mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

BASIC ASSESSMENT REPORT

And

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT:	**SOUTHERN AMBITION 1549 (PTY) LTD**
TEL NO:	**0607852780**
FAX NO:	**0865767057**
POSTAL ADDRESS:	**27 Old De Beers Road** **Hadisonpark** **Kimberley** **8301**
PHYSICAL ADDRESS:	**27 Old De Beers Road** **Kimberley** **8301**

FILE REFERENCE NUMBER SAMRAD: **(NC) 30/5/1/1/3/2/1/10137 MR**
(NC)-00173-MR/102

1. 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 therefore 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.

2. OBJECTIVE OF THE BASIC ASSESSMENT PROCESS

The objective of the basic assessment process is to, through a consultative process—

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

(b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

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

  (ii) the degree to which these impacts—

    (aa) can be reserved;

    (bb) may cause irreplaceable loss of resources; and

    (cc) can be managed, avoided, or mitigated.

(e) identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment;

(f) identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity;

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

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

PART A

SCOPE OF ASSESSMENT AND BASIC ASSESSMENT REPORT

Contact Person and Correspondence Address

a) Details of

i) Details of the EAP

Name of the Practitioner: Roelien Oosthuizen
Tel No.: 053 8320029
Fax No.: 086 510 7120
e-mail address: roosthuizen950@gmail.com

ii) Expertise of the EAP

(1) **The qualifications of the EAP**

Masters in Environmental Management MEM (UFS)
B-Comm in Human and Industrial- Psychology (NWU)
(With evidence attached as Appendix 1)

(2) **Summary of the EAP's past experience**
(In carrying out the Environmental Impact Assessment Procedure)

Relevant past experiences in carrying out the Environmental Impact Assessment Procedures include Environmental Impact Assessments, Environmental Management Plans/Programmes/ Reports, Performance assessments, Rehabilitation progress assessments, Environmental Liability assessments, Environmental compliance monitoring, Scoping Reports, etc. See attached CV. (with evidence attached as **Appendix 2**)

b) Description of the property

Farm Name:	Remaining Extent and Portion 1 of Farm East No. 270
Application area (Ha)	1017 Ha (One thousand and seventeen hectares).
Magisterial district:	Kuruman
Distance and direction from nearest town	The farm East is located 10km toward the north of Hotazel and about 60 km toward the north-northwest of the town Kuruman. Access is via a dirt road branching off the Hotazel-Wessels bitumen road. Electricity supply is from the Eskom network.
21-digit Surveyor General Code for each farm portion	C04100000000027000000 C04100000000027000001

c) Locality map

(show nearest town, scale not smaller than 1:250000)

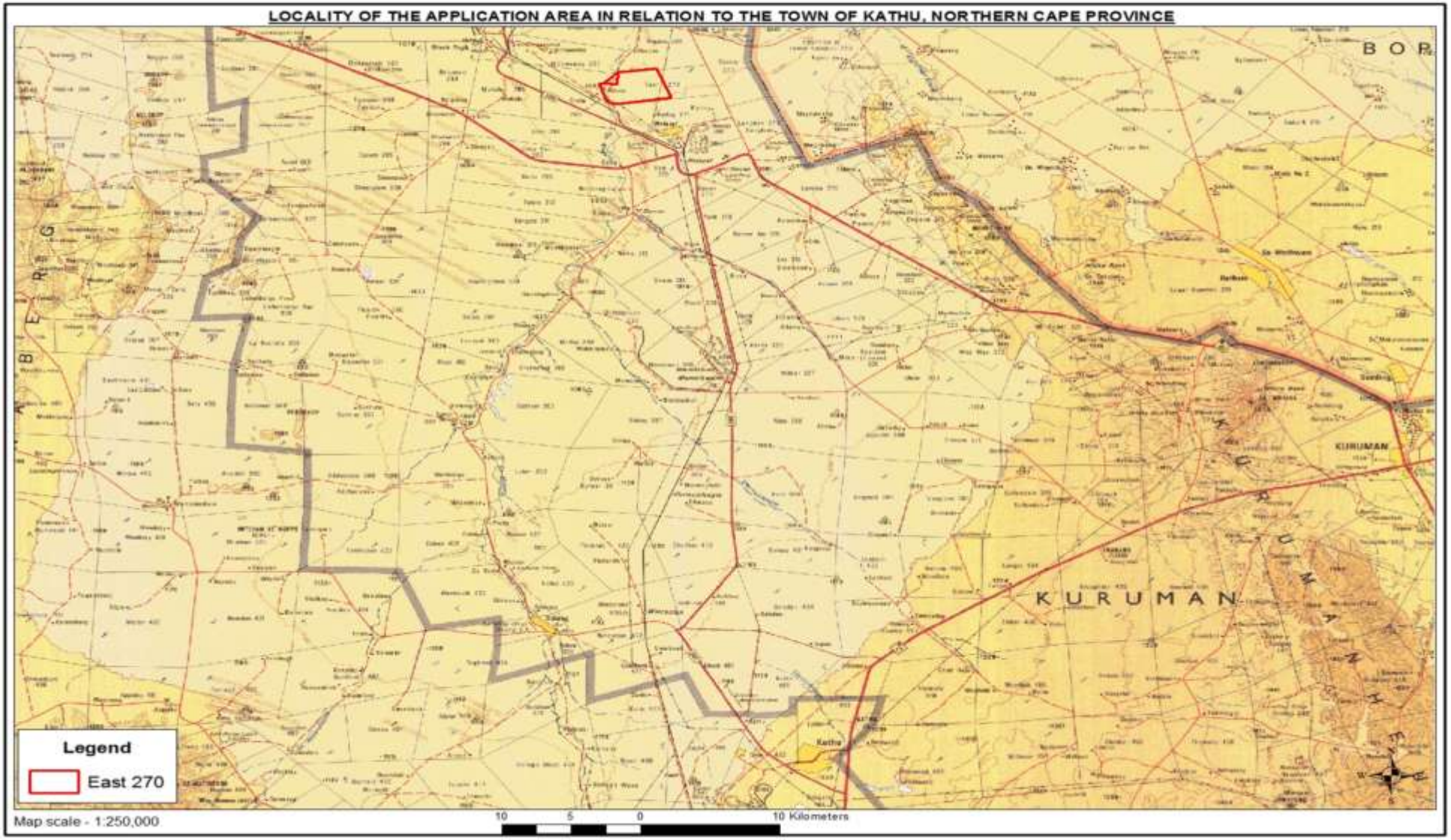

Figure 1. The locality of the proposed mining right area indicated in the red blocks

d) Description of the scope of the proposed overall activity

(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)

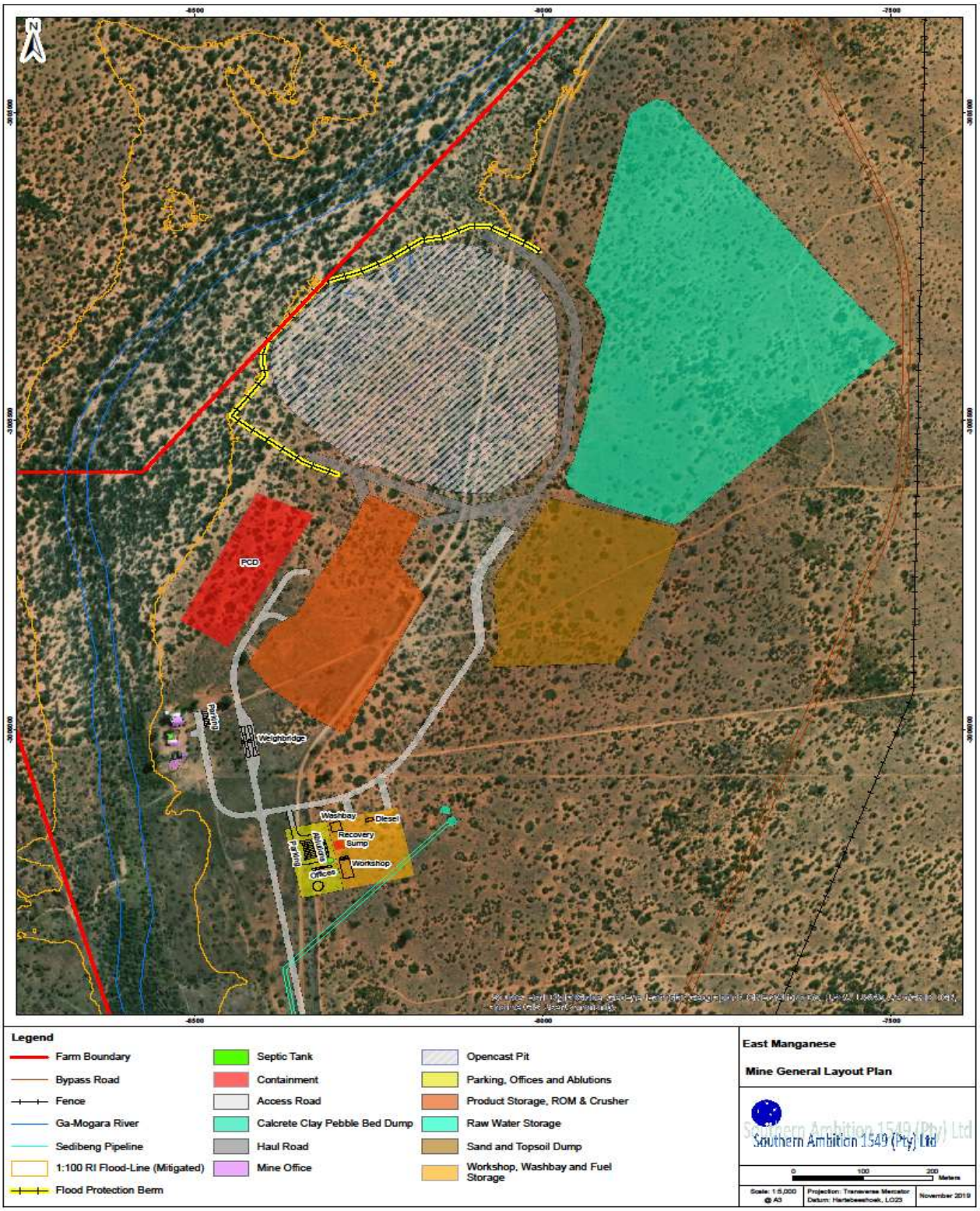

Figure 2. Map showing the aforesaid main and listed activities, and infrastructure to be placed on site with specific reference to the flood protection berm and Pollution control dam.

i) Listed and specified activities

Table 1: Listed and Specified Activities

a Section 102 application to revise the approved Environmental Authorization was lodged to add two listed activities.

With the application from the mine for their Water Use Licence the Department of Water and Sanitation instructed Southern Ambition to include the following in terms of the mine infrastructure

a) to construct a pollution control dam as part of their storm water management plan;

b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.

This instruction led to the inclusion of two listed activities which had not been included into the original application.

NAME OF ACTIVITY **(E.g. for prospecting** – drill site, site camp, ablution facility, accommodation, equipment storage, sample storage, site office, access route, etc. … etc. … etc. **E.g. for mining** – excavations, blasing, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc. … etc. … etc.)	**Aerial extent of the Activity Ha or m²**	**LISTED ACTIVITY** (Mark with an **X** where applicable or affected).	**APPLICABLE LISTING NOTICE** ***(GNR 544, GNR 545 or GNR 546)***	**WASTE MANAGEMENT AUTHORISATION** (Indicate whether an authorisation is required in terms of the Waste Management Act). **(Mark with an X)**
Activity 12 of NEMA Listing notice 1 "The development of— (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size; (iv**) dams, where the dam, including infrastructure and water surface area, exceeds 100 square metres in size;** (v) weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size;	**Open Cast Mine Pit** 0,0 Mtr FROM EDGE OF THE WATER COURSE AND WITHIN 32 MTR BUFFER (**** Please note that the - 0,0 Mtr refers to 1:100 year floodline marker) **Flood Protection Berm** 0,0 Mtr FROM EDGE OF THE WATER COURSE AND WITHIN 32 MTR BUFFER (**** Please note that the 0,0 Mtr refers to 1:100 year floodline marker) **Access / Haul Road** 18,0 Mtr FROM EDGE OF THE WATER COURSE AND WITHIN 32 MTR BUFFER	X	GNR 327	

(vi) bulk storm water outlet structures exceeding 100 square metres in size; (x) buildings exceeding 100 square metres in size; or (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or **(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse"** Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities)	(**** Please note that the 0,0 Mtr refers to 1:100 year floodline marker)			
Activity 13 of NEMA Listing notice 1 The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.	**PCD: 49,950 M³** ZINK STORAGE DAMS: 160 M³ COMBINED STORAGE: 50,110 M³	X	GNR 327	

ii) Description of the activities to be undertaken

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

Mining Method:

Where present, vegetated soil overlying the planned mining area will be stripped prior to mining and stockpiled on a dedicated dump to be used for rehabilitation purposes at a later stage. Mining will be done by the conventional opencast mining method. Access to the opencast mining areas will be provided by a number of haul roads to the crushing and screening plant.

The overview of the mining method will be an open cast mining whereby the ore will be excavated with excavators, sand removed, the ore loaded onto articulated dumps trucks from the open pit and hauled to the crushing and screening plant.

Production drilling the mine will utilizes a standard hole diameter which will be 165 mm and the hole depth about 20 m allowing for the 15m bench height and 0.5m for sub drilling in ore.

Loading of waste and ore respectively will use the excavators; ADTs, Front End Loaders and TLBs. Waste material of manganese will be loaded separately on the articulated dump trucks and hauled to their destination.

Hauling of manganese by the modular crusher and screening plant where ore will be dumped on the crushing floor for processing through the plant or hauled to the sub-grade stockpile area, which ore will be utilized in the future mine plan for blending purpose. And the waste will be hauled on the permanent waste rock dumps and also to the mined-out areas for backfilling purposes.

Pit design:

Due to the size of the deposit, a pit was designed in an effort to minimise the stripping required to expose the ore. The pit proposed below should not be considered as the best option available and further detailed optimisation might be required.

The parameters used during the pit design are typical of those used in the Kalahari Manganese Basin and is as follows:

- Bench widths = 20m
- Maximum bench heights = 15m
- Bench angles= ±90°
- Overall Slope angle = 38.4°
- Decline ramp angle = 6.5°

The bench width of 20m will allow for a catchment berm 3m from the highwall and a safety berm 3m from the crest (Figure 3). The Pit will be within 32m from the 1:100 year flood line. The benches will be used as haul roads and allows for two-way traffic for ADT40 or similar type haulers. Due to limited space, the centre berm for separating the two lanes, was removed.

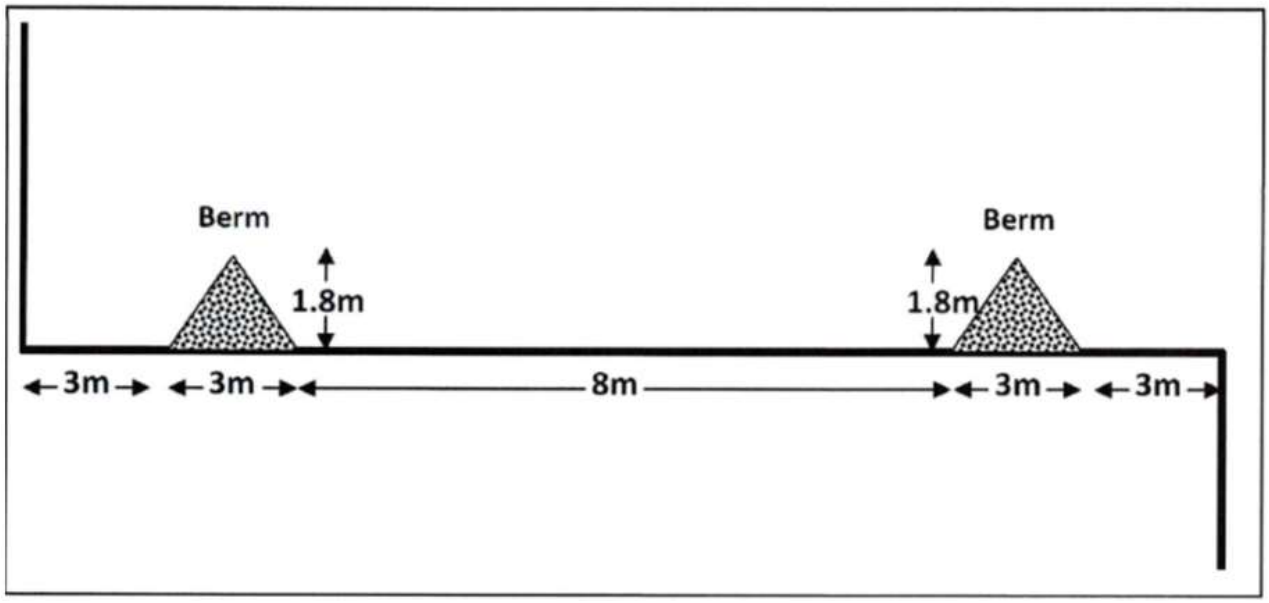

Figure 3. Bench design.

The pit was designed with an in-pit ramp system and requires 3 benches, each L5m high (Figure 4).

Mining will commence from the south-west and gradually progress in a north-westerly direction.

A surface waste dump for the initial overburden will be required but backfilling of waste should start as soon as possible to limit rehabilitation liabilities. An in-pit mobile crushing and screening plant can further reduce rehabilitation liabilities and hauling distances and will allow higher production rates.

Figure 4. Schematic illustration of the pit design for the final push-back.

Processing Method:

Technique

During the mining process overburden (waste material) will be removed from the manganese ore. The manganese ore will be mined selectively to ensure that only on-grade material is transported to the Run of Mine (ROM) stockpile at the plant. The mining equipment selected for the mine will enable the mine to carry out the selective mining process. The selective mining process will be controlled by the mine's geologists. From the mine the manganese ore will be transported to the plant. The plant process is a standard crushing and screening process to create a marketable product with a particle sizing of -90mm +0mm.

Technology

The technology applied will be a jaw crusher and a multi-deck screen. The final product will have a particle sizing of -90mm to +0 mm and a manganese content of 36.7%Mn.

Production Rates:

The average Mn ore thickness/borehole is calculated at 5.025m, while the mine model (Model Maker and Caddie 21) shows an area measurement amounting to 74 361.84m².

A relative density of 3.45g/cm³ will be used during ore resource calculations.
5.025m x74 361.84m² = 373 668.25m³
Bcm = 373 668.246
Sg = 3.45g/cm³
Total tonnage = 1 289 155.46 @ 36.6%Mn

The period for the maximum mining right for Southern Ambition on the Farm Rhodes and Farm East is expected to be 5 years +. This is due to the manganese resource indicated in the geological reports, resource estimation report'.
It has been soon on the Resource estimate report that the total tonnage is 1 289 155.46 @ 36.6% of Manganese

The plant will operate for 260 days per year for 24 hours per day (Sundays, public holidays and days when rain prevent production have been taken in consideration).

The average estimated uptime per day will be 24hrs taking the availability and the utilisation of the plant into consideration).

The plant production per day will be on average 1200 ton/day.

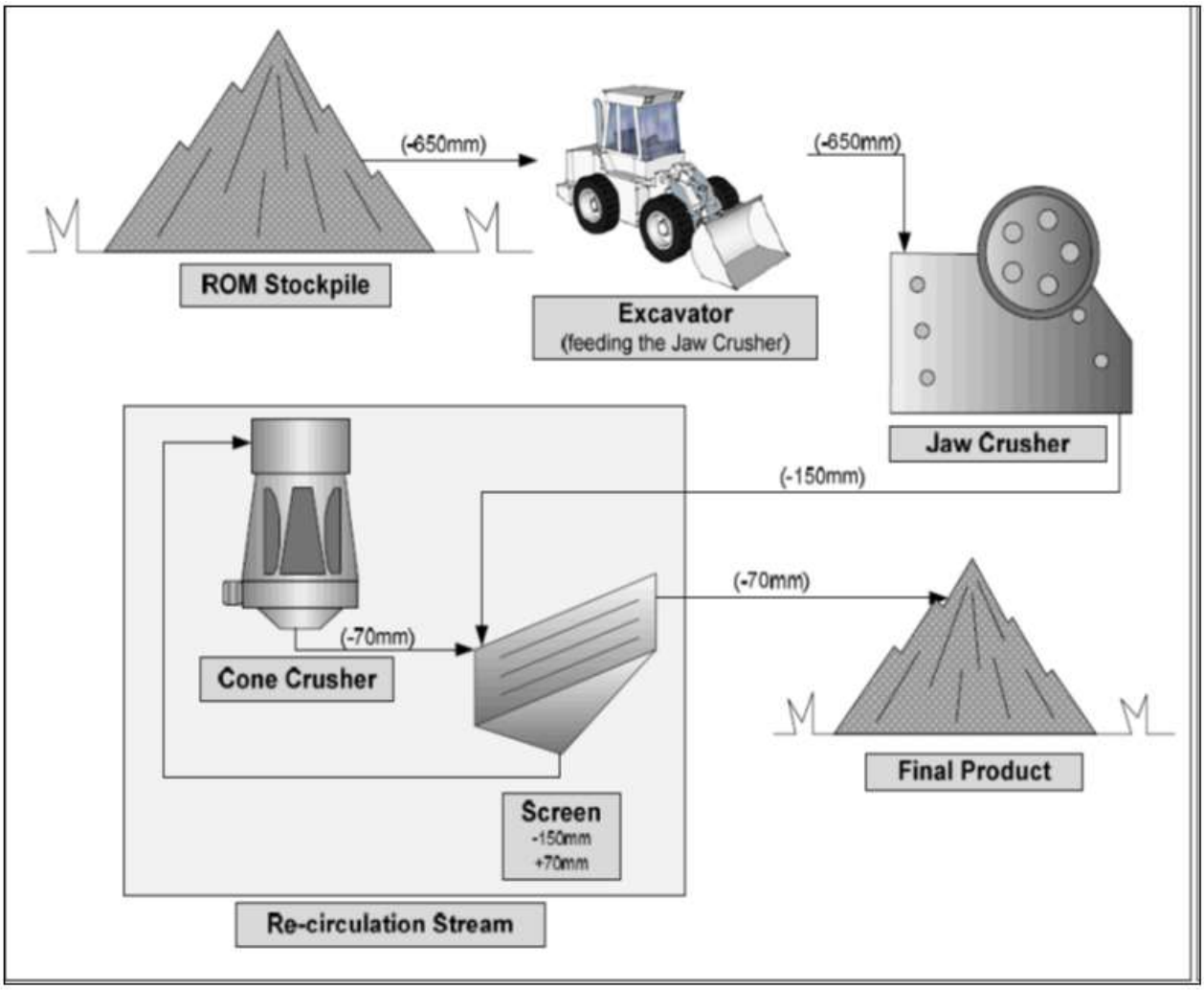

Figure 5. Conceptual schematic flow diagram of the plant.

e) Policy and Legislative Context

Table 2. Policy and Legislative Context

Applicable Legislation and Guidelines used to compile the report (a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process.)	Reference where applied	HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT (E.g In terms of the National Water Act:-Water Use License has/has not been applied for).
Conservation of Agricultural Resources Act (Act 43 of 1983) and Regulations (CARA)	- Section 5: Implementation of control measures for alien and invasive plant species; - Section 6: Control measures. - Regulation GN R1048, published on 25 May 1984, in terms of CARA	- Control measures are to be implemented upon the approval of the EMPR.
Constitution of South Africa (Act 108 of 1996)	- Section 24: Environmental right - Section 25: Rights in Property - Section 27: Water and sanitation right	- To be implemented upon the approval of the EMPR.
Environment Conservation Act (Act 73 of 1989) and Regulations (ECA)	- Sections 21, 22, 25, 26 and 28: EIA Regulations, including listed activities that still relate to the existing section of ECA. - Section 28A: Exemptions.	- To be implemented upon the approval of the EMPR.
Fencing Act (Act 31 of 1963)	- Section 17: States that any person erecting a boundary fence may clean any bush along the line of the fence up to 1.5m on each side thereof and remove any tree standing in the immediate line of the fence. However, this provision must be read in conjunction with the environmental legal provisions relevant to protection of flora.	- Control measures are to be implemented upon the approval of the EMPR.
Hazardous Substances Act (Act 15 of 1973) and Regulations read together with NEMA and NEMWA	- Definition, classification, use, operation, modification, disposal or dumping of hazardous substances.	- Noted and Considered measures are to be implemented upon the approval of the EMPR.

Intergovernmental Relations Act (Act 13 of 2005)	- This Act establishes a framework for the National, Provincial and Local Governments to promote and facilitate intergovernmental relations.	
Mine, Health and Safety Act (Act 29 of 1996) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Mineral and Petroleum Resources Development Act (Act 28 of 2002) and Regulations as amended	- Entire Act. - Regulations GN R527	- A Mining Right had been applied for (NC) 30/5/1/1/3/2/1/10137 MR - (NC)-00173-MR/102 was submitted to add two listed activities which was not included in the original application - Rights and obligations to be adhered to.
National Environmental Management Act (Act 107 of 1998) and Regulations as amended	- Section 2: Strategic environmental management principles, goals and objectives. - Section 24: Foundation for Environmental Management frameworks. - Section 24N: - Section 24O: - Section 28: The developer has a general duty to care for the environment and to institute such measures to demonstrate such care. - Regulations GN R547, more specifically Chapters 5 and 7, where applicable (the remainder was repealed) published on 18 June 2010 in terms of NEMA (Environmental Management Framework Regulations) - Regulations GN R982 to R985, published on 4 December 2014 in terms of NEMA (Listed Activities) - Regulations GN R993, published on 8 December 2014 in terms of NEMA (Appeal)	- Control measures are to be implemented upon the approval of the EMPR.

	- Regulations GN R994, published on 8 December 2014 in terms of NEMA (exemption) - Regulations GN R205, published on 12 March 2015 in terms of NEMA (National appeal Amendment Regulations) - Regulations GN R1147, published on 20 November 2015 in terms of NEMA (Financial Provision)	
National Environmental Management: Air Quality Act (Act 39 of 2004)	- Section 32: Control of dust - Section 34: Control of noise - Section 35: Control of offensive odours - Regulation GN R551, published on 12 June 2015 (amended Categories 1 to 5 of GN 983) in terms of NEM:AQA (Atmospheric emission which have a significant detrimental effect on the environment) - Regulation GN R283, published on 2 April 2015 in terms of NEM:AQA (National Atmospheric Emissions Reporting Regulations) (Group C-Mines)	- Control measures are to be implemented upon the approval of the EMPR. - This is also legislated by Mine Health and Safety from DMR and is to be adhered to.
National Environmental Management: Biodiversity Act (Act 10 of 2004)	- Section 52 of The National Environmental Management Act: Biodiversity Act (NEMBA) (Act 10 of 2004) states that the MEC/Minister is to list ecosystems that are threatened and in need of protection. - Section 53 states that the Minister may identify any process or activity in such a listed ecosystem as a threatening process. - A list of threatened and protected species has been published in terms of Section 56(1) GG 29657 GNR 151 and GNR 152, Threatened or Protected Species Regulations. Commencement of Threatened or Protected Species Regulations 2007 : 1 June 2007	- A permit application regarding protected plant species need to be lodged with DENC if any protected species is encountered. Control measures are to be implemented upon the approval of the EMPR.

	GNR 150/GG 29657/23-02-2007 Publication of lists of critically endangered, vulnerable and protected species GNR 151/GG 29657/23-02-2007 ***** Threatened or Protected Species Regulations GNR 152/GG 296547/23-02-2007 ***** - Sections 65 – 69: These sections deal with restricted activities involving alien species; restricted activities involving certain alien species totally prohibited; and duty of care relating to alien species. - Sections 71 and 73: These sections deal with restricted activities involving listed invasive species and duty of care relating to listed invasive species. - Regulation GN R151, published on 23 February 2007 (List fo Critically Endangered, Vulnerable and Protected Species, 2007) in terms of NEM: BA - Regulation GN R152, published on 23 February 2007 (TOPS) in terms of NEM:BA - Regulations GN R507 to 509 of 2013 and GN 599 of 2014 in terms of NEM:BA (Alien Species)	
The National Environmental Management Act: Protected Areas Act (NEMPAA) (Act 57 of 2003) provides for the protection of ecologically viable areas that are representative of South Africa‟s natural biodiversity and its landscapes and seascapes.	- Chapter 2 lists all protected areas.	- Not applicable. The mining operation does not fall within any protected area.
National Environmental Management: Waste Management Act (Act 59 of 2008)	- Chapter 4: Waste management activities	- To be implemented upon the approval of the EMPR.

	- Regulations GN R634 published on 23 August 2013 in terms of NEM:WA (Waste Classification and Management Regulations) - Regulations GN R921 published on 29 November 2013 in terms of NEM:WA (Categories A to C – Listed activities) - National Norms and Standards for the Remediation of contaminated Land and Soil Quality published on 2 May 2014 in terms of NEM:WA (Contaminated land regulations) - Regulations GN R634 published on 23 August 2013 in terms of NEM: WA (Waste Classification and Management Regulations) - Regulations GN R632 published on 24 July 2015 in terms of NEM: WA (Planning and Management of Mineral Residue Deposits and Mineral Residue Stockpiles) - Regulations GN R633 published on 24 July 2015 in terms of NEM: WA (Amendments to the waste management activities list published under GN921)	
National Forest Act (Act 84 of 1998) and Regulations	- Section 15: No person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.	- A permit application regarding protected tree species need to be lodged with DAFF if necessary. - Control measures are to be implemented upon the approval of the EMPR.
National Heritage Resources Act (Act 25 of 1999) and Regulations	- Section 34: No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. - Section 35: No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface	- Control measures are to be implemented upon the approval of the EMPR. Fossil finds procedure are attached to the PIA.

	or otherwise disturb any archaeological or paleontological site. - Section 36: No person may, without a permit issued by SAHRA or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a forma cemetery administered by a local authority. - Section 38: This section provides for HIA which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during HIA process. - Regulation GN R548 published on 2 June 2000 in terms of NHRA	
National Water Act (Act 36 of 1998) and regulations as amended, *inter alia* Government Notice No. 704 of 1999	- Section 4: Use of water and licensing. - Section 19: Prevention and remedying the effects of pollution. - Section 20: Control of emergency incidents. - Section 21: Water uses In terms of Section 21 a licence is required for: (a) taking water from a water resource; (b) storing water; (c) impeding or diverting the flow of water in a watercourse; (f) Waste discharge related water use; (g) disposing of waste in a manner which may detrimentally impact on a water resource; (i) altering the bed, banks, course or characteristics of a watercourse; (j) removing, discharging or disposing of water found underground if it is necessary for the	- A water use application will not be a requirement for this application Control measures are to be implemented upon the approval of the EMPR.

	efficient continuation of an activity or for the safety of people; and; - Regulation GN R704, published on 4 June 1999 in terms of the National Water Act (Use of water for mining and related activities) - Regulation GN R1352, published on 12 November 1999 in terms of the National Water Act (Water use to be registered) - Regulation GN R139, published on 24 February 2012 in terms of the National Water Act (Safety of Dams) - Regulation GN R398, published on 26 March 2004 in terms of the National Water Act (Section 21 (j)) - Regulation GN R399, published on 26 March 2004 in terms of the National Water Act (Section 21 (a) and (b)) - Regulation GN R1198, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i) – rehabilitation of wetlands) - Regulations GN R1199, published on 18 December 2009 in terms of the National Water Act (Section 21 (c) and (i)) - Regulations GN R665, published on 6 September 2013 in terms of the National Water Act (Amended GN 398 and 399 – Section 21 (e), (f), (h), (g), (j))	
Nature Conservation Ordinance (Ord 19 of 1974)	- Chapters 2, 3, 4 and 6: Nature reserves, miscellaneous conservation measures, protection of wild animals other than fish, protection of Flora.	- Control measures are to be implemented upon the approval of the EMPR.
Northern Cape Nature Conservation Act (Act 9 of 2009)	- Addresses protected species in the Northern Cape and the permit application process related thereto.	- A permit application regarding provincially protected plant species as well as for large-scale harvesting of indigenous flora need to be lodged with DENC if necessary.

		- Control measures are to be implemented upon the approval of the EMPR.
Occupational Health and Safety Act (Act 85 of 1993) and Regulations	- Section 8: General duties of employers to their employees. - Section 9: General duties of employers and self-employed persons to persons other than their employees.	- Control measures are to be implemented upon the approval of the EMPR.
Road Traffic Act (Act 93 of 1997) and Regulations	- Entire Act.	- Control measures are to be implemented upon the approval of the EMPR.
Water Services Amendment Act (Act 30 of 2007)	- It serves to provide the right to basic water and sanitation to the citizens of South Africa (giving effect to section 27 of the Constitution).	- Control measures are to be implemented upon the approval of the EMPR.
National Land Transport Act, (Act 5 of 1998)		- To take note.
Northern Cape Planning and Development Act (Act 7 of 1998)	- To control planning and development	- To be implemented upon the approval of the EMPR.
Spatial Planning and Land Use Management (Act 16 of 2013 (SPLUMA) and regulations	- To provide a framework for spatial planning and land use management in the Republic; - To specify the relationship between the spatial planning and the land use management, amongst others - Regulations GN R239 published on 23 March 2015 in terms of SPLUMA	- To be implemented upon the approval of the EMPR.
Subdivision of Agricultural Land Act, 70 of 1970 and regulations	- Regulations GN R373 published on 9 March 1979 in terms of Subdivision of Agricultural Land	- To take note.
Basic Conditions of Employment Act (Act 3 of 1997)) as amended	- To regulate employment aspects	- To be implemented upon the approval of the EMPR
Community Development (Act 3 of 1966)	- To promote community development	- To be implemented upon the approval of the EMPR

Development Facilitation (Act 67 of 1995) and regulations	- To provide for planning and development	- To take note.
Development Facilitation (GN24, PG329, 24/07/1998)	- Regulations re Northern Cape LDO's	- To take note.
Development Facilitation (GNR1, GG20775, 07/01/2000)	- Regulations re application rules S26, S46, S59	- To take note.
Development Facilitation (GN732, GG14765, 30/04/2004)	- Determines amount, see S7(b)(ii)	- To take note.
Land Survey Act (Act 8 of 1997)) and regulations, more specifically GN R1130	- To control land surveying, beacons etc. and the like; - Agriculture, land survey S10	- To take note.
National Veld and Forest Fire Act (Act 101 of 1998)) and regulations, more specifically GN R1775	- To regulate law on veld and forest fires - (Draft regulations s21)	- To be implemented upon approval of the EMPR
Municipal Ordinance, 20/1974	- To control pollution, sewers etc.	- To be implemented upon approval of the EMPR
Municipal Ordinance, PN955, 29/08/1975	- Nature conservation Regulations	- To be implemented upon approval of the EMPR
Cape Land Use Planning Ordinance, 15/85	- To control land use planning	- To take note.
Cape Land Use Planning Ordinance, PN1050, 05/12/1988	- Land use planning Regulations	- To take note.

f) Need and desirability of the proposed 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)

Gamagara Resources was instructed by Strata Exploration (Pty) Ltd to undertake a field magnetic survey and first phase drilling exercise on Portion 1 & 2 of the Farm East 270. A subsidiary of Strata Exploration (Pty) Ltd, namely Southern Ambition 1549 (Pty) Ltd, holds the prospecting rights, covering the above specified properties.

The prospecting right has been issued in terms of Section 19 of the MAPDA with a prospecting right number of (NC) 10423 PR which commenced on 16th October 2016. The prospecting right had been converted into a mining right.

Manganese ore, within the area (Kalahari Manganese Field) was discovered during the 1960's. Ore production was from open pits on the farms Blackrock, Hotazel, Langdon Annex and Mamatwan.

Ore from underground workings became operational at Wessels by Samancor and at Nchwaning and Gloria by Assmang. These two companies were originally in possession of the mineral rights, over most of the properties within the Kalahari Manganese Bain.
The rights on the farm East 270, bounding the Main Basin toward the east, were also held by Samancor. Gloria mine is located toward the west and Nchwaning toward the northwest, as neighbouring properties to East.

National Manganese Mines (Langdon-Annex) was the third company getting involved with the production of manganese within the area, during the early years (Information taken out of the Exploration and Resource Report Prepared for and property of: Strata Exploration (Pty) Ltd ln terms of: Portion 1 & Portion 2 of the Farm East 270. Compiled by: Gamagara Resources (Pty) Ltd (C.H. van der Merwe) and Reviewed by: S.J. van der Merwe; 10 November 2017).

Exploration Target Area

The target area was selected from historical information and geological data collected from exploration of adjoining farms.

Introduction

East is located along the eastern boundary of the Kalahari Manganese Basin. An aerial geophysical map indicates a magnetic high in the north-western corner of the farm as well towards the centre.
It was agreed by all parties that a ground magnetic survey be implemented to investigate aerial magnetic anomalies on a closer grid spacing.
The survey was done along north-south lines, spaced at 100m intervals. Readings were recorded at 25m intervals on each line. 100 metre x 25 metre grid formation was implemented. A G856 proton magnetometer was used. Data was downloaded and processed using MagMap2000 software.

Field Magnetic interpretation

The exercise confirmed the presence of an elevated, aerial magnetic signature, located along the north-western farm boundary. This location was then selected as a phase 1 drilling

target area. Magnetic highs were recorded within the southern portion and along the outer fringes of the target area. Lower magnetic intensity readings were recorded within the mid-section of this target, toward the north. The elevated magnetic response may relate to the presence of magnetite, present within the BIF host rock.
The total thickness of the Ongeluk lava is approximately 1000m of which only the bottom 200m is slightly magnetic.
The general impression is that the ore body, if present, could relate to a structural or a localized basinal setting similar to that at Hotazel and Landon-Annex.

Ore Deposit
The axial extent from ore intersections suggests a north-west - south-east trend. Thicker ore intersections, thinning toward the north-west and south-east appear to suggest a canoe shaped structural relation, similar to the Hotazel and Langdon Annex deposits.

The average Mn ore thickness/borehole is calculated at 5.025m, while the mine model (Model Maker and Caddie 21) shows an area measurement amounting to 74 361.84m^2.

A relative density of 3.45g/cm^3 will be used during ore resource calculations.
5.025m x74 361.84m^2 = 373 668.25m^3
Bcm = 373 668.246
Sg = 3.45g/cm^3
Total tonnage = 1 289 155.46 @ 36.6%Mn

The period for the maximum mining right for Southern Ambition on the Farm Rhodes and Farm East is expected to be 5 years +. This is due to the manganese resource indicated in the geological reports, resource estimation report'.
It has been seen on the Resource estimate report that the total tonnage is 1 289 155.46 @ 36.6% of Manganese.

Although Percussion drilled boreholes penetrated decent intersections with good grades, and core drilled boreholes were scattered throughout the ore body, the ratio percussion boreholes drilled against core drilled boreholes may cause some dispute.
Regarding the SAMREC code, the Mineral Resource categories and tonnages are as follows (also see certificate):

lndicated Mineral Resource = 386 746.64tons
Measured Mineral Resource = 902 408.82 tons

(Information taken out of the Exploration and Resource Report Prepared for and property of: Strata Exploration (Pty) Ltd ln terms of: Portion 1 & Portion 2 of the Farm East 270. Compiled by: Gamagara Resources (Pty) Ltd (C.H. van der Merwe) and Reviewed by: S.J. van der Merwe; 10 November 2017.)

- **Need:**
  World manganese ore reserves fell by 9.5 percent to an estimated 570 Mt in 2013. The drop was attributed to the revision of reserve estimates by the government of Brazil and updated information from major producers in Gabon. South Africa and Ukraine account for approximately 50.9 percent of known manganese ore reserves.

Global manganese ore output grew by 9.0 percent to 53 Mt in 2013 as demand increased on the back of a recovery from major economies following a contraction in 2012. China was the leading manganese ore producer contributing 30.2 percent to global output, followed by South Africa at 20.7 percent, (Table 3).

Table 3. World Manganese ore reserves, production and exports 2013 (Source: DMR Directorate Mineral Economics: 2014)

COUNTRY	RESERVE#			PRODUCTION+			EXPORTS+		
	Mt	%	Rank	Mt	%	Rank	Mt	%	Rank
China	44	7.7	6	16	30.2	1	-	-	-
South Africa	150	26.3	1	11*	21.1	2	8	30.8	1
Australia	97	17.0	3	8	14.8	3	6	23.1	2
Gabon	24	4.2	7	4	7.4	4	4	15.4	3
India	49	8.6	5	3	5.5	5	-	0.3	6
Brazil	54	9.5	4	3	4.7	6	2	7.0	5
Ghana	-	-		2	3.4	7	2	7.6	4
Ukraine	140	24.6	2	1	2.5	8	-	0.2	8
Malaysia	-	-		1	2.1	9	-	-	-
Kazakhstan	5	0.9	8	1	1.9	10	-	0.3	7
Other	7	1.2		4	6.5		4	15.4	
TOTAL: 2013	570			53	100		26	100	
2012	630			48			22		

Sources: + CRU Group, 2014
** DMR Directorate Mineral Economics, 2014*
 # USGS, 2014

Source: DMR Directorate Mineral Economics: 2014

South Africa was the leading exporter of manganese contributing 30.8 percent, followed by Australia at 23.1 percent. South Africa's exports sales volumes increased by 1.8 percent to 7,6 Mt mainly due to China's rising demand for manganese ore. The country's exports to China increased by 57.7 percent to 5.4 Mt in 2013.
China's manganese imports increased by 34.3 percent to 17 Mt in 2013, approximately 64.2 percent of the total global manganese ore imports.

Table 4. South Acrica's Manganese Ore Production and Sales 2003 to 2013 (Source: DMR Directorate Mineral Economics: 2014)

YEAR	PRODUCTION	LOCAL SALES			EXPORT SALES		
	Mass	Mass	Value		Mass	Value	
	kt	kt	R' 000	R/t	kt	R' 000	R/t
2004	4 282	W	656	W	2 403	1 082	450
2005	4 612	W	682	W	2 119	1 519	717
2006	5 213	W	727	W	2 846	1 519	534
2007	5 996	W	935	W	3 691	2 637	697
2008	6 807	W	1 762	W	4 689	15 582	3 323
2009	4 575	W	584	W	3 975	5 003	1 258
2010	7 172	W	1 321	W	5 986	9 340	1 560
2011	8 652	W	1 325	W	6 773	8 570	1 265
2012	8 943	W	1 135	W	7 498	9 686	1 292
2013	11 056	W	1 569	W	7 631	12 513	1 640

Source: DMR Directorate Mineral Economics, 2014

Table 5. South Africa's Production and sales of other Manganese Alloys, 2003 – 2013 (Source: DMR Directorate Mineral Economics: 2014)

YEAR	PRODUCTION	LOCAL SALES			EXPORT SALES		
	Mass	Mass	Value		Mass	Value	
	kt	kt	R' 000	R/t	kt	R' 000	R/t
2004	374	39	148	3 798	308	1 833	5 956
2005	275	25	121	4 811	184	1 080	5 865
2006	278	31	130	4 266	149	813	5 468
2007	328	35	216	6 115	223	1 700	7 614
2008	259	47	653	13 958	182	3 021	16 568
2009	118	45	385	8 600	151	1 805	11 955
2010	317	44	413	9 372	271	2 979	10 974
2011	350	34	314	9 276	298	3 020	10 131
2012	177	28	264	9 533	158	2 197	13 910
2013	163	32	319	9 848	131	1 980	15 120

Source: DMR Directorate Mineral Economics, 2014

- **Industrial Application Manganese**

Approximately 85 percent of the manganese units mined from the ground is used in the production of mild and carbon steels. The other, more minor, uses of manganese are in the manufacture of non-ferrous alloys, dry cell batteries, chemicals and agricultural products. Recently the use of manganese in steel making was extended into the production of speciality steels, valve and engineering steels and in the Series Stainless Steels, in which a combination of manganese and nitrogen replace nickel as the austenitizing agent. In its use in steelmaking, manganese is mainly used in the form of bulk alloys (High-Carbon Ferromanganese and Silico Manganese) or in speciality sheets as refined alloy (Medium-Carbon Ferromanganese or Low-Carbon Ferromanganese). Electrolytic Manganese Metal is used as an alloying agent in non-ferrous alloys or as a substitute for refined manganese alloys in the steel industry.

In its use in crude steel production, the manganese serves to de-sulphurise the molten steel as well as to control the shape of the residual sulphur inclusions in rolled steel products. In addition, manganese is used as an alloying agent, which imparts toughness and hardness to the steel. The extreme example of the application of manganese in this respect is the ultra-hard Hadfield and Rail Steels, which contain 15% manganese.

g) Motivation for the overall preferred site, activities and technology alternative

In order to ensure that the proposed development enables sustainable development, a number of feasible options must be explored. Motivation for the footprint of the actual mining operation (i.e. Open Pit) will not be provided here, as the location of the mine is determined by the geological location of the mineral resource.

Mine Site Location

Mining infrastructure was strategically placed by incorporating mining project demands, environmental sensitivities and IAP concerns, as identified during the BAR and EIA process. Thus, the mining site location is primarily based on proximity to the access roads, proximity

to the areas earmarked for mining and limited additional impact on the environment and heritage resource. This renders the consideration of further alternative locations in terms of the mine site location, unnecessary.

The consideration of alternatives is a critical component of the BAR and EIA process, where an appropriate range of alternatives require consideration whilst achieving the desired objective of the proposed project. In order to ensure that the proposed development enables sustainable development, a number of feasible options must be explored. The various alternatives were assessed in terms of logistical practicality, environmental acceptability and economic feasibility. Alternatives for the locality of the mining operation do not form part of the discussion as the location of the mine is determined by the geological location of the mineral resources.

Project Infrastructure

Alternatives and considerations pertaining to the project infrastructure were discussed in Section (g).

Land Use

No specialist comparative land use assessments were conducted, but the mining area has a low agricultural potential. Therefore, mining the land has been determined as the most feasible alternative.

The current land use is grazing, with a low stocking rate for the farm. If the mining operation does not continue, the farming of cattle, sheep and game will persist. The most significant activity associated with grazing is the provision of water. This could have a potential impact on the existing surface water features and ground water resource. Existing boreholes will be used as a substitute to provide water for animals. The mining operation will not abstract any ground water, while this alternative land use will require the use of ground water. Cumulative aspects associated with grazing include overgrazing, with potential of desertification.

Socio-Economy

Southern Ambition's mining project plan is to employ 47 people. The non-approval of this mining operation would impact negatively on the employment rate for the region and the families who are likely to benefit from the positive employment opportunities. Simultaneously, it may have a negative effect on the economy of South Africa and the mining industry as a whole. Substantial tax benefits to the State and Local Government will also be lost.

Furthermore, the mining operation's commitment to invest in Human Resource Development, Infrastructure Development Projects, Sustainable Local Economic Development and Small and Medium Enterprises will be lost.

Biodiversity

The implementation of Southern Ambition's mining will have a potential impact on the biodiversity through removal of indigenous vegetation and destruction of habitats. If no mining activities were to continue, the status quo would apply and no damage would accrue to the environment.

Heritage and Cultural Resources

In the event that the mining operation does not proceed, the heritage resources will remain as is. The protection and preservation of these resources are therefore not guaranteed. However, if the mining operation is approved, the heritage resources will be protected through the demarcation of no-go zones and fencing off of graves.

h) Full description of the process followed to reach the proposed preferred alternatives within the site

NB!! – 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.

In order to ensure that the proposed development enables sustainable development, a number of feasible options must be explored. Motivation for the footprint of the actual mining operation (i.e. excavations) will not be provided here, as the location of the mining is determined by the possible geological location of the mineral resource (as discussed in section f).

Mining Site Location

A Mining Right application was lodged to mine the identified preferred areas on the property. The mining will be done by means of opencast mining and blasting and hauling.

