and Closure	Local	3	Medium term	3	High 4	Partly reversible	4	14	High	4	Medium	56	Low to Medium	0, 8	Medium	44, 8



ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained within the operation	Operation	Local	3 Medium term	3 Medium	3 Nearly completely reversible	2 11 Medium	3 Low 33	Low to Medium	0, 8 Low 26, 4
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management. Mining and related operational activities.	Surface water quantity - alteration of flow due to the diversion of clean water areas	Construction and operation	Local	3 Medium term	3 Medium	3 Partly reversible	4 13 High	4 Medium 52	Medium	0, 6 Low 31, 2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management.	AIP proliferation within sensitive riparian and wetland zones	Construction, Operation and Closure	Local	3 Medium term	3 Medium	3 Nearly completely reversible	2 11 High	4 Medium 44	Medium	0, 6 Low 26, 4

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation									
Mining and related operational activities. Rehabilitation activities.																			
Rehabilitation of the opencast pit and all disturbed areas	Surface water quantity - Reinstatement of surface drainage patterns (Positive Impact)	Closure	Local	3	Medium term	3	Medium	3	Completely reversible	1	10	Medium	3	Low	30	Medium	0, 6	Very low	18
<b>Aquatic Ecology</b>																			
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management. Mining and related operational activities.	Loss of Biodiversity and Ecological function - Riparian zone impacts.	Construction and operation	Local	3	Long term	4	Medium	3	Partly reversible	3	13	Medium	3	Low	39	Medium	0, 6	Low	23, 4
All opencast mining activities in close proximity to watercourses	Loss of Biodiversity and Ecological function. Interference with Ecological Corridor functioning	Construction and operation	Local	3	Long term	4	Medium	3	Partly reversible	3	13	Medium	3	Low	39	Medium	0, 6	Low	23, 4

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Underground activities in close proximity to watercourses	Loss of Biodiversity and Ecological function. Interference with Ecological Corridor functioning due to changing levels of water within the system as a result of dewatering	Construction and operation	Region	4 Medium term	3 Medium	3 Nearly irreversible	4 14 Medium	3 Medium 42	Low to Medium 0, 8	Low 33, 6
Alteration of drainage patterns by activities within and in close proximity of river	Leading to decrease and changes in water quantity and availability in the Ecological Reserve	Construction and operation	Site	2 Long term	4 Low	2 Partly reversible	3 11 Low	2 Low 22	Medium 0, 6	Very low 13, 2
Pollution and sedimentation due to unmanaged soil and stormwater runoff bringing forth water quality impacts	Deterioration of water quality in the Hex 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 operation	Local	3 Long term	4 Medium	3 Partly reversible	3 13 Medium	3 Low 39	Low 0, 8	Low 31, 2
Erosion and sedimentation caused by mining within close proximity to the Hex river.	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 operation	Site	2 Long term	4 Low	2 Nearly irreversible	4 12 Low	2 Low 24	Low 0, 8	Very low 19, 2

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Insufficient Stormwater management impacting surface water quality and therefore aquatic ecological functioning (changes in PES).	If river is negatively affected and may lead to a deterioration of the Present Ecological Status (PES).	Construction and operation	Local	3 Long term	4 Low	2 Partly reversible	3 12 High	4 Medium 48	Medium to high	0, 4 Very low 19, 2
Changing water inflow/flow patterns and reducing water available to sustain Aquatic diversity. Interference with subsurface flows by opencast development mining activities.	Impacts to Streamflow Regulation	Construction and operation	Local	3 Long term	4 Medium	3 Nearly irreversible	4 14 Low	2 Low 28	Medium to high	0, 4 Very low 11, 2
Decommissioning impacts resulting in impacts to Biodiversity and Ecological function – including Riparian zone activities or activities within buffer zones or regulated zones	Decommissioning and material movement in proximity or within buffer zones of water resources	Decommissioning and Closure	Site	2 Medium term	3 Medium	3 Nearly completely reversible	2 10 Medium	3 Low 30	Medium to high	0, 4 Very low 12
Alteration of drainage patterns after or during removal of the infrastructure	Leading to decrease and changes in water quantity and availability in the Ecological Reserve	Decommissioning and Closure	Site	2 Short term	1 Low	2 Nearly completely reversible	2 7 Medium	3 Low 21	High	0, 2 Very low 4, 2

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Water quality impacts due to improper waste management during decommissioning and removal of infrastructure	Deterioration of water quality in the Hex 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	Site	2 Short term	1 Low	1 Nearly completely reversible	2 6 Low	2 Very low 12	High	0, 2 Very low 2,4
Sedimentation of water resources due to erosion and impacts in areas with steep topography (OC)	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 term	1 Low	1 Nearly completely reversible	2 7 Medium	3 Very low 21	High	0, 2 Very low 4,2
Deterioration in surface water quality and changes in PES	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	1 Nearly completely reversible	2 7 High	4 Low 28	Medium to high	0, 4 Very low 11, 2
<b>Wetland</b>										



ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Placement of the Topsoil Stockpile within the wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction.	Changing the quantity and fluctuation properties of the watercourse/wetland by for example restricting water flow or increasing flood flows. Permanent changes to water flows and loss of important habitat may occur.	Construction and operation	Local	3 Permanent	5 High	4 Nearly irreversible	4 16 Definite	5 Very High 80	Low to Medium 0, 8	High 64
Placement of the Topsoil Stockpile within the wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction.	Changing the quantity and fluctuation properties of the watercourse/wetland by for example restricting water flow or increasing flood flows. Permanent changes to water flows and loss of important habitat may occur.	Closure	Site	1 Short term	1 High	4 Partly reversible	3 9 Medium	3 Low 27	Medium to high 0, 4	Medium 10, 8
The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and closure, may cause oil and diesel leaks and spills. This can result in the loss of sensitive biota in the downstream	Changes in water quality due to pollution.	Construction and operation	Local	3 Short to medium term	2 Medium	3 Partly reversible	3 11 Definite	5 Medium 55	Medium 0, 6	Low 33

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Significance with mitigation										
wetlands/watercourses and a reduction in wetland/watercourse function.																			
The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and closure, may cause oil and diesel leaks and spills. This can result in the loss of sensitive biota in the downstream wetlands/watercourses and a reduction in wetland/watercourse function.	Changes in water quality due to pollution.	Closure	Local	3	Short to medium term	2	Low	2	Nearly reversible	2	9	Medium	3	Low	27	Medium	0, 6	Very low	16, 2
Direct development and stockpiling within wetland/watercourse areas.	Loss and disturbance of wetland/watercourse habitat; wetland/watercourse fauna fatalities. Owing to the nature of the impact of opencast mining where both the soil profile and the underlying stratigraphy are for all intents and purposes permanently altered, impacts on wetlands/watercourses and their	Construction and operation	Local	3	Long term	4	High	4	Irreversible	4	15	Definite	5	High	75	Low to Medium	0, 8	Medium	60

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
	associated functions are permanently lost.									
Direct development and stockpiling within wetland/watercourse areas.	Loss and disturbance of wetland/watercourse habitat; wetland/watercourse fauna fatalities. Owing to the nature of the impact of opencast mining where both the soil profile and the underlying stratigraphy are for all intents and purposes permanently altered, impacts on wetlands/watercourses and their associated functions are permanently lost.	Closure	Local	3 Short term	1 Low	2 Nearly completely reversible	2 8 Medium	3 Low 24	Low to medium	0, 8 Very low 19, 2
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles	Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland/watercourse system, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed	Construction and operation	Local	3 Long term	4 High	4 Partly reversible	3 14 High	5 High 70	Medium to high	0, 6 Medium 42

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation									
	before control measures are implemented alien plants can easily colonise and impact on downstream users.																		
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles	Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland/watercourse system, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.	Closure	Site	2	Long term	4	Low	2	Partly reversible	3	11	High	4	Medium	44	Medium	0, 6	Low	26, 4

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Construction and operational activities consisting of earthworks and soil disturbances.	Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of wetlands/watercourse and downstream rivers.	Construction and operation	Local	3 Long term	4 Very high	5 Partly reversible	3 15 Definite	5 High 75	Medium to high	0, 4 Low 30
Construction and operational activities consisting of earthworks and soil disturbances.	Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of wetlands/watercourse and downstream rivers.	Closure	Site	2 Long term	4 Very high	5 Nearly irreversible	4 15 High	4 Medium 60	Medium to high	0, 4 Low 24
<b>Heritage</b>										



ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Construction of the boxcut and opencast mining	Damage or removal of historical buildings B07, B08 & B15	Construction and operation	Footprint	1 Permanent	5 Very high	5 Irreversible	5 16	Definite 5 High	80 Medium	0, 6 Medium 48
Construction, operation and decommissioning of the topsoil stockpile	Damage and removal of the cemetery F05	Construction, operation and closure	Footprint	1 Permanent	5 very high	5 Irreversible	5 16	Definite 5 High	80 Medium	0, 6 Medium 48
<b>Paleontological</b>										
Construction of infrastructure and opencast mine and associated infrastructure.	No fossils are likely to occur on site	Construction, operation and closure	Footprint	Short term	1 Minor	1 Nearly completely reversible	2 4	Improbable 1 Very low	4 Low	1 Very low 4
<b>Visual</b>										
Removal of vegetation for site clearing / preparation for all proposed infrastructure and opencast areas.	Negative impacts on aesthetics	Construction	Regional	4 Short to medium term	2 Very high	5 Partly reversible	3 14	High 4 Medium	56 Low to Medium	0, 8 Medium 44, 8
Removal of vegetation for site clearing / preparation for all proposed infrastructure and opencast areas.	Negative impact on visibility from sensitive receptors/Viewpoints	Construction	Regional	4 Short to medium term	2 High	4 Partly reversible	3 13	High 4 Medium	52 Low to Medium	0, 8 Medium 41, 6

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation									
Movement of construction vehicles and heavy machinery for site clearance	Change of visual character from a natural landscape to a built landscape	Construction	Regional	4	Short to medium term	2	High	4	Partly reversible	3	13	High	4	Medium	52	Low to Medium	0, 8	Medium	41, 6
Design of supporting infrastructure	Landscape visual change	Construction	Local	3	Short to medium term	2	High	4	Partly reversible	3	12	High	4	Medium	48	Low to Medium	0, 8	Low	38, 4
Daily operational activities and continued expansion of the opencast areas.	Negative impacts on aesthetics	Operation	Local	3	Long term	4	High	4	Partly reversible	3	14	Definite	4	Medium	56	Low	1	Medium	56
Daily operational activities of the Mine and associated infrastructure	Negative impact on visibility from sensitive receptors/Viewpoints	Operation	Local	3	Long term	4	High	4	Partly reversible	3	14	Definite	4	Medium	56	Low to Medium	0, 8	Medium	44, 8
Movement of heavy machinery	Change of visual character	Operation	Local	3	Long term	4	Medium	3	Nearly irreversible	4	14	Definite	4	Medium	56	Medium	0, 6	Low	33, 6
Night lighting for security and operational activities	Light pollution (Glare, spill light, sky glow)	Operation	Local	3	Long term	4	High	4	Nearly irreversible	4	15	Definite	4	Medium	60	Medium	0, 6	Low	36
Daily operational activities of the Mine, associated infrastructure and opencast mining.	Landscape visual change	Operation	Site	2	Long term	4	Medium	3	Nearly irreversible	4	13	Definite	4	Medium	52	Medium	0, 6	Low	31, 2
<b>Groundwater</b>																			
Opencast Mining	Dewatering of the aquifer	Operation	Local	3	Long term	4	High	4	Nearly irreversible	4	15	Definite	4	High	60	Low to medium	0, 8	Medium	48

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation									
Opencast Mining	Impact on water quality	Operation	Footprint	1	Medium term	3	Minor	1	Partly reversible	3	8	Improbable	1	Very low	8	Medium	0,6	Very low	4,8
Closure and rehabilitation of the opencast pit	Impacts on water quality	Closure	Local	3	Permanent	5	Medium	3	Nearly irreversible	4	15	Medium	3	Medium	45	Medium	0,6	Low	27
<b>Blasting</b>																			
Opencast Mining, Drilling and Blasting	Blasting hazard - ground vibration	Construction & operation	Site	2	Medium term	3	High	4	Nearly irreversible	4	13	High	4	Medium	52	Medium	0,6	Low	31,2
Opencast Mining, Drilling and Blasting	Blasting hazard - air blast	Construction & operation	Site	2	Medium term	3	High	4	Partly reversible	3	12	High	4	Medium	48	Medium	0,6	Low	28,8
Opencast Mining, Drilling and Blasting	Blasting hazard - fly rock	Construction & operation	Site	3	Medium term	3	High	4	Nearly irreversible	4	14	Definite	5	High	70	Medium to high	0,4	Low	28
<b>Noise</b>																			
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM.	Equipment and vehicles used for construction of infrastructure will result in increased noise levels.	Construction	Site	3	Short to medium term	2	High	4	Partly reversible	3	12	Definite	5	Medium	60	Medium	0,6	Low	36

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Mining and related operational activities.	Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of workshop and office will all increase noise level in the project area.	Operation	Site	3 Long term	4 Medium	3 Partly reversible	3 13	5 High	65	0, 6 Low 39
Demolishing of surface infrastructure	Equipment and vehicles used for demolishing and rehabilitation of infrastructure will result in increased noise levels.	Closure	Site	3 Short term	1 Low	2 Partly reversible	3 9	5 Medium	45	0, 6 Low 27
<b>Traffic</b>										
Construction of infrastructure and opencast mining	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Construction	Local	3 Short term	1 Medium	3 Party reversible	3 10	5 Medium	50	0, 6 Low 30
Transportation of ROM from site to the Millsell plant	Continued change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Operation	Region	4 Long term	4 High	4 Nearly irreversible	4 16	5 High	80	0, 6 Medium 48
<b>Air Quality</b>										

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Construction activities are associated with land clearing, ground excavation, material handling (loading/offloading), vehicle dust entrainment from trucks, stockpiling and the construction of infrastructure such as access roads and storm water management systems.	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Construction	Site	2 Short term	1 Medium	3 Nearly completely reversible	2 8 Definite	5 Low 40	Medium 0, 6	Low 24
Drilling and blasting at the opencast pit, bulldozing, material handling operations (truck loading / offloading operations), crushing, wind erosion from exposed areas: opencast pit, exposed surfaces & material stockpiles, excavators and FELs (loading dump trucks at pit area & loading ROM onto primary crusher) and vehicle dust entrainment on unpaved haul road.	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Operation	Site	2 Long term	4 Medium	3 Nearly irreversible	4 13 Definite	5 High 65	Low to Medium 0, 8	Medium 52
Rehabilitation of disturbed areas, dismantling on infrastructure, removal of SWMP	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Closure	Site	2 Short term	1 Low	2 Nearly completely reversible	3 8 Definite	5 Low 40	Medium 0, 6	Low 24



ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation									
and general closure activities.																			
<b>Socio- Economic</b>																			
Construction of infrastructure, development of the boxcut, mining of chrome and use of associated infrastructure.	<b>Positive:</b> Continued employment of current employees as the current mine reaches its life	Construction and Operational	Regional	4	Long term	4	High	4	Partly reversible	3	15	Definite	5	Positive High	75	N/A	1	Positive High	75
Implementation of the SLP and existing Procurement Policy	<b>Positive</b> Promotion of preferential procurement of goods and services and local content.	Construction and Operational	Regional	4	Long term	4	Very high	5	Partly reversible	3	16	Definite	5	Positive High	80	N/A	1	Positive High	80
Opencast mining	Loss of access to livelihoods as area will be used for opencast pit and businesses around the mining area	Operations	Local	3	Long term	4	Medium	3	Nearly completely reversible	2	12	Definite	5	Medium	60	Medium	0,6	Low	36
Construction and operation of mine	Devaluation of property values	Construction and Operational	Local	3	Long term	4	Medium	3	Partly reversible	3	13	High	4	Medium	52	Low to Medium	0,8	Medium	41,6
Poor management of the mining operation during construction and operational activities	Road accidents, Unauthorized access to site, fire hazards, pollution problems, high ambient noise levels, dust generation and air pollution	Construction and Operational	Site	2	Long term	4	0	4	Partly reversible	3	13	Definite	5	High	65	Low to Medium	0,8	Medium	52
Construction and operation of mine	Inflow of job seekers will lead to noise creation, littering, safety and security risks.	Construction and Operational	Site	2	Long term	4	Low	2	Nearly completely reversible	2	10	Medium	3	Low	30	Low to medium	0,8	Low	24

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Construction of infrastructure, development of the boxcut, mining of chrome and use of associated infrastructure.	Intrusion impacts associated with traffic, air quality & noise	Construction	Site	2 Long term	4 Medium	3 Partly reversible	3 12 High	4 Medium 48	Medium 0,6	Low 28,8
Construction and operation of mine	Social conflict	Construction and Operational	Local	3 Long term	4 Medium	3 Nearly completely reversible	2 12 Medium	3 Low 36	Low to medium 0,8	Low 28,8
<b>Closure and Rehabilitation</b>										
Closure and Rehabilitation of opencast mine and associated infrastructure	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Closure	Site	2 Short term	1 Medium	3 Partly reversible	3 9 Medium	3 Low 27	Medium 0,6	Very Low 16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Closure	Site	2 Short term	1 Medium	3 Partly reversible	3 9 Medium	3 Low 27	Medium 0,6	Very Low 16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust	Closure	Regional	4 Short term	1 Low	2 Nearly irreversible	4 11 Medium	3 Low 33	Medium 0,6	Very Low 19,8

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
	pollution, noise pollution etc.									
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Economic impact should there be an incident of public health and safety.	Closure	Regional	4 Long term	4 High	4 Partly reversible	3 15 Medium	3 Medium 45	Low 0, 8	Low 36
Closure and Rehabilitation	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Closure	Regional	4 Short term	1 High	4 Nearly irreversible	4 13 Medium	3 Low 39	Low 0, 8	Low 31, 2
<b>Hydropedology</b>										
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management. Mining and related operational activities.	Contamination of Water Resources	Construction and operations	Regional	4 Long term	4 High	4 Nearly irreversible	4 16 High	4 High 64	Low to medium 0, 8	Medium 51, 2

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management. Mining and related operational activities.	Loss of vadose zone flows feeding water resources	Construction and operations	Local	3 Permanent	5 Low	2 Nearly irreversible	4 14 Medium	3 Medium 42	Low to medium	0, 8 Low 33, 6
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management. Mining and related operational activities.	Alteration of landscape hydrodynamics	Construction and operations	Local	3 Permanent	5 High	4 Nearly irreversible	4 16 High	4 High 64	Low to medium	0, 8 Medium 51, 2
Underground mining	Contamination of Water Resources	Construction and operations	Local	3 Long term	4 Medium	3 Nearly irreversible	4 14 High	4 Medium 56	Low to medium	0, 8 Medium 44, 8

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation									
Underground mining	Loss of vadose zone flows feeding water resources	Construction and operations	Local	3	Medium term	3	Low	2	Nearly irreversible	4	12	Medium	3	Low	36	Medium	0, 6	Low	21, 6
Underground mining	Alteration of landscape hydrodynamics	Construction and operations	Local	3	Medium term	3	Low	2	Nearly irreversible	4	12	Medium	3	Low	36	Medium	0, 6	Low	21, 6
Closure and Rehabilitation of opencast mine and associated infrastructure	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Site	2	Short term	1	Medium	3	Partly reversible	3	9	Medium	3	Low	27	Medium	0, 6	Very Low	16, 2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Site	2	Short term	1	Medium	3	Partly reversible	3	9	Medium	3	Low	27	Medium	0, 6	Very Low	16, 2

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Region	4 Short term	1 Low	2 Nearly irreversible	4 11 Medium	3 Low 33	Medium 0, 6	Very Low 19, 8
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Economic impact should there be an incident of public health and safety.	Region	4 Long term	4 High	4 Partly reversible	3 15 Medium	3 Medium 45	Low to medium 0, 8	Low 36
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Region	4 Short term	1 High	4 Nearly irreversible	4 13 Medium	3 Low 39	Low to medium 0, 8	Low 31, 2
<b>Hydropedology</b>										



ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Contamination of Water Resources	Regional	4 Long term	4 High	4 Nearly irreversible	4 16 High 4	High 64	Low to medium	Medium 51, 2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Loss of vadose zone flows feeding water resources	Local	3 Permanent	5 Low	2 Nearly irreversible	4 14 Medium 3	Medium 42	Low to medium	Low 33, 6

ACTIVITY	POTENTIAL IMPACT	PHASE	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Probability)	Significance without mitigation	Mitigation Efficiently	Significance with mitigation
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden, overburden dump and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Alteration of landscape hydrodynamics	Local	3 Permanent	5 High	4 Nearly irreversible	4 16 High 4	High 64	Low to medium 0, 8	Medium 51, 2
Underground mining	Hydropedology	Contamination of Water Resources	Local	3 Long term	4 Medium	3 Nearly irreversible	4 14 High 4	Medium 56	Low to medium 0, 8	Medium 44, 8
Underground mining	Hydropedology	Loss of vadose zone flows feeding water resources	Local	3 Medium term	3 Low	2 Nearly irreversible	4 12 Medium 3	Low 36	Medium 0, 6	Low 21, 6
Underground mining	Hydropedology	Alteration of landscape hydrodynamics	Local	3 Medium term	3 Low	2 Nearly irreversible	4 12 Medium 3	Low 36	Medium 0, 6	Low 21, 6

Table 65: Cumulative Impacts

POTENTIAL IMPACT	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability	Significance without mitigation	Mitigation Efficiency	Significance with mitigation	Mitigation Measures								
Deterioration of water quality of the Hex River, downstream users and catchment ecological reserve	Region	4	Long term	4	Low	2	Partly reversible	3	13	Medium	3	Low	39	Medium	0,6	Low	23,4	Develop and maintain a surface and groundwater monitoring program in line with the WUL requirements. Implement SWMP. Contain any runoff on the rehabilitated area to prevent siltation and contamination of surface water.
The deterioration of groundwater quality due to pollution from ROM stockpile & overburden dumps.	Local	3	Medium term	3	Medium	3	Partly reversible	3	12	High	4	Medium	48	Medium	0,6	Low	28,8	Develop and maintain a surface and groundwater monitoring program in line with the WUL requirements;
Reduction in land capability after rehabilitation	Footprint	1	Long term	4	High	4	Nearly irreversible	4	13	High	4	Medium	52	Medium	0,6	Low	31,2	Optimise the topsoil resources available on site; Utilize the stored topsoil for the sole purpose of rehabilitation, no topsoil should be used for landscaping or construction purposes such as roads or embankments; Analysis of topsoil for fatality and

POTENTIAL IMPACT	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance without mitigation		Mitigation Efficiency		Significance with mitigation		Mitigation Measures
																		apply require amelioration where required; Apply agricultural lime and fertiliser to soil profile
Agricultural sense of place will be changed to a more mining and industrial one	Local	3	Long term	4	High	4	Nearly irreversible	4	15	Definite	5	High	75	Medium	0,6	Medium	45	Ensure the rehabilitation of the site is planned during operations. Opencast pit area to be free draining. The impacted area to be rehabilitated to agriculture. All buildings and structures that are no longer require post closure must be removed from site. Rehabilitation must be done in terms of the approved EMP and rehabilitation plan.
Decreased air quality due to increase in dust fall, PM10 and PM2.5	Local	3	Long term	4	Medium	3	Partly reversible	3	13	High	4	Medium	52	Medium to high	0,4	Low	20,8	Implementation of dust control plan. Vehicle restrictions - reducing the height of material transfer at the crushing plant, enclosure of material transfer points, water sprays during material handling operations, and the use rock armour at large stockpiles

POTENTIAL IMPACT	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance without mitigation		Mitigation Efficiency		Significance with mitigation		Mitigation Measures
																		prone to wind erosion. Regular cleaning and sweeping of mine areas to prevent the accumulation of dust on surfaces. Immediate clean-up of any material (i.e. ROM, waste/overburden and topsoil) spillages. Conduct regular site inspections to ensure the dust mitigation measures are being implemented. Regular visual site inspections are recommended to assess whether further mitigation is required for any of the dust emission sources. Implement monitoring requirements.
Damage and degradation of habitats and vegetation communities	Local	3	Long term	4	Medium	3	Nearly irreversible	4	14	High	4	Medium	56	Medium	0,6	Low	33,6	A control of access should be implemented for all remaining natural areas. No additional/unnecessary fragmentation should occur. No vehicles or

POTENTIAL IMPACT	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)		Probability		Significance without mitigation		Mitigation Efficiency		Significance with mitigation		Mitigation Measures
													Medium	56			Low	33,6	<p>personnel are permitted outside of these demarcated roads.</p> <p>The vegetation removal during the construction phase should be controlled.</p> <p>Demarcate specific areas to be developed and remain clear of other areas where activities are not necessary.</p> <p>Animals should not be handled, removed, killed or interfered with.</p> <p>Implement the SWMP.</p> <p>Continuous rehabilitation of the areas impacted which are outside of the development footprint</p>
Spread of alien invasive species	Local	3	Long term	4	High	4	Partly reversible	3	14		High	4	Medium	56	Medium	0,6	Low	33,6	<p>A management plan for the control of invasive and exotic plant species needs to be implemented.</p> <p>Annual AIP monitoring to be undertaken.</p> <p>Removal of alien and invasive species must be undertaken as per</p>



POTENTIAL IMPACT	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance without mitigation		Mitigation Efficiency		Significance with mitigation		Mitigation Measures
																		the recommendations of the AIP Management and Control Plan.
Faunal habitat destruction	Local	3	Long term	4	Medium	3	Partly reversible	3	13	Definite	5	High	65	Low to medium	0, 8	Medium	52	Controlled access for all natural areas. Noise impacts to be monitored. Waste must be prevented from reaching the environment and water. Hazardous waste to be stored in impermeable bunded areas.
Alteration of wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction and operations.	Local	3	Permanent	5	High	4	Nearly irreversible	4	16	Definite	5	Very high	80	Low to medium	0, 8	High	64	A Rehabilitation Plan must be developed and implemented. Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat. Where practically possible, the proposed Topsoil Stockpile should be developed around the wetland and not within the wetland. If not possible, the area of the proposed Topsoil Stockpile should be demarcated in

POTENTIAL IMPACT	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)		Probability		Significance without mitigation		Mitigation Efficiency		Significance with mitigation		Mitigation Measures
																			terms of developable area. Infringements within the wetland should only occur within the developable area. The channel of the wetland should be piped or channelised at the point of the Topsoil Stockpile, so that preferential movement of water can still be received at downstream watercourses. A Watercourse Rehabilitation Plan will need to be developed and implemented to account for losses to wetland/watercourse integrity.
Devaluation of property values	Local	3	Long term	4	Medium	3	Partly reversible	3	13		High	4	Medium	52	Low to Medium	0,8	Medium	41,6	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.) that could

POTENTIAL IMPACT	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability	Significance without mitigation	Mitigation Efficiency	Significance with mitigation	Mitigation Measures							
										result in degradation of farmland, natural areas, negative impacts on water resources and intrusion impacts for surrounding properties.							
Creation of new business opportunities and the downstream opportunities through indirect and induced impacts with regards to the manufacturing and service industries. <b>(Positive impact)</b>	National	5 Long term	4	High	4	Partly reversible	3	16	High	4	High	64	N/A	1	High	64	No mitigation measures required as this is a positive impact.
Increase in the rate of flow of people into the area, thereby increasing the demand for housing, infrastructure, social and health services.	Region	4 Medium term	3	Medium	3	Nearly irreversible	4	14	Medium	3	High	42	Low to medium	0,8	Low	33,6	Ensure transparency and communicate through the Ward Councillors and CLO the fact that no / minimal recruitment will take place. Through workshops and training programmes and through the

POTENTIAL IMPACT	Extent		Duration		Intensity		Reversibility		Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability		Significance without mitigation		Mitigation Efficiency		Significance with mitigation		Mitigation Measures
																		involvement of the CLO, encourage workers to invest their housing allowances in established residential areas or to apply for government housing schemes.
Negative impact on water resources that would impact agricultural production	Local	3	Medium term	3	Medium	3	Nearly irreversible	4	13	High	4	Medium	52	Low to medium	0, 6	Low	31,2	Five monitoring boreholes needs to be drilled immediately downstream of the opencasts as well as at the Hex River to monitor the impacts on the river. Monitoring of these boreholes should commence as soon as possible. The size of unrehabilitated areas (pit, spoils, unvegetated areas) that could produce contamination should be minimised. Mine planning should consider concurrent rehabilitation of mine workings and waste management facilities.

POTENTIAL IMPACT	Extent	Duration	Intensity	Reversibility	Irreplaceability (Extent + Duration + Intensity + Reversibility)	Probability	Significance without mitigation	Mitigation Efficiency	Significance with mitigation	Mitigation Measures
										<p>Rehabilitation should be planned to promote free drainage and to minimise or eliminate ponding of storm water that contribute to recharge of the aquifer. The connectivity between the surface water in the Hex River and the groundwater must be clarified by a hydrogeological study as soon as possible. This can be done with a survey of the river in the potentially affected area, as well as with drilling of monitoring boreholes as recommended.</p>

## 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 66: Summary of the key environmental impacts and Management Objectives and Mitigation Type

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
<b>Socio Economic</b>						
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	48
<b>Natural Environment &amp; Wetlands</b>						
No-go option	Natural Environment and Wetlands	Positive: No additional negative impacts on the environment	<b>Positive:</b> No additional negative impacts on the environment		Positive Medium	48
<b>Agriculture</b>						
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of high potential land	Limit impacts on agricultural activities.	There will be no loss of high potential land. No mitigation required.	Very low	0,8



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of grazing land	Limit impacts on agricultural activities.	Concentrate infrastructure and still allow grazing to take place on vacant land	Very low	11,2
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of crop production	Limit impacts on agricultural activities.	Minimise the infrastructure development to low potential land	Low	33
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of animal production	Limit impacts on agricultural activities.	Concentrate infrastructure and still allow grazing to take place on vacant land. Allow grazing to take place on vacant land.	Medium	42
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of agriculture infrastructure	Limit impacts on agricultural activities.	No farming infrastructure was observed that will be lost.	Very low	0,8
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of jobs from farming	Limit impacts on agricultural activities.	5 labourers are currently employed. They can be absorbed by the proposed mine or other farmers in the area.	Very low	1,6
<b>Terrestrial Ecology</b>						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	Damage and degradation of habitats and vegetation communities. Overall loss of biodiversity and ecosystem function within clearance area. Fragmentation of habitats - impeding ecological corridors. Degradation of compression of areas.	Early detection of impacts and remediation thereof.	A control of access should be implemented for all remaining natural areas. No additional/unnecessary fragmentation should occur. No vehicles or personnel are permitted outside of these demarcated roads. The vegetation removal during the construction phase should be controlled. Demarcate specific areas to be developed and remain clear of other areas where activities are not necessary. Animals should not be handled, removed, killed or interfered with. Implement the SWMP. Continuous rehabilitation of the areas impacted which are outside of the development footprint	Low	31,2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	May lead to the introduction of alien invader species, impacting on the floral characteristics.	Early detection of impacts and remediation thereof.	A management plan for the control of invasive and exotic plant species needs to be implemented. Annual AIP monitoring to be undertaken. Removal of alien and invasive species must be undertaken as per the recommendations of the AIP Management and Control Plan.	Low	31,2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	Protected and/or SCC species could possibly occur within the area of construction and would then be destroyed. The mining and related activities may impact on the watercourse (VU2) 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.	Early detection of impacts and remediation thereof.	All footprint areas should remain as small as possible. If any SCC species are found they must be managed relocated with all permits in place. Watercourses and buffers must be avoided. It is recommended that the topsoil dump be relocated outside the riparian zone. SWMP must be implemented. All mine residue stockpiles managed as per DWS requirements. Emergency spill plans and procedures must be in place and implemented. All vehicles and equipment must be regularly maintained.	Medium	39

