SCOPING REPORT FOR THE PROPOSED DEVELOPMENT OF THE SIYANDA FERROCHROME SMELTER

April 2016

SCOPING REPORT FOR PUBLIC AND REGULATORY AUTHORITY REVIEW

SUBMITTED FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT (ACT 107 OF 1998) AND THE NATIONAL ENVIRONMENTAL MANAGEMENT WASTE ACT (ACT 59 OF 2008)

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ACRONYMS AND ABBREVIATIONS

Acronyms / Abbreviations	Definition
BID	Background information document
BPDM	Bojanala Platinum District Municipality
CBA	Critical Biodiversity Area
DPWRT	Department of Public Works, Roads and Transport
DRDLR	Department of Rural Development and Land Reform
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental impact assessment
EMP	Environmental management programme
IAPs	Interested and/or affected parties
IUCN	International Union for Conservation of Nature
mcm	million cubic meters
MKLM	Moses Kotane Local Municipality
NEMA	National Environmental Management Act No.107 of 1998
NEM:AQA	National Environmental Management: Air Quality Act 39 of 2004 (NEM:AQA).
NEM:BA	National Environmental Management: Biodiversity Act No. 10 of 2004
NEM:WA	National Environmental Management: Waste Management Act No. 59 of 2008
NFEPA	National Freshwater Ecosystem Priority Areas 2011
NPAES	National Protected Areas Expansion Strategy 2008
NWA	National Water Act No. 36 of 1998
SAHRA	South African Heritage Resources Agency
SANBI	South African National Botanical Institute
SANS	South African National Standards
SCSC	Siyanda Chrome Smelting Company
SLR	SLR Consulting (Africa) (Pty) Ltd
TLM	Thabazimbi Local Municipality
WDM	Waterberg District Municipality

INTRODUCTION

INTRODUCTION TO THE PROPOSED PROJECT

Siyanda Chrome Smelting Company (Pty) Ltd (SCSC) is a South African company, the majority shareholding of which is held by Siyanda Resources (Pty) Ltd (SR). SR is a diversified mining investment company with a long history in the production and sale of UG2 chrome ore, through its subsidiary Siyanda Chrome Investments (Proprietary) Limited (SCI). SCI is Anglo American Platinum Limited's joint venture partner in Masa Chrome Company (Pty) Ltd (Masa) situated at the Union Section Mine.

SCSC is proposing to construct a new ferrochrome (FeCr) smelter on portion 3 of the farm Grootkuil 409 KQ located adjacent to the existing Union Section Mine approximately 5 km north-west of Northam in the Thabazimbi Local Municipality, Limpopo Province. Refer to Figure 1 and Figure 2 for the regional and local settings respectively.

SCSC is proposing to process UG2 chrome concentrate from surrounding platinum mines and in broad terms, the project will comprise a railway siding, a raw materials offloading area, two 70 MW DC ferrochrome furnaces, crushing and screening plant, mineralised waste facility and related facilities such as material stockpiles, workshops, stores and various support infrastructure and services including powerlines, access and internal roads and pipelines.

The EIA process comprises two phases: a scoping phase and an environmental impact assessment phase combined with the environmental management programme (EIA and EMP) phase. This report describes the scoping phase for the proposed project.

SLR Consulting (Africa) (Pty) Ltd (SLR), an independent firm of environmental consultants, has been appointed by SCSC to undertake the environmental assessment process for the proposed project.

LEGAL FRAMEWORK

Prior to the commencement of the proposed project, environmental authorisation is required from various government departments. These include:

- Environmental authorisation from the Department of Environmental Affairs (DEA) in terms of National Environmental Management Act No.107 of 1998 (NEMA). The proposed project incorporates several listed environmental activities. An integrated application for environmental authorisation was submitted by SCSC to the DEA on 6 April 2016. The applicable list of activities is provided in Section 4.1. The EIA regulations being followed for this project are Regulation 982 of 04 December 2014.
- A waste management license from the DEA in terms of the National Environmental Management: Waste Act No. 59 of 2008 (NEM:WA) which is being applied for as part of the

integrated application for environmental authorisation as described above. The applicable list of activities as currently set out in the legislation is provided in Section 4.1.

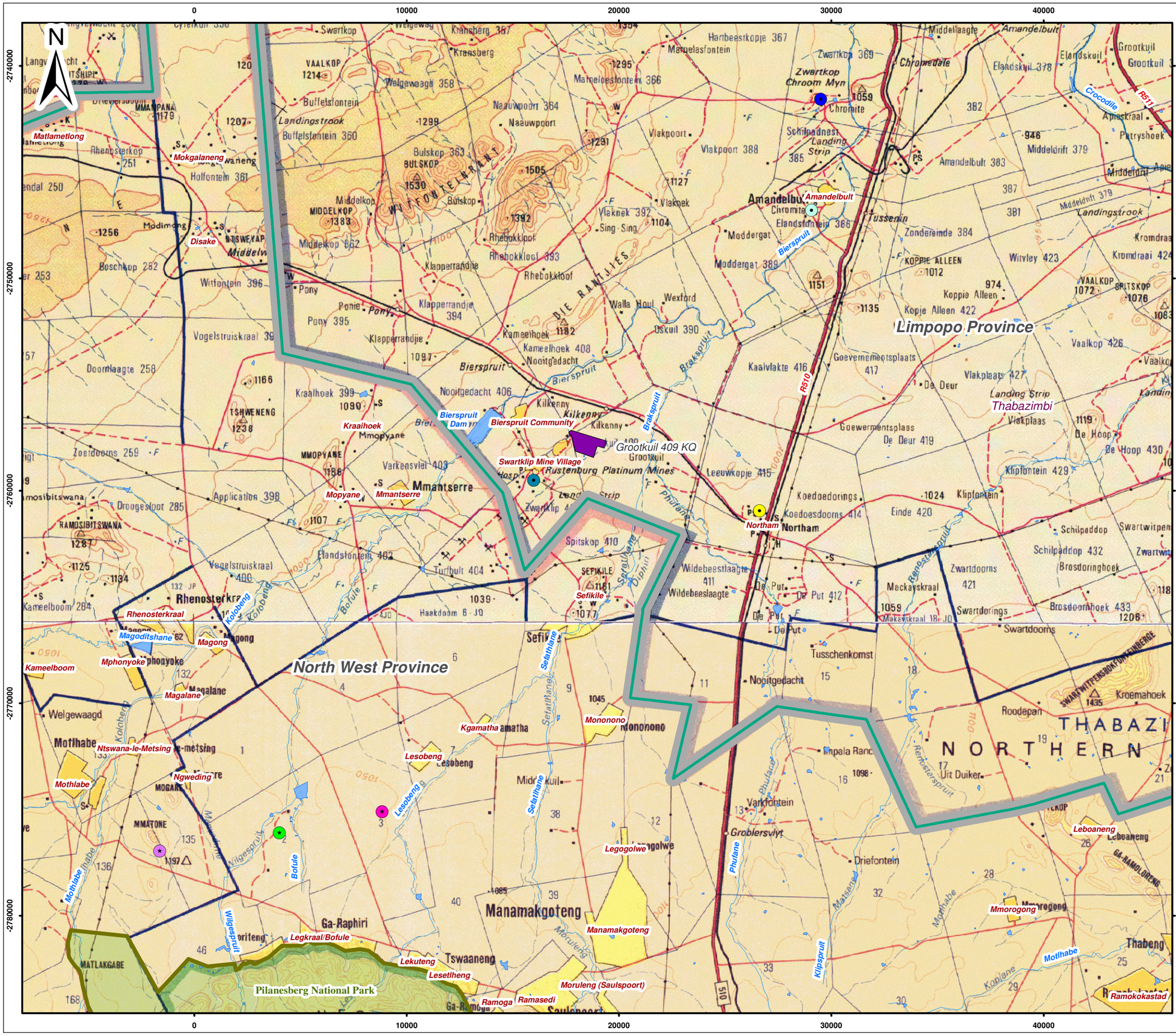
- A water use license from the Department of Water and Sanitation (DWS) in terms of the National Water Act No. 36 of 1998 (NWA). The applicable water uses in terms of Section 21 of the NWA may include (a), (b), (c), (g), (i) and (j). This list of water uses will be refined during the EIA and EMP phase.
- An Air Emissions License (AEL) in terms of the National Environmental Management: Air Quality Act 39 of 2004 (NEM: AQA). This applies to activities which could result in emissions which could have a detrimental impact as listed in terms of Notice 964 of 2012 (23 November 2012) in terms of Section 21 of NEM:AQA.

Any additional approvals/permits needed for the project will be identified during the course of the environmental assessment process. A detailed list will be provided in the EIA and EMP report.

SCOPING PHASE OBJECTIVES

The objectives of the scoping phase in accordance with Appendix 2(1) of Regulation 982 of NEMA are as follows:

- To identify policies and legislation that is relevant to the proposed project.
- To motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location.
- To identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process.
- To identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on geographical, physical, biological, social, economic, and cultural aspects of the environment.
- To identify key issues to be addressed in the assessment phase.
- To agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the site.
- To identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.



Legend

- Project Infrastructure Area
- Dams
- Rivers
- Roads
- Villages
- Municipal Boundaries
- Provincial Border
- Amandelbult Mine
- Northam Mine
- Union Section Mine
- Zwartkop Mine
- Magazynskraal Platinum Mine (Proposed)
- Sedibelo Platinum Mine
- Pilanesberg Platinum Mine

Reserves

Existing

- Pilanesberg National Park (Including Black Rhino Game Reserve)

0 2 4 6 8 Kilometers

Scale: 1:175 000 @ A3

Projection: Transverse Mercator
Datum: Hartebeeshoek, LO27

Siyanda Chrome Smelting Company (Pty) Ltd

Figure 1

Regional Setting

SLR Consulting (Africa) (Pty) Ltd
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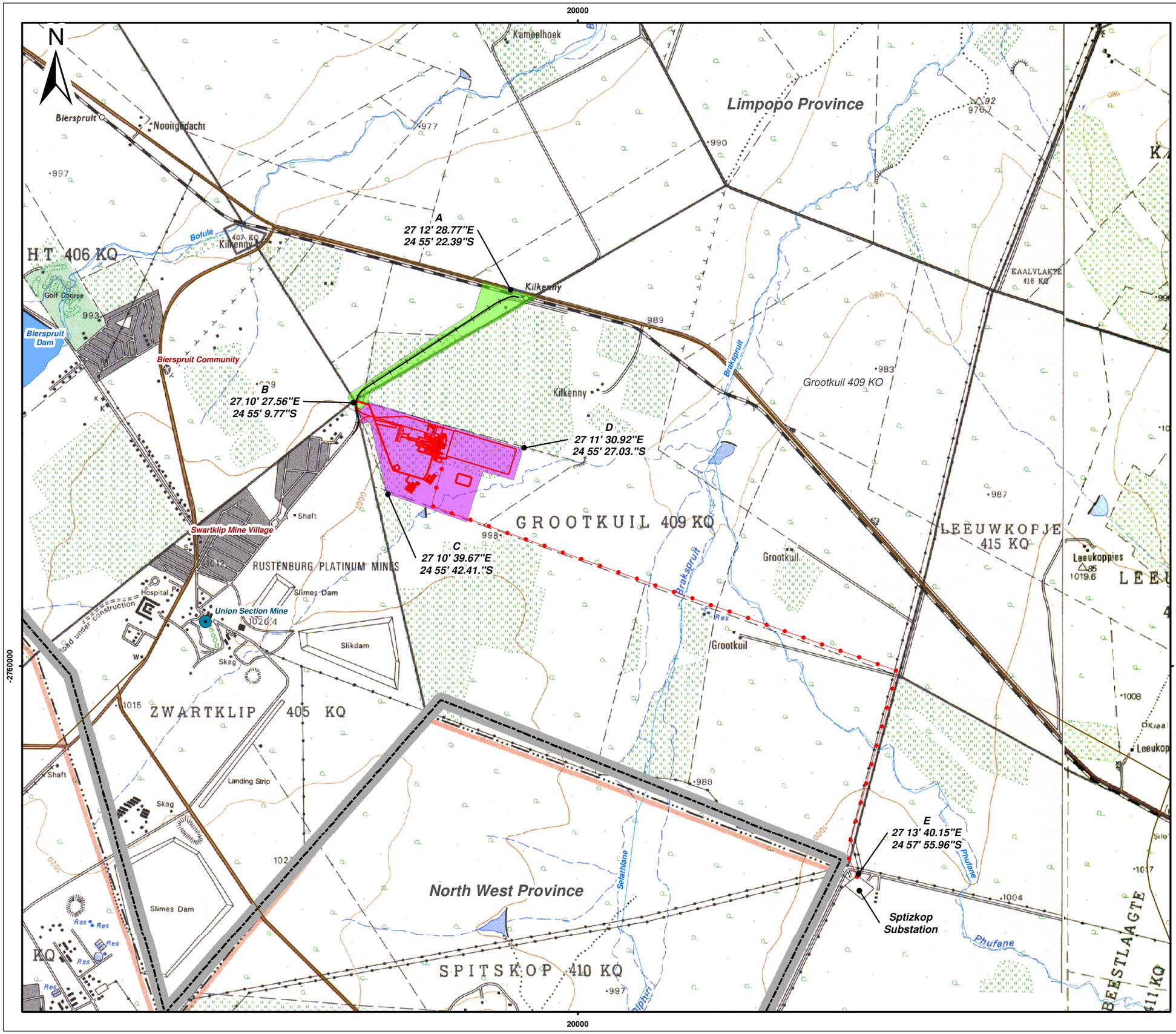

Legend

- Project Infrastructure Area
- Road Access Corridor
- Proposed Infrastructure layout
- Proposed Powerline Route
- Existing Union Section Railway
- Dams
- Rivers
- Roads
- Provincial Border

0 0.5 1 1.5 Km

Scale: 1:80 000 @ A3

Projection: Transverse Mercator
Datum: Hartebeeshoek, LO27

Siyanda Chrome Smelting Company (Pty) Ltd

Figure 2

Local Setting

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1 CONTACT PERSON AND CORRESPONDENCE ADDRESS

1.1 DETAILS OF THE EAP WHO PREPARED THE REPORT

The details of the environmental assessment practitioners (EAPs) that were involved in the preparation of this scoping report are provided in Table 1 below.

TABLE 1: DETAILS OF THE EAPS

DETAILS	PROJECT MANAGER AND AUTHOR	REVIEWER
Name of the practitioner	Caitlin Hird	Brandon Stobart
Tel No.:	011 467 0945	011 467 0945
Fax No.:	011 467 0978	011 467 0978
E-mail address	chird@slrconsulting.com	-

Neither SLR nor any of the specialists involved in the environmental assessment process have any interest in the project other than fair payment for consulting services rendered as part of the environmental assessment process.

1.2 EXPERTISE OF THE EAP

Caitlin Hird has approximately six years of relevant experience (Curriculum Vitae attached in Appendix B). Brandon Stobart has over 17 years of relevant experience (Curriculum Vitae attached in Appendix B) and is registered as an environmental assessment practitioner (EAP) with the interim certification board. The proof of this registration is attached in Appendix A. Both Caitlin Hird and Brandon Stobart have been involved in several impact assessments for large scale developments in Southern Africa.

2 DESCRIPTION OF THE PROPERTY

A description of the properties on which the proposed project infrastructure is located is provided in Table 2.

TABLE 2: DESCRIPTION OF THE PROPERTY (INCLUDING LINEAR INFRASTRUCTURE)

Farm Name(s)	Portion 2 and Portion 3 of the farm Grootkuil 409 KQ (smelter infrastructure, powerline and access road) Portion 4 & 5 of the farm Grootkuil 409 KQ and Portion 0 & 10 of the farm Wildebeeslaagte 411 KQ (powerline) Portion 1, 3 and Portion 11 of the farm Kameelhoek 408 KQ and Portion 7 of the farm Nooitgedacht 406 KQ (access road)
Application area (Ha)	Portion 3 of the farm Grootkuil 409 KQ (the SCSC owned property) covers an area of 626 ha, however the majority of this will be undisturbed for the purposes of the project. It is expected that approximately 140 ha will be disturbed by the proposed project infrastructure, and the disturbance footprint will be limited to the western area of the farm (see Figure 2), with the exception of the powerline and access road. It should be noted that the majority of the proposed project infrastructure area has been previously disturbed due to cropping and other agricultural activities.
Magisterial district	Northam Sub-district of the Thabazimbi Magisterial District.
Local municipality	Thabazimbi Local Municipality in the Waterberg District Municipality
Distance and direction from nearest town	Located approximately 5 km north-west of the town Northam
21 digit Surveyor General Code for each farm portion	It should be noted that the farm portion numbers and 21 digit Surveyor General Codes provided below cater for all linear infrastructure routing alternatives. This list below will be refined during the EIA/EMP. Portion 2 of the farm Grootkuil 409 KQ: T0KQ00000000040900002 Portion 3 of the farm Grootkuil 409 KQ: T0KQ00000000040900003 Portion 4 of the farm Grootkuil 409 KQ: T0KQ00000000040900004 Portion 5 of the farm Grootkuil 409 KQ: T0KQ00000000040900005 Portion 0 of the farm Wildebeeslaagte 411 KQ: T0KQ00000000041100000 Portion 10 of the farm Wildebeeslaagte 411 KQ: T0KQ00000000041100010 Portion 1 of the farm Kameelhoek 408 KQ: T0KQ00000000040800001 Portion 3 of the farm Kameelhoek 408 KQ: T0KQ00000000040800003 Portion 11 of the farm Kameelhoek 408 KQ: T0KQ0000000004080011 Portion 7 of the farm Nooitgedacht 406 KQ T0KQ00000000040600007
Co-ordinates (Points A, B, C and D illustrated on Figure 2)	**Point A:** 24° 55’ 22.39’’ S and 27° 12’ 28.77’’ E (start point of access road corridor) **Point B:** 24° 55’ 9.77’’ S and 27° 10’ 27.56’’ E (western corner of preferred smelter infrastructure area) **Point C:** 24° 55’ 42.41’’ S and 27° 10’ 39.67’’ E (southern corner of preferred smelter infrastructure area) **Point D:** 24° 55’ 27.03’’ S and 27° 102 30.92’’ E (eastern corner of preferred smelter infrastructure area)

	Point E: 24° 57’ 55.96’’ S and 27° 13’ 40.15’’ E (start point of powerline)

3 LOCALITY MAP

The regional and local settings of the proposed site alternatives area are illustrated in Figure 1 and Figure 2 respectively. In addition to this the regional and local settings have also been included in Appendix C.