Mining infrastructure will be placed strategic by incorporating mining project demands, environmental sensitivities and IAP concerns, as identified during BAR and EIA process. Thus, the mining site location is primarily based on proximity to the access roads, proximity to the areas earmarked for mining and limited additional impact on the environment and heritage resource. This renders the consideration of further alternative location in terms of the mining site location other than the application mining area unnecessary.

Fuel Storage Tanks

Fuel storage includes surface storage, underground storage and the storage of fuel in mobile tanks with a metal bund wall. Underground storage has an adverse negative pollution potential, because it is not easy to monitor leakages. Remediation measures are also not as effective as compared to surface storage tanks. Mobile tanks are viable option for infield screening activities, but the best viable long terms option is the instalment of fuel tanks within a concrete bund wall. The final location of the fuel storage tanks will be determined based on proximity to mining operations.

Proceed without the Mine (No Go)

Land Use

The current land use is agriculture and grazing. If the mining operation does not continue, the grazing capacity and agriculture will continue. The mining operation will not abstract any ground water.

Socio-Economy

The mining plan is to employ 47 people. The non-approval if this mining operation would impact negatively on the employment rate for Hotazel and Kuruman and the families who are likely to benefit from the positive employment opportunities. Substantial tax benefits to the State and Local Government will also be lost.

Biodiversity

The implementation of the mining will have a potential impact on the biodiversity through removal of indigenous vegetation and destruction of habitats. If no mining activities were to continue, the status quo would apply, and no damage would accrue to the environment.

Heritage and Cultural Resources

In the event that the mining operation does not proceed, the heritage resources will remain as is. The protection and preservation of these resources are therefore not guaranteed. However, if the mining operation is approved, the heritage resources will be protected through the demarcation of no-go zones and fencing off if any of these resources are encountered.

i) 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.

(a) The property on which or location where it is proposed to undertake the activity:

The registered description of the land to which the mining Right application relates:

Farm Name	Title Deed	In Extent
Remaining Extent and Portion 1 of the farm East 270 located in the Kuruman District, Northern Cape Province	T791/2002 T3190/2017	1017 Ha

The property on which the Mining Right was applied for is determined by the geological location of the mineral resource. Therefore, there are no alternatives for the location of the activity, except for not proceeding with the operation. This will however cause the underutilisation of a national economic resource.
Manganese ore, within the area (Kalahari Manganese Field) was discovered during the 1960's. Ore production was from open pits on the farms Blackrock, Hotazel, Langdon Annex and Mamatwan. Ore from underground workings became operational at Wessels by Samancor and at Nchwaning and Gloria by Assmang.

These two companies were originally in possession of the mineral rights, over most of the properties within the Kalahari Manganese Bain.
The rights on the farm East 270, bounding the Main Basin toward the east, were also held by Samancor. Gloria mine is located toward the west and Nchwaning toward the northwest, as neighbouring properties to East.

National Manganese Mines (Langdon-Annex) was the third company getting involved with the production of manganese within the area, during the early years.

Access is via a dirt road branching off the Hotazel-Wessels bitumen road.

Infrastructure in the area is well developed with good road and rail networks, electricity grid and water. Experienced labour is available in the area as is an extensive network of secondary industries geared towards small and large-scale mining. ESKOM power is available on site.

There is no permanent surface water on the mine area, the Gamagara riverbed are usually dry, except during periods of abnormally high rainfall (1974,1988 and 2006). Water can be obtained from the Vaal- Gamagara water pipeline or from boreholes. The ground water quality is generally poor and mostly only suitable for animal use.

Alternatives considered: -
Alternatives for land are thus not available, as the mining right was applied for over this area with proven reserves.

Therefore, there are no alternatives to the area.

(b) The type of activity to be undertaken:

Opencast Mining activities for Manganese Ore.

Alternatives considered: -
The only alternative land use is livestock and game farming; however, the applicant's main economic activity is mining and for this reason does not favour any other alternative land use.

(c) The design or layout of the activity:

The site infrastructure will need to be strategically placed by incorporating mining project demands and environmental sensitivities identified during the Environmental Impact Assessment process. Thus, the site layout will primarily be based on proximity to the access roads, proximity to the areas earmarked for mining as well as limited additional impact on the environmental (non-perennial drainage lines and wind direction), heritage resources and discussions with the surface owner.

The following infrastructure will be established and will be associated with the mining operation:

- **Explosive Magazine:**

The mine will need two magazines to store the different explosive products namely:
- 200 case detonator ad accessories magazine (3-meter x 6 meter)
- 200 case explosives magazine (3-meter x 6 meter)

The magazine area will be fenced to comply with the guidelines set out by the Chief inspector of Explosives (CIE). The fence must be further than 10 meters away from the magazine.

The CIE determines the safety radius necessary, but the typical approved radiuses have been 90 meters for the inner radius & 180 for the outer radius.

No structures are allowed in the area contained by the inner radius and only structures approved by the CIE, for example a guard house, will be allowed in the area contained in by the outer radius.

The construction of the magazines and the safety and security measures for the magazines and the magazine area are regulated by the Explosives Act.

- **Ablution blocks (Sewage facilities) : 200m²**
  - House 100m²
  - 4X rondawels 25m² each sealed septic tanks

- **Clean & Dirty water system**:

It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site.

a) to construct a pollution control dam as part of their storm water management plan;

b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.

- **Fuel Storage facility (Diesel tanks): 10m²**
  It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.

- **Re-fuel and lube station.**

- **Mining Area: 1017ha (application area) (7.5 HA OPEN PIT)**
  The mining process will be initiated by drilling of blast holes. These holes will then be blasted where after the ore will be loaded from the open pit and hauled to the crushing and screening plant. The Pit will be within 32m from the 1:100 year flood line.

- **Generator: 25m²**
  The mine infrastructure plan made provision for a brick building that will house the generators for power generation on site.

- **Office and Office Parking Bay: 50m²**

It is anticipated that vegetation will be cleared in this area and superfine material will be used as groundcover in the parking area.

- **Crushing and Screening Processing plant: 1500m³**
  The processing of ore will be a dry process, with the option to convert to a 'wet' process after full production has been reached.

- **Roads (both access and haulage road on the mine site):**
  Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 7-8 km of roads, with a width of 20 meters. The width of the road is based on an operating width of the ROM haul trucks of 5 meters. Best practice and the guideline from the DMR is to allow for 4 x Operating width of haul truck, in this case 20 meters wide roads. There will be additional haul roads created for finished product to be evacuated form the mine by haul road and these roads will be the prescribed 6m haul roads.

- Salvage yard (Storage and laydown area).

- Security Gate and guard house at access control point 20m².

- Product Stockpile area.

- Ore Stockpile dumps.

- Subgrade stockpile area.

- Topsoil storage area (temporary): Topsoil dumps X3.

- **Waste disposal site (domestic and industrial waste):**
  It is anticipated that the operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area:

- **Small amounts of low-level hazardous waste in suitable receptacles;**
  Domestic waste;
  Industrial waste.

- Workshop and Wash bay 25m²

- Water distribution Pipeline.

- **Water tank**
  It is anticipated that the operation will establish 2 x 10 000 litre water tanks with purifiers for potable water.

- Weighbridge. 6m³

- Weighbridge control room: – Mobile container.

Alternatives considered: -

Alternatives for fuel storage include surface storage, underground storage and the storage of fuel in mobile tanks with a metal bund wall. Underground storage has an adverse negative pollution potential, because it is not easy to monitor leakages. Remediation measures are also not as effective as compared to surface storage

tanks. Mobile tanks are viable option for infield screening activities, but the best viable long-term option is the instalment of fuel tanks within a concrete bund wall. The final location of the fuel storage tanks will be determined based on proximity to site operations.

In terms of water use alternatives; the operation is not located near any perennial rivers and therefore groundwater is the best water source for the operation. Alternatives include sourcing from service providers, if available and feasible (Vaal-gamagara pipeline). Plastic pipelines are considered to be the best long-term option for transferring water, due to their temporary nature which causes minimum environmental disturbances.

Therefore, a pipeline route will be designed based on the principle of minimum impacts to the environment. Alternatives in terms of altering the characteristics of drainage lines include avoidance and demarcation as no-go zones.

In terms of power generation, the options available was for ESKOM power or generators. In the light of the limited power available on the ESKOM grid it was decided to use generators but may be converted to electricity.

In terms of sewage the decision was made to use ablution blocks facilities with closed French drains.

(d) The technology to be used in the activity:

- Technique

During the mining process overburden (waste material) will be removed from the manganese ore. The manganese ore will be mined selectively to ensure that only on grade material is transported to the Run of Mine (ROM) stockpile at the plant. The mining equipment selected for the mine will enable the mine to carry out the selective mining process. The selective mining process will be controlled by the mine's geologists. From the mine the manganese ore will be transported to the plant. The plant process is a standard crushing and screening process to create a marketable product with a particle sizing of -90mm +0mm.

- Technology

The technology applied will be a jaw crusher and a multi-deck screen. The final product will have a particle sizing of -90mm to +0 mm and a manganese content of 36.7% Mn (Manganese) average. An independent laboratory will visit the site on a daily basis.

Alternatives considered: -

The planned mining activities include the excavation of a pit with benching and blending continued backfilling if possible. The Pit will be within 32m from the 1:100 year flood line. The operation is also associated with processing techniques that make use of modern technologies. These are the most economic viable method currently being used by the manganese fraternity. There is no other feasible, alternative mining method for the mining and extraction of manganese.

(e) The operational aspects of the activity:

The overview of the mining method will be an open cast mining whereby the ore will be excavated with excavators, sand removed, the ore loaded onto articulated dumps trucks from the open pit and hauled to the crushing and screening plant.

Production drilling the mine will utilizes a standard hole diameter which will be 165 mm and the hole depth about 20 m allowing for the 15m bench height and 0.5m for sub drilling in ore.

Loading of waste and ore respectively will use the excavators; ADTs, Front End Loaders and TLBs. Waste material of manganese will be loaded separately on the articulated dump trucks and hauled to their destination.

Hauling of manganese by the modular crusher and screening plant where ore will be dumped on the crushing floor for processing through the plant or hauled to the sub-grade stockpile area, which ore will be utilized in the future mine plan for blending purpose. And the waste will be hauled on the permanent waste rock dumps and also to the mined-out areas for backfilling purposes.

Alternatives considered: -

The conventional opencast drill-load-haul-mining method has been proven to be the most economic viable method currently being used by the manganese fraternity. There is no other feasible, alternative mining method for the mining and extraction of manganese.

(f) The option of not implementing the activity:

Potential land use includes grazing and mining. The majority of the area is classified to have low to moderate potential for grazing land and no suitability for crop yield. Apart from the manganese deposits, there are also potential for iron ore mining on the property. Therefore, mining activities are believed to be the most economically beneficial option for the area. Whether the iron ore mining operation continues or not, the other mining operations already granted will most likely persist. The farming of livestock will only be able to continue in areas not affected by mining operations. The most significant impacts associated with grazing activities include the provision of water. These are not expected to have a serious impact on the existing groundwater features. Cumulative impacts associated to grazing include overgrazing and destruction of natural vegetation, but the cumulative effect of mining activities on the property are expected to outweigh any potential negative effects that agriculture might have.

The Southern Ambition Mining project aims to uplift the local community. If the operation does not continue it would hold back any potential employment for the region and the families who are likely to benefit from the positive employment opportunities. Simultaneously, it may have a stagnant effect on the economy of South Africa and the manganese industry as a whole. Substantial tax benefits to the State and Local Government will also be inhibited.

Mining forms an integrated part of the social and economic growth of South Africa and more specifically the Northern Cape Province.

ii) 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.

Identified interested and/or affected parties were notified of the acceptance of the application as follows:

- Notification letters were sent to all identified interested and / or affected parties on the 28 January 2020. Attached to each of these letters was a Background Information Document, containing information relating to the proposed mining project application and the Environmental Authorisation.
- The Basic Assessment Report will also be sent to all identified interested and / or affected parties by registered mail.
- The Basic Assessment Report will also be placed in the Hotazel public library for any interested and / or affected parties to give comments or concerns on the document.

Proof of notification is attached as Appendix '3'.

Consultation process:

Proof of consultation (attendance registers, minutes of meetings and response forms) is attached as Appendix 3. The consultation process is still in process.

iii) Summary of issues raised by I&APs

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

Table 6. Summary of issues raised by I&APs

Interested and Affected Parties List the names of persons consulted in this column, and Mark with an X where those who must be consulted were in fact consulted		Date Comments Received	Issues Raised	EAPs response to issues as mandated by the applicant	Section and paragraph reference in this report where the issues and or response were incorporated
AFFECTED PARTIES					
Landowner/s	**X**				
JN Pretorius and HR Pretorius PO Box 1443; Kuruman 8460	X 28/01/2020				
JN Pretorius and HR Pretorius PO Box 154; Hotazel 8490	X 28/01/2020				
ASSOCIATED MANGANESE MINES OF SOUTH AFRICA LTD PO Box 1 Mancorp Mine 8423	X 28/01/2020				
Head Office 24 Impala Road Chislehurston 2196 Tel : 011-7791000					
Lawful occupier/s of the land					
There are no lawful occupiers.					
Landowners or lawful occupiers on adjacent properties	**X**				
Associated Manganese Mines of South Africa Ltd (BEESHOEK) PO Box 1 Mancorp Mine 8423 Head Office 24 Impala Road Chislehurston	X 28/01/2020				

2196 Tel: 011-7791000 Assmang Ltd (African Rainbow Minerals) PO Box 782058 Sandton 2146					
Kudumane Manganese Resources Pty Ltd PO Box 1010; Houghton; 2041	X 28/01/2020				
Mr. P Hauman PO Box 714; Kuruman; 8640	X 28/01/2020				
Sishen Iron Ore Company Pty Ltd Private Bag 506; Kathu; 8446 PO Box 9679; Centurion; 0001	X 28/01/2020				
Municipal Councillor	**X**				
Municipality	**X**				
Joe Morolong Local Municipality Private Bag X 117 Mothibistad 8474	X 28/01/2020				
John Taolo Gaetsewe District Municipality PO Box 1480 Kuruman 8460	X 28/01/2020				
Organs of State (Responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS					
Eskom 120 Henry Street Bloemfontein 9300 Eskom Holdings SOC Limited	X	10 February 2020	RE: NOTICE OF THE PUBLIC PARTICIPATION FOR AN APPLICATION FOR AMENDMENT OF AN ENVIRONMENTAL AUTHORIZATION IN KURUMAN. This notice affects the existing Eskom Distribution's power lines, Hotazel/Klipkop 166kV Overhead Line and Hotazel/Heuningvlei 1 132kV Overhead Line which traverses the proposed mining area. The approximate		

PO Box 606 Kimberley 8300			positions of these services are indicated on the attached locality Map. Eskom Distribution will raise no objection to the proposed Mining operations on the above-mentioned properties provided Eskom's rights and services are acknowledged and respected at all times. Eskom's rights are protected by Wayleave Agreements and Servitudes. The approximate positions of these services are indicated on the attached sketches. Further to the above the following conditions must be adhered to and accepted in writing before any development and or construction: A.1 Access and egress Eskom shall at all times retain unobstructed access to and egress from its servitudes and services. A.2 Approvals A.2.1 Eskom's consent doesn't relieve the applicant from obtaining the necessary statutory, land owner or municipal approvals. A.2.2 The applicant will adhere to all relevant environmental legislation. Any cost incurred by Eskom as a result of non-compliance will be charged to the applicant. A.3 Eskom Cables Eskom's underground cables affected must be placed in sleeves encased in concrete across the width of the servitude, at the applicant's expense. Materials to be used and relevant dimensions shall be determined as required. A.4 Dimensions No construction or excavation work shall be executed within 11 metres from any Eskom power line structure, and/or within 11 metres from any stay wire. A.5 Earthing All work within Eskom's servitude areas shall comply with the relevant Eskom standards in force at the time. A.6 Expenditure If Eskom has to incur any expenditure in order to comply with statutory clearances or other regulations as a result of the applicant's activities or because of the presence of his equipment or installation within the servitude or wayleave area, the applicant shall pay such costs to Eskom on demand. A.7 Ground level variations Changes in ground level may not infringe statutory ground to conductor clearances or statutory visibility clearances. After any changes in ground level, the surface shall be rehabilitated and stabilised so as to prevent erosion. The measures taken shall be to Eskom's requirements. A.8 Indemnity Eskom shall not be liable for the death of or injury to any person or for the loss of or damage to any property whether		

			as a result of the encroachment or of the use of the servitude area by the applicant, his/her agent, contractors, employees, successors in title, and assigns. The applicant indemnifies Eskom against loss, claims or damages including claims pertaining to consequential damages by third parties and whether as a result of damage to or interruption of or interference with Eskom's services or apparatus or otherwise. Eskom will not be held responsible for damage to the applicant's equipment. The applicant's attention is drawn to the Electricity Act, 1987, (Act 41 of 1987, as amended in 1994), Section 27(3), which stipulates that the applicant can be fined and/or imprisoned as a result of damage to Eskom's apparatus. A.9 Machinery No mechanical equipment, including mechanical excavators or high lifting machinery, shall be used in the vicinity of Eskom's apparatus and/or services, without prior written permission having been granted by Eskom. If such permission is granted the applicant must give at least seven working days prior notice of the commencement of work The Eskom's authorised area representative for the Kuruman CNC: Humphrey Mokgwabone 053 712 8379/076 112 0662, email address: MokgwaRB@eskom.co.za. This allows time for arrangements to be made for supervision and/or precautionary instructions to be issued. A.10 Permission to do work A.10.1 No work shall commence unless Eskom has received the applicant's written acceptance of the conditions specified in the letter of consent and/or permit. A.10.2 Eskom's rights and duties in the servitude shall be accepted as having prior right at all times and shall not be obstructed or interfered with. Note: Where an electrical outage is required, at least fourteen work days is required to arrange same. A.11 Remedial action Under no circumstances shall rubble, earth or other material be dumped within the servitude or Way Leave restriction area. The applicant shall maintain the area concerned to Eskom's satisfaction. The applicant shall be liable to Eskom for the cost of any remedial action which has to be carried out by Eskom. A.12 Safety A.12.1 The clearances between Eskom's live electrical equipment and the proposed construction work shall be observed as stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993). A.12.2 Equipment shall be regarded electrically live and therefore dangerous at all times.		

			A. 12.3 In spite of the restrictions stipulated by Regulation 15 of the Electrical Machinery Regulations of the Occupational Health and Safety Act, 1993 (Act 85 of 1993), as additional safety precaution, Eskom will not approve the erection of Houses, or structures occupied or frequented by human beings under the power lines and only after consideration of all alternatives, within the servitude area. A. 12.4 Eskom may stipulate any additional requirements to illuminate any possible exposure to Customers or Public to coming into contact or be exposed to any dangers of Eskom plant. A. 12.5 It is required of the applicant to familiarize him/herself with all safety hazards related to Electrical plant. B.1 Blasting, opencast mining and undermining B.1.1 A specific document of permission in respect of the blasting or mining activity as issued by the Inspector of Mines must be submitted to Eskom before commencement of operations. [refer to the Minerals Act, 1991 (Act 50 of 1991) Regulation 9.33.5 – Permission to fire more than one shot hole at a time within 500m from surface structures] B.1.2 Blasting in close proximity to Eskom's overhead power lines or substations is prohibited unless the following precautions are met [refer to the Mine Health and Safety Act, 1996 (Act 29 of 1996) Regulation 17.6(a) - 100m and above • a blasting plan submitted with the document of permission referred to in B.1.1 above, • a Peak Particle Velocity (PPV) to be kept below 75 mm/s, for lines and 50 mm/s for buildings, • a seismic control device is set up to record the readings, ensure fly rock and air blast control by means of adequate matting, in the interest of air blast control, only single shot blasting shall be allowed. • Permission for blasting will be strictly as stipulated in the Blasting Design by the Blasting Consultants and blasting should be done away from the power lines. B.1.3 The applicant will be held liable for damage to Eskom's towers or substation equipment, as a result of blasting activities. B.1.4 Costs incurred by Eskom to comply with statutory requirements in terms of an applicant's (or his contractors) works, equipment or plant in the servitude area, shall be paid to Eskom on demand. B.1.5 Eskom may charge the applicant appropriately for time on site during blasting operations. B.1.6 Eskom reserves the right to withdraw its consent if the blasting process becomes hazardous and likely to result in power interruptions.		

			B.1.7 If and whenever the applicant apply and if permission for the blasting process is granted the applicant must give at least fourteen work days prior notice of the commencement of blasting to The Eskom's authorised area representative for the Kuruman CNC: Humphrey Mokgwabone 053 712 8379/076 112 0662, email address: MokgwaRB@eskom.co.za. This allows time for arrangements to be made for supervision of and/or precautionary instructions to be issued in terms of the blasting operation. B.1.8 General Conditions B.1.8.1 Firing near the power lines should be along a free face, facing away from the power lines, as the Mine has suggested. B.1.8.2 The Mine should prepare a proper analysis of the rock structure and any geological anomalies prior to blasting. B.1.8.3 The "safe distance of 25m" from Eskom pylons should be indicated on the blasting plan. Existing geological faults, decomposed zones and fractured rock structures could have destabilising effects on founding material as a result of the firing, especially when developing an open face next foundation and below founding level. These conditions should be taken into account when deciding on the method and plan of blasting near the Eskom power line pylons. B.1.8.4 Eskom retains the right to appoint any specialist at any time on behalf of the Mine, to inspect Eskom structures for deformation. B.1.8.5 The mining depth near Eskom pylons should carefully be controlled for stability and adjustments being made when so instructed by Eskom. B.1.8.6 Upon receiving the letter of consent from the inspector of the mine to blast below 100m, the applicant must present to Eskom Technical Evaluation Forum L3 the blasting philosophy for final approval. Should the applicant or his contractor damage any of Eskom services during commencement of any work whatsoever, then Eskom's 24-hour Contact Centre Tel: 08600 37566 must be dialled immediately to report the incident. Any relocation of Eskom's services, due to this undermining, will be for the account of the Applicant. The Applicant will also be responsible for granting Eskom an alternative route for the power line. The Eskom Customer Contact Centre at 08600 37566 must be contacted in connection with any line deviation and costs.		
Eskom Environmental Division PO Box 356 Bloemfontein 9300	X				

Transnet PO Box 72501 Parkview 2122	X 28/01/2020				
SANRAL PO Box 415 Pretoria 0001	X 28/01/2020				
NC Department of Roads and Public Works PO Box 3132 Squarehill Park Kimberley 8300	X 28/01/2020				
Communities					
Dept. Land Affairs					
Department of Agriculture, Land Reform and rural Development Private Bag X 5018 Kimberley 8300	X 28/01/2020				
Traditional Leaders					
Not applicable: There are no communities, with Traditional Leaders, in the immediate vicinity of the mining right application area.					
Dept. Environmental Affairs					
The Department of Environmental Affairs is a competent authority in this Mining Right application process.					
Other Competent Authorities affected					
Department of Mineral Resources Private Bag X 6093 Kimberley 8300	X 28/01/2020				
Department of Water and Sanitation Private Bag X6101 Kimberley 8300	X 28/01/2020				
Department of Agriculture Forestry and Fisheries PO Box 2787 Upington 8800	X 28/01/2020				

Department of Agriculture & Land Reform and Rural Development Private Bag X5018 Kimberley 8300	X 28/01/2020				
Department Environment and Nature Conservation PO Box X 6102 Kimberley 8300	X 28/01/2020				
SA Heritage Resources Agency PO Box 4637 Cape Town 8000	X 28/01/2020	05/03/2020	Please create an application on SAHRIS and upload all documents pertaining to the EA application process. As per section 38(8) of the National Heritage Resources Act, Act 25 of 1999 (NHRA), an assessment of heritage resources must form part of the process and the assessment must comply with section 38(3) of the NHRA.	An application was created on SAHRIS.	
National Department of Public Works Private Bag X 5002 Kimberley 8300	X 28/01/2020				
Department of Rural Development and Land Reform Private Bag X5007 Kimberley 8300	X 28/01/2020				
OTHER AFFECTED PARTIES					
Osalus Energy (Pty) Ltd / Mira Energy (Pty) Ltd PO Box 225 Highlands North 2037	X 28/01/2020				
Agri Kuruman PO Box 2514 Kuruman 8460	X 28/01/2020				
INTERESTED PARTIES					

*Note: The contents of this table have been recorded up to March 2020 as the process of public participation is an ongoing process.

iv) The Environmental attributes associated with the development footprint alternatives (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

(1) **Baseline Environment**

(a) Type of environment affected by the proposed activity
(its current geographical, physical, biological, socio-economic, and cultural character)

(1) **GEOLOGY:**

The Ghaap Group
The Ghaap Group is subdivided, from the base upward, into the Schmidtsdrif Subgroup (interbedded siliclastics and carbonates), The Campbellrand Subgroup (carbonates), the Asbesheuwel Subgroup (iron formation) and the Koegas Subgroup (interbedded siliclastics and iron formations) (Figure. 7).

Carbonates from the Schmidtsdrif Subgroup have been dated at 2557 t 49 Ma by Pb-Pb method (jahn et al, 1990). The lower Asbesheuwel Subgroup (Kuruman Iron Formation) has been dated at 2432 ± 31 Ma using single zircons from ash beds (Trendall et al, 1990).

The Schmidtsdrif Subgroup
The basal Schmitsdrif Subgroup comprises fluvially deposited feldspatic quartz arenites, shallow marine and intertidal quartz arenites as well as a platformal carbonate sequence (Beukes, 1979).

The Campbellrand Subgroup
The Campbellrand Subgroup consists of stromaolitic dolomite and limestone platform facies, which interfingers down slope with carbonate turbidites (Fig. 4). The turbidites have been ankerized and silicified to form banded ferruginous chert. Toward the south the turbidites interfinger with carbonaceous shale (Prieska facies), which, per Beukes, relates to deposition within an euxinic basin, in front of the carbonate platform.

The Asbesheuwel Subgroup
Shallow water carbonate deposition was terminated during a major transgression, which drowned the shelf, resulting in a fairly, sudden transition from carbonates through chert and into the banded iron formation of the Asbesheuwel Subgroup. Beukes, 1978 subdivided the Asbesheuwel Subgroup into the Kuruman Iron Formation at the base followed by the Griquatown Iron Formation at the top. Per Beukes the Kuruman Iron Formation was deposited within a deep shelf setting over the entire Kaapvaal Craton.

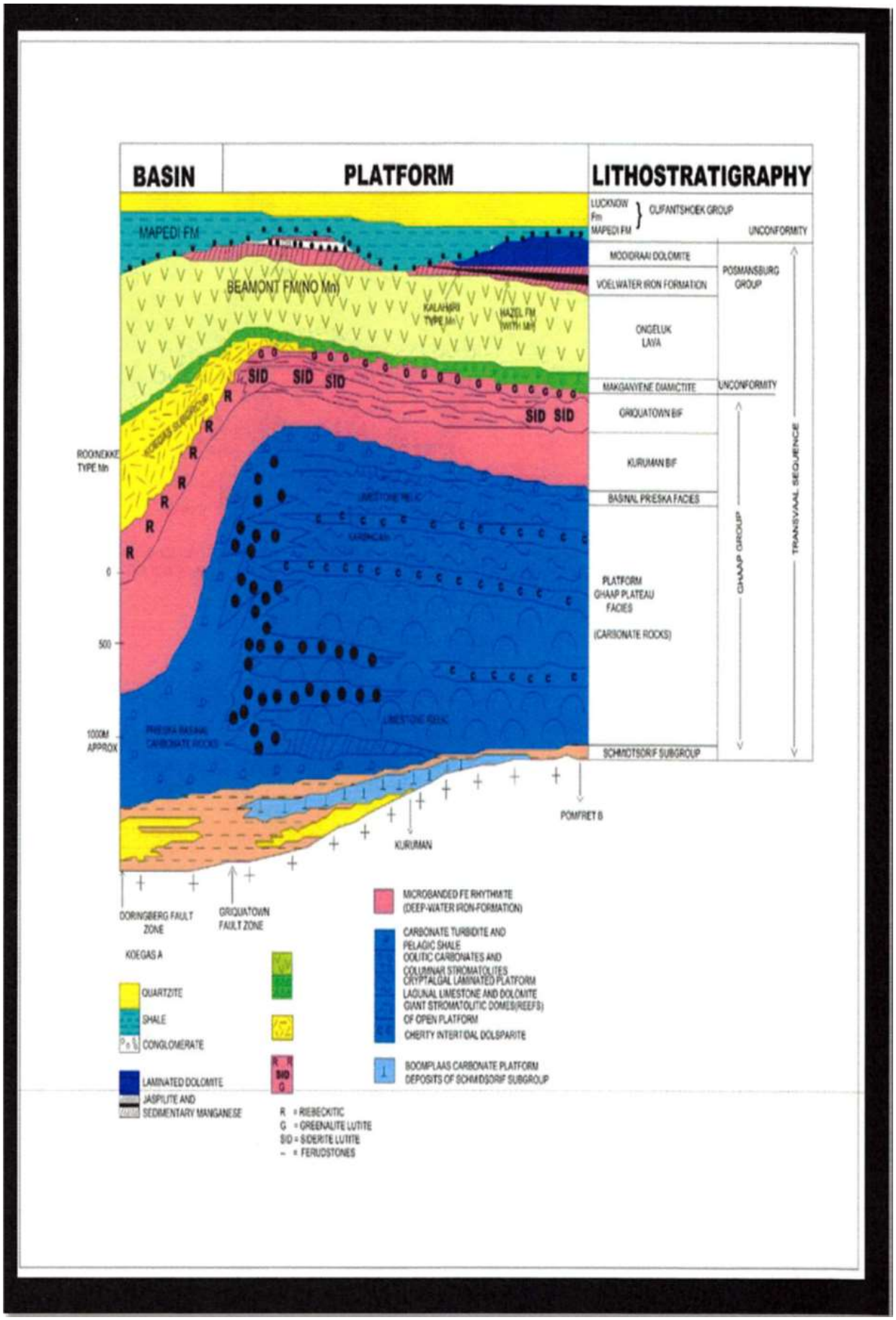

Figure 6. North-south section illustrating the relationships of the stratigraphic and sedimentological facies in the Transvaal Supergroup of Griqualand West.

It comprises an upward-shallowing sequence consisting of carbonaceous shale deposited in an euxinic basin, ankerite-banded chert, representing distal carbonate turbidites which was deposited in a transition zone, between the euxinic basin and the open shelf. Magnetite-hematite-chert micro banded rhythmite macrocycles containing interbedded stilpnomelane band- lutites, were deposited on the deep open shelf, while greenalite-siderite rhythmites mark the toe-of-slope and slope areas of a shallow water platform. The Ouplaas Member, which marks the top of the Kuruman Iron Formation, represents a clastic-textured shallow-water platform deposit (Beukes, 1983 and 1984).

The Griquatown Iron Formation overlies the Kuruman Iron Formation and consists of upward coarsening megacycles, deposited in environments that vary from low energy, subtidalto high energy, intertidal and lagoonal settings.

The Koegas Subgroup

The Koegas Subgroup was only deposited down slope and within the deeper part of the basin toward the south (Prieska area) and is absent toward the north (Sishen) (Fig. a). The Koegas Subgroup was deposited during a transgressional phase and comprises a quartzchlorite- mudstone unit at the base followed upward by iron formations with interbedded quartz-wackes, with more iron formations, containing interbedded carbonates toward the top. The Koegas Subgroup was subdivided by Beukes; (1978), from the base upward into the following formations:

- Pannetjie Formation: Quartz-chlorotic mudstone
- Dorasdale Formation: Iron-lutites
- Kwa kwas Formation: Greena lite-lutites and interbedded quartz-wackes
- Naragas Formation: Mudstones and carbonates
- Rooinekke Formation: Iron band-lutites
- Nelani Formation: Mudstones with interbedded limestone, chert and grit beds

THE POSTMASBURG GROUP

Uplift and erosion of the platform strata took place prior to the deposition of the Makganyene Diamictite Formation at the base of the Postmasburg Group Beukes, 1983, 1984). Visser (1971) and de Villiers and Visser (1977) considered the diamictite to be of glacial origin.

The Postmasburg Group has been subdivided, from the base upward, into the following Formations:

- The Makganyene Formation (glacial diamictites)

- The Ongeluk Formation (basaltic lavas)
- The Hotazel Iron Formation (Banded iron stones, host to manganese deposits within the Kalahari Manganese Basin)
- The Mooidraai Formation (dolomites)
- The different formations within the Postmasburg Group, conformably follows on top of one another.

The Ongeluk lava has been dated by Armstrone (1987) at 2239 t 90 Ma and at 2239 3 Ma by Cornell et al (1987). During post Postmasburg times, the Postmasburg Group was exposed to intense weathering. The erosional unconformity progressively cuts down the Stratigraphy, moving from the north (Hotazel area) toward the south (Postmasburg area), truncating gradually the Mooidraai, the Hotazel, Ongeluk, Makganyene and Asbesheuwel Formations to finally rest on dolomites of the Campbellrand Subgroup on the Maremane Dome near Postmasburg.

THE OLIFANTSHOEK GROUP

The unconformity is overlain by the Olifantshoek Group, which comprises shales at the base (Mapedi). Formation) followed by quartzites of the Lucknow Formation. Ages for the Hartley Basal Formation at the base of the lower OlifantshoekGroup have been calculated at 2026! 180 Ma (Crampton, L9741, and at 1863 t 54 Ma (Armstrong, L987) and at 1930 t 4 Ma (Cornell and Schutte, 1995).

In the Sishen-Postmasburg area the Olifantshoek Group, is referred to as the Gamagara Formation. The unconformity is marked by a hematite-pebble conglomerate and shale unit. Here the unit fills depressions along the undulating unconformity surface and is thought to represent a braided alluvial fan complex (van Schalkwyk and Beukes, 1986).
The Olifantshoek unconformity is of utmost economic importance within the area. Where it rests on the Asbesheuwel Subgroup, hematite iron ore was formed (Iscor and Beeshoek), where it truncates the Campbellrand dolomites, manganese mineralization is developed.

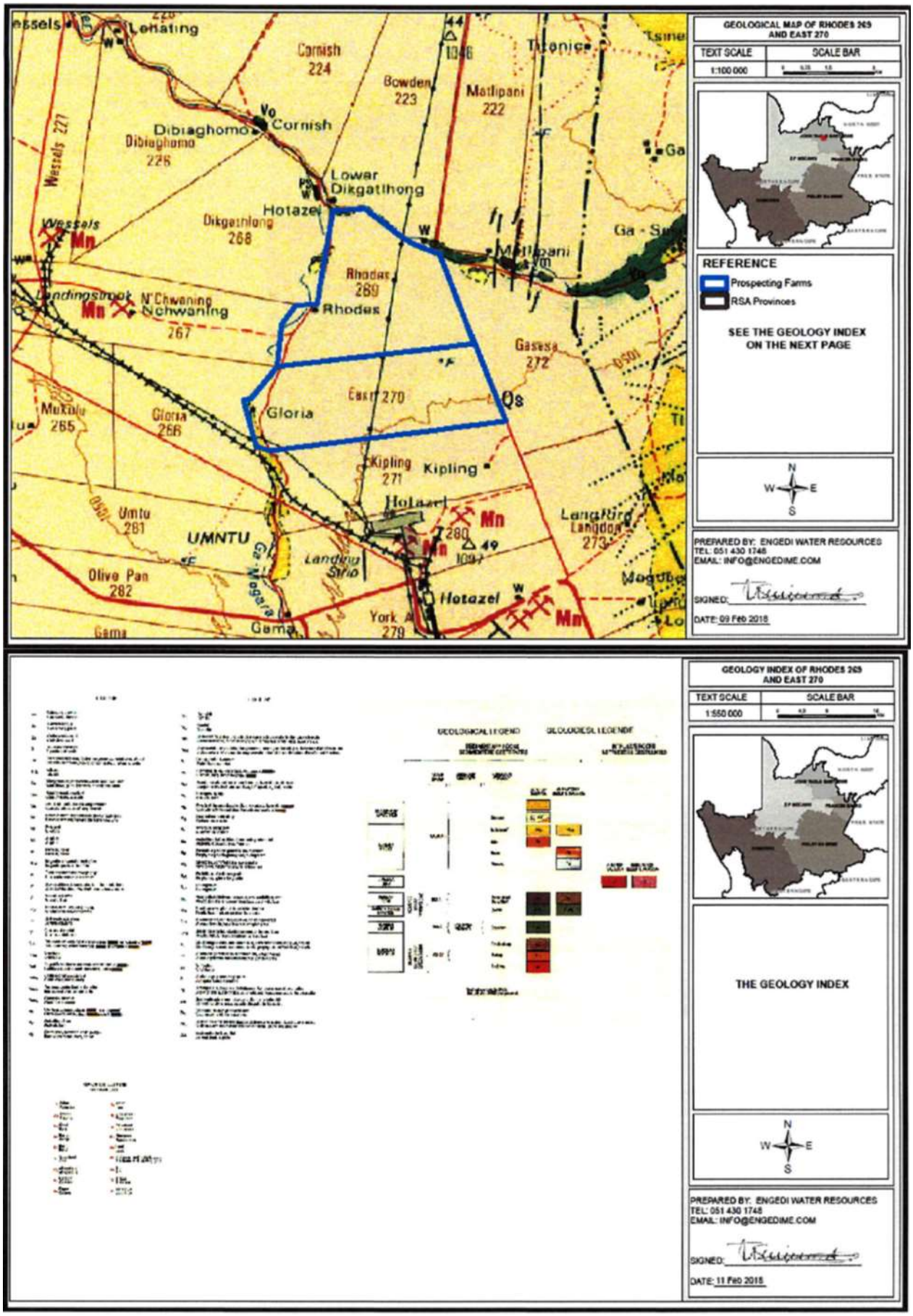

Figure 7. Specific Geological Map

2) Climate:

The East Farm no. 270 area's climate is described as semi-arid with high daytime temperatures of up to 40"C during the summer months of November to February and sub-zero temperatures during the winter months of June to August.

The average climate for the site is presented in Figure 8 using the outcome of the investigation into rainfall and evaporation for the site. While evaporation is showing as greatly exceeding rainfall, this is representative of the maximum A-Pan equivalent potential evapotranspiration that could occur assuming no limitations are placed on evaporative demand. The combination of rainfall, evaporation and temperature result in a hot arid desert climate according to the Köppen-Geiger climate classification (Taken out of the HYDROLOGICAL ASSESSMENT OF THE PROPOSED EAST MANGANESE MINE September, 2018 Version 2 by Highlands Hydrology) (The Complete study is appended as Appendix 5 to the BAR/EMP document)

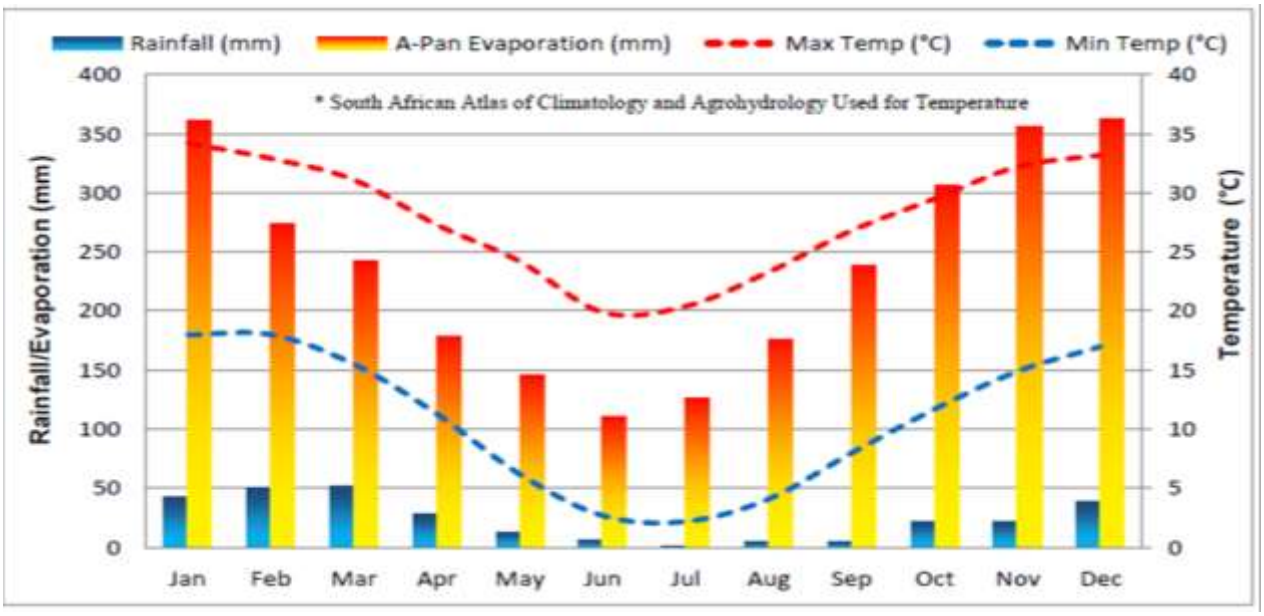

Figure 8. AVERAGE MONTHLY CLIMATE FOR THE SITE taken out of the HYDROLOGICAL ASSESSMENT OF THE PROPOSED EAST MANGANESE MINE September 2018 Version 2 by Highlands Hydrology)

The mean rainfall of 350mm per annum occurs during the summer months and is accompanied by thunderstorms. The variance in the annual rainfall is large, ranging from as little as 150mm to as much as 800mm. Wind direction is generally from a north-westerly direction

Fog and snow are unlikely to occur in the area, and thunder showers irregularly occur in the summer months from October to March. The period during which frost can be expected lasts for about 120 days (May to August). With extreme minimum temperatures to below -8°C at night in the winter, frost development can be severe.

Hail is sometimes associated with thunderstorms and mainly occurs in early to late summer (November to February). It occurs on average three times a year and although these storms may sometimes be severe and cause much damage, they usually impact on a relatively small area.

High winds, in excess of 8.0 m/s, are likely to occur at a frequency of 0.6% (i.e. once in every 22 days of the year). This is common in the months of September and October.

Excessive temperatures (i.e. above 45 °C) can occur in the months of December and January. These frequently correlate with an excessively dry humidity score.

Rainfall in excess of 36 mm during a 60-minute period does not frequently occur.

Droughts are common and may vary from mild to severe. During these periods dust storms sometimes occur, depending mainly on denudation of the surface.

3) **Topography:**

Dr. BJ Henning has been appointed by Southern Ambition to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area, and to determine the possible impact of mining on the diversity and ecological status of the application area Topography was described and included in this report as part of the ecological study. (The Complete study is appended as Appendix 4 to the BAR/EMP document)

Two land facets are present on site. Dunes occur as high-gradient hills in the west and north of the site, while remainder of the site represent slightly undulating plains. The topography across the site is slightly undulating with the average elevation of 1030 mamsl. The site is located within two quaternary catchments namely D41K (Eastern section of site) and D41L (western section of site) and is situated in the Lower Vaal Water Management Area. Drainage occurs as sheet-wash towards major rivers namely the Gamagara River west and the Kuruman River north of the site (Taken out of the Ecological study done by Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat, July 2018). (The Complete study is appended as Appendix 4 to the BAR/EMP document)

Highlands Hydrology environmental consultants has been appointed by Southern Ambition to provide an Hydrological Assessment in order to ensuring compliance with Government Notice 704 (Government Gazette 20118 of June 1999 GN 704) to mitigate the potentially adverse impacts to surface water resources from the proposed mine topography was described and included in this report

as part of the Hydrological Assessment (taken out of the HYDROLOGICAL ASSESSMENT OF THE PROPOSED EAST MANGANESE MINE September, 2018 Version 2 by Highlands Hydrology). (The Complete study is appended as Appendix 5 to the BAR/EMP document)

Three topographical datasets in the form of Digital Elevation Models (DEM) were used to assess the topography of the site and surrounds, namely:
1. 100m SRTM2 data for the greater Ga-Morgara catchment containing the site;
2. 30m SRTM (Shuttle Radar and Topography Mission) data for area about the site; and
3. 0.5m contour dataset provided by the client (SurfaceAll.dwg) which covered a portion of the site.

The three DEM's utilised presents the topography of the Ga-Morgara catchment and illustrates the relatively flat characteristics of the region about the site. Figure 9 in the study presents the local topography of the site and illustrates the extent of the available 0.5m contour dataset. The 0.5m contour dataset was interpolated into a 10m DEM while the 30m SRTM data (hereafter referred to as SRTM30) was resampled to an equivalent 10m DEM and used to patch the missing topographical detail when considering the 0.5m contour dataset. To enable an improved integration, 20 sampling points along the riverbed were used to assess the convergence between the 0.5m contour dataset derived DEM and the SRTM30 DEM with an average of 3.5m extra height noted in the SRTM30 DEM. The SRTM30 DEM was consequently reduced by a consistent level of 3.5m to try and better match the 0.5m contour derived DEM. As illustrated in Figure 2-4 of the study, the site contour data indicates a more regular surface while the surrounding SRTM30 DEM is characterised by numerous depressions. This 'rough' SRTM30 surface is a result of the limitations of the SRTM30 data which has a poor vertical accuracy when compared to the 0.5m contour derived DEM, with the error appearing exaggerated by the flat region surrounding the site. The 0.5m contour derived DEM and resampled SRTM30 DEM were subsequently merged into a 'Combined DEM'. The use of SRTM30 data for the flood-line modelling of this study has a significant impact on model accuracy which is discussed in future detail in Section 4 of this report. A continuous elevation dataset covering the site and surrounds such as Lidar would enable greater accuracy/detail in the developed flood-lines and SWMP. Site slopes were calculated for the site and surrounds with most of the sites surrounds characterised by slopes under 30% (and predominantly below 10%). Elevations on the site approximate 1020m Above Mean Sea Level (AMSL).

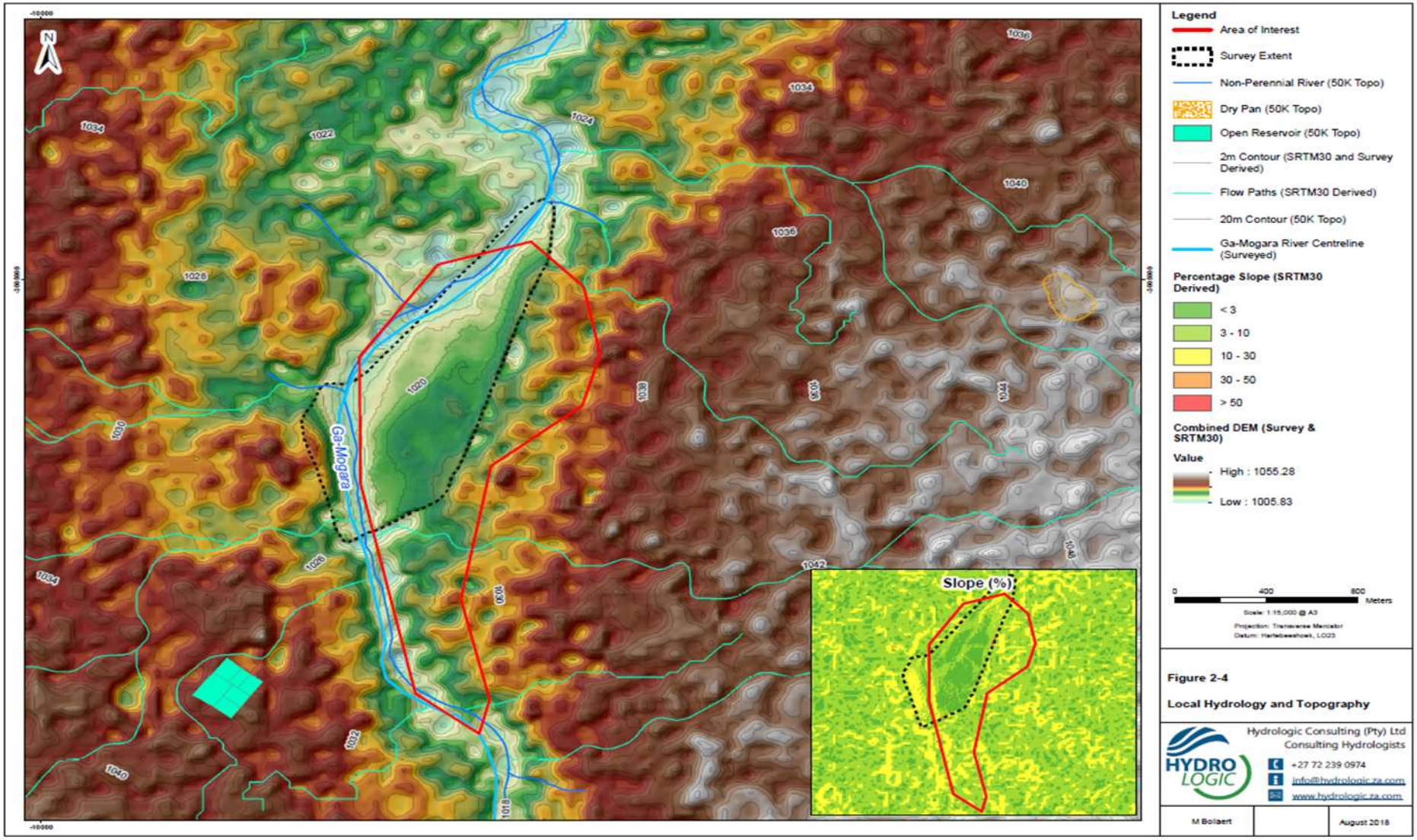

Figure 9. Local Hydrology and Topography (taken out of the HYDROLOGICAL ASSESSMENT OF THE PROPOSED EAST MANGANESE MINE September 2018 Version 2 by Highlands Hydrology).