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Continuous human activity. Associated noise, waste, the smell of humans and physical infiltration	Ecology	Impact on the faunal communities within the area. May lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavourable).	Early detection of impacts and remediation thereof.	Controlled access for all natural areas. Noise impacts to be monitored. Waste must be prevented from reaching the environment and water. Hazardous waste to be stored in impermeable banded areas.	Low	36
Rehabilitation conducted ineffectively.	Ecology	Environmental will not be self-sustaining. Increase in alien invasive species. Property will become less viable for post-closure activities.	Early detection of impacts and remediation thereof.	A management plan for control of invasive/exotic plant species needs to be implemented. Rehabilitation plans should be planned long before the closure phase. Rehabilitation plans should be compiled with the use of a specialist and the correct seeding techniques and mixtures should be applied	Low	25,2
<b>Surface Water</b>						
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface Water	Surface water quality - Sedimentation and pollution of surface water resources resulting in the deterioration of water quality	Prevent hydrological impacts and prevent contamination of water resources	SWMP must be implemented and stormwater structures maintained. Roads must be maintained. Maintenance of machinery and refuelling to be done in designated areas. Avoid encroaching into natural area. Implement an Alien Invasive Plants Control Plan. Rehabilitate disturbed areas as soon as possible. Watercourses and buffers must be avoided. It is recommended that the topsoil dump be relocated outside the riparian zone.	Medium	44,8
Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface Water	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained within the operation	Prevent hydrological impacts and prevent contamination of water resources	SWMP must be implemented and stormwater structures maintained. All mine residue stockpiles managed as per DWS requirements. Seepage or discharge of waste water from the waste water containment facilities should be prevented.	Low	26,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface Water	Surface water quantity - alteration of flow due to the diversion of clean water areas	Prevent hydrological impacts and prevent contamination of water resources	Watercourses and buffers must be avoided. It is recommended that the topsoil dump be relocated outside the riparian zone.	Low	31,2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities. Rehabilitation activities.	Surface Water	AIP proliferation within sensitive riparian and wetland zones	Prevent hydrological impacts and prevent contamination of water resources		Low	26,4
Rehabilitation of the opencast pit and all disturbed areas	Surface Water	Surface water quantity - Reinstatement of surface drainage patterns (Positive Impact)	Prevent hydrological impacts and prevent contamination of water resources	Implementation of the Rehabilitation Plan	Very low	18
<b>Aquatic Ecology</b>						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Aquatic Ecology	Loss of Biodiversity and Ecological function - Riparian zone impacts.	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Avoidance of unnecessary disturbance or destruction of natural habitat. Avoid encroaching on natural areas. Implement rehabilitation features Rehabilitation must include planting of indigenous local species as per Plant species plan To prevent the erosion of soil, management measures may include structures to protect areas and soil from areas susceptible to erosion. Implement an Alien Invasive Plants Control Plan.	Low	23,4
All opencast mining activities in close proximity to watercourses	Aquatic Ecology	Loss of Biodiversity and Ecological function. Interference with Ecological Corridor functioning	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Corridor movement associated with water resources should not be hampered by the development. Unnecessary movement of workers must be prevented. Activities on site must comply with the regulations of the Animal Protection Act, 1962 (Act No. 71 of 1962) Animals should not be handled, removed, killed or interfered with.	Low	23,4
Underground activities in close proximity to watercourses	Aquatic Ecology	Loss of Biodiversity and Ecological function. Interference with Ecological Corridor functioning due to changing levels of water within the system as a result of dewatering	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Appoint a groundwater specialist to assess the dewatering cone of depression and suggest mitigation of this aspect if the cone of depression will impact the river system.	Low	33,6
Alteration of drainage patterns by activities within and in close proximity of river	Aquatic Ecology	Leading to decrease and changes in water quantity and availability in the Ecological Reserve	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Erosion protection and appropriate energy dissipation structures should be implemented at applicable stretches of the Hex River Monitor Water Quality and continue with monitoring programme as per WUL or revised if changes are required to ensure the riverbed remains protected.	Very low	13,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	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 Hex 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	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.		Low	31,2
Erosion and sedimentation caused by mining within close proximity to the Hex 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.	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	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.	Very low	19,2
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).	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Dirty water must not be discharged into the surrounding environment. Implementation of the SWMP.	Very low	19,2
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	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	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 obtain. Rehabilitate affected areas immediately to prevent sedimentation and protect against erosion.	Very low	11,2
Decommissioning impacts resulting in impacts to Biodiversity and Ecological function – including Riparian zone activities or activities within buffer zones or regulated zones	Aquatic Ecology	Decommissioning and material movement in proximity or within buffer zones of water resources	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Implement Rehabilitation Plan Rehabilitation must include planting of indigenous local species. Appoint a specialist to assist in riverbank or wetland rehabilitation as necessary Implement an Alien Invasive Plants Control Plan Implement SWMP No waste will be disposed of in or around the	Very low	12



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	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	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	project area 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. 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.	Very low	4,2
Water quality impacts due to improper waste management during decommissioning and removal of infrastructure	Aquatic Ecology	Deterioration of water quality in the Hex 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	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.		Very low	2,4
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.	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.		Very low	4,2
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.	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.		Very low	11,2
<b>Wetland</b>						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Placement of the Topsoil Stockpile within the wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction.	Wetland	Changing the quantity and fluctuation properties of the watercourse/wetland by for example restricting water flow or increasing flood flows. Permanent changes to water flows and loss of important habitat may occur.	To protect wetlands and ensure their ecological function continues.	<p>Construction possibly affecting wetlands/watercourses should be restricted to the drier winter months, where practically possible.</p> <p>A 50 m construction buffer area and an 80 m operational buffer has been placed around the wetlands/watercourses.</p> <p>All bare areas due to construction and operation activities must be rehabilitated by adding topsoil where required and revegetated with indigenous vegetation</p> <p>Implement the SWMP</p> <p>The wetland/watercourse areas that are at risk should be monitored for any degradation and changes to the PES of these systems.</p> <p>Ensure that erosion management and sediment controls are strictly implemented from the beginning of site clearing activities</p> <p>All areas should be re-sloped and top-soiled where necessary and reseeded with indigenous grasses to stabilise the loose material</p> <p>Monitor the occurrence of erosion</p> <p>As far as possible the existing road network should be utilised, minimising the need to develop new access routes resulting in an increased impact on the local environment.</p>	High	64
Placement of the Topsoil Stockpile within the wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction.	Wetland	Changing the quantity and fluctuation properties of the watercourse/wetland by for example restricting water flow or increasing flood flows. Permanent changes to water flows and loss of important habitat may occur.	To protect wetlands and ensure their ecological function continues.	<p>Implement the SWMP</p> <p>A 50 m construction buffer area and an 80 m operational buffer has been placed around the wetlands/watercourses.</p> <p>Maintenance of construction and operation vehicles / equipment should not take place within the wetlands/watercourses and associated buffers.</p> <p>Re-fuelling must take place on a sealed surface area to prevent hydrocarbon pollution.</p> <p>All spills should be cleaned up immediately and disposed of.</p> <p>Littering must be prevented by effective site management and the provision of bins.</p> <p>Treatment of pollution identified should be prioritised accordingly.</p>	Medium	10,8
The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and closure, may cause oil and diesel leaks and spills. This can result in the loss of sensitive biota in the downstream wetlands/watercourses and a reduction in wetland/watercourse function.	Wetland	Changes in water quality due to pollution.	To protect wetlands and ensure their ecological function continues.	<p>Implement the SWMP</p> <p>A 50 m construction buffer area and an 80 m operational buffer has been placed around the wetlands/watercourses.</p> <p>Maintenance of construction and operation vehicles / equipment should not take place within the wetlands/watercourses and associated buffers.</p> <p>Re-fuelling must take place on a sealed surface area to prevent hydrocarbon pollution.</p> <p>All spills should be cleaned up immediately and disposed of.</p> <p>Littering must be prevented by effective site management and the provision of bins.</p> <p>Treatment of pollution identified should be prioritised accordingly.</p>	Low	33

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and closure, may cause oil and diesel leaks and spills. This can result in the loss of sensitive biota in the downstream wetlands/watercourses and a reduction in wetland/watercourse function.	Wetland	Changes in water quality due to pollution.	To protect wetlands and ensure their ecological function continues.		Very low	16,2
Direct development and stockpiling within wetland/watercourse areas.	Wetland	Loss and disturbance of wetland/watercourse habitat; wetland/watercourse fauna fatalities. Owing to the nature of the impact of opencast mining where both the soil profile and the underlying stratigraphy are for all intents and purposes permanently altered, impacts on wetlands/watercourses and their associated functions are permanently lost.	To protect wetlands and ensure their ecological function continues.	A Rehabilitation Plan must be developed and implemented. No service roads or other unauthorized activities to take place within the buffer zones. Alien and invasive vegetation control should take place throughout all phases to prevent loss of floral habitat. Where practically possible, the proposed Topsoil Stockpile should be developed around the wetland and not within the wetland. If not possible, the area of the proposed Topsoil Stockpile should be demarcated in terms of developable area. Infringements within the wetland should only occur within the developable area. The channel of the wetland should be piped or channelised at the point of the Topsoil	Medium	60

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Direct development and stockpiling within wetland/watercourse areas.	Wetland	Loss and disturbance of wetland/watercourse habitat; wetland/watercourse fauna fatalities. Owing to the nature of the impact of opencast mining where both the soil profile and the underlying stratigraphy are for all intents and purposes permanently altered, impacts on wetlands/watercourses and their associated functions are permanently lost.	To protect wetlands and ensure their ecological function continues.	Stockpile, so that preferential movement of water can still be received at downstream watercourses. A Watercourse Rehabilitation Plan will need to be developed and implemented to account for losses to wetland/watercourse integrity.	Very low	19,2
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles	Wetland	Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland/watercourse system, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.	To protect wetlands and ensure their ecological function continues.	Relocate conservation-worthy species under the supervision of a botanist or horticultural specialist. An Alien Invasive Vegetation Management Plan should be developed and implemented immediately. Alien and invasive vegetation control should take place throughout all phases to prevent	Medium	42

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles	Wetland	Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland/watercourse system, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.	To protect wetlands and ensure their ecological function continues.	loss of floral habitat. No vehicles should be allowed to drive through designated sensitive areas during the eradication of alien and weed species. Rehabilitate and thereafter revegetate disturbed areas within native indigenous vegetation.	Low	26,4
Construction and operational activities consisting of earthworks and soil disturbances.	Wetland	Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of wetlands/watercourse and downstream rivers.	To protect wetlands and ensure their ecological function continues.	Effective sediment traps should be installed. Construction within and in close proximity to wetlands/watercourses must be restricted to the dryer winter months where possible. Remove only the vegetation where essential and do not allow any disturbance to the adjoining natural vegetation cover. Stockpiling of soils and materials should take place outside of preferential flow paths and associated calculated buffer zones. All bare areas due to construction and operation activities must be rehabilitated by adding topsoil where required and revegetated with indigenous native vegetation. The291required areas should be monitored for any degradation and changes to the PES of the291required and downstream watercourses.	Low	30

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Construction and operational activities consisting of earthworks and soil disturbances.	Wetland	Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of wetlands/watercourse and downstream rivers.	To protect wetlands and ensure their ecological function continues.	Monitor the occurrence of erosion during the rainy season and take immediate corrective action where needed.	Low	24
<b>Heritage</b>						
Construction of the boxcut and opencast mining	Heritage	Damage or removal of historical buildings B07, B08 & B15	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements. Apply for Section 38 Permit for Graves identified, Conduct Risk Assessment in terms of MHSA, Section 17.7(a).	Application for a demolition permit can be made with the Provincial Heritage Resources Agency. No mining activities can take place within 50m of the sites. No blasting within 100m of the sites. Buildings must be monitored pre and post blasting activities	Medium	48
Construction, operation and decommissioning of the topsoil stockpile	Heritage	Damage and removal of the cemetery F05	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements. Apply for Section 38 Permit for Graves identified, Conduct Risk Assessment in terms of MHSA, Section 17.7(a).	The topsoil stockpile should be relocated if possible. If the stockpile cannot be removed a buffer must be placed around the cemetery. A relocation permit can be applied for with the Provincial Heritage Resources Agency. The next of kin must be allowed to visit the cemetery. Should skeletal remains be exposed during development and construction Should phases, all activities must be suspended and the relevant heritage resources authority must be contacted.	Medium	48
<b>Paleontological</b>						



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Construction of infrastructure and opencast mine and associated infrastructure.	Palaeontological	No fossils are likely to occur on site	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements. Apply for Section 38 Permit for Graves identified, Conduct Risk Assessment in terms of MHSA, Section 17.7(a).	Should fossils be exposed during development and construction Should phases, all activities must be suspended and the relevant heritage resources authority must be contacted.	Very low	4
<b>Visual</b>						
Removal of vegetation for site clearing / preparation for all proposed infrastructure and opencast areas.	Visual	Negative impacts on aesthetics	Minimise Visual Impacts.	Reduce the construction period through careful planning and productive implementation of resources. Plan the placement of lay-down areas and temporary camps. Restrict the activities and movement of construction workers and vehicles. Ensure that all infrastructure, the site, and general surrounds are maintained in a neat and appealing way. Screen the whole construction site via fence cover. Reduce and control construction dust using approved dust suppression techniques. Implement daily dust suppression and pave roads where possible to avoid transport related dust pollution. Restrict construction activities to daylight hours. Ensure that the outer material/colour of the structures are not white and will not result in any glare/reflection. Plan infrastructure in accordance with the topography of the surrounding area and with the location of sensitive receptors. Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way. Maintain stockpiles to the recommended minimum height. Revegetate soon after stockpiling to avoid erosion forming on the stockpiles.	Medium	44,8
Removal of vegetation for site clearing / preparation for all proposed infrastructure and opencast areas.	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	Minimise Visual Impacts.		Medium	41,6
Movement of construction vehicles and heavy machinery for site clearance	Visual	Change of visual character from a natural landscape to a built landscape	Minimise Visual Impacts.		Medium	41,6
Design of supporting infrastructure	Visual	Landscape visual change	Minimise Visual Impacts.		Low	38,4
Daily operational activities and continued expansion of the opencast areas.	Visual	Negative impacts on aesthetics	Minimise Visual Impacts.		Medium	56
Daily operational activities of the Mine and associated infrastructure	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	Minimise Visual Impacts.		Medium	44,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Movement of heavy machinery	Visual	Change of visual character	Minimise Visual Impacts.	Rehabilitation of disturbed areas and re-establishment of vegetation. Keep lighting to a minimum. Direct light downwards to avoid illumination to the sky. Minimize the number of night-time lights used. Plant indigenous trees around the perimeter fence to break structural forms and provide visual screens. Backfilling of the opencast areas as part of concurrent rehabilitation.	Low	33,6
Night lighting for security and operational activities	Visual	Light pollution (Glare, spill light, sky glow)	Minimise Visual Impacts.		Low	36
Daily operational activities of the Mine, associated infrastructure and opencast mining.	Visual	Landscape visual change	Minimise Visual Impacts.		Low	31,2
<b>Groundwater</b>						
Opencast Mining	Groundwater	Dewatering of the aquifer	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	Five monitoring boreholes needs to be drilled immediately downstream of the opencasts as well as at the Hex River to monitor the impacts on the river. Monitoring of these boreholes should commence as soon as possible. The size of unrehabilitated areas (pit, spoils, unvegetated areas) that could produce contamination should be minimised. Mine planning should consider concurrent rehabilitation of mine workings and waste management facilities. Rehabilitation should be planned to promote free drainage and to minimise or eliminate ponding of storm water that contribute to recharge of the aquifer. The connectivity between the surface water in the Hex River and the groundwater must be clarified by a hydrogeological study as soon as possible. This can be done with a survey of the river in the potentially affected area, as well as with drilling of monitoring boreholes as recommended.	Medium	48
Opencast Mining	Groundwater	Impact on water quality	Prevent hydrogeological impacts and prevent contamination of water resources.		Very low	4,8