4 DESCRIPTION OF THE SCOPE OF THE PROPOSED PROJECT

4.1 LISTED AND SPECIFIED ACTIVITIES

The activities and infrastructure associated with the proposed project are listed Table 3 below and are illustrated in Figure 4 (where relevant). In each case the relevant NEMA and/or possible NEM:WA listed activities which will be triggered by the proposed project for the various activities and infrastructure has been provided in Table 3. A description of each of the listed activities identified is provided in Table 3.

Maintenance of rehabilitated areas		

TABLE 3: DESCRIPTION OF THE NEMA AND NEM:WA LISTED ACTIVITIES APPLIED FOR AS PART OF THE PROPOSED PROJECT

ACTIVITY NUMBER	LISTED ACTIVITY
NEMA LISTING NOTICE 1 GNR.983	
9	The development of infrastructure exceeding 1000 metres in length for the bulk transportation of water or storm water- (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where - (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve; or (b) where such development will occur within an urban area.
10	The development and related operation of infrastructure exceeding 1000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where- (a) such infrastructure is for bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve; or (b) where such development will occur within an urban area.
11	The development of facilities or infrastructure for the transmission and distribution of electricity- (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts; or (ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more.
13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.
24	The development of - (i) a road for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) a road with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding - (a) roads which are identified and included in activity 27 in Listing Notice 2 of 2014; or (b) roads where the entire road falls within an urban area.
25	The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2000 cubic metres but less than 15000 cubic metres

ACTIVITY NUMBER	LISTED ACTIVITY
27	The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.
28	Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare; excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.
56	The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 km – (i) where the existing reserve is wider than 13.5 metres; or (ii) where no reserve exists, where the existing road is wider than 8 metres; excluding where widening or lengthening occur inside urban areas.
64	The expansion of railway lines, stations or shunting yards where there will be an increased development footprint.
NEMA LISTING NOTICE 2: GNR.984	
2	The development and related operation of facilities or infrastructure for the generation of electricity from a non-renewable resource where the electricity output is 20 megawatts or more.
4	The development of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.
6	The development of facilities or infrastructure for any process or activity which requires a permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent, excluding i) activities which are identified and included in Listing Notice 1 of 2014; (ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies; or (iii) the development of facilities or infrastructure for the treatment of effluent, wastewater or sewage where such facilities have a daily throughput capacity of 2000 cubic metres or less.
7	The development and related operation of facilities or infrastructure for the bulk transportation of dangerous goods; (i) in gas form, outside an industrial complex, using pipelines, exceeding 1000 metres in length, with a throughput capacity of more than 700 tons per day; (ii) in liquid form, outside an industrial complex, using pipelines, exceeding 1000 metres in length, with a throughput capacity of more than 50 cubic metres per day; (iii) in solid form, outside an industrial complex, using funiculars or conveyors with a throughput capacity of more than 50 tons day.
12	The development of railway lines, stations or shunting yards excluding - (i) railway lines, shunting yards and railway stations in industrial complexes or zones; (ii) underground railway lines in a mining area; or (iii) additional railway lines within the railway line reserve.
15	The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for- (i) the undertaking of a linear activity; or

ACTIVITY NUMBER	LISTED ACTIVITY
	(ii) maintenance purposes undertaken in accordance with a maintenance management plan.
16	The development of a dam where the highest part of the dam wall, as measured from the outside toe of the wall to the highest part of the wall, is 5 metres or higher or where the highwater mark of the dam covers an area of 10 hectares or more.
28	Commencing of an activity, which requires an atmospheric emission license in terms of section 21 of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004), excluding – (i) listed activities which are identified and included in Listing Notice 1 of 2014 (ii) activities which are included in the list of waste management activities published in terms of Section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 0f 2008), in which case the National Environmental Management Waste Act, 2008 applies. (iii) the development of infrastructure or facilities for the treatment of effluent, waste water or sewage where such facilities have a daily throughput capacity of 200 m^3 or less.
NEMA LISTING NOTICE 3: GNR. 985	
2	The development of reservoirs for bulk water supply with a capacity of more than 250 cubic metres. In an estuary ; ii. In a protected area identified in terms of NEMPAA , excluding conservancies; iii. Outside urban areas , in: (aa) National Protected Area Expansion Strategy Focus areas; (bb) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (cc) Sites or areas identified in terms of an International Convention; (dd) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ee) Core areas in biosphere reserves; (ff) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or (gg) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iv. In urban areas : (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority , or zoned for a conservation purpose; or (cc) Areas seawards of the development setback line or within urban protected areas.
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres (i) in an estuary (ii) outside urban areas in: (aa) a protected area identified in terms of NEMPAA, excluding disturbed areas (bb) National Protected Area Expansion Strategy Focus Area (cc) Sensitive areas as identified in an Environmental Management Framework as contemplated in chapter 5 of the Act as adopted by the competent authority (dd) Sites or areas identified in terms of an International Convention

ACTIVITY NUMBER	LISTED ACTIVITY
	(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans (ff) Core areas in biosphere reserves (gg) Areas within 10 km of national parks or world heritage sites or 5 km from any other protected area in terms of NEMPAA or from the core areas of biosphere reserve, excluding disturbed areas; or (hh) Areas seawards of the development setback line or within 1 kilometre from the high water mark of the sea if no such development setback line is determined; or (iii) in urban areas; (aa) Areas zoned for use as public space (bb) Areas zoned for conservation use in Spatial Development Frameworks (SDFs) adopted by the competent authority or zoned for conservation for a conservation purpose; or (cc) Seawards of the development setback line or within urban protected areas.
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA 'or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii. Within critical biodiversity areas identified in bioregional plans; iii. Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuary, whichever distance is the greater, excluding where such removal will occur behind the development setback line on even in urban areas; or iv. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.
14	The development of - (i) canals exceeding 10 square metres in size ; (ii) channels exceeding 10 square metres in size; CO bridges exceeding 10 square metres in size; (iv) dams, where the dam , including infrastructure and water surface area exceeds 10 square metres in size; (v) weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres in size; (vi) bulk storm water outlet structures exceeding 10 square metres in size; (vii) marinas exceeding 10 square metres in size; (viii) jetties exceeding 10 square metres in size; (ix) slipways exceeding 10 square metres in size; (x) buildings exceeding 10 square metres in size; (xi) boardwalks exceeding 10 square metres in size; or (xii) infrastructure or structures with a physical footprint of 10 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 has been adopted, within 32 metres of a watercourse , measured from the edge of a watercourse ; excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. In an estuary ;

ACTIVITY NUMBER	LISTED ACTIVITY
	ii. Outside urban areas , in: (aa) A protected area identified in terms of NEMPAA , excluding conservancies; (bb) National Protected Area Expansion Strategy Focus areas; (cc) World Heritage Sites; (dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority ; (ee) Sites or areas identified in terms of an International Convention; (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; (hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; (ii) Areas seawards of the development setback line or within 1 kilometre from the high-water mark of the sea if no such development setback line is determined; or iii. In urban areas : (aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority , zoned for a conservation purpose; or (cc) Areas seawards of the development setback line.
18	The widening of a road by more than 4 metres or the lengthening of a road by more than 1 kilometre. (i) in an estuary (ii) outside urban areas in: (aa) a protected area identified in terms of NEMPAA, excluding disturbed areas (bb) National Protected Area Expansion Strategy Focus Area (cc) Sensitive areas as identified in an Environmental Management Framework as contemplated in chapter 5 of the Act as adopted by the competent authority (dd) Sites or areas identified in terms of an International Convention (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans (ff) Core areas in biosphere reserves (gg) Areas within 10 km of national parks or world heritage sites or 5 km from any other protected area in terms of NEMPAA or from the core areas of biosphere reserve, excluding disturbed areas; or (hh) Areas seawards of the development setback line or within 1 kilometre from the high water mark of the sea if no such development setback line is determined (ii) Areas on the watercourse side of a development setback line or within 100 m of the edge of a watercourse where no such setback line has been determined; or (iii) in urban areas; (aa) Areas zoned for use as public space; or (bb) Areas zoned for conservation use in Spatial Development Frameworks (SDFs) adopted by the competent authority or zoned for conservation for a

ACTIVITY NUMBER	LISTED ACTIVITY
	conservation purpose.
NEM:WA LISTED ACTIVITIES GNR 921	
Category B 4 (2)	The reuse or recycling of hazardous waste in excess of 1 ton per day, excluding reuse or recycling that takes place as an integral part of an internal manufacturing process within the same premises.
Category B 4(4)	The treatment of hazardous waste in excess of 1 ton per day calculated as a monthly average using any form of treatment of effluent, waste water or sewage.
Category B 4(7)	The disposal of any quantities of hazardous waste to land
Category B 4(10)	The construction of a facility for a waste management activity listed in Category B of this schedule

4.2 DESCRIPTION OF THE ACTIVITIES TO BE UNDERTAKEN

Information provided in the following section was provided to SLR by the SCSC project team.

SCSC is proposing to establish a smelter complex to process the UG2 chrome concentrate from chrome recovery plants of nearby operations. In broad terms, the project will comprise a railway siding, a raw materials offloading area, two 70 MW DC furnaces, crushing and screening plant, mineralised waste facility, and related facilities such as material stockpiles, workshops, stores and various support infrastructure and services including powerlines, roads and pipelines.

4.2.1 CONSTRUCTION PHASE

CONSTRUCTION PHASE FACILITIES

The construction phase facilities include:

- Contractor's laydown areas
- Workshops (instrumentation, electrical, mechanical, diesel)
- Stores for the storing and handling of fuel, lubricants, solvents, paints and construction materials
- Wash bay
- laboratory
- Construction waste collection and storage facilities
- Store
- Parking area for cars and equipment
- Mobile site offices
- Portable ablution facilities
- Temporary electricity supply (diesel generators)
- Portable water supply (bowsers)
- Change houses and clinic
- Soil stockpiles
- Water management infrastructure
- Security and access control
- Main access road

Construction facilities will either be removed at the end of the construction phase or incorporated into the layout of the operational phase facilities.

CONSTRUCTION PHASE ACTIVITIES

The key construction activities associated with the proposed project include:

- Site establishment of construction phase facilities
- Clearing of vegetation in accordance with the relevant vegetation management procedures
- Stripping and stockpiling of soil resources and earthworks in accordance with the relevant soil conservation procedures
- Collection, storage and removal of construction related waste
- Construction of all infrastructure required for the operational phase
- Transportation of construction phase materials and staff (via existing roads and roads to be built for the purposes of the project)

WATER SUPPLY AND MANAGEMENT

Potable water

During the construction phase, process and potable water will be sourced from the adjacent Union Section Mine located immediately adjacent (south-west) to the proposed SCSC project (see Figure 2). It is expected that approximately 6000 litres of potable water and 5000 litres of construction water will be utilised on a daily basis.

POWER SUPPLY AND USE

During the construction phase, generators will be used as the primary power supply. It is expected that the total capacity of generators to be used on site will be 1 MVA.

TRANSPORT

It is expected that for the construction phase, access to site will be via the planned access road corridor (see Figure 2). The preferred road routing within this corridor is currently being investigated and further detail will be provided in the EIA and EMP report. It is planned that this road will be constructed at the beginning of the construction phase in order to provide site access for construction phase traffic. Given that alternative 2 is an already existing dirt access road traversing the Siyanda property, this may be used in addition to the main access road during the construction phase.

CONSTRUCTION WASTE MANAGEMENT

Domestic and industrial waste

Facilities for the temporary storage of non-mineralised waste associated with the project components will be provided. The types of waste that could be generated during the construction phase include hazardous industrial waste (such as packaging for hazardous materials, used oil, lubricants), general industrial waste (such as scrap metal, contaminated wood and building rubble), and domestic waste (such as packaging). These wastes will be temporarily handled and stored on site before being removed for recycling by suppliers and approved waste handling companies, reused by scrap dealers or final disposal at permitted waste disposal facilities.

Sewage

Construction workers will make use of portable toilets that will be serviced on a regular basis. The sewage will be removed off-site by a certified contractor.

EMPLOYMENT AND HOUSING

The proposed project will allow for the creation of approximately 700 jobs during the construction phase. No contractors will be housed on-site as part of the proposed project. Instead construction workers will be accommodated in nearby towns or communities.

OPERATING HOURS

It is anticipated that the construction phase will consist of one shift per day from 07h00 to 17h00 from Monday to Sunday. In cases where emergency action is required and/or critical activities are required, motivation will be made for the extension of these hours within the provisions of the regulations.

CONSTRUCTION PHASE TIMING

It is envisaged that construction phase activities will commence during the first quarter of 2017 (approval dependent) and will continue for a period of approximately 24 months.

4.2.2 OPERATIONAL PHASE

PROCESSING METHOD

The proposed project will comprise two 70MW DC furnaces which will be used to process approximately 850 000 tons per annum of UG2 chrome concentrate from nearby chrome recovery plants. Table 4 below summarises the activities associated with the smelting process. A simplified conceptual flow diagram is illustrated in Figure 3.

TABLE 4: SUMMARY OF SMELTING ACTIVITIES

ACTIVITY	DESCRIPTION
Transportation of raw materials to site	Raw materials (chrome concentrate, flux/reductant) will be transported to site via a combination of rail and road and temporarily stored in bunkers prior to use. Dust generated during materials handling will move through a gas cleaning system afterwhich clean gas will be emitted to the atmosphere. Baghouse dust which cannot be emitted to the atmosphere will be returned to the raw materials system for processing.
Drying	In order to eliminate moisture in the raw materials (that is a source of electrical energy consumption in the furnaces and is also detrimental to the effective use of burnt lime), the chrome concentrate and flux/reductant will move through driers prior to being fed into proportioning bins in preparation for furnace feeding. Dust generated during the drying process will move through a gas cleaning system afterwhich clean gas will be emitted to the atmosphere. Baghouse dust which cannot be emitted to the atmosphere will be returned to the raw materials system for processing.

ACTIVITY	DESCRIPTION
Pre-heating	Smelter feed material will be pre-heated prior to smelting. Baghouse dust which cannot be cleaned and flared will be collected and disposed onto a mineralised waste facility or re-circulated into the smelting process (depending on particulate size).
Smelting	Two 70MW DC furnaces will be used to smelt raw materials (chrome concentrate and flux and reductant). Offgas generated by the furnaces will be used as a fuel source for various plant processes and remaining offgas will be flared. Baghouse dust which cannot be flared or used as a source of energy will be collected, moistened and disposed onto a mineralised waste facility.
Furnace cooling	Water will be used as a cooling medium to extract heat from the equipment in the high temperature areas. Hot water (as a result of the cooling process) will be cooled by means of a fan filter and once cooled will be re-circulated back to the furnaces for cooling. The cooling system will be a closed water circuit.
Tapping of metal	Metal will be tapped from the furnaces using moulds built from alloy fines. Taphole fume extraction will take place during the tapping process and the dust will be transported to a mineralised waste facility.
Crushing and screening	The tapped metal will then move through a crushing and screening plant where it will be broken into sizeable ingots (of approx.6 tons) and allowed to cool.
Transportation of product	Product will be loaded at the railway siding and dispatched to market via train.
Tapping of slag	Slag will be tapped from the furnaces via a slag launder into slag pots. Molten slag will be transported in pots to a mineralised waste facility area, where the pot will be emptied and returned to the furnaces for the next slag tap. Taphole fume extraction will take place during the tapping process and the dust will be transported to a mineralised waste facility. It is expected that approximately 400 000 tons of mineralised waste will be disposed of onto the mineralised waste facility per annum.
Dust suppression	Dust suppression will be utilised at all material handling transfer points, as required.

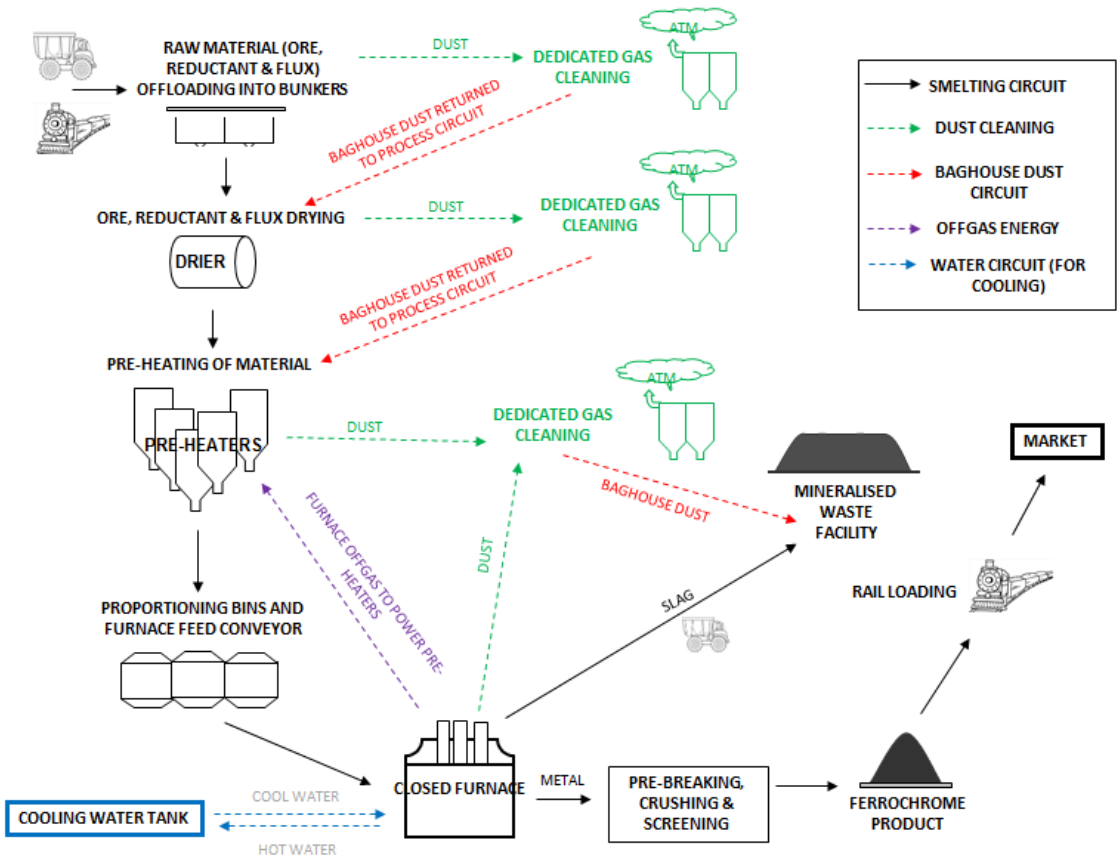


FIGURE 3: CONCEPTUAL PROCESS FLOW DIAGRAMME

SURFACE INFRASTRUCTURE

Operational phase surface infrastructure is listed below. Key infrastructural elements (in the form of a conceptual site layout) have been illustrated in Figure 4.