4) **Soils:**

Dr. BJ Henning has been appointed by Southern Ambition to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area, and to determine the possible impact of mining on the diversity and ecological status of the application area. Soils was described and included in this report as part of the ecological study. (The Complete study is appended as Appendix 4 to the BAR/EMP document).

Geology is directly related to soil types and plant communities that may occur in a specific area (Van Rooyen & Theron, 1996). A Land type unit is a unique combination of soil pattern, terrain and macroclimate, the classification of which is used to determine the potential agricultural value of soils in an area. The land type unit represented within the footprint area include the Ah9 and Af28 land types (Land Type Survey Staff, 1987) (ENPAT, 2000). The land types, geology and associated soil types is presented in Table 7 below as classified by the Environmental Potential Atlas, South Africa (ENPAT, 2000), while the location of the land types are indicated in Figure 10(Taken out of the Ecological study done by Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat, July 2018).

Table 7. Land types, geology and dominant soil types of the proposed development site

Land type	Soils	Geology
Ah9	Red-yellow apedal, freely drained soils; red and yellow, high base status, usually < 15% clay	Aeolian sand of Recent age with a few outcrops of Tertiary Kalahari beds (surface limestone, silcrete and sandstone) in the riverbeds.
Af28	Red-yellow apedal, freely drained soils; red, high base status, > 300 mm deep (with dunes)	Red to flesh-coloured wind-blown sand (sand dunes) of Tertiary to Recent age with some outcrops of coarse-grained brown quartzite and subgreywacke and conglomerate (Matsap Formation).

Soils associated with the site are mostly deep, Aeolian sands overlying calcrete.

5. **Land Capability and Land Use:**

Current land use:

Dr. BJ Henning has been appointed by Southern Ambition to provide an ecological study in order to highlight the ecological characteristics of the proposed mining area, and to determine the possible impact of mining on the diversity and ecological status of the application area.

Land use was described and included in this report as part of the ecological study. (The Complete study is appended as Appendix 4 to the BAR/EMP document)

The current land-use of the proposed development site is grazing by livestock and game.
Neighbouring farms are being used for livestock grazing and game farming, with mining further away from the site. The major land use of the study area as classified by the Environmental Potential Atlas of South Africa (2000) is vacant / unspecified land (Taken out of the Ecological study done by Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat, July 2018).

The surface owners Mr and Mrs Pretorius currently utilises the land covered under the Mining Right as a cattle and game farm.

Evidence of disturbance

Manganese ore, within the area (Kalahari Manganese Field) was discovered during the 1960's. Ore production was from open pits on the farms Blackrock, Hotazel, Langdon Annex and Mamatwan. Ore from underground workings became operational at Wessels by Samancor and at Nchwaning and Gloria by Assmang.

These two companies were originally in possession of the mineral rights, over most of the properties within the Kalahari Manganese Bain.

The rights on the farm East 270, bounding the Main Basin toward the east, were also held by Samancor. Gloria mine is located toward the west and Nchwaning toward the northwest, as neighbouring properties to East.

National Manganese Mines (Langdon-Annex) was the third company getting involved with the production of manganese within the area, during the early years.

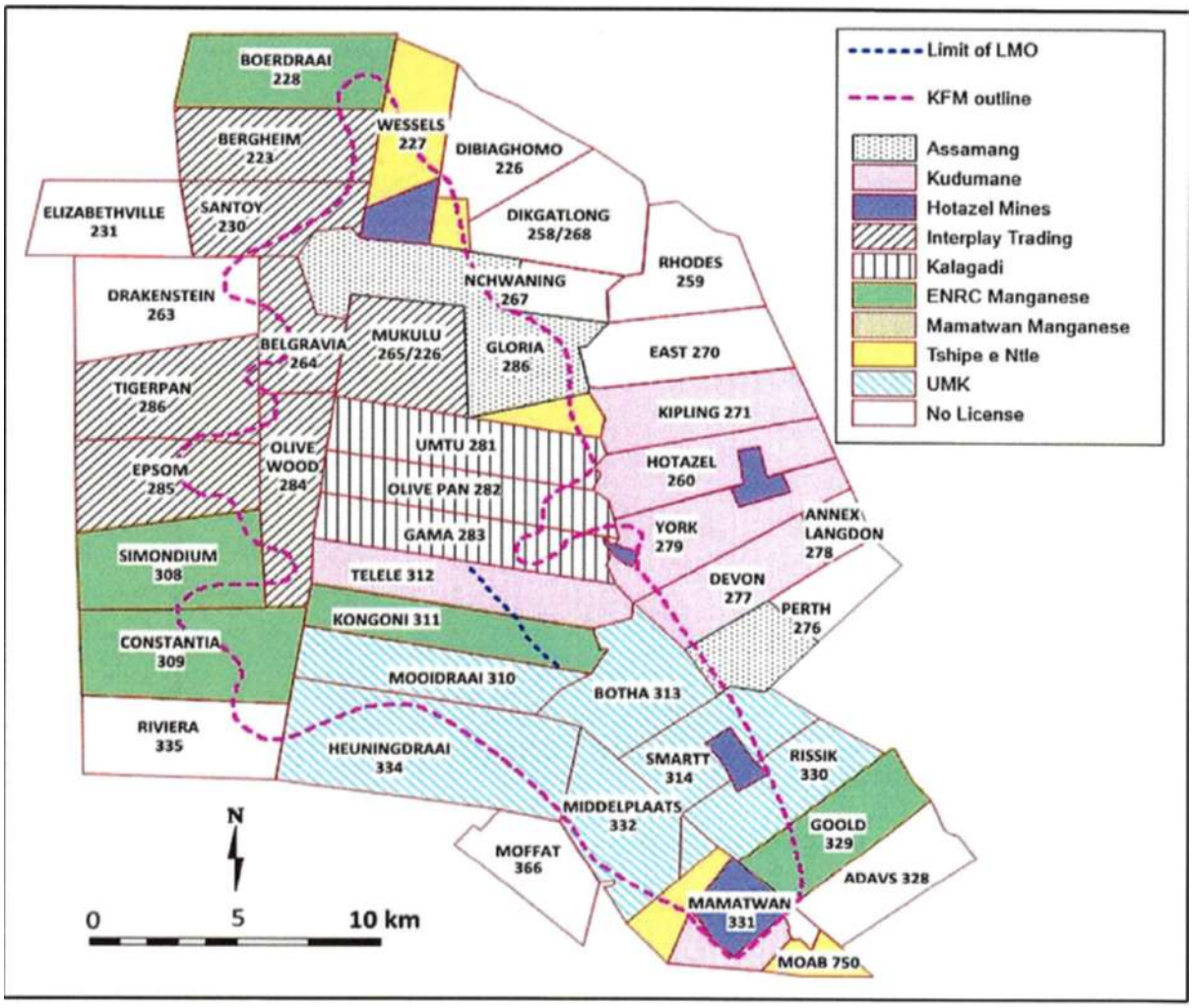

Figure 10. Farm Map.

6. NATURAL FAUNA:

Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat) was appointed by Southern Ambition 1549 (Pty) Ltd ("the Mining Right Applicant") to conduct an BAR and EIA phase study on the ecological components (fauna and flora) for the proposed establishment of the East Manganese Mine with associated and structures on a footprint of approximately 100 hectares located on portion 1 and the remainder of the farm East 270, in Joe Morolong Local Municipality, John Taolo Gaetsewe District Municipality, Northern Cape Province. (The Complete study is appended as Appendix 4 to the BAR/EMP document).

The Scope of Study

The specific terms of reference for the study include the following:

1. **Detailed flora survey** – in each vegetation type/plant community onsite:

a. After studying the aerial photograph identify specific areas to be surveyed and confirm location by making use of a Geographical Positioning System (GPS).

b. Conduct a site visit and list the plant species (trees, shrubs, grasses, succulents and other herbaceous species of special interest) present for plant community and ecosystem delimitation.

c. Identify potential red data plant species, possible encroacher species, medicinal plants of value and exotic plant species.

d. Indicate suitable plant species that can be used for the landscaping around the proposed developments.

2. **Plant community delimitation and description**

a. Process data (vegetation and habitat classification) to determine vegetation types on an ecological basis.

b. Describe the habitat and vegetation.

3. **Fauna scoping**

a. List the potential fauna (mammal species, red data birds, reptiles, amphibians, invertebrates) present linked to the specific potential habitats that occur as identified in the vegetation survey.

b. Analyse the data and identify potential red data fauna species, as well as other endemic or protected species of importance.

c. Indicate species mitigation measures and management measures to be implemented to prevent any negative impacts on the fauna of the area.

4. **General**

a. Identify and describe ecologically sensitive areas. Create a sensitivity map to indicate specific sensitive areas based on various environmental parameters such as natural vegetation in a good condition, rockiness, slopes, flood lines etc.

b. Identify problem areas in need of special treatment or management, e.g. bush encroachment, erosion, degraded areas, reclamation areas.

c. Make recommendations, impact ratings and risk assessments for each impact.

Limitations and assumptions

- In order to obtain a comprehensive understanding of the dynamics of the flora of the study area, surveys should ideally be replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible, and this floral study was conducted over two seasons;
- The large study area did not allow for the finer level of assessment that can be obtained in smaller study areas. Therefore, data collection in this study relied heavily on data from representative, homogenous sections of vegetation units, as well as general observations, aerial photograph analysis, generic data and a desktop analysis;
- The surveys were focused on the proposed footprint areas as well as areas in close proximity to the access point in the south. The northern vegetation units were broadly identified through a drive through survey.
- Visibility proved to be a constraint in encroached areas where plant species might have been missed beneath the densely overgrown and obstructed by surface vegetation;

Thus, even though it might be assumed that survey findings are representative of the ecosystem of the project area, it should be stated that the possibility exists that individual plants species might have been missed due to the nature of the terrain (dense vegetation). Therefore, maintaining due cognizance of the integrity and accuracy of the ecological survey, it should be stated that the ecological resources identified during the study do not necessarily represent all the ecological resources present on the property.

FAUNA SURVEY

The fauna survey was conducted as follows:

- A site survey was done to identify potential habitats after identifying the vegetation units.

Fauna observed on site or any specific indication of species was noted as confirmed in the specialists.

- A scoping survey was then conducted by comparing the habitat types identified with the preferred habitats of species occurring in the area.

Data recorded:

A list of all species of fauna and their status as observed on site or that could potentially occur on site. Notes were made of specific sensitive or specialized habitats that occur on the site.

Red data specialists

A species list of the red data species of the different faunal classes was obtained from the following references:

- Red Data Book of the Mammals of South Africa (Friedman & Daly, 2004)
- The Atlas of the Southern African Birds - digital data on quarter degree grid data (Avian Demography Unit, University of Cape Town)
- Atlas and red data book of the frogs of South Africa, Lesotho and Swaziland (Minter et al. 2004)
- South African Red Data Book – Reptiles and Amphibians. National Scientific Programmes Report no.151;

Data processing

A comparison of the habitats (vegetation units) occurring on the property was made to the preferred habitats of the faunal species. In addition to species observed on the site, lists of the potential mammal, bird, reptile, amphibian and insect species were compiled and mitigating measures recommended if needed.

SENSITIVITY ASSESSMENT

The ecological sensitivity of any piece of land is based on its inherent ecosystem service and overall preservation of biodiversity.

Ecological function

The ecological function relates to the degree of ecological connectivity between systems within a landscape matrix. Therefore, systems with a high degree of landscape connectivity amongst one another are perceived to be more sensitive and will be those contributing to ecosystem service (e.g. wetlands) or overall preservation of biodiversity.

Conservation importance

Conservation importance relates to species diversity, endemism (unique species or unique processes) and the high occurrence of threatened and protected species or ecosystems protected by legislation.

Sensitivity scale

- High – sensitive ecosystem with either low inherent resistance or low resilience towards disturbance factors or highly dynamic systems considered being important for the maintenance of ecosystem integrity. Most of these systems represent ecosystems with high connectivity with other important ecological systems or with high species diversity and usually provide suitable habitat for a number of threatened or rare species. These areas should be protected;
- Medium – These are slightly modified systems which occur along gradients of disturbances of low-medium intensity with some degree of connectivity with other ecological systems or ecosystems with intermediate levels of species diversity but may include potential ephemeral habitat for threatened species;
- Low – Degraded and highly disturbed / transformed systems with little ecological function and which are generally very poor in species diversity.

DISCUSSION

Most development has an impact on the environment. In this case the area on which the proposed development footprint will be built will be cleared, therefore directly impacting on the environment.

Most of the vegetation will be completely modified during the construction. Detailed ecological (fauna habitat & flora) surveys were conducted during March 2018 to verify the ecological sensitivity and ecological components of the site at ground level.

The development will have a medium to high impact on the vegetation and general ecology of the area, due to the sensitive habitats (dunes, pan, woodland with dense stands of protected tree species) that occur in the area, and therefore a sound EMP and mitigating measures should be considered for the proposed footprint of the East Manganese Mine. Considering the results from the field surveys, mitigation needs to be implemented to prevent any excessive negative impacts on the ecosystem, since most of the site is in a natural state. A sensitivity analyses was conducted to identify the most suitable site for the development. From this investigation and ecological survey, the following main observations was made:

- The duneveld areas has a medium to high sensitivity. These areas play an important role as habitat for fauna and flora. Strict mitigation is needed for the preservation of some sections of this natural vegetation entity. The East Manganese Mine open cast pit falls outside of these area's the plant or production area development should avoid these areas if possible;

- The pan has a high sensitivity and should be preserved as important fauna and flora habitats. A 30-meter buffer zone should be implemented although the mine development does not impact on this area.
- The river ravine area to the north west being a high sensitivity area will be severely impacted by the open cast mine pit and the natural course of the Ga-Mogara seasonal river will have to be changed and diverted around the mining area.

Some potential rare fauna may also occur in the area, and specific mitigation measures need to be implemented to ensure that the impact of the development on the species' habitat will be low.

Specific mitigation relating to red data fauna includes the following:

- Disturbances in close vicinity of the development (periphery) should be limited to the smallest possible area in order to protect species habitat;
- Corridors between the development zones are also important to allow fauna to move freely between the areas of disturbance.

A number of ecological potential impacts were identified and assessed. A few of these were assessed as having potentially medium or high significance, including the following:

- Destruction or disturbance to ecosystems leading to reduction in the overall extent of a particular habitat;
- Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts (habitat fragmentation);
- Increased soil erosion;
- Destruction/permanent loss of rare, endangered, endemic and/or protected species;
- Establishment and spread of declared weeds and alien invader plants;
- Soil and water pollution due to spillages;
- Air pollution as a result of dust;
- Negative effect of human activities and road mortality.

Mitigation measures provided would reduce impacts from a high to low significance. A monitoring plan is recommended for inclusion into the EMP should the application be approved.

CONCLUSION

All aspects of the environment, especially living organisms, are vulnerable to disturbance of their habitat. If we can bring about a more integrated approach to living within our ecosystems, we are

much more likely to save the fundamental structure of biodiversity. Positive contributions can be made even on a small scale within the

proposed East Manganese Mine and associated infrastructure. All stakeholders need to be involved to avoid a loss of biodiversity in the area.

The proposed development area will modify the natural vegetation and faunal habitats. The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the development phase should be considered.

The following summarises the recommended rehabilitation process and is referenced to a more comprehensive discussion in the wetland and riparian report:

The catchment adjacent to the Ga-Mogara River where mining will take place will also affect it and its rehabilitation is therefore also important (p21-23):

- The topography should be re-instated as close to the natural condition as possible.
- The correct backfilling of material and management of topsoil with an intact seedbank is crucial to the re-establishment of indigenous vegetation.
- Indigenous vegetation should be allowed to re-establish from the seedbank present in the topsoil.
- The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas.
- Monitor and eradicate exotic weeds and invaders where they establish.

Re-instating the topography and geomorphology of affected areas in the floodplain of the river and prevention of erosion (p24-28):

- Rehabilitation should endeavour to re-instate the current topography as far as possible.
- The natural, pre-mining environment should be documented prior to mining by means of a photographic record and surveying.
- The management of topsoil and keeping the seedbank intact is a crucial element in the rehabilitation of mined areas. Topsoil from the floodplain and terrestrial areas should be kept separate.
- Surface water flow and erosion should be stemmed by using gumpoles, eco-logs and brush piles.
- Re-instating the topography should avoid areas devoid of topsoil, tailings dumps and steps or benches as these prevent vegetation establishment.
- Erosion monitoring should be implemented continuously and where erosion occurs this should be remedied.

The establishment of indigenous vegetation should be promoted by implemented the following recommendations (p28-29):

- Mulch, obtained from vegetation removed from mining areas, should be placed in rehabilitated areas together with topsoil.
- Natural vegetation should be allowed to re-establish from the intact seedbank in the topsoil.
- The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas.
- Implement plant establishing techniques during the rainy season to increase the probability of successful establishment.
- Protect the rehabilitated areas and riparian zone from trampling and browsing by game and domestic stock.
- In order to determine and monitor the success of rehabilitation a biomonitoring programme which includes an Index of Habitat Integrity (IHI) and vegetation assessments should be conducted bi-annually.

Weed monitoring and eradication should be implemented and strictly adhered to. A comprehensive eradication and monitoring programme will have to be implemented in order to control the infestation of Prosopis glandulosa on and around the site (p29-32).

The proposed development should avoid the high sensitivity areas where possible such as the pan habitats and river ravine habitats but it is noted that the mining area falls within a high sensitivity area while sections of the woodland with dense stands of protected trees should be preserved if possible.

Where sensitive areas of natural vegetation cannot be avoided, a number of mitigation measures have been recommended to minimize and/or offset impacts (license application for eradication of protected species, identification of offset areas). Negative impacts can be minimized by strict enforcement and compliance with an Environmental Management Plan which takes into account the recommendations for managing impacts detailed above.

Provided that the proposed development is consistent with limiting impact in the sensitive areas marked on the map , it is taken into account that the underlying valuable natural resource cannot be shifted and that mining has a definite impact on the environment, but the total footprint of the mine and infrastructure is less than 60 hectares and that if the EMP takes all the mitigation measures into consideration stipulated in this report, the planned development can be fully supported (Taken out of the Ecological Study by Dr. Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat, July 2018).

7. NATURAL VEGETATION:

Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat) was appointed by Southern Ambition 1549 (Pty) Ltd (“the Mining Right Applicant”) to conduct an EIA phase study on

the ecological components (fauna and flora) for the proposed establishment of the East Manganese Mine with associated and structures on a footprint of approximately 100 hectares located on portion 1 and the remainder of the farm East 270, in Joe Morolong Local Municipality, John Taolo Gaetsewe District Municipality, Northern Cape Province. (The Complete study is appended as Appendix 4 to the BAR/EMP document).

The Scope of Study

The specific terms of reference for the study include the following:

1. Detailed flora survey – in each vegetation type/plant community onsite:

a) After studying the aerial photograph identify specific areas to be surveyed and confirm location by making use of a Geographical Positioning System (GPS).
b) Conduct a site visit and list the plant species (trees, shrubs, grasses, succulents and other herbaceous species of special interest) present for plant community and ecosystem delimitation.
c) Identify potential red data plant species, possible encroacher species, medicinal plants of value and exotic plant species.
d) Indicate suitable plant species that can be used for the landscaping around the proposed developments.

2. Plant community delimitation and description

a) Process data (vegetation and habitat classification) to determine vegetation types on an ecological basis.
b) Describe the habitat and vegetation.

3. Fauna scoping

a) List the potential fauna (mammal species, red data birds, reptiles, amphibians, invertebrates) present linked to the specific potential habitats that occur as identified in the vegetation survey.
b) Analyse the data and identify potential red data fauna species, as well as other endemic or protected species of importance.
c) Indicate species mitigation measures and management measures to be implemented to prevent any negative impacts on the fauna of the area.

4. General

a) Identify and describe ecologically sensitive areas. Create a sensitivity map to indicate specific sensitive areas based on various environmental parameters such as natural vegetation in a good condition, rockiness, slopes, flood lines etc.

b) Identify problem areas in need of special treatment or management, e.g. bush encroachment, erosion, degraded areas, reclamation areas.
c) Make recommendations, impact ratings and risk assessments for each impact.

Limitations and assumptions

- In order to obtain a comprehensive understanding of the dynamics of the flora of the study area, surveys should ideally be replicated over several seasons and over a number of years. However, due to project time constraints such long-term studies are not feasible, and this floral study was conducted over two seasons;
- The large study area did not allow for the finer level of assessment that can be obtained in smaller study areas. Therefore, data collection in this study relied heavily on data from representative, homogenous sections of vegetation units, as well as general observations, aerial photograph analysis, generic data and a desktop analysis;
- The surveys were focused on the proposed footprint areas as well as areas in close proximity to the access point in the south. The northern vegetation units were broadly identified through a drive through survey.
- Visibility proved to be a constraint in encroached areas where plant species might have been missed beneath the densely overgrown and obstructed by surface vegetation;

Thus, even though it might be assumed that survey findings are representative of the ecosystem of the project area, it should be stated that the possibility exists that individual plants species might have been missed due to the nature of the terrain (dense vegetation). Therefore, maintaining due cognisance of the integrity and accuracy of the ecological survey, it should be stated that the ecological resources identified during the study do not necessarily represent all the ecological resources present on the property.

METHODS

VEGETATION SURVEY

Two basic methods were used during the vegetation survey:

- Line transects were walked on the site surveyed to record the plant species present. Rare and threatened plant species and any botanically sensitive sites or habitats were searched for in the various vegetation units.
- The Braun-Blanquet survey technique to describe plant communities as ecological units was also used for this study. It

allows for the mapping of vegetation and the comparison of the data with similar studies in the area.

The vegetation survey was conducted on site during March 2018 and July 2018. The vegetation was in a moderate to good condition and most species could be identified, although some species might have been missed as a result of the large site. No further surveys were necessary considering that the area received sufficient precipitation during the wet season to allow for the identification of most plants in the study area.

Data recorded:
Plant names used in this report are in accordance with Arnold & De Wet (1993), with the exception of a few newly revised species. A list of all plant species present, including trees, shrubs, grasses, forbs, geophytes and succulents were compiled. All identifiable plant species were listed. Notes were additionally made of any other features that might have an ecological influence as well as potential fauna habitat that might occur.

Red data species
A species list of the red data species previously recorded in the vicinity of the proposed development was obtained from the South African Biodiversity Institute (SANBI), South Africa as classified by the IUCN red data list categories.

Protected trees
A species list of the protected tree species was obtained from the Department of Forestry. These trees are listed by the NFA (Act 84 of 1998) as protected.

Protected plants
A list of protected and specially protected plants was obtained from the LEMA (2004).

Data processing
A classification of vegetation data was done to identify, describe and map vegetation types. The descriptions of the vegetation units include the tree, shrub and herbaceous layers.

Conservation priority of each vegetation unit was assessed by evaluating the plant species composition in terms of the present knowledge of the vegetation of the Northern Cape Province, as well as the Bushmanland Arid Grassland vegetation type and Nama Karoo Biome of South Africa.

The following four conservation priority categories were used for each vegetation unit:

- High: Ecologically sensitive and valuable land with high species richness that should be conserved, and no development allowed.
- Medium: Land that should be conserved but on which low impact development could be considered with the provision of mitigation measures.
- Medium-low: Land that has some conservation value but on which development could be considered with limited impact on the vegetation / ecosystem. It is recommended that certain sections of the vegetation be maintained.
- Low: Land that has little conservation value and that could be considered for developed with little to no impact on the vegetation / ecosystem.

VEGETATION UNITS

The proposed development is planned on a landscape that varies from slightly undulating plains to moderately undulating terrain associated with dunes. The importance to survey the area as a whole to have a better understanding of the ecosystem and the potential impact of the development on the natural environment was identified as a key factor, and subsequently the property was completely surveyed. The farm is currently managed as a livestock farm. The vegetation units on the site vary according to soil characteristics, topography and land-use. Most of the site is characterized by microphyllous woodland that varies in density and species composition. Pans (depressions) represent the only drainage feature on site, although the Kuruman and Gamagara Rivers occur to the north and west of the site, respectively. Vegetation units were identified and can be divided into 5 distinct vegetation units according to soil types and topography.

The vegetation communities identified on the proposed development site are classified as physiographic physiognomic units, where physiognomic refers to the outer appearance of the vegetation, and physiographic refers to the position of the plant communities in the landscape.

The physiographic-physiognomic units will be referred to as vegetation units in the following sections. These vegetation units are divided in terms of the land-use, plant species composition, topographical and soil differences that had the most definitive influence on the vegetation units.

Each unit is described in terms of its characteristics and detailed descriptions of vegetation units are included in the following section. A species list for the site is included in Appendix A in the ecological study, while a plant species list for the quarter degree grid square (QDS) is included in Appendix B in the ecological study.

Photographs of each unit is included in the Ecological Study to illustrate the grass layer, woody structure and substrate (soil, geology etc.). The following vegetation units were identified during the survey.

1. Open Acacia haematoxylon woodland on deep Aeoliansand;
2. Acacia melliferathickets;
3. Acacia mellifera – Acacia hebecladawoodland;
4. Mixed Acacia haematoxylon – Grewia flava – Acacia melliferawoodland;
   - Plains;
   - Lowdunes
5. Depression (pan) wetland type.
6. Riverine Vegetation type.

DISCUSSION

Most development has an impact on the environment. In this case the area on which the proposed development footprint will be built will be cleared, therefore directly impacting on the environment.
Most of the vegetation will be completely modified during the construction. Detailed ecological (fauna habitat & flora) surveys were conducted during March 2018 to verify the ecological sensitivity and ecological components of the site at ground level.
The development will have a medium to high impact on the vegetation and general ecology of the area, due to the sensitive habitats (dunes, pan, woodland with dense stands of protected tree species) that occur in the area, and therefore a sound EMP and mitigating measures should be considered for the proposed footprint of the East Manganese Mine. Considering the results from the field surveys, mitigation needs to be implemented to prevent any excessive negative impacts on the ecosystem, since most of the site is in a natural state. A sensitivity analyses was conducted to identify the most suitable site for the development. From this investigation and ecological survey, the following main observations were made:

- The duneveld areas has a medium to high sensitivity. These areas play an important role as habitat for fauna and flora. Strict mitigation is needed for the preservation of some sections of this natural vegetation entity. The East Manganese Mine open cast pit falls outside of these area's the plant or production area development should avoid these areas if possible;
- The pan has a high sensitivity and should be preserved as important fauna and flora habitats. A 30-meter buffer zone should be implemented although the mine development does not impact on this area.
- The river ravine area to the north west being a high sensitivity area will be severely impacted by the open cast mine pit and the natural course of the Ga-Mogara seasonal river will have to be changed and diverted around the mining area.

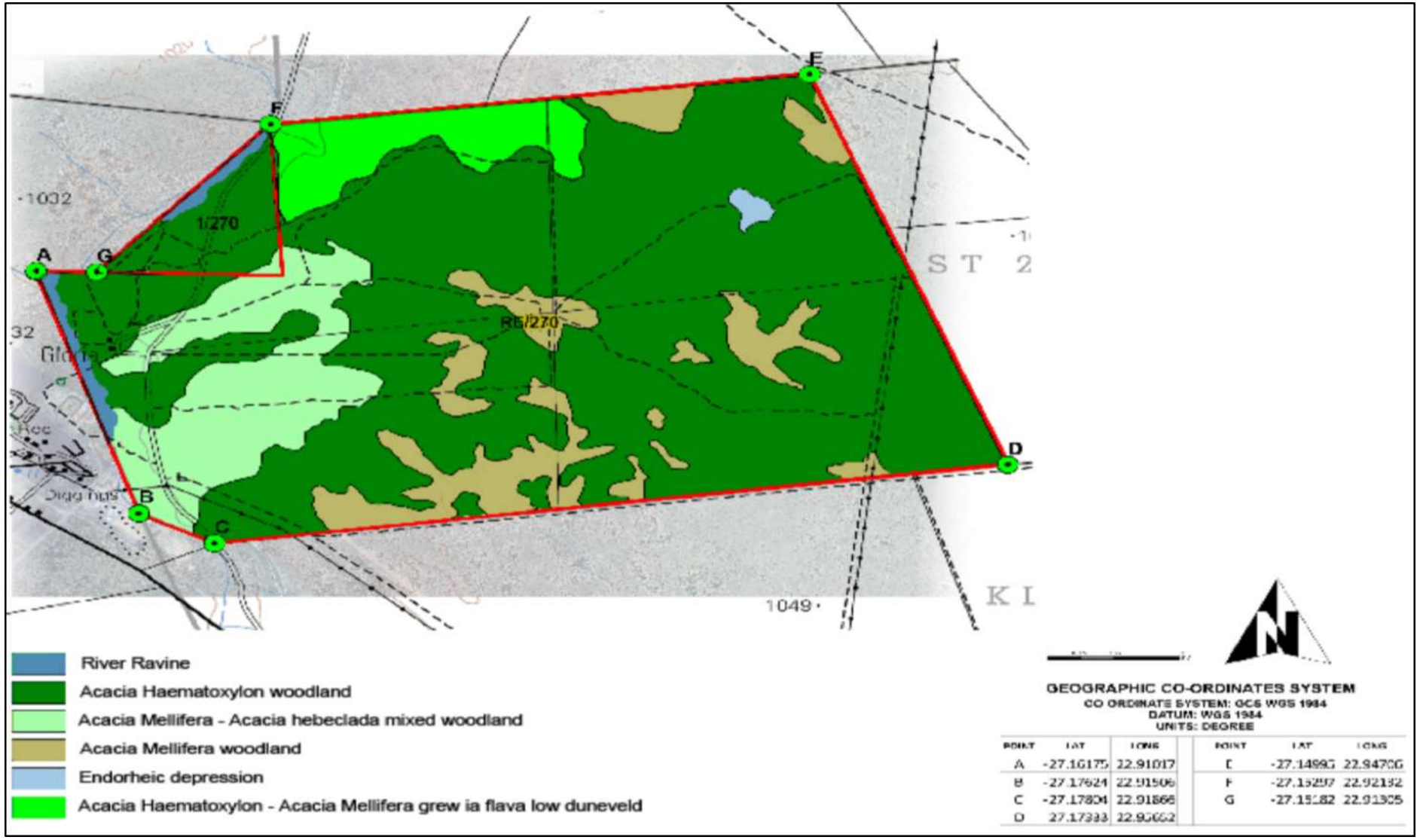

Figure 11. Vegetation Map (Map taken out of the ecological study by Dr. Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat, July **2018).**

Some potential rare fauna may also occur in the area, and specific mitigation measures need to be implemented to ensure that the impact of the development on the species' habitat will be low.
Specific mitigation relating to red data fauna includes the following:

- Disturbances in close vicinity of the development (periphery) should be limited to the smallest possible area in order to protect species habitat;
- Corridors between the development zones are also important to allow fauna to move freely between the areas of disturbance.

A number of ecological potential impacts were identified and assessed. A few of these were assessed as having potentially medium or high significance, including the following:

- Destruction or disturbance to ecosystems leading to reduction in the overall extent of a particular habitat;
- Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts (habitat fragmentation);
- Increased soil erosion;
- Destruction/permanent loss of rare, endangered, endemic and/or protected species;
- Establishment and spread of declared weeds and alien invader plants;
- Soil and water pollution due to spillages;
- Air pollution as a result of dust;
- Negative effect of human activities and road mortality.

Mitigation measures provided would reduce impacts from a high to low significance. A monitoring plan is recommended for inclusion into the EMP should the application be approved.

CONCLUSION

All aspects of the environment, especially living organisms, are vulnerable to disturbance of their habitat. If we can bring about a more integrated approach to living within our ecosystems, we are much more likely to save the fundamental structure of biodiversity. Positive contributions can be made even on a small scale within the proposed East Manganese Mine and associated infrastructure. All stakeholders need to be involved to avoid a loss of biodiversity in the area.
The proposed development area will modify the natural vegetation and faunal habitats. The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the development phase should be considered.

The proposed development should avoid the high sensitivity areas where possible such as the pan habitats and river ravine habitats but it is noted that the mining area falls within a high sensitivity area while sections of the woodland with dense stands of protected trees should be preserved if possible.
Where sensitive areas of natural vegetation cannot be avoided, a number of mitigation measures have been recommended to minimise and/or offset impacts (licence application for eradication of protected species, identification of offset areas). Negative impacts can be minimised by strict enforcement and compliance with an Environmental Management Plan which takes into account the recommendations for managing impacts detailed above.
Provided that the proposed development is consistent with limiting impact in the sensitive areas marked on the map , it is taken into account that the underlying valuable natural resource cannot be shifted and that mining has a definite impact on the environment, but the total footprint of the mine and infrastructure is less than 60 hectares and that if the EMP takes all the mitigation measures into consideration stipulated in this report, the planned development can be fully supported (Taken out of the Ecological Study by Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat, July 2018).

8. SURFACE WATER

Highlands Hydrology (Pty) Ltd has been appointed by Delta-H Water Systems Modelling (Pty) Ltd to undertake a hydrological assessment including flood-line modelling and a conceptual Storm Water Management Plan (SWMP) for the proposed East Manganese Mine situated on Portion 1 and Remainder of Farm East 270, near Hotazel in the Northern Cape. The hydrological assessment is aimed at ensuring compliance with Government Notice 704 (Government Gazette 20118 of June 1999 GN 704) to mitigate the potentially adverse impacts to surface water resources from the proposed mine.

The scope of work was achieved by undertaking the following:

- Baseline Assessment – sourcing of baseline climatic and hydrological data. This included the interrogation of rainfall data, site specific design rainfall (depth/duration/frequency), evaporation, soils, land-use, as well as a regional and local hydrological assessment;
- Flood-Line Delineation – required the modelling of both hydrological peak flows and development of a 2D hydraulic (flood) model which was used to delineate flood-lines for the 1:50 and 1:100 recurrence interval (RI) events.
- Conceptual Storm Water Management Plan (SWMP) - this was developed based on South African best practice guidance and

conceptualized through mapping and indicative design drawings; and

- A technical report detailing the achieved scope of work as Appendix 9 to the BAR EMP document.

The site is located within two quaternary catchments namely D41K (Eastern section of site) and D41L (western section of site) and is situated in the Lower Vaal Water Management Area. Drainage occurs as sheet-wash towards major rivers namely the Gamagara River west and the Kuruman River north of the site (Taken out of the Ecological study done by Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat, July 2018). (The Complete study is appended as **Appendix 4** to the BAR/EMP document)

There is no permanent surface water in the application area, the Gamagara riverbed are usually dry, except during periods of abnormally high rainfall (1974, 1988 and 2006). Water can be obtained from the Vaal- Gamagara water pipeline or from boreholes. The ground water quality is generally poor and mostly only suitable for animal use.

Discussion, Conclusions and Recommendations from the Hydrological Report.

Baseline information including rainfall, evaporation, design event rainfall, soils, vegetation and land cover, as well as site topography and regional and local catchment hydrology have been considered for the proposed East Manganese Mine.
Flood-lines were developed for the Ga-Mogara River adjacent the site utilising a Combined DEM with a 10m cell size, which was the product of the interpolated 0.5m contour data and resampled STRM30 data. The area of the site covered by the 0.5m contour data resulted in a more sensible depth of flooding, whilst the use of SRTM30 data introduced inaccuracies into the overall flood-line delineation.

A comparison of modelled flood-lines with the underlying aerial imagery illustrates this likely inaccuracy since the floodplain (which appears to coincide with pale sand alongside the river) extends beyond the modelled flood-lines in some instances (particularly near the proposed opencast pit). Modelled floodlines
can consequently only be considered indicative with the site survey data requiring a greater area of coverage if a defendable (more precise) flood model is to be produced. Regardless of flood model accuracy, the results clearly showed that the western perimeter of the site has an associated flood risk which is expected given the presence of the Ga-Morgara River and the substantial flood flows that may occur because of the large upstream catchment area. The proposed opencast pit is most at risk of flooding given its low-lying

characteristic once it becomes developed. The intersection of the surveyed river centreline by the opencast pit, presents an unequivocal flood risk to the pit (regardless of the accuracy of the flood model results) and mitigation will be required to manage this flooding. This will require a detailed engineering and geo-technical investigation into the design of either a formalised river diversion, or appropriate flood defences. Exemptions to GN 704 will also likely be necessary given the proposed location of various mining infrastructure within the 1:50 RI flood extent, 1:100 RI flood extent and the 100m river buffers.

A conceptual storm water management plan has been developed based on the requirements of GN 704 and best practice guidance. The location and sizing for the diversions/containment included in this conceptual SWMP are based upon the Combined DEM. Inaccuracies or limited detail in the Combined DEM (resulting from the incorporated SRTM30 data) could potentially cause inaccuracies in the SWMP as modelled. In developing the SWMP, areas of surface works were first identified with subsequent separation of clean and dirty water producing areas. Dirty water producing areas have been isolated by diverting upstream clean water around them via clean water diversions. Dirty water produced within dirty areas has been routed to the opencast pit for temporary storage from where it can be pumped back into the dirty process water circuit. Diversions have been sized to route/contain the 1:50 year RI storm event into the opencast pit which is being utilised as an informal PCD given its location which
allows for the routing of dirty water areas into it (via dirty diversions). It is suggested that discussions are held with the DWS regarding the proposed SWMP and the lining requirements for storm water management infrastructure, as well as the use of the opencast pit as a PCD.

In conclusion, it is recommended that East Manganese Mine do a more extensive and detailed elevation survey for the site. This would benefit the re-assessment and associated confidence in flood risk as well as any formalised design of any river diversions or flood defences which will be necessary should the opencast pit location not be reconsidered. The SWMP will also require more topographic detail once it enters the detailed design phase prior to construction, to ensure effective routing of water. In addition to this, it is recommended that the location of proposed mining infrastructure be reconsidered and placed outside of the modelled 1:100 year RI and 100m buffers, in line with the requirements of GN 704. Finally, it is also recommended that an Automatic Weather Station be installed at the site to obtain site specific climatic variables.

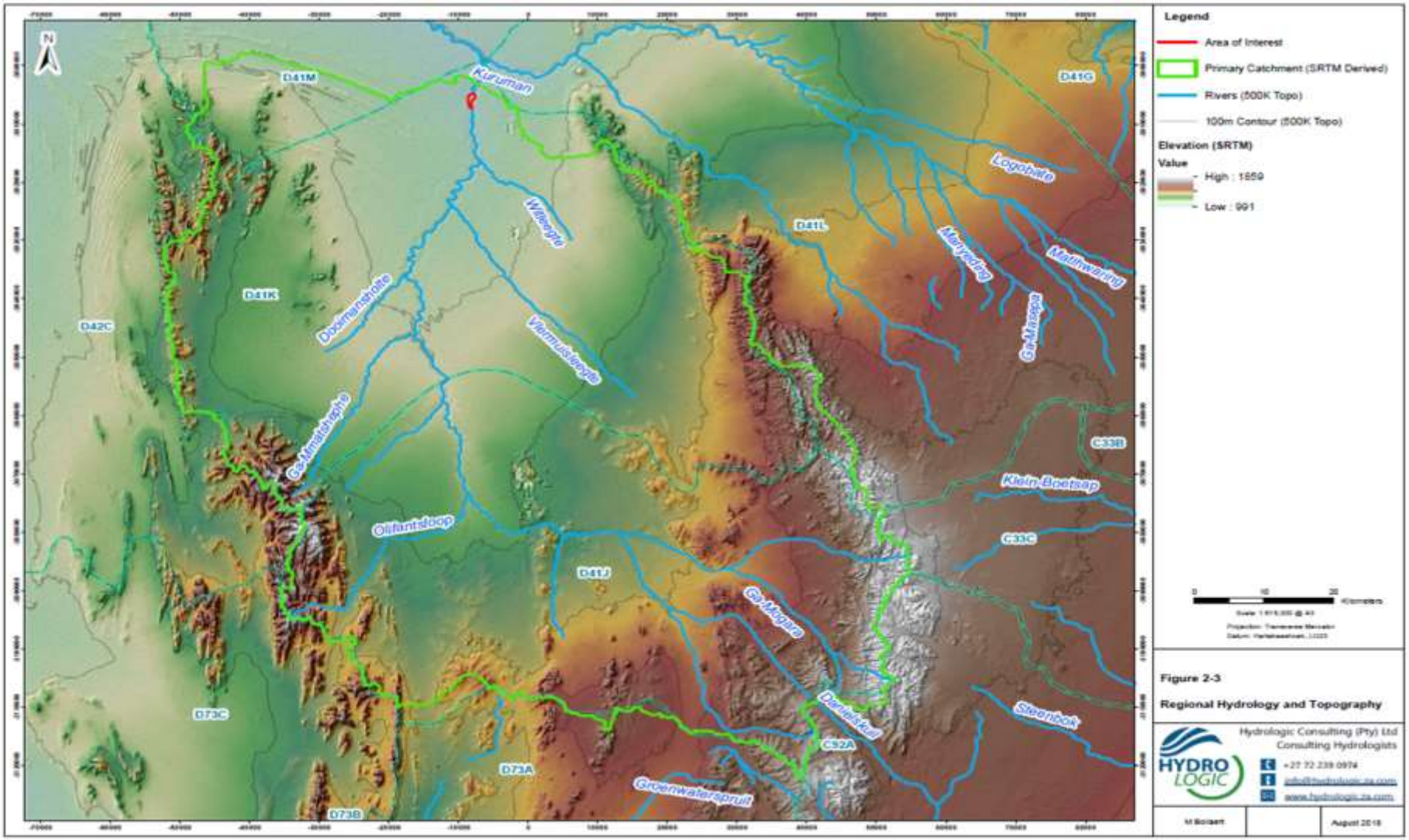

Figure 12. Regional Hydrology and Topography MAP TAKEN OUT OF THE HYDROLOGICAL ASSESSMENT OF THE PROPOSED EAST MANGANESE MINE BY HIGHLANDS HYDROLOGY (PTY) LTD, SEPTEMBER 2018

Rainfall and Evaporation

The mean monthly evaporation for Quaternary Catchment D41K is present in Table 8. The study area has a Mean Annual Precipitation (MAP) of 344 mm (Lynch, 2004). Figure 13 shows the annual precipitation for the Quaternary Catchment D41K from 1920 to 2009 (Bailey and Pitman, 2015). The study area has a semi-arid climate with a rainfall regime confined to summer months (Figure 13), with approximately 85% of the rainfall occurring between November and April.

Table 8. Mean monthly evaporation (S-pan) in mm for Quaternary catchment D41K (Bailey and Pitman, 2015)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
270	284	294	277	210	193	144	115	91	106	154	213

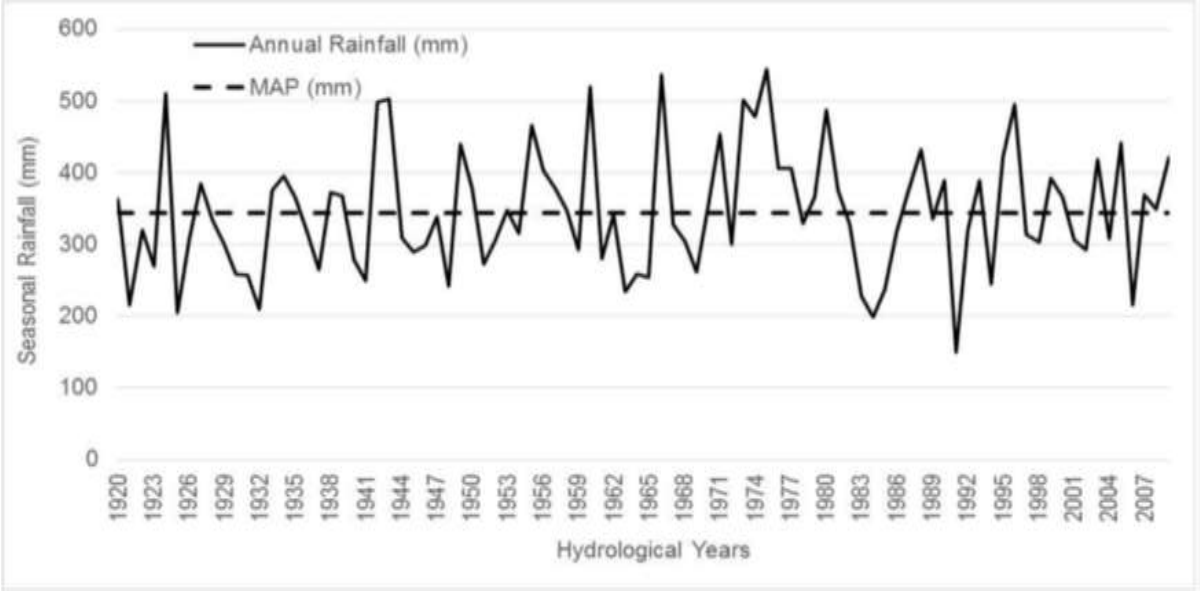

Figure 13. Annual precipitation for Quaternary Catchment D41K (1920-2009)

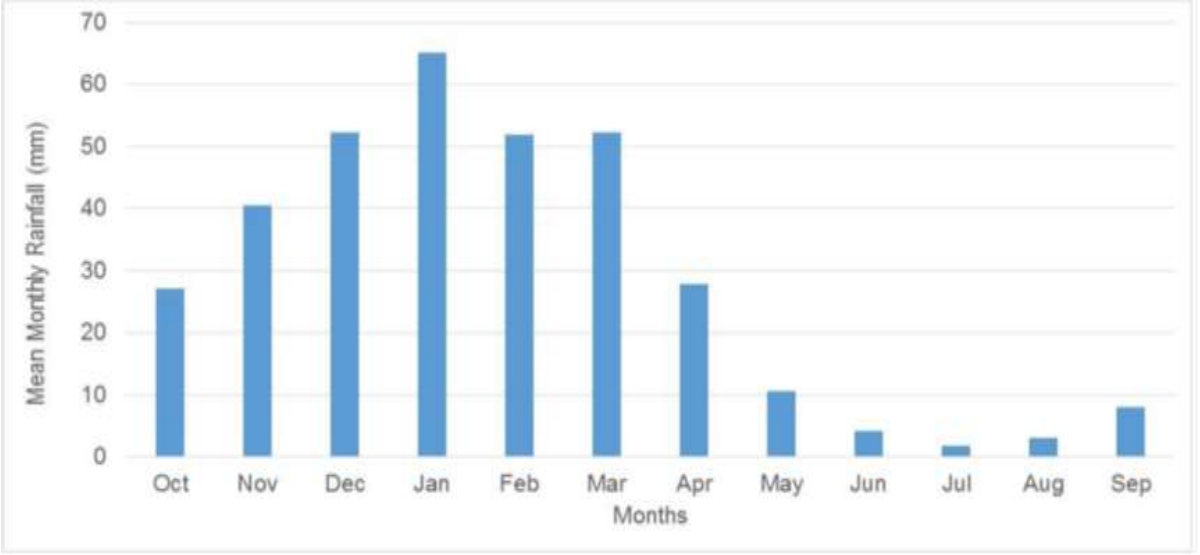

Figure 14. Mean monthly precipitation for Quaternary Catchment D41K (1920-2009)

Stormwater Intensities and Infiltration

The high permeability of the sandy soils and flat topography produces a very low stream density in the area with no clear water courses or drainage lines on the site. The high infiltration of the soil results in limited runoff. The infiltration rate of this type of soil is well in excess of 20mm.hr (Schmidt and Schulze, 1987). Table 9 contains an estimate of the 6-hour rainfall for the Hotazel site (Smithers and Schulze, 2002). A comparison of the 6-hour storm rainfall and the estimated infiltration of the deep sandy soils shows that there would be minimal runoff even at higher recurrence intervals and explains why there are no clear drainage lines on the site.