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Closure and rehabilitation of the opencast pit	Groundwater	Impacts on water quality	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	The final mine topography should be planned, as far as possible, to be free-draining. The final layer (just below the topsoil cover) should be as clayey as possible and compacted if feasible, to reduce recharge to the opencasts. Institute water level and water quality monitoring programmes to confirm rate of water rise and water quality as the opencasts floods. Modelling of the post-closure groundwater situation will be required at the time of closure.	Low	27
<b>Blasting</b>						
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard – ground vibration	To prevent impacts on people and animals and to avoid damage to structures.	Specific blast design to be done, shorter blast holes, smaller diameter blast hole, using electronic initiation and single hole firing.	Low	31,2
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard – air blast	To prevent impacts on people and animals and to avoid damage to structures.	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	28,8
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard – fly rock	To prevent impacts on people and animals and to avoid damage to structures.	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
<b>Noise</b>						
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM.	Noise	Equipment and vehicles used for construction of infrastructure will result in increased noise levels.	Prevent or minimise the impact of noise.	Construction crew must conduct toolbox talks to educate their employees and ensure that they are aware of the legislation regarding noise. The Environmental Coordinator should inform the receptors prior to activities that will be noisy. Pit highwalls should be developed prior to nighttime pit operations.	Low	36

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Loading, hauling, and stockpiling of overburden and ROM. Mining and related operational activities.	Noise	Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of workshop and office will all increase noise level in the project area.	Prevent or minimise the impact of noise.	Implement and maintain berms around the opencast pits when operating within the pits and due to receptors. Berms or the selected acoustical barrier should enclose all sides when implementing a berm at receptors R2 – R4. The acoustical shield needs to be implemented as feasibly close as possible to the opencast or receptors. The mine should minimise operations during night-times and close to receptors R2 – R4 on their boundary. The noisy equipment and areas should be considered as low as possible for acoustical berms and surrounding buildings/stockpiles to act as noise shields.	Low	39
Demolishing of surface infrastructure	Noise	Equipment and vehicles used for demolishing and rehabilitation of infrastructure will result in increased noise levels.	Prevent or minimise the impact of noise.		Low	27
<b>Traffic</b>						
Construction of infrastructure and opencast mining	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	To limit impacts on traffic as a result of the project.	Implementation of street lights. Warning signs on R104 on both approaches (trucks crossing). Re-painting of road markings. At intersection of R104 & Arondoldistad Road: 45m right lane on Arondoldistad Road northbound approach.	Low	30
Transportation of ROM from site to the Millsell plant	Traffic	Continued change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	To limit impacts on traffic as a result of the project.		Medium	48
<b>Air Quality</b>						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Construction activities are associated with land clearing, ground excavation, material handling (loading/offloading), vehicle dust entrainment from trucks, stockpiling and the construction of infrastructure such as access roads and storm water management systems.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Decrease impacts on air quality	Implementation of dust control plan. Limit cleared Areas. Retain as much existing vegetation as possible. Activities with high dust causing potential should not be carried out in sensitive areas during adverse wind conditions. Wind barriers to be placed on site before the commencement of works. Plan earth moving works so that they are completed just prior to the time they are needed. Pre-water areas to be disturbed. Ensure dust suppression takes place. Implement monitoring requirements.	Low	24
Drilling and blasting at the opencast pit, bulldozing, material handling operations (truck loading / offloading operations), crushing, wind erosion from exposed areas: opencast pit, exposed surfaces & material stockpiles, excavators and FELs (loading dump trucks at pit area & loading ROM onto primary crusher) and vehicle dust entrainment on unpaved haul road.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Decrease impacts on air quality	Implementation of dust control plan. Vehicle restrictions – reducing the height of material transfer at the crushing plant, enclosure of material transfer points, water sprays during material handling operations, and the use rock armour at large stockpiles prone to wind erosion. Regular cleaning and sweeping of mine areas to prevent the accumulation of dust on surfaces. Immediate clean-up of any material (i.e. ROM, waste/overburden and topsoil) spillages. Conduct regular site inspections to ensure the dust mitigation measures are being implemented. Regular visual site inspections are recommended to assess whether further mitigation is required for any of the dust emission sources. Implement monitoring requirements.	Medium	52
Rehabilitation of disturbed areas, dismantling on infrastructure, removal of SWMP and general closure activities.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Decrease impacts on air quality	Implementation of dust control plan. Implement monitoring requirements. Ensure dust suppression takes place.	Low	24
<b>Socio- Economic</b>						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Construction of infrastructure, development of the boxcut, mining of chrome and use of associated infrastructure.	Socio-Economic <b>Positive Impact</b>	Continued employment of current employees as the current mine reaches its life	Minimise impacts on socio-economic environment.	Continued communication with employees on the	Positive High	75
Implementation of the SLP and existing Procurement Policy	Socio-Economic <b>Positive Impact</b>	Promotion of preferential procurement of goods and services and local content.	Minimise impacts on socio-economic environment.	Strictly implement the Procurement Plan. Do skills development and training for the SMME's, if feasible, to ensure that SMMEs / contractors are prepared and equipped to take part in the tender processes. 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 Rustenburg LM LED Department and to the local communities prior to the tender process commencing.	Positive High	80
Opencast mining	Socio-Economic	Loss of access to livelihoods as area will be used for opencast pit and businesses around the mining area	Minimise impacts on socio-economic environment.		Low	36
Construction and operation of mine	Property Values	Devaluation of property values	Minimise impacts on socio-economic environment.	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.) that could result in degradation of farm land, natural areas, negative impacts on water resources and intrusion impacts for surrounding properties.	Medium	41,6



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Poor management of the mining operation during construction and operational activities	Health and Safety	Road accidents, Unauthorized access to site, fire hazards, pollution problems, high ambient noise levels, dust generation and air pollution	Minimise impacts on socio-economic environment.	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. 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. Fence off the construction area and any excavations and display warning and 'no trespass' signs at appropriate localities in various local languages.	Medium	52
Construction and operation of mine	Population	Inflow of job seekers will lead to noise creation, littering, safety and security risks.	Minimise impacts on socio-economic environment.	Ensure transparency and communicate through the Ward Councillors and CLO the fact that no / minimal recruitment will take place. Through workshops and training programmes and through the involvement of the CLO, encourage workers to invest their housing allowances in established residential areas or to apply for government housing schemes.	Low	24
Construction of infrastructure, development of the boxcut, mining of chrome and use of associated infrastructure.	Living & movement patterns	Intrusion impacts associated with traffic, air quality & noise	Minimise impacts on socio-economic environment.	Ensure mitigation measures as outlined in the relevant specialist reports are implemented.	Low	28,8
Construction and operation of mine	Community institutional arrangements	Social conflict	Minimise impacts on socio-economic environment.	Ensure transparency and communicate through the Ward Councillors and CLO the fact that no / minimal recruitment will take place. Through workshops and training programmes and through the involvement of the CLO, encourage workers to invest their housing allowances in established residential areas or to apply for government housing schemes.	Low	28,8
<b>Closure and Rehabilitation</b>						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Closure and Rehabilitation of opencast mine and associated infrastructure	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Minimise impacts on socio-economic environment	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.	Very Low	16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Minimise impacts on socio-economic environment	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.	Very Low	16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Minimise impacts on socio-economic environment	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.	Very Low	19,8
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Economic impact should there be an incident of public health and safety.	Minimise impacts on socio-economic environment	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.	Low	36
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Minimise impacts on socio-economic environment	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.	Low	31,2
<b>Hydropedology</b>						

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Contamination of Water Resources	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures	Medium	51,2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Loss of vadose zone flows feeding water resources	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures	Low	33,6
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water	Hydropedology	Alteration of landscape hydrodynamics	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures	Medium	51,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	Management Objectives	Mitigation Measures	Significance with mitigation	
management. Mining and related operational activities.						
Underground mining	Hydropedology	Contamination of Water Resources	Prevent hydroopedological impacts on the wetlands.	Avoid and control through implementation of preventative measures	Medium	44,8
Underground mining	Hydropedology	Loss of vadose zone flows feeding water resources	Prevent hydroopedological impacts on the wetlands.	Avoid and control through implementation of preventative measures	Low	21,6
Underground mining	Hydropedology	Alteration of landscape hydrodynamics	Prevent hydroopedological impacts on the wetlands.	Avoid and control through implementation of preventative measures	Low	21,6

### 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 67: Specialist Recommendations Summarised

List of Studies Undertaken	Recommendations of Specialist Reports	Specialist Recommendations included	Reference to Section in Report Included
Agricultural Impact Assessment	The site is located in a predominantly platinum mining area that is a major contributor to the country's economy. No high potential land will be lost. Grazing land could have a low to moderate impact on local informal farmers. This is temporary until the land is rehabilitated and returned to the farmers. It is recommended that mining on the land be approved.	X	Baseline Environment (Section 10.4), Impact Assessment and

			Management (Table 64) Tables (Appendix 5)
Terrestrial Biodiversity / Ecological Impact Assessment	<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.</p> <p>The watercourse and associated buffer areas must be considered as sensitive areas and ideally these sensitive areas would be avoided by the mining and related activities. It is recommended that the topsoil stockpile, which is located in the riparian zone, be relocated outside of the riparian zone.</p> <p>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>	X	Baseline Environment (Section 10.5), Impact Assessment and Management (Table 64) Tables (Appendix 6)
Surface Water Assessment	<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.</p> <p>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 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>	X	Baseline Environment (Section 10.6), Impact Assessment and Management (Table 64) Tables (Appendix 7)
Aquatic Ecological Assessment	<p>The applicant needs to develop an Environmental Management Programme which describe in detail how identified impacts will be managed on site to ensure that impacts are minimised. The EMP must then be approved by the relevant government agencies. The management measures as indicated in <b>Error! Reference source not found.</b> and <b>Error! Reference source not found.</b> of Section <b>Error! Reference source not found.</b> found in the specialist report must be implemented where applicable.</p>	X	Baseline Environment (Section 10.7), Impact Assessment and

	<p>The findings should be confirmed during several seasons. 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>		<p>Management (Table 64) Tables (Appendix 8)</p>
Wetland Assessment	<p>The current proposed layout for the Opencast Mine Project allows for the Topsoil Stockpile to be placed directly within the CVB wetland along with the newly proposed road and a section of the opencast pit occurring within the calculated wetland buffer zones. It is highly recommended that an alternative layout be considered, as mentioned in the Mitigation Hierarchy in Appendix A of the specialist report.</p> <p>If an alternative layout is not considered for the application, the specialist can only support the project if all mitigation measures provided in this report as well as general good practice, are strictly adhered to and the following recommendations implemented:</p> <ul style="list-style-type: none"> <li>• A 50 m construction buffer and 80 m operational buffer has been placed around the wetland system. No unauthorised activities should take place within these buffer zones. Where practically possible, the proposed Topsoil Stockpile should be developed around the wetland and not within the wetland. If not possible, the area of the proposed Topsoil Stockpile should be demarcated in terms of developable area. Infringements within the wetland should only occur within the developable area.</li> <li>• The wetland/watercourse areas that are at risk should be monitored for any degradation and changes to the PES of these systems.</li> <li>• An Alien Invasive Vegetation Management Plan should be developed and implemented immediately.</li> </ul> <p>Any direct impact on the wetland/watercourse will need to be managed by a Watercourse Rehabilitation Plan in such a way as to support the larger drainage and wetland systems at the same level as those in the pre-mining condition.</p>	X	<p>Baseline Environment (Section 10.8), Impact Assessment and Management (Table 64) Tables (Appendix 9)</p>
Hydrogeology Assessment	<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 and existing Millsell Waterkloof Mining, including the proposed new opencast as well as the Portion 528 extension top the underground. The suggested management and mitigation measures for the operation are summarised in the report for implementation.</p>	X	<p>Baseline Environment (Section 10.9), Impact Assessment and</p>



			Management (Table 64) Tables (Appendix 10)
Hydropedological Assessment	It is the specialist opinion that the impacts posed by the mining project on the hydropedological flow drivers do not constitute any fatal flaws, and therefore the project may proceed from this aspect.	X	Baseline Environment (Section 10.10), Impact Assessment and Management (Table 64) Tables (Appendix 11)
Air Quality Assessment	In conclusion, based on the dispersion modelling results presented above, Rayten is of the opinion that the proposed Waterkloof opencast mining activities can go-ahead if the recommendations provided in this report are implemented (where possible and applicable). The proposed project is anticipated to result in low to medium impacts after the implementation of mitigation measures, with no fatal flaws identified.	X	Baseline Environment (Section 10.11), Impact Assessment and Management (Table 64) Tables (Appendix 12)
Noise Assessment	With mitigation measures implemented the project activities would comply to GN R154 legislation. In terms of noise the project does not present a fatal flaw. International Finance Corporation (IFC) guidelines targets will also be achieved should mitigation be implemented. It is the specialist's opinion that the project may be authorised in terms of noise, with mitigation measures adhered to.	X	Baseline Environment (Section 10.12), Impact Assessment and Management (Table 64) Tables (Appendix 13)

Heritage Impact Assessment	Subject to adherence to the recommendations and approval by the South African Heritage Resources Agency, the proposed Millsell & Waterkloof Opencast Mine Project as per the proposed impact boundary may continue. 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 and Resources Act, 1999 (Act No. 25 of 1999 section 36 (6))). Also, should culturally significant material be discovered during the course of the said development, all activities must be suspended pending further investigation by a qualified archaeologist.	X	Baseline Environment (Section 10.13), Impact Assessment and Management (Table 64) Tables (Appendix 14)
Paleontological Assessment	As far as the palaeontological heritage is concerned, no fossils are present and so the New Waterkloof mining operation will have no impact	X	Baseline Environment (Section 10.14), Impact Assessment and Management (Table 64) Tables (Appendix 15)
Traffic Impact Assessment	<p>From a traffic flow point of view the application can be supported. The following mitigation measures are proposed:</p> <p><u>Intersection: C1: R104 &amp; Unknown Rd:</u></p> <p>This is the only intersection where trucks will cross the R104.</p> <p>The following is proposed at this intersection to improve safety.</p> <ul style="list-style-type: none"> <li>• Implementation of street lights;</li> <li>• Warning signs on R104 on both approaches (trucks crossing); and</li> <li>• Re-painting of road markings.</li> </ul> <p><u>Intersection: C4: R104 &amp; Arnoldistad Rd</u></p> <p>This upgrade is to improve the congestion on the Arnoldistad Rd northbound approach from the access to the mine.</p> <p>The following is proposed at this intersection as depicted:</p> <ul style="list-style-type: none"> <li>• 45m right turn lane on Arnoldistad Rd northbound approach.</li> </ul>	X	Baseline Environment (Section 10.15), Impact Assessment and Management (Table 64) Tables (Appendix 16)
Visual Impact Assessment	Visual impacts will result from the construction and operational phases of the proposed Waterkloof Millsell opencast mining activities. Specifically, impacts will result from the construction and operation of the opencast pit and the associated stockpiles and dumps being seen from sensitive viewpoints and the negative effects on the scenic quality and sense of place of the	X	Baseline Environment (Section 10.16),