- Furnaces
- Crushing and screening plant
- Ingot cooling pad
- Service yard
- Operational store
- Instrumentation workshop
- Mechanical workshop
- Electrical workshop
- Diesel workshop
- Diesel storage
- Refractory and general store
- Laboratory
- Mineralised waste facility

- Substation
- Filter Yard
- Stormwater dam and associated stormwater management infrastructure
- Emergency fire water dam
- Change house
- Clinic
- HR/SHEQ office
- Main entrance/security
- Raw materials offloading area
- Railway siding
- Access road
- Internal roads
- Powerline
- Conveyors
- Pipelines
- Cooling water tank (and pumps)
- Topsoil stockpiles and berms
- Sewage treatment/containment facility

TRANSPORT SYSTEM

Roads

Access to the proposed project area will be via the main Northam-Swartklip road (also referred to as the Dwaalboom road) off which a permanent/formal site access road will be constructed (see "access road corridor" as presented in Figure 2). SCSC is currently considering various routing alternatives for the proposed access road. Figure 5 presents the proposed alternatives being considered and further detail on routing alternatives is provided in Section 7.1.2. During the public scoping meetings option 2 only was presented to the public. Since then the access road corridor (option 1 as illustrated in Figure 5) has been identified as a preferred alternative in response to public concerns about option 2 and given the environmental, logistical and economic benefits associated with option 1. The preferred routing within the access corridor will be confirmed in the EIA and EMP report.

Within the proposed project area boundary, haul roads will be established. These haul roads will consist of a combination of upgrading existing gravel roads as well as the establishment of new haul roads. A traffic impact assessment which includes a trip generation survey is being undertaken by a traffic specialist. More information on the total number of vehicles entering and leaving site by road on a daily basis will be provided in the EIA report.

Rail

SCSC will construct a railway siding for the purposes of the proposed project which will merge onto the existing Union Section Mine railway line which meets the main Spoornet railway line at the Kilkenny station/siding approximately 2 km north of the project area (see Figure 2). This railway line will be used to transport incoming chrome concentrate and flux/reductant and will also be used to despatch product to market.

Conveyors

Conveyors will be established within the proposed project area to allow for the movement of raw materials between the various storage bunkers to the proportioning bins and from there to the driers, pre-heaters and finally to the furnaces.

Pipelines

The proposed project will require the establishment of a pipeline network for the transportation of potable water, process water and sewage effluent.

WATER SUPPLY AND MANAGEMENT

Potable Water

Potable water will be made available from the adjacent Union Section Mine. It is expected that approximately 144m^3 of potable water will be utilised on a daily basis. Potable water will be stored on site in elevated steel pressed panel tanks.

Process water

Only limited process water will be required for the proposed smelter project. As with potable water, process water will be sourced from the adjacent Union Section Mine. It is expected that approximately 73m^3 of process water will be utilised on a daily basis. Process water will be stored on site in elevated steel pressed panel tanks.

Site water management

Although the project is not a mine, the water management facilities will be designed in accordance with the principles of Regulation 704 (4 June 1999). Two key principles include:

- Clean and dirty water systems must be kept separate and must be designed, constructed, maintained and operated such that these systems do not spill more than once in 50 years.
- Measures which must be taken to protect water resources from all dirty water or substances which cause or are likely to cause pollution.

POWER SUPPLY AND USE

Power will be sourced from the Spitzkop substation located approximately 7 km from site. It is proposed that 132 kV powerlines (on a single support structure) will run parallel to the existing Eskom servitude in a northerly direction from the Spitzkop substation and will then travel westwards along the southern

boundary of the project area (see Figure 2) before entering the project infrastructure area. Further information on routing alternatives being considered for the proposed powerline is provided in Section 7.1.2 and illustrated in Figure 5.

SCSC is currently making arrangements for the necessary offtake agreement with Eskom, and daily power requirements during the operational phase will be approximately 3600 MW (150MW/hour).

SMELTER PROCESS MINERALISED WASTE MANAGEMENT

As a priority SCSC will investigate and implement waste minimisation options so as to limit the required disposal to a waste facility. More information on these options will be provided in the EIA/EMP report. Where disposal is required, slag and baghouse dust emanating from the smelter complex will be disposed onto a designated mineralised waste facility which will be designed in accordance with the principles contained in Regulation 704 (4 June 1999). Dirty runoff and/or seepage water associated with this facility will be contained within the dirty water containment system which will be designed in accordance with the principles above. In addition to this, a waste type assessment will be undertaken in terms of Regulation 8 of GN R. 634 of 2013, which references the following associated National Norms and Standards:

- National Norms and Standards for the assessment of waste for landfill disposal (GN R.635 of 2013).
- National Norms and Standards for disposal of waste to landfill (GN R. 636 of 2013).

The results of the waste type assessment will be used to inform the civil engineering design of the mineralised waste facility and will determine the relevant liner requirements as called for by the Norms and Standards.

NON-MINERALISED WASTE MANAGEMENT

Domestic and industrial waste

Facilities for the temporary storage of non-mineralised waste associated with the proposed project will be provided. The types of waste that could be generated on site during the operational phase include: hazardous industrial waste (such as packaging for hazardous materials, used oil, lubricants), general industrial waste (such as scrap metal and building rubble), medical waste (such as swabs, bandages) from the staff medical station, and domestic waste (such as packaging, canteen waste and office waste). These wastes will be temporarily handled and stored on site before being removed for recycling by suppliers, appointed waste contactors/scrap dealers or final disposal at permitted waste disposal facilities.

Sewage

It is expected that approximately 20m^3 of sewage will be generated per day. Sewage will be temporarily stored on site prior to being removed by an accredited removal contractor.

EMPLOYMENT AND HOUSING

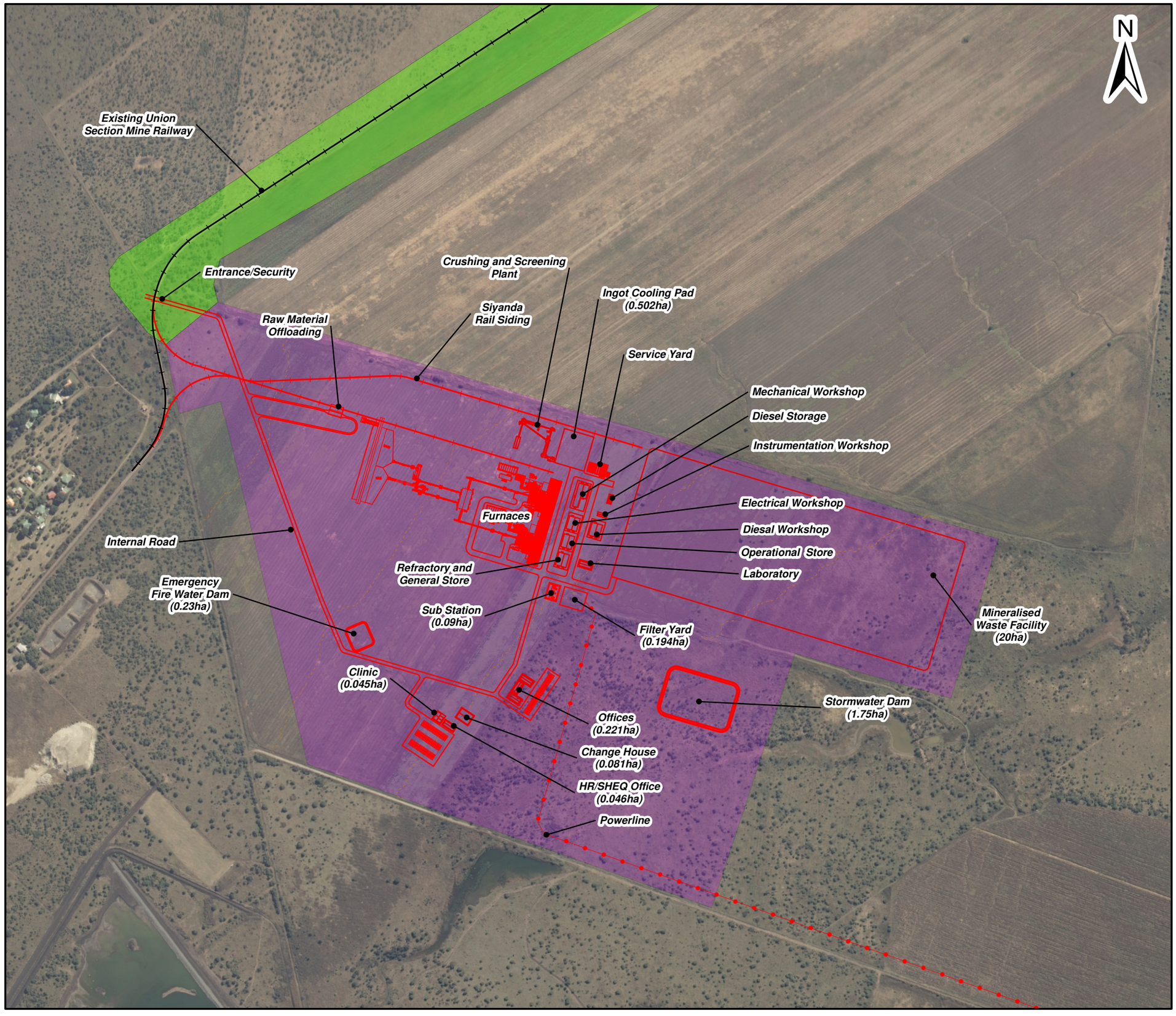
The proposed project will allow for the creation of approximately 280 jobs during the operational phase. No staff will be housed on-site as part of the proposed project. Operational workers will be accommodated in nearby towns and communities.

OPERATING HOURS

At this stage it is expected that the proposed smelter complex will be operational 24 hours a day for 7 days a week. It is anticipated that there will be two twelve hour shifts (06h00 to 18h00 and 18h00 to 06h00) per day during the operational phase.

LIFE OF OPERATIONS/FACILITIES

The anticipated life of the operations will be dependent on market conditions as well as the availability of a steady supply of incoming chrome concentrate from nearby operations. It is expected that the minimum life of project will be 30 years.



Legend

- Project Infrastructure Area
- Road Access Corridor
- Proposed Infrastructure layout
- Proposed Powerline Route
- Rivers

0 0.1 0.2 0.3 Kilometers

Scale: 1:8 000 @ A3

Projection: Transverse Mercator
Datum: Hartebeeshoek, LO27

Siyanda Chrome Smelting Company (Pty) Ltd

Figure 4

Conceptual Layout Showing Key Infrastructure Items

SLR Consulting (Africa) (Pty) Ltd
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DECOMMISSIONING AND CLOSURE

The environmental objective for closure is to minimise the impacts associated with the closure and decommissioning of the smelter development and to restore the land to a useful land use not dissimilar to the pre project land use. The conceptual closure plan objectives and principles include the following:

- Environmental damage is minimised to the extent that they are acceptable to all parties involved.
- The land is rehabilitated to achieve a condition approximating its natural state, or so that the envisaged end use is achieved.
- All surface infrastructure, excluding the mineralised waste facility will be removed from site after rehabilitation. The mineralised waste facility will be sloped, dressed with topsoil and revegetated to return this area as close as is practically possible to its pre-project land use.
- Project closure is achieved efficiently, cost effectively and in compliance with the law.
- The social impacts resulting from project closure are managed in such a way that negative socio-economic impacts are minimised.

5 POLICY AND LEGISLATIVE CONTEXT

Table 5 below provides a summary of the legislative context and policy applicable to the activity.

TABLE 5: LEGAL FRAMEWORK

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT	REFERENCE WHERE APPLIED
National Environmental Management Act No. 107 of 1998 (NEMA)	As outlined in Table 6
Regulations 983 (Listing Notice 1), 984 (Listing Notice 2) and 985 (Listing Notice 3) in terms of NEMA	As outlined in 4.1
National Environment Management: Waste Act No. 59 of 2008 (NEM:WA)	Section 4.1
Regulation 921 in terms of NEM:WA (as amended by Regulation 633)	Section 4.1
National Environmental Management: Air Quality Act 39 of 2004 (NEM:AQA)	Section 4.1
Notice 964 of 2012 (23 November 2012) in terms of Section 21 of NEM:AQA	Section 4.1
National Water Act No. 36 of 1998 (NWA)	Section 7.8
Regulation 704 of 1999 in terms of the NWA	Section 4.2.2 and 7.8
National Environmental Management: Biodiversity Act No. 10 of 2004 (NEM:BA)	Section 7.4.1.5
National Biodiversity Assessment (NBA) of2011	Section 7.4.1.5
National Protected Area Expansion Strategy 2008 (NPAES)	Section 4.1
Mining and Biodiversity Guideline (DEA *et al*, 2013)	Section 7.4.1.5
National Freshwater Ecosystem Priority Areas 2011 (NFEPA)	Section 7.4.1.5
National Forest Act No. 84 of 1998	Section 7.4.1.5 and 7.8
National Veld and Forest Fire Act No. 101 of 1998	Section 7.4.1.5
International Union for Conservation of Nature (IUCN)	Section 7.4.1.5
Conservation of Agriculture Resources Act No. 43 of 1983	Section 7.4.1.5
Limpopo Conservation Plan Version 2 of 2013	Section 7.4.1.5
South African National Botanical Institute (SANBI) Integrated Biodiversity Information	Section 7.4.1.5
Thabazimbi Local Municipality Spatial Development Framework	Sections 7.4.1.12 and 4.1
Waterberg District Municipality Integrated Development Framework and Spatial Development Framework	Sections 7.4.1.12
National Heritage Resource Act No. 25 of 1999	Section 7.4.1.11 and 7.8

This report complies with the requirements of the National Environmental Management Act (NEMA) (Act 107 of 1998). The relevant criteria are indicated in Table 6.

The environmental assessment process will also consider (where relevant) the Equator Principles (June 2013), related IFC Performance Standards (January 2012) and relevant World Bank Group Environmental, Health and Safety (EHS) Guidelines (April 2007).

TABLE 6: SCOPING REPORT REQUIREMENTS AS PER 2014 NEMA REGULATIONS

SCOPING REPORT REQUIREMENTS AS PER THE 2014 NEMA REGULATIONS	REFERENCE IN THE SCOPING REPORT
Details of the EAP who prepared the report.	Section 1.1
Details of the expertise of the EAP, including curriculum vitae.	Appendix A and Appendix B
The location of the activity, including - the 21 digit Surveyor General code of each cadastral land parcel. Where available the physical address and farm name. Where the required information is not available, the coordinates of the boundary of the property or properties.	Section 2
A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken or on land where the property has not been defined, the coordinates within which the activity is to be undertaken	Section 3
A description of the scope of the proposed activity, including all listed and specified activities triggered.	Section 4.1
A description of the scope of the proposed activity, including a description of the activities to be undertaken, including associated structures and infrastructure.	Section 4.2
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.	Section 5
A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 6
A full description of the process followed to reach the proposed preferred activity, site and location within the site, including	Section 7
Details of all the alternatives considered.	Section 7.1
Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs.	Section 7.2
A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them.	Section 7.3
The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 7.4

SCOPING REPORT REQUIREMENTS AS PER THE 2014 NEMA REGULATIONS	REFERENCE IN THE SCOPING REPORT
The impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts can be reversed, may cause irreplaceable loss of resources and can be avoided, managed and mitigated.	Section 7.5 and 7.7
The methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives.	Section 7.6
Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects.	Section 7.7
The possible mitigation measures that could be applied and level of residual risk.	Section 7.8
The outcome of the site selection matrix.	Section 7.9
A concluding statement indicating the preferred alternatives, including preferred location of the activity.	Section 7.9
A plan of study for undertaking the environmental impact assessment process to be undertaken.	Section 8
A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity.	Section 8.1
A description of the aspects to be assessed as part of the environmental impact assessment process.	Section 8.2
Aspects to be assessed by specialists.	Section 8.3
A description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists.	Section 8.4
A description of the proposed method of assessing duration and significance.	Section 8.5
An indication of the stages at which the competent authority will be consulted.	Section 8.6
Particulars of the public participation process that will be conducted during the environmental impact assessment process.	Section 8.7
A description of the tasks that will be undertaken as part of the environmental impact assessment process.	Section 8.8
Identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Section 8.9
Any other matter required in terms of section 24(4)(a) and (b) of the Act.	Section 9
An undertaking under oath or affirmation by the EAP in relation to the correctness of the information provided in	Section 10

SCOPING REPORT REQUIREMENTS AS PER THE 2014 NEMA REGULATIONS	REFERENCE IN THE SCOPING REPORT
the report, the inclusion of comments and inputs from stakeholders and interested and affected parties and any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties.	
An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment.	Section 11

6 NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES

Development of the smelter complex supports the national South African economy at a macro level by gearing exports that will leverage foreign income to the country. Direct economic benefits will be derived from wages, taxes and profits. Indirect economic benefits will be derived from the procurement of goods and services and the spending power of employees. This is in line with the Thabazimbi Local Municipality Spatial Development Framework (TLM, September 2014) which identifies the promotion of mining and minerals processing related job creation as one of the strategies to guide spatial development within the local municipality given that mining and minerals processing forms the backbone of employment and is an important source of income within the local municipality. Further to this, through employment, persons at the proposed smelter complex will gain skills in the construction and operation of a smelter in keeping with the skills upgrading and development which contributes to the building of the nation. The proposed development will also ensure local economic development through implementation of projects identified in the social and labour plan.

In addition to this, according to the Waterberg District Municipality Environmental Management Framework, the proposed site alternatives area is located in an area currently zoned as a “mining focus area” and a “major infrastructure corridor area” (SDF for the Thabazimbi Local Municipality, 2015). This zoning has been confirmed telephonically by the town planning officer at the Thabazimbi Local Municipality.

The proposed project plan has been based on favourable market conditions, the availability of incoming chrome concentrate from nearby operations and the availability of raw materials such as flux/reductant. The proposed site layout has been based on limiting the project footprint area and trying to avoid sensitive areas (for example watercourses) where possible from an environmental and social perspective while still considering project and engineering feasibility and financial factors. In addition to this, the project infrastructure is proposed to be developed close to the existing Union Section Mine (one of the sources of incoming chrome concentrate) and as close as possible to the existing railway facilities so as to concentrate development footprints, limit haulage costs and avoid the duplication of transport facilities where possible. Moreover, the proposed powerline will run parallel to an existing Eskom servitude as far as possible and thereafter will traverse an existing disturbance corridor (i.e. boundary fence line/fire-break) along the southern boundary of the project area. The two 132 kV powerlines will be run along a single support structure in order to reduce the footprint of linear infrastructure and in addition to this the servitude of the powerline has been limited to what is absolutely necessary (30m).