The current natural drainage of the site should be maintained. The natural vegetation is important in maintaining the soil structure and any permanent removal of the vegetation should be minimal in order to maintain soil structure. If the natural vegetation is not maintained, then the site is likely to experience erosion of the soil by stormwater in the wet season and wind erosion in the dry season.

Table 9. Design rainfall estimate for 6-hour storm

Recurrence Interval	Rainfall 6 hours storm (mm)
1:2 year	44
1:5 year	62
1:10 year	75
1:20 year	88
1:50 year	106

(9) GROUND WATER:

Delta H (Delta-H Water System Modelling PTY Ltd) has been appointed by Strata Africa Resources (Pty) Ltd to conduct a hydrogeological specialist study for a small mining operation, East Manganese, situated on Portion 1 and Remainder of Farm East 270 in the Hotazel area ((The Complete study is appended as Appendix 5 to the BAR/EMP document)

PROJECT OBJECTIVE

For the purpose of the study the following project tasks are proposed. The scope of work entails the desktop groundwater specialist study and flood-line delineation in support of the WUL application.
The main tasks for the investigation include:

- Data collation and review
    1. This phase will comprise of data collation/review and analysis to establish the baseline hydrogeological conditions in and around the proposed mining area.

2. Data i.e. hydrocensus and borehole yield/quality results will be incorporated.

- Review of geochemical characterisation and waste classification of the waste (MRD) in accordance to the NEMWA – Norms and Standards, i.e. based on available data/reports.
- Flood line (hydraulic model)
  1. The investigation of appropriate baseline climatic data to be used in hydrological calculations.
  2. The 1 in 100-year flood events will be modelled to produce their respective flood-lines for the current (baseline) scenario only.
- Reporting
  1. Groundwater Impact Assessment of the proposed mine on the groundwater environment will be based on the outcomes of the groundwater study and differentiate impacts related to:
     - a change in the groundwater quality,
     - a change in the volume of groundwater in storage or entering groundwater storage (recharge), or
     - a change in the groundwater flow regime.
- The flood study will be incorporated as a technical memo in support of the water use license.

DATA SOURCES AND DEFICIENCIES

Numerous data sources were obtained to investigate and conceptualize the groundwater conditions and to make recommendations for groundwater management. The development of the hydrogeological concepts was based on the following information and data made available to the consulting team or gathered as part of the groundwater investigation:

- Geological information based on the 1:250 000 scale geology map.
- National hydrogeological map of South Africa, 1:500 000 scale hydrogeology map.
- Digital Elevation Model (DEM) based on a 30m x 30 m grid, Advanced Spaceborn Thermal Emission and Reflection Radiometer (ASTRA) data.
- Groundwater studies conducted by other consultants within the study area

CONCLUSIONS

Delta-H conducted a desktop groundwater study for supporting document to the environmental application for East Manganese Mine. East Manganese plan to conduct mining though conventional open cast pit mining method. The overburden material and ore material will be placed on site for pick up to offsite processing.

The regional groundwater levels observed range from 3.4 m BGL to 100 m BGL, with an average water level of 32.16 m BGL, suggesting that most of the boreholes measure within the upper Kalahari formation.

The proposed residue material be disposed of on surface as part of the East Manganese Mine project include calcrete storage area, Kalahari sand storage area, top soil storage area and a clay & gravel bed storage area. The potential acid generating formation of the geological sequences, i.e. Kalahari Fm, Dwyka, Ongeluk Laval as well as the manganese ore, associated at East Manganese is expected to non-acid forming due to the limited sulphide sulphur content which is the primary source of acid. A geochemical assessment of mine materials is proposed to confirm the low estimated AMD potential.

Potential groundwater related impacts are expected to be insignificant w.r.t. the shallow weathered and fractured aquifers of the Kalahari Fm, unlikely to impact third party groundwater users.

Due to the limited footprint area and the inert nature of the material no significant impacts of the mine residues are expected. The realistically foreseeable potential impact on the ambient groundwater quality during the construction and operational phase is due to accidental hydrocarbon or other chemical spillages from the construction vehicles, including nitrate contamination associated with the use of nitrate-based explosives in mining operations. Such spillages are localised, quickly reversible if properly contained and/or excavated and unlikely to occur, while the nitrate concentrations generally return to acceptable levels within one or two years after regular blasting has ended in the specific area.

The drilling of monitoring borehole upgradient and downgradient of the proposed pit, infrastructure and plant area are recommended to monitor the concentrations and any potential seepage in addition to confirm the depth to groundwater. Approximate locations have been given but should be refined locally using intrusive investigations.

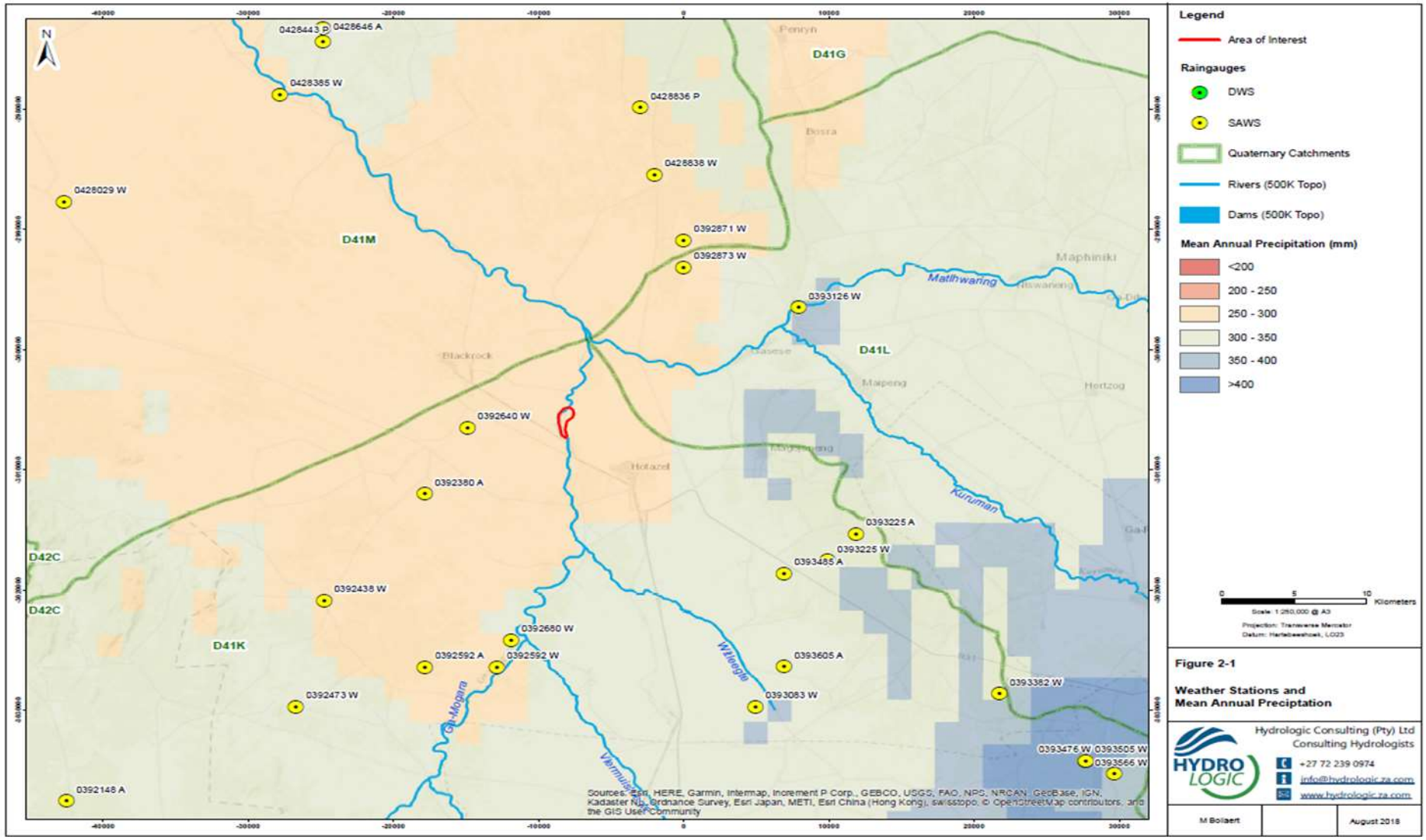

Figure 15. CATCHMENT MAP WITH MEAN ANNUAL PRECIPITATION MAP TAKEN OUT OF THE HYDROLOGICAL ASSESSMENT OF THE PROPOSED EAST MANGANESE MINE BY HIGHLANDS HYDROLOGY (PTY) LTD, SEPTEMBER 2018

10. AIR QUALITY:

Dustwatch CC was appointed by Southern Ambition 1549 (Pty) Ltd to undertake an Air Quality Impact Assessment (AQIA) for the proposed East Manganese Project.

Scope and Approach

The aim of this investigation was to determine baseline air quality conditions, delineate sensitive receptors and identify potential impacts to air quality that may arise from the project. This formed the basis for the air quality impact assessment conducted for the proposed project.

The following tasks, typical of an air quality impact assessment, were included in the scope of work:

- A review of proposed project activities in order to identify sources of emission and associated pollutants.
- A study of regulatory requirements and health thresholds for identified key pollutants against which compliance was assessed and health risks screened.
- A study of the receiving environment in the vicinity of the project; including:
  - The identification of potential air quality sensitive receptors (AQSRs);
  - A study of the atmospheric dispersion potential of the area taking into consideration local meteorology, land-use and topography; and
  - The analysis of available ambient air quality information/data to determine pre-development ambient pollutant levels and dustfall rates.
- The compilation of a comprehensive emissions inventory which included both process and fugitive emissions.
- Atmospheric dispersion modeling to simulate ambient air pollutant concentrations as a result of the project.
- A screening assessment to determine:
  - Compliance of criteria pollutants with National Ambient Air Quality Standards (NAAQSs);
  - Potential health risks as a result of exposure to non-criteria pollutants; and
  - Nuisance dustfall gauged against the National Dust Control Regulations (NDR).
- The compilation of a comprehensive air quality specialist report detailing the study approach, limitations, assumption, results and recommendations of mitigation and management of air quality impacts.

The air quality impact assessment included a study of the receiving environment and the quantification and assessment of the impact of

the proposed project on human health and the environment. The receiving environment was described in terms of local atmospheric dispersion potential, the location of potential air quality sensitive receptors (AQSRs) in relation to proposed activities as well as ambient pollutant levels and dustfall rates.

A comprehensive atmospheric emissions inventory was compiled for the operational phase of the project.

Pollutants quantified included those most commonly associated with open-cast mining i.e. particulate matter (PM) (TSP, PM10, and PM2.5), carbon monoxide (CO), oxides of nitrogen (NOx), sulfur dioxide (SO2) and volatile organic compounds (VOCs). In the quantification of operational phase impacts, the mine design mitigation as provided by SLR was utilized.

Main Findings

A quantitative air quality impact assessment was conducted for construction and operational phase activities for the East Manganese Project. Decommissioning and post-closure activities were assessed qualitatively. The assessment included an estimation of atmospheric emissions, the simulation of pollutant levels and determination of the significance of impacts.

This section summarizes the main findings of the assessment.

- **The receiving environment:**
  - The area is dominated by winds from the north, north east and east. Long-term air quality impacts are therefore expected to be the most significant to the south and south west of the project area.
  - Ambient air pollutant levels in the project area are currently affected by the following sources of emission: mining to the south west and northwest, vehicles tail-pipe emissions and open areas exposed to the wind.
  - Air Quality Sensitive Receptors (AQSRs) around the project site include single homesteads /farmsteads, towns and a mine village. The closest AQSRs include residences of the Gloria Mine village situated approximately 1.3km north of the northern project boundary and residences in the town of Hotazel which is approximately 3.9km east of the eastern project boundary. All other residences, farmsteads and towns (including Black Rock) are further than 5km from the project boundary.

- **Impact of the proposed Project:**

  - **Construction and closure phases:**

- Construction phase PM emissions (PM2.5, PM10 and TSP) were quantified and utilized in dispersion simulations. Impacts due to construction phase activities were generally low and within the respective standards. This is expected of construction activities due to the temporary nature, and the likelihood that these activities will not occur concurrently at all portions of the site. The significance rating of the construction phase is expected to be 'low'.
- Closure phase emissions were not quantified, since, as for all open-pit mining operations, most of the air pollution activities would have ceased. The significance rating of the closure phase is expected to be 'low'.

- **Operational phase:**

- Sources of emission quantified included drilling, blasting, crushing and screening, material handling, vehicles travelling on unpaved roads, windblown dust from the stockpiles, vehicle exhaust and power generation (diesel engines).
- Operational phase PM emissions (PM2.5, PM10 and TSP), including manganese (Mn), and gaseous emissions (CO, NOx, SO2 and VOC) were quantified and utilized in the dispersion simulations.
- Simulated PM10 impacts during the operational phase with mine design mitigation did result With reference to the Scheduled Processes under the Second Schedule to the Atmospheric Pollution Prevention Act, 1965 (Act No. 45 of 1965), no scheduled process relates to any proposed mining activity. in exceedances of both long-term (annual) and short-term (24-hour) ambient air quality standards off-site, but not at nearby AQSRs (Hotazel and Gloria Mine village). A significance weighting of 'medium' was assigned to potential inhalation health impacts associated with PM10. PM10 impacts reduced when recommended additional mitigation was applied. However, exceedances of both long-term (annual) and short-term (24-hour) ambient air quality standards off-site remained, but over a smaller area. The assigned significance weighting of 'medium' was sustained.
- Simulated PM2.5 impacts during the operational phase with mine design mitigation resulted in exceedances of the short-term (24-hour) ambient air quality criteria off-site, but not at nearby AQSRs (Hotazel and Gloria Mine village). For long-term (annual) impacts, offsite exceedances did not occur. A significance weighting of 'medium' was assigned to potential inhalation health impacts associated with PM2.5.

- Simulated elemental Mn impacts during the operational phase with mine design resulted in exceedances of long-term

(annual) ambient air quality screening criteria off-site and at the nearby AQSRs of Hotazel and Gloria Mine village. A significance weighting of 'medium' was assigned to potential inhalation health impacts associated with elemental Mn. Elemental Mn impacts reduced when recommended additional mitigation was applied. However, predicted exceedances of long-term (annual) ambient air quality criteria off-site remained. Exceedance of the long-term (annual) ambient air quality screening criteria was simulated to occur at Gloria Mine village, but not at Hotazel. The assigned significance weighting of 'medium' was sustained.

- Simulated CO, NO2, SO2 and VOC concentrations were low and did not result in offsite exceedances. A significance weighting of 'low' was assigned to potential inhalation health impacts associated with these pollutants.

- Simulated dust fall deposition rates were low and did not result in off-site exceedances. A significance weighting of 'low' was assigned to potential impacts associated with dust fall.

Recommendations

To ensure the lowest possible impact on AQSRs and the environment, it is recommended that the air quality management plan as set out in this report be adopted.

- The recommended management plan includes the following:
- The implementation of emission controls for the management of significant emission sources; and
- Air quality monitoring:
- The implementation of continuous dustfall monitoring as part of the project's air quality management plan. Monitoring should be undertaken throughout the life of the mine to provide air quality trends and indicate compliance with NAAQSs.
- The recommendation that East Manganese mine collaborate with other mines/industries in the region to install an ambient gravimetric PM10/PM2.5 monitor in Gloria Mine village or Hotazel. This will provide adequate data on cumulative PM10 and PM2.5 concentrations from the East Manganese Project and other mines/industries in the region.
- Finally, it is recommended that the PM10/PM2.5 samples be analysed for manganese content to determine the manganese concentrations at Gloria Mine village or Hotazel. Should exceedances of the long-term assessment criteria occur (as simulated), a health risk/toxicological assessment should be conducted to ascertain the health impact due to manganese emissions at Gloria Mine village or Hotazel.

The delineation of an air quality buffer zone is not deemed necessary, considering the “low” to “medium” significance rating assigned to pollutants impacts (All information taken out of the Air Quality Specialist Report by Dust watch, July 2018).

- Noise:

M and S Consulting (Pty) Ltd (hereinafter referred to as ‘M&S’) has been appointed by Southern Ambition 1549 (Pty) Ltd (hereinafter referred to as ‘Southern Ambition’) to conduct a baseline noise assessment over the Remaining Extent and Portion 1 of the Farm East 270, Kuruman District, Northern Cape Province (hereinafter referred to as ‘the site’). The complete study is appended as Appendix 10 to the BAR EMP.

Existing sources of noise

The following existing sources of noise were identified:

On site:

- Residential ambient noise; and
- Livestock noise.

Off site:

- Traffic noise on the R380 and farm road network in the immediate surrounding area;
- Mining related noise from the adjacent Gloria Mine (Assmang); and
- Trains passing on the railway line which is situated in close proximity to the site.

The noise levels were surveyed at the boundaries of the site to ascertain the noise fall-out levels leaving the site. The focus of the survey was on areas that stand to be affected by the activities at the site.

The baseline noise assessment was carried out in accordance with SANS 10328 (Edition 3), a South African Standard presenting the Methods for Environmental Noise Impact Assessment. This noise assessment was also conducted in accordance with the South African Standard SANS 10103 (Edition 6) which stipulates the measurement and rating of Environmental Noise with respect to annoyance and to speech communication.

SANS 10328 (Edition 3) specifies the methods to assess the noise impacts on the environment due to an activity that might impact on the environment. The standard also stipulates the minimum

requirements to be investigated for an assessment report. These minimum requirements are:

i. the purpose of the investigation;
ii. a brief description of the planned development or the changes that are being considered;
iii. a brief description of the existing environment including, where relevant, the topography, surface conditions and meteorological conditions during measurements;
iv. the identified noise sources together with their respective sound pressure levels or sound power levels (or both) and, where applicable, the operating cycles, the nature of sound emission, the spectral composition and the directional characteristics;
v. the identified noise sources that were not taken into account and the reasons as to why they were not investigated;
vi. the identified noise-sensitive developments and the noise impact on them;
vii. where applicable, any assumptions, with references, made with regard to any calculations or determination of source and propagation characteristics;
viii. an explanation, either by a brief description or by reference, of all measuring and calculation procedures that were followed, as well as any possible adjustments to existing measuring methods that had to be made, together with the results of calculations;
ix. an explanation, either by description or by reference, of all measuring or calculation methods (or both) that were used to determine existing and predicted rating levels, as well as other relevant information, including a statement of how the data were obtained and applied to determine the rating level for the area in question;
x. the location of measuring or calculating points in a sketch or on a map;
xi. quantification of the noise impact with, where relevant, reference to the literature consulted and the assumptions made;
xii. alternatives that were considered and the results of those that were investigated;

Other Acts that were used as guideline for this noise survey are:

i. The Republic of South Africa Constitution Act

The environmental rights contained in Section 24 of this Act provide that everyone is entitled to an environment that is not harmful to his or her well-being. In the context of noise, this requires a determination of what level of noise is harmful to well-being. The general approach of the common law is to define an acceptable level of noise as that which the reasonable person can be expected to

tolerate in the particular circumstances. The subjectivity of this approach can be problematic which has led to the development of noise standards.

ii. The Environmental Conservation Act

This Act allows the Minister of Environmental Affairs and Tourism to make regulations regarding noise, among other concerns.

iii. The National Environmental Management Act (NEMA)

NEMA defines pollution to include any change in the environment, including noise. A duty therefore arises under Section 28 of NEMA to take reasonable measures while establishing and operating the mine to prevent noise pollution occurring. NEMA sets out measures which may be regarded as reasonable:

- To investigate, assess and evaluate the impact on the environment.
- To inform and educate employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment.
- To cease, modify or control any act, activity or process causing the pollution or degradation.
- To contain or prevent the movement of the pollution or degradation.
- To eliminate any source of the pollution or degradation.
- To remedy the effects of the pollution or degradation.

iv. The National Environmental Management: Air Quality Act (AQA)

Section 34 of this Act makes provision for:

- The Minister to prescribe essential National noise standards:-
- for the control of noise, either in general or by specified machinery or activities or in specified places or areas; or
- for determining: -
    - a definition of noise
    - the maximum levels of noise
    - When controlling noise the Provincial and Local Spheres of Government are bound by any prescribed National Standards.

This Section of the Act is in force, but no such standards have yet been promulgated. Draft regulations have however, been promulgated for adoption by Local Authorities.

v. Noise Standards

Two South African Bureau of Standards (SABS) scientific standards are considered relevant to noise from a mining operation. They are:

- SANS 10103 (Edition 6) which stipulates the measurement and rating of Environmental Noise with respect to annoyance and to speech communication.
- SANS 10328 (Edition 3) specifies the methods to assess the noise impacts on the environment due to a proposed activity that might impact on the environment.

Figure 16. Noise monitoring points

General considerations

The strategy and methodology employed to obtain relevant data must be devised to suit the requirements of each individual application by the person undertaking the survey. This involves tasks such as selecting suitable monitoring locations, deciding on appropriate sampling sequences and selecting suitable integration intervals. It also involves careful aural monitoring, judgement and data screening to make sure the recorded data is explained and relevant. In some cases, particularly when measuring night-time levels in rural areas, it may be necessary to filter out insect noise by post-processing.

Aforementioned details cannot be prescribed and are not to be found in any standard, code of practice or textbook. It is the task and responsibility of the surveyor, who has to be equipped with the necessary acoustic competence, insight and experience.

Selection of noise monitoring locations

Criteria and practical considerations which influence the selection of suitable locations for noise monitoring include the following:

- Community concerns: In selecting locations for noise monitoring, concerns raised by interested and affected parties should be taken into account.
- Worst-case impact: Focus on areas where maximum noise impact is expected.
- Suitability for future surveys: As far as possible, select locations likely to be accessible in future surveys.
- Avoid interference: As far as practically possible, stay clear of and avoid interference by localised noise sources which may distort the data. Examples are power distribution boxes, barking dogs, speech interference by curious visitors and insects in close proximity of the microphone.
- Equipment safety: Measurement procedure, integration periods and sample size depend on the availability of facilities for safeguarding equipment. Long duration samples are only possible at locations where facilities are available to lock away recording equipment connected via a cable to a microphone positioned outdoors at a point clear of vertical reflecting surfaces and protected from the elements.

Meteorological considerations

Outdoor noise measurement is not permitted under certain weather conditions. Rain, drizzle or fog affects the conductivity of measurement microphones, resulting in faulty readings. It may also damage the microphone and measuring equipment. Secondly, although measurements often have to be performed in the presence of wind, care should be taken to verify that wind turbulence noise on the microphone capsule is negligible compared to the sound level under investigation. There is no fixed upper limit for permissible wind speed, it all depends on the level being measured. Thunder is another weather phenomenon which may cause interference and spoil measurement data.

Meteorological conditions also affect the acoustic environment and the actual sound levels without causing interference or measurement error. Normal fluctuations in atmospheric conditions may cause large variations in noise level which cannot and should not be avoided in the planning and execution of noise monitoring surveys. These variations constitute the natural variance in both background and

intrusive noise levels. Noise levels at a distance from large sources are highly dependent on meteorological patterns is one reason why 24-hour industrial operations always have much greater noise impacts at night. Another contributing factor is increased community sensitivity at night due to a natural decline in road traffic and human activity noise.
It should be noted that, for the reasons explained above, the monitoring of meteorological conditions, such as temperature, wind and humidity on the ground can at best only serve to avoid errors and distortion of measurement data. Knowledge of cloud cover, temperature, humidity and wind which prevailed during the course of a noise survey has little if any value in the post-processing and interpretation of data.

Sampling considerations

To be of any use as an environmental management tool, noise monitoring has to produce accurate and relevant data. As a minimum requirement, measurement grade instrumentation should be used and tests performed with the necessary precision and accuracy, as laid down in SANS 10103. Just as important, no matter how accurate the measurements, the data is only as good as the sample. What complicates noise sampling is that ambient noise is all but constant. As a rule, it is the net result of contributions from various constant, cyclic and randomly fluctuating sources.
To account for the intrinsic 24-hour cyclic variation, measurements should be taken within the relevant period of interest. Noise regulations require that the noise investigated must be measured (averaged) over a period of at least 10 minutes (or longer). Occasionally, in the investigation of noise complaints, a 10-minute sample may be sufficient to obtain the data needed to make a finding. However, for the purposes of predictive noise studies and monitoring surveys, much longer averaging periods are required to determine baseline or operational noise levels. Noise levels have to be averaged over periods long enough to ensure that the sample is representative of the true average.

Where this is possible, in addition to measuring the average over the day or night-time period of interest, equipment may be programmed to simultaneously determine averages in a contiguous series of short sub-intervals of say 10-minute, 30-minute or 1 hour duration, covering the main survey period. In this way, a picture can be obtained of the noise pattern over that period. For practical reasons, it is often not possible to attend measurements for the full duration of such long recordings.

In terms of the survey results the noise fall-out levels of the site are well below the allowed maximum levels. The noise impact when

mining operations commences is expected to fall within the 'High' classification in terms of the above description.

The survey conducted during the period 7 October 2018 – 12 October 2018 showed that all of the baseline ambient noise levels are below the expectations (typical levels) for the relevant district type (Rural) according to SANS 10103:2008 (Edition 6) guidelines.

11. VISUAL ASPECTS:

The Mining site is visible from the existing farm road, 3,6km long, running along Western boundary.

The mining operation will also be visible to the neighbour since it is located within a rural landscape and not shaded by vegetation. The negative visual impacts associated with the open pit cannot be reduced during mining operations (operational phase), it can only be mitigation by doing concurrent rehabilitation of the open pit when possible as mining progress.

12. Site Sensitivity & BROAD-SCALE ECOLOGICAL PROCESSES:

The vegetation of the proposed development site falls within the south-eastern range of the Griqualand West Centre of Endemism (Van Wyk & Smith 2001). A centre of plant endemism is an area with high concentrations of plant species with very restricted distributions. Centres of endemism are important because it is these areas, which if conserved, would safeguard the greatest number of plant species. They are extremely vulnerable; relatively small disturbances in a centre of endemism may easily pose a serious threat to its many range-restricted species (Van Wyk & Smith 2001). The Griqualand West Centre (GWC) is one of the 84 African centres of endemism and one of 14 centres in southern Africa, and these centres are of global conservation significance.

The endemic and near-endemic species make up 2.2% of the total flora, and are mostly from the Asclepiadaceae, Euphorbiaceae and Mesembryanthemaceae families. Some of the endemics are edaphic specialists, adapted to lime-richsubstrates.

Endemics and near endemics include Searsia tridactyla, Aloinopsis orpenii, Euphorbia planiceps, Euphorbia bergii, Lebeckia macrantha, Lithops aucampiae subsp. aucampiae and Tarchonanthusobovatus.

The GWC of endemism is extremely poorly conserved and is a national conservation priority.

Figure 17 below shows the extent of the GWC.

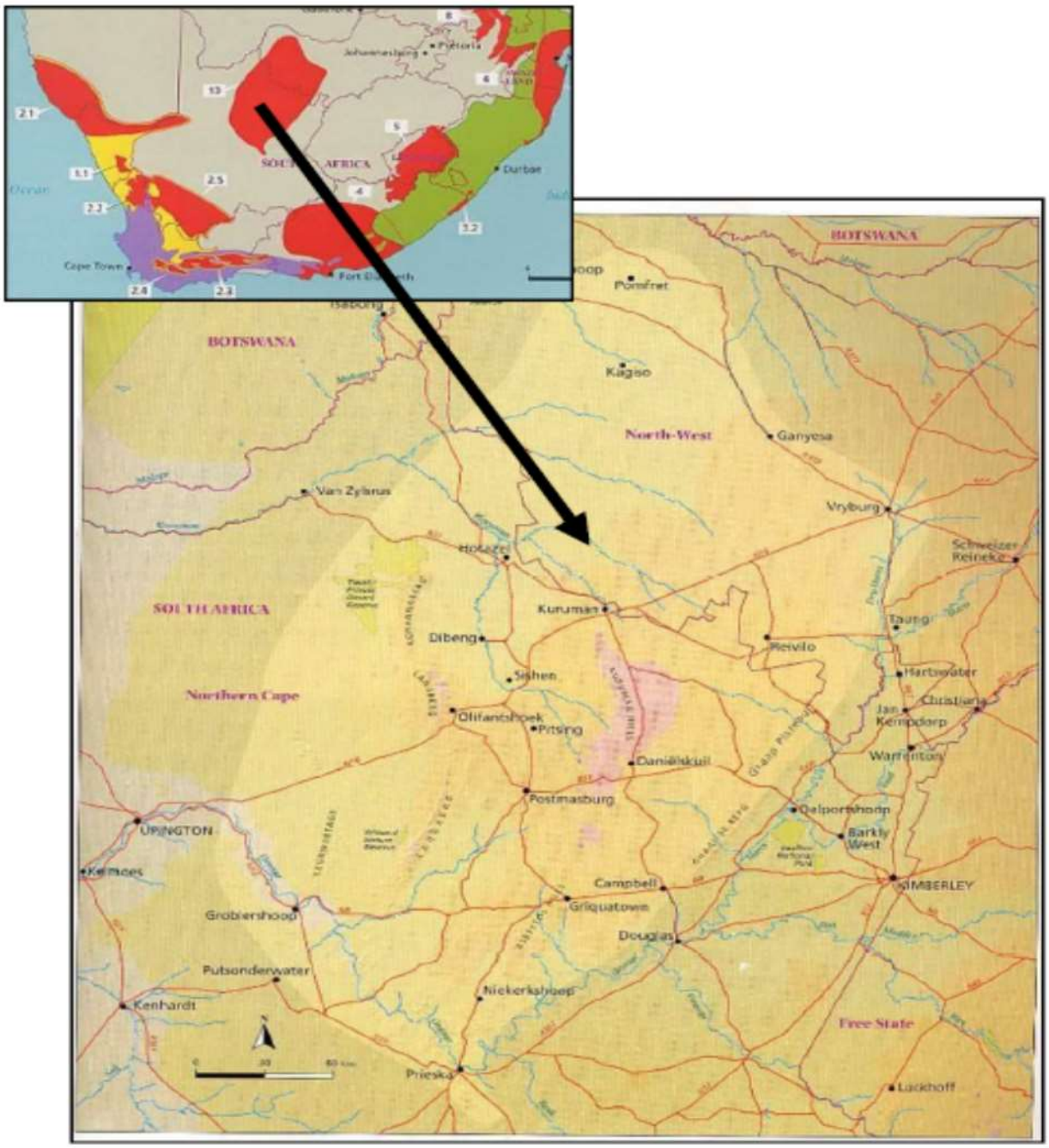

Figure 17. Map showing the extent of the Griqualand West Centre of Endemism (Light centre). It is centered on the surface outcrops of the Ghaap Group (Limestone and dolomite) and those of the Olifantshoek supergroup (Quartzite). From Van Wyk and Smith (2001). The location of the study area is presented by the arrow. (map taken out of the Ecological Study of BJ Henning, July 2018).

In addition to the biodiversity elements, the study area falls within a zone where South Africa's largest economically most important deposits of manganese and the principle deposits of iron ore are found. The manganese zone extends northwards over a distance of 150 km, from just south of Postmasburg to as far as the Wessels and black rock Mines north of Hotazel, while the most significant iron ore deposits occur in the vicinity of Postmasburg and Sishen (Figure 18).

Any invasive mining activities are therefore expected to contribute to the cumulative effect of mining in the region.

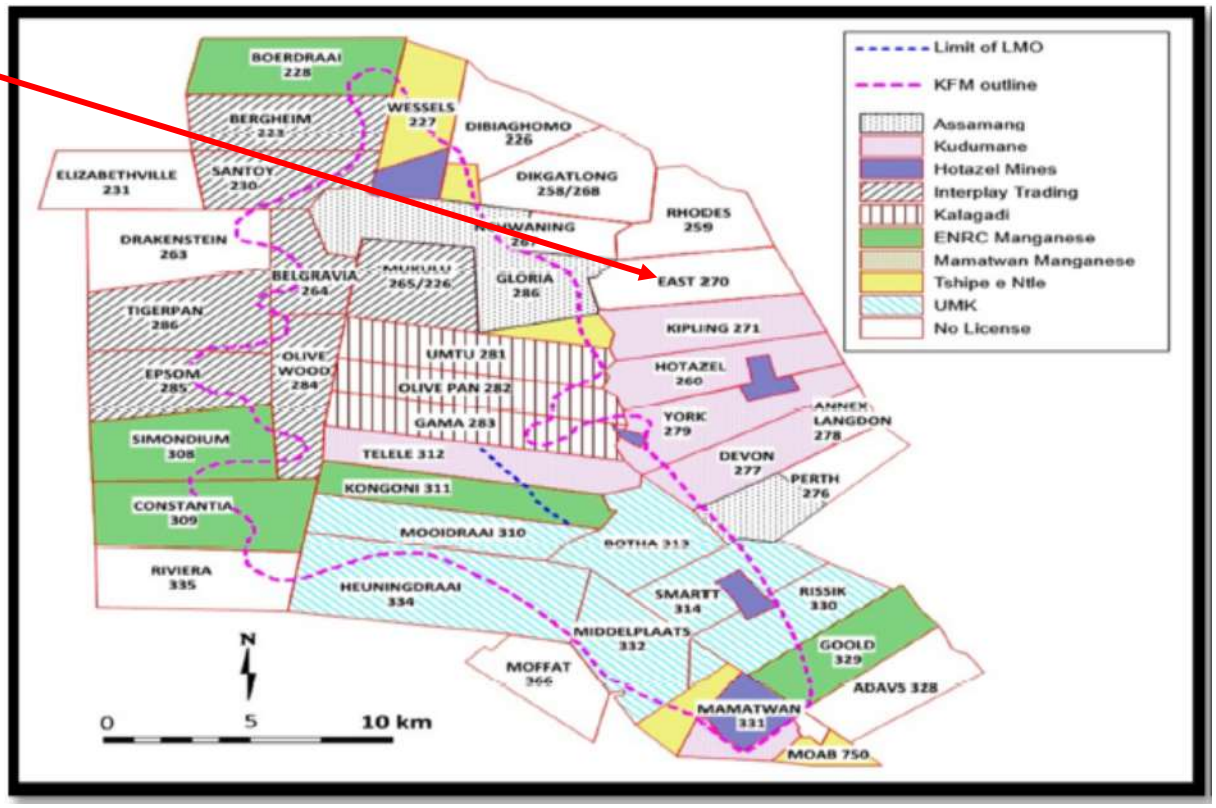

Figure 18. The distribution of mining properties in the Sishen/Postmasburg Manganese Field (Bonga 2005), with the proposed mining area indicated with an arrow. (Map taken out of the Ecological Study of BJ Henning, July 2018).

The following summarises the recommended rehabilitation process and is referenced to a more comprehensive discussion in the wetland and riparian report:

- The catchment adjacent to the Ga-Mogara River where mining will take place will also affect it and its rehabilitation is therefore also important (p21-23):
- The topography should be re-instated as close to the natural condition as possible.
- The correct backfilling of material and management of topsoil with an intact seedbank is crucial to the re-establishment of indigenous vegetation.
- Indigenous vegetation should be allowed to re-establish from the seedbank present in the topsoil.
- The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas.
- Monitor and eradicate exotic weeds and invaders where they establish.

Re-instating the topography and geomorphology of affected areas in the floodplain of the river and prevention of erosion (p24-28):

- Rehabilitation should endeavour to re-instate the current topography as far as possible.
- The natural, pre-mining environment should be documented prior to mining by means of a photographic record and surveying.

- The management of topsoil and keeping the seedbank intact is a crucial element in the rehabilitation of mined areas. Topsoil from the floodplain and terrestrial areas should be kept separate.
- Surface water flow and erosion should be stemmed by using gumpoles, eco-logs and brush piles.
- Re-instating the topography should avoid areas devoid of topsoil, tailings dumps and steps or benches as these prevent vegetation establishment.
- Erosion monitoring should be implemented continuously and where erosion occurs this should be remedied.

The establishment of indigenous vegetation should be promoted by implemented the following recommendations (p28-29):

- Mulch, obtained from vegetation removed from mining areas, should be placed in rehabilitated areas together with topsoil.
- Natural vegetation should be allowed to re-establish from the intact seedbank in the topsoil.
- The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas.
- Implement plant establishing techniques during the rainy season to increase the probability of successful establishment.
- Protect the rehabilitated areas and riparian zone from trampling and browsing by game and domestic stock.
- In order to determine and monitor the success of rehabilitation a biomonitoring programme which includes an Index of Habitat Integrity (IHI) and vegetation assessments should be conducted bi-annually.

Weed monitoring and eradication should be implemented and strictly adhered to. A comprehensive eradication and monitoring programme will have to be implemented in order to control the infestation of Prosopis glandulosa on and around the site (p29-32).

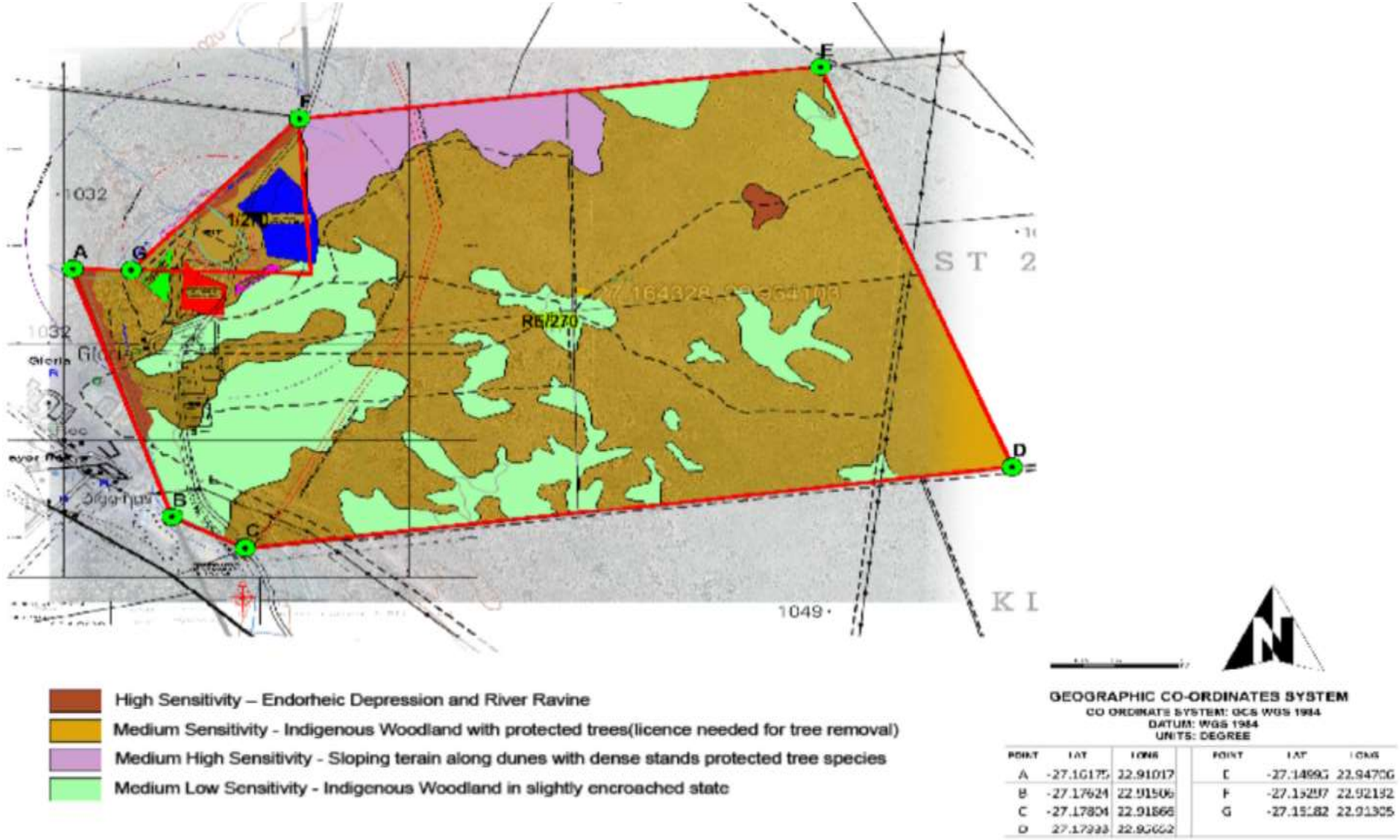

Figure 19. A sensitivity map for the proposed mining area. (Map taken out of the Ecological Study of BJ Henning, July 2018).

(13) SOCIO-ECONOMIC STRUCTURE OF THE REGION:

All information in this section is taken out of the IDP 2017 Joe Morolong Local Municipality.

DEMOGRAPHIC PROFILE OF THE MUNICIPALITY

Joe Morolong it is located in the Northern Cape Province based in the John Taolo Gaetsewe District, on the North eastern and western part of the District. The Municipality is accessible via the National infrastructure through the N14 which links North West and the Northern Cape Provinces. Joe Morolong Local Municipality was established on the 6 th December 2000 under the name of “Moshaweng” which is now called Joe Morolong named after Taolo Joseph Morolong who was born at Ditshipeng Village on July the 1st 1927. Joe Morolong Local Municipality covers 20, 172km2 area and covers one semi-urban area, villages and commercial farms Our municipality is characterized by rural establishments that are mostly connected through gravel and dirt roads There are Tribal authorities in our municipal jurisdiction with eight (8) Paramount Chiefs. Our municipality is regarded as the poorest area in the district. Our population is 89 377 as per the Census 2011 report, with 146 villages and 2 small towns and surrounding private commercial farms and government owned farms (Department of Rural Development and Department of Public Works) (number), There are 20 707 households with a population growth of -0,9%, We have 168 schools, 4 police stations, 24 clinics and 3 community health centres. Agriculture , mining and community services are our primary economic sectors The following mining houses are found within the jurisdiction of our municipality: UMK, South 32, Assmang Blackrock Mine, Tshipi-e-Ntle, Kalagadi, Kudumane Mining Resources, Baga Phadima Sand Mining, Sebilo Mine and Aqcuila mine (Sebilo and Aqcuila not yet in operation).

OVERVIEW OF THE MUNICIPALITY

Figure 20. Location of the Northern Cape

Country	South Africa
Province	Northern Cape
District	John Taolo Gaetsewe
Seat	Churchill
Wards	15
Mayor	Cllr D Leutlwetse
Type	Municipal Council
Area	20, 172 km^2
Population	89 377
Density	4,4/ km^2
Households	23 707

Source (Area, population, density and households): Census 2011

RACIAL MAKE UP

RACE	PERCENTAGE
Black African	96.4%
Coloured	2,0%
Indian/Asian	0,3%
White	1,2%

Source: Census 2011

FIRST LANGUAGES

LANGUAGE	PERCENTAGE
Setswana	90,1%
Afrikaans	3,6%
English	1,9%
Other	4,4%

Source: Census 2011

HOUSEHOLDS The total number of households in the Municipality is 23 707:

HOUSEHOLDS	NUMBER OF HOUSEHOLDS	%
Female headed	12 016	50.7%
Male headed	11 447	48,3%
Child headed	244	1,0%
TOTAL	**23 707**	**100%**

Source: Census 2011

HUMAN CAPACITY DEVELOPMENT: Education level

EDUCATION LEVEL	NUMBER
No schooling	10 204
Some primary school	11 887
Completed primary school	2 324
Some Secondary school	12 384
Grade 12	5 986
Higher education	1 823

Source: Census 2011

KEY ECONOMIC DRIVERS IN THE MUNICIPALITY Mining and Agriculture are the largest contributing factors in terms of the economy in the Municipality. Employment: Industry Sector

Sector	Number of jobs created
Agriculture related work	720
Manufacturing	144
Mining , Quarrying	471
Electricity, gas, water	116
Construction	283
Wholesale, Retail	432
Transport	122
Business services	100
Community services	1 693
Undetermined	87 171

Source: Municipal Demarcations Board

EMPLOYMENT: Employment statistics

Category					
Employed	Unemployed	Discouraged work seeker	Other not economically active	Not applicable	Total
7 828	4 912	6 200	29 569	41 022	89 530

Source: Census 2011

The Gamagara Corridor “comprises the mining belt of the John Taolo Gaetsewe and Siyanda districts and runs from Lime Acres and Danielskuil to Hotazel in the north. The corridor focuses on the mining of iron and manganese” (NCPSDF 2012: 68)

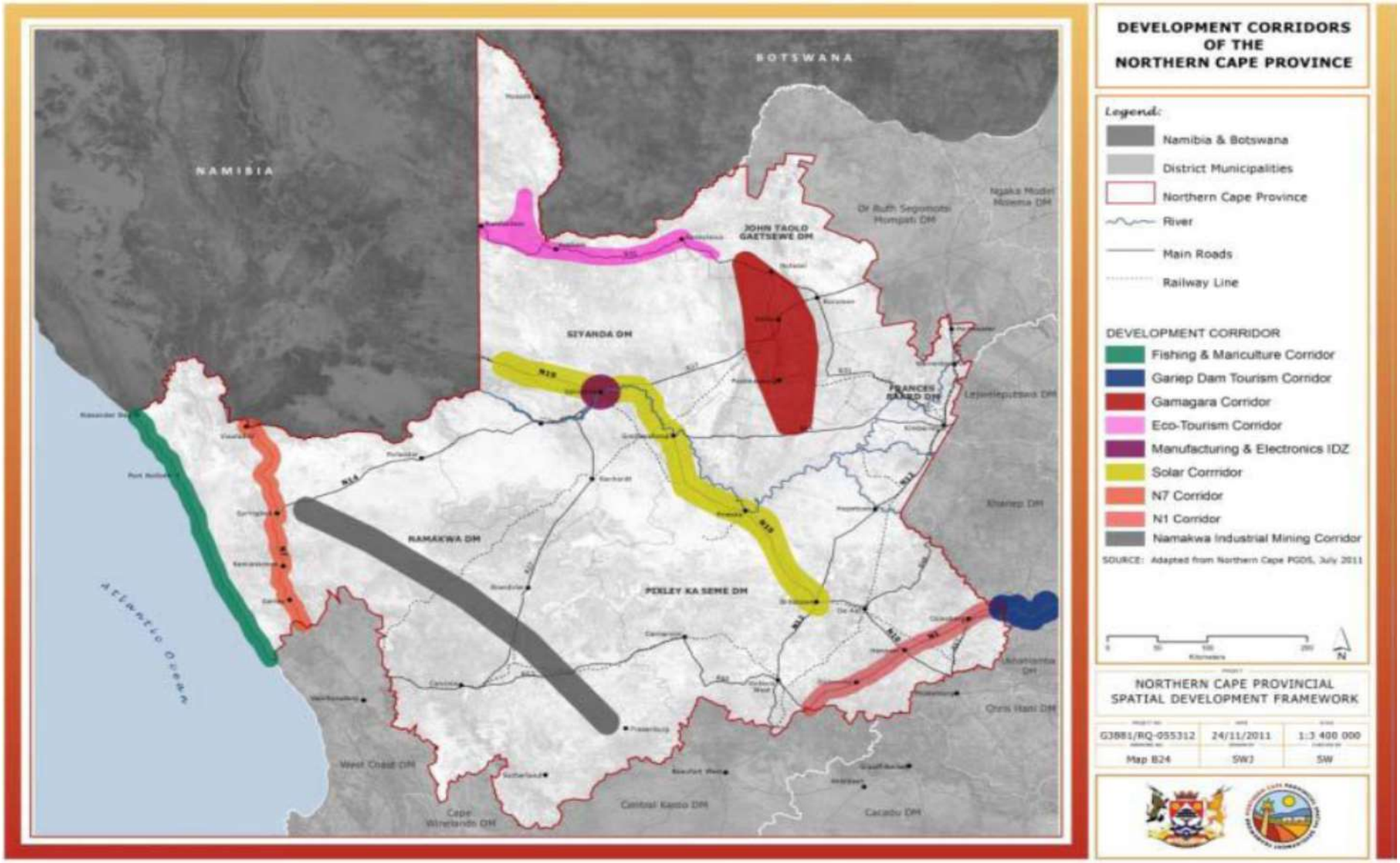

Figure 21. Map Locating the municipality (Map out of the draft IDP 2017 – 2022 Gamagara)

(15) ARCHAEOLOGICAL

African Heritage Consultants were appointed to undertake a Phase I Heritage Assessment. The brief was to survey the footprint and adjacent land in order to record all existing cultural and heritage resources and to assess potential impacts to heritage resources that might occur through the proposed development of the open cast manganese mine on the farm East 270 (Portion 1 & Re) (Figure 1). The planned development is located at 27° 9'36.90"S and 22°55'5.19"E The locality under review was visited between 8 and 10 May 2018 and inspected on foot. Visibility was good (Study is appended as **Appendix 6** to this report).