	<p>landscape. However, it should be noted that the area has already undergone significant transformation prior to the commencement of mining activities. Current mining activities are also taking place south of the proposed site. The proposed opencast mine will further change the agricultural and commercial sense of the area to one with a more mining and industrial character. Whilst tourism activities exist in the region, no major impacts on the tourism industry are expected as a result of the proposed opencast mine. The proposed Waterkloof Millsell opencast mine will have a Medium visual impact on the scenic resources and surrounding land users. With the correct mitigation measures, the impact can be reduced to a having a less significant visual impact.</p> <p>To minimize the visual impact, several mitigation measures are recommended. These include controlling the height of stockpile areas, implementing vegetation restoration and rehabilitation of the area, and rehabilitating the opencast areas after mining operations cease. While no closure phase is expected to occur soon, the restoration and rehabilitation efforts are crucial to minimizing the visual impact in the long term. Based on the findings made in the report the impact can be mitigated to an acceptable level and the specialist can support the application if all mitigation measures provided in this report as well as general good practice, are <b>strictly</b> adhered to.</p>		<p>Impact Assessment and Management (Table 64) Tables (Appendix 17)</p>
<p>Socio-economic Assessment</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 Millsell Waterkloof Opencast Sections 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>	<p>X</p>	<p>Baseline Environment (Section 10.17), Impact Assessment and Management (Table 64) Tables (Appendix 18)</p>
<p>Blasting and Vibration</p>	<p>There is no reason to believe that this operation cannot continue if attention is given to the recommendations made.</p>	<p>X</p>	<p>Baseline Environment (Section 10.18), Impact Assessment and Management</p>

			(Table 64) Tables (Appendix 19)
Closure Assessment	<p>This Preliminary Closure and Financial Provision Assessment Report was undertaken in terms of the requirements as set out in GNR 1147 (as amended) of NEMA. According to the regulations, financial provision must be made for annual rehabilitation, final rehabilitation, decommissioning, and closure activities at the end of prospecting, exploration, mining, or production operations, and remediation and management of latent or residual environmental impacts which may become known in the future</p> <p>The scheduled quantum for closure-related financial provision for proposed Millsell Waterkloof Opencast area is:</p> <ul style="list-style-type: none"> <li>• R18 411 362.93 (Incl VAT).</li> </ul>	X	Baseline Environment (Section 19 and Appendix 20)

*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 opencast mining 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 64 above. For a summary giving only the Significance obtained, refer Table 68 below. Impacts have been discussed in Section 14.5.

Table 68: Summary of Key findings in terms of Impact Significance

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
<b>Socio Economic</b>									
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	Medium	48	N/A	1	Medium	48
<b>Natural Environment &amp; Wetlands</b>									
No-go option	Natural Environment and Wetlands	Positive: No additional negative impacts on the environment	N/A	Medium	48	N/A	1	Medium	48
<b>Agriculture</b>									
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of high potential land	Construction and operation	Very low	4	High	0,2	Very low	0,8
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of grazing land	Construction and operation	Low	28	Medium to high	0,4	Very low	11,2
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of crop production	Construction and operation	Medium	55	Medium	0,6	Low	33



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of animal production	Construction and operation	Medium	70	Medium	0,6	Medium	42
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of agriculture infrastructure	Construction and operation	Very low	4	High	0,2	Very low	0,8
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of jobs from farming	Operation	Very low	8	High	0,2	Very low	1,6
<b>Terrestrial Ecology</b>									
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	Damage and degradation of habitats and vegetation communities. Overall loss of biodiversity and ecosystem function within clearance area. Fragmentation of habitats - impeding ecological corridors. Degradation of compression of areas.	Construction and operation	Medium	52	Medium	0,6	Low	31,2
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	May lead to the introduction of alien invader species, impacting on the floral characteristics.	Construction and operation	Medium	52	Medium	0,6	Low	31,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	Protected and/or SCC species could possibly occur within the area of construction and would then be destroyed. The mining and related activities may impact on the watercourse (VU2) 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.	Construction and operation	High	65	Medium	0,6	Medium	39
Continuous human activity. Associated noise, waste, the smell of humans and physical infiltration	Ecology	Impact on the faunal communities within the area. May lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavourable).	Construction and operation	Medium	60	Medium	0,6	Low	36
Rehabilitation conducted ineffectively.	Ecology	Environmental will not be self-sustaining. Increase in alien invasive species. Property will become less viable for post-closure activities.	Closure and Decommissioning	Medium	42	Medium	0,6	Low	25,2
<b>Surface Water</b>									

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational 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
Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface Water	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained within the operation	Operation	Low	33	Low to Medium	0,8	Low	26,4
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface Water	Surface water quantity - alteration of flow due to the diversion of clean water areas	Construction and operation	Medium	52	Medium	0,6	Low	31,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities. Rehabilitation activities.	Surface Water	AIP proliferation within sensitive riparian and wetland zones	Construction, Operation and Closure	Medium	44	Medium	0,6	Low	26,4
Rehabilitation of the opencast pit and all disturbed areas	Surface Water	Surface water quantity - Reinstatement of surface drainage patterns (Positive Impact)	Closure	Low	30	Medium	0,6	Very low	18
<b>Aquatic Ecology</b>									
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Aquatic Ecology	Loss of Biodiversity and Ecological function - Riparian zone impacts.	Construction and operation	Low	39	Medium	0,6	Low	23,4
All opencast mining activities in close proximity to watercourses	Aquatic Ecology	Loss of Biodiversity and Ecological function. Interference with Ecological Corridor functioning	Construction and operation	Low	39	Medium	0,6	Low	23,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Underground activities in close proximity to watercourses	Aquatic Ecology	Loss of Biodiversity and Ecological function. Interference with Ecological Corridor functioning due to changing levels of water within the system as a result of dewatering	Construction and operation	Medium	42	Low to Medium	0,8	Low	33,6
Alteration of drainage patterns by activities within and in close proximity of river	Aquatic Ecology	Leading to decrease and changes in water quantity and availability in the Ecological Reserve	Construction and operation	Low	22	Medium	0,6	Very low	13,2
Pollution and sedimentation due to unmanaged soil and stormwater runoff bringing forth water quality impacts	Aquatic Ecology	Deterioration of water quality in the Hex 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 operation	Low	39	Low	0,8	Low	31,2
Erosion and sedimentation caused by mining within close proximity to the Hex 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 operation	Low	24	Low	0,8	Very low	19,2
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 operation	Medium	48	Medium to high	0,4	Very low	19,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
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 operation	Low	28	Medium to high	0,4	Very low	11,2
Decommissioning impacts resulting in impacts to Biodiversity and Ecological function – including Riparian zone activities or activities within buffer zones or regulated zones	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
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	Low	21	High	0,2	Very low	4,2
Water quality impacts due to improper waste management during decommissioning and removal of infrastructure	Aquatic Ecology	Deterioration of water quality in the Hex 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	12	High	0,2	Very low	2,4



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	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	Very low	21	High	0,2	Very low	4,2
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	28	Medium to high	0,4	Very low	11,2
<b>Wetland</b>									
Placement of the Topsoil Stockpile within the wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction.	Wetland	Changing the quantity and fluctuation properties of the watercourse/wetland by for example restricting water flow or increasing flood flows. Permanent changes to water flows and loss of important habitat may occur.	Construction and operation	Very High	80	Low to Medium	0,8	High	64

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Placement of the Topsoil Stockpile within the wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction.	Wetland	Changing the quantity and fluctuation properties of the watercourse/wetland by for example restricting water flow or increasing flood flows. Permanent changes to water flows and loss of important habitat may occur.	Closure	Low	27	Medium to high	0,4	Medium	10,8
The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and closure, may cause oil and diesel leaks and spills. This can result in the loss of sensitive biota in the downstream wetlands/watercourses and a reduction in wetland/watercourse function.	Wetland	Changes in water quality due to pollution.	Construction and operation	Medium	55	Medium	0,6	Low	33
The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and closure, may cause oil and diesel leaks and spills. This can result in the loss of sensitive biota in the downstream wetlands/watercourses and a reduction in wetland/watercourse function.	Wetland	Changes in water quality due to pollution.	Closure	Low	27	Medium	0,6	Very low	16,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Direct development and stockpiling within wetland/watercourse areas.	Wetland	Loss and disturbance of wetland/watercourse habitat; wetland/watercourse fauna fatalities. Owing to the nature of the impact of opencast mining where both the soil profile and the underlying stratigraphy are for all intents and purposes permanently altered, impacts on wetlands/watercourses and their associated functions are permanently lost.	Construction and operation	High	75	Low to Medium	0,8	Medium	60
Direct development and stockpiling within wetland/watercourse areas.	Wetland	Loss and disturbance of wetland/watercourse habitat; wetland/watercourse fauna fatalities. Owing to the nature of the impact of opencast mining where both the soil profile and the underlying stratigraphy are for all intents and purposes permanently altered, impacts on wetlands/watercourses and their associated functions are permanently lost.	Closure	Low	24	Low to medium	0,8	Very low	19,2
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles	Wetland	Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland/watercourse system, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are	Construction and operation	High	70	Medium to high	0,6	Medium	42

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
		implemented alien plants can easily colonise and impact on downstream users.							
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles	Wetland	Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland/watercourse system, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.	Closure	Medium	44	Medium	0,6	Low	26,4

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Construction and operational activities consisting of earthworks and soil disturbances.	Wetland	Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of wetlands/watercourse and downstream rivers.	Construction and operation	High	75	Medium to high	0,4	Low	30
Construction and operational activities consisting of earthworks and soil disturbances.	Wetland	Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of wetlands/watercourse and downstream rivers.	Closure	Medium	60	Medium to high	0,4	Low	24
<b>Heritage</b>									

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Construction of the boxcut and opencast mining	Heritage	Damage or removal of historical buildings B07, B08 & B15	Construction and operation	High	80	Medium	0,6	Medium	48
Construction, operation and decommissioning of the topsoil stockpile	Heritage	Damage and removal of the cemetery F05	Construction, operation and closure	High	80	Medium	0,6	Medium	48
<b>Paleontological</b>									
Construction of infrastructure and opencast mine and associated infrastructure.	Palaeontological	No fossils are likely to occur on site	Construction, operation and closure	Very low	4	Low	1	Very low	4
<b>Visual</b>									
Removal of vegetation for site clearing / preparation for all proposed infrastructure and opencast areas.	Visual	Negative impacts on aesthetics	Construction	Medium	56	Low to Medium	0,8	Medium	44,8
Removal of vegetation for site clearing / preparation for all proposed infrastructure and opencast areas.	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	Construction	Medium	52	Low to Medium	0,8	Medium	41,6



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Movement of construction vehicles and heavy machinery for site clearance	Visual	Change of visual character from a natural landscape to a built landscape	Construction	Medium	52	Low to Medium	0,8	Medium	41,6
Design of supporting infrastructure	Visual	Landscape visual change	Construction	Medium	48	Low to Medium	0,8	Low	38,4
Daily operational activities and continued expansion of the opencast areas.	Visual	Negative impacts on aesthetics	Operation	Medium	56	Low	1	Medium	56
Daily operational activities of the Mine and associated infrastructure	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	Operation	Medium	56	Low to Medium	0,8	Medium	44,8
Movement of heavy machinery	Visual	Change of visual character	Operation	Medium	56	Medium	0,6	Low	33,6
Night lighting for security and operational activities	Visual	Light pollution (Glare, spill light, sky glow)	Operation	Medium	60	Medium	0,6	Low	36
Daily operational activities of the Mine, associated infrastructure and opencast mining.	Visual	Landscape visual change	Operation	Medium	52	Medium	0,6	Low	31,2
<b>Groundwater</b>									
Opencast Mining	Groundwater	Dewatering of the aquifer	Operation	High	60	Low to medium	0,8	Medium	48

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Opencast Mining	Groundwater	Impact on water quality	Operation	Very low	8	Medium	0,6	Very low	4,8
Closure and rehabilitation of the opencast pit	Groundwater	Impacts on water quality	Closure	Medium	45	Medium	0,6	Low	27
<b>Blasting</b>									
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard - ground vibration	Construction & operation	Medium	52	Medium	0,6	Low	31,2
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard - air blast	Construction & operation	Medium	48	Medium	0,6	Low	28,8
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard - fly rock	Construction & operation	High	70	Medium to high	0,4	Low	28
<b>Noise</b>									
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM.	Noise	Equipment and vehicles used for construction of infrastructure will result in increased noise levels.	Construction	Medium	60	Medium	0,6	Low	36
Loading, hauling, and stockpiling of overburden and ROM. Mining and related operational activities.	Noise	Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of workshop and office will all increase noise level in the project area.	Operation	High	65	Medium	0,6	Low	39

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Demolishing of surface infrastructure	Noise	Equipment and vehicles used for demolishing and rehabilitation of infrastructure will result in increased noise levels.	Closure	Medium	45	Medium	0,6	Low	27
<b>Traffic</b>									
Construction of infrastructure and opencast mining	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	Construction	Medium	50	Medium	0,6	Low	30
Transportation of ROM from site to the Millsell plant	Traffic	Continued change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	Operation	High	80	Medium	0,6	Medium	48
<b>Air Quality</b>									
Construction activities are associated with land clearing, ground excavation, material handling (loading/offloading), vehicle dust entrainment from trucks, stockpiling and the construction of infrastructure such as access roads and storm water management systems.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Construction	Low	40	Medium	0,6	Low	24

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Drilling and blasting at the opencast pit, bulldozing, material handling operations (truck loading / offloading operations), crushing, wind erosion from exposed areas: opencast pit, exposed surfaces & material stockpiles, excavators and FELs (loading dump trucks at pit area & loading ROM onto primary crusher) and vehicle dust entrainment on unpaved haul road.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Operation	High	65	Low to Medium	0,8	Medium	52
Rehabilitation of disturbed areas, dismantling on infrastructure, removal of SWMP and general closure activities.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Closure	Low	40	Medium	0,6	Low	24
<b>Socio- Economic</b>									
Construction of infrastructure, development of the boxcut, mining of chrome and use of associated infrastructure.	Socio-Economic <b>Positive Impact</b>	Continued employment of current employees as the current mine reaches its life	Construction and Operational	Positive High	75	N/A	1	Positive High	75
Implementation of the SLP and existing Procurement Policy	Socio-Economic <b>Positive Impact</b>	Promotion of preferential procurement of goods and services and local content.	Construction and Operational	Positive High	80	N/A	1	Positive High	80
Opencast mining	Socio-Economic	Loss of access to livelihoods as area will be used for opencast pit and businesses around the mining area	Operations	Medium	60	Medium	0,6	Low	36
Construction and operation of mine	Property Values	Devaluation of property values	Construction and Operational	Medium	52	Low to Medium	0,8	Medium	41,6