More detail relating to the need and desirability of the proposed project will be provided in the EIA and EMP report.

7 DESCRIPTION OF PROCESS FOLLOWED TO REACH THE PROPOSED PREFERRED SITE

7.1 DETAILS OF ALL ALTERNATIVES CONSIDERED

This section describes land use or development alternatives, alternative means of carrying out the operation, and the consequences of not proceeding with the proposed project.

The main project alternatives to be considered in accordance with Appendix 2(2)(h) of Regulation 982 of NEMA include:

- The preferred activity
- The preferred site (this includes the location of the smelter infrastructure as well as the proposed access road and powerline)
- The preferred location within the site
- Other alternatives
- The “no-go” alternative

7.1.1 ACTIVITY

The main activity centres on ferrochrome smelting. Two 70 MW DC furnaces will be constructed in order to process approximately 850 000 tons per annum of UG2 chrome concentrate from nearby chrome recovery plants. AC furnace technology was also considered, however DC technology was deemed to be preferable both from an environmental impact perspective as well as from a productivity efficiency perspective.

7.1.2 SITE (INCLUDING ACCESS ROAD AND POWERLINE ROUTING)

From the perspective of site alternatives, two alternative smelter complex infrastructure areas, two access road alternatives, and four powerline routing alternatives were considered (Figure 5). A detailed site selection matrix is provided in Table 7 and a summary of the main points is included in the paragraphs below.

The preferred smelter complex infrastructure area was selected for the following reasons:

- It is owned by SCSC which is important for site access.
- It is close to chrome concentrate sources on surrounding mines (one source of which will be the immediately adjacent Union Section Mine).
- By being immediately adjacent to Union Section Mine, the potential impact footprint associated with the project is contained in as close proximity as possible to the existing impact footprint associated with the mine.

- It is close to rail and road infrastructure for the transport of incoming raw materials and outgoing product.
- It is close to viable water and power sources.
- It has already been heavily disturbed by existing and historic agricultural activities which reduces the biophysical sensitivity.

The preferred powerline alternative (alternative 1 as presented in Figure 5) was selected for the following reasons:

- It traverses existing corridors of disturbance (and parallel to existing Eskom servitudes) as far as is practically possible.
- It traverses SCSC property as far as possible.
- It avoids the functional areas of Anglo American Game Farm (Portions 4 and 5 of the Farm Grootkuil 409 KQ).

The access road corridor (option 1) in which the exact routing of the access road will be confirmed in the EIA and EMP report is deemed to be preferred to access road option 2 for the following reasons:

- The length of a proposed access road (option 1) within the access road corridor will be approximately one third of the length of alternative 2, thereby reducing the environmental footprint, reducing haulage distances (thereby allowing greater project efficiencies to be realised).
- An access road which follows the access road corridor (as depicted in Figure 5) will follow an existing disturbance corridor (as far as practically possible) given that it will run parallel to the Union Section Mine railway.
- Several IAP concerns were raised regarding security/access issues associated with road alternative 2 (see Appendix F), and in this regard, option 1 (the access road corridor) was considered in response to IAP concerns.

Key to the final determination of the routing of the access road within the access road corridor will however be land access (where third party land will be traversed for the purposes of the access road).

An alternative selection matrix was compiled in order to present the preferred smelter complex infrastructure area alternative as well as the preferred alternatives in terms of the routings of the proposed powerline and access road. Table 7 presents the relevant detail. The ranking system is a simple two score system for the smelter infrastructure and access road where only two alternatives are provided for each, and a four score relative ranking system for the powerline routing given that four alternatives powerline routing alternatives are provided. In the case of the smelter location and access road (where only two alternatives are presented) for each criterion, a score of one is allocated to the best option and a score of two to the worst. Similarly, for the powerline routing, a score of one is allocated to the best option and a score of four is allocated to the worst option. The option with the lowest total score

is the preferred option. It should be noted that the site selection matrix below has been compiled using information available to date.

TABLE 7: SITE SELECTION MATRIX FOR THE PROPOSED PROJECT AREA (INCLUDING ACCESS ROAD AND POWERLINE ROUTING)

CRITERIA	RELATIVE RANKING								DISCUSSION/NOTES
	SMELTER AREA OPTION 1	SMELTER AREA OPTION 2	ACCESS ROAD OPTION 1 (CORRIDOR)	ACCESS ROAD OPTION 2	POWER LINE OPTION 1	POWER LINE OPTION 2	POWER LINE OPTION 3	POWER LINE OPTION 4	
Biodiversity (terrestrial and aquatic fauna, flora)	1	1	1	2	1	4	1	2	**Smelter Complex:** Both options are located outside of sensitive areas and within already disturbed areas which have been used for cropping and heavy grazing activities. Neither of these alternatives would require the removal of any sensitive or protected species. **Road**: Alternative 1 is substantially shorter than alternative 2, and by implication has a reduced footprint. In addition, road option 1 requires no removal of Protected Vachellia erioloba tree species, whereas alternative 2 might require some of these trees to be removed. In addition, alternative 2 would require several stream crossings whereas option 1 would not. **Powerline:** Alternatives 1 and 3 are deemed to be preferable due to the fact that as far as is practically possible they follow existing powerline servitudes and disturbance corridors (this includes the 400 kVv Matimba line servitude which alternative 3 follows as it travels in a northerly direction through the Anglo property). Although alternative 4 would follow the Anglo property boundary fence (which has already been disturbed to an extent for fence maintenance), the level of disturbance is not to the same extent as would be expected of an existing powerline servitude and therefore the biodiversity impacts associated with alternative 4 would be higher than those expected with alternatives 1 and 3. Alternative 2 would require routing the powerline through an undisturbed area used for game farming (by Anglo) and is therefore deemed to be the least preferable routing option. All powerline routes may require the removal of some Protected Vachellia erioloba tree species. This will however be avoided where possible.
Heritage	1	1	1	1	1	1	1	1	**Smelter Complex:** Neither of the proposed alternatives would

CRITERIA	RELATIVE RANKING								DISCUSSION/NOTES
	SMELTER AREA OPTION 1	SMELTER AREA OPTION 2	ACCESS ROAD OPTION 1 (CORRIDOR)	ACCESS ROAD OPTION 2	POWER LINE OPTION 1	POWER LINE OPTION 2	POWER LINE OPTION 3	POWER LINE OPTION 4	
resources									interfere with known existing heritage resources. **Road:** Neither of the proposed alternatives would interfere with known existing heritage resources. **Powerline:** It is not expected that any of the proposed alternatives would interfere with known existing heritage resources.
Soils and land capability	1	1	1	2	1	2	1	1	**Smelter Complex**: Soil type Hutton and Arcadia are located within both proposed infrastructure alternative areas. The related land capability is arable, grazing and wilderness for both proposed infrastructure options. **Road**: Soil type Hutton and Arcadia are located within both proposed road alternative areas. The related land capability is arable, grazing and wilderness for both proposed infrastructure options. It is expected that soil types may become more sensitive towards the rivers and in this regard, road alternative 1 which does not require any river crossings would be preferable. **Powerline:** Soil type Hutton and Arcadia are located within all four proposed powerline alternative areas. The related land capability is arable, grazing and wilderness for all proposed infrastructure options. It is expected that soil types may become more sensitive towards the rivers and therefore, powerline routing options which follow existing disturbance corridors (and will therefore follow existing river crossings with roads, other powerlines and fences are deemed preferable). In this regard, options 1, 3 and 4 are deemed to be preferable since additional powerline river crossings will be limited to where already existing river crossings (and therefore disturbance to soils) with fences,

CRITERIA	RELATIVE RANKING								DISCUSSION/NOTES
	SMELTER AREA OPTION 1	SMELTER AREA OPTION 2	ACCESS ROAD OPTION 1 (CORRIDOR)	ACCESS ROAD OPTION 2	POWER LINE OPTION 1	POWER LINE OPTION 2	POWER LINE OPTION 3	POWER LINE OPTION 4	
									roads or other powerlines are already built.
Ground water regime and impacts on downstream users	1	1	1	1	1	1	1	1	**Infrastructure**: The Hydrogeological Map indicates that the aquifer for the project area (and surrounds) is intergranular and fractured. In terms of the Aquifer Classification Map of South Africa (*Conrad et al, 1999*), the aquifer underlying the project area is classified as a minor aquifer, which implies a moderately yielding aquifer system of variable water quality. No notable geological features were documented. **Road**: Same as above. **Powerline:** Same as above.
Proximity to surface water resources	2	1	1	2	1	2	1	1	**Smelter Complex:** Both infrastructure alternative areas would be located outside of the 1:100 year floodline or further than 100m from the relevant drainage channels, thereby complying with Regulation 704 (4 June 1999). Alternative 1 is however located closer to a watercourse. **Road**: Access road alternative 1 is preferable since it does not require any river crossings whereas alternative 2 would require several crossings. **Powerline:** All four powerline alternatives would require river crossings. Alternatives 1, 3 and 4 are deemed to be preferable since they would follow existing disturbance corridors (and therefore presumably existing river crossings with powerlines, fences, roads etc.).
Visual impact	1	2	1	2	1	3	1	2	**Smelter Complex:** Infrastructure area alternative 1 is immediately adjacent to the existing Union Section Mine (which is already subjecting receptors to visual impacts), whereas alternative 2 is further away from the existing Union Section Mine

CRITERIA	RELATIVE RANKING								DISCUSSION/NOTES
	SMELTER AREA OPTION 1	SMELTER AREA OPTION 2	ACCESS ROAD OPTION 1 (CORRIDOR)	ACCESS ROAD OPTION 2	POWER LINE OPTION 1	POWER LINE OPTION 2	POWER LINE OPTION 3	POWER LINE OPTION 4	
									and would therefore be seen in "isolation" rather than as a "cumulative" visual impact. In addition, alternative 2 would be closer to the main Dwaalboom road and therefore more visible than alternative 2. **Road:** Alternative 1 traverses a shorter distance prior to entering the preferred project area and is therefore deemed to have a lower visual impact. **Powerline:** Alternatives 1 and 3 traverse existing powerline servitudes and disturbance corridors where possible thereby limiting "new" visual impacts. Alternative 2 is the least preferable since it presents a "new" visual impact, whilst alternative 4, even though it follows an existing boundary fence line is not as preferable from a visual impact perspective as alternatives 1 and 3.
Proximity to residential areas from an air quality and noise perspective	2	1	1	2	N/A	N/A	N/A	N/A	**Smelter Complex:** Alternative 2 is further from the Union Section Mine village (Swartklip village) and is therefore deemed to be preferable from an air and noise perspective. **Road:** Road alternative 1 is deemed to be preferable from an air and noise perspective given that the distance is shorter. In addition, it is closer to existing linear infrastructure. **Powerline:** Not relevant
Sterilisation of mineral resources	1	1	1	1	1	1	1	1	**Smelter Complex:** Neither alternative is expected to sterilise any known mineral resources. **Road:** Neither alternative is expected to sterilise any known mineral resources. Should this occur, the road could be re-routed.

CRITERIA	RELATIVE RANKING								DISCUSSION/NOTES
	SMELTER AREA OPTION 1	SMELTER AREA OPTION 2	ACCESS ROAD OPTION 1 (CORRIDOR)	ACCESS ROAD OPTION 2	POWER LINE OPTION 1	POWER LINE OPTION 2	POWER LINE OPTION 3	POWER LINE OPTION 4	
									Powerline: None of the alternatives are expected to sterilise any known mineral resources. Should this occur, the powerline could be re-routed.
Interference with surface infrastructure	1	1	1	2	1	2	2	2	**Smelter Complex:** It is not expected that either alternative will interfere with existing surface infrastructure. **Road:** Both road alternatives will require level crossings with the railway line. IAP concerns (from farmers neighbouring road alternative 2 were raised) (see Appendix F), and in this regard road alternative 1 is deemed to be preferable since it was considered in response to such IAP concerns. **Powerline:** All alternatives are expected to present an equal disturbance to existing surface infrastructure since they will all require crossing the 400kV Matimba line which travels in a northerly direction through the Anglo and SCSC properties. It should however be noted that Eskom has agreed in principle to the proposed alternative 1 routing and therefore the expected disturbance to existing Eskom powerlines associated with this.
Land Access	1	2	1	1	1	2	2	2	**Smelter Complex:** SCSC has been denied access to alternative 2 and therefore alternative 1 is deemed to be the preferred alternative. **Road:** It is expected that land access for both alternatives 1 and 2 should not be problematic since the proposed access road will as far as is practically possible follow existing servitudes and property boundaries. **Powerline:** All routing alternatives will require land use/servitude agreements with third party landowners, namely Anglo. It is expected that the alternative preferred by Anglo is option 1 since

CRITERIA	RELATIVE RANKING								DISCUSSION/NOTES
	SMELTER AREA OPTION 1	SMELTER AREA OPTION 2	ACCESS ROAD OPTION 1 (CORRIDOR)	ACCESS ROAD OPTION 2	POWER LINE OPTION 1	POWER LINE OPTION 2	POWER LINE OPTION 3	POWER LINE OPTION 4	
									it presents only a limited disturbance footprint to Anglo property.
Total	**12**	**12**	**10**	**16**	**9**	**18**	**11**	**13**	**Smelter Complex:** Alternatives 1 and 2 are equally preferable, however the land access issue is definitive, making alternative 1 the preferred option. **Road:** Alternative 1 is preferable. **Powerline:** Alternative 1 is preferable. In addition this is the proposed routing to which Eskom has agreed and it is expected that this will also be the preferred routing by Anglo whose property the powerline will traverse prior to entering SCSC property.

7.1.3 LOCATION WITHIN THE SITE

The proposed conceptual location of infrastructure within the preferred smelter complex infrastructure site took account of proximity to the main source of incoming chrome concentrate source, optimising process flow, avoiding undisturbed and/or sensitive vegetation and avoiding surface water resources. Alternative layout options within the preferred smelter complex infrastructure site may be considered in the EIA process if deemed important from an impact mitigation/management perspective.

7.1.4 OTHER ALTERNATIVES

WATER SUPPLY ALTERNATIVES

SCSC is currently planning to secure water supply from the adjacent Union Section Mine. In addition, SCSC is investigating the use of water from boreholes. Depending on the outcome of the investigations, if it is determined that water will not be able to be sourced from boreholes, other alternatives may be considered. These alternatives include sourcing water from the municipal supply. Details will be provided in the EIA and EMP report.

TRANSPORT ALTERNATIVES

Transportation alternatives which are currently being considered include transportation of raw materials to site via road and rail as well as transportation of product to market via road and rail. Rail would however be the project's preferred mode of transport. Further detail will be provided in the EIA and EMP report.

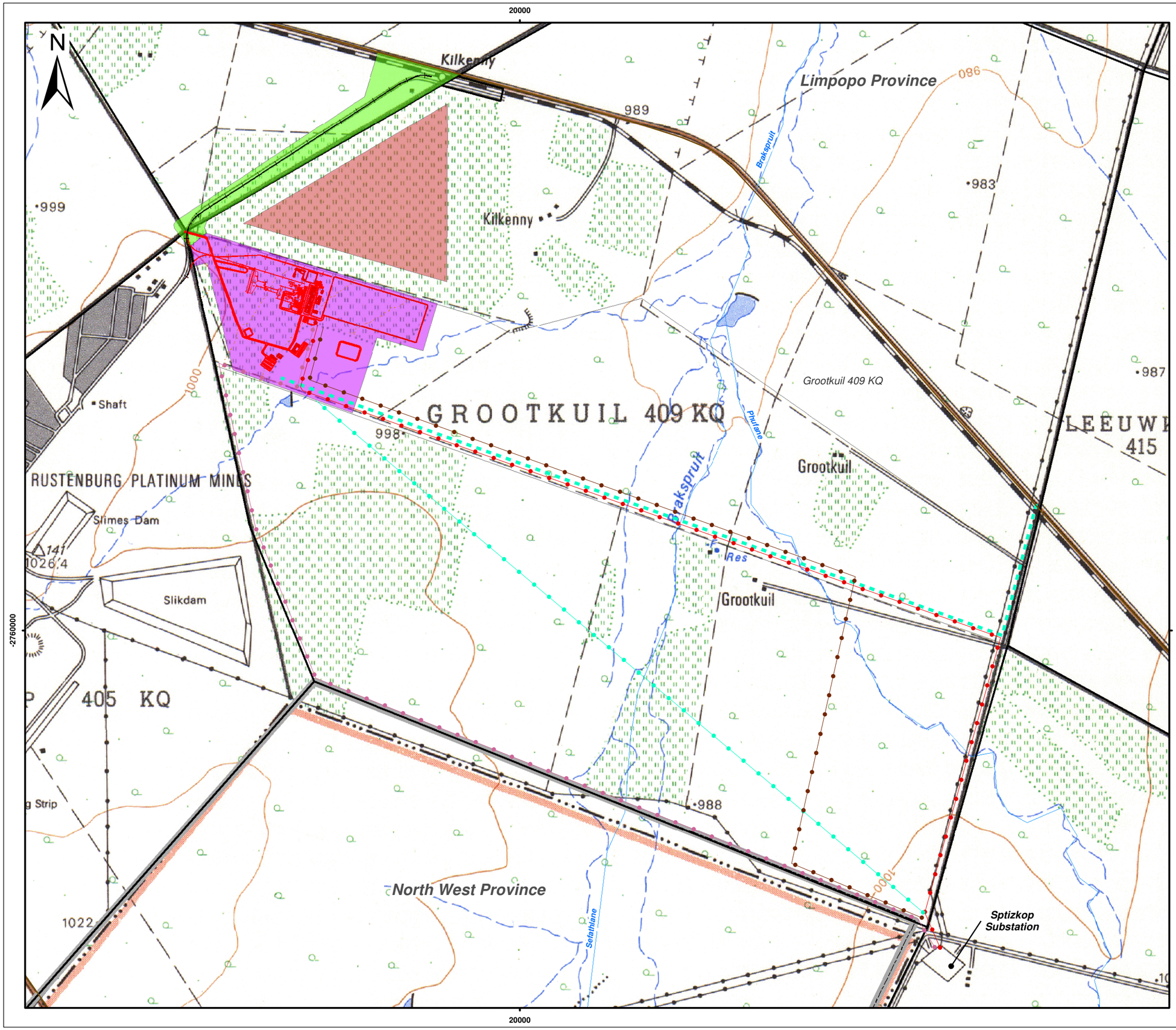
MINERALISED WASTE

It is proposed that slag and baghouse dust emanating from the smelter will be co-disposed onto a single mineralised waste facility. The facility has the option of co-disposal (preferred) or compartmentalised disposal (alternative option if required). This will be detailed further in the EIA and EMP report.