Scope and purpose of the report

The HIA report provides a general background to the project, an introduction to the southern African heritage that gives a brief outline of the chronological succession of the various phases of settlement, provides context for the heritage resources of the immediate region of Hotazel and sets out the methodologies that were applied during this particular heritage assessment. The findings of the HIA are discussed and recommendations are made for mitigation.

The desktop literature study indicated a generally low level of heritage resources around Hotazel and within the immediate landscape. Prehistoric and historical settlement and utilization of the resources of the region focussed mostly on sources of water such as the GaMogara River, springs and pans.

Traces of prehistoric occupations are mainly in the form of dispersed lithics that hint at previous living sites and subsistence activities. These include stone tools that are characteristic of all three successive periods of the southern African Stone Age.

Stone tools were found in the vicinity of the Ga-Mogara River during the field survey. These were mostly isolated specimens and scatters of stone tools. A few Large Cutting Tools that are typical of the ESA were present. However, most of the lithics comprise representative MSA examples, while a few are more characteristic of LSA tool types. The stone tools that have been located were mostly in dispersed contexts. Where there were concentrations of lithics, these occurred in low densities of <10 tools per square metre. All of the identified scatters of stone tools are of low significance and no mitigation is recommended.

Two informal cemeteries were located. Cemetery 1, demarcated with what is now a somewhat dilapidated fence, contains two graves and possibly another grave. Cemetery 2 contains around 18 graves. The graves are marked by headstones of calcrete cobbles and in two instances, banded iron stones. From consultations with the local farm workers it seemed that the graves have not been recently visited by any relatives. This is borne out by a complete lack of grave offerings.

The cemeteries are situated outside the footprint of the proposed development and will not be impacted. While there is no objection to the proposed development based on a very low level of archaeological remains, the presence of graves identified during the survey has to be addressed. It is accordingly recommended that the two cemeteries should be clearly demarcated and fenced. Graves are deemed to have high cultural significance for their social value. The graves are accordingly graded as a Grade IIIA resource.

Conclusions and recommendations

The literature study indicated a low level of heritage resources around Hotazel and within the immediate landscape. Prehistoric and historical utilization of the region focussed mostly on sources of water such as the Ga-Mogara River, springs and pans. During the current field survey traces of prehistoric utilisation and/or settlement were mainly found in the form of dispersed lithics from the ESA and MSA, and also some LSA stone tools. All the isolated specimens and scatters of stone tools with debris that have been identified are of low significance. While there is no objection to the proposed development of an open-cast mine and associated infrastructure by East Manganese on the Farm East 270 (Portion 1 & Re) from a heritage resources perspective, the presence of graves in two informal cemeteries that were identified during the survey has to be addressed.

Stone Age localities

Stone tools occurred mainly as finds of singe specimens or low density concentrations. A small MSA stone tool production area dominated by cores, primary cortical flakes and secondary flakes, blade forms and triangular flakes was recorded at 27°10’33’S; 22°55’00’E. Another concentration was located further along the ridge. This is in proximity with the point where the existing access road enters the farm. In this locality the immediate area has been significantly disturbed during previous road building and calcrete borrowing.

It is recommended that the new road diversion be done on the northern side of the existing road cutting to mitigate possible impacts in this area. Please refer to the map where the heritage localities are indicated for the details.

Cemetery 1 at 27°09’52’S; 22°54’53’E

A set of two, and possibly more, graves are located in a small cemetery in close proximity to the existing worker house. The cemetery of approximately 10 m across is enclosed by the remains of a crude fence.

According to the proposed mine layout the locality falls outside the impact area. As such, these graves will not be affected by the

proposed development. Graves are deemed to have high cultural significance for their social value. The cemetery with graves is accordingly graded as a Grade IIIA resource. It is recommended that the cemetery should be clearly demarcated and fenced.

Cemetery 2 at 27°10'07'S; 22°55'03'E

From consultations with the local farm workers it seemed that the graves in Cemetery 2 have not been visited during the recent past by any relatives. This is borne out by a complete lack of grave offerings. According to the proposed mine layout Cemetery 2 with around 18 graves falls outside the impact area. As such, these graves will not be affected by the proposed development. Graves are deemed to have high cultural significance for their social value. The cemetery with graves is accordingly graded
as a Grade IIIA resource. It is recommended that the cemetery should be clearly demarcated and fenced.

Possible finds emanating from the development

In the event that any sub-surface heritage resources or graves are unearthed all work has to be stopped until an assessment as to the significance of the site (or material) in question has been made by a heritage practitioner. Note that no archaeological material that has been uncovered may be removed. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply. If human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process (Taken out of the HIA report by African Heritage Consultants CC, June 2018).

Palaeontological

African Heritage Consultants CC has facilitated the appointment of Dr H. Fourie, a palaeontologist, to undertake a Paleontological Impact Assessment (PIA), Phase 1: Field Study of the suitability of the Proposed East Manganese mining near Hotazel on the Farm Portion 1 and Remaining Extent of East 270 in the Gamagara Local Municipalities, in the John Taolo Gaetsewe District Municipality, Northern Cape Province.

This report aims to provide comment and recommendations on the potential impacts that the proposed development could have on the fossil heritage of the area and to state if any mitigation or conservation measures are necessary.

Summary of findings: The Palaeontological Impact Assessment: Phase 1: Field Study was undertaken towards the end of July 2018 in the winter in mild and dry conditions (Appendix 6 of Act, 1(d)), and the following is reported:
The development is taking place on the Kalahari Group (Qs) with underlying Griqualand West Basin rocks, Transvaal Supergroup of Vaalian age.
The Kalahari deposits extend in age down to at least the Late and probably the Early Tertiary (65 million years ago). Fossils are scarce, and are of terrestrial plants and animals with close affinity to living forms. Included in the Kalahari Group are the Quaternary alluvium, terrace gravels, surface limestone, silcrete, and aeolian sand.
Four major types of sands have been delineated (Kent 1980).
The alluvium sands were deposited by a river system and reworked by wind action (Snyman 1996). A thick cover of Kalahari reddish sand blankets most outcrops and is dominated by the typical Kalahari thornveld (Norman and Whitfield 2006). The Kalahari Group is underlain by the Uitenhage and Zululand Groups (McCarthy and Rubidge 2005).
The Griqualand West Basin, Transvaal Supergroup consists mainly of sediments of chemical origin together with lavas and subordinate clastic sediments. The basal unit, the Vryburg Formation lies unconformably on the granite and rocks of the Ventersdorp Supergroup. It is followed by the Campbell Group which consists of the Schmidtsdrif Formation and the upper Ghaap Plateau Formation. There are also two formations in the Griquatown Group, namely, the Asbestos Hills and Koegas Formations. The Gamagara Formation follows and is located on the Maremane Anticline, it is overlain by the Makganyene Formation. The Cox Group consists of the lower Ongeluk Formation and the upper Voëlwater Formation. It attains a maximum thickness of 4500 m (Kent 1980, Snyman 1996).
Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, the palaeontological sensitivity can generally be LOW to VERY HIGH, and here locally HIGH for the Kalahari Group and MODERATE for the Griqualand West rocks (SG 2.2 SAHRA APMHOB, 2012) (Groenewald and Groenewald 2014).

Recommendation:
The impact of the development on fossil heritage is HIGH and MODERATE and therefore a field survey or further mitigation or conservation measures were necessary for this development (according to SAHRA protocol). A Phase 1 Palaeontological Impact Assessment was done. Fossils were not found during the walk through.

(b) Description of the current land uses

(1) Land Use before Mining:

The current land-use of the proposed development site is grazing by livestock and game. Neighbouring farms are being used for livestock grazing and game farming, with mining further away from the site. The major land use of the study area as classified by the Environmental Potential Atlas of South Africa (2000) is vacant / unspecified land.

(2) Evidence of Disturbance: -

Manganese ore, within the area (Kalahari Manganese Field) was discovered during the 1960's. Ore production was from open pits on the farms Blackrock, Hotazel, Langdon Annex and Mamatwan. Ore from underground workings became operational at Wessels by Samancor and at Nchwaning and Gloria by Assmang.
These two companies were originally in possession of the mineral rights, over most of the properties within the Kalahari Manganese Bain.
The rights on the farm East 270, bounding the Main Basin toward the east, were also held by Samancor. Gloria mine is located toward the west and Nchwaning toward the northwest, as neighbouring properties to East.

National Manganese Mines (Langdon-Annex) was the third company getting involved with the production of manganese within the area, during the early years.

(3) Existing Structures: -

a) Infrastructure at the site includes a residence, with associated buildings, Eskom power line, windmills and other associated agricultural infrastructure.
b) The Dry Gamagara riverbed.
c) A structure for cattle, the cattle kraal and drinking troves.
d) The ESKOM line that transects the property to the West corner which is under servitude on the property of September 1978 (31m wide).

(c) Description of specific environmental features and infrastructure on the site

The infrastructure on site is comprehensively discussed in section d(ii) as part of the mining methodology discussion, as well as in section g as part of the mine footprint description. Furthermore, a comprehensive description of the environment was presented in section g (iv) (A) as part of the baseline report.

(d) Environmental and current land use map

(Show all environmental, and current land use features)

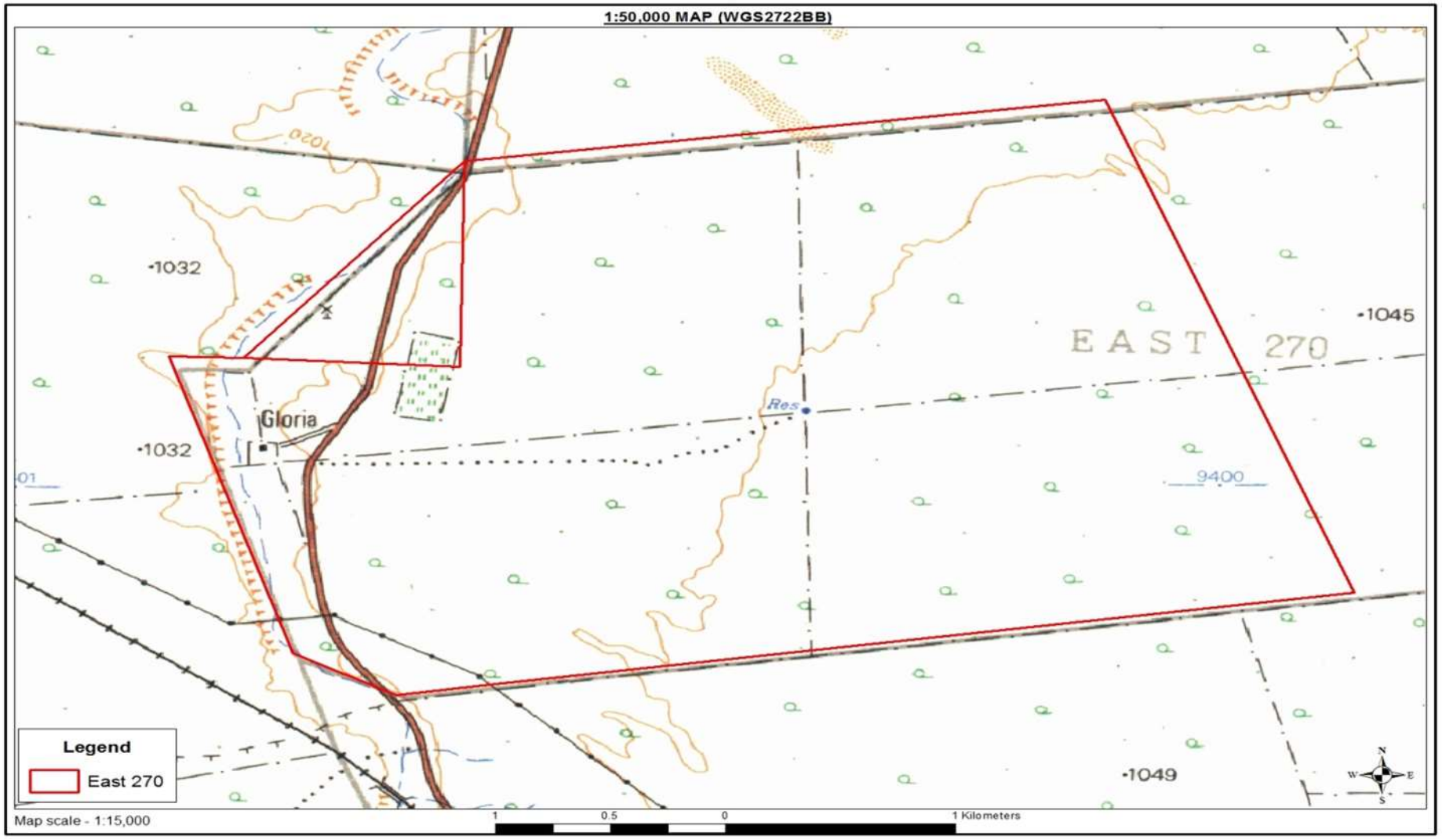

Figure 22. *Environmental and current land use map*

v) 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)

Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
PHYSICAL						
Geology and Mineral Resource	Sterilisation of mineral resources	Very low	Highly unlikely	Operational and Decommissioning	insignificant Local	Ensure that optimal use is made of the available mineral resource.
Topography	Changes to surface topography Development of infrastructure; and residue deposits.	Medium	High	Construction and Operational	Low Local	• Mining of all manganese ore continuously, if possible and does not influence mining and safety requirements. • Employ effective rehabilitation strategies to restore surface topography of the Open Pit excavations, dumps and plant site. • Stabilise the mine residue deposits. • All temporary infrastructures should be demolished during closure.
Soils	Soil Erosion Infrastructure; Open Pit Excavations.	High	Certain	Decommissioning	Low Regional	• When possible, topsoil stripping and Open Pit excavation activities should be scheduled for the low rainfall season(winter); • The project should be divided into as many phases as possible, to ensure that the

						exposed areas prone to erosion are minimal at any specific time; • Cover disturbed soils as completely as possible, using vegetation or other materials; • Control the flow of runoff to move the water safely off the site without destructive gully formation; • Trap the sediment before releasing the run-off water offsite; • Sediment control devices need to be installed to capture mobilised sediment. The following sediment control devices are suggested: o Sediment filters: use materials such as fine mesh or geofabric to filter run-off prior to discharge; o Sediment traps: temporary sedimentation basins; o Drop inlet filters: e.g. hay bales and silt fences, which prevent sediment entry into the drainage system; • Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. Control dust on construction

						sites and access roads using water-sprayers; • Stormwater and run-off systems: install temporary drains and minimize concentrated water flows. Control storm-water velocity where necessary with temporary energy dissipater structures. Divert run-off around trench excavations or disturbed areas. • Institute a storm water management plan including strategies such as: o Minimising impervious area; o Increasing infiltration to soil by use of recharge areas; o Use of natural vegetated swales instead of pipes; or o Installing detention or retention facilities with graduated outlet control structures. • Hard Armor such as riprap (large angular rocks), gabions or interlocking concrete blocks can cover the sides and bottom of drainage channels to withstands the cutting force of flowing water. The soil is first covered with a geotextile filter cloth to

						prevent mixing of the soil into the rock or stone; o Do not allow surface water or storm water to concentrate or to flow down cut/fill slopes or along power line route without erosion protection measures in place; o Line overflow and scour channels at their points of discharge to prevent soil erosion and point of discharge must be where there is dense natural grass cover; o Ensure channels do not discharge straight down contours. These must be aligned at such an angle to contours that they have the least possible gradient; o Temporary water diversion measures are to be designed and protected so that no undue scouring of riverbanks occurs. • Have both temporary (during construction) and permanent erosion control plans: o Temporary control plans should include: • Brush-packing of exposed areas to prevent overgrazing and subsequent erosion;

						• Silt fencing; • Temporary silt trap basins; • Short term seeding or mulching of exposed soil areas (particularly on slopes); • Limitations on access for heavy machinery and the storage of materials to avoid soil compaction; o Permanent erosion control plans should focus on the establishment of stable native vegetation communities. • Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work areas; • Repair all erosion damage as soon as possible and not later than six months before the termination of the Maintenance Period to allow for sufficient rehabilitation growth; • Gravel roads must be well drained in order to limit soil erosion; • Re-establishment of plant cover on disturbed areas must

						take place as soon as possible, once activities in the area have ceased. • Ground exposure should be minimised in terms of the surface area and duration, wherever possible. • Run-off from exposed ground should be controlled with flow retarding barriers. • All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses. • Stockpiled soil material is to be stored and bermed on the higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate. • Audits must be carried out at regular intervals to identify areas where erosion is occurring. • Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management

						infrastructure is effective in controlling erosion.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Loss of soil fertility During the removal of topsoil; stockpiling.	Low-Medium	Possible	Residual	Low-medium Local	• Topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions. • Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired. • Topsoil stockpiles must be kept separate from sub-soils. • The topsoil should be replaced as soon as possible onto the cleared areas, thereby allowing for the re-growth of the seed bank contained within the topsoil.
	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Soil pollution Spillage of hazardous material; runoff.	Medium	Medium	Construction and Operational	Low Local	• Water falling on areas polluted with oil/diesel or other hazardous substances must be contained. Any excess or waste material or chemicals should be removed from site and discarded in an environmentally friendly way.

						The ECO should enforce this rule rigorously. • Chemicals to be stored on an impervious surface protected from rainfall and storm water run-off. • Spill kits should be on-hand to deal with spills immediately; • Spillages or leakages must be treated according to an applicable procedure as determined by a plan of action for the specific type of disturbance; • All construction vehicles should be inspected for oil and fuel leaks regularly and frequently. Vehicle maintenance will not be done on site except in emergency situations in which case mobile drip trays will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier. • Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. • All facilities where dangerous materials are stored must be contained in a bund wall.

						• Vehicles and machinery should be regularly serviced and maintained.
Land Capability	Loss of land capability through topsoil removal, disturbances and loss of fertility.	Very Low	Possible	Short term	Minimal Local	Employ appropriate rehabilitation strategies to restore land capability.
Land use	Loss of land use due to poor placement of surface infrastructure and ineffective rehabilitation	Very low	Possible	Short term	Minimal Local	Carefully plan the placement of infrastructure and employ rehabilitation strategies to restore land capability.
Ground Water Quantity	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation
	Hydrocarbon Spills Hydrocarbon spills from construction vehicles and fuel storage areas may contaminate the groundwater resource locally	Medium	Possible	Construction	Low Local	Staff at Workshop areas, yellow metal laydown zones and fuel storage areas should be sufficiently trained in hydrocarbon spill response. Each area where hydrocarbons are stored or likely to spill should be equipped with sufficient spill response kits and personnel, contaminated soil should be disposed of correctly at a suitable location.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management / mitigation

Surface Water	• Ground works and stripping of vegetation resulting in a changed land profile. • Runoff from stockpiled soil and vegetation may contain high levels of silt.	Medium to Low	Possible	Construction	Low Local	Water Quality deterioration: change in water quality is caused by a change in natural conditions and/or an enhancement of pollution from sources. Dirty storm water trenches should be inspected regularly (once before the rainy season and after each occurrence of a storm) to clean the trench from excess soil particles to prevent overtopping of the channel wall during a sudden storm which will result in mixing of the dirty and clean water systems. Mitigation measures (or safety precautions) that are taken in order to eliminate any risk the project area could have on the natural, cultural and social environment of the concerned area and that must be implemented during the different phases i.e. construction, operational and post closure to minimize the impacts are as follows: • Proper clean and dirty water separation techniques must be used to ensure
	• Spillages that may occur on access	High	Possible	Operational	Low to Moderate Local	

	and haul roads may impact negatively on surface water quality. This issue is dealt with in the EMP. • A high potential of soil erosion exists due to an increased percentage of bare surfaces.					uncontaminated water returning to the environment. ***a) to construct a pollution control dam as part of their storm water management plan;*** ***b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.*** • Non mining waste i.e. grease, lubricants, paints, flammable liquids, garbage, historical machinery and other combustible materials generated during activities should be placed and stored in a controlled manner in a proper designed area. • The topography of rehabilitation disturbed areas must be rehabilitated in such a manner that the rehabilitated area blends in naturally with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation. The vegetation associated with the wetlands has a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is
	• Possible leaching of polluted soil through infiltration and runoff resulting in surface water pollution. • Removal of vegetation could lead to erosion and sediment transportation. • Significant dust levels will emanate from the use of heavy construction vehicles.	Moderate to High	Possible	Closure	Low Local	

						recommended, especially considering it to form part of an important catchment. The potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if possible, in terms of the mining operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface; • All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Indigenous Flora	**Loss of and disturbance to indigenous vegetation** Construction of roads, plant site, as well as other necessary infrastructure; placement of stockpiles; and the clearing of vegetation for mining, materials storage and topsoil	Low to medium	Certain	Life of Operation	Low to Medium Local	• Minimise the footprint of transformation. • Encourage proper rehabilitation of areas. • Encourage the growth of natural plant species. • Ensure measures for the adherence to the speed limit.

	stockpiles; vehicular movement.					
	Loss of flora with conservation concern Removal of listed or protected plant species; during Construction of new roads and other necessary infrastructure, the placement of stockpiles; and clearing of vegetation for Open Pit excavations.	Low to medium	Possible	Life of Operation	Low to Medium Local	• Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining. • It is recommended that these plants are identified and marked prior to mining • These plants should, where possible, be incorporated into the design layout and left in situ. • However, if threatened of destruction by mining, these plants should be removed (with the relevant permits from DAFF and DENC) and relocated if possible. • A management plan should be implemented to ensure proper establishment of ex situ individuals and should include a monitoring programme for at least two years after re-establishment in order to ensure successful translocation. • The appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance and must ensure that all contractors and

						workers undergo Environmental induction prior to commencing with work on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. • All those working on site must be educated about the conservation importance of the fauna and flora occurring on site.
	Proliferation of alien vegetation Clearing of vegetation; mining activities	Medium-High	Possible	Residual	Medium High Regional	• Minimise the footprint of transformation. • Encourage proper rehabilitation of mined areas. • Encourage the growth of natural plant species. • Mechanical methods (hand pulling) of control to be implemented extensively. • Annual follow-up operations to be implemented.
	Encouragement of bush encroachment Clearing of vegetation; disturbance through mining activities.	Low-Medium	Possible	Residual	Low-medium Local	• Minimise the footprint of transformation. • Encourage proper rehabilitation of mined areas. • Encourage the growth of natural plant species. • Mechanical methods (hand pulling) of control to be implemented extensively.

						• Annual follow-up operations to be implemented.
Fauna	**Loss, damage and fragmentation of natural habitats** Clearance of vegetation; mining activities	Medium-High	Certain	Decommissioning	Medium-high site	• Mining activities must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type. • Those pristine areas surrounding the earmarked area that are not part of the demarcated area should be considered as a no-go zone for employees, machinery or even visitors
	Disturbance, displacement and killing of fauna Vegetation clearing; increase in noise; human and vehicular movement on site resulting from mining activities.	Low-Medium	Possible	Decommissioning	Low -Medium site	• Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall mining footprint. • The appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior

						to commencing with work on site. • All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. • All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. • The environmental induction should occur in the appropriate languages for the workers who may require translation. • Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. • If any mortalities resulting from mining occur, it should be recorded with the date of the observation, the species affected and any other relevant information.

						• Employ measures that ensure adherence to the speed limit.
Air Quality	Sources of atmospheric emission associated with the mining operation are likely to include fugitive dust from materials handling operations, wind erosion of stockpiles, and vehicle entrainment of road dust.	Low	Certain	Life of Mine	Low Local	Effective soil management; identification of the required control efficiencies in order to maintain dust generation within acceptable levels. The implementation of continuous dustfall monitoring as part of the project's air quality management plan. Monitoring should be undertaken throughout the life of the mine to provide air quality trends and indicate compliance with NAAQSs. The recommendation that East Manganese mine collaborate with other mines/industries in the region to install an ambient gravimetric PM10/PM2.5 monitor in Gloria Mine village or Hotazel. This will provide adequate data on cumulative PM10 and PM2.5 concentrations from the East Manganese Project and other mines/industries in the region. Finally, it is recommended that the PM10/PM2.5 samples be analysed for manganese content to determine the manganese concentrations at Gloria Mine village or Hotazel. Should exceedances of the long-term assessment criteria occur (as

						simulated), a health risk/toxicological assessment should be conducted to ascertain the health impact due to manganese emissions at Gloria Mine village or Hotazel.
SOCIAL SURROUNDINGS						
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Noise Impacts	Clearing of footprint areas, stripping of stockpiling of topsoil Noise increase at the boundary of the mine footprint	High	Definite	Permanent	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Construction of Roads	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Building activities Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels
	Hauling of building material to and from the specific areas.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Hauling of material should be limited to daytime only.

						Noise survey to be carried out to monitor the noise levels during these activities.
	Construction of the soil stockpile and material stock pile. Noise increase at the boundary of the mine footprint.	Medium	Possible	Pre- Construction and Construction	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Clearing of new open cast mining areas, stripping and stockpiling of topsoil. Noise increase at the boundary of the mine footprint.	Medium	Possible	Operational	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Topsoil stripping should be limited to daytime only.
	Diesel emergency generators Noise increase at the boundary of the mine footprint.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Additional traffic to and from the mine	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels

						Noise survey to be carried out to monitor the noise levels during these activities.
	Maintenance activities at the site.	Medium	Possible	Operational to closure	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Noise survey to be carried out to monitor the noise levels during these activities.
	Back fill of mine footprint area	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Backfill of mine footprint area activities should be limited to daytime only.
	Planting of grass and vegetation at the rehabilitated areas	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Planting of grass and/or vegetation should be limited to daytime only
	Removal of infra-structure	Medium	Possible	Decommissioning	Low Local	Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels Removal of infrastructure should be limited to daytime only.

						Noise survey to be carried out to monitor the noise levels during these activities.
Visual impacts	Potential visual impact	Low Site	Certain	Construction, Operation and Decommissioning	Low Local Site	The design of the proposed mining development will determine the visual impact. As the visual impact would be low, Correct design will ensure that the development will fit into the surrounding area and will become a feature of the area.
	Potential Visual Impact on the surrounding land users/ residents	Medium Regional	Highly Likely	Construction, Operation and Decommissioning	Medium Local Site	The design of the proposed mining development will determine the visual impact.
	Potential visual impact of the proposed development on the construction phase of the surrounding land users in close proximity	Medium Regional	Highly Likely	Construction	Low Local Site	Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact. • Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way; • Reduce and control construction dust emitting activities through the use of approved dust suppression techniques; and
	Potential visual impact of the proposed development on the operational phase of the surrounding land users in close proximity.	Medium Regional	Highly likely	Operational	Medium Local Site	Wetting of exposed areas should be undertaken as required to prevent dust pollution having a negative visual impact. • Ensure that all infrastructure and the site and general

						surroundings are maintained in a neat and appealing way; • Rehabilitation of disturbed areas and re-establishment of vegetation;
Traffic	Potential negative impacts on traffic safety and deterioration of the existing road networks.	Low	Low likelihood	Decommissioning	Low Local	Utilise existing access roads, where applicable; implement measures that ensure adherence to traffic rules.
Environmental Factor	Nature of Impact	Significance	Probability	Duration	Consequence Extent	Management
Socio-Economic	**Population Impacts** Employment Opportunities and skills Inequities	Medium Positive	Probable	Start-up and Construction	Medium Positive Local	• Training of potential future employees, contract workers and/or community members should focus on mining related skills which would furthermore equip trainees/beneficiaries with the necessary portable skills to find employment at the available employment sectors within the study area. Multi-skilling is thus not necessarily the preferred training and skills development method. • Training courses should be accredited and certificates obtained should be acceptable by other related industries.
	Safety and Security Risks	Low Negative	Highly Probable	Construction	Low Negative Local	• A Fire/Emergency Management Plan should be

						developed and implemented at the outset of the construction phase. • Open fires for cooking and related purposes should not be allowed on site. • Appropriate firefighting equipment should be on site and construction workers should be appropriately trained for fire fighting • The construction area should be fenced or access to the area should be controlled to avoid animals or people entering the area without authorisation. • The construction sites should be clearly marked and "danger" and "no entry" signs should be erected. • Speed limits on the local roads surrounding the construction sites should be enforced. • Speeding of construction vehicles must be strictly monitored • Local procurement and job creation should receive preference.
	Health Impacts	Low Negative	Highly probable	Construction	Low Negative Local	• Maximise the employment of locals where possible

						• First aid supplies should be available at various points at the construction site • Continue and extend the current HIV/AIDS awareness and support programmes, with specific focus on those in and nearby the construction site • The general health of construction workers should be monitored on an on-going basis
Interested and Affected Parties	Loss of trust and a good standing relationship between the IAP's and the mining company.	Low to medium	Possible	Construction, Operational and Decommissioning	Low Local	Ensure continuous and transparent communication with IAP's

vi) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks

(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision)

Methodology used in determining and ranking the nature, severity, consequences, extent, duration and probability of potential environmental impacts and risks

The Different environmental components on which the project (can) have an impact are:

1. **Geology**
2. **Topography**
3. **Soil**
4. **Land Capability**
5. **Land Use**
6. **Flora (Vegetation)**
7. **Fauna**
8. **Surface Water**
9. **Ground Water**
10. **Air Quality**
11. **Noise**
12. **Archaeological and Cultural Sites**
13. **Sensitive Landscapes**
14. **Visual Aspects**
15. **Socio-Economic Structures**
16. **Interested and Affected Parties**

Impact Assessment

Before the impact assessment could be done the different project Activities/infrastructure components were identified.

1	**Processing Plant** The overview of the mining method will be an open cast mining whereby the ore will be excavated with excavators, sand removed, the ore loaded onto articulated dumps trucks from the open pit and hauled to the crushing and screening plant. Production drilling the mine will utilizes a standard hole diameter which will be 165 mm and the hole depth about 20 m allowing for the 15m bench height and 0.5m for sub drilling in ore. Loading of waste and ore respectively will use the excavators; ADTs, Front End Loaders and TLBs. Waste material of manganese will be loaded separately on the articulated dump trucks and hauled to their destination. Hauling of manganese by the modular crusher and screening plant where ore will be dumped on the crushing floor for processing through the plant or hauled to the sub-grade stockpile area, which ore will be utilized in the future mine plan for blending purpose. And the waste will be hauled on the permanent waste rock dumps and also to the mined-out areas for backfilling purposes.
2	**Ablution Facilities:** In terms of sewage the decision was made to use existing facilities (4 Rondawels) which has been fitted with closed septic tanks and can be serviced regularly by the service provider.
3	**Clean & Dirty water system:** It is anticipated that the operation will establish stormwater control berms and trenches to separate clean and dirty water on the mine site. ***a) to construct a pollution control dam as part of their storm water management plan;*** ***b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.***
4	**Fuel Storage facility (Concrete Bund walls and Diesel tanks):** It is anticipated that the operation will utilize 2 x 23 000 litre diesel tanks. These tanks must be placed in bund walls, with a capacity of 1.5 times the volume of the diesel tanks. A concrete floor must be established where the re-fuelling will take place.
5	**Mining Area (EAST):** Mining for manganese ore.
6	**Salvage yard (Storage and laydown area).**
7	**Product Stockpile area.**
8	**Waste disposal site** The operation will establish a dedicated, fenced waste disposal site with a concrete floor and bund wall. The following types of waste will be disposed of in this area: ○ Small amounts of low-level hazardous waste in suitable receptacles; ○ Domestic waste;

	○ Industrial waste.
9	**Roads (both access and haulage road on the mine site):** Although it is recommended that the operation utilize existing roads as far as possible, it is anticipated that the mining operation will create an additional 2 - 4 km of roads, with a width of 6 meters.
10	**Temporary Workshop Facilities and Wash bay.**
11	**Water distribution Pipeline.**
12	**Water tank:** It is anticipated that the operation will establish 1 x 10 000 litre water tanks with purifiers for potable water.

The criteria used to assess the significance of the impacts are shown in the table 10 below/overleaf. The limits were defined in relation to mining characteristics. Those for probability, intensity/severity and significance are subjective, based on rule-of-thumb and experience. Natural and existing mitigation measures were considered. These natural mitigation measures were defined as natural conditions, conditions inherent in the project design and existing management measures, which alleviate impacts. The significance of the impacts was calculated by using the following formula:

(Severity + Extent + Duration) x Probability weighting

For the impact assessment, the different project activities and associated infrastructure were identified and considered in order to identify and analyse the various possible impacts.

Table 10. Significance of impacts is defined as follows.

SIGNIFICANCE				
Colour Code	**Significance rating**	**Rating**	**Negative Impact**	**Positive Impact**
	Very low	3 -16	Acceptable/Not serious	Marginally Positive
	Low	17 - 22	Acceptable/Not serious	Marginally Positive
	Medium-Low	23 -33	Acceptable/Not desirable	Moderately Positive
	Medium	34 - 48	Generally undesirable	Beneficial
	Medium-High	49 - 56	Generally unacceptable	Important
	High	57 - 70	Not Acceptable	Important
	Very High	90 - 102	Totally unacceptable	Critically Important

Significance of impacts is defined as follows:

Very Low -Impact would be negligible. Almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple.

Low -Impact would have little real effect. Mitigation and/or remedial activity would be either easily achieved or little would be required or both.

Medium Low- Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and fairly easily possible.

Medium - Impact would be real but not substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be feasible and possible.

Medium High- Impact would be real but could be substantial within the bounds of those which could occur. Mitigation and/or remedial activity would be both feasible and possible but may be difficult and or costly.

High - Impacts of substantial order. Mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these.

Before any assessment can made the following evaluation, criteria need to be described.

Table 11. Explanation of PROBABILITY of impact occurrence

Weight	Probability of Impact Occurrence	Explanation of Probability
1	Improbable	<20% sure of particular fact or likelihood of impact occurring
2	Low Probability Possible	20 – 39% sure of particular fact or likelihood of impact occurring
3	Probable /Likely	40 – 65% sure of particular fact or likelihood of impact occurring
4	Highly Probable /Likely	66 – 85% sure of particular fact or likelihood of impact occurring
5	Definite	86% - 100% sure of particular fact or likelihood of impact occurring

Table 12. Explanation of EXTENT of impact

Weight	Extent of Impact	Explanation of Extent
1	Footprint	Direct and Indirect impacts limited to the activity, such as footprint occurring within the total site area of impact only.
2	Surrounding Area **Site**	Direct and Indirect impacts affecting environmental elements **within 2 km of site**
3	Local Municipality **Local**	Direct and Indirect impacts affecting environmental elements within the **Joe Morolong Municipal area**
4	Regional/District **Regional**	Direct and Indirect impacts affecting environmental elements within District **(John Taolo Gaetsewe District)**
5	**Provincial**	Direct and Indirect impacts affecting environmental elements in the **Northern Cape Province**

Table 13. Explanation of DURATION of impact

Weight	Duration of Impact	Explanation of Duration
1	Temporary (Very Short)	Less than 1 year
2	Short term	1 to 5 years
3	Medium term	6 to 15 years
4	Long term (Life of project)	16 to 50 years
5	Very Long term	Longer than 50 years
6	Permanent	Permanent

Table 14. Explanation of SEVERITY of the impact

Weight	Impact Severity	Explanation of Severity
1	No Impact	There will be no impact at all – not even a very low impact on the system or any of its parts.
2	Very Low	Impact would be negligible. In the cast of negative impacts, almost no mitigation and/or remedial activity would be needed, and any minor steps which might be needed would be easy, cheap and simple. In the case of positive impacts alternative means would almost all likely to be better, if one or a number of ways, then this means of achieving the benefit.
3	Low	Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and/or remedial activity would be either easily achieved or little would be required or both. In the case of positive impacts alternative means for achieving this benefit would be easier, cheaper, more effective, less time-consuming, or some combination of these.
4	Moderately Severe	Impact would be real but not substantial within the bounds of those which could occur. In the case of negative impacts, mitigation and/or remedial activity would be both feasible and fairly easily possible. In the case of positive impacts other means other means of covering these benefits would be about equal in cost and effort.
5	High Severance	Impacts of substantial order. In the case of negative impacts, mitigation and/or remedial activity would be feasible but difficult, expensive, time consuming or some combination of these. In the case of positive impacts other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
6	Very High Severity	Of the highest order possible within the bounds of impacts which could occur, in the case of negative impacts, there would be no possible mitigation and/or remedial activity to offset the impact at the spatial or time scale for which was predicted. In the case of positive impacts there is no real alternative to achieving the benefit.

vii) The positive and negative impacts that the proposed 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)

During the operational stages of the mining operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. The infrastructure and Open Pit excavations /dumps will alter the topography by adding features to the landscape. Removal of manganese will

unearth the current topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and making Open Pit excavations, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the improper placement of infrastructure. Most of the site has a land capability for grazing, with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be affected, if any oil and fuel spillages occur during these scenarios and activities, then groundwater will be directly contaminated. Similarly, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. If no, or inadequate ablution facilities are available then workers might feel the need to use the veld for this purpose, which can contaminate natural resources.

Mining activities on site will reduce the natural habitat for ecological systems to continue their operation. While general clearing of the area and mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

During the operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The operation will typically have low to moderate levels of noise, along with man-influenced sounds such as traffic on the secondary road and very occasional air traffic. The proposed operation will add a certain amount of noise to the existing noise in the area.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be moderate. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users.

The activities on site have the potential to impact upon heritage resources. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage resources, although the literature study indicated a low level of heritage resources around Hotazel and within the immediate landscape. Prehistoric and historical utilization of the region focussed mostly on sources of water such as the Ga-Mogara River, springs and pans. During the current field survey traces of prehistoric utilisation and/or settlement were mainly found in the form of dispersed lithics from the ESA and MSA, and also some LSA stone tools. All the isolated specimens and scatters of stone tools with debris that have been identified, are of low significance. While there is no objection to the proposed development of an open-cast mine and associated infrastructure by East Manganese on the Farm East 270 (Portion 1 & Re) from a heritage resources perspective, the presence of graves in two informal cemeteries that were identified during the survey has to be addressed.

The impact of the development on fossil heritage is HIGH and MODERATE and therefore a field survey or further mitigation or conservation measures were necessary for this development (according to SAHRA protocol). A Phase 1 Palaeontological Impact Assessment was done. Fossils were not found during the walk through.

The operation will create a number of new employment opportunities and uplift the local community. The magnitude of this impact will depend on the number of people that will be employed and the number of contractors sourced. An influx of people into the area could possibly impact on safety and security of local residents. During the decommissioning and at closure of the site, staff will most likely be retrenched, resulting in people being unable to find new employment for a long period of time.It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the site, and that the economy will not decline to its original level prior to the development of this project. This is because the operation will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

viii) The possible mitigation measures that could be applied and the level of risk

Geology and mineral resource

Level of risk: Very low

Mitigation measures

- Ensure that optimal use is made of the available mineral resource through proper planning.
- The mining of manganese ore should be well planned, and all infrastructure positions should be selected with the main aim of avoiding sterilization of future resources.
- No dumping of materials prior to approval by mine manager.

Topography

Level of risk: Low

Mitigation measures

- Mining of manganese ore continuously if possible, otherwise when they become available;
- Employ effective rehabilitation strategies to restore surface topography of and controlled backfilling at Open Pit excavations if possible and plant site;
- Stabilise the mine residue deposit;
- All temporary infrastructures should be demolished during closure.

Soil erosion

Level of risk: High with mitigation measures Low

Mitigation measures

- When possible, topsoil stripping and Open Pit excavation activities should be scheduled for the low rainfall season(winter);
- The project should be divided into as many phases as possible, to ensure that the exposed areas prone to erosion are minimal at any specific time;
- Cover disturbed soils as completely as possible, using vegetation or other materials;
- Control the flow of runoff to move the water safely off the site without destructive gully formation;
- Trap the sediment before releasing the run-off water offsite;
- Sediment control devices need to be installed to capture mobilised sediment. The following sediment control devices are suggested:
  - Sediment filters: use materials such as fine mesh or geofabric to filter run-off prior to discharge;
  - Sediment traps: temporary sedimentation basins;
  - Drop inlet filters: e.g. hay bales and silt fences, which prevent sediment entry into the drainage system;
- Minimize the amount of land disturbance and develop and implement stringent erosion and dust control practices. Control dust on construction sites and access roads using water-sprayers;
- Storm-water and run-off systems: install temporary drains and minimize concentrated water flows. Control storm-water velocity where necessary with

temporary energy dissipater structures. Divert run-off around trench excavations or disturbed areas.

- Institute a storm water management plan including strategies such as:
  - Minimising impervious area;
  - Increasing infiltration to soil by use of recharge areas;
  - Use of natural vegetated swales instead of pipes; or
  - Installing detention or retention facilities with graduated outlet control structures.
- Hard Armor such as riprap (large angular rocks), gabions or interlocking concrete blocks can cover the sides and bottom of drainage channels to withstands the cutting force of flowing water. The soil is first covered with a geotextile filter cloth to prevent mixing of the soil into the rock or stone;
- Do not allow surface water or storm water to concentrate or to flow down cut/fill slopes or along power line route without erosion protection measures in place;
  - Line overflow and scour channels at their points of discharge to prevent soil erosion and point of discharge must be where there is dense natural grass cover;
  - Ensure channels do not discharge straight down contours. These must be aligned at such an angle to contours that they have the least possible gradient;
  - Temporary water diversion measures are to be designed and protected so that no undue scouring of riverbanks occurs.
- Have both temporary (during construction) and permanent erosion control plans:
  - Temporary control plans should include:
    - Brush-packing of exposed areas to prevent overgrazing and subsequent erosion;
    - Silt fencing;
    - Temporary silt trap basins;
    - Short term seeding or mulching of exposed soil areas (particularly on slopes);
    - Limitations on access for heavy machinery and the storage of materials to avoid soil compaction;
  - Permanent erosion control plans should focus on the establishment of stable native vegetation communities.
    - Protect all areas susceptible to erosion and ensure that there is no undue soil erosion resultant from activities within and adjacent to the construction camp and Work areas;
    - Repair all erosion damage as soon as possible and not later than six months before the termination of the Maintenance Period to allow for sufficient rehabilitation growth;
    - Gravel roads must be well drained in order to limit soil erosion;

- At no point may plant cover be removed within the no-development zones;
- All attempts must be made to avoid exposure of dispersive soils;
- Re-establishment of plant cover on disturbed areas must take place as soon as possible, once activities in the area have ceased;
- Ground exposure should be minimised in terms of the surface area and duration, wherever possible;

- The mining operation must co-ordinate different activities in order to optimise the utilisation of the mining of manganese ore and thereby prevent repeated and unnecessary dumping;
- The soil that is stockpiled during construction should be stock piled in layers and protected by berms to prevent erosion;
- All stockpiles must be kept as small as possible, with gentle slopes (18 degrees) in order to avoid excessive erosional induced losses;
- Stockpiled soil material are to be stored and bermed on the higher lying areas of the footprint area and not in any storm water run-off channels or any other areas where it is likely to cause erosion, or where water would naturally accumulate;
- Stockpiles susceptible to wind erosion are to be covered during windy periods;
- Audits must be carried out at regular intervals to identify areas where erosion is occurring;
- Appropriate remedial action, including the rehabilitation of eroded areas, must occur;
- Dust suppression should take place;
- Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion;
- Topsoil stockpiles must be kept as small as possible in order to prevent compaction and the formation of anaerobic conditions;
- Topsoil must be stockpiled for the shortest possible timeframes in order to ensure that the quality of the topsoil is not impaired;
- Topsoil stockpiles must be kept separate from sub-soils;
- The topsoil should be replaced as soon as possible on to the backfilled areas, thereby allowing for the re-growth of the seed bank contained within the topsoil;
- Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution;
- Spill kits to clean up accidental spills from earthmoving machinery must be well marked and available on site;
- Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures;
- All facilities where dangerous materials are stored must be contained in a bund wall;
- Vehicles and machinery should be regularly serviced and maintained.

Soil pollution

Level of risk: Low

Mitigation measures

- Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.
- Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site.
- Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures.

- All facilities where dangerous materials are stored must be contained in a bund wall.
- Vehicles and machinery should be regularly serviced and maintained.

Land capability and land use

Level of risk: Low

Mitigation measures

- Ensure that optimal use is made of the available land through consultation with landowner and proper planning of mining activities.
- Employ effective rehabilitation strategies to restore land capability and land use potential of the site.
- All activities to be restricted within the demarcated areas.

Ground water

Level of risk: Low

Mitigation measures

- Training and awareness
  - Make all employees aware of water conservation/water demand management, water pollution avoidance and minimization measures reporting procedure and registry of incidents.
  - Train all employees to reduce water consumption.
  - Make one (1) individual person at a management level responsible for the management of the overall mine water balance. Train employees in the managing of water balance, water pollution and water conservation within their sectors.
  - Train all employees in the implementation of standard operating procedures (SOP's) (e.g. hydrocarbon management, sewerage plant management, monitoring and record keeping).
- Minimise and manage the loss in water resource
- Allow for a safe working environment

Surface water

Level of risk: Low - Medium

Mitigation measures

- Water falling on areas polluted with oil/diesel or other hazardous substances must be contained. Any excess or waste material or chemicals should be removed from site and discarded in an environmentally friendly way. The ECO should enforce this rule rigorously.
- Chemicals to be stored on an impervious surface protected from rainfall and storm water run-off.
- Spill kits should be on-hand to deal with spills immediately;
- Spillages or leakages must be treated according to an applicable procedure as determined by a plan of action for the specific type of disturbance;
- All construction vehicles should be inspected for oil and fuel leaks regularly and frequently. Vehicle maintenance will not be done on site except in emergency situations in which case mobile drip trays will be used to capture any spills. Drip trays should be emptied into a holding tank and returned to the supplier.