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Poor management of the mining operation during construction and operational activities	Health and Safety	Road accidents, Unauthorized access to site, fire hazards, pollution problems, high ambient noise levels, dust generation and air pollution	Construction and Operational	High	65	Low to Medium	0,8	Medium	52
Construction and operation of mine	Population	Inflow of job seekers will lead to noise creation, littering, safety and security risks.	Construction and Operational	Low	30	Low to medium	0,8	Low	24
Construction of infrastructure, development of the boxcut, mining of chrome and use of associated infrastructure.	Living & movement patterns	Intrusion impacts associated with traffic, air quality & noise	Construction	Medium	48	Medium	0,6	Low	28,8
Construction and operation of mine	Community institutional arrangements	Social conflict	Construction and Operational	Low	36	Low to medium	0,8	Low	28,8
<b>Closure and Rehabilitation</b>									
Closure and Rehabilitation of opencast mine and associated infrastructure	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Closure	Low	27	Medium	0,6	Very Low	16,2
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Closure	Low	27	Medium	0,6	Very Low	16,2

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Socio-economic impact on farmers, labourers and surrounding landowners and residents due to negative impacts on groundwater, dust pollution, noise pollution etc.	Closure	Low	33	Medium	0,6	Very Low	19,8
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Socio-Economic	Economic impact should there be an incident of public health and safety.	Closure	Medium	45	Low	0,8	Low	36
Closure and Rehabilitation	Socio-Economic	Sourcing supplies from local residents and businesses boosting the local economy for an extended period of time.	Closure	Low	39	Low	0,8	Low	31,2
<b>Hydropedology</b>									
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Contamination of Water Resources	Construction and operations	High	64	Low to medium	0,8	Medium	51,2



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	PHASE	Significance without mitigation		Mitigation Efficiently		Significance with mitigation	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Loss of vadose zone flows feeding water resources	Construction and operations	Medium	42	Low to medium	0,8	Low	33,6
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Alteration of landscape hydrodynamics	Construction and operations	High	64	Low to medium	0,8	Medium	51,2
Underground mining	Hydropedology	Contamination of Water Resources	Construction and operations	Medium	56	Low to medium	0,8	Medium	44,8
Underground mining	Hydropedology	Loss of vadose zone flows feeding water resources	Construction and operations	Low	36	Medium	0,6	Low	21,6
Underground mining	Hydropedology	Alteration of landscape hydrodynamics	Construction and operations	Low	36	Medium	0,6	Low	21,6

## **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 67. Specialist management measures as well as the significance of the impacts prior and post mitigation are provided in Table 64 and contained in the respective studies.

Table 69: Impact management objectives and the impact management outcomes for inclusion in the EMPr

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of high potential land	Limit impacts on agricultural activities.	Early detection and prevention of possible impacts. Avoid through preventative measures (e.g. bunding, spill kits) Remedy through clean-up and waste disposal. Early detection and prevention of possible impacts Modify through soil treatment if required. Restoration of Landscape function and Capability
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of grazing land	Limit impacts on agricultural activities.	
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of crop production	Limit impacts on agricultural activities.	
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of animal production	Limit impacts on agricultural activities.	
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of agriculture infrastructure	Limit impacts on agricultural activities.	
Opencast Mining (including access/haul roads, Overburden dumps, topsoil stockpile, crushing pad/ ROM)	Agriculture	Loss of jobs from farming	Limit impacts on agricultural activities.	
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	Damage and degradation of habitats and vegetation communities. Overall loss of biodiversity and ecosystem function within clearance area. Fragmentation of habitats - impeding ecological corridors. Degradation of compression of areas.	Early detection of impacts and remediation thereof.	Control through implementation of EMPR mitigation measures (e.g. limit area of disturbance, training). Avoid/Stop through relocation of threatened or protected species. Control through implementation of ESMS.
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	May lead to the introduction of alien invader species, impacting on the floral characteristics.	Early detection of impacts and remediation thereof.	Control through implementation of EMPR mitigation measures (e.g. limit area of disturbance, training). Avoid/Stop through relocation of threatened or protected species. Control through implementation of ESMS.

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Opencast mining, human and vehicle movement	Ecology	Protected and/or SCC species could possibly occur within the area of construction and would then be destroyed. The mining and related activities may impact on the watercourse (VU2) 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.	Early detection of impacts and remediation thereof.	Control through implementation of EMPR mitigation measures (e.g. limit area of disturbance, training). Avoid/Stop through relocation of threatened or protected species. Control through implementation of ESMS.
Continuous human activity. Associated noise, waste, the smell of humans and physical infiltration	Ecology	Impact on the faunal communities within the area. May lead to ever declining populations (where the disturbance of habitat has caused habitat remaining to become unfavourable).	Early detection of impacts and remediation thereof.	Control through implementation of EMPR mitigation measures (e.g. limit area of disturbance, training). Avoid/Stop through relocation of threatened or protected species. Control through implementation of ESMS.
Rehabilitation conducted ineffectively.	Ecology	Environmental will not be self-sustaining. Increase in alien invasive species. Property will become less viable for post-closure activities.	Early detection of impacts and remediation thereof.	Control through implementation of EMPR mitigation measures (e.g. limit area of disturbance, training). Avoid/Stop through relocation of threatened or protected species. Control through implementation of ESMS.
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface Water	Surface water quality - Sedimentation and pollution of surface water resources resulting in the deterioration of water quality	Prevent hydrological impacts and prevent contamination of water resources	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management). Control through implementation of mitigation measures.
Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface Water	Surface water quantity - Reduction of Catchment Yield as dirty water runoff within the mine will be contained within the operation	Prevent hydrological impacts and prevent contamination of water resources	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management). Control through implementation of mitigation measures.
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Surface Water	Surface water quantity - alteration of flow due to the diversion of clean water areas	Prevent hydrological impacts and prevent contamination of water resources	Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management). Control through implementation of mitigation measures.

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
<p>Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities. Rehabilitation activities.</p>	<p>Surface Water</p>	<p>AIP proliferation within sensitive riparian and wetland zones</p>	<p>Prevent hydrological impacts and prevent contamination of water resources</p>	<p>Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management). Control through implementation of mitigation measures.</p>
<p>Rehabilitation of the opencast pit and all disturbed areas</p>	<p>Surface Water</p>	<p>Surface water quantity - Reinstatement of surface drainage patterns (Positive Impact)</p>	<p>Prevent hydrological impacts and prevent contamination of water resources</p>	<p>Avoid through implementation of preventative measures (e.g. Bunding, Hazardous materials management, Pollution prevention measures, storm water management). Control through implementation of mitigation measures.</p>
<p>Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.</p>	<p>Aquatic Ecology</p>	<p>Loss of Biodiversity and Ecological function - Riparian zone impacts.</p>	<p>To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.</p>	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
<p>All opencast mining activities in close proximity to watercourses</p>	<p>Aquatic Ecology</p>	<p>Loss of Biodiversity and Ecological function. Interference with Ecological Corridor functioning</p>	<p>To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.</p>	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Underground activities in close proximity to watercourses	Aquatic Ecology	Loss of Biodiversity and Ecological function. Interference with Ecological Corridor functioning due to changing levels of water within the system as a result of dewatering	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.
Alteration of drainage patterns by activities within and in close proximity of river	Aquatic Ecology	Leading to decrease and changes in water quantity and availability in the Ecological Reserve	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.
Pollution and sedimentation due to unmanaged soil and stormwater runoff bringing forth water quality impacts	Aquatic Ecology	Deterioration of water quality in the Hex 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	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Erosion and sedimentation caused by mining within close proximity to the Hex 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.	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal.</p> <p>Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained.</p> <p>Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
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).	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal.</p> <p>Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained.</p> <p>Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
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	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal.</p> <p>Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained.</p> <p>Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Decommissioning impacts resulting in impacts to Biodiversity and Ecological function – including Riparian zone activities or activities within buffer zones or regulated zones	Aquatic Ecology	Decommissioning and material movement in proximity or within buffer zones of water resources	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal.</p> <p>Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained.</p> <p>Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
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	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal.</p> <p>Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained.</p> <p>Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
Water quality impacts due to improper waste management during decommissioning and removal of infrastructure	Aquatic Ecology	Deterioration of water quality in the Hex 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	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal.</p> <p>Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained.</p> <p>Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
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.	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal.</p> <p>Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained.</p> <p>Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
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.	To prevent the loss of aquatic biodiversity and ecological function within the ecosystem.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
Placement of the Topsoil Stockpile within the wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction.	Wetland	Changing the quantity and fluctuation properties of the watercourse/wetland by for example restricting water flow or increasing flood flows. Permanent changes to water flows and loss of important habitat may occur.	To protect wetlands and ensure their ecological function continues.	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal.</p> <p>Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained.</p> <p>Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
<p>Placement of the Topsoil Stockpile within the wetland's preferred flow path, compaction of soil, the removal of vegetation, surface water redirection during construction.</p>	<p>Wetland</p>	<p>Changing the quantity and fluctuation properties of the watercourse/wetland by for example restricting water flow or increasing flood flows. Permanent changes to water flows and loss of important habitat may occur.</p>	<p>To protect wetlands and ensure their ecological function continues.</p>	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
<p>The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and closure, may cause oil and diesel leaks and spills. This can result in the loss of sensitive biota in the downstream wetlands/watercourses and a reduction in wetland/watercourse function.</p>	<p>Wetland</p>	<p>Changes in water quality due to pollution.</p>	<p>To protect wetlands and ensure their ecological function continues.</p>	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>
<p>The mishandling of hazardous substances and/or improper maintenance of machinery during construction, operation and closure, may cause oil and diesel leaks and spills. This can result in the loss of sensitive biota in the downstream wetlands/watercourses and a reduction in wetland/watercourse function.</p>	<p>Wetland</p>	<p>Changes in water quality due to pollution.</p>	<p>To protect wetlands and ensure their ecological function continues.</p>	<p>Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.</p>

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Direct development and stockpiling within wetland/watercourse areas.	Wetland	Loss and disturbance of wetland/watercourse habitat; wetland/watercourse fauna fatalities. Owing to the nature of the impact of opencast mining where both the soil profile and the underlying stratigraphy are for all intents and purposes permanently altered, impacts on wetlands/watercourses and their associated functions are permanently lost.	To protect wetlands and ensure their ecological function continues.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.
Direct development and stockpiling within wetland/watercourse areas.	Wetland	Loss and disturbance of wetland/watercourse habitat; wetland/watercourse fauna fatalities. Owing to the nature of the impact of opencast mining where both the soil profile and the underlying stratigraphy are for all intents and purposes permanently altered, impacts on wetlands/watercourses and their associated functions are permanently lost.	To protect wetlands and ensure their ecological function continues.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles	Wetland	Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland/watercourse system, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.	To protect wetlands and ensure their ecological function continues.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
The moving of soil and vegetation resulting in opportunistic invasions after disturbance and the introduction of seed in building materials and on vehicles	Wetland	Invasions of alien plants can impact on hydrology, by reducing the quantity of water entering a wetland/watercourse system, and outcompete natural vegetation, decreasing the natural biodiversity. Once in a system alien invasive plants can spread through the catchment. If allowed to seed before control measures are implemented alien plants can easily colonise and impact on downstream users.	To protect wetlands and ensure their ecological function continues.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.
Construction and operational activities consisting of earthworks and soil disturbances.	Wetland	Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of wetlands/watercourse and downstream rivers.	To protect wetlands and ensure their ecological function continues.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.
Construction and operational activities consisting of earthworks and soil disturbances.	Wetland	Changes in sediment entering and exiting the system may result in smothering of vegetation and habitats and lead to the loss of niche habitats. Furthermore, increased turbidity affects the oxygen concentration and temperature of the water. Sedimentation and erosion will lead to the degradation of wetlands/watercourse and downstream rivers.	To protect wetlands and ensure their ecological function continues.	Early detection and prevention of possible impacts. Integrity of aquatic system remains as is and the ecological function within the ecosystem continues as normal. Control through proper soil management procedures. Ensure biodiversity and ecological function is maintained. Avoid and control through implementation of preventative measures (e.g. wetland delineation and mine planning, limitation area of wetland disturbance – i.e.: avoid wetlands and wetland buffer areas). Remedy/modify through wetland rehabilitation. Prevent Discharge to the environment.
Construction of the boxcut and opencast mining	Heritage	Damage or removal of historical buildings B07, B08 & B15	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements. Apply for Section 38 Permit for Graves identified, Conduct Risk Assessment in terms of MHSA, Section 17.7(a).	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils



ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Construction, operation and decommissioning of the topsoil stockpile	Heritage	Damage and removal of the cemetery F05	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements. Apply for Section 38 Permit for Graves identified, Conduct Risk Assessment in terms of MHSA, Section 17.7(a).	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils
Construction of infrastructure and opencast mine and associated infrastructure.	Palaeontological	No fossils are likely to occur on site	To avoid disturbing sites of archaeological and cultural interest. If any new heritage aspects are discovered, a specialist must be called for evaluation. This must be done in accordance with legal requirements. Apply for Section 38 Permit for Graves identified, Conduct Risk Assessment in terms of MHSA, Section 17.7(a).	Avoid and control through implementation of preventative measures (e.g. Palaeontological site visit and training, watching brief) Modify through removal and curation of fossils
Removal of vegetation for site clearing / preparation for all proposed infrastructure and opencast areas.	Visual	Negative impacts on aesthetics	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.
Removal of vegetation for site clearing / preparation for all proposed infrastructure and opencast areas.	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.
Movement of construction vehicles and heavy machinery for site clearance	Visual	Change of visual character from a natural landscape to a built landscape	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.
Design of supporting infrastructure	Visual	Landscape visual change	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.
Daily operational activities and continued expansion of the opencast areas.	Visual	Negative impacts on aesthetics	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.
Daily operational activities of the Mine and associated infrastructure	Visual	Negative impact on visibility from sensitive receptors/Viewpoints	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.
Movement of heavy machinery	Visual	Change of visual character	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Night lighting for security and operational activities	Visual	Light pollution (Glare, spill light, sky glow)	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.
Daily operational activities of the Mine, associated infrastructure and opencast mining.	Visual	Landscape visual change	Minimise Visual Impacts.	Reducing disturbing noise/light and vibration to outside boundaries.
Opencast Mining	Groundwater	Dewatering of the aquifer	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)
Opencast Mining	Groundwater	Impact on water quality	Prevent hydrogeological impacts and prevent contamination of water resources.	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)
Closure and rehabilitation of the opencast pit	Groundwater	Impacts on water quality	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)	Avoid and control through implementation of preventative measures (e.g. limitation of water usage, water conservation strategies, optimization of water usage and recycling)
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard - ground vibration	To prevent impacts on people and animals and to avoid damage to structures.	Safe mining environment. Prevention of blasting related impacts. Adhere to Risk Assessment and specifications for Blasting set out within the report to ensure no harm befalls. Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management).
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard - air blast	To prevent impacts on people and animals and to avoid damage to structures.	Safe mining environment. Prevention of blasting related impacts. Adhere to Risk Assessment and specifications for Blasting set out within the report to ensure no harm befalls. Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management).
Opencast Mining, Drilling and Blasting	Blasting	Blasting hazard - fly rock	To prevent impacts on people and animals and to avoid damage to structures.	Safe mining environment. Prevention of blasting related impacts. Adhere to Risk Assessment and specifications for Blasting set out within the report to ensure no harm befalls. Avoid and control through implementation of preventative measures (e.g. Fire breaks, Blasting procedures, hazardous substances management).