In line with the nationwide drive to minimise disposal of waste to land, SCSC is considering various options which would allow for the re-processing, recycling or reclamation of its mineralised waste. Should SCSC be successful in this regard, the footprint of the mineralised waste facility would be reduced. More detail will be provided in the EIA and EMP report.

7.1.5 THE "NO-GO" ALTERNATIVE

The assessment of this option requires a comparison between the options of proceeding with the proposed project with that of not proceeding with the proposed project. Proceeding with the proposed project attracts potential economic benefits and potential negative environmental and social impacts. Not proceeding with the proposed project leaves the status quo. More detail will be provided in the EIA and EMP report.



Legend

- Proposed Infrastructure layout
- Dams
- Farm Boundaries
- Rivers
- Roads
- Existing Union Section Railway Line
- Provincial Border

Options

- Project Infrastructure Area - Option 1 (Preferred)
- Project Infrastructure Area - Option 2
- Access Road Corridor - Option 1
- Access Road - Option 2
- Powerline - Option 1 (Preferred)
- Powerline - Option 2
- Powerline - Option 3
- Powerline - Option 4

0 0.25 0.5 0.75 1 Kilometers

Scale: 1:26 500 @ A3

Projection: Transverse Mercator
Datum: Hartebeeshoek, LO27

Siyanda Chrome Smelting Company (Pty) Ltd

Figure 5

Site Layout Alternatives

SLR Consulting (Africa) (Pty) Ltd
P O Box 1596, Cramerview, 2060, South Africa
Tel: +27 (11) 467-0945 Fax: +27 (11) 467-0978

710.19057.00001	November 2015

7.2 DETAILS OF THE PUBLIC PARTICIPATION PROCESS FOLLOWED

This section describes the information provided to landowners, adjacent landowners, regulatory authorities and other interested and affected parties (IAPs) to inform them in sufficient detail of what the proposed project will entail, in order for them to assess what impact the operation will have on them or the use of the land and to have input into alternative considerations.

7.2.1 DATABASE

The proposed project's public involvement database was developed by sourcing IAPs details relating to immediate landowners and adjacent landowners by means of a deed search. This information was verified during social scans including site visits in the surrounding area, networking and direct consultation with IAPs. In addition to this, the project's public involvement database was supplemented with information on IAPs provided in the scoping meetings. A copy of the project's public involvement database is included in Appendix E. The database will be updated on an on-going basis throughout the environmental process.

7.2.2 BACKGROUND INFORMATION DOCUMENT (BID)

A BID was compiled in both English and Setswana and distributed by hand (at the scoping meetings) and sent via email to IAPs and regulatory authorities on the project's public involvement database. The purpose of the BID was to inform IAPs and regulatory authorities about the proposed project, the environmental assessment process, the current status of the environment, possible environmental impacts, and means of providing input into the environmental assessment process. Attached to the BID was a registration and response form, which provided IAPs with an opportunity to submit their names, contact details and comments on the project. A copy of the BID is provided in Appendix E.

7.2.3 REGULATORY AUTHORITIES AND STAKEHOLDERS NOTIFICATIONS

Regulatory authorities and stakeholder were informed in writing of the proposed project. Proof of this notification is provided in Appendix E. The following regulatory authorities and stakeholder were notified:

- National Department of Environment Affairs (DEA)
- Department of Water and Sanitation (DWS) (Hartebeespoort)
- Department of Economic Development, Environment and Tourism (LEDET)
- Department of Agriculture, Forestry and Fisheries (DAFF)
- South Africa Heritage Resource Agency (SAHRA)
- Department of Rural Development and Land Reform (DRDLR)
- Department of Public Works, Roads and Transport (DPWRT)
- Thabazimbi Local Municipality
- Waterberg District Municipality

- Moses Kotane Local Municipality
- Bojanala District Municipality
- Parastatals:
  - Telkom
  - Transnet
  - Eskom
- Non-government organisations:
  - None identified
- Others:
  - Landowners and land users
  - Surrounding mines

7.2.4 SITE NOTICES AND ADVERTISEMENTS

Site notices in English and Setswana were placed at key conspicuous positions in and around the proposed project site and block advertisements were placed in the Sowetan and Kwevoel newspapers on Friday 3rd July 2015. Photographs of the site notices and copies of the newspaper advertisements are provided in Appendix E.

7.2.5 SCOPING MEETINGS – IAPS AND REGULATORY AUTHORITIES

IAPs were notified of the public meeting in the following manner:

- Telephonic discussions and emails to notify IAPs of the proposed date for the public meetings (Appendix E)
- Advertisements placed in the Sowetan and Kwevoel newpspapers (Appendix E)
- Site notices placed in and around the proposed project site (Appendix E).

Regulatory authorities were notified of the regulatory authorities meeting in the following manner:

- Telephonic discussions to notify regulatory authorities of the proposed date for the authorities meeting
- Formal invitations to the regulatory authorities meeting sent via email (Appendix E) including telephonic discussions.

The following public scoping and regulatory authority meetings were held for the proposed project:

- Four public scoping meetings were held between 21 and 23 July. These were held at the community of Mantserre (Community Hall), the community of Kwetsheza (Lekgotla Meeting Area), Northam Town Hall and at the Swartklip town Recreational Club. Meeting attendance registers and minutes are provided in Appendix E.

- One regulatory authorities meeting was held on 23 July 2015 at the Swartklip Recreation Club. The meeting attendance register and minutes are provided in Appendix E.
- One scoping meeting was planned with the community of Sefikile. Due to internal politics within the community, this meeting was cancelled and SLR is engaging with the Sefikile leadership. The Sefikile leadership were provided a copy of the BID as well as the presentation presented at the public scoping meetings. Proof is included in Appendix E.

The purpose of the abovementioned meetings was as follows:

- To provide an overview of the proposed project and alternatives
- To provide an overview of the environmental assessment process that will be undertaken for the proposed project
- To provide an overview and obtain input on the existing status of the environment
- To outline and obtain input on potential impacts identified for the proposed project
- To record any comments and issues raised. These issues and concerns will be used to inform the Plan of Study for the EIA Phase.
- Agree on the way forward and the logistics for report distribution

7.2.6 REVIEW OF THE SCOPING REPORT

The scoping report will be made available for public and regulatory authorities review from **7 April to 10 May 2016**. Hard copies of the scoping report will be available for public review at the following venues:

- Thabazimbi Local Municipality
- Waterberg District Municipality
- Northam public library
- Kwetsheza community (home of ward councillor)
- Mmantserre community (home of ward councillor)
- Sefikile community (Mr Mataboge c/o BBKTA)
- Swartklip recreation centre
- SLR's offices in Johannesburg

In addition, scoping reports will be available electronically on a CD on request.

Summaries of the scoping report will be sent by e-mail to all IAPs and authorities that are registered by email on the public involvement database. Communities will receive hard copies of summary documents and community leaders will receive hard copies of the scoping report should members of the community which to review the full report. In addition, IAPs will be notified via SMS when the draft scoping report is available for review.

7.3 SUMMARY OF ISSUES RAISED BY IAPS

A summary of the issues and concerns raised by IAPs and regulatory authorities is provided below. A full record is included in Appendix F.

- Air pollution concerns (and associated health impacts)
- Increase in disturbing noise levels;
- Surface water quality issues;
- Groundwater contamination
- Loss of heritage/cultural resources;
- Land use issues pertaining to the continuation of existing land uses in the surrounding area
- Waste related issues pertaining to the incapacity of the Northam town sewage plant.
- Negative visual impacts
- Traffic impacts relating to incapacity and safety of existing roads
- Negative socio-economic issues relating to the unemployment, influx of people, lack of employment opportunities, and associated crime such as stock-theft

7.4 THE ENVIRONMENTAL ATTRIBUTES

The baseline information provided here is aimed at giving the reader perspective on the existing status of the cultural, socio-economic and biophysical environment. In this regard, information on the environmental attributes for all project alternatives (infrastructure area, powerline and access road alternatives) is provided. More detailed information will be provided in the EIA report once the specialist reports and other research has been concluded in further detail.

7.4.1 ENVIRONMENT ASSOCIATED WITH THE PROPOSED ALTERNATIVE SITES

The section below provides the environmental attributes (baseline environment) associated with the site alternatives area. Unless indicated the baseline sections which follow are relevant for both the smelter infrastructure areas, both access road options as well as all four powerline routing options. Where baseline condition differentiation is required for various alternatives this has been provided.

7.4.1.1 Geology

INTRODUCTION

The geology of a particular area will determine the following factors:

- The type of soils present since the soils can be derived from the parent rock material
- The presence and quality of groundwater and the movement of the groundwater in the rock strata
- the presence of paleontological resources in the rock strata
- The potential for contaminant generation.

A description of the regional geology is provided below. More detailed information will be provided in the EIA and EMP.

Soil types are discussed in section 7.4.1.4, groundwater in section 7.4.1.7 and paleontological resources in section 7.4.1.11.

DATA SOURCES

Information in this section was sourced from the project team.

RESULTS/CONCLUSION

Regional Geology

The site alternatives area (which for the purposes of the baseline geological environment includes both proposed infrastructure areas, both access road alternatives and all four powerline routing alternatives) is situated in the Bushveld Igneous Complex (BIC). Centred on the Limpopo Province and extending into the Provinces of Mpumalanga, North West and Gauteng in South Africa, the BIC is the largest layered

mafic igneous complex on earth, with an exposed surface area of some 67 000 $km^{2.}$ The BIC is an intrusive igneous body, extending about 400 km from east to west and about 350 km from north to south.

The BIC consists of crystalline material such as norites and pyroxenites and comprises an unweathered and intact rock matrix with negligible matrix porosity and permeability, and planes of discontinuity in the rock matrix, including both faults and joint plant (collectively referred to as fractures). More information on potential geological lineaments will be provided in the EIA report.

7.4.1.2 Topography

INTRODUCTION

The topography of a particular area will determine the following factors:

- The flow of surface water, and in many cases, also groundwater
- The depth of soils and the potential for soil erosion, for example, in the case of steep slopes soils are shallower and more prone to erosion
- The type of land use, for example flat plains are more conducive to crop farming
- The aesthetic appearance of the area
- Topography can also influence climatic factors such as wind speeds and direction, for example, wind will be channelled in between mountains and along valleys.

Changes in the topography caused by the industrial activities could therefore alter all of the above-mentioned aspects of the environment. Project-related activities have the potential to alter the topography of the site through the establishment of infrastructure.

This section provides a brief description of the site topography (which includes the topography of the various alternatives being considered) to facilitate an understanding of the topographical features relevant to the proposed project area and surrounding area from which to measure potential change. More detailed information will be provided in the EIA and EMP report.

DATA SOURCES

Information in this section was sourced from the project team.

RESULTS/CONCLUSION

The topographic relief within the site alternatives area can be described as gently sloping towards the east or south-east. Topographic elevation varies between 988 to 1002 metres above mean sea level (mamsl). This gently sloping topography is uninterrupted, with the exception of watercourses which flow through the site alternatives area, altering the topography slightly (see Figure 5).

7.4.1.3 Climate

INTRODUCTION

Climate can influence the potential for environmental impacts and related project design. Specific issues are listed below:

- Rainfall could influence erosion, evaporation, vegetation growth, rehabilitation planning, dust suppression, and surface water management planning;
- Temperature could influence air dispersion through impacts on atmospheric stability and mixing layers, vegetation growth, and evaporation which could influence rehabilitation planning; and
- Wind could influence erosion, the dispersion of potential atmospheric pollutants, and rehabilitation planning.

To understand the basis of these potential impacts, a brief baseline situational analysis is described below. More detailed and updated information will be provided in the EIA.

DATA SOURCES

Information in this section was sourced from the surface water study (SLR, October 2015) and the air quality study (Airshed, November 2015) being undertaken as part of the proposed project.

RESULTS/CONCLUSION

The site alternatives area (which includes both smelter infrastructure alternative areas, both access road alternatives as well as all four powerline alternatives) falls within the Highveld Climatic Zone, as defined by Schulze (1974). The average annual precipitation ranges from 500 mm to 700 mm (WRC, 1994). Rainfall is generally in the form of thunderstorms. These can be of high intensity with lightening and strong gusty south-westerly winds. Hail frequency is high, tending to occur 4-7 times per season. Temperatures in this climatic zone are generally mild, but low minima can be experienced in winter due to clear night skies. Frost characteristically occurs in the winter months. Generally winds are light, but south-westerly winds associated with thunderstorms are typically strong and gusty.

<u>Rainfall</u>

Rainfall data for the proposed site alternatives area was sourced from the South African Weather Station for weather stations Middelkop and Northam. In addition to this rainfall data was also sourced from the Water Resources of South Africa manual (WR2005) for the catchment A24E Kuruman weather station including the. A summary of the monthly rainfall data from these various stations is included in Table 8 below (SLR, September 2015).

TABLE 8: SUMMARY OF MONTHLY RAINFALL FOR THE PROPOSED PROJECT AREA (SLR, SEPTEMBER 2015)

MONTH	RAINFALL (mm)		
	Middlekop (0587139 W)	Northam (0587477 W)	WR2005
January	119	117	106.4
February	96	82	92.9
March	83	81	79.6
April	48	35	40.7
May	20	8	13.8
June	8	2	6.3
July	6	1	3.6
August	4	2	4.9
September	15	16	13.7
October	48	51	46.2
November	84	81	79.6
December	106	95	104.1
Annual	**639**	**571**	**592**

Evaporation

Monthly evaporation data was obtained from the Water Resources of South Africa manual, (WR2005, 2009). Below in Table 9 is a summary of the adopted evaporation data for the proposed project area (SLR, September 2015).

TABLE 9: SUMMARY OF EVAPORATION DATA (SLR, SEPTEMBER 2015)

MONTHS	SYMONS PAN EVAPORATION (MM)	LAKE EVAPORATION FACTOR	LAKE EVAPORATION (MM)
January	201.7	0.84	169.4
February	165.7	0.88	145.8
March	153.1	0.88	134.7
April	114.9	0.88	101.1
May	91.3	0.87	79.4
June	71.9	0.85	61.1
July	83.2	0.83	69.1
August	122.1	0.81	98.9
September	168.2	0.81	136.3
October	207.5	0.81	168.1
November	207.8	0.82	170.4
December	213.6	0.83	177.3
Total	**1801**	**N/A**	**1512**

Temperature

Monthly mean, maximum and minimum temperatures for the proposed project area are provided in Table 10 below. Temperatures ranged between 1°C and 34 °C (Airshed, November 2015).

TABLE 10: MONTHLY TEMPERATURE DATA (AIRSHED, NOVEMBER 2015)

MONTHS	AVERAGE	MAXIMUM	MINIMUM
January	25	34	16
February	25	33	17
March	23	33	15
April	19	29	9
May	15	27	5
June	12	24	1
July	12	22	1
August	15	28	2
September	19	30	4
October	21	32	9
November	24	34	12
December	25	33	16

Wind

During the day, winds occur more frequently from the east-south-east with almost 4% calm conditions. Night time airflow has less frequent winds from the east-south-easterly sector and at lower wind speeds, with winds mostly occurring from the north-north-easterly sector during this time.

The autumn and winter seasons reflect the average prevailing wind direction as being from the east-south-east, while the spring and summer seasons reflect average prevailing wind from the north-north-east and an increase in winds from the easterly sector (Airshed, November 2015).

7.4.1.4 Soil and land capability

INTRODUCTION

Soil is an important natural resource and provides ecosystem services that are critical for life, such as:

- Water filtering
- Providing growth medium for plants, which in turn provide food for plant-eating animals
- Providing habitat for a wide variety of life forms.

Soil forms rather slowly by the breaking down of rock material and is therefore viewed as a non-renewable resource. Soil determines the type of land use the area is suitable for, for example, soil with low nutrients may not be able to support unassisted crop farming.

Soil resources are vulnerable to pollution, erosion and compaction, which could be caused by project-related activities.

The baseline soil information will be used to identify sensitive soil types, to guide the project planning in order to avoid sensitive soil types where possible, to determine how best to conserve the soil resources in the area and allow for proper rehabilitation of the site once the project has ceased.

The land capability of an area is based on the soil properties and related potential to support various land use activities. Industrial operations have the potential to significantly transform the land capability.

A brief description of the soil types and land capability in the site alternatives area is provided below. More detailed information will be provided in the EIA and EMP.

DATA SOURCES

Information in this section was sourced from the soils, land use and land capability study being undertaken for the proposed project (Terra Africa, November 2015).

RESULTS/CONCLUSION

Land Types

The land type data indicates that only two land types are present in the site alternatives area, namely Land Type Ae64 and Land Type Ea70.

Soil forms: Land Type Ae64

This land type (found mostly in the eastern part of the site alternatives area) is dominated by red apedal, freely drained soils (dystrophic and/or mesotrophic) of the Hutton soil form. The other prominent soil form in this land type consists of deep to very deep soils in which clay accumulation through time has resulted in more structured soil profiles of the Shortlands soil form and Valsrivier soil form.

Soil forms: Land Type Ea70

This land type (found in the western part of the site alternatives area) is dominated by extremely strongly structured vertic soils of the Arcadia soil form. The other prominent soil forms in this land type are the Hutton soil form consisting of an orthic A horizon on a red apedal B horizon overlying unspecified material, and the Shortlands soil form consisting of an orthic A horizon underlain by a red structured B horizon.

Agricultural Potential

Dryland crop production is possible in parts of the site alternatives area where the soil conditions permit it (well-drained profiles deep enough for cultivation) and this includes the preferred alternative area on which the proposed smelter infrastructure will be developed. These crops include maize, groundnuts,

cotton and sunflowers. There is also potential for irrigated crop production, provided that irrigation water is available. The site alternatives area also has potential for livestock farming and the grazing capacity of the site alternatives area ranges between 7 and 10 hectare per animal unit (ha/AU). Throughout the site alternatives area, the agricultural potential is deemed to be intermediately suitable for arable agriculture where climate permits.

Land use capability

Following the soil and land type classification system, it is anticipated that the site alternatives area will have arable, grazing and wilderness land capability. This will be further refined during the EIA phase.

7.4.1.5 Biodiversity

INTRODUCTION

Biodiversity refers to the flora (plants) and fauna (animals). According to the International Union for Conservation of Nature (IUCN) (2011), biodiversity is crucial for the functioning of ecosystems which provide us with products and services which sustain human life. Healthy ecosystems provide us with oxygen, food, fresh water, fertile soil, medicines, shelter, protection from storms and floods, stable climate and recreation.