- Sufficient care must be taken when handling hazardous materials to prevent pollution.
- If servicing and washing of the vehicles occur on site, there must be specific areas constructed for these activities, which must have concrete foundations, bunding as well as oil traps to contain any spillages.
- A walled concrete platform, dedicated store with adequate flooring or bermed area and ventilation must be used to accommodate chemicals such as fuels, oils, paints, herbicide and insecticides.
- Oil residue shall be treated with oil absorbent and this material removed to an approved waste site.
- Spill kits must be easily accessible, and workers must undergo induction regarding the use thereof.
- At all times care should be taken not to contaminate surface water resources.
- Provide bins for staff at appropriate locations, particularly where food is consumed.
- The mining site should be cleaned daily and litter removed.
- Conduct ongoing staff awareness programmes in order to reinforce the need to avoid littering, which can contribute to surface water pollution.
- Only environmentally friendly materials must be used during the construction phase to minimize pollution of surface water runoff and/or underground water resources.
- Proper clean and dirty water separation techniques must be used to ensure uncontaminated water returning to the environment.
  a) to construct a pollution control dam as part of their storm water management plan;
  b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.
- Non mining waste i.e. grease, lubricants, paints, flammable liquids, garbage, historical machinery and other combustible materials generated during activities should be placed and stored in a controlled manner in a proper designed area.
- The topography of rehabilitation disturbed areas must be rehabilitated in such a manner that the rehabilitated area blends in naturally with the surrounding natural area. This will reduce soil erosion and improve natural re-vegetation.
- The vegetation associated with the wetlands has a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if possible, in terms of the mining operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface;
- All construction and maintenance activities should be conducted in such a way that
  minimal damage is caused to the drainage features onsite.

Indigenous flora

Level of risk: Low to medium

Mitigation measures

- Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining;
- It is recommended that these plants are identified and marked prior to mining.
- These plants should where possible, be incorporated into the design layout and left in situ.
- However, if threatened of destruction by mining these plants should be removed (with the relevant permits from DAFF and DENC) and relocated if possible.
- All those working on site must be educated about the conservation importance of the fauna and flora occurring on site.
- Minimise the footprint of transformation
- Encourage proper rehabilitation of mined areas
- Encourage the growth of natural plant species (diverse selection of natural plant species).
- Mechanical methods (hand-pulling) of control to be implemented extensively.
- Annual follow-up operations to be implemented.
- Ensure measures for the adherence to speed limit.
- Maintenance of firebreaks;
- No trees felled for firewood;

Alien invasive plants

Level of risk: Low to medium

Mitigation measures

- Minimise the footprint of transformation.
- Encourage proper rehabilitation of mined areas.
- Encourage the growth of natural plant species.
- Mechanical methods (hand-pulling) of control to be implemented extensively.
- Annual follow-up operations to be implemented.

Fauna

Level of risk: Medium

Mitigation measures

- Mining activities must be planned, where possible in order to encourage (faunal dispersal) and should minimise dissection or fragmentation of any important faunal habitat type.
- The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance).
- Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site.
- All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition.
- All those working on site must be educated about the conservation importance of the fauna and flora occurring on site.

- The environmental induction should occur in the appropriate languages for the workers who may require translation.
- Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert.
- Employ measures that ensure adherence to the speed limit.
- Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall mining footprint.
- The Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining;
- Snares & traps removed and destroyed; and
- Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction process;
- No animals may be poached during the construction of the mine. Many animals are protected by law and poaching, or other interference could result in a fine or jail term;
- Do not feed any wild animals onsite;
- Waste bins and foodstuffs should be made scavenger proof;
- Roads in the area should be designed without pavements to allow for the movement of small mammals;
- Monitoring of the environmental aspects should be done over the longer term to ensure that impacts are limited to a minimum during the construction and operational phases. Monitoring of specific species is necessary to ensure that these species would be unaffected over the longer term by the development. Information on red data species should be provided to construction workers to make them more aware of these faunas and their behaviour.

Habitat

Level of risk: Medium - High

Mitigation measures

- mining activities must be planned, where possible in order to encourage faunal dispersal and should minimise dissection or fragmentation of any important faunal habitat type.
- The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance).

Air quality

Level of risk: Low-Medium

Mitigation measures

- Vegetation must be removed when soil stripping is required only. These areas should be limited to include those areas required for mining only, hereby reducing the surface area exposed to wind erosion. Adequate demarcation of these areas should be undertaken.
- Control options pertaining to topsoil removal, loading and dumping are generally limited to wet suppression.

- Where it is logistically possible, control methods for gravel roads should be utilised to reduce the re-suspension of particulates. Feasible methods include wet suppression, avoidance of unnecessary traffic, speed control and avoidance of track-on of material onto paved and treated roads.
- The length of time where open areas are exposed should be restricted. Mining should not be delayed after vegetation has been cleared and topsoil removed.
- Dust suppression methods should, where logistically possible, must be implemented at all areas that may / are exposed for long periods of time.
- For all mining activities management should undertake to implement health measures in terms of personal dust exposure, for all its employees:
  - Speed limits;
  - Spraying of surfaces with water;
  - Mining of manganese ore and rehabilitation of disturbed areas; and
- The implementation of continuous dust fall monitoring as part of the project's air quality management plan. Monitoring should be undertaken throughout the life of the mine to provide air quality trends and indicate compliance with NAAQSs.
- The recommendation that East Manganese mine collaborates with other mines/industries in the region to install an ambient gravimetric PM10/PM2.5 monitor in Gloria Mine village or Hotazel. This will provide adequate data on cumulative PM10 and PM2.5 concentrations from the East Manganese Project and other mines/industries in the region.
- Finally, it is recommended that the PM10/PM2.5 samples be analysed for manganese content to determine the manganese concentrations at Gloria Mine village or Hotazel. Should exceedances of the long-term assessment criteria occur (as simulated), a health risk/toxicological assessment should be conducted to ascertain the health impact due to manganese emissions at Gloria Mine village or Hotazel.

Noise

Level of risk: Medium to High

Mitigation measures

- All vehicles in operation will be in good working order and adhere to the relevant noise requirements in terms of the Road Traffic Act, 1997 (Act No. 93 of 1997).
- Every vehicle in operation will be equipped with a silencer on its exhaust system.
- Safety measures which generate noise, such as the reverse gear alarms on large vehicles, will be appropriately calibrated or adjusted.
- Hearing protection will be made available to all employees where attenuation cannot be implemented.
- When the equivalent noise exposure, as defined in the South African Bureau of Standards code of Practice for the Measurement and Assessment of occupational Noise for Hearing Conservation Purposes, SABS 083 was amended, at or in any operation or works where persons may travel or work, exceeds 85 dB, the holder will take the necessary steps to reduce the noise below this level.
- It is recommended that a buffer zone of 1.5km be placed around all residential areas, be it formal or informal, on-site or surrounding, in which buffer zone no plant must be established.
- Appropriate non-metallic washers/insulation must be used with any joining apparatus to join screens such as corrugated iron to other structures and to each other. Such screens (if not mobile units) must be maintained in a fixed position.

- Controlled drilling and blasting activities by an authorised person.
- Noise levels to be monitored at regular intervals and the results compiled into monthly reports and submitted to the relevant authority.
- In addition to the above good public relations are essential. At all stages surrounding receptors should be educated with respect to the sound generated by the Southern Ambition operations. The information presented to stakeholders should be factual and should not set unrealistic expectations. Community involvement needs to continue throughout the project. Annoyance is a complicated psychological phenomenon; as with many industrial operations, expressed annoyance with sound can reflect an overall annoyance with the project, rather than a rational reaction to the sound itself. Southern Ambition must implement a line of communication, where complaints could be lodged.

Visual impacts

Level of risk: Low Medium

Mitigation measures

Mitigation measures may be considered in two categories:

Primary measures that intrinsically comprise part of the development design through an iterative process. Mitigation measures are more effective if they are implemented from project inception when alternatives are being considered; and

Secondary measures designed to specifically address the remaining negative effects of the final development proposals:

- Primary measures that will be implemented should mainly be measures that minimise the visual impact by softening the visibility of the mining activities, by “blending” with the surrounding areas. Such measures will include rehabilitation of the disturbed area, such as the Open Pit excavations by re-vegetation of the area and using an aesthetically pleasing design for the proposed development.
- During the construction phase the following mitigation measures should be implemented to minimise the visual impact.
- Ensure that rubble, litter and disused construction materials are managed and removed regularly.
- Ensure that all infrastructure and the site and general surrounds are maintained in a neat and appealing way.
- Reduce and control construction dust emitting activities through the use of approved dust suppression techniques; and
- During operational phase, the following mitigation measures should be implemented to minimise the visual impact.
- Ensure that all infrastructure and the site and general surroundings are maintained in a neat and appealing way;
- Rehabilitation of disturbed areas and re-establishment of vegetation;

Traffic and road safety

Level of risk: Low

Mitigation measures

- Implement measures that ensure the adherence to traffic rules.

Heritage resources and Palaeontological

Level of risk: Medium to High

Mitigation measures

- The heritage and cultural resources (e.g. stone tools sites and graves etc.) must be protected and preserved by the delineation of a no-go zone.
- Should any further heritage or cultural resources be disturbed, exposed or uncovered during site preparations, these should immediately be reported to an accredited archaeologist.
- The impact of the development on fossil heritage is HIGH and MODERATE and therefore a field survey or further mitigation or conservation measures were necessary for this development (according to SAHRA protocol). A Phase 1 Palaeontological Impact Assessment was done. Fossils were not found during the walk through.

Socio-economic

Level of risk: Low-Medium

Mitigation measures

In order to ensure that negative impacts are minimised, and positives are enhanced, the following is recommended:

- Implement the mitigation measures as proposed in this report.
- Southern Ambition should assist their employees to find suitable housing in the towns surrounding the mining area to limit additional impacts on the provision of services and infrastructure by the SPM.
- Possible SMME links to the mine should be pursued to maximise local business benefits;
- Southern Ambition should communicate and present their involvement in the community (goodwill, social responsibility, capacity building programmes, skills development, general development support and so forth) to obtain community support.

Interested and affected parties

Level of risk: Low

Mitigation measures

- Maintain active communication with IAPs.
- Ensure transparent communication with IAPs at all times.
- IAPs must be kept up to date on any changes in the mining operation.

A complaints management system should be maintained by the mine to ensure that all issues raised by any interested and affected parties are followed up and addressed appropriately.

ix) Motivation where no alternative sites were considered

No alternative location for the proposed mining operation was considered, as the manganese ore has been deposited in this area. There is therefore no other alternative with regard to the overall operation footprint.

x) Statement motivating the alternative development location within the overall site

Not applicable. There is no alternative development location for the site as this is the area with the mineable resource.

i) 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

Not applicable. There is no alternative development location for the site and therefore the initial site locality is considered to be the final site locality. The impact assessment provided in section g(v) is therefore sufficient and the process undertaken to identify impacts is the same as in section g(vi).

j) 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)

In this section, the potential impacts and associated risk factors that may be generated by the proposed mining operation on Eureka are identified. In order to ensure that the impacts identified are broadly applicable and inclusive, all the likely or potential impacts that may be associated with the mining activities are listed.

ACTIVITY Whether listed or not listed.	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….	ASPECTS AFFECTED	PHASE In which impact is anticipated (e.g. construction, commissioning, operational, Decommissioning, closure, post closure)	SIGNIFICANCE IF NOT MITIGATED	MITIGATION TYPE (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	SIGNIFICANCE IF MITIGATION
Processing Plant: Material excavated from the trenches and historical dump cuttings will be selected and processed through a crush-and-screen processing plant. Mineralized material is delivered to the plant area a point within 50m from the front end of the mobile plant. The material is then fed with earthmoving equipment into the mobile plant's vibrating feeder bin which then feeds a crusher. The crusher crushes the ore down to smaller fractions. This material is then fed into the mobile plant's multiple deck screens. The screen separates different size fractions which are then	Dust Noise Removal and Disturbance of Vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Medium	Access control Maintenance of processing plant Dust control and monitoring Noise and vibration control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing suitable mufflers on engine exhausts and compressor components; Re-locate noise sources to areas which are less noise sensitive, to take advantage of distance and natural shielding; Develop a mechanism to record and respond to complaints.	Medium

temporarily stockpiled. From the stockpiles the material is loaded onto independent transport contractor tipper trucks which transport the material to the market after being weighed on a weighbridge.						
Ablution Facilities 4 Rondawels	Soil contamination Possible Groundwater contamination	Soil Groundwater	Construction Commissioning Operational Decommissioning Closure	Low	Maintenance of sewage facilities on a regular basis.	Very Low
Clean & Dirty water systems: a)to construct a pollution control dam as part of their storm water management plan; b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.	Surface disturbance Soil contamination Surface water contamination	Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Low	It will be necessary to divert storm water around excavations and dumps areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage areas. Open Pit Excavations for manganese ore, where and when applicable, should be rehabilitated concurrently as mining progresses. The re vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches	Low

					Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipes will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion. The following summarises the recommended rehabilitation process and is referenced to a more comprehensive discussion in the wetland and riparian report (Appendix 11): The catchment adjacent to the Ga-Mogara River where mining will take place will also affect it and its rehabilitation is therefore also important (p21-23): • The topography should be re-instated as close to the natural condition as possible. • The correct backfilling of material and management of topsoil with an intact seedbank is crucial to the re-establishment of indigenous vegetation. • Indigenous vegetation should be allowed to re-establish from the seedbank present in the topsoil. • The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas. • Monitor and eradicate exotic weeds and invaders where they establish. Re-instating the topography and geomorphology of affected areas in the	

					floodplain of the river and prevention of erosion (p24-28): • Rehabilitation should endeavour to re-instate the current topography as far as possible. • The natural, pre-mining environment should be documented prior to mining by means of a photographic record and surveying. • The management of topsoil and keeping the seedbank intact is a crucial element in the rehabilitation of mined areas. Topsoil from the floodplain and terrestrial areas should be kept separate. • Surface water flow and erosion should be stemmed by using gumpoles, eco-logs and brush piles. • Re-instating the topography should avoid areas devoid of topsoil, tailings dumps and steps or benches as these prevent vegetation establishment. • Erosion monitoring should be implemented continuously and where erosion occurs this should be remedied. The establishment of indigenous vegetation should be promoted by implemented the following recommendations (p28-29): • Mulch, obtained from vegetation removed from mining areas, should be placed in rehabilitated areas together with topsoil. • Natural vegetation should be allowed to re-establish from the intact seedbank in the topsoil.	

					• The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas. • Implement plant establishing techniques during the rainy season to increase the probability of successful establishment. • Protect the rehabilitated areas and riparian zone from trampling and browsing by game and domestic stock. • In order to determine and monitor the success of rehabilitation a biomonitoring programme which includes an Index of Habitat Integrity (IHI) and vegetation assessments should be conducted bi-annually. Weed monitoring and eradication should be implemented and strictly adhered to. A comprehensive eradication and monitoring programme will have to be implemented in order to control the infestation of Prosopis glandulosa on and around the site (p29-32).	
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well marked and available on site. Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. All facilities where dangerous materials are stored must be contained in a bund	Low

					wall. Vehicles and machinery should be regularly serviced and maintained.	
Mining area.	Dust Noise Removal and Disturbance of Vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Air quality Fauna Flora Groundwater Noise Soil Surface Water Topography Safety	Commissioning Operational Decommissioning Closure	High to Medium	Access control Dust control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays MRD stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints. The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). Those areas surrounding the mine site that are not part of the demarcated development area should be considered as a no-go zone for employees, machinery or even visitors. Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site.	Low

					All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to minimise the overall mining footprint. The Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining; Snares & traps removed and destroyed; and The vegetation associated with the wetlands have a high sensitivity with a high conservation priority. No major alteration of these important drainage areas are recommended, especially considering it to form part of an important catchment. The	

					potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if possible, in terms of the mining operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface; All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Low
Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Medium	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment	Low

	Surface disturbance				Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints.	
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Low
Roads (both access and haulage road on the mine site):	Dust Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air quality Fauna Flora Groundwater Noise Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Low

					The vegetation associated with the wetlands have a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if possible, in terms of the mining operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface; All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.	
Temporary Workshop Facilities and Wash bay	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Medium	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Low
Water tanks: 1 X 10 000 litre water tanks and purifiers for potable water.	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Medium	Maintain water tanks and structures	Low

k) Summary of specialist reports

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
ECOLOGICAL IMPACT ASSESSMENT REPORT FOR EAST MANGANESE MINE ON PORTION 1 AND THE REMAINDER OF THE FARM EAST 270, NORTHERN CAPE PROVINCE by Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat) **July 2018** **Appendix 4**	ECOLOGICAL IMPACT ASSESSMENT REPORT FOR EAST MANGANESE MINE ON PORTION 1 AND THE REMAINDER OF THE FARM EAST 270, NORTHERN CAPE PROVINCE by Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat) July 2018 DISCUSSION Most development has an impact on the environment. In this case the area on which the proposed development footprint will be built will be cleared, therefore directly impacting on the environment. Most of the vegetation will be completely modified during the construction. Detailed ecological (fauna habitat & flora) surveys were conducted during March 2018 to verify the ecological sensitivity and ecological components of the site at ground level. The development will have a medium to high impact on the vegetation and general ecology of the area, due to the sensitive habitats (dunes, pan, woodland with dense stands of protected tree species) that occur in the area, and therefore a sound EMP and mitigating measures should be considered for the proposed footprint of the East Manganese Mine. Considering the results from the field surveys, mitigation needs to be implemented to prevent any excessive negative impacts on the	X	i)Details of the development footprint alternatives considered e) Impact Management Outcomes (A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph ()

	ecosystem, since most of the site is in a natural state. A sensitivity analyses was conducted to identify the most suitable site for the development. From this investigation and ecological survey, the following main observations was made: • The duneveld areas has a medium to high sensitivity. These areas play an important role as habitat for fauna and flora. Strict mitigation is needed for the preservation of some sections of this natural vegetation entity. The East Manganese Mine open cast pit falls outside of these area's the plant or production area development should avoid these areas if possible; • The pan has a high sensitivity and should be preserved as important fauna and flora habitats. A 30-meter buffer zone should be implemented although the mine development does not impact on this area. • The river ravine area to the north west being a high sensitivity area will be severely impacted by the open cast mine pit and the natural course of the Ga-Mogara seasonal river will have to be changed and diverted around the mining area. Some potential rare fauna may also occur in the area, and specific mitigation measures need to be implemented to ensure that the impact of the development on the species' habitat will be low. Specific mitigation relating to red data fauna includes the following: • Disturbances in close vicinity of the development (periphery) should be limited to the smallest possible area in order to protect species habitat; • Corridors between the development zones are also important to allow fauna to move freely between the areas of disturbance. A number of ecological potential impacts were identified and assessed. A few of these were assessed as having potentially medium or high significance, including the following:		

	• Destruction or disturbance to ecosystems leading to reduction in the overall extent of a particular habitat; • Impairment of the movement and/or migration of animal species resulting in genetic and/or ecological impacts (habitat fragmentation); • Increased soil erosion; • Destruction/permanent loss of rare, endangered, endemic and/or protected species; • Establishment and spread of declared weeds and alien invader plants; • Soil and water pollution due to spillages; • Air pollution as a result of dust; • Negative effect of human activities and road mortality. Mitigation measures provided would reduce impacts from a high to low significance. A monitoring plan is recommended for inclusion into the EMP should the application be approved. **CONCLUSION** All aspects of the environment, especially living organisms, are vulnerable to disturbance of their habitat. If we can bring about a more integrated approach to living within our ecosystems, we are much more likely to save the fundamental structure of biodiversity. Positive contributions can be made even on a small scale within the proposed East Manganese Mine and associated infrastructure. All stakeholders need to be involved to avoid a loss of biodiversity in the area. The proposed development area will modify the natural vegetation and faunal habitats. The importance of rehabilitation and implementation of mitigation processes to prevent negative impacts on the environment during and after the development phase should be considered. The proposed development should avoid the high sensitivity areas where possible such as the pan habitats and river ravine habitats but it is noted that the		

	mining area falls within a high sensitivity area while sections of the woodland with dense stands of protected trees should be preserved if possible. Where sensitive areas of natural vegetation cannot be avoided, a number of mitigation measures have been recommended to minimise and/or offset impacts (licence application for eradication of protected species, identification of offset areas). Negative impacts can be minimised by strict enforcement and compliance with an Environmental Management Plan which takes into account the recommendations for managing impacts detailed above. Provided that the proposed development is consistent with limiting impact in the sensitive areas marked on the map , it is taken into account that the underlying valuable natural resource cannot be shifted and that mining has a definite impact on the environment, but the total footprint of the mine and infrastructure is less than 60 hectares and that if the EMP takes all the mitigation measures into consideration stipulated in this report, the planned development can be fully supported.		
East Manganese – Desktop Groundwater Study by Delta h. August 2018.089-02 **Appendix 5**	Delta-H conducted a desktop groundwater study for supporting document to the environmental application for East Manganese Mine. East Manganese plan to conduct mining though conventional open cast pit mining method. The overburden material and ore material will be placed on site for pick up to offsite processing. The regional groundwater levels observed range from 3.4 m BGL to 100 m BGL, with an average water level of 32.16 m BGL, suggesting that most of the boreholes measure within the upper Kalahari formation. The proposed residue material be disposed of on surface as part of the East Manganese Mine project include calcrete storage area, Kalahari sand storage area, top soil storage area and a clay & gravel bed storage area. The potential acid generating formation of	X	i) Details of the development footprint alternatives considered e) Impact Management Outcomes (A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph ()

	the geological sequences, i.e. Kalahari Fm, Dwyka, Ongeluk Laval as well as the manganese ore, associated at East Manganese is expected to non-acid forming due to the limited sulphide sulphur content which is the primary source of acid. A geochemical assessment of mine materials is proposed to confirm the low estimated AMD potential. Potential groundwater related impacts are expected to be insignificant w.r.t. the shallow weathered and fractured aquifers of the Kalahari Fm, unlikely to impact third party groundwater users. Due to the limited footprint area and the inert nature of the material no significant impacts of the mine residues are expected. The realistically foreseeable potential impact on the ambient groundwater quality during the construction and operational phase is due to accidental hydrocarbon or other chemical spillages from the construction vehicles, including nitrate contamination associated with the use of nitrate-based explosives in mining operations. Such spillages are localised, quickly reversible if properly contained and/or excavated and unlikely to occur, while the nitrate concentrations generally return to acceptable levels within one or two years after regular blasting has ended in the specific area. The drilling of monitoring borehole upgradient and downgradient of the proposed pit, infrastructure and plant area are recommended to monitor the concentrations and any potential seepage in addition to confirm the depth to groundwater. Approximate locations have been given but should be refined locally using intrusive investigations.		
East Manganese: Phase 1 Heritage Impact Assessment on	Conclusions and recommendations The literature study indicated a low level of heritage resources around Hotazel and within the immediate landscape. Prehistoric and historical utilization of the region focussed mostly on sources of water such as the	X	i) Details of the development footprint alternatives considered e) Impact Management Outcomes

the farm East 270 (Portion 1 & Re) within the John Taolo Gaetsewe District Municipality, Northern Cape by AFRICAN HERITAGE CONSULTANTS CC June 2018 **Appendix 6**	Ga-Mogara River, springs and pans. During the current field survey traces of prehistoric utilisation and/or settlement were mainly found in the form of dispersed lithics from the ESA and MSA, and also some LSA stone tools. All the isolated specimens and scatters of stone tools with debris that have been identified, are of low significance. While there is no objection to the proposed development of an open-cast mine and associated infrastructure by East Manganese on the Farm East 270 (Portion 1 & Re) from a heritage resources perspective, the presence of graves in two informal cemeteries that were identified during the survey has to be addressed. Stone Age localities Stone tools occurred mainly as finds of singe specimens or low-density concentrations. A small MSA stone tool production area dominated by cores, primary cortical flakes and secondary flakes, blade forms and triangular flakes was recorded at 27°10'33'S; 22°55'00'E. Another concentration was located further along the ridge. This is in proximity with the point where the existing access road enters the farm. In this locality the immediate area has been significantly disturbed during previous road building and calcrete borrowing. It is recommended that the new road diversion be done on the northern side of the existing road cutting to mitigate possible impacts in this area. Please refer to the map where the heritage localities are indicated for the details. Cemetery 1 at 27°09'52'S; 22°54'53'E A set of two, and possibly more, graves are located in a small cemetery in close proximity to the existing worker house. The cemetery of approximately 10 m across is enclosed by the remains of a crude fence. According to the proposed mine layout the locality falls outside the impact area. As such, these graves will not		(A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph()

	be affected by the proposed development. Graves are deemed to have high cultural significance for their social value. The cemetery with graves is accordingly graded as a Grade IIIA resource. It is recommended that the cemetery should be clearly demarcated and fenced. Cemetery 2 at 27°10'07'S; 22°55'03'E From consultations with the local farm workers it seemed that the graves in Cemetery 2 have not been visited during the recent past by any relatives. This is borne out by a complete lack of grave offerings. According to the proposed mine layout Cemetery 2 with around 18 graves falls outside the impact area. As such, these graves will not be affected by the proposed development. Graves are deemed to have high cultural significance for their social value. The cemetery with graves is accordingly graded as a Grade IIIA resource. It is recommended that the cemetery should be clearly demarcated and fenced. Possible finds emanating from the development In the event that any sub-surface heritage resources or graves are unearthed all work has to be stopped until an assessment as to the significance of the site (or material) in question has been made by a heritage practitioner. Note that no archaeological material that has been uncovered may be removed. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply. If human remains are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process.		

East Manganese: Phase 1 Palaeontological Impact Assessment on the farm East 270 near Hotazel Gamagara Local Municipalities, John Taolo Gaetsewe District Municipality, Northern Cape Province Farm: Portion 1 and Remaining Extent East 270 by Fourie, H. Dr heidicindy@yahoo.com **August 2018** **Appendix 7**	**The recommendations are:** 1. Mitigation is needed if fossils are found, permission needed from SAHRA. 2. No consultation with parties was necessary. 3. The mining development may go ahead; the ECO must survey for fossils before or after blasting or excavating in line with the legally binding Environmental Management Programme (EMPr) this must be updated to include the involvement of a palaeontologist/ archaeozoologist when necessary. 4. The EMPr already covers the conservation of heritage and palaeontological artefacts that may be exposed during construction activities. The protocol is to immediately cease all construction activities if a fossil is unearthed and contact SAHRA for further investigation. It is recommended that the EMPr be updated to include the involvement (pre-construction training of ECO) of a palaeontologist/archaeozoologist during the digging and excavation phase of the development and ECO to visit site bi-weekly during construction and keep a photographic record. **Conclusions** a. All the land involved in the development was assessed and none of the property is unsuitable for development (see Recommendation B). b. All information needed for the Phase 1: Field Study was provided by the Consultant. All technical information was provided by Strata Africa Resources (Pty) Ltd. c. Areas that would involve mitigation and may need a permit from the South African Heritage Resources Agency are discussed. d. The following should be conserved: if any palaeontological material is exposed during digging, excavating, drilling or blasting, SAHRA must be notified. All development activities must be stopped and a	X	i)Details of the development footprint alternatives considered e) Impact Management Outcomes (A description of impact management outcomes, identifying the standard of impact management required for the aspects contemplated in paragraph ()

	palaeontologist should be called in to determine proper mitigation measures, for example, shallow caves. e. Condition in which development may proceed: It is further suggested that a Section 37(2) agreement of the Occupational, Health and Safety Act 85 of 1993 is signed with the relevant contractors to protect the environment and adjacent areas as well as for safety and security reasons.		
Air Quality Specialist Report for the Proposed East Manganese Project in the Northern Cape Province by Dustwatch **July 2018** **Appendix 8**	**Recommendations** To ensure the lowest possible impact on AQSRs and the environment, it is recommended that the air quality management plan as set out in this report be adopted. The recommended management plan includes the following: • The implementation of emission controls for the management of significant emission sources; and • Air quality monitoring: □ The implementation of continuous dust fall monitoring as part of the project's air quality management plan. Monitoring should be undertaken throughout the life of the mine to provide air quality trends and indicate compliance with NAAQSs. □ The recommendation that East collaborate with other mines/industries in the region to install an ambient gravimetric PM10/PM2.5 monitor in Gloria Mine village or Hotazel. This will provide adequate data on cumulative PM10 and PM2.5 concentrations from the East Manganese Project and other mines/industries in the region. □ Finally, it is recommended that the PM10/PM2.5 samples be analysed for manganese content to determine the manganese concentrations at Gloria Mine village or Hotazel. Should exceedances of the long-term assessment criteria occur (as simulated), a health risk/toxicological assessment should be conducted to ascertain the health impact due to manganese emissions at Gloria Mine village or Hotazel.	X	viii)The possible mitigation measures that could be applied and the level of risk l)Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including g) Monitoring of Impact Management Actions h) Monitoring and Reporting Frequency i)Responsible persons j) Time Period for Implementing Impact Management Actions k) Mechanisms for Monitoring Compliance

	□ The delineation of an air quality buffer zone is not deemed necessary, considering the "low" to "medium" significance rating assigned to pollutants impacts.		
HIGHLANDS HYDROLOGY (PTY) LTD **HYDROLOGICAL ASSESSMENT OF THE PROPOSED EAST MANGANESE MINE** **September 2018** **Version 2** **Appendix 9**	Baseline information including rainfall, evaporation, design event rainfall, soils, vegetation and land cover, as well as site topography and regional and local catchment hydrology have been considered for the proposed East Manganese Mine. Flood-lines were developed for the Ga-Morgara River adjacent the site utilising a Combined DEM with a 10m cell size, which was the product of the interpolated 0.5m contour data and resampled STRM30 data. The area of the site covered by the 0.5m contour data resulted in a more sensible depth of flooding, whilst the use of SRTM30 data introduced inaccuracies into the overall flood-line delineation. A comparison of modelled flood-lines with the underlying aerial imagery illustrates this likely inaccuracy since the floodplain (which appears to coincide with pale sand alongside the river) extends beyond the modelled flood-lines in some instances (particularly near the proposed opencast pit). Modelled flood lines can consequently only be considered indicative with the site survey data requiring a greater area of coverage if a defendable (more precise) flood model is to be produced. Regardless of flood model accuracy, the results clearly showed that the western perimeter of the site has an associated flood risk which is expected given the presence of the Ga-Morgara River and the substantial flood flows that may occur because of the large upstream catchment area. The proposed opencast pit is most at risk of flooding given its low-lying characteristic once it becomes developed. The intersection of the surveyed river centreline by the opencast pit, presents an unequivocal flood risk to the pit (regardless of the accuracy of the flood model results) and mitigation will be required to manage this flooding. This will require a detailed engineering and	X	viii)The possible mitigation measures that could be applied and the level of risk l)Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

	geo-technical investigation into the design of either a formalised river diversion, or appropriate flood defences. Exemptions to GN 704 will also likely be necessary given the proposed location of various mining infrastructure within the 1:50 RI flood extent, 1:100 RI flood extent and the 100m river buffers. A conceptual storm water management plan has been developed based on the requirements of GN 704 and best practice guidance. The location and sizing for the diversions/containment included in this conceptual SWMP are based upon the Combined DEM. Inaccuracies or limited detail in the Combined DEM (resulting from the incorporated SRTM30 data) could potentially cause inaccuracies in the SWMP as modelled. In developing the SWMP, areas of surface works were first identified with subsequent separation of clean and dirty water producing areas. Dirty water producing areas have been isolated by diverting upstream clean water around them via clean water diversions. Dirty water produced within dirty areas has been routed to the opencast pit for temporary storage from where it can be pumped back into the dirty process water circuit. Diversions have been sized to route/contain the 1:50 year RI storm event into the opencast pit which is being utilised as an informal PCD given its location which allows for the routing of dirty water areas into it (via dirty diversions). It is suggested that discussions are held with the DWS regarding the proposed SWMP and the lining requirements for storm water management infrastructure, as well as the use of the opencast pit as a PCD. In conclusion, it is recommended that East Manganese Mine do a more extensive and detailed elevation survey for the site. This would benefit the re-assessment and associated confidence in flood risk as well as any formalised design of any river diversions or flood defences which will be necessary should the opencast pit location not be reconsidered. The SWMP will also		

	require more topographic detail once it enters the detailed design phase prior to construction, to ensure effective routing of water. In addition to this, it is recommended that the location of proposed mining infrastructure be reconsidered and placed outside of the modelled 1:100-year RI and 100m buffers, in line with the requirements of GN 704. Finally, it is also recommended that an Automatic Weather Station be installed at the site to obtain site specific climatic variables.		
Baseline Environmental Noise Fall-Out Assessment **over the Remaining Extent and Portion 1 of the Farm East 270, Kuruman District, Northern Cape Province** **Appendix 10**	The survey conducted during the period 7 October 2018 – 12 October 2018 showed that all of the baseline ambient noise levels are below the expectations (typical levels) for the relevant district type (Rural) according to SANS 10103:2008 (Edition 6) guidelines.	X	viii) The possible mitigation measures that could be applied and the level of risk l) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr
Wetland and Riparian Rehabilitation Plan for manganese mining operations along the Ga-Mogara River on the Remaining Extent and Portion 1 of the farm East 270 near Hotazel, Northern Cape Province. October 2019 Prepared by: Darius van Rensburg DPR Ecologists **Appendix 11**	Summary The following summarises the recommended rehabilitation process and is referenced to a more comprehensive discussion in the report: The catchment adjacent to the Ga-Mogara River where mining will take place will also affect it and its rehabilitation is therefore also important (p21-23): • The topography should be re-instated as close to the natural condition as possible. • The correct backfilling of material and management of topsoil with an intact seedbank is crucial to the re-establishment of indigenous vegetation. • Indigenous vegetation should be allowed to re-establish from the seedbank present in the topsoil.	X	viii) The possible mitigation measures that could be applied and the level of risk l) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr

	• The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas. • Monitor and eradicate exotic weeds and invaders where they establish. Re-instating the topography and geomorphology of affected areas in the floodplain of the river and prevention of erosion (p24-28): • Rehabilitation should endeavour to re-instate the current topography as far as possible. • The natural, pre-mining environment should be documented prior to mining by means of a photographic record and surveying. • The management of topsoil and keeping the seedbank intact is a crucial element in the rehabilitation of mined areas. Topsoil from the floodplain and terrestrial areas should be kept separate. • Surface water flow and erosion should be stemmed by using gumpoles, eco-logs and brush piles. • Re-instating the topography should avoid areas devoid of topsoil, tailings dumps and steps or benches as these prevent vegetation establishment. • Erosion monitoring should be implemented continuously and where erosion occurs this should be remedied. The establishment of indigenous vegetation should be promoted by implemented the following recommendations (p28-29): • Mulch, obtained from vegetation removed from mining areas, should be placed in rehabilitated areas together with topsoil. • Natural vegetation should be allowed to re-establish from the intact seedbank in the topsoil. • The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas.		

	• Implement plant establishing techniques during the rainy season to increase the probability of successful establishment. • Protect the rehabilitated areas and riparian zone from trampling and browsing by game and domestic stock. • In order to determine and monitor the success of rehabilitation a biomonitoring programme which includes an Index of Habitat Integrity (IHI) and vegetation assessments should be conducted bi-annually. Weed monitoring and eradication should be implemented and strictly adhered to. A comprehensive eradication and monitoring programme will have to be implemented in order to control the infestation of Prosopis glandulosa on and around the site (p29-32).		

l) Environmental impact statement

(i) Summary of the key findings of the environmental impact assessment;

- The Processing plant may have a medium impact on air quality, fauna, flora, noise, soil and surface water after mitigation.
- The Ablution facilities will have a very low impact on groundwater and soil in case of an emergency spill after mitigation.
- The Clean & Dirty water systems may have a low impact on groundwater, soil and surface water after mitigation.
- The Fuel Storage facility (Diesel tanks) may have a low impact on groundwater, soil, and surface water after mitigation.
- The Mining Area may have a medium to High impact on air quality fauna, flora, noise, soil, surface water and topography after mitigation.
- The Salvage yard (Storage and laydown area) may have a low impact on fauna, flora, groundwater, soil and surface water after mitigation.
- The Security Gate and guard house at access control point may have a low impact on air quality, fauna, flora and soil after mitigation.
- The waste disposal site (domestic and industrial waste) may have a low impact on groundwater, soil, and surface water after mitigation.
- The Roads (both access and haulage road on the mine site) may have a low impact on air quality, fauna, flora, noise, soil and surface water after mitigation.
- The Workshop and Wash bay may have a low impact on groundwater, soil and surface water after mitigation.
- The Water tanks may have a low impact on fauna, flora, and surface water after mitigation.

From the assessment of impacts throughout all the phases it is clear that though The impacts may occur directly as a result of the proposed start in Mining operations, the impacts are mostly of medium significance before mitigation. According to the assessment carried out by the EAP the majority of the impacts can be reduced to a low significance with the appropriate mitigation measures in place.

The EAPs and environmental consultants responsible for the compilation of this document, and the associated PPP are of the opinion based on the presented specialist assessments and impact assessment that the Environmental Authorization application should be authorised.

The following mitigation measures are crucial and should form part of the environmental authorisation to ensure that the applicant manages impacts adequately:

- Adhere to the approved Environmental Management Programme
- Adhere to the Emergency procedures Report and implement spill clean-up procedures
- Apply for relevant permits with authorities for the removal of indigenous tree species and indigenous vegetation if applicable.

- Major spills should be reported within 24hr to the Department of Water and Sanitation and the NCDENC.

The nature of impacts can vary widely depending on the type of physical environment, the
size of the activity and the perceptions and values of each of the affected parties. It was the objective of the assessment to identify both positive and negative impacts. The existing information was reviewed to assess the present status of the environment and the extent to which they have already been modified. The planned activities and associated infrastructure were used as reference to assess potential impacts.

In general, the environmental impacts associated to the mining operation are rather negative, while the social impacts are more beneficial. Impacts on vegetation are likely to be most profound, because the mining operation will constitute large-scale clearance of indigenous vegetation and most likely also the removal of protected species if any is encountered. Soil erosion and surface water deterioration are likely to be possible important impacts if appropriate management strategies are not practised.

The vegetation associated with the wetlands has a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if possible, in terms of the mining operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface;

All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.

Positive impacts include the demarcation and subsequent protection of heritage resources and the eradication of alien invasive species. Positive social impacts include the creation of jobs, social upliftment, training opportunities, community development and numerous economic benefits.

Positive impacts on Palaeontology is as follows:
1. Mitigation is needed if fossils are found, permission needed from SAHRA.
2. No consultation with parties was necessary.
3. The mining development may go ahead; the ECO must survey for fossils before or after blasting or excavating in line with the legally binding Environmental Management Programme (EMPr) this must be updated to include the involvement of a palaeontologist/ archaeozoologist when necessary.
4. The EMPr already covers the conservation of heritage and palaeontological artefacts that may be exposed during construction activities. The protocol is to immediately cease all construction activities if a fossil is unearthed and contact SAHRA for further investigation. It is recommended that the EMPr be updated to include the involvement (pre-construction training of ECO) of a

palaeontologist/archaeo-zoologist during the digging and excavation phase of the development and ECO to visit site bi-weekly during construction and keep a photographic record.

To conclude, it must be accepted that any activities will have both physical and social impacts. Therefore, the destruction of the natural environmental features within the mining area is inevitable. The significance of the impacts will however be affected by the success of the mitigation measures implemented and the rehabilitation programme for the mining area.

(ii) 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 indicated any areas that should be avoided, including buffers. Attach as Appendix (Figure 13)

The final site map below indicates the Mining right application area in which all mining will take place. Existing roads are also depicted. The associated infrastructure relating to the mining site is also indicated.

The following specific recommendations for the area should be adhered to for the drainage features on site:

- The vegetation associated with the wetlands has a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if possible, in terms of the mining operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface;
- All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.

No Mining operations are carried out within a horizontal distance of 100 (one hundred) metres from reserve land, buildings, roads, railways, dams, waste dumps, or any other structure whatsoever including such structures beyond the mining boundaries, or any surface, which it may be necessary to protect in order to prevent any significant risk, unless a lesser distance has been determined safe by risk assessment and all restrictions and conditions determined in terms of the risk assessment are complied with; **Please see Final Site Map below.**

Figure 23. Final Site Map

(iii) Summary of the positive and negative implications and risks of the proposed activity and identified alternatives;

As mentioned before, the specific occurrence of manganese ore in the area dictates the selection of the specific mining site and there are no alternatives in terms of project location.

In terms of alternative land use, the proposed mining operation will be done in such a way that residential living and (grazing) will still be possible as the site will be rehabilitated in such a way that it allows the establishment of grass cover again.

The mining operation will provide 47 jobs and will also add to the increased economic activity and the area surrounding the farm.

The Open pit Excavations, where and when applicable, should be rehabilitated concurrently as mining progresses. The Pit will be within 32m from the 1:100 year flood line. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration.

During the operational stages of the mining operation, there is a possibility of sterilisation of the mineral reserves and resources due to improper placement of infrastructure. However, the site layout plan has been developed not to place any infrastructure where resource materials could be located. The infrastructure and Open Pit excavations /dumps will alter the topography by adding features to the landscape. Topsoil removal and Mine Residue Dumps will change the natural topography. The construction of infrastructure and various facilities in the mining area can also result in loss of soil due to erosion. Vegetation will be stripped in preparation for placement of infrastructure and mining of manganese ore, and therefore the areas will be bare and susceptible to erosion.

The topsoil that is stripped and piled on surrounding areas can be eroded by wind and rain. The soil will be carried away during runoff. The cleared areas will be rehabilitated, but full restoration of soils might only occur over a number of years, subsequent to the re-establishment of vegetation. Furthermore, improper stockpiling and soil compaction can result in soil sterilisation. Leaching can also occur, resulting in the loss of nutrients.

There is also a possibility that equipment might leak oil, thus causing surface spillages. The hydrocarbon soil contamination will render the soil useless unless they are decontaminated. The storage of fuels on site might have an impact on soil if the tanks that are available on site are not properly monitored and maintained to avoid leakages. Then there is the potential that contaminated soil can be carried through runoff to contaminate water resources and soil stockpiled for rehabilitation. Soil pollution is therefore possible, but through mitigation it can be minimised.

The loss of land capability and land use can occur in two ways. Firstly, through topsoil removal, disturbances and loss of soil fertility; and secondly through the

improper placement of infrastructure. Most of the site has a land capability for grazing, but grazing activities can still be performed in areas not earmarked for the operation, and with proper rehabilitation the land capabilities and land use potential can be restored.

Groundwater could be directly affected if any oil and fuel spillages occur during these scenarios and activities, then groundwater will be directly contaminated. Similarly, hazardous surface spillages will seep into the underlying aquifers and contaminate ground water. Improper handling of hazardous material will cause contamination of nearby surface water resources during runoff episodes. Lack of storm control structures will lead to erosion of stockpiles during heavy rains and runoff will carry suspended solids into the downstream environment. This might cause high silt load and affect stream flow. If no, or inadequate ablution facilities are available then workers might feel the need to use the veld for this purpose, which can contaminate natural resources.

Any dumping within the drainage lines will impact on the surface water environment by altering their physical characteristics. These impacts include the alteration of flow patterns, ponding and an increase in the concentration of suspended solids and sedimentation.

The vegetation associated with the wetlands has a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if possible, in terms of the mining operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface;

All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.

The following summarises the recommended rehabilitation process and is referenced to a more comprehensive discussion in the wetland and riparian report (Annexure 11):

- The catchment adjacent to the Ga-Mogara River where mining will take place will also affect it and its rehabilitation is therefore also important (p21-23):
- The topography should be re-instated as close to the natural condition as possible. The correct backfilling of material and management of topsoil with an intact seedbank is crucial to the re-establishment of indigenous vegetation.
- Indigenous vegetation should be allowed to re-establish from the seedbank present in the topsoil.
- The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas.
- Monitor and eradicate exotic weeds and invaders where they establish.

Re-instating the topography and geomorphology of affected areas in the floodplain of the river and prevention of erosion (p24-28):

- Rehabilitation should endeavour to re-instate the current topography as far as possible.
- The natural, pre-mining environment should be documented prior to mining by means of a photographic record and surveying.
- The management of topsoil and keeping the seedbank intact is a crucial element in the rehabilitation of mined areas. Topsoil from the floodplain and terrestrial areas should be kept separate.
- Surface water flow and erosion should be stemmed by using gumpoles, eco-logs and brush piles.
- Re-instating the topography should avoid areas devoid of topsoil, tailings dumps and steps or benches as these prevent vegetation establishment.
- Erosion monitoring should be implemented continuously and where erosion occurs this should be remedied.

The establishment of indigenous vegetation should be promoted by implemented the following recommendations (p28-29):

- Mulch, obtained from vegetation removed from mining areas, should be placed in rehabilitated areas together with topsoil.
- Natural vegetation should be allowed to re-establish from the intact seedbank in the topsoil.
- The establishment of the tree layer can be supplemented by planting saplings in rehabilitated areas.
- Implement plant establishing techniques during the rainy season to increase the probability of successful establishment.
- Protect the rehabilitated areas and riparian zone from trampling and browsing by game and domestic stock.
- In order to determine and monitor the success of rehabilitation a biomonitoring programme which includes an Index of Habitat Integrity (IHI) and vegetation assessments should be conducted bi-annually.

Weed monitoring and eradication should be implemented and strictly adhered to. A comprehensive eradication and monitoring programme will have to be implemented in order to control the infestation of Prosopis glandulosa on and around the site (p29-32).

Mining activities on site will reduce the natural habitat for ecological systems to continue their operation. While general clearing of the area and Mining activities destroy natural vegetation, invasive plants can increase due to their opportunistic nature in disturbed areas. If invasive plants establish in disturbed areas, it may cause an impact beyond the boundaries of the Mining site. These alien invasive species are thus a threat to surrounding natural vegetation and can result in the decrease of biodiversity and ecological value of the area. Therefore, if alien invasive species are not controlled and managed, their propagation into new areas could have a high impact on the surrounding natural vegetation in the long term. With proper mitigation, the impacts can be substantially reduced.

The transformation of natural habitats to Mining and associated infrastructure will result in the loss of habitat affected individual species, and ecological processes. In turn this will result in the displacement of faunal species dependent upon such habitat. Increased noise due to operational activities will disturb and possibly displace birds and other wildlife. Fast moving vehicles take a heavy toll in the form of road kills of small mammals, birds, reptiles, amphibians and a large number of invertebrates.

During the operation the abovementioned activities have potential for dust generation. It is anticipated that the extent of dust emissions would vary substantially from day to day depending on the level of activity and the specific operations. The operation will typically have low to moderate levels of noise, along with man-influenced sounds such as traffic on the secondary road, activities on the residential areas and very occasional air traffic. The proposed operation will add a certain amount of noise to the existing noise in the area.

The impact of site generated trips on the traffic and infrastructure of the existing roads is expected to be moderate. Furthermore, if road safety is not administered it can have a high impact on the safety of fellow road users.

The activities on site have the potential to impact upon heritage resources. Heritage sites are fixed features in the environment, occurring within specific spatial confines. Any impact upon these resources will be permanent and irreversible. Any movement of vehicles, equipment or personnel through areas containing these artefacts could result in the permanent destruction of the artefacts and loss of heritage resources.

The operation will create a number of new employment opportunities and uplift the local community. The magnitude of this impact will depend on the number of people that will be employed, and the number of contractors sourced. An influx of people into the area could possibly impact on safety and security of local residents. During the decommissioning and at closure of the site, staff will most likely be retrenched, resulting in people being unable to find new employment for a long period of time.