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM.	Noise	Equipment and vehicles used for construction of infrastructure will result in increased noise levels.	Prevent or minimise the impact of noise.	Reducing disturbing noise and vibration to outside boundaries.
Loading, hauling, and stockpiling of overburden and ROM. Mining and related operational activities.	Noise	Operational phase including the use of the various stockpiles, the plant operational activities e movement of vehicles, use of workshop and office will all increase noise level in the project area.	Prevent or minimise the impact of noise.	Reducing disturbing noise and vibration to outside boundaries.
Demolishing of surface infrastructure	Noise	Equipment and vehicles used for demolishing and rehabilitation of infrastructure will result in increased noise levels.	Prevent or minimise the impact of noise.	Reducing disturbing noise and vibration to outside boundaries.
Construction of infrastructure and opencast mining	Traffic	Nuisance, health and safety risks caused by increased traffic on an adjacent to the study area including cars and heavy vehicles.	To limit impacts on traffic as a result of the project.	Traffic Control and prevention of impacts.
Transportation of ROM from site to the Millsell plant	Traffic	Continued change in the traffic patterns as a result of increased traffic entering and exiting the operations on the surrounding road infrastructure and existing traffic.	To limit impacts on traffic as a result of the project.	Traffic Control and prevention of impacts.
Construction activities are associated with land clearing, ground excavation, material handling (loading/offloading), vehicle dust entrainment from trucks, stockpiling and the construction of infrastructure such as access roads and storm water management systems.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Decrease impacts on air quality	Early detection and prevention of possible impacts. Implementation of dust suppression to reduce impact. Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource
Drilling and blasting at the opencast pit, bulldozing, material handling operations (truck loading / offloading operations), crushing, wind erosion from exposed areas: opencast pit, exposed surfaces & material stockpiles, excavators and FELs (loading dump trucks at pit area & loading ROM onto primary crusher) and vehicle dust entrainment on unpaved haul road.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Decrease impacts on air quality	Early detection and prevention of possible impacts. Implementation of dust suppression to reduce impact. Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Rehabilitation of disturbed areas, dismantling on infrastructure, removal of SWMP and general closure activities.	Air quality	Increase in dust fall rates, PM10 and PM2.5 decreasing the quality of air	Decrease impacts on air quality	Early detection and prevention of possible impacts. Implementation of dust suppression to reduce impact. Ensure health and safety of mine workers within the underground sections as well as the surrounding environment. Conservation of the soil resource
All	Socio-Economic <b>Positive Impact</b>	Continued employment of current employees as the current mine reaches its life	Minimise impacts on socio-economic environment.	Increased Employment Opportunities in the Long term, Increased employment for the surrounding communities. Implementation of the Social and Labour Plan Implement Social and Labour Plan with the specific objectives: To ensure effective transformation as envisaged in the Minerals and Petroleum Resources Development Act (28/2002) the Regulations, and the Mining Charter To promote fair and equitable employment practices as prescribed in the Employment Equity Act (55/1998). The social and economic advancement of the community influenced and affected by Samancor The positively strive towards equitable practices in accordance with the procurement plan. Supporting, utilising and building local economy. Implementation of Social Labour Plan.
All	Socio-Economic <b>Positive Impact</b>	Promotion of preferential procurement of goods and services and local content.	Minimise impacts on socio-economic environment.	
All	Socio-Economic	Loss of access to livelihoods as area will be used for opencast pit and businesses around the mining area	Minimise impacts on socio-economic environment.	Reduced impact on the livelihoods of businesses.
All	Property Values	Devaluation of property values	Minimise impacts on socio-economic environment.	Reduced negative impact on the property values.
All	Health and Safety	Road accidents, Unauthorized access to site, fire hazards, pollution problems, high ambient noise levels, dust generation and air pollution	Minimise impacts on socio-economic environment.	Reduced impact on the health and safety of the surrounding community.
All	Population	Inflow of job seekers will lead to noise creation, littering, safety and security risks.	Minimise impacts on socio-economic environment.	Reduced impact on the health and safety of the surrounding community.
All	Living & movement patterns	Intrusion impacts associated with traffic, air quality & noise	Minimise impacts on socio-economic environment.	Prevention of possible impacts. Implementation of mitigation measures provided for the traffic, air quality and noise.
All	Community institutional arrangements	Social conflict	Minimise impacts on socio-economic environment.	Reduced impact on the safety of the surrounding community.

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
<b>Closure and Rehabilitation</b>				
Closure and Rehabilitation of opencast mine and associated infrastructure	Health and Safety	Possibility of closure activities and workers causing veld fires, which can potentially cause injury and or loss of life to workers and surrounding landowners and visitors.	Minimise impacts on socio-economic environment	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.
Rehabilitation of site, removal of infrastructure, closure of waste management facilities (including Stormwater)	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management facilities poses health risks and possible loss of life to mine workers and visitors to the site.	Minimise impacts on socio-economic environment	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.
All	Health and Safety	Possibility of mining activities and workers causing veld fires, which can potentially cause injury and or loss of life to mine workers and surrounding landowners, visitors and workers.	Minimise impacts on socio-economic environment.	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.
All	Health and Safety	Increased risk to public health and safety: Dangerous areas including the waste management activities and waste poses health risks and possible loss of life to mine workers and visitors to the site.	Minimise impacts on socio-economic environment.	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.
All	Health and Safety	Increased risk to public and worker health and safety	Minimise impacts on socio-economic environment.	Environmental Awareness, Monitoring and Rehabilitation if required. Management; Communication; Strategy implementation. Implementation of HR policies.
<b>Hydropedology</b>				
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Contamination of Water Resources	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures

ACTIVITY	ASPECTS AFFECTED	POTENTIAL IMPACT	MANAGEMENT OBJECTIVES	MANAGEMENT OUTCOMES
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Loss of vadose zone flows feeding water resources	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures
Construction of the boxcut, access/haul roads, Overburden dumps, topsoil stockpile and crushing pad/ ROM. Site clearing, including removal of topsoil and vegetation. Loading, hauling, and stockpiling of overburden and ROM. Storm water management. Mining and related operational activities.	Hydropedology	Alteration of landscape hydrodynamics	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures
Underground mining	Hydropedology	Contamination of Water Resources	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures
Underground mining	Hydropedology	Loss of vadose zone flows feeding water resources	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures
Underground mining	Hydropedology	Alteration of landscape hydrodynamics	Prevent hydropedological impacts on the wetlands.	Avoid and control through implementation of preventative measures



## 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 current mining area was informed by the position of the mineable resource, ensuring a feasible access point to the mineable resource and environmental sensitivity.

## 16 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 67 for conditions which should be included in the Environmental Authorisation. The Mitigation measures as specified within the Table 66 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 per Section 8.1.2 in Part B: EMPR be implemented.

It is recommended that the numerical groundwater model and transport model be updated.

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 specialist recommendations.

SASS needs to be implemented at the mine as indicated in Section 8.1.4 in Part B: EMPR.

Continue with the approved Surface Water monitoring programme Section 8.1.3 in Part B: EMPR.

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 as discussed in Table 67.

## **17 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.

## **18 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 statements. 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 Millsell Waterkloof project can 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 is provided in Table 67.

#### **18.2.1 Rehabilitation Requirements: Closure Objectives**

Adhere to the Closure and Rehabilitation Plan (Appendix 20). The following broadly accepted principles have been adopted to guide the preliminary closure planning for the proposed opencast mine at the Millsell Waterkloof Sections:

- 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 link 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**

Specific rehabilitation and closure actions forming the basis of the rehabilitation and closure operations. The actions are aligned with the mitigations defined in the comparative risk assessment. These actions are planned to comply with the requirements of the vision and objectives. The closure actions form the basis for the closure liability assessment.

The actions are indicated according to the following categories:

- Mining area – Open pit and final void.
- Topsoil berm and stormwater measures.
- Overburden Stockpiles, Haul Road.
- Temporary Office Complex, and
- General surface rehabilitation and water management.

### **Mining Area - Open pit & Final void**

The overburden will initially be hauled to the overburden dump, and the overburden material will be utilised to be backfilled into the final void. The concurrent backfilling during the operations, will limit the mass earthworks required during closure and rehabilitation to backfill the final void. During concurrent rehabilitation the area can be compacted to limit water ingress. The backfilled box cut, and voids shall follow the natural surrounding topographical features and ensure minimised slopes to maximise potential land capability and reduce erosion risks as far as possible. Benches will be established in the slope. This will be to limit the length of a single slope and to create areas where vegetation can be established.

Rehabilitation should follow the following requirements:

- Each horizon (i.e., Horizon A – Topsoil, Horizon B – subsoil and Hard overburden Rock) should be backfilled following the sequence it was removed.
- Shape and contour slopes to be free draining and non-erosive, benches to be established.
- Rocks to be utilised to protect steep sections of the slope.
- Load, haul topsoil or shovel from the topsoil berm, tip at the correct spacing and level to the specified depths (assumed 500mm – 600m).
- Conduct fertility sampling, have the soils analysed at an accredited laboratory and define amelioration measures based on the results.
- Cross rip replaced soils with an agricultural ripper to alleviate compaction and scarify the area; and
- Establish vegetation (includes specified amelioration and seed mix application).

### **Overburden**

The overburden dumps should be shaped to be non-erosive during the operation phase and runoff should be contained by a stormwater system surrounding the overburden stockpiles. After clearance of the overburden stockpile area, the area should be shaped considering surface water drainage and erosion risk considerations. The proposed closure plan is to truck or shovel all overburden back into the pit for final rehabilitation.

- Load, haul topsoil or shovel overburden into backfilled areas.
- Ensure that the footprint is cleared of rocks that could damage agricultural equipment.
- Load, haul topsoil from the topsoil dump and tip at the correct spacing and level to the specified depths.
- Cross rip replaced soils with an agricultural ripper to alleviate compaction and scarify the area.
- Conduct fertility sampling, have the soils analysed at an accredited laboratory and define amelioration measures based on the results, and

- Establish vegetation (includes specified amelioration and seed mix application).

### **Topsoil berm**

- Load, haul topsoil or shovel topsoil berm onto slopes and backfilled areas.
- Ensure that the footprint is cleared of any fugitive material that could damage agricultural equipment.
- Cross rip in-situ soils with an agricultural ripper to alleviate compaction and scarify the area.
- Conduct fertility sampling, have the soils analysed at an accredited laboratory and define amelioration measures based on the results; and
- Establish vegetation (includes specified amelioration and seed mix application).

### **Haul roads**

Haul roads will remain intact and be utilised during the final void backfilling operation. Sections of the road will remain for monitoring. The following actions will be implemented:

- Remove all signage.
- Re-establish natural drainage.
- Rip haul roads with construction equipment to a depth of at least 0.5 m, and over-rip with agricultural equipment to create suitable conditions for vegetation establishment.
- Profile to be free draining and emulate the natural surface topography.
- Conduct fertility sampling, have the soils analysed at an accredited laboratory and define amelioration measures based on the results; and
- Establish vegetation (includes land preparation, specified amelioration and seed mix application).

### **Infrastructure**

Container and mobile office will be removed, and the footprint rehabilitated and re-vegetated. Closure actions as detailed in the “Guidelines for the Rehabilitation of Mined Land” include:

- All power and water services to be disconnected and certified as safe prior to commencement of any demolition works.
- Salvageable equipment will be removed and transported offsite prior to the commencement of demolition.
- All fittings, fixtures and equipment within buildings will be dismantled and removed to designated temporary disposal yards.
- All tanks, pipes and sumps containing hydrocarbons to be flushed or emptied prior to removal to ensure no hydrocarbon/ chemical residue remains.
- All above ground electrical, water and other service infrastructure and equipment to be removed and placed in designated temporary salvage yards, to be sold as scrap.
- Electrical, water and other services that are more than one metre below ground surface will remain.
- All pipes and structures deeper than one metre need to be sealed to prevent possible ingress and ponding of water.
- Non-hazardous concrete slabs and footings will be broken. This concrete (and metal) will be broken up and disposed of in the base of the pits.

- Soils beneath the plant, storage tanks and chemical storage areas will be sampled. Any contaminated soils found will be removed for disposal.
- Plant and equipment will be removed from site and concert will be removed and used as backfill (be placed more than 1m under surface level); and
- All excavations resulting from demolition of crushing and screening plant, buildings, roads, etc. and earth structures will be left in a safe manner.

### **General Surface Rehabilitation**

The general surface rehabilitation measures for the proposed opencast pit are limited to the following:

- Seeding of areas with natural grasses.
- Development of free draining profile as per landform design.
- Maintaining of area to prevent erosion.
- Soils, which should have been stripped according to form, should be replaced according to a pre-existing plan.
- A soil reserve should be retained to repair localised surface subsidence areas.
- Compaction should be minimised by use of appropriate equipment and replacing soils to the greatest possible thickness in single lifts.
- Soils should be moved when dry to minimise compaction. If they have to be moved when wet, shovel and truck should be used as bowl scrapers create massive compaction when moving wet soils.
- Where multi-layer soil profiles are re-created, running over the lower layers with heavy equipment should be minimised.
- Minimise compaction during smoothing of replaced soils by using dozers rather than graders.
- Following placement, all soils should be ripped to full rooting depth; and
- Where natural revegetation is not possible, the soils should be tilled to produce a seed-bed suitable for the plant species selected for seeding.
- Lime and superphosphate are applied to the surface.
- These ameliorants are then incorporated by deep ripping, which penetrated 100 mm through the soil into the underlying overburden material.
- Compound (NPK + Zn) fertilizer is applied and disced in as part of seedbed preparation.
- A grass seed mix is then planted, usually with first rains, or after rains have commenced; and
- The site is then mulched using locally obtained grass; this is to stimulate the long-term establishment of indigenous vegetation and to reduce erosion during early plant growth.

No cost is allocated for any shortfall in topsoil. A topsoil balance to be established and any shortfall shall be costed for, and provision made before final closure.

### **Operational storm water measures**

The measures are assumed to be limited to shallow trenching and berm construction. All berms and trenches will be flattened by backfilling the excavations or dozing the structures to a functioning topography, except where they have been positioned prevent additional water flowing onto rehabilitated pit areas. The following will be



undertaken:

- Shape the area and slopes to be free draining
- Cross rip in-situ soils with an agricultural ripper to alleviate compaction.
- Conduct fertility sampling have the soils analysed at an accredited laboratory and define amelioration measures based on the results; and
- Establish vegetation (includes land preparation, specified amelioration and seed mix application).

### **Long term water issues**

No provision is made for active long-term water issues. Monitoring of groundwater and surface water resources will take place during the closure and aftercare phases of the project. Recommendations during the aftercare phase will be made based on monitoring results and water levels within the rehabilitated area.

- Installation of monitoring boreholes in the rehabilitated opencast area.

### **Aftercare and Maintenance**

During after care and maintenance a number of actions, monitoring and audits will be required to establish if the Relinquishment Criteria for each of the aspect have been reached. The Proposed Relinquishment criteria are presented in the Closure Report (Appendix 20).

Any corrective measures required as a result of the monitoring or audits must be implemented during this period. It is anticipated that a stable final landform will be created within a period of 2-3 years. The annual audit will be utilised to established if the relinquishment criteria have been reached or if additional measures are required.

## **18.3 PERIOD FOR WHICH THE ENVIRONMENTAL AUTHORISATION IS REQUIRED**

The environmental authorisation is required for 15 years.