The establishment of project infrastructure as well as project-related activities have the potential to result in a loss of habitat through the destruction/disturbance of vegetation and/or contamination of soil and/or water resources, thereby reducing the occurrence of fauna and flora on site and in the surrounding areas that are linked through ecological processes.

The baseline information on biodiversity in the proposed project area will be used to identify sensitive areas, to guide the project planning in order to avoid sensitive areas where possible, to determine how best to conserve the fauna and flora in the area and allow for proper rehabilitation of the site once operations cease.

A brief description of fauna and flora located within the proposed site alternatives area is provided below. More detailed information will be provided in the EIA and EMP.

DATA SOURCE

Information in this section was sourced from the biodiversity study being undertaken for the proposed project (SAS, September 2015) and on-site observations by the SLR project team.

RESULTS/CONCLUSION

Flora (Natural plant life)

The proposed site alternatives area falls within the Dwaalboom Thornveld vegetation type which is comprised of four broad habitat units, namely the Bushveld Habitat Unit, the Wetland/ Riparian Habitat Unit, the Secondary Bushveld Habitat Unit and the Transformed Habitat Unit. The Dwaalboom Thornveld occurs as plains with a layer of scattered deciduous microphyllous trees and shrubs with a few broad-leaved tree species, and an almost continuous herbaceaous layer dominated by grass species. *Vachellia tortilis* and *V. nilotica* dominate on the medium clay soils. On particularly heavy clays most other woody plants are excluded and the diminutive *V. tenuispina* dominates at a height of less than 1m above the ground. On the sandy clay loams *V. erubescens* is the most prominent tree. Further information pertaining to the dominant species within this Dwaalboom Thornveld vegetation type is summarised in Table 11.

TABLE 11: DOMINANT AND TYPICAL FLORISTIC SPECIES OF DWAALBOOM THORNVELD (SAS, SEPTEMBER 2015)

GRASS SPECIES	FORB SPECIES	TREE/SHRUB SPECIES
Aristida bipartita (d) *Bothriochloa insculpta (d)* *Digitaria eriantha subsp. eriantha (d)* *Ischaemum afrum (d)* *Panicum maximum (d)* *Cymbopogon pospischilii* *Eragrostis curvula* *Sehima galpinii* *Setaria incrassata*	*Heliotropium ciliatum* *Kohautia caespitose subsp. brachyloba* *Nidorella hottentotica.*	Tall trees: *Acacia erioloba;* Small trees: *Acacia erubescens (d)* *A. nilotica (d)* *A. tortilis subsp. heteracantha (d)* *A. fleckii* *A. melifera subsp. detinens* *Combretum imberbe* *Searsia lancea* *Ziziphus mucronata* Tall shrubs: *Acacia hebeclada subsp. hebeclada* *Combretum hereroense* *Diospyros lycioides subsp. lycioides* *Euclea undulate* *Grewia flava* *Tarchonanthus camphoratus* Low shrubs: *Acacia tenuispina (d)* *Abutilon austro-africanum* *Aptosimum elongatum* *Hirpicium bechuanense* *Pavonia burchellii* *Solanum delagoense* Succulent shrubs: *Kalanchoe rotundifolia* *Talinum caffrum* Herbaceous climber: *Rhynchosia minima*

*(d) – Dominant species for the vegetation type.

V. erioloba trees (listed as “declining” in terms of the SANBI Red Data List (RDL) occur scattered, but in low abundance throughout the Bushveld Habitat Unit but is present in high abundance within the Sandy Thorn Bushveld Habitat Unit. A number of *V. erioloba* trees have been encountered within the preferred powerline routing alternative. It is unlikely that *V. erioloba* will be successfully relocated and permits will need to be obtained from the Department of Forestry and Fisheries (DAFF) in order to remove all identified trees located within the footprint area. *V. erioloba* is also protected in terms of the National Forests Act of 1998 (Act 84 of 1998). In addition to *V. erioloba*, one other tree species, namely *Boscia albitrunca*, also protected under the National Forests Act (Act 84 of 1998) was encountered within the Sandy Thorn Bushveld habitat. This species is however not located where project related infrastructure is planned to be and is therefore unlikely to be impacted by the proposed project.

In terms of species of conservation concern, two SANBI Red Data List (RDL) floral species listed as “Declining”, namely *Vachellia erioloba* (Camel thorn) and *Crinum macowanii*, were encountered within the site alternatives area. *Crinum macowanii* was encountered within the Wetland/ Riparian Habitat Unit within the site alternatives area.

One other SANBI RDL floral species which was not encountered within the site alternatives area but has a high likelihood of occurring within the Bushveld Habitat Unit is *Boophane disticha* (also listed as ‘Declining’). Due to the proposed smelter infrastructure (both alternatives) being located almost entirely within the Transformed Habitat Unit, it is unlikely that *B. disticha* will be encountered within the smelter footprint area itself, however its likelihood of occurring should not be ignored.

Other protected tree species that were not encountered within the site alternatives area, but which may occur due to suitable habitat being available within the Wetland/ riparian and Bushveld Habitat units respectively are *Combretum imberbe* and *Sclerocarya birrea* subsp. *caffra*. These species were not noted within the proposed smelter, powerline or access road alternative areas and, if present it is unlikely that they will be impacted by the proposed project.

One provincially protected floral species, as stipulated in Section 12 of the LEMA (Act 7 of 2003), namely *Scadoxus puniceus*, was encountered within the Bushveld Habitat Unit within the site alternatives area. This species is however located outside of the proposed smelter and powerline footprint areas. No protected floral species as listed under Section 56 (1) d) of the TOPS Regulations under NEMBA (Act 10 of 2004) were encountered within the site alternatives area. Due to the location of the proposed smelter infrastructure (both alternatives) being almost entirely within the Transformed Habitat Unit, it is highly unlikely that these species will be present within the smelter development footprint and none were encountered. However should any species protected under LEMA (Act 7 of 2003) or NEMBA (Act 10 of 2004) have been overlooked during the field assessment and be encountered within the proposed powerline alignment alternatives, authorisation to relocate such species must be obtained from LEDET or DEA.

Alien and invasive species

A list of Alien and invasive species located within the proposed site alternatives area is provided in Table 12 below.

TABLE 12: DOMINANT ALIEN/INVASIVE VEGETATION SPECIES IDENTIFIED WITHIN THE SITE ALTERNATIVES AREA

SPECIES	COMMON NAME	NEMBA CATEGORY*
Trees/ Shrubs		
Opuntia ficus-indica	Sweet prickly pear	1b
Forbs/ Sedges		
Achyranthes aspera	Burweed	N/L
Alternanthera pungens	Khakiweed	N/L
Bidens pilosa	Common blackjack	N/L
Conyza bonariensis	Flax-leaf fleabane	N/L
Datura ferox	Large thorn-apple	1b
Hibiscus trionum	Bladder hibiscus	N/L
Persicaria lapathifolia	Spotted knotweed	N/L
Rumex crispus	Curly dock	N/L
Schkuhria pinnata	Dwarf marigold	N/L
Sesbania bispinosa	Spiny sesbania	N/L
Tagetes minuta	Tall khakiweed	N/L
Tribulus terrestris	Devil's thorn	N/L
Verbena bonariensis	Purple top	1b
Zinnia peruviana	Redstar zinnia	N/L

N/L = Not Listed and not categorised

* National Environmental Management: Biodiversity Act (Act 10 of 2004): Alien and Invasive Species Regulations, GN R598 of 2014
Category 1a – Invasive species that require compulsory control.
Category 1b – Invasive species that require control by means of an invasive species management programme.
Category 2 – Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread.
Category 3 – Ornamentally used plants that may no longer be planted. Existing plants may remain, except within the flood line of watercourses and wetlands, as long as all reasonable steps are taken to prevent their spread (Bromilow, 2001).

From the table above, it is clear that although a moderate diversity of alien/invasive floral species occur within the site alternatives area, the majority of species are not listed as declared invaders, with the exception of *Datura ferox, Verbena bonariensis* and *Opuntia ficus-indica,* which are listed as Category 1b invaders that require mandatory eradication. Most alien/invasive floral species occur throughout the site alternatives area with the majority being present within the Wetland/ riparian Habitat Unit and within transformed areas.

Vegetation sensitivity

A sensitivity analysis was done with the use of the floral and faunal integrity and diversity encountered during the assessment of the site alternatives area, as well as taking into consideration the location and extent of wetland and riparian features traversing the site alternatives area. The Wetland/ Riparian

Habitat Unit is regarded as being of high ecological sensitivity due to the contribution of the various wetland features to faunal migratory connectivity, wetland eco-services provision and the habitat provided for faunal and floral species. Areas of high sensitivity include the watercourses within the site alternatives area, namely the Brakspruit River and the Phufane River as well as the two unnamed tributaries (see Figure 2). It follows that both alternative locations for smelter infrastructure fall outside of the relevant floodlines of these watercourses, and the preferred access road alternative (the access road corridor) would not require any river crossings as opposed to alternative 2 that would require three river crossings (see Figure 5). All four powerline routing alternatives would require river crossings, however given the nature of powerlines, it is expected that the impacts associated with this would be negligible.

The Bushveld Habitat Unit comprises the majority of the site alternatives area (with the exception of the western part of the site alternatives area which has been disturbed by cropping activities) and is in a largely natural condition. Due to differences in soil types and local topography within the site alternatives area, which determines species composition, four sub-habitat units were identified within this habitat unit, with differing ecological importance, as follows:

- Sandy Thorn Bushveld: this habitat provides largely intact habitat and a high abundance of floral SCC occur in this area. This habitat is considered to be of a Moderately High ecological sensitivity.
- Plains (low-lying) Thorn Bushveld: this habitat plays an important role in flood control within this area and is therefore also considered to be of Moderately High ecological sensitivity.
- Turf Thorn Bushveld: This habitat is considered to be largely intact, provides good habitat for floral and faunal species and is considered to be of Moderate ecological importance and sensitivity.
- Mixed Bushveld: This habitat is considered to have a lowered ecological sensitivity and conservation value due to the alteration of floral species composition and vegetation structure as a result of the abovementioned impacts.

Both the Secondary Bushveld and the Transformed Habitat Units are considered to have Low ecological sensitivity.

Fauna (Natural animal life)

Although the majority of the western part of the site alternatives area (where both smelter location alternatives and the preferred road alternative is located) has been transformed by cattle farming and maize cultivation (see Figure 5), the Wetland/ Riparian Habitat Unit (located close to the watercourses) and Bushveld Habitat Unit (which covers the remainder of the site alternatives area where all four powerline routings are located) still provide sufficiently intact habitat for many mammal species. The Wetland/ Riparian Habitat Unit was also the habitat unit where nearly all of the mammal species were encountered.

Mammals

Mammal species observed during the field survey include Slender Mongoose, Warthog, Cape Porcupine, Steenbuck, Reedbuck, Kudu, Scrub Hare, Red Veld Rat, Black-backed jackal.

In terms of conservation, no mammal of Species of Conservation Concern (SCC) were encountered during the field assessment.

Birds

Approximately 100 *avifaunal* species were observed during the field assessment. The majority of avifaunal species observed were common species, with several avifaunal SCC that were also observed within the boundaries of the SCSC property. Both the Bushveld and Wetland/Riparian Habitat Units provide consistent habitat for a number of common avifaunal species, with the Transformed Habitat Unit being subject to change due to varying degrees of usage through agricultural activities. The Wetland/ Riparian Habitat Unit had a higher diversity and number of common avifaunal species, which utilise these areas for breeding and foraging.

TABLE 13: AVIFAUNAL SCC RECORDED DURING THE FIELD ASSESSMENT

SCIENTIFIC NAME	COMMON NAME	IUCN STATUS	LIMPOPO SoER 2004 STATUS
Coracias garrulus	European Roller	NT	
Polemaetus bellicosus	Martial Eagle	VU	T
Pterocles gutturalis	Yellow-throated Sandgrouse	LC	

NT = Near Threatened, VU = Vulnerable, T = Listed as threatened but with no specific status for the Limpopo Province

Although not all identified during the field assessment, the full list of avifaunal SCC occurring in the Limpopo DFED 2004 report (and which could potentially occur within the project area) including IUCN status is provided in Table 14 below.

TABLE 14: RED DATA BIRD SPECIES LISTED IN THE LIMPOPO DFED REPORT INCLUDING IUCN STATUS

SCIENTIFIC NAME	COMMON NAME	LIMPOPO DFED 2004 STATUS	IUCN RED LIST STATUS
Gyps coprotheres	Cape Vulture	T	VU
Ciconia nigra	Black Stork	T	LC
Falco naumanni	Lesser Kestrel	T	LC
Certhilauda chuana	Short-clawed Lark	T	LC
Pterocles gutturalis	Yellow-throated Sandgrouse	T	LC
Anthropoides paradiseus	Blue Crane	T	VU
Gyps africanus	Whitebacked Vultures	T	E
Ardeotis kori	Kori Bustard	T	LC

SCIENTIFIC NAME	COMMON NAME	LIMPOPO DFED 2004 STATUS	IUCN RED LIST STATUS
Scotopelia peli	Pel's Fishing Owl	T	LC
Bucorvus leadbeateri	Southern Ground Hornbill	T	VU
Buphagus erythrorhynchus	Red-billed Oxpecker	T	LC
Terathopius ecaudatus	Bateleur	T	NT
Polemaetus bellicosus	Martial Eagle	T	NT
Aquila rapax	Tawny Eagle	T	LC
Torgos tracheliotos	Lappetfaced Vulture	T	VU
Trigonoceps occipitalis	Whiteheaded Vulture	T	VU
Buphagus africanus	Yellow billed Oxpecker	T	LC
Stephanoaetus coronatus	Crowned hawk Eagle	T	NT

LC = Least concerned, CE = Critically Endangered, E = Endangered, VU = Vulnerable, NT = Near Threatened. NYBA = Not yet been assessed by the IUCN. T = listed as threatened but with no specific status for the Limpopo Province.

The site alternatives area does not fall within an Important Bird Area (IBA), but the Northern Turf Thornveld IBA is situated between 500m and 1,5km to the north thereof, as depicted in Figure 5. The Northern Turf Thornveld IBA holds the core of the remaining resident South African *Pterocles gutturalis* (Yellow-throated Sandgrouse) population, which inhabits short open grasslands, fallow fields and recently burnt veld, especially on black clay soils near water and is regionally threatened. In addition to *P. gutturalis*, the globally threatened avifaunal species *Glareola nordmanni* (Black-winged Pratincole) and *Sagittarius serpentarius* (Secretarybird), as well as other regionally threatened species namely *Falco biarmicus* (Lanner Falcon) and *Ardeotis kori* (Kori Bustard) occur within this IBA.

Amphibians

Common amphibian species that are expected to occur in this region include *Ptychadena anchietae* (Plain Grass Frog), *Amietophrynus gutteralis* (Guttural Toad) and *Schismaderma carens* (Red Toad). Although not observed during the field assessment, there remains the possibility that *Pyxicephalus adspersus* (Giant Bullfrog) may occur within the Wetland/ Riparian Habitat Unit. *P. adspersus* is listed by the IUCN as being of Least Concern, but on a provincial basis this species is listed as Vulnerable by the LEMA (Act 7 of 2003) under Schedule 3 (Protected Wild Animals). A List of

The complete list of amphibian SCC known to occur within the Limpopo Province (and which could therefore potentially be found to occur within the project area) is included in Table 15 below.

TABLE 15: RED DATA AMPHIBIAN SPECIES LISTED IN THE LIMPOPO DFED 2004 REPORT INCLUDING IUCN STATUS

SCIENTIFIC NAME	COMMON NAME	LIMPOPO DFED 2004 STATUS	IUCN RED LIST STATUS
Breviceps sylvestris	Transvaal forest rain frog	VU	E
Ptychadena uzungwensis		P	LC
Leptopelis bocagii		P	LC
Hemisus guineensis	Guinea Snout-burrower	P	LC

LC = Least concerned, CE = Critically Endangered, E = Endangered, VU = Vulnerable, NT = Near Threatened, P = Peripheral. NYBA = Not yet been assessed by the IUCN.

Reptiles

Trachylepis punctatissima (Montane Striped Skink) and a shed skin of *Psammophylax sp.* (Skaapsteker) was observed during the field assessment. An overall low reptile species diversity was observed within the site alternatives area mainly due to the on-going anthropogenic and agricultural and grazing activities coupled with the general secretive behaviour of reptile species. Reptile species are most likely to be found in the more intact Bushveld and Wetland/Riparian Habitat Units as these areas provide suitable and varied habitat for reptiles and their food sources.

Although no reptile SCC were observed during the field surveys, one reptile SCC *Python natalensis* (Southern African Python), is likely to be present in the project area as suitable habitat for this species is present in the Wetland/Riparian Habitat Unit.

A full list of reptile SCC occurring within the Limpopo Province (and which could therefore occur within the project area) is included in Table 20 below.

TABLE 16: RED DATA REPTILE SPECIES LISTED IN THE LIMPOPO DFED 2004 REPORT INCLUDING IUCN STATUS

SCIENTIFIC NAME	COMMON NAME	LIMPOPO DFED 2004 STATUS	IUCN RED LIST STATUS
Homoroselaps dorsalis	Striped Harlequin snake	R	NT
Xenocalamus transvaalensis	Transvaal Quill-snout snake	R	DD
Lamprophis swazicus	Swaziland House Snake	R	NT
Python sebae natalensis	Python	VU	NYBA
Lygodactylus methueni	Methuen's Dwarf Gecko	VU	VU
Crocodylus niloticus	Nile Crocodile	VU	LC
Lycophidion variegatum	Variegated Wolf snake	P	NYBA
Psammophis jallae	Jalla's Sand snake	P	NYBA

R = Rare, DD = Data Deficient, LC = Least concerned, CE = Critically Endangered, E = Endangered, VU = Vulnerable, NT = Near Threatened, P = Peripheral. NYBA = Not yet been assessed by the IUCN.

Invertebrates

The invertebrate assessment conducted was a general assessment with the purpose of identifying common species and taxa in the site alternatives area As such, the invertebrate assessment is not an indication of the complete invertebrate diversity of the subject property and surrounding area. A representation of commonly encountered families in the Insecta class that were observed during the assessment is listed in Table 17 below.