Economic slump of the local towns after site closure is not considered to be an associated potential impact, because there are numerous other mining operations in the region. However, income streams from wage bills as well as goods and services contracts (at all geographical levels) will come to an end, reducing the monetary income of individuals and operation-related businesses.

It is likely, however that there will be residual positive economic impacts that are not fully reversed with the closure of the site, and that the economy will not decline to its original level prior to the development of this project. This is because the operation will generate substantial income for the regional and local economy, both directly and indirectly, during its life.

In terms of the Social Impact Assessment findings derived from the information available at this stage it is concluded that the likely benefits of the proposed project outweigh the potential social risks and/or threats to the local communities. However,

the possible impact on the infrastructure and service needs due to the inflow of an additional workforce should be addressed. It would remain the responsibility of the Local Municipality but considering the social framework within which the mine operates, it is important for the mine to engage with the SPM in this regard to minimise any possible negative impacts. Such engagement should also contribute to meaningful contributions to the communities situated in close proximity to the mine.

It is furthermore important to ensure that any negative impacts as a result of the mining activities on the residents should be limited.
The mining activities and associated infrastructure by itself will thus not introduce new social risks and hazards, but only increase the probability and scale of those already associated with the existing mining activities

On a more detailed level, the following **positive impacts** are anticipated:

- The creation of job opportunities in the area, and associated local economic development;
- Economic and revenue contribution to the local municipal area, as well as the John Taolo Gaetsewe District and adjacent municipalities;
- The involvement of Southern Ambition with regards to training and capacity building of his employees and subsequent improvement of the livelihoods of the employees' families, as well as its efforts in sustaining the socio-economic development of the communities in close proximity to the operation;
- The involvement of Southern Ambition with regards to social development projects and support through the Integrated Development Plans (IDPs);
- The positive impact of mining activity on the regional and local economy; and
- Positive impact of extensive local procurement focus.

Negative impacts as a result of the mining activity refer to:

- Inconvenience and intrusion impacts during the start-up and construction phases of the project such as the inflow of an additional workforce to the area, the possible influx of jobseekers, possible increase in the criminal activities (safety and security issues), disruption of social networks, as well as possible health risks;
- Disruptions in the daily living and movement patterns (increased traffic and possible dust pollution);
- Additional pressure on infrastructure development and maintenance;
- General intrusion impacts such as visual and noise pollution

From a social perspective it can be concluded that the proposed Southern Ambition Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

Negative impacts on the area are expected to be temporary and can be mitigated to a large extent if the recommendations of the EMPR are adhered

to e.g. ongoing environmental management and rehabilitation once the mine reaches its end of life.

m) Proposed 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 conditions of authorisation.

Air Quality

- To limit the creation of nuisance, dust the following management guidelines must be followed:
  - Avoidance of unnecessary removal of vegetation.
  - Routine spraying of unpaved site areas and roads utilized by the mining operation with water.
  - Speed limits of vehicles inside the mining area must be strictly controlled to avoid excessive dust or the excessive deterioration of the roads to be used.
  - Continuous dumping and rehabilitation of disturbed areas.
  - All cleared, disturbed or exposed areas must be re-vegetated as soon as practically possible to prevent the formation of additional sources of dust.
  - The implementation of continuous dust fall monitoring as part of the project's air quality management plan. Monitoring should be undertaken throughout the life of the mine to provide air quality trends and indicate compliance with NAAQSs.
  - The recommendation that East Manganese mine collaborates with other mines/industries in the region to install an ambient gravimetric PM10/PM2.5 monitor in Gloria Mine village or Hotazel. This will provide adequate data on cumulative PM10 and PM2.5 concentrations from the East Manganese Project and other mines/industries in the region.
  - Finally, it is recommended that the PM10/PM2.5 samples be analysed for manganese content to determine the manganese concentrations at Gloria Mine village or Hotazel. Should exceedances of the long-term assessment criteria occur (as simulated), a health risk/toxicological assessment should be conducted to ascertain the health impact due to manganese emissions at Gloria Mine village or Hotazel.

Archaeology:

- All operators of equipment should be made aware of the possibility of the occurrence of sub-surface heritage features and the following procedures should they be encountered:
  - All construction in the immediate vicinity (50m radius of the site) should cease.
  - The heritage practitioner should be informed as soon as possible.
  - In the event of obvious human remains the SAPS should be notified.
  - Mitigation measures (such as refilling) should not be attempted.
  - The area in a 50m radius of the find should be cordoned off with hazard tape.
  - Public access should be limited.
  - No media statement should be released until such time as the heritage practitioner has had sufficient time to analyse the finds.

Palaeontology:

The recommendations are:

1. Mitigation is needed if fossils are found, permission needed from SAHRA.
2. No consultation with parties was necessary.
3. The mining development may go ahead; the ECO must survey for fossils before or after blasting or excavating in line with the legally binding Environmental Management Programme (EMPr) this must be updated to include the involvement of a palaeontologist/ archaeozoologist when necessary.
4. The EMPr already covers the conservation of heritage and palaeontological artefacts that may be exposed during construction activities. The protocol is to immediately cease all construction activities if a fossil is unearthed and contact SAHRA for further investigation. It is recommended that the EMPr be updated to include the involvement (pre-construction training of ECO) of a palaeontologist/archaeozoologist during the digging and excavation phase of the development and ECO to visit site bi-weekly during construction and keep a photographic record.

Fauna

- To ensure a minimum of impact to animals the following management guidelines will be followed:
  - Speed limits of vehicles inside the application area must be strictly controlled to avoid road kills.
  - Continuous controlled dumping.
  - Operational areas must be low angled as a preventative measure to ensure an escape route for animals.
  - No hunting (snares) must be allowed at the application area or in the surrounding area.
  - All mining and access roads must be fenced.
  - Where trenches pose a risk to animal safety, they should be adequately cordoned off to prevent animals falling in and getting trapped and/or injured. This could be prevented by the constant excavating and backfilling of trenches during construction process;
  - No animals may be poached during the construction of the mine. Many animals are protected by law and poaching or other interference could result in a fine or jail term;
  - Do not feed any wild animals onsite;
  - Waste bins and foodstuffs should be made scavenger proof;
  - Roads in the area should be designed without pavements to allow for the movement of small mammals;
  - Monitoring of the environmental aspects should be done over the longer term to ensure that impacts are limited to a minimum during the construction and operational phases. Monitoring of specific species is necessary to ensure that these species would be unaffected over the longer term by the development. Information on red data species should be provided to construction workers to make them more aware of these faunas and their behaviour.

Flora

- No trees or shrubs must be felled or damaged for the purpose of obtaining firewood.
- Management must take responsibility to control declared invader or exotic species on the site. The following control methods must be used:

- The plants will be uprooted, felled or cut off and can be destroyed completely.
- The plants will be treated with an herbicide that is registered for use in connection therewith and in accordance with the directions for the use of such an herbicide.
- Valid permits from DAFF must be obtained before any protected plant species are removed or damaged if encountered.
- Continuous controlled dumping and spreading of previously stored topsoil over the rehabilitated areas.
- All rehabilitated areas, where applicable and possible must be seeded with a vegetation seed mix adapted to reflect the local indigenous flora that was present prior to mining activities commenced if the natural succession of vegetation is unacceptably slow.
- Fires may only be allowed in facilities or equipment specially constructed for this purpose.
- The end objective of the re-vegetation program must be to achieve a stable self-sustaining habitat unit.

Groundwater

- Vehicle- and equipment maintenance must only be allowed within the maintenance area. Only emergency breakdowns may be allowed in other areas.
- The following procedure must be followed if a vehicle or piece of equipment would break down inside an excavation and outside of the maintenance area.
  - Drip pans must be placed at all points where diesel, oil or hydraulic fluid may drip and in so doing contaminate the soil.
  - All efforts must be made to move the broken-down vehicle or piece of equipment to the maintenance area.
  - If the vehicle/piece of equipment cannot be moved, the broken part must firstly be drained of all fluid. The part must then be removed and taken to the maintenance area.
- No repairs may be allowed outside the maintenance area except for emergencies.
- Equipment used as part of the proposed operation must be adequately maintained so as to ensure that the oil, diesel, grease or hydraulic fluid does not leak during the operation.
- Fuel and other petrochemicals must be stored in steel receptacles that comply with SANS 10089-1:2003 (SABS 089-1:2003) standards. An adequate bund wall, 150% of volume of the largest storage receptacle, must be provided for fuel and diesel areas to accommodate any spillage or overflow of these substances. The area inside the bund wall must be lined with an impervious lining to prevent infiltration of the fuel into the soil (and ultimately groundwater).
- Proper sanitation facilities must be provided for employees. No person may pollute the workings with faeces or urine, misuse the facilities provided or inappropriately foul the surrounding environment with faeces or urine.
- Acceptable hygienic and aesthetic practices must be adhered to.
- The workshops, washing bays and sewage tanks should be constructed far away from significant aquifer systems.
- SOP for storage, handling and transport of different hazardous materials.

- Place oil traps (drip trays) under stationary vehicles, only re-fuel al fuelling stations, construct structures to trap fuel spills at fuelling stations, immediately clean oil and fuel spills and dispose of contaminated material at licensed sites only.
- Ensure good housekeeping rules.

Noise

- Working hours must be kept between sunrise and sunset as far as possible.
- As a minimum, ambient noise levels emanating from the mining activities may not exceed 82dBA at the site boundary.
- The Company must comply with the Occupational Noise Regulations of the Occupational Health and Safety Act, Act 85 of 1993.
- The company must comply with the measures for good practice with regard to management of noise related impacts during construction and operation.
- The management objective must be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the plant area and that which may migrate outside the plant area.
- When the equivalent noise exposure, as defined in the South African Bureau of Standards Code of Practice for the Measurement and Assessment of Occupational Noise for Hearing Conservation Purposes, SABS 083 as amended, in any place at or in any mine or works where persons may travel or work exceeds 82 dB (A), the site manager will take the necessary steps to reduce the noise below this level.
- Hearing protection must be provided to all employees where attenuation cannot be implemented.
- If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.

Mechanical equipment

- All vehicles in operation will be in good working order and adhere to the relevant noise requirements in terms of the Road Traffic Act, 1997 (Act No. 93 of 1997).
- Every vehicle in operation will be equipped with a silencer on its exhaust system.
- Safety measures which generate noise, such as the reverse gear alarms on large vehicles, will be appropriately calibrated or adjusted.

Screening / Migration Control:

- Hearing protection will be made available to all employees where attenuation cannot be implemented.
- When the equivalent noise exposure, as defined in the South African Bureau of Standards code of Practice for the Measurement and Assessment of occupational Noise for Hearing Conservation Purposes, SABS 083 was amended, at or in any operation or works where persons may travel or work, exceeds 85 dB, the holder will take the necessary steps to reduce the noise below this level.
- It is recommended that a buffer zone of 1.5km be placed around all residential areas, be it formal or informal, on-site or surrounding, in which buffer zone no plant must be established.
- Appropriate non-metallic washers/insulation must be used with any joining apparatus to join screens such as corrugated iron to other structures and to each other. Such screens (if not mobile units) must be maintained in a fixed position.
- Controlled drilling and blasting activities by an authorised person.

- Noise levels to be monitored at regular intervals and the results compiled into monthly reports and submitted to the relevant authority.
- In addition to the above good public relations are essential. At all stages surrounding receptors should be educated with respect to the sound generated by the Southern Ambition operations. The information presented to stakeholders should be factual and should not set unrealistic expectations. Community involvement needs to continue throughout the project. Annoyance is a complicated psychological phenomenon; as with many industrial operations, expressed annoyance with sound can reflect an overall annoyance with the project, rather than a rational reaction to the sound itself. Southern Ambition must implement a line of communication, where complaints could be lodged.

Safety

- No employees may reside on the mine site.
- Access and haul roads must be maintained.
- Security access point to ensure monitoring of access to the site.

Soil

- In all places of development, the first 300mm of loose or weathered material found will be classified as a growth medium. The topsoil must be removed where possible, from all areas where physical disturbance of the surface will occur.
- In all areas where the above growth medium will be impacted on, it must be removed and stockpiled on a dedicated area. The maximum height of stockpiles may not exceed 2 meters.
- The growth medium/topsoil must be used during the rehabilitation of any impacted areas, after sloping in order to re-establish the same land capability.
- If any soil is contaminated during the life of the mining area, it must either be treated on site or be removed together with the contaminant and placed in acceptable containers to be removed with the industrial waste to a recognized facility or company.
- Erosion control in the form of re-vegetation and contouring of slopes must be implemented on disturbed areas in and around the site.
- Topsoil must be kept separate from overburden and may not be used for building or maintenance of access roads.
- The stored topsoil must be adequately protected from being blown away or being eroded.
- Compacted areas must be ripped to a depth of 300mm, where possible, during the continuous rehabilitation, decommissioning and closure phases of the operation in order to establish a growth medium for vegetation.
- Vehicle movement must be confined to establish roads for as far as practical in order to prevent the compaction of soils.

Surface water

- The disposal of oil, grease and related industrial waste must be transported to the stores area where it will be stored in steel containers supplied by an oil recycling contractor. All oil and grease must be removed on a regular basis from the operation by a registered approved contractor.
- All refuse and waste from the different sections must be handled according to NEMA Guidelines. Recycling of waste is encountered in all the consumer sections of the

operation, where recyclable materials must be collected before dumping them in the domestic waste disposal area.

- All non-biodegradable (recyclable) refuse such as glass bottles, plastic bags and metal scrap must be stored in a container in the waste area and collected on a regular basis and disposed of at a recognized disposal facility.
- Erosion and storm water control measures must be implemented.
- An application for an integrated Water Use Licence must be submitted at the Department of Water and Sanitation for all actions to be performed which requires authorization in terms of water uses.
- Vehicle repairs must only take place within the maintenance area for vehicles. Repairs within open excavations must be limited to emergency break downs with drip trays.
- Re-fuelling must only take place in the re-fuelling area. If this is found not to be practical, drip trays must be used whenever re-fuelling takes place outside of this area.
- During rehabilitation the application must endeavour to reconstruct flow patterns in such a way that surface water flow is in accordance with the natural drainage of the area as far as practically possible.
- The vegetation associated with the wetlands has a high sensitivity with a high conservation priority. No major alteration of these important drainage areas is recommended, especially considering it to form part of an important catchment. The potential to impact on the wetland habitat is high and therefore a sufficient buffer zone of 30 meters is applicable for if possible, in terms of the mining operations, while strict mitigation should be implemented for the access road to allow natural flow underneath the road surface;
- All construction and maintenance activities should be conducted in such a way that minimal damage is caused to the drainage features onsite.

Topography

- All manganese excavations must be rehabilitated if and when possible and made safe so as to reflect as far as possible the pre-mining topography of the area.
- All temporary features e.g. plant, containers and stockpiling must be removed and handled in the prescribed manner during rehabilitation.

Visual

- Security Lights must be fixed at an angle to ensure that it does not cause a disturbance to the surrounding environment at night
- The Pit must be subject to progressive backfilling if possible and made safe (including the re-establishment of vegetation).
- Permanent structures or features that are part of the proposed mining operation must be kept neat and well presented.
- Waste material of any description must be removed from the mining area on a regular basis and be disposed of at a recognized landfill facility.

The impact management objectives for the Southern Ambition planned mining operation should include:

  - To ensure efficient extraction of the manganese and to prevent the sterilization of any manganese reserves.
  - To limit the alteration of the surrounding topography
  - To manage and preserve soil types

- To prevent the loss of land capability
- To ensure the continuation of economically viable land use.
- To ensure that the surrounding ground water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quality of ground water resources.
- To ensure that the surrounding surface water resources are not adversely affected to the detriment of the health and welfare of nearby communities; and to ensure suitable quantity and quality of ground water resources.
- Rehabilitation of disturbed areas during the mine life cycle as well as during closure phase has to be done to minimize erosion and/or pollution of natural streams.
- To contain soils and materials within demarcated areas and prevent contamination of storm water runoff.
- To minimise the loss of natural vegetation.
- To prevent the proliferation of alien invasive plants species.
- To protect the wildlife and bird species.
- To protect the natural habitat of wildlife and bird species.
- To maintain visual integrity; and to minimise the extent of the generation of dust in order to minimise the aspect of nuisance and health impacts to sensitive receptors.
- To minimise noise to a level that disturbances felt by the communities are limited.
- To reduce the impact on visual quality due to intrusive mine infrastructure, activities and facilities.
- To ensure that all traffic generated by the proposed mining development does not negatively impact on existing road networks and infrastructure; and to ensure traffic safety.
- To preserve the historical and cultural artefacts located on site in compliance with the South African Heritage Resources Act, 1999 (Act No 25 of 1999).
- To ensure that the current socio-economic status quo is improved.
- To be transparent and practise effective communication; in order to maintain good relationships with all interested and affected parties.

n) Aspects for inclusion as conditions of Authorisation

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

All recommendations and limitations in specialist studies appended should be adhered to.

o) Description of any assumptions, uncertainties and gaps in knowledge

The above mitigation measures are tried and tested over many years in the manganese industry. The Company must monitor the potential impacts throughout the life of operation, and mitigate any deviations detected. This has been proven to be very effective in existing operations.

The EAP who compiled this document and the specialists who compiled the respective specialist reports have extensive knowledge in their field and it is therefore assumed that the above assumptions are adequate and that the information provided is correct.

p) Reasoned opinion as to whether the proposed activity should or should not be authorised

i) Reasons why the activity should be authorized or not.

There are no significant reasons why the activity should not be authorised. However, if the proposed management and mitigation measures are not properly applied or if the mining operation intentionally disregards any of these measures, it will negatively affect the environment and have more long-term consequences. Therefore, the competent authority should take all the necessary steps to ensure that the mining operation complies with the conditions set out in the approval of the EMPR.

ii) Conditions that must be included in the authorisation.

(1) Specific conditions to be included into the compilation and approval of EMPr

The general conditions; including management of activity, monitoring, recording and reporting to the Department, commissioning of the activity, operation of the activity, site closure and decommissioning as well as non-compliances; as required in terms of the Environmental Impact Assessment Regulations promulgated in terms of NEMA (Act 107 of 1998) as well as objectives and requirements of relevant legislation, policies and guidelines must be included in the Authorization.

(2) Rehabilitation requirements

A Detailed rehabilitation plan will be compiled and attached to the EMPR. The Mine had to provide to the DMR, a financial rehabilitation guarantee to the amount as calculated in terms of the financial quantum Guideline and approved by the DMR.

Infrastructure areas

On completion of the mining operation, the various surfaces, including the access road, the office area, storage areas and the plant site, will finally be rehabilitated as follows: All other material on the surface will be removed to the original topsoil level where possible. This material will then be backfilled into any open pits. Any compacted area will then be ripped to a depth of 300mm, where possible, the topsoil or growth medium returned and landscaped.

All infrastructures, equipment, plant, and other items used during the operational period will be removed from the site.

On completion of operations, all buildings, structures or objects on the office site will be dealt with in accordance with regulation 44 of the Minerals and Petroleum Resources Development Act, 2002.

Topsoil and Stockpile Deposits:

Disposal Facilities: Waste material of all description inclusive of receptacles, scrap, rubble and tyres should be removed entirely from the mining area and disposed of at a recognized landfill facility. It should not be permitted to be buried or burned on the site.

Ongoing Seepage, Control of Rainwater:

Water Quality Management in accordance with the South African Water Quality Guidelines must be adhered to in order to provide timely and accurate water data to the Department of Water and Sanitation (DWS) as well as to manage impacts caused by the activity. Specific objectives of such a program are to:

- Determine whether water quality comply with water quality standards.
- Provide timely data for intervention as and when required.
- Assess the status of water quality in the surrounding areas.
- Provide analytical water quality information describing trends (present conditions and changes).

The objectives are to limit the adverse effect of pollutants in the water resource. The setting of in-stream Resource Water Quality Objectives (RWQO) is based on the South African Water Quality Guidelines.

Water Monitoring Points

Surface water: There are no perennial Rivers near the mining area which may be impacted by the mining activity. There is a non-perrennial river the Ga-Mogara on the western side of the Mining area. Monitoring takes place by collecting surface water samples every quarter if there is any surface water available.

Long Term Stability and Safety: It should be the objective of mine management to ensure the long-term stability of all rehabilitated areas including the Open Pit. This should be done by the monitoring of all areas until a closure certificate has been issued.

Groundwater Monitoring

The following recommendations are given with regard to the updated monitoring protocol for the mine:

- Drill designated boreholes upgradient and downgradient of the mine residue and pit areas.

- Quarterly monitoring frequency of groundwater levels and qualities is deemed appropriate. Consideration should be given to continuous water level measurements using automatic data logger with quarterly reporting
- The borehole should be purged before the physic-chemical parameters are determined and samples for analysis retrieved.
- Suitable sample containers should be utilised for the sample collection, i.e. plastic or glass containers for major elements and plastic or boron-glass containers for minor and trace elements (taken out of the Geohydrological Report by delta H water system monitoring, August 2018).

Final rehabilitation in respect of erosion and dust control: Self-sustaining vegetation will result in the control of erosion and dust and no further rehabilitation is deemed necessary, unless vegetation growth is not returned to a desirable state by the time of mine closure.

Final Rehabilitation Roads:

- After rehabilitation has been completed, all roads should be ripped or ploughed, fertilized and providing the landowner does not want them to remain that way and with written approval from the Director: Mineral Development of the Department of Mineral Resources.

Submission of Information:

- Reports on rehabilitation and monitoring should be submitted annually to the Department of Mineral Resources – Kimberley, as described in Regulation 55 and NEMA.

Maintenance (Aftercare):

- Maintenance after closure should include the regular inspection and monitoring and/or completion of the re-vegetation programme.
- The aim of the Environmental Management Programme is for rehabilitation to be stable and self-sufficient, so that the least possible aftercare is required.
- The aim with the closure of the mine should be to create an acceptable post-mine environment and land-use. Therefore, all agreed commitments should be implemented by Mine Management.

After-effects Following Closure:

Acid Mine Drainage: No potential for bad quality leachate or acid mine drainage development is associated with manganese mine closure.
Long Term Impact on Ground Water: No after effect on the groundwater yield or quality is expected.

Long-term Stability of Rehabilitated Land: One of the main aims of any rehabilitated ground should be to obtain a self-sustaining and stable end result. The concurrent monitoring of all material and replacement of topsoil where available should be ensured.

q) Period for which the Environmental Authorisation is required

5 years. The period for the maximum mining right for Southern Ambition on the Farm Rhodes and Farm East is expected to be 4 - 5 years. This is due to the manganese resource indicated in the geological reports, resource estimation report' (Taken out of the submitted Mining Works Programme for Southern Ambition).

r) Undertaking

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.

s) Financial Provision

i) Explain how the aforesaid amount was derived

The total cost to rehabilitate and mitigate the Southern Ambition site as it stands currently (risking premature rehabilitation) is estimated to be R2 693 328 according to the DMR calculations.

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures	m3	1500	13.72	1	1	20580
2 (A)	Demolition of steel buildings and structures	m2	86	191.16	1	1	16439.76
2(B)	Demolition of reinforced concrete buildings and structures	m2	16	281.71	1	1	4507.36
3	Rehabilitation of access roads	m2	140000	2	1	1	280000
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	332.01	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	181.1	1	1	0
5	Demolition of housing and/or administration facilities	m2	245	382.32	1	1	93668.4
6	Opencast rehabilitation including final voids and ramps	ha	5	194579.4	0.52	1	505906.44
7	Sealing of shafts adits and inclines	m3	0	102.62	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0.5	133609.85	1	1	66804.925
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	3	166408.65	1	1	499225.95
			0		1	1	
8 (C)	Rehabilitation of processing waste deposits and evaporation	ha	0	483329.59	1	1	0
9	Rehabilitation of subsided areas	ha	0	111878.12	1	1	0
10	General surface rehabilitation	ha	5.025	105841.53	1	1	531853.6883
11	River diversions	ha	0	105841.53	1	1	0
12	Fencing	m	0	120.73	1	1	0
13	Water management	ha	0	40243.93	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	0	14085.38	1	1	0
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum	0			1	0
					Sub Total 1		2018986.523
1	Preliminary and General		121139.1914		weighting factor 2 1		121139.1914
2	Contingencies		201898.6523				201898.6523
					Subtotal 2		2342024.37
					VAT (15%)		351303.66
					Grand Total		2693328

ii) Confirm that this amount can be provided from operating expenditure

It is confirmed that the amount for outstanding rehabilitation can be provided from operating expenditure.

t) Specific information required by the competent Authority

i) 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 (Act 107 of 1998), the EIA Report must include the:-

(1) Impact on the socio-economic conditions of any directly affected person

From a social perspective the following objectives and measures should be included as part of the Social Management Plan (SMP) as part of the Environmental Management Plan (EMP).
It should be noted that the responsibility of the mitigation lies with the owner, operator, and/or with the local municipality. The mitigation measures would have to form part of the respective stakeholder's expenditure predictions or operations and management within the area; therefore, the monitoring activities cannot be expressed in financial terms.
From a social perspective it can be concluded that the proposed Southern Ambition Project would not result in permanent damaging social impacts. The socio-economic benefits associated with the mine outweigh the negative social impacts. It is thus concluded that the proposed project is acceptable from a social point of view, provided that mitigation measures are implemented.

(2) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act

African Heritage Consultants were appointed to undertake a Phase I Heritage Assessment. The brief was to survey the footprint and adjacent land in order to record all existing cultural and heritage resources and to assess potential impacts to heritage resources that might occur through the proposed development of the open cast manganese mine on the farm East 270 (Portion 1 & Re) (Figure 1). The planned development is located at 27° 9'36.90"S and 22°55'5.19"E The locality under review was visited between 8 and 10 May 2018 and inspected on foot. Visibility was good (Study is appended as Appendix 3 to this report).

Scope and purpose of the report
The HIA report provides a general background to the project, an introduction to the southern African heritage that gives a brief outline of the chronological succession of the various phases of settlement, provides context for the heritage resources of the immediate region of Hotazel and sets out the methodologies that were applied during this particular heritage assessment. The findings of the HIA are discussed and recommendations are made for mitigation.

The desktop literature study indicated a generally low level of heritage resources around Hotazel and within the immediate landscape. Prehistoric and historical settlement and utilization of the resources of the region focussed mostly on sources of water such as the GaMogara River, springs and pans.
Traces of prehistoric occupations are mainly in the form of dispersed lithics that hint at previous living sites and subsistence activities. These include stone tools that are characteristic of all three successive periods of the southern African Stone Age.

Stone tools were found in the vicinity of the Ga-Mogara River during the field survey. These were mostly isolated specimens and scatters of stone tools. A few Large Cutting Tools that are typical of the ESA were present. However, most of the lithics comprise representative MSA examples, while a few are more characteristic of LSA tool types. The stone tools that have been located were mostly in dispersed contexts. Where there were concentrations of lithics, these occurred in low densities of <10 tools per square metre. All of the identified scatters of stone tools are of low significance and no mitigation is recommended.

Two informal cemeteries were located. Cemetery 1, demarcated with what is now a somewhat dilapidated fence, contains two graves and possibly another grave. Cemetery 2 contains around 18 graves. The graves are marked by headstones of calcrete cobbles and in two instances, banded iron stones. From consultations with the local farm workers it seemed that the graves have not been recently visited by any relatives. This is borne out by a complete lack of grave offerings.

The cemeteries are situated outside the footprint of the proposed development and will not be impacted. While there is no objection to the proposed development based on a very low level of archaeological remains, the presence of graves identified during the survey has to be addressed. It is accordingly recommended that the two cemeteries should be clearly demarcated and fenced. Graves are deemed to have high cultural significance for their social value. The graves are accordingly graded as a Grade IIIA resource.

Conclusions and recommendations

The literature study indicated a low level of heritage resources around Hotazel and within the immediate landscape. Prehistoric and historical utilization of the region focussed mostly on sources of water such as the Ga-Mogara River, springs and pans. During the current field survey traces of prehistoric utilisation and/or settlement were mainly found in the form of dispersed lithics from the ESA and MSA, and also some LSA stone tools. All the isolated specimens and scatters of stone tools with debris that have been identified, are of low significance. While there is no objection to the proposed development of an open-cast mine and associated infrastructure by East

Manganese on the Farm East 270 (Portion 1 & Re) from a heritage resources perspective, the presence of graves in two informal cemeteries that were identified during the survey has to be addressed.

Stone Age localities

Stone tools occurred mainly as finds of singe specimens or low-density concentrations. A small MSA stone tool production area dominated by cores, primary cortical flakes and secondary flakes, blade forms and triangular flakes was recorded at 27°10'33'S; 22°55'00'E. Another concentration was located further along the ridge. This is in proximity with the point where the existing access road enters the farm. In this locality the immediate area has been significantly disturbed during previous road building and calcrete borrowing.

It is recommended that the new road diversion be done on the northern side of the existing road cutting to mitigate possible impacts in this area. Please refer to the map where the heritage localities are indicated for the details.

Cemetery 1 at 27°09'52'S; 22°54'53'E

A set of two, and possibly more, graves are located in a small cemetery in close proximity to the existing worker house. The cemetery of approximately 10 m across is enclosed by the remains of a crude fence.

According to the proposed mine layout the locality falls outside the impact area. As such, these graves will not be affected by the proposed development. Graves are deemed to have high cultural significance for their social value. The cemetery with graves is accordingly graded as a Grade IIIA resource. It is recommended that the cemetery should be clearly demarcated and fenced.

Cemetery 2 at 27°10'07'S; 22°55'03'E

From consultations with the local farm workers it seemed that the graves in Cemetery 2 have not been visited during the recent past by any relatives. This is borne out by a complete lack of grave offerings.

According to the proposed mine layout Cemetery 2 with around 18 graves falls outside the impact area. As such, these graves will not be affected by the proposed development. Graves are deemed to have high cultural significance for their social value. The cemetery with graves is accordingly graded

as a Grade IIIA resource. It is recommended that the cemetery should be clearly demarcated and fenced.

Possible finds emanating from the development

In the event that any sub-surface heritage resources or graves are unearthed all work has to be stopped until an assessment as to the significance of the site (or material) in question has been made by a heritage practitioner. Note that no archaeological material that has been uncovered may be removed. This applies to graves and cemeteries as well. In the event that any graves or burial places are located during the development, the procedures and requirements pertaining to graves and burials will apply. If human remains

are uncovered, or previously unknown graves are discovered, a qualified archaeologist needs to be contacted and an evaluation of the finds made. If the remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA need to be followed. This includes an extensive social consultation process (Taken out of the HIA report by African Heritage Consultants CC, June 2018).

Palaeontological

African Heritage Consultants CC has facilitated the appointment of Dr H. Fourie, a palaeontologist, to undertake a Paleontological Impact Assessment (PIA), Phase 1: Field Study of the suitability of the Proposed East Manganese mining near Hotazel on the Farm Portion 1 and Remaining Extent of East 270 in the Gamagara Local Municipalities, in the John Taolo Gaetsewe District Municipality, Northern Cape Province.

This report aims to provide comment and recommendations on the potential impacts that the proposed development could have on the fossil heritage of the area and to state if any mitigation or conservation measures are necessary.

Summary of findings: The Palaeontological Impact Assessment: Phase 1: Field Study was undertaken towards the end of July 2018 in the winter in mild and dry conditions (Appendix 6 of Act, 1(d)), and the following is reported:

The development is taking place on the Kalahari Group (Qs) with underlying Griqualand West Basin rocks, Transvaal Supergroup of Vaalian age.

The Kalahari deposits extend in age down to at least the Late and probably the Early Tertiary (65 million years ago). Fossils are scarce, and are of terrestrial plants and animals with close affinity to living forms. Included in the Kalahari Group are the Quaternary alluvium, terrace gravels, surface limestone, silcrete, and aeolian sand.

Four major types of sands have been delineated (Kent 1980).

The alluvium sands were deposited by a river system and reworked by wind action (Snyman 1996). A thick cover of Kalahari reddish sand blankets most outcrops and is dominated by the typical Kalahari thornveld (Norman and Whitfield 2006). The Kalahari Group is underlain by the Uitenhage and Zululand Groups (McCarthy and Rubidge 2005).

The Griqualand West Basin, Transvaal Supergroup consists mainly of sediments of chemical origin together with lavas and subordinate clastic sediments. The basal unit, the Vryburg Formation lies unconformably on the granite and rocks of the Ventersdorp Supergroup. It is followed by the Campbell Group which consists of the Schmidtsdrif Formation and the upper Ghaap Plateau Formation. There are also two formations in the Griquatown Group, namely, the Asbestos Hills and Koegas Formations. The Gamagara Formation follows and is located on the Maremane Anticline, it is overlain by the Makganyene Formation. The Cox Group consists of the lower Ongeluk Formation and the upper Voëlwater Formation. It attains a maximum thickness of 4500 m (Kent 1980, Snyman 1996).

Fossils in South Africa mainly occur in rocks of sedimentary nature and not in rocks from igneous or metamorphic nature. Therefore, the palaeontological sensitivity can generally be LOW to VERY HIGH, and here locally HIGH for the Kalahari Group and MODERATE for the Griqualand West rocks (SG 2.2 SAHRA APMHOB, 2012) (Groenewald and Groenewald 2014).

Recommendation:
The impact of the development on fossil heritage is HIGH and MODERATE and therefore a field survey or further mitigation or conservation measures were necessary for this development (according to SAHRA protocol). A Phase 1 Palaeontological Impact Assessment was done. Fossils were not found during the walk through.

v) Other matters required in terms of sections 24(4)(a) and (b) of the Act

There are no alternatives, as the application area applied for is the area where the applicant has proven manganese and has found potential for a manganese mining operation.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1) Draft environmental management programme

a) Details of the EAP (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A, section 1(a) herein as required)

I hereby confirm that the requirements for the provision of the details and expertise of the EAP are already included in PART A, section 1(a).

Confirmed (Mark with an X)	**X**

b) Description of the Aspects of the Activity (Confirm that the requirement to describe the aspects of the activity that are covered by the draft environmental management programme is already included in PART A, section (1)(h) herein as required)

I hereby confirm that the requirements to describe the aspects of the activity that are covered by the draft environmental management programme are already included in PART A, section 1(h).

Confirmed (Mark with an X)	**X**

c) Composite Map

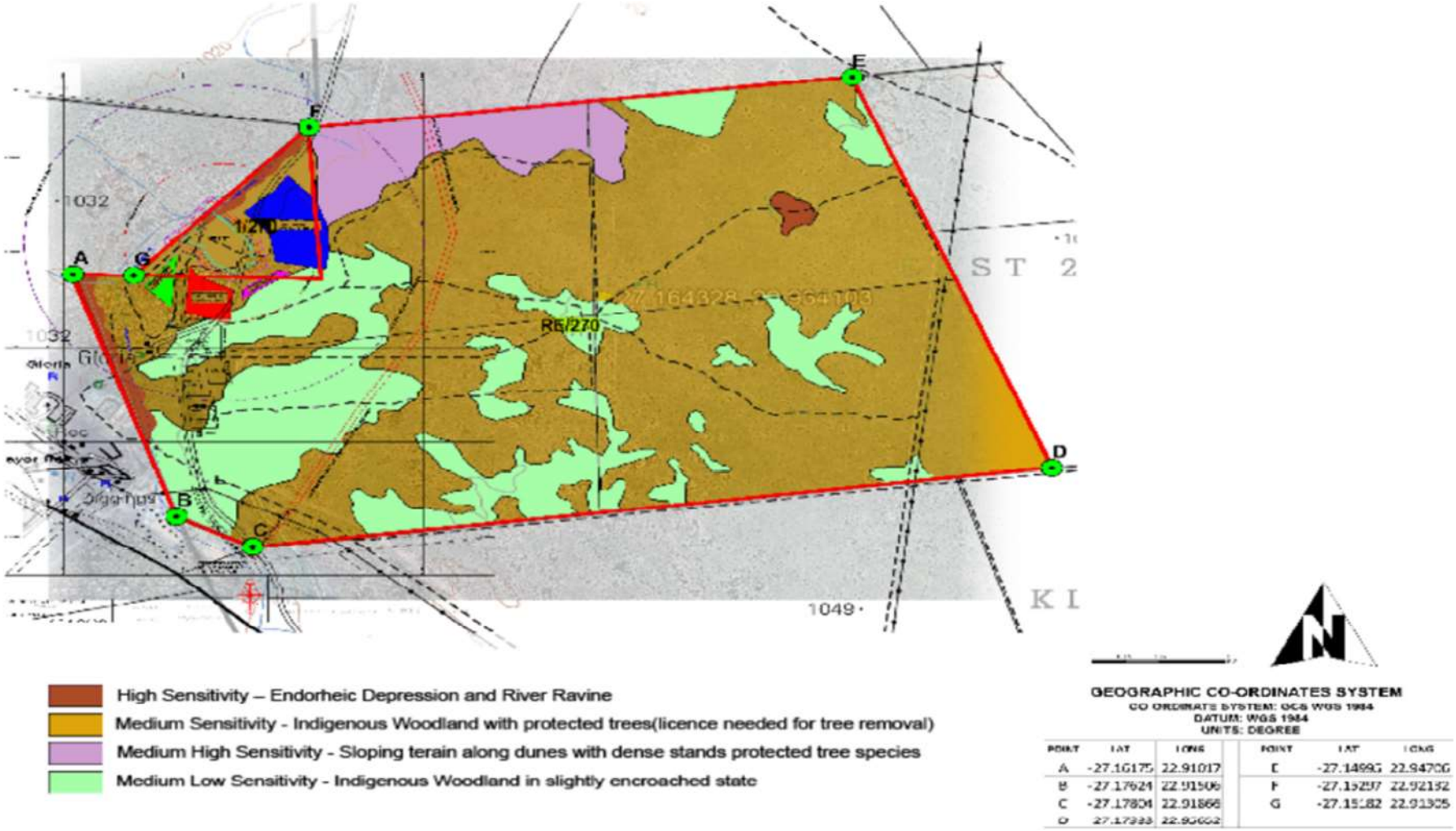

Figure 24. A sensitivity map for the proposed mining area (map taken out of the Ecological Study of Dr. BJ Henning (PhD plant Ecology; M.Sc Botany - Soil Science related Pr.Sci.Nat), July 2018).

d) Description of impact management objectives including management statements

i) Determination of closure objectives

The main closure objectives of the planned mining operation are:

- To restore the site to its current land capability in a sustainable manner.
- To prevent the sterilization of any manganese reserves.
- To prevent the establishment of any permanent structures or features.
- To manage and limit any impact to the surface and groundwater aquifers in such a way that an acceptable water quality and yield can still be obtained when a closure certificate is issued.
- To establish a stable and self-sustainable vegetation cover.
- To limit and rehabilitate any erosion features and prevent any permanent impact to the soil capability.
- To limit and manage the visual impact of the mining activities.
- To safeguard the safety and health of humans and animals on the site.
- To close the mining operation efficiently, cost effectively and in accordance with Government Policy.

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas should be left in a stable, self-sustainable state. Proof of this should be submitted at closure. Specific objectives include:

Rehabilitation of infrastructure areas

The objectives for the removal of infrastructure and the subsequent rehabilitation of the areas they occupied include:

- To ensure that infrastructure identified for removal is successfully demolished and removed.
- To ensure that infrastructure identified to remain after mine closure is maintained until the issue of a closure certificate.
- The removal, decommissioning and disposal of all mining infrastructure, will comply with all conditions contained in the MPRDA. To this end, decommissioning and rehabilitation of all infrastructure areas will follow the following principles:
- The plant and associated disused infrastructure will be dismantled or demolished. Any building foundations will be removed and land exposed to the demolition and dismantling of infrastructure and all other disturbed land will be rehabilitated.
- Rubble will be disposed of at a suitable site. The site will be selected in consultation with DENC.
- Any surface water management infrastructure will be maintained to ensure they are stable and functional.
- Just before closure, when disturbed land has been rehabilitated and erosion is controlled by vegetation cover, all disused surface water management facilities will be decommissioned.

Open Pit and Mine Residue Deposits

The objectives pertaining to the effective management and rehabilitation of the Open Pit and Residue Deposits include:

- To ensure that the Open Pit and Mine Residue Deposits are stable and that there is an acceptably low risk of failure of the pit or Deposits during the decommissioning phase and following mine closure; To establish self-sustainable vegetation cover on the benches that are not backfilled or sloped so that the visual impact of the Open Pit and Deposits is improved and in order to prevent erosion.

Management principles pertaining to Open Pit and Mine residue Deposits include:

- The Open Pit and Deposits will continuously be inspected by a suitable qualified professional engineer to ensure their stability. If they are unstable, the appropriate remedial measures will be implemented.
- Inspection and monitoring should continue until a suitable qualified profession engineer has confirmed the long-term stability of the Open Pit and Mine Residue Deposits.
- Any infrastructure or facilities that serve the Open pit or Mine Residue Deposits will be maintained to ensure that they are both stable and functional.

Maintenance

The necessary agreements and arrangement will be made by the Southern Ambition to ensure that all natural physical, chemical and biological processes for which a closure condition were specified are monitored until they reach a steady state or for three (3) years after closure or as long as deemed necessary at the time.

- Such processes include erosion of the Open Pit, Mine Residue Deposits, rehabilitated surfaces, surface water drainage, air quality, surface water quality, ground water quality, vegetative re-growth, weed encroachment.
- The closure plan will be reviewed yearly.
- Rehabilitation of the land will be maintained until a closure certificate is granted or until the land use is regarded as sustainable.
- All rehabilitated areas will be monitored and maintained until such time as required to enable the mine to apply for closure of these different areas.

Performance assessments

As per the MPRDA and associated Regulations, as well as NEMA and associated Regulations, this Environmental Management Programme will be continually assessed in terms of its appropriateness and adequacy. In order to achieve this, Southern Ambition will undertake the following:

- Implement the necessary monitoring programmes, as discussed as part of this EMPR;
- Conduct performance assessments of this EMPR; and

- Compile and submit the afore-mentioned performance assessment reports to the DMR. The frequency of the performance assessments will be annually. An independent and competent person will undertake all performance assessments.

Decommissioning and closure objectives

The key aim decommissioning and closure is to ensure that all the significant impacts are ameliorated. All rehabilitated areas will be left in a stable, self-sustainable state. Proof of this will be submitted at closure. Specific objectives include:

- To identify potential post-closure land uses in consultation with the surrounding land owners and land users. This should be done during the operational phase of the mine;
- Rehabilitate disturbed land to a state suitable for its post-closure uses;
- Rehabilitate disturbed land, Mine Residue Deposits and the open pit to a state that facilitates compliance with applicable environmental quality objectives;
- Limit the impact on staff whose positions become redundant at the time of mine closure, as addressed in the SLP;
- Keep relevant authorities informed of the progress of the decommissioning phase;
- Submit monitoring data to the relevant authorities;
- Maintain required pollution control facilities and rehabilitated land until closure.

Negative economic impacts

The objective is to alleviate the negative socio-economic impacts that will result from mine closure. Management principles to achieve this include:

- Southern Ambition will undertake a carefully planned stepwise decommissioning process.
- Closure planning will form an integral part of mine planning.
- Strategies for sustainable development have been and will continue to be developed by the project in collaboration with district and local authorities, local businesses and other interested parties. Early warning of impending closure will be given to IAPs.
- In conjunction with long-term closure planning, the mine will actively participate in regional and local planning to enhance the economic benefits of the project through development of alternative forms of income generation.
- Southern Ambition will initiate and participate in regional planning exercises that will mitigate the impacts of closure of the mine, the local and regional economies and associated abandonment of community infrastructures surrounding the mine.
- The mine will fulfil the requirements for closure.

ii) Volumes and rate of water use required for the operation

The only activity relating to the cost of water in the mining operations relates to dust suppression in the mining area and on the roads when hauling and transporting material to the processing plant, and for ablution facilities (24 128m³ per annum form the Sedibeng pipeline).

During the mining process overburden (waste material) will be removed from the manganese ore. The manganese ore will be mined selectively to ensure that only on grade material is transported to the Run of Mine (ROM) stockpile at the plant. The mining equipment selected for the mine will enable the mine to carry out the selective mining process. The selective mining process will be controlled by the mine's geologists. From the mine the manganese ore will be transported to the plant. The plant process is a standard crushing and screening process to create a marketable product with a particle sizing of -90mm +0mm.

The technology applied will be a jaw crusher and a multi-deck screen. The final product will have a particle sizing of -90mm to +0 mm and a manganese content of 36.7% Mn (Manganese) average. An independent laboratory will visit the site on a daily basis.

iii) Has a water use licence been applied for?

An application for a Water Use Licence has been loaded onto the E-WULA system and the application is in process.

iv) Impact to be mitigated in their respective phases

Table 15. Impact to be mitigated in their respective phases

ACTIVITY Whether listed or not listed. (E.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc…etc…etc.).	**PHASE** of operation in which activity will take place. State; Planning and design, Pre-Construction' Construction, Operational, Rehabilitation, Closure, Post closure.	**SIZE AND SCALE** of disturbance (volumes, tonnages and hectares or m^2)	**MITIGATION MEASURES** (describe how each of the recommendations in herein will remedy the cause of pollution or degradation and migration of pollutants)	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)	**TIME PERIOD FOR IMPLEMENTATION** Describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when Required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. With regard to Rehabilitation, therefore state either:- Upon cessation of the individual activity or. Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.
Processing Plant During the mining process overburden (waste material) will be removed from the manganese ore. The manganese ore will be mined selectively to ensure that only on grade material is transported to the Run of Mine (ROM) stockpile at the plant. The mining	Construction Commissioning Operational Decommissioning Closure	0.5 ha Steel, concrete, electric wires	Access control Maintenance of processing plant Dust control and monitoring Noise control and monitoring Drip trays Storm water run-off control		Removal of processing plant upon closure of mining right.

equipment selected for the mine will enable the mine to carry out the selective mining process. The selective mining process will be controlled by the mine's geologists. From the mine the manganese ore will be transported to the plant. The plant process is a standard crushing and screening process to create a marketable product with a particle sizing of -90mm +0mm.			Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover		
Ablution facilities 4 rondawels	Construction Commissioning Operational Decommissioning Closure	25m² or 0.0025ha	Maintenance of ablution facilities.		Removal ablution facilities upon closure of the mining Right.
Clean & Dirty water systems: a) to construct a pollution control dam as part of their storm water management plan; b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.	Construction Commissioning Operational Decommissioning Closure	This area also includes the re-fuel and lubrication station, wash bay and office area.	Maintenance of berms and trenches Oil traps used in relevant areas. Drip trays used. Immediately clean hydrocarbon spill.		Upon cessation of the individual activity (continuous rehabilitation)
Fuel Storage facility (Diesel tanks)	Construction Commissioning Operational Decommissioning Closure	250m² Concrete, bricks, and steel	Maintenance of diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point		Removal of diesel tanks upon closure of mining Right.

			Immediately clean hydrocarbon spill.		
Mining Area	Commissioning Operational Decommissioning Closure	Provision is made for a maximum footprint of 7.5 hectares of Open Pit.	No dumping of materials prior to approval by exploration geologist; Proper planning of the Open Pit Access control Dust control and monitoring Noise control and monitoring Continuous rehabilitation Stormwater run-off control Immediately clean hydrocarbon spill Drip trays Dump control and monitoring Erosion control		Upon cessation of the individual activity (continuous rehabilitation)
Salvage yard (Storage and laydown area)	Construction Commissioning Operational Decommissioning Closure	1000m² or 0.1 ha No construction material, area to be levelled with a grader and fenced with a gate and access control	Access control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill		Removal of fence around salvage yard and ripping of salvage yard area upon closure of the Mining right.
Waste disposal site (domestic and industrial waste):	Construction Commissioning Operational Decommissioning Closure	15m x 30m = 450m²	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals		Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of Mining right.