## **19 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.

Due to the current uncertainty surrounding the change in the financial provision regulations, this report has utilised the current existing regulations but has only calculated the final rehabilitation cost and no concurrent rehabilitation cost is included based on the mine schedule. Concurrent annual environmental costs will be included into the operating budget of the mine. The closure costs of the aspects linked with the project have been determined using current contractor cost.

This Closure Cost Assessment (Appendix 20 )was compiled in order to comply with the requirements of Regulation 54(2) of the MPRDA. This financial provision is submitted in terms of regulation 53 and 54 of the MPRDA, within the extended transitional period as presented in Government Notice No. R. 495 of 11 June 2021: “*unless regulation 17A, a holder of a right or permit, who applied for such right or permit prior to 20 November 2015, regardless when the right or permit was obtained –*

- a) *must by no later than 19 June 2022 comply with these Regulations; and*
- b) *shall, until 19 June 2022, be regarded as having complied with the provisions of these Regulations, if such holder has complied with the provisions and arrangements regarding financial provisioning, approved as part of the right or permit issued in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).”*

### **19.1.1 METHODOLOGY**

The costing methodology applied is summarized as follows:

- Developed an itemised plan indicating an inventory of closure aspects based on the proposed mine schedule and discussions with mine personnel.
- Defined specific rehabilitation actions for each through reviewing specialist studies, impact assessment outcomes, industry guidelines, conceptual modelling, and rehabilitation experience.
- Calculated monitoring and maintenance costs.
- Compiled a dedicated closure spreadsheet to determine the closure costs of the quantified actions through applicable rates. All quantities have been provided by the mine.
- Determine and update applicable unit rates by applying a Consumer Price Index (CPI) linked increase
- Determine Contingencies; Preliminary and General (P&G)
- DMRR procedure for calculating financial closure liability

Refer to the Closure Report attached in Appendix 20 for the detailed methodology on how the final closure liability was estimated for the proposed opencast mine at the Millsell Waterkloof Sections. The quantum of financial provision is presented in Table 70.

Table 70: Quantum of Financial Provision – Proposed Millsell Waterkloof Sections

Calculation of the Scheduled Quantum for Samancor Chrome (Pty) Ltd: Western Chrome Mines (Pty) Ltd Proposed Millsell Opencast Area								
Company	Samancor Chrome (Pty) Ltd: WCM							
Mining Right	NW 30/5/1/2/2/236 MR, NW 30/5/1/2/2/260MR & NW30/5/1/2/2/479MR							
Operation	Proposed Millsell Opencast							
Farm Portions	Waterval 306 JQ & Waterkloof 305 JQ							
Prepared by	Elemental Sustainability (Pty) Ltd							
Risk Class	C							
Area Sensitivity	Medium							
Component No.	Description	Unit	A1	B	C	D	E1 = A1*B*C*D	
			Quantity Unscheduled	Master rate	Multiplication factor	Weighting factor 1	Scheduled Closure Liability	
1	Dismantling of processing plant and related structures (including overland conveyors and powerlines)	m <sup>3</sup>	-	R 17,95	1	1	R	-
2(A)	Demolition of steel buildings and structures:	m <sup>2</sup>	100	R 250,02	1	1	R	25 001,70
2(B)	Demolition of reinforced concrete buildings and structures	m <sup>2</sup>	-	R 368,45	1	1	R	-
3	Rehabilitation of access roads	m <sup>2</sup>	26 250	R 44,74	1	1	R	1 174 422,10
4(A)	Demolition and rehabilitation of electrified railway lines	m	-	R 434,24	1	1	R	-
4(B)	Demolition and rehabilitation of non-electrified railway lines	m	-	R 236,86	1	1	R	-
5	Demolition of housing and/or administration facilities	m <sup>2</sup>	-	R 500,03	1	1	R	-

	<b>Sub Total for Infrastructure Areas</b>							<b>R 1 199 423,80</b>
6	<b>Opencast rehabilitation including final voids and ramps</b>	ha	45,00	R 254 491,02	0,52	1	R	5 955 089,83
7	<b>Sealing of shafts, adits and inclines</b>	m <sup>3</sup>	-	R 134,22	1	1	R	-
8(A)	<b>Rehabilitation of overburden and spoils</b>	ha	-	R 174 748,74	1	1	R	-
8(B)	<b>Rehabilitation of processing waste deposits and evaporation ponds (basic salt-producing waste)</b>	ha	-	R 217 646,40	1	1	R	-
8(C)	<b>Rehabilitation of processing waste deposits and evaporation ponds (acidic, metal-rich waste)</b>	ha	-	R 632 148,32	0,66	1	R	-
9	<b>Rehabilitation of subsided areas</b>	ha	-	R 146 325,76	1	1	R	-
	<b>Sub Total for Mining Areas</b>							<b>R 5 955 089,83</b>
10	<b>General surface rehabilitation:</b>	ha	32,87	R 138 430,48	1	1	R	4 550 209,93
11	<b>River diversions</b>	ha	-	R 138 430,48	1	1	R	-
12	<b>Fencing</b>	m	-	R 157,91	1	1	R	-
13	<b>Water management</b>	ha	77,87	R 52 635,16	0,25	1	R	1 024 675,06
14	<b>2 to 3 years of maintenance and aftercare</b>	ha	78	R 1 842,23	1	1	R	143 454,51
15(A)	<b>Specialist study</b>	Sum	1	R 250 000,00	1	1	R	250 000,00
15(B)	<b>Specialist studies (soil remediation)</b>	Sum	-	R 69 217,04	1	1	R	-
	<b>Sub Total for General Areas</b>							<b>R 5 968 339,49</b>
				<b>Sum of items 1 - 15 above</b>				<b>R 13 122 853,12</b>
							<b>Total Premature</b>	
				<b>Subtotals 1 Multiply by Weighting Factor 2</b>		1,00	R	13 122 853,12

<b>Preliminary and General</b>	<b>Add 6% of Subtotal 1 if Subtotal 1 R 100,000,000.00</b>	-
	<b>Add 12% of Subtotal 1 if Subtotal 1 R 100,000,000.00</b>	R 1 574 742,37
<b>Contingency</b>	10% of Sub Total 1	R 1 312 285,31
<b>Sum of management and contingency (excl. VAT)</b>	<b>Subtotals 2</b>	R 2 887 027,69
	Sub Total 3	R 16 009 880,81
	Add 15% VAT	R 2 401 482,12
	<b>GRAND TOTAL (incl. VAT)</b>	R 18 411 362,93

**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 20) and refer to Objectives provided per item 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 is made available with this report 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 20.

**19.5 EXPLAIN WHY IT CAN BE CONFIRMED THAT THE REHABILITATION PLAN IS COMPATIBLE WITH THE CLOSURE OBJECTIVES**

The rehabilitation plan has been 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). Refer to Section 19.2. A preliminary Closure Plan has been drafted and is included in Appendix 20.

**19.6 CALCULATE AND STATE THE QUANTUM OF THE FINANCIAL PROVISION REQUIRED TO MANAGE AND REHABILITATE THE ENVIRONMENT IN ACCORDANCE WITH THE APPLICABLE GUIDELINE**

Refer to Table 70 for the quantum of financial provision.

**19.7 CONFIRM THAT THE FINANCIAL PROVISION WILL BE PROVIDED AS DETERMINED**

Samancor 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.

**20 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).*



The following deviations were made:

- The location of the topsoil stockpile was changed.
- Two additional stockpiles were added.
- A RoM pad was added with a crushing and screening facility.
- A Hydropedological Impact Assessment was conducted.

## **20.2 MOTIVATION FOR THE DEVIATION**

The topsoil stockpile was placed directly inline with a wetland and cemetery F05. The topsoil stockpile was removed and placed in areas that were not environmentally sensitive and would not encroach on any heritage features identified. The identified areas were not large enough for one topsoil stockpile. As a result three topsoil stockpiles were developed for the proposed project.

Once the chrome is mined it will be placed on the ROM pad and the Crushing and screening process will commence. The crushing and screening of the chrome is required before the chrome is taken to the existing Millsell plant for washing.

The Hydropedological Assessment was conducted to determine whether the vadose zone flows will be altered within the landscape by the proposed project and the impact on the water resources within the catchment.

## **21 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 will continue the implementation of the current SLP. The SLP will be updated every five years.. The proposed activities will extend the LOM and ensure the job security of the existing workers.

##### **21.1.1.1 CRIME, HEALTH AND HIV**

The proposed project will allow for the continued employment of current employees. The influx of people to the area was assessed as having a low impact. The health and safety impacts were assessed as having a medium impact.

##### **21.1.1.2 LAND TENURE, USE AND CAPABILITY**

A portion of the properties on which the opencast pit is located on belongs to Samancor and a portion is in the

process of being transferred to Samancor. Samancor will have to undertake negotiations with the landowners of Portion 528 of the Farm Waterkloof 305 JQ which is proposed for underground mining.

The loss of high potential and grazing land was assessed as being low without mitigation measures and very low with mitigation measures. The loss of crop production was assessed as medium without mitigation measures and low with mitigation measures.

#### **21.1.1.3 NOISE**

The impact of noise from various aspects and equipment of the mining operation will be of high to medium impact without mitigation measures and low with mitigation measures. Recommendations have been made for mitigation measures to ensure that impacts will be low, managed and monitored (Table 66).

#### **21.1.1.4 AIR POLLUTION**

The impact of air pollution during operations has a high impact without mitigation measures and medium impact with the implementation of mitigation measures. Monitoring as outlined in the EMPr will be implemented for the life of the project.

#### **21.1.1.5 VISUAL ASPECTS**

Visual impacts will be of medium to low significance overall. Visual impacts, like any other will affect sensitive receptors identified close by more than those on a local scale. That does not mean that the impact should be rated higher, since the impacts rated are based on methodology to ensure objectivity and standard.

#### **21.1.1.6 ECONOMIC OPPORTUNITIES, INFRASTRUCTURE DEVELOPMENT AND EMPLOYMENT**

The proposed activities will have the following positive socio-economic impacts:

- Continued employment of current employees from the current Millsell and Waterkloof operations;
- Continued investment into the community through the SLP; and
- Continued investment into the local business through various procurement opportunities.

#### **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).*

A Phase 1 Archaeological Impact Assessment for the proposed opencast mine at the Millsell Waterkloof Section was undertaken by Mr Tobias Coetzee. Mitigation measures have been included in this EIAR and the specialist assessment is included in the impact management tables and EMPr.

Historical Sites B07, B08 and B15 appear to consist of intact buildings likely to exceed 60 years of age. A demolition permit will be applied for in order to demolish the structures.

Cemeteries F02 and F05 are significant and sensitive from a heritage perspective. No infrastructure is planned for the areas the cemeteries are located.

## **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.

## **22 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 Impacts Assessment (Part A) and the Environmental Management Programme (Part B).

## 23. REFERENCES

- Agri Civils Geo- Tech & Heritage, 2023, Phase 1 Archaeological Impact Assessment for the Proposed Samancor WCM Millsell & Waterkloof Opencast Mine Project, North West Province.
- Blast Management and Consulting, 2023, Blast Impact Assessment: Samancor Waterkloof Opencast Mine Project
- Corli Havenga Transportation Engineers, 2023, Traffic Impact Assessment: Samancor Millsell and Waterkloof Sections Opencast Mining
- Eco Assist Environmental Consulting, 2023, Hydropedological Modelling and Impact Assessment for the Proposed Millsell Waterkloof Opencast Mining Project. Rustenburg, North West
- Elemental Sustainability (Pty) Ltd, 2023, Alien Invasive Plant Management Plan for the Proposed Waterkloof Millsell Sections, North West Province
- Elemental Sustainability (Pty) Ltd, 2023, Preliminary Closure Plan and Financial Provision Assessment for Proposed Samancor WCM – Millsell Waterkloof Sections Opencast Mine
- Elemental Sustainability (Pty) Ltd, 2023, Visual Impact Assessment for the Samancor WCM Waterkloof Millsell Sections: Proposed Opencast Mining Application
- Elemental Sustainability (Pty) Ltd, 2023, Waste Classification – Samancor Western Chrome Mine, Millsell Opencast Waste Rock Sample
- Elemental Sustainability (Pty) Ltd, 2023, Watercourse Delineation and Functionality Assessment for the Samancor WCM – Waterkloof Proposed Opencast Mining Application, North West Province
- Enviridi Environmental Consultants, 2023, Samancor Chrome Ltd. Western Chrome Mines – Waterkloof Opencast Section Aquatic Ecology Impact Assessment
- Enviroroots (Pty) Ltd, 2023, Environmental Noise Impact Assessment for the Waterkloof Opencast Mine, Rustenburg Local Municipality, North West Province
- GFK Consulting Engineers CC, 2023, Proposed Millsell Waterkloof Section Opencast Mine Water Balance and Stormwater Management Plan
- GPT Consulting and Environmental Scientists, 2023, Hydrological Impact Assessment for Millsell Waterkloof Opencast and Underground Mining
- Index Social Consulting Services (Pty) Ltd, 2023, Socio-Economic Impact Assessment : Samancor Millsell and Waterkloof Sections Opencast Mine, North West Province
- Index (Pty) Ltd, 2023a, Agricultural Assessment: Millsell and Waterkloof Sections Opencast Mining
- Index (Pty) Ltd, 2023b, Agricultural Assessment: Millsell and Waterkloof Sections Opencast Mining: Supplementary Report
- Rayten Engineering Solutions, 2023, Samancor Chrome Ltd – Proposed Waterkloof Opencast Mining Project
- Red Kite Environmental Solutions (Pty) Ltd. 2023 Surface Water and Aquatic Ecology Assessment for Samancor Chrome Western Chrome Mines: Waterkloof Section Opencast Mining
- Red Kite Environmental Solutions (Pty) Ltd, 2023, Terrestrial Ecology Assessment for Samancor Chrome Western Chrome Mines: Waterkloof Section Opencast Mining
- Samancor Chrome Ltd, 2022, Mining Works Programme.
- Western Cape Department of Environmental Affairs & Development Planning (WC DEADP) Guideline on alternatives: EIA Guideline and Information Document Series (2011).

Western Cape Department of Environmental Affairs and Development Planning's (WC DEADP). *Guideline on Need and Desirability: EIA Guideline and Information Document Series* (2011).

## **24 APPENDICES**

Appendix 1: Qualifications and Resume of EAP

Appendix 2: Locality Plan

Appendix 3: Layout

Appendix 4: Public Participation Documents

Appendix 5: Specialist report – Agricultural Assessment, Soil and Land Capability Report

Appendix 6: Specialist report – Terrestrial Ecology

Appendix 7: Specialist report – Surface Water & Aquatic Ecology Assessment and Wetland Impact Assessment

Appendix 8: Specialist report – Aquatic Ecology Impact Assessment

Appendix 9: Specialist report – Watercourse Delineation and Functionality Assessment

Appendix 10: Specialist report – Hydrogeological Assessment

Appendix 11: Specialist report – Hydrogeological Assessment

Appendix 12: Specialist report – Air Quality Assessment

Appendix 13: Specialist report – Noise Assessment

Appendix 14: Specialist report – Heritage Impact Assessment

Appendix 15: Specialist report - Paleontological Opinion

Appendix 16: Specialist report – Traffic Impact Assessment

Appendix 17: Specialist report – Visual Impact Assessment

Appendix 18: Specialist report – Social Impact Assessment

Appendix 19: Specialist report – Blasting Impact Assessment

Appendix 20: Specialist report – Closure Cost Assessment

Appendix 21: Specialist report – Alien Invasives Management Plan & SOP

Appendix 22: Specialist report – Waste Classification

Appendix 23: Impact Assessment

Appendix 24: Stormwater Management Plan