TABLE 17: GENERAL RESULTS FROM INVERTEBRATE OBSERVED DURING THE ASSESSMENT OF THE SITE ALTERNATIVES AREA

SCIENTIFIC NAME	COMMON NAME	IUCN 2015 LIST STATUS
Eurema brigitta	Broad-bordered Grass Yellow	NYBA
Belenois aurota	Brown-veined White	NYBA
Junonia hierta	Yellow Pansy	LC
Danaus chrysippus	African Monarch	NYBA
Trinervitermes sp.	Snouted harvester Termites	NYBA
Musca domestica	House fly	NYBA
Catantops humeralis	N/A	NYBA
Orthoctha dasycnemis	N/A	NYBA
Rhachitopis sp.		NYBA
Anterhynchium natalense	N/A	NYBA
Anoplolepis custodiens	Pugnacious Ant	NYBA
Gryllus bimaculatus	Common Garden Cricket	NYBA
Phymateus morbillosus	Common Milkweed Locust	NYBA
Conocephalus caudalis	Meadow Katydid	LC
Lycus melanurus	Hooked-winged Net-winged Beetle	NYBA
Astylus atromaculatus	Spotted Maize Beetle	NYBA
Exochomus flavipes	Black Mealy Bug Predator	NYBA

LC = Least Concern, NYBA = Not yet been assessed by the IUCN

No invertebrate SCC were observed during the field assessment and it is also important to note that the distribution of all the red data species listed in the Limpopo Province LDFED 2004 report fall outside of the site alternatives area, and hence are not discussed further.

Arachnids

Four spider species were identified during the field investigation (Table 18). These species are considered to be common within the region and are not listed as threatened by either the IUCN, National or Provincial databases. All baboon spider species from the genera *Ceratgyrus, Harpactira* and *Pterinochilus* are protected under NEMBA (Act 10 of 2004) for South Africa. None were observed and the probability of them utilising the site alternatives area is deemed unlikely.

TABLE 18: SPIDER SPECIES RECORDED DURING THE FIELD SURVEY

SCIENTIFIC NAME	COMMON NAME	IUCN 2015 LIST STATUS
Thomisus onustus	Crab spider	NYBA
Argiope australis	Garden orb spider	NYBA
Stegodyphus dumicola	Community nest spider	NYBA
Olurunia ocellata	Grass funnel-web spider	LC

LC = Least Concern, NYBA = Not Yet Been Assessed

No scorpion species were identified within the site alternatives area. All scorpion species from the genera *Hadogenes, Opisthacanthus* and *Opistophthalmus* are also protected under NEMBA (Act 10 of 2004) in South Africa.

No threatened spider or scorpion species are listed for the Limpopo Province LDFED nor were any spider or scorpion SCC encountered, and as such these SCC species are not expected to occur in the site alternatives area. It is likely that only common arachnid species will be present within the boundary and close proximity of the subject property. The proposed smelter infrastructure and powerline alignment alternatives have been placed in such a way as to minimise the impact on arachnid SCC habitat. In addition both of the smelter infrastructure alternatives are placed on a cultivated land, and as such will not pose a significant threat to arachnid SCC habitat.

The Limpopo Conservation Plan v2 was consulted in order to determine whether the site alternatives area falls within any areas of conservation importance. From preliminary information obtained, it is evident that the area where the smelter complex infrastructure will be developed falls within an area with No Natural Habitat Remaining (NNR), whilst the proposed access road will be developed within an area with NNR and an area identified as an Other Natural Area (ONA). The preferred powerline alternative will traverse an area identified as an Ecological Support Area 1 (ESA1), with the remainder of the powerline traversing an area with NNR and ONA. This will be investigated further in the biodiversity specialist study, and more information will be included in the EIA and EMP report.

According to the National Biodiversity Assessment (NBA, 2011), which includes a summary of spatial biodiversity priority areas that have been identified through systematic biodiversity plans at national,

provincial and local levels (SANBI BGIS), the site alternatives area is not located within a formally or informally protected area and falls within an area classified as poorly protected.

7.4.1.6 Surface water

INTRODUCTION

Surface water resources include drainage lines and paths of preferential flow of stormwater runoff. Project-related activities have the potential to alter the drainage of surface water through the establishment of infrastructure and/or result in the contamination of the surface water resources through seepage and/or spillage of potentially polluting materials, non-mineralised waste (general and hazardous) and mineralised wastes. Key to understanding the hydrology of the site is the climatic conditions of the site (climate is discussed in section 7.4.1.3).

As a baseline, this section provides a brief description of surface water resources in the site alternatives area in order to facilitate an understanding of the hydrological catchments that could be affected by the project and the status of surface water resources in the project area. More detailed information will be provided in the EIA and EMP.

DATA SOURCES

Information in this section was sourced from the surface water study being undertaken for the proposed project (SLR, September 2015).

RESULT/CONCLUSION

Regional hydrology

The proposed site alternatives area falls within the quaternary catchment A24E which has a gross total catchment area of 688 km^2, with a net Mean Annual Runoff (MAR) of 9.86 million cubic meters (mcm).

The major river within quaternary catchment A24E is the Crocodile River located downstream of the proposed site alternatives area.

Local hydrology

As evident in Figure 5, the rivers that flow through the site alternatives area are the Brakspruit River, the Phufane River, as well as two unnamed tributaries one of which is located south-east of the proposed smelter infrastructure area and the second of which is located west of the Brakspruit River. All of these watercourses are non-perennial. The Phufane joins the Brakspruit River just north of the site alternatives area and the Brakspruit River joins the Bierspruit River at the outlet of quaternary catchment A24E. The Bierspruit River then drains in a north westerly direction eventually joining the Limpopo River approximately 100 km downstream.

It should be noted that for both the proposed smelter location alternatives, infrastructure will be located outside of the floodlines of the above mentioned watercourses. In so far as the access road and powerline alternatives are concerned, access road alternative 1 would not require any stream crossings, whereas access road alternative 2 would require crossings over the Brakspruit River, the Phufane River as well as an unnamed tributary. All four powerline alternatives would require river crossings, however given the nature of powerlines, it is expected that the impacts associated with this would be negligible.

Surface water quality

No water sampling within the proposed site alternatives area has been conducted to date because there are no permanent surface water features. Given this, no surface water quality data is available as of yet. Should surface water be obtained for monitoring purposes, the monitoring data will be provided in the EIA and EMP phase.

Surface water users

Due to the ephemeral nature of the various drainage lines traversing site alternatives area, there is no third party reliance on surface water.

Wetlands

According to the wetland assessment undertaken by SAS there are wetlands occurring within the larger site alternatives area. All project infrastructure (including the powerline and access road) will be kept outside of the wetland areas. (EMS, September 2015). Further detail on these wetlands will be provided in the EIA and EMP report.

7.4.1.7 Groundwater

INTRODUCTION

Groundwater is a valuable resource and is defined as water which is located beneath the surface in rock pore spaces and in the fractures of lithologic formations. Understanding the geology of the area (See Section 7.4.1.1) provides a basis from which to understand the occurrence of groundwater resources. Project-related activities such as the handling, storage and disposal of mineralised and non-mineralised wastes have the potential to impact on groundwater resources, both to the environment and third party users, through pollution.

As a baseline, this section provides a brief description of the pre-project groundwater conditions to facilitate an understanding of the potential for pollution plumes to occur as a result of project-related activities. More detailed information will be provided in the EIA and EMP.

DATA SOURCES

Information in this section was sourced from the groundwater study being undertaken for the proposed project (SLR, November 2015).

RESULTS/CONCLUSION

Presence of groundwater

The Hydrogeological Map indicates that the aquifer for the site alternatives area is intergranular and fractured. In terms of the Aquifer Classification Map of South Africa (Conrad *et al*, 1999), the aquifer underlying the site alternatives area is classified as a **minor aquifer,** which implies a moderately yielding aquifer system.

Groundwater flow

Groundwater flow directions will be along the surface topographical gradient. In the case of the Siyanda site alternatives area, groundwater flow is in a south-easterly direction.

Groundwater quality and levels

Based on the hydrocensus and drilling works undertaken by SLR in and around the site alternatives area, groundwater levels vary between approximately 7 metres below ground level (mbgl) and 34 mbgl. Groundwater levels are likely to be closely related to fracture systems.

The Groundwater Quality Map of South Africa (Conrad et al, 1999b) indicates the groundwater quality of South Africa in terms of electrical conductivity (EC). The Groundwater Quality Map indicates that the EC concentrations are low, ranging between 70 and 150 mS/m where the water will have a slightly salty taste. Further groundwater quality information will be available in the EIA and EMP report once the results of the hydrocensus have been reported and interpreted.

Groundwater use and yield

Groundwater within the site alternatives area and surrounds is used for domestic purposes and agricultural purposes such as livestock and game watering. There may also be limited potential for groundwater to be used as potable water. Expected yields within the project area are between 0.5 – 2.0 L/s, although yields can be higher if substantial fractures are encountered within the aquifer.

7.4.1.8 Air quality

INTRODUCTION

A change in ambient air quality can result in a range of impacts, which in turn, may impact nearby receptors. As a baseline, this section provides a brief description of pre-project conditions in the area from which to measure changes as a result of the proposed project. More detailed information will be provided in the EIA and EMP.

DATA SOURCES

Information in this section was sourced from the air quality specialist study being conducted by Airshed Planning Professionals (October 2015) for the proposed project.

RESULTS/CONCLUSION

Existing emission sources

Neighbouring land-use in the area in and surrounding of the proposed site alternatives area comprises predominantly mining, farming and residential activities. These land-uses contribute to baseline pollutant concentrations via the following sources:

- Mining sources: Particulates represent the main pollutant of concern at mining operations, whether it is underground or opencast. The amount of dust emitted by these activities depends on the physical characteristics of the material, the way in which the material is handled and the weather conditions.
- Fugitive dust sources: Sources of fugitive dust identified in the proposed project area include, paved and unpaved roads; and wind erosion of sparsely vegetated surfaces.
- Unpaved and paved roads: Emissions from unpaved roads constitute a major source of emissions to the atmosphere in the South African context. Dust emissions from unpaved roads vary in relation to the vehicle traffic and the silt loading on the roads. Emission from paved roads are significantly less than those originating from unpaved roads, however they do contribute to the particulate load of the atmosphere. Particulate emissions occur whenever vehicles travel over a paved surface. The fugitive dust emissions are due to the re-suspension of loose material on the road surface.
- Wind erosion and open areas: Windblown dust generates from natural and anthropogenic sources.
- Vehicle tailpipe emissions: Emissions resulting from motor vehicles can be grouped into primary and secondary pollutants. While primary pollutants are emitted directly into the atmosphere, secondary pollutants form in the atmosphere as a result of chemical reactions. Significant primary pollutants emitted combustion engines include carbon dioxide (CO2), carbon (C), sulphur dioxide (SO2), oxides of nitrogen (mainly NO), particulates and lead. Secondary pollutants include NO2, photochemical oxidants such as ozone, sulphur acid, sulphates, nitric acid, and nitrate aerosols (particulate matter). Transport in the vicinity of the proposed project area is via trucks and private vehicles along the Dwaalboom road and the R510, which are the main sources of vehicle tailpipe emissions.

Potential receptors

Potential receptors located surrounding the proposed site alternatives area includes the following:

- The Swartklip mine town (associated with Union Section Mine) situated less than 1km west of the proposed project infrastructure area.

- The Bierspruit/Kilkenny community situated approximately 2.5 km west-north-west of the proposed infrastructure area.
- Several farm residences on the farm Kameelhoek situated within 1 km north of the proposed infrastructure area.
- Farm residence on portion 2 of Grootkuil situated approximately 1.5 km north of the proposed infrastructure area.
- Tiramogo Lodge, belonging to Anglo and located on Portion 4 of Grootkuil (approximately 3 km south-east of the infrastructure area).
- The town of Northam, located approximately 5 km east-south-east of the proposed infrastructure area.
- The Wildebeeslaagte residential development located approximately 6 km south west of the proposed infrastructure area.
- The community of Sefikile located approximately 5 km south of the proposed infrastructure area.

The above list of receptors (the most significant of which have been illustrated in Figure 7) will be refined and illustrated further during the EIA and EMP phase.

7.4.1.9 Noise

INTRODUCTION

Some of the noise generating activities associated with the project may cause an increase in ambient noise levels in and around the site alternatives area. This may cause a disturbance to nearby potential receptors listed above. As a baseline, this section provides a brief description of pre-project conditions in the area from which to measure changes as a result of project-related noise. More detailed information will be provided in the EIA and EMP.

DATA SOURCE

Information in this section was sourced from the noise specialist study being conducted by Airshed Planning Professionals (November, 2015) for the proposed project.

RESULTS/CONCLUSION

Noise levels in and around the site alternatives area vary considerably with some parts exhibiting acoustic climates which are comparable to urban districts according to SANS 10103 (2008) and other parts which are comparable to levels typically found in rural districts except for occasional railway noise. It is expected that noise levels in the western section of the site alternatives area (where the main noise generating project infrastructure will be located regardless of the chosen alternative) are elevated already due to proximity to the existing Union Section Mine operations.

7.4.1.10 Visual aspects

INTRODUCTION

Project-related activities have the potential to alter the landscape character of the site and surrounding area through the establishment of both temporary and permanent infrastructure. As a baseline, this section provides a preliminary understanding of the pre-project visual character of the site alternatives area against which to measure potential change as a result of project infrastructure and activities. More detailed information will be provided in the EIA and EMP.

DATA SOURCE

Information in this section was sourced from the visual specialist study being conducted by Newtown Landscape Architects (NLA) (August 2015) for the proposed project.

RESULTS/CONCLUSION

The site alternatives area lies in a flat, open area characterised by existing and historical cropping activities. Livestock and game farms and associated isolated farmsteads are typical of the region. Mining activities and infrastructure are also evident in the region.

Central to the visual character of an area are the concepts of sense of place and scenic quality. Sense of place is informed by the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area which lend that area its uniqueness and distinctiveness. The scenic quality of the proposed site alternatives area and surrounding area is linked to the type of landscapes that occur within an area. In this regard, scenic quality can range from high to low as follows:

- High – these include the natural features such as mountains and koppies and drainage systems;
- Moderate – these include agricultural activities, smallholdings, and recreational areas; and
- Low – these include towns, communities, roads, railway line, industries and existing mines.

Although numerous mining related structures and activities dominate the landscape of the greater area (particularly the western portion of the site alternatives area closer to the existing Union Section Mine) and Eskom lines traverse the proposed site alternatives area on its eastern boundary, the overall scene is characterised by cultivated lands and the remaining savannah with hills further afield. These landscape types are generally associated with a moderate visual quality and sensitivity but where they are more closely associated with the hills, the value would increase.

7.4.1.11 Heritage/cultural and palaeontological resources

INTRODUCTION

This section describes the existing status of the heritage and cultural environment that may be affected by the proposed project. Heritage (and cultural) resources include all human-made phenomena and

intangible products that are the result of the human mind. Natural, technological or industrial features may also be part of heritage resources as places that have made an outstanding contribution to the cultures, traditions and lifestyles of the people or groups of people of South Africa.

Paleontological resources are fossils, the remains or traces of prehistoric life preserved in the geological (rock stratigraphic) record. They range from the well-known and well publicized (such as dinosaur and mammoth bones) to the more obscure but nevertheless scientifically important fossils (such as palaeobotanical remains, trace fossils, and microfossils). Paleontological resources include the casts or impressions of ancient animals and plants, their trace remains (for example, burrows and trackways), microfossils (for example, fossil pollen, ostracodes, and diatoms), and unmineralised remains (for example, bones of Ice Age mammals).

DATA SOURCE

Information was sourced from a heritage/cultural and paleontological studies undertaken by Julius Pistorius CC (July, 2015) and BPI Palaentology (December, 2015) respectively.

RESULTS/CONCLUSION

The site alternatives area is situated in a region which is known for its rich and diverse range of heritage resources, dating back from the Stone Age thousands of years ago to the Iron Age which ended some two hundred years ago. Stone Age sites must be scattered throughout this region but very few heritage studies have reported on these occurrences.

The Phase I HIA study for the proposed project did not reveal any of the types and ranges of heritage resources.

It is unlikely that any paleontological resources will be found to occur within the proposed site alternatives area, however this will be investigated further as part of the Palaeontological Specialist Study.

7.4.1.12 Socio-economic

INTRODUCTION

The proposed project has the potential to result in both positive and negative socio-economic impacts.

The positive impacts are usually economic in nature with mines contributing directly towards employment, procurement, skills development and taxes on a local, regional and national scale. In addition, mining related activities indirectly contribute to economic growth in the national, local and regional economies by strengthening the national economy and because the increase in the number of income earning people has a multiplying effect on the trade of other goods and services in other sectors.

The negative impacts can be both social and economic in nature. In this regard, mines can cause:

- Influx of people seeking job opportunities which can lead to increased pressure on basic infrastructure and services (housing, health, sanitation and education), informal settlement development, increased crime, introduction of diseases and disruption to the existing social structures within established communities;
- A change to not only pre-existing land uses and potentially land values, but also the associated social structure and meaning associated with these land uses and way of life.

To understand the basis of these potential impacts, a brief baseline situational analysis is described below. More detailed information will be provided in the EIA and EMP.

DATA SOURCE

Information in this section was sourced from the Social Impact Assessment (SLR, November 2015) as well as the Economic Impact Assessment (Mercury Financial Consultants, November 2015). As part of these investigations, socio-economic profile data was sourced from the Waterberg District Municipality (WDM), the Thabazimbi Local Municipality (TLM), the Bojanala District Municipality (BDM) and the Moses Kotane Local Municipality (MKLM) Integrated Development Plans (IDPs) and Spatial Development Framework (SDFs).

RESULTS/CONCLUSION

Population

The average population within the WDM is approximately 679 366 people while the average population within the TLM is approximately 85 234.

Dwellings

The most dominant type of dwelling utilized within both the WDM and the TLM is a formally constructed house or brick structure. This consists of 87% within the WDM and 78% within the TLM. Informal dwellings are the second highest used dwelling type with percentages ranging from 11% to 20% within the WDM and the TLM respectively.

Basic services

As would be expected with the relatively formalized housing infrastructure within both the WDM and the TLM, basic services infrastructure appears to be relatively well formalised too. In the WDM, 48% of the population has access to flushing toilets, while 44% of the population utilises pit toilets. In the TLM, 68% of the population have access to flushing toilets, while 21% of the population within the TLM, utilises pit toilets.

Approximately 70% of the WDM population has access to piped water with 71% of the TLM population having access to piped water. In the WDM, 24% have access to a communal stand and only 5% have no

access to piped water. In the TLM's households, 22 % have access to a communal water stand and only 6% have no access to piped water.

Approximately 45% of the WDM population and 63% of the TLM population have access to refuse removal through municipalities or private companies, while approximately 7% of the WDM population and 5% of the TLM population have no access to refuse removal. Other forms of refuse removal include own refuse dumps and communal refuse dumps.

Education

Overall statistics throughout the WDM and TLM show poor educational profiles which results in a shortage of educated labour. Significant numbers of the population at these levels have received either no schooling (12% of WDM and 9% of JMLM) or only limited primary education.

Employment

There is an overall unemployment rate of 28% at a district level (WDM) and 20% at a local municipal level (TLM).

7.4.2 CURRENT LAND USES

INTRODUCTION

Mining and/or beneficiation related activities (such as the proposed SCSC project) have the potential to affect land uses both within the proposed site alternatives area and in the surrounding areas. This can be caused by physical land transformation and through direct or secondary impacts.

To understand the basis of the potential land use impacts, a brief baseline situational analysis is described below. More detailed information will be provided in the EIA and EMP.

DATA SOURCE

Information in this section was sourced from on-site observations and through the review of topographical maps and satellite imagery.

RESULTS/CONCLUSION

The discussion below should be considered with reference to Figure 6 and Figure 7.

Current zoning

According to the Waterberg District Municipality Environmental Management Framework, the proposed site alternatives area is located in an area currently zoned as a "mining focus area" and a "major infrastructure corridor area" (SDF for the Thabazimbi Local Municipality, 2015). This zoning has been confirmed telephonically by the town planning officer at the Thabazimbi Local Municipality.

Mineral/prospecting rights

Anglo Platinum currently holds a mining right over the farms Haakdoorn 6 JQ, Syferkuil 9 JQ, Grootkuil 409 KQ, Zwartklip 405 KQ, Spitskop 410 KQ, Turfbult 404 KQ and Elandsfontein 402 KQ under the mining right number ML83/2003. In addition, Anglo Platinum holds a mining right on portion 2 of Spitskop 410 KQ under the mining right ML12/2002. These numbers refer to the old older mineral rights which have subsequently been converted to new order mineral rights which were notarially executed on 7 October 2011 and 29 July 2010 respectively.

Existing environmental authorisations in terms of NEMA

In addition to environmental approval for the Union Section Mine and associated activities and infrastructure, Anglo Platinum currently holds an environmental authorisation (NWP/47/EIA/2008) for the aboveground storage of diesel on the farm Turfbult 404KQ.

In addition, Anglo Platinum currently holds an environmental authorisation (16/2/7/A240/C5/Z1/P440) for the construction of a 75 MW photovoltaic power plant on portion 5 of the farm Grootkuil 409 KQ.

Land owners within the preferred site alternatives area

Portion 3 of the farm Grootkuil which is where the preferred smelter infrastructure alternative area is located has been purchased by SCSC (transfer was effective as of 20 February 2015 under the title deed number T000028236/2015), whereas the second alternative area for the location of the smelter is located on third party property, to which access is not possible. All of the alternatives for the powerline and access road routing will however traverse third party property. Third party landowners whose properties the preferred alternatives will traverse or whose properties the preferred alternative will be bordered by, are outlined in Table 19 below. The table below should be read with consideration to Figure 4 which illustrates all proposed project infrastructure, including relevant linear infrastructure (preferred alternatives only). It should be noted that the land ownership details below caters for all project alternatives and the delineation of farm portions is illustrated in Figure 7. The list below will be refined in the EIA and EMP report once the routing of the access road (within the access road corridor illustrated in Figure 5) has been confirmed.

TABLE 19: LANDOWNERS LOCATED WITHIN AND ADJACENT TO THE PROPOSED PROJECT AREA (ALL ALTERNATIVES)

RELEVANT FARMS	RELEVANT PORTION	LANDOWNER	RELEVANT INFRASTRUCTURE
Grootkuil	Portion 2	Ingrid Morrison	Alternative 2 for the smelter infrastructure is located on this portion of land. In addition, depending on what access road routing is confirmed (within the access road corridor identified in Figure 5) a small portion of this property may be required in order to cater for road access to the preferred project area.
	Portion 3	Siyanda Chrome Smelting Company (SCSC)	The preferred alternative for the smelter and related infrastructure will be located within SCSC owned land.
	Portion 4	Rustenburg Platinum Mines (Ltd) (RPM)/ Anglo Platinum	The preferred powerline alternative will traverse the eastern boundary of Anglo property before turning west and entering SCSC property. The other powerline alternatives will also traverse portion 4 and 5 of Grootkuil.
	Portion 5		
Kameelhoek	Portion 1	Transnet	Depending on what the final routing of the access road is planned to be, the access road (now shown only as an access road corridor) may pass through Transnet property as it comes off the main Dwaalboom road, in the direction of the project area.
	Portion 3	Benhaus Aviation	The proposed access road will pass through Benhaus property as it runs south off the main Dwaalboom road, in the direction of the project area.

RELEVANT FARMS	RELEVANT PORTION	LANDOWNER	RELEVANT INFRASTRUCTURE
	Portion 11		Depending on what the final routing of the access road is planned to be, the access road (now shown only as an access road corridor) may pass through Benhaus property as it runs south off the main Dwaalboom road, in the direction of the project area.
Nooitgedacht	Portion 7	Samancor Chrome (Ltd)	The proposed access road may briefly traverse Samancor property as it turns eastwards to enter the SCSC project area.
Grootkuil	Portion 2	Ingrid Morrison	Immediately north of the preferred alternative for infrastructure. Depending on what access road routing (within the access road corridor) is decided on, a small section of the access road may traverse a section of this property.
	Portion 6		Immediately east of the preferred alternative for smelter infrastructure
	Portion 0	Martha Schoeman	North east of the preferred alternative for smelter infrastructure
Zwartklip	Portion 2	Rustenburg Platinum Mines (Ltd) (RPM)	Western boundary of the preferred alternative for smelter infrastructure
Wildebeeslaagte	Portion 10	Masood Mohammed	Immediately east of the existing Eskom servitude through which the proposed powerline will traverse.
Wildebeeslaagte	Portion 0	Dorsland Ontwikkelings Pty Ltd	This is the location of the existing Spitzkop substation from where the project powerline will originate.

Mining

The currently operative Union Section Mine is located immediately adjacent to the proposed SCSC smelter infrastructure area, on Portion 2 of Zwartklip 405 KQ. Benhaus Aviation and Samancor previously had mining operations on portion 3 of Kameelhoek and portion 7 of Nooitgedacht (respectively) however it is understood from information provided to SLR that these are now dormant/closed.

Livestock and game grazing

The majority of the site alternatives area is or was previously utilised for agricultural activities (livestock grazing and cropping). Given that the proposed project infrastructure will be limited mostly to the western most part of the site alternatives area, it is likely that agricultural activities on parts of the property might continue, however this will need to be restricted and managed by SCSC to ensure alignment with project planning.

Portions 0 and 2 of the farm Grootkuil (immediately north of the site alternatives area) are both utilised for cropping and livestock grazing activities as are Portions 3 of Kameelhoek and Portion 7 of Nooitgedacht (owned by Benhaus Aviation and Samancor Chrome respectively) through which the proposed access route will pass.

Communities/towns and isolated farmsteads

With reference to Figure 7, the nearest residential areas include the following:

- The Swartklip mine town situated less than 1km from the proposed smelter infrastructure area.
- The Bierspruit/Kilkenny community situated approximately 2.5 km west-north-west of the proposed smelter infrastructure area.
- Several farm residences on the farm Kameelhoek situated within 1 km north of the proposed smelter infrastructure area.
- Farm residence on portion 2 of Grootkuil situated approximately 1.5 km north of the proposed smelter infrastructure area.
- Tiramogo Lodge, belonging to Anglo and located on Portion 4 of Grootkuil (approximately 3 km south-east of the smelter infrastructure area).
- The town of Northam, located approximately 5 km east-south-east of the proposed smelter infrastructure area.
- The Wildebeeslaagte residential development located approximately 6 km south west of the proposed smelter infrastructure area.
- The community of Sefikile located approximately 5 km south of the proposed smelter infrastructure area.

No informal settlements are located in immediate proximity to the proposed site alternatives area.

Regional powerline infrastructure

Given the proximity of the proposed site alternatives area to the Spitzkop substation there are various powerlines located within and/or within proximity of the proposed site alternatives area. The most relevant of these lines include the 132 kV bus (powerline corridor) which traverses the eastern boundary of portion 3 of the SCSC owned property (and along which the preferred proposed powerline alternative will be built) and the 400kV Matimba powerline which runs through the site alternatives area approximately 2 km

from where the proposed smelter infrastructure alternative areas are located. In addition there is a privately owned powerline which traverses the boundary of portions 0 and 2 of Grootkuil before entering the SCSC property and servicing the farm house. The abovementioned powerlines are illustrated in Figure 7.

Regional Telkom line infrastructure

It is not expected that any regional Telkom infrastructure or servitudes will be impacted by the proposed project.

Regional railway infrastructure

A railway line connecting Northam to Dwaalboom runs adjacent to the Dwaalboom road to the north of the proposed site alternatives area and is located within an existing servitude (Figure 7).

Local Road Network

Existing roads within the vicinity of the proposed site alternatives area include:

- The tarred Northam-Swartklip road (also referred to as the Dwaalboom road) which runs in a west-east direction, to the north of the site alternatives area (refer to Figure 7).
- The Swartklip town/Union Section Mine access road which runs in a southerly direction (off the main Northam-Swartklip Road).
- The tarred R510 that runs between Northam and Amandelbult (Figure 7).

Land claims

According to the Department of Rural Development and Land Reform (DRDLR), no land claims have been lodged on portion 3 of the farm Grootkuil where the preferred alternative for the proposed smelter and related infrastructure is proposed, or on the portions of land where the linear infrastructure alternatives are planned (Appendix E).

Legend

- Project Infrastructure Area
- Road Access Corridor
- Provincial Border
- Municipal Boundaries

Land Use

- Dams
- Wetlands
- High Urban Density
- Railway
- Powerlines
- Roads
- Amandelbult Mine
- Northam Mine
- Union Section Mine
- Zwartkop Mine
- Magazynskraal Platinum Mine (Proposed)
- Sedibelo Platinum Mine
- Pilanesberg Platinum Mine

Reserves

Existing

- Pilanesberg National Park (Including Black Rhino Game Reserve)

0 2 4 6 8 Kilometers

Scale: 1:175 000 @ A3

Projection: Transverse Mercator
Datum: Hartebeeshoek, LO27

Siyanda Chrome Smelting Company (Pty) Ltd

Figure 6

Regional Land Use Map

SLR

SLR Consulting (Africa) (Pty) Ltd
P O Box 1596, Cramerview, 2060, South Africa
Tel: +27 (11) 467-0945 Fax: +27 (11) 467-0978

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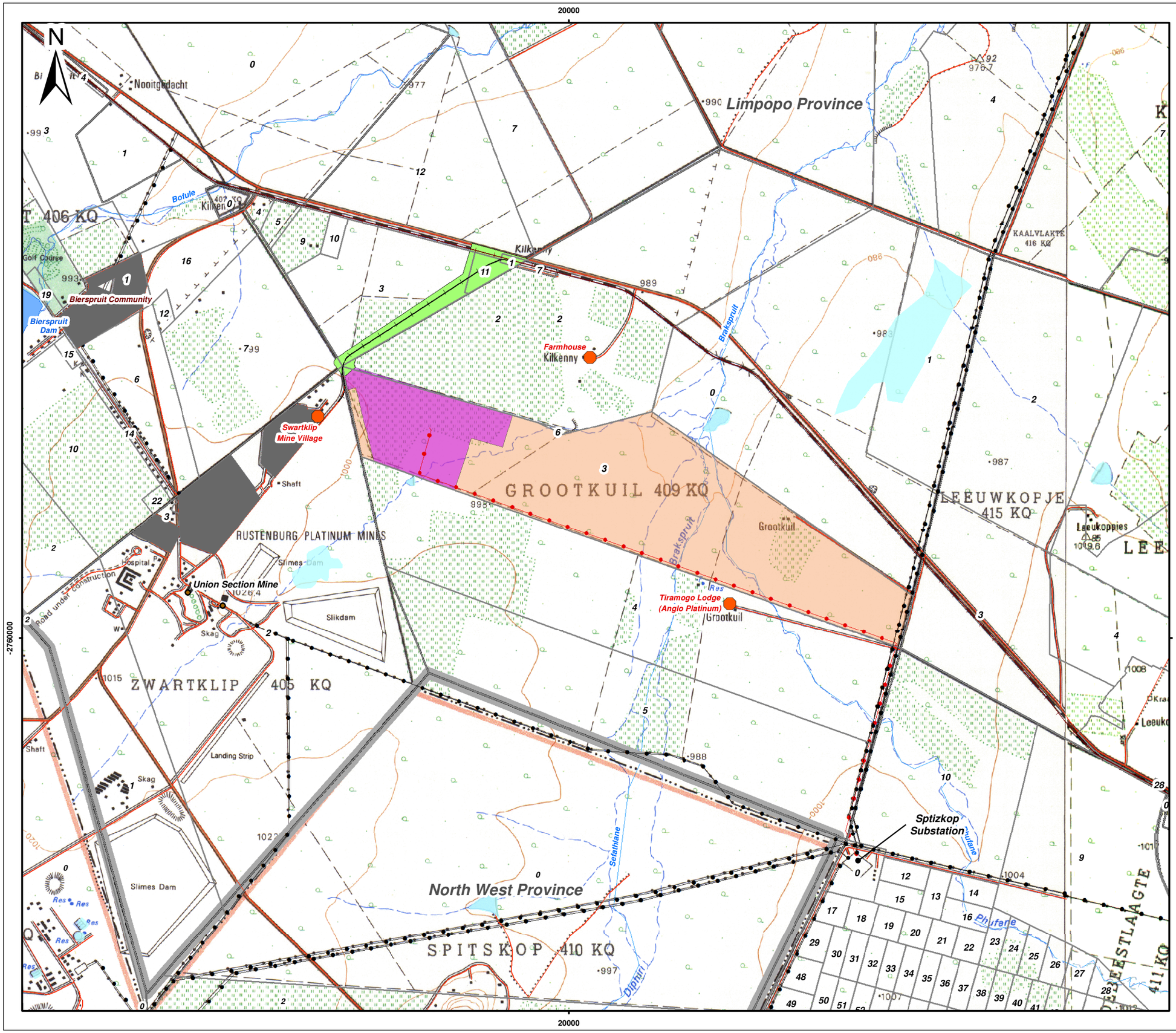

Legend

- Farm Portion 3 of Grootkuil 409 KO
- Road Access Corridor
- Project Infrastructure Area
- Provincial Border

Land Use

- Potential Receptors
- High Urban Density
- Dams
- Wetlands
- Rivers
- Railway
- Existing Union Section Railway Line
- Powerlines
- Roads
- Powerline - Option 1 (Preferred)
- Farm Boundaries
- Farm Portions

0 0.4 0.8 1.2 1.6 Kilometers

Scale: 1:39 000 @ A3

Projection: Transverse Mercator
Datum: Hartebeeshoek, LO27

Siyanda Chrome Smelting Company (Pty) Ltd

Figure 7

Local Land Use

SLR Consulting (Africa) (Pty) Ltd
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7.5 IMPACTS AND RISKS IDENTIFIED FOR ALTERNATIVES

This section provides a list of potential impacts on environmental and socio-economic aspects that have been identified in respect of each of the main project actions / activities and processes for each of the project phases (Table 20). A discussion of each of the impacts identified is provided in Section 7.7. The preliminary ratings for consequence, probability and significance of each of the impacts in the **unmitigated scenario** (which assumes that no consideration is given to the prevention or reduction of environmental and social impacts). In this regard it must be noted that a conservative approach has been applied to these ratings in the absence of site specific studies. Once all the site specific studies have been completed the assessment and related ratings may change. The final ratings will be included in the EIA and EMP report.

TABLE 20: PRELIMINARY LIST OF POTENTIAL IMPACTS IDENTIFIED FOR THE ALTERNATIVES (UNMITIGATED SCENARIO ONLY)

The preliminary assessment ratings provided in this table are for the unmitigated scenario only which assumes that no consideration is given to the prevention or reduction of environmental and social impacts. Furthermore, a conservative approach has been applied to these ratings in the absence of site specific studies. Once all the site specific studies have been completed the assessment and related ratings may change. Moreover, once the mitigation/management measures have been fully incorporated into the assessment as part of the EIA and EMP a specific and final determination of residual impact will be provided.

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Site preparation										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Earthworks										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			H	H	M	H	H	Fully		

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction	H	H	M	H	H	Fully		
Pollution from emissions to air		Operation	H	H	M	H	H	Fully		
Noise pollution		Decommissioning	M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Civil works										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			H	H	M	H	H	Fully		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	M	M	L	M	Fully		
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully	Possible	
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Smelter plant complex										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			H	H	M	H	H	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Contamination of groundwater resources			H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Increase in disturbing noise levels			M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic			H^+	H	H	H	H^+	Fully		Can be

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
impact)										managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Transport systems										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			H	H	M	H	H	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			M	M	M	H	M	Fully	Unlikely	
Disturbance of roads by project related traffic			H	H	M	M	H	Fully	Possible	
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially		Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Change in land use			H	H	M	H	H	Fully		
Power supply and use										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			H	H	M	H	H	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Water supply and use										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction	H	H	M	H	H	Fully	Possible	Can be managed/mitigated

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Loss of soil resources and land capability through pollution		Operation Decommissioning	H	H	M	H	H	Fully		to acceptable levels
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction	H	H	H	H	H	Fully		
Lowering of groundwater levels (Only applicable if abstraction from boreholes takes place)	N/A	Operation Decommissioning	H	M	M	M	H	Fully		
Negative visual impacts	All		M	M	M	L	M	Fully	Unlikely	
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Mineralised waste										
Loss and sterilization of mineral resources	All	Construction	H	M	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Hazardous excavations and infrastructure that can be harmful to people and animals		Operation Decommissioning	H	H	M	H	H	Fully		
Loss of soil resources and land capability through pollution			H	H	M	H	H	Fully		
Loss of soil resources and land capability			H	H	L	H	H	Fully		

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
through physical disturbance										
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction	H	H	M	H	H	Fully		
Pollution from emissions to air		Operation	H	H	M	H	H	Fully		
Noise pollution		Decommissioning	M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	H	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Non-mineralised waste management (general and hazardous)										
Loss of soil resources and land capability through pollution	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Fully		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Partially		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction	H	H	M	H	H	Fully		
Pollution from emissions to air		Operation	H	H	M	H	H	Fully		
Noise pollution		Decommissioning	M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Support services										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution		Operation	H	H	M	H	H	Fully		
Loss of soil resources and land capability through physical disturbance		Decommissioning	H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction	H	H	M	H	H	Fully		
Pollution from emissions to air		Operation	H	H	M	H	H	Fully		
Noise pollution		Decommissioning	M	M	M	H	M	Fully	Unlikely	

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
General site management										
Loss of soil resources and land capability through pollution	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Alteration of natural drainage patterns		Construction	