Roads (both access and haulage road on the mine site):	Construction Commissioning Operational Decommissioning Closure	Additional mine haul road = 5 000m²	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover		Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the mining right.
Workshop and Wash bay	Construction Commissioning Operational Decommissioning Closure	300m² Concrete and Steel	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills		Removal of wash bay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right
Water distribution Pipeline	Construction Commissioning Operational Decommissioning Closure	HDPE Pipes	Maintain water pipeline and structures		Removal of pipeline upon closure of the mining right.
Water tanks:	Construction Commissioning Operational Decommissioning Closure	3m X 3m = 9m²	Maintain water tanks and structures		Removal of water tank and steel structure upon closure of the mining right.

e) Impact Management Outcomes

ACTIVITY **Whether listed or not listed.**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….**	**ASPECTS AFFECTED**	**PHASE** **In which impact is anticipated** **(e.g. construction, commissioning, operational, Decommissioning, closure, post closure)**	**MITIGATION TYPE** (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	**STANDARD TO BE ACHIEVED** **(impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives) etc.**
Processing Plant	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Air Quality Fauna Flora Noise Soil Surface water Safety	Construction Commissioning Operational Decommissioning Closure	Access control Maintenance of processing plant Dust control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints.	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Ablution facilities 4 Rondawels	Soil contamination	Soil Groundwater	Construction Commissioning Operational	Maintenance of sewage facilities on a regular basis.	Minimize the potential for a chemical spill on soil, which

	Possible Groundwater contamination		Decommissioning Closure		could infiltrate to groundwater.
Clean & Dirty water systems: a) to construct a pollution control dam as part of their storm water management plan; b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.	Surface disturbance Groundwater Contamination Soil contamination Surface water contamination	Soil Groundwater Surface Water	Construction Commissioning Operational Decommissioning Closure	The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Safety ensured. Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna	Soil Groundwater Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution.	Minimize potential for hydrocarbon spills to infiltrate into groundwater. Rehabilitation standards and closure objectives to be met.

	Soil contamination Surface disturbance			Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site. Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.	
Mining Area.	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Air quality Fauna Flora Groundwater Noise Soil Surface Water Topography Safety	Commissioning Operational Decommissioning Closure	Access control Dust control and monitoring Noise control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays Dump stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints.	Safety ensured. Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

				Mining activities must be planned, where possible in order to encourage (faunal dispersal) and should minimise dissection or fragmentation of any important faunal habitat type. The extent of the Mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). No construction personnel or vehicles may leave the demarcated area except those authorized to do so. Those areas surrounding the mine site that are not part of the demarcated development area should be considered as a no go zone for employees, machinery or even visitors. Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance, and must ensure that all contractors and workers undergo Environmental Induction prior to commencing with work on site. All those working on site must undergo	

				environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall mining footprint. The Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining;	

				Snares & traps removed and destroyed; and Maintenance of firebreaks. It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the drainage lines. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away.	
Salvage yard (Storage and laydown area)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Fauna Flora Groundwater Soil Surface Water	Construction Commissioning Operational Decommissioning Closure	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Minimize potential for hydrocarbon spills to infiltrate into groundwater Rehabilitation standards and closure objectives to be met. Erosion potential minimized.

Product Stockpile area	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Surface disturbance	Air Quality Fauna Flora Noise Soil Surface Water	Commissioning Operational Decommissioning Closure	Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Installing acoustic Develop a mechanism to record and respond to complaints.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Waste disposal site (domestic and industrial waste):	Groundwater contamination Contamination of soil Surface water contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Storage of Waste within receptacles Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met.
Roads (both access and haulage road on the mine site):	Dust Noise Removal and disturbance of vegetation cover	Air quality Fauna Flora Noise Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives met.

	and natural habitat of fauna Soil contamination Surface disturbance			Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans; Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Erosion potential minimized.
Workshop and Wash bay	Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination	Groundwater Soil Surface water	Construction Commissioning Operational Decommissioning Closure	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Water distribution Pipeline	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning	Monitor pipeline for water leaks Maintenance of pipeline	Rehabilitation standards and closure objectives to be met.

			Closure	Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Erosion potential minimized.
Water tanks:	Surface disturbance	Fauna Flora Surface Water	Construction Commissioning Operational Decommissioning Closure	Maintain water tanks and structures	Safety ensured. Rehabilitation standards and closure objectives to be met.

f) Impact Management Actions

ACTIVITY **Whether listed or not listed.**	**POTENTIAL IMPACT** **(e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater, contamination, air pollution)….**	**MITIGATION TYPE** (modify, remedy, control or stop) through (e.g. noise control measures, storm water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity	**TIME PERIOD FOR IMPLEMENTATION** **Describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required. With regard to Rehabilitation specifically this must take place at the earliest opportunity. With regard to Rehabilitation, therefore state either:- Upon cessation of the individual activity or Upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be.**	**COMPLIANCE WITH STANDARDS** (A description of how each of the recommendations in 2.11.6 read with 2.12 and 2.15.2 herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)
Processing Plant: During the mining process overburden (waste material) will be removed from the manganese ore. The manganese ore will be mined selectively to ensure that only on grade material is transported to the Run of Mine (ROM) stockpile at the plant. The mining equipment selected	Dust Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Access control Maintenance of processing plant Dust control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Installing silencers for fans;	Removal of processing plant upon closure of mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees.

for the mine will enable the mine to carry out the selective mining process. The selective mining process will be controlled by the mine's geologists. From the mine the manganese ore will be transported to the plant. The plant process is a standard crushing and screening process to create a marketable product with a particle sizing of -90mm +0mm.		Installing suitable mufflers on engine exhausts and compressor components; Develop a mechanism to record and respond to complaints.		• The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.
Ablution Facilities 4 Rondawels	Soil contamination Groundwater contamination	Maintenance of sewage facilities on a regular basis.	Removal of facility upon closure of the mining Right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan.

				• Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.
Clean & Dirty water systems: a) to construct a pollution control dam as part of their storm water management plan; b) to construct a flood protection berm on the side of the open cast pit excavation within 32m from the 1:100-year flood line to control any 1:100-year flooding events.	Surface disturbance Groundwater Contamination Soil contamination Surface water contamination	It will be necessary to divert storm water around dump areas by construction of a temporary gravel cut-off berm that will prevent surface run-off into the mining area. The Open Pit, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away. Maintenance of trenches Monitoring and maintenance of oil traps in relevant areas. Drip trays used. Immediately clean hydrocarbon spill. Linear infrastructure such as roads and pipelines will be inspected at least monthly to	Upon cessation of the individual activity (continuous rehabilitation) Levelling of storm water berms upon closure of mining Right	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.

		check that the associated water management infrastructure is effective in controlling erosion.		
Fuel Storage facility (Diesel tanks)	Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Maintenance of Diesel tanks and bund walls. Oil traps Drip tray at re-fuelling point. Refuelling must take place in well demarcated areas and over suitable drip trays to prevent soil pollution. Spill kits to clean up accidental spills from earthmoving machinery must be well-marked and available on site. Workers must undergo induction to ensure that they are prepared for rapid clean-up procedures. All facilities where dangerous materials are stored must be contained in a bund wall. Vehicles and machinery should be regularly serviced and maintained.	Removal of diesel tanks upon closure of Mining Right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.
Mining Area	Dust Noise Removal and disturbance of vegetation cover and	Access control Dust control and monitoring Continuous rehabilitation Storm water run-off control Immediately clean hydrocarbon spill Drip trays	Upon cessation of the individual activity (continuous rehabilitation)	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's

	natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Dump stability control and monitoring Erosion control Noise control Well maintained equipment Selecting equipment with lower sound power levels; Taking advantage during the design stage of natural topography as a noise buffer; Develop a mechanism to record and respond to complaints. Mining activities must be planned, where possible in order to encourage (faunal dispersal) and should minimise dissection or fragmentation of any important faunal habitat type. The extent of the mining area should be demarcated on site layout plans (preferably on disturbed areas or those identified with low conservation importance). No construction personnel or vehicles may leave the demarcated area except those authorized to do so. Those areas surrounding the mining site that are not part of the demarcated development area should be considered as a no-go zone for employees, machinery or even visitors. Appointment of a full-time ECO must render guidance to the staff and contractors with respect to suitable areas for all related disturbance and must ensure that		Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.

		all contractors and workers undergo Environmental Induction prior to commencing with work on site. All those working on site must undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls which are often persecuted out of superstition. All those working on site must be educated about the conservation importance of the fauna and flora occurring on site. The environmental induction should occur in the appropriate languages for the workers who may require translation. Reptiles and amphibians that are exposed during the clearing operations should be captured for later release or translocation by a qualified expert. Employ measures that ensure adherence to the speed limit. Careful consideration is required when planning the placement for stockpiling topsoil and the creation of access routes in order to avoid the destruction of habitats and minimise the overall mining. The Footprint areas of the mining activities must be scanned for Red Listed and protected plant species prior to mining; Snares & traps removed and destroyed; and		

		Maintenance of firebreaks. The Open Pit, where and when applicable, should be rehabilitated concurrently as mining progresses. The re-vegetation of disturbed areas is important to prevent erosion and improve the rate of infiltration. Erosion channels that may develop before vegetation has established should be rehabilitated by filling, levelling and re-vegetation where topsoil is washed away.		
Salvage yard (Storage and laydown area)	Surface Water contamination Groundwater contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination	Access Control Maintenance of fence Storm water run-off control Immediately clean hydrocarbon spill	Removal of fence around salvage yard and ripping of salvage yard area upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the

				operation adheres to the contents of the BAR and EMPr documents.
Product Stockpile area	Surface Water contamination Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance Surface water contamination		Dust Control and monitoring Noise control and monitoring Drip trays Storm water run-off control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Develop a mechanism to record and respond to complaints.	Dust levels minimized Minimize potential for hydrocarbon spills to infiltrate into groundwater Noise levels minimized Rehabilitation standards and closure objectives to be met. Erosion potential minimized.
Waste disposal site (domestic and industrial waste):	Groundwater contamination Surface Water contamination Contamination of soil Surface water contamination	Storage of Waste within receptacles Storm water control Ground water monitoring Storage of hazardous waste on concrete floor with bund wall Removal of waste on regular intervals	Removal of waste receptacles, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto.

				Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.
Roads (both access and haulage road on the mine site):	Dust Surface Water contamination Groundwater contamination Noise Removal and disturbance of vegetation cover and natural habitat of fauna Soil contamination Surface disturbance	Maintenance of roads Dust control and monitoring Noise control and monitoring Speed limits Storm water run-off control Erosion control Immediately clean hydrocarbon spills Rip disturbed areas to allow re-growth of vegetation cover Noise control Well maintained equipment Selecting equipment with lower sound power levels; Develop a mechanism to record and respond to complaints. Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Upon cessation of the individual activity (continuous rehabilitation) Ripping of roads upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.
Workshop and Wash bay	Surface Water contamination Removal and disturbance of vegetation cover and	Concrete floor with oil/water separator Storm water run-off control Immediately clean hydrocarbon spills	Removal of wash bay equipment, breaking and removal of rubble from the concrete floors and bund walls upon closure of mining right	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's

	natural habitat of fauna Soil contamination			• SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.
Water distribution Pipeline	Surface disturbance	Monitor pipeline for water leaks Maintenance of pipeline Linear infrastructure such as roads and pipelines will be inspected at least monthly to check that the associated water management infrastructure is effective in controlling erosion.	Removal of pipeline upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan.

				• Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.
Water tanks:	Surface disturbance	Maintain water tanks and structures	Removal of water tank and steel structure upon closure of the mining right.	The following must be placed at the site and is applicable to all activities: • Relevant Legislation; • Acts; • Regulations • COP's • SOP's Management and staff must be trained to understand the contents of these documents and to adhere thereto. • Environmental Awareness training must be provided to employees. • The operation must have a rehabilitation and closure plan. • Management and staff must be trained to understand the contents of these documents, and to adhere thereto. Annual performance Assessment Reports and quantum Calculations must be done to ensure that the operation adheres to the contents of the BAR and EMPr documents.

i) Financial Provision

(1) Determination of the amount of Financial Provision

(a) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under the Regulation.

The key aim of decommissioning and closure is to ensure that all the significant impacts are ameliorated, and that the environment is returned to its original state, based on the baseline information, as far as is practically possible. Therefore, all rehabilitated areas should be left in a stable, self-sustainable state and proof of this should be submitted at closure.

The baseline environmental information is usually determined by reviewing all applicable information available for the site and the overall region. This information is gathered through a combination of on-site observations, spatial information and specialist baseline studies. Information regarding current land uses and existing biophysical environment gathered from interested and affected parties during the public consultation process are also taken into consideration when describing the baseline environment.

General closure objectives include the following:

Adhere to all statutory and other legal requirements;

Identify potential post-closure land uses in consultation with the future landowner, surrounding landowners and land users; well in advance, before closure and preferably during the operational phase of the mine;

Remove, decommission and dispose all infrastructures, and ensure that these processed comply with all conditions contained in the MPRDA

Rehabilitate disturbed land to a state suitable for its post-closure uses, and which are stable, sustainable and aesthetically acceptable on closure;

Rehabilitate disturbed land and Open Pit to a state that facilitates compliance with applicable environmental quality objectives;

Physically stabilise remaining structures to minimise residual risks;

Ensure the health and safety of all stakeholders during closure and post closure and that future land users are not exposed to unacceptable risks;

To alleviate the negative socio-economic impacts that will result from closure;

Promote biodiversity and ecological sustainability as far as practically possible;

Keep relevant authorities informed of the progress of the decommissioning phase;

To ensure that all natural physical, chemical and biological processes for which a closure condition were specified are monitored until they reach a steady state, for two years after closure, or for long as deemed necessary at the time and to submit such monitoring data to the relevant authorities;

Maintain required facilities and rehabilitated land until closure.

(b) Confirm specifically that the environmental objectives in relation to closure have been consulted with landowner and interested and affected parties.

The surface owner is Mr. Niekie Pretorius and a surface use agreement had been concluded with him.

(c) 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.

The rehabilitation of land disturbed by the operation during the life of the mining Right will be accompanied by ongoing monitoring of the environment, until a stable state is reached. The main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the area and habitats to a condition acceptable for obtaining a closure certificate.

Final rehabilitation of the site is expected to be within 5 years after the right has been granted. Final rehabilitation will be executed systematically and will consist of the elements and procedures as listed below. More realistic closure elements will be fully determined by a Professional Mine Surveyor once the operation is active.

Dismantling of processing plant and related structures:

- The processing plant in total is expected to cover an area of ± 500 m2, of which all should be dismantled and removed. This includes related infrastructures, equipment, machinery,

screening plant, and other items used during the processing activities, such as conveyor belts, pipelines and power lines.
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of steel buildings and structures:
- All steel buildings and structures are expected to amount to 86 m2. These include mobile stores, workshops, offices, ablutions, water tanks, etc. Those in disuse and which cannot be sold, donated, or used for future purposes should be dismantled and removed or demolished.
- Any associated foundations associated with dismantled steel buildings and structures should also be demolished to 1 m below ground level;
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition of reinforced concrete buildings and structures
- All brick buildings and concrete structures are expected to amount to ± 245 m2. These include French drains, wash bays, refuelling depots and concrete floors. Those in disuse and which cannot be donated or used for future purposes should be demolished.
- The foundations of these buildings should also be demolished and to a depth of 1 m below ground level;
- The topography should then be restored to its natural contours, and any compacted area should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Rehabilitation of access roads
- Mine roads in total, is expected to cover an area of 140 000 m2. After general site rehabilitation has been completed, all redundant roads should be ripped or ploughed.
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Demolition and rehabilitation of electrified railway lines

- There are no electrified railway lines associated with the mining activities.

Demolition and rehabilitation of non-electrified railway lines

- There are no non-electrified railway lines associated with the mining activities.

Demolition of housing and/or administration facilities

- There are no other housing or administration facilities associated with the Mining activities, other than those in the form of mobile containers. These were however included in the section for demolition of steel buildings and structures.

Opencast rehabilitation including final voids and ramps

- Opencasts and ramps associated with the Mining activities are expected to cover 5 ha (7.5ha over the LOM).
- In-filling of the pits should take place concurrently and by obtaining material from the closest adjacent excess material heaps;
- The topography should then be shaped to the natural contours;
- The prepared surfaces should finally be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation.

Sealing of shafts, adits and inclines

- There are no shafts associated with the Mining activities.

Rehabilitation of overburden and spoils

- The total final overburden and spoils are estimated to amount to 0.5 ha and includes waste dumps as well as earth walls. Pre-planning should be conducted in order decide the fate of these features. For example, if the material from these features will be used for in-filling, or if the features will remain after closure.
- The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Rehabilitation of processing waste deposits and evaporation ponds with pollution potential

- No processing waste deposits and evaporation ponds with pollution potential are associated with the Mining activities.

Rehabilitation of processing waste deposits and evaporation ponds with no pollution potential

- There will be processing waste deposits on the Mining area and evaporation ponds is estimated to cover an area of ± 3 ha. Pre-planning should be conducted in order decide the fate of this feature. For example, if the material from these features will be used for in-filling, or if the features will remain after closure.
- The toe trenches should be backfilled by obtaining material from the closest adjacent heaps deemed appropriate for such purpose;

The slopes of those features selected to remain after closure, should be downgraded to such an extent that they are not visually intrusive to the skyline after closure, and/or at least have an average outer slope of 1:3 (18°); or as predetermined by a specialist, depending on the type of material;

- For backfilled trenches the topography should be shaped to be in line with the natural contours, but where compaction occurred, the areas should be ripped to a depth no deeper than 300 mm;
- The prepared surfaces should then be covered with 300 mm of topsoil or suitable growth medium, which includes a viable seed bank; in order to encourage restoration of natural vegetation, to ensure stability, improve the visual impact, and minimise erosion.

Storm water management

Storm water runoff arising from the upper and outer slopes of the rehabilitated residue deposit should be managed to

(1) prevent uncontrolled runoff from the residue deposit, which in turn creates surface erosion and resultant damage to the cover material and could also expose deposited material;

(2) route the runoff arising from the rehabilitated residue deposit into the surrounding surface water drainage regime in a manner that would limit the creation of secondary erosion in the receiving surface water environment and/or possible damage to downstream surface infrastructure; and

(3) allow for the control routing of the runoff collected on the rehabilitated residue deposit across cut-off, seepage or solution trenches provided to handle excess contaminated seepage from the residue deposit.

Current practice allows for two broad approaches to handle runoff arising from the rehabilitated residue deposit:

- Collection of the runoff arising from the benches in chutes to route this water to the toe of the residue deposit. Chutes must be constructed from concrete or other suitable material to cater for the high flow velocities that could be encountered.
- Collection of runoff arising from the modified outer slopes on the benches itself and allowing this water to evaporate on the benches. Under these circumstances bench width could be wider than the normal 5 m width, with parapet walls provided on the outer edges of the benches. These walls must be designed for at least the 1:200 year rainfall events. The residue deposit material must also be suitable for this type of storm water contaminant and must not be susceptible to slumping under saturated conditions.

Rehabilitation of subsided areas

The EAP is not currently aware of any areas of subsidence on site. However, any potential for such occurrences should be actively investigated and should be included in the rehabilitation plan, if and when such areas are identified.

General surface rehabilitation

Final surface rehabilitation of areas disturbed by mining and related activities should be aligned to the selected final land use. General surface rehabilitation encompasses the reinstatement of natural topography, the top soiling and the re-vegetation of all those areas where infrastructure have been dismantled and removed or demolished. It also includes any industrial waste or scrap material that need to be removed from site. The total area that will need general surface rehabilitation at the time mine closure is estimated to be ± 5 ha.

River diversions

No river diversions are planned.

Fencing

It is not known at this stage if any fencing is planned.

Water management

No treatment of water will be necessary for the Mining activities.

Maintenance and aftercare

Maintenance and aftercare should be planned for two to three years after mine production have ceased and should include the following:

- Annual fertilising of rehabilitated areas.
- Monitoring of surface and subsurface water quality,
- Control of alien plants, and
- General maintenance, including rehabilitation of cracks and subsidence.
- Erosion control and monitoring of the slopes of the slimes dams.

Specialist study

A screening level risk assessment should be completed by a specialist environmental practitioner during mine closure in order to ensure that all of the rehabilitation objectives have been met and that all of the potential risks have been eliminated and/or are controlled. This assessment should specifically emphasis on those risks relating to river disturbances, groundwater quality and slope stabilities, but should not neglect progress made in natural vegetation restoration or success in alien invasive eradications. The current average specialist fees are estimated at R 50 000.

(d) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives.

The rehabilitation plan was primarily designed with the closure objectives in mind and therefore it relates to all the various objectives as set out above in Section 1) g) 1) a) of this EMPR. In general, the main objectives are to have an uncontaminated, rehabilitated and safe environment, and to restore the mining area to a condition acceptable for obtaining a closure certificate. Each and every element in the rehabilitation plan was designed in order to meet these closure objectives.

The ultimate rehabilitation of the site that involves the sloping, levelling, replacement of topsoil and the seeding of an grass seed mix in areas that does not recover acceptably as agreed to by the land owner will ensure that the site could be regarded as safe for humans and animals and will also ensure that the site is stable from an erosion point of view and also ensuring that the site could be used for grazing / residential use again.

(e) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline.

The total cost to rehabilitate and mitigate the site as it stands currently (risking premature rehabilitation) is estimated to be R2,693,328 according to the DMR calculations for the first phases of the project. The detailed calculation DMR quantum is presented in Table 16. The total rehabilitation costing is based on the assumption that the mining operation will do continuous concurrent rehabilitation throughout the project.

Table 16. Financial Quantum

No.	Description	Unit	A	B	C	D	E=A*B*C*D
			Quantity	Master Rate	Multiplication factor	Weighting factor 1	Amount (Rands)
1	Dismantling of processing plant and related structures	m3	1500	13.72	1	1	20580
2 (A)	Demolition of steel buildings and structures	m2	86	191.16	1	1	16439.76
2(B)	Demolition of reinforced concrete buildings and structures	m2	16	281.71	1	1	4507.36
3	Rehabilitation of access roads	m2	140000	2	1	1	280000
4 (A)	Demolition and rehabilitation of electrified railway lines	m	0	332.01	1	1	0
4 (A)	Demolition and rehabilitation of non-electrified railway lines	m	0	181.1	1	1	0
5	Demolition of housing and/or administration facilities	m2	245	382.32	1	1	93668.4
6	Opencast rehabilitation including final voids and ramps	ha	5	194579.4	0.52	1	505906.44
7	Sealing of shafts adits and inclines	m3	0	102.62	1	1	0
8 (A)	Rehabilitation of overburden and spoils	ha	0.5	133609.85	1	1	66804.925
8 (B)	Rehabilitation of processing waste deposits and evaporation ponds (non-polluting potential)	ha	3	166408.65	1	1	499225.95
			0		1	1	
8 (C)	Rehabilitation of processing waste deposits and evaporation	ha	0	483329.59	1	1	0
9	Rehabilitation of subsided areas	ha	0	111878.12	1	1	0
10	General surface rehabilitation	ha	5.025	105841.53	1	1	531853.6883
11	River diversions	ha	0	105841.53	1	1	0
12	Fencing	m	0	120.73	1	1	0
13	Water management	ha	0	40243.93	1	1	0
14	2 to 3 years of maintenance and aftercare	ha	0	14085.38	1	1	0
15 (A)	Specialist study	Sum	0			1	0
15 (B)	Specialist study	Sum	0			1	0
					Sub Total 1		2018986.523
1	Preliminary and General		121139.1914		weighting factor 2 1		121139.1914
2	Contingencies		201898.6523				201898.6523
					Subtotal 2		2342024.37
					VAT (15%)		351303.66
					Grand Total		2693328

(f) Confirm that the financial provision will be provided as determined.

It is hereby confirmed that the financial provision will be provided as determined.

Mechanisms for monitoring compliance with and performance assessment against the environmental management programme and reporting thereon, including

g) Monitoring of Impact Management Actions
h) Monitoring and Reporting Frequency
i) Responsible persons
j) Time Period for Implementing Impact Management Actions
k) Mechanisms for Monitoring Compliance

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Topography	To minimise the reduction of land capability.	To ensure that rehabilitation post-mining slopes are stable, free draining and no slopes have an angle in excess of 20º.	Site Manager/ Environmentalists	Monitoring will be done on an *annual basis* to ensure that the levels and the slopes are in order.
Soil	To prevent soil pollution. To limit soil compaction. To curb soil erosion; and To reinstate a growth medium able to sustain plant life.	Soil depth and chemical composition will be tested, and possible erosion damage will be assisted and rectified.	Site Manager/ Environmentalists	Monitoring will be done on an *annual basis* or after a heavy rain event.
Air Quality	To control the incidence of unacceptable levels of dust pollution on site.	To ensure that the mine minimizes dust omissions, so that dust does not become a nuisance for affected parties and a health hazard.	Site Manager/Foreman appointed SHE Consultant	Visual inspections will be done and managed by dust suppression by a water tanker. Quarterly tests will also be conducted by a Safety Health and Environmental Consultant and submitted to Mine Health and Safety for monitoring purposes. The implementation of continuous dustfall monitoring as part of the project's air quality management plan. Monitoring should be undertaken throughout the life of the mine to provide air quality trends and indicate compliance with NAAQSs. □ The recommendation that East collaborate with other mines/industries in the region to install an ambient gravimetric PM10/PM2.5 monitor in Gloria Mine village or Hotazel. This will provide adequate data on cumulative PM10 and PM2.5 concentrations from the East Manganese Project and other mines/industries in the region. □ Finally, it is recommended that the PM10/PM2.5 samples be analysed for manganese content to determine the manganese concentrations at Gloria Mine village or Hotazel. Should exceedances of the

				long-term assessment criteria occur (as simulated), a health risk/toxicological assessment should be conducted to ascertain the health impact due to manganese emissions at Gloria Mine village or Hotazel. □ The delineation of an air quality buffer zone is not deemed necessary, considering the "low" to "medium" significance rating assigned to pollutants impacts.
Fauna	To minimise vegetation destruction in mining areas, and therefore a habitat for wildlife; and To eliminate poaching and the extermination of animal species within the boundaries of the study area as well as the surrounding areas.	To ensure that the species diversity and abundance is not significantly reduces.	Site Manager/ Environmentalists	Monitoring will be done at rehabilitated area on an *annually basis* to investigate species diversity and abundance.
Flora	To minimise the destruction of vegetation units; and To control invasion of exotic and invasive plant species.	To ensure that the rehabilitated areas become self-maintaining.	Site Manager/ Environmentalists	Monitoring will be done at the rehabilitated areas on a *twice a year basis* (mid-summer and mid-winter), where species diversity and vegetation cover will be investigated.
SOURCE ACTIVITY	**IMPACTS REQUIRING MONITORING PROGRAMMES**	**FUNCTIONAL REQUIREMENTS FOR MONITORING**	**ROLES AND RESPONSIBILITIES** (FOR THE EXECUTION OF THE MONITORING PROGRAMMES)	**MONITORING AND REPORTING FREQUENCY and TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS**
Noise	To ensure that the legislated noise levels will be adhered to at all times. To control the incidence of unacceptable noise levels on site.	The management objective will be to reduce any level of noise, shock and lighting that may have an effect on persons or animals, both inside the area and that which may migrate outside the area.	The manager .	Quarterly reports on fall-out dust and noise monitoring will be conducted as required by legislation. If any complaints are received from the public or state department regarding noise levels the levels will be monitored at prescribed monitoring points.
Surface Water	To conserve water; and To eliminate the contamination of run-off.	There are no perennial Rivers in the vicinity of the mining operation. The Ga-Mogara non perennial river is to the western border of the mining area. Water will be obtained from the Sedibeng pipeline.	Site Manager/Water Supply	Monitoring takes place by collecting surface water samples every quarter if available.
Ground Water	To conserve water; and To eliminate the contamination of Ground Water.	No Groundwater will be used.		

l) Indicate the frequency of the submission of the performance assessment/environmental audit report

Auditing of compliance with environmental authorisation, the environmental management programme and the closure plan should be conducted annually by an independent EAP and an Environmental Audit Report should be compiled in such a way that it meets the requirements in terms of Regulation 34 of the National Environmental Management Act 107 of 1998): Environmental Impact Assessment Regulation, 2014.

The rehabilitation plan should also be reviewed annually in order to fulfil the requirements of Section 41(3) of the MPRDA and should be conducted by an independent EAP. Subsequently, an Annual Rehabilitation Plan should be developed to meet the various requirements set out in the National Environmental Management Act (No 107 of 1998) (NEMA) Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).

These reports should be submitted annually to the Northern Cape DMR offices in Kimberley.

m) Environmental Awareness Plan

The objective of the environmental awareness plan is to ensure that:

- Training needs are identified and all personnel whose work may create a significant impact upon the environment have received appropriate training.
- All employees are aware of the impact of their activities;
- Procedures are established and maintained to make appropriate employees aware of:
  - The significant environmental impacts (actual or potential) of their work activities and environmental benefits of improved personal performance,
  - Their roles and responsibilities in achieving conformance with environmental policies, procedures, and any implementation measures,
  - The potential consequences of departure from specified operating procedures.
- Personnel performing tasks, which can cause significant environmental impacts, are competent in terms of appropriate education, training and / or experience.

Environmental awareness will be part of the existing training and development plan. Key personnel with environmental responsibilities will be identified and the following principles will apply:

- Procedures will be developed to facilitate training of employees, on-site service providers and contractors;
- Environmental awareness will focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;

Top management will build awareness and motivate and reward employees for achieving environmental objectives;

- Environmental policies will be availed to mine employees and contractors;

- Environmental inductions will be conducted for employees, contractors and visitors;
- There will be an ongoing system of identifying training needs.

General environmental awareness training as part of the induction at the Southern Ambition Operation should focus on the following:

- General environmental awareness
- The mine policies and vision concerning environmental management
- Legal requirements
- Mine activities and their potential impacts
- Different management measures to manage identified impacts
- Mine personnel's role in implementing environmental management objectives and targets

(1) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work.

It is the responsibility of management to ensure that all employees, contractors and visitors are trained to understand the impacts of their tasks on the environment and to reduce them wherever possible. Environmental awareness should be part of the existing training and development plan. Key personnel with environmental responsibilities should be identified and the following principles should be applied:

- Procedures should be developed to facilitate training of employees, on-site service providers and contractors;
- Environmental awareness should focus on means to enhance the ability of personnel and ensure compliance with the environmental requirements;
- Top management should build awareness and motivate and reward employees for achieving environmental objectives;
- There should be an ongoing system of identifying training needs.
- An environmental, health and safety induction programme should be provided to all employees, contractors and visitors prior to commencing work or entering the site, and they should sign acknowledgement of the induction. An attendance register and agenda/programme should be filed for each induction.
- A daily "toolbox talk" should be held prior to commencing work, which will include discussions on health, safety and environmental considerations. The toolbox talks should be led by the site manager or the appointed supervisor/s.
- Refresher training should also be given to permanent employees and long-term contractors on an annual basis, to ensure that all are competent to perform their duties, thereby eliminating negative impacts on their safety, health and environment.

General environmental awareness training as part of the induction at Southern Ambition should focus on the following:

- General environmental awareness, which incorporates environmental, ecological and heritage elements;
- The mine policies and vision concerning environmental management;
- Legal requirements;
- Mine activities and their potential impacts;
- Different management measures to manage identified impacts;
- Mine personnel's role in implementing environmental management objectives and targets.

Environmental awareness topics to be covered in training should include:

- Natural resource management and conservation;
- Biodiversity awareness and conservation principles;
- Heritage resource awareness and preservation principles;
- Hazardous substance use and storage;
- Waste management; and
- Incident and emergency actions and reporting;

(2) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

Environmental incident reporting will be a vital part of communication in order to deal with risks and ultimately avoid pollution or the degradation of the environment. Such communication should take place through the management, administrative and worker sectors of the operation, as well as contractors and visitors. Employees should be required to report any and all environmentally related problems, incidents and pollution, so that the appropriate mitigation actions can be implemented timeously. In the event of an environmental incident, the reporting procedure as indicated in the table below should be followed.

ENVIRONMENTAL INCIDENT REPORTING STRUCTURE	ACTIONS REQUIRED
Person causing or observing the incident	The first person causing or observing the incident shall report the incident to an immediate supervisor where the environmental incident is observed.
Line management in the relevant area of responsibility where the incident occurred	Line management in the relevant area of responsibility where the incident occurred shall: • Investigate the incident and record the following information: - How the incident happened; - The reasons the incident happened; - How rehabilitation or clean up needs to take place; - The nature of the impact that occurred; - The type of work, process or equipment involved; - Recommendations to avoid future such incidents and/or occurrences. • Inform the environmental manager/ECO and the Operations Manager on a daily basis of all incidents that were reported on site. • Consult with the relevant department/person for recommendations on actions to be taken or implemented where appropriate (e.g. clean-ups). • Assist the Environmental Manager and/or Operations Manager with applicable data in order to accurately capture the incident into the reporting database. • Ensure that remediation measures are implemented as soon as possible.
Site managers	The site managers shall: • Forward a copy of the incident form to other line managers. • Forward a copy of the incident form to the Environmental manager/ECO. • Inform the relevant department/person on a weekly basis of the incident by e-mail or by submitting a copy of the incident report. Once a High Risk Incident (any incident which results from a significant aspect and has the potential to cause a significant impact on the environment) occurred it must be reported immediately to the Environmental

	Manager and the Operations Manager by telephone or email to ensure immediate response/action. • Forward a copy of the completed Incident Reporting Form (and where applicable a copy of the incident investigation) to the relevant department/person.
Environmental manager/ECO	The appointed environmental manager or ECO shall: • Complete an incident assessment form to assess what level of incident occurred. • Make recommendations for clean-up and/or appropriate alternate actions. • Enter actions necessary to remediate environmental impacts into the database in conjunction with the responsible line manager. • Enter the incident onto the database in order to monitor the root causes of incidents. • Include the reported incidents in an appropriate monthly/quarterly report. • Highlight all incidents for discussion at HSEC meetings.

n) Specific information required by the Competent Authority

Section 41 of the MPRDA and regulation 53 and 54 promulgated in terms of the MPRDA deal with financial provision for mine rehabilitation and closure.

The holder of a right as described in the relevant sections of the MPRDA and its regulations must provide the Department of Mineral Resources (DMR) with sufficient financial provision. Officials in the DMR Regional Offices are required to assess, review and approve the quantum of financial provision submitted (that is, the monetary value of the financial provision that has been computed by the holder of a prospecting right, mining right or mining permit during the annual review) as being sufficient to cover the environmental liability at that time and for closure of the mine at that time.

The holder of a prospecting right, mining right or mining permit is required to annually assess the total quantum of environmental liability for the mining operation and to ensure that financial provision are sufficient to cover the current liability (in the event of premature closure) as well as the end-of-mine liability.

It is hereby confirmed that the financial provision will be reviewed annually.

2) UNDERTAKING

The EAP herewith confirms

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

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

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

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

SIGNATURE

Date: 11 March 2020

END

APPENDIX 1

DIE UNIVERSITEIT VAN DIE ORANJE-VRYSTAAT

THE UNIVERSITY OF THE ORANGE FREE STATE

HIERMEE WORD VERKLAAR DAT DIE GRAAD THIS IS TO CERTIFY THAT THE DEGREE

Magister in Omgewingsbestuur

Master in Environmental Management

TOEGEKEN IS AAN
HAS BEEN CONFERRED UPON

ROELINA HENRIËTTE OOSTHUIZEN

NADAT AAN DIE STATUTE EN REGULASIES VAN DIE UNIVERSITEIT VOLDOEN IS. AS BEWYS DAARVAN PLAAS ONS ONS ONDERSKEIE HANDTEKENINGE EN DIE SEëL VAN DIE UNIVERSITEIT HIERONDER.

IN ACCORDANCE WITH THE STATUTES AND REGULATIONS OF THE UNIVERSITY. AS WITNESS OUR RESPECTIVE SIGNATURES AND THE SEAL OF THE UNIVERSITY BELOW.

VISEKANSELIER/VICE-CHANCELLOR

DEKAAN/DEAN

REGISTRATEUR/REGISTRAR

BLOEMFONTEIN
2000-09-16

APPENDIX 2

CURRICULUM VITAE

Roelina Henriette Oosthuizen

Cell: 084 208 9088

E-Mail: roosthuizen950@gmail.com

1. PERSONAL INFORMATION

Name: Roelina Henriette Oosthuizen

Surname: Oosthuizen (Maiden: Alberts)

Identity number: 7004180037082

Date of birth: 18 April 1970

Gender: Female

Marital status: Married (26 years) with 3 children

Driving license: Yes, Code EB

Languages: Fluent in Afrikaans and English

Nationality: South African

Criminal offences: None

Health: Excellent, fit

2. SYNOPSIS OF PROFESSIONAL CAREER

Roelina Henriette Oosthuizen has 22 years of experience in the environmental management field. She started her career in the area of Environmental Management and Environmental Impact Assessment (EIA) evaluation in 1997 at the Department of Minerals and Energy. After moving to industry in 2005, Roelien became involved in the practical aspects of environmental management. A major project during her early years outside of government was that of the EIA for a Game Reserve and Lodge development near Barkly-Wes, she did this project together with a consultancy firm from Kimberley AWS water solutions (Mr. Adriaan du Toit). In 2007 the Company she worked for was bought by a Canadian Group of Companies and she became more involved in practical aspects of the operations and worked closely with operations personnel in dealing with ongoing management of environmental impacts at the Mine (e.g. monitoring, auditing, operating procedures). She was also centrally involved in liaison with the authorities and with stakeholders in neighbouring areas.

During her time at the Canadian Group of Companies, Roelien was the environmental manager overseeing operations in the Barkly-West, Prieska and Douglas areas. She was responsible for preparing the environmental compliance documents for each operation which included Performance Assessments (Audit reports) and Financial Quantum submissions as well as new applications for Prospecting Rights and Mining Rights with the relevant Scoping, EIA / EMP documents. Her activities included liaison with stakeholders and also with the relevant Departments. During this time, Roelien became increasingly involved in environmental policy and strategy work, as well as the environmental aspects of corporate governance.

She has assisted a range of clients with Environmental Due Diligence audits and compliance audits. Roelien has also undertaken numerous environmental audits, particularly compliance and due diligence audits for clients in the mining industry. Thus, she is familiar with best practice standards in environmental auditing.

Roelien have also represented the South African Diamond Producers Organisation (SADPO) on the Environmental Policy Committee (EPC) at the Chamber of Mines between 2005 and 2011.

In a nutshell, Roelien has wide ranging experience and is thus well-positioned to assist clients in any matter related to sustainability and environmental management. This is achieved through her own skills base and on drawing on specialists.

3. QUALIFICATIONS

MEM (Master in Environmental Management) University of the Orange Free State (2000)
B – Comm NWU (1991)

4. TRAINING COURSES

Roelien have attended various mining and environmental conferences and seminars to stay abreast with the latest changes in legislation, legal compliance and policy positions in the sector.

October 1997	Mineral Laws Administration & Environmental Management (University of Pretoria)
July 2002	Project Management for Environmental Systems (University of the Orange Free State)
August 2004	Environmental and Sustainability in Mining Minerals and Energy Education and Training Institute (MEETI)
September 2005	Converting Old Order Rights to New Order Rights in Mining International Quality & Productivity Centre Johannesburg)
November 2006	Mine waste disposal and Achievement of Mine Closure
February 2007	Introduction to ArcGis 1
April 2010	Mining Law Update Conference (IIR BV South Africa)
November 2010	Social Labour Plans for Mining Workshop (Melrose Training)
August 2011	Mineral Resources Compliance and Reporting (ITC)
May 2012	Enviro Mining Conference 2012 (Sustainability and Rehabilitation) (Spectacular Training Conferences)
August 2012	Mineral Resources Compliance and Reporting 4th Annual (ITC)
March 2013	1st EnviroMining-Ensuring Environmental Compliance and reporting
March 2014	4th Annual EnviroMining Conference
March 2015	5th Annual EnviroMining Conference
February 2018	Seminar by the Department of Environmental Affairs on knowledge sharing workshops on the Screening Tool

5. PROFESSIONAL REGISTRATION

Registered as a professional at IAIAsa (International Association for Impact Assessment South Africa). IAIAsa is a voluntary organisation and is not a statutory body regulating the profession. Its members are however expected to abide by the organisations code of ethics.
Registered Environmental Assessment Practitioner: Number 2019/1467
at EAPASA (Environmental Assessment Practitioners Association of South Africa).

6. PROFESSIONAL EXPERIENCE

Projects are listed below by area of expertise.

Environmental Management Systems (EMS) and Environmental Auditing

Development of EMS and Compilation of INCIDENT REPORT AND INVESTIGATION FORMS for the EMS of the Canadian group of Companies on various sites.

Undertaking of a range of due diligence and performance audits for operations, including those listed below:

Performance Assessment reports for a mining company with various infrastructure and mining operations near Barkly-West and Windsorton.

Performance Assessment reports for a mining company near Douglas.

Preparation of an environmental auditing checklist / protocol for a Community project with restitution ground in assisting the community to determine environmental legal compliance at their operations.

Environmental audit as part of a closure with Dr. Betsie Milne another specialist. This Annual Rehabilitation Plan has been developed to match the various requirements set out in the National Environmental Management Act (No 107 of 1998) (NEMA) Regulations pertaining to the financial provision for prospecting, exploration, mining or production operations (as amended in 2015).This project had the objective of ensuring that this company are accounting for environmental liabilities and risks adequately. The plan distinguishes between (a) those environmental rehabilitation liabilities pertaining to drilling, for which the Company was legally responsible and (b) those environmental rehabilitation liabilities pertaining to historic mining activities, for which the Company is not legally responsible, but consider performing as part of their best practice environmental principals. Three costing scenarios were explored in order to evaluate the most feasible rehabilitation plan, i.e. (1) Total cost (worst-case scenario) including risks, (2) legally required cost and (3) features currently available that do not involve any risks.

Sustainability projects: policies, guidelines, strategies and performance reporting

Involved in the compilation of 43-101 technical documents for listed companies which included information on sustainability and performance in rehabilitation and sustainable mining.

Alien species eradication project guideline and strategy near Barkly-Wes in terms of Regulations that have been promulgated in terms of the Conservation of Agricultural Resources Act, No. 43 of 1983 further make it unlawful to allow various species of weeds and invader plants to grow. The target species was Wild tobacco (declared weed), Pink Tamarisk (declared weed) and Mexican poppy, it also involved the community for job creation and training (2008).

Investigations for a Company near Prieska on Development of a biodiversity offsets policy for the applications for forestry tree licences for protected tree species.

Strategic Environmental Studies and Environmental Impact Assessment (EIA)

Undertaking of a Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2006 for a Private Individual which involved the proposed extension of a roof over an existing deck with two wood pillars by means of the excavating of 0.5m X 0.5m X 1m X 2 (½m²) OF SOIL WITHIN 100M OF THE HIGH WATER MARK OF THE SEA. A Positive Record of Decision (ROD) Granted (2010).

Undertaking of an ENVIRONMENTAL IMPACT ASSESSMENT & ENVIRONMENTAL MANAGEMENT PROGRAMME SUBMITTED FOR AN APPLICATION FOR A MINING RIGHT IN TERMS OF SECTION 39 & OF REGULATION 50 & 51 OF THE MPRDA, 2002 (ACT NO. 28 OF 2002) near Boshof for a kimberlite Diamond Mining Company (2015)

Undertaking of a strategic environmental review and amendment for a Chinese group of Companies near Postmasburg. The study provided baseline environmental information and a high-level review of the potential impacts of various components of the development (2014 – 2016). Roelien worked as a member (EAP) of a large team consisting of a project Coordinator, attorneys, water specialists, other specialist and an engineer.

Environmental Impact Assessments for various developments including the proposed mining project for the former retrenchees of De Beers in Kimberley. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialist with contributions of specialist reports to compile the EIA EMP report (2017). Roelien worked as a member (EAP) of a team consisting of De Beers (attorneys and environmentalists), the retrenchees, the appointed contractor, EKAPA, and specialist appointed for the studies.

Environmental Impact Assessments for a Salt operation near Upington. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialists with contributions of specialist reports to compile the EIA EMP report (2019). Roelien also worked as part of a team with the Company and another consultant that started with the Water Use Licence application. The public participation was done to include the water use activities.

Environmental Impact Assessment for a change in scope of a prospecting right application consisting of the sole and exclusive right to prospect for iron, silver, zinc, copper and sulphur ore. This project involved coordination of the process, liaison with the authorities and compilation as well as appointment of specialists with contributions of specialist reports to compile the EIA EMP report (2019). Roelien also worked as a member (EAP) of a team consisting of the directors of the company and specialists appointed for the studies

7. CAREER PATH

01 April 1997 to 28 February 2005
DEPT OF MINERALS & ENERGY
Senior Environmentalist - Assistant Director Environment

MAIN JOB FUNCTIONS

- Collect analyse and interpret information regarding the measurement of impacts of mining operations on the environment, the rehabilitation of land surfaces.

- The prevention, control and combating of pollution.
- Co-ordinate and prioritise the rehabilitation of derelict and ownerless mines.
- Co-ordinate, investigate, audit and resolve environmental problems in conjunction with the Department of Water Affairs and Forestry, Department of Agriculture and the provincial Department of Tourism, Environment and Conservation.
- Address complaints and inquiries received from the public and mining industry.
- Consult with relevant authorities and interested and affected people regarding the approval of Environmental Management Programmes.
- Ensuring that rehabilitation standards are applied.
- Ensuring that the requirements stated in Environmental Management Programme Reports are adhered to.
- Conduct inspections and recommendations on mines that apply for closure.
- Evaluate mining licences and prospecting applications and recommend site-specific conditions according to legislative requirements.
- Constant liaison with the public, the mining industry and other government authorities on environmental matters, legislation and agreements.
- Influence new development processes through participation in the EMPR and EIA processes and give guidance through education and awareness programmes.
- Calculate and verify financial provision for outstanding rehabilitation.

01 March 2005 – 30 September 2012
Appointed as professional Mineral Law Administration and Environmental Manager for HC van Wyk Diamonds which was bought over in 2007 by a **Canadian group of Companies.**

MAIN JOB FUNCTIONS

Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.
Undertaking of environmental reviews, audits and management plans:
Formulation of an environmental policy and guidelines for the Group.
Participation in the development of the budget for environmental expenditure.
Co-ordination of technical studies (e.g. monitoring of groundwater quality).
Environmental compliance measurement and reporting with respect to environmental permit conditions (e.g. Forestry Licences and water sampling for Water Use Licences).
Development of environmental guidelines for contractors on sites.
Liaison with regulatory authorities on compliance with environmental legislation.
Documentation of environmental incidents.
Environmental awareness and training.
Development of a public participation strategy.
Formulation of a complaint's procedure.

01 October 2012 to 29 February 2020
Appointed as professional Mineral Law Administration and Environmental Manager for **Mentor Trade and Investments Pty Ltd**

MAIN JOB FUNCTIONS

Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.
Undertaking of environmental reviews, audits and management plans.
Formulation of an environmental policy and guidelines for the Mine.
Co-ordination of technical studies (e.g. monitoring of groundwater quality) as well as updating of the Mine's IWWMP.
Environmental compliance measurement and reporting with respect to environmental permit conditions (e.g. as water sampling and effluent).
Development of environmental guidelines for contractors.
Liaison with regulatory authorities on compliance with environmental legislation.
Documentation of environmental incidents.
Environmental awareness and training.
Development of a public participation strategy.
Formulation of a complaint's procedure.

01 March 2020 to Present full time
Appointed as EAP on projects for ***Wadala Mining and Consulting Pty Ltd***

Conducting of Environmental Impact Assessments (EIAs), including the implementation of public participation programmes, for a variety of projects.
Undertaking of environmental reviews, audits and management plans.
Liaison with regulatory authorities on compliance with environmental legislation.
Environmental awareness and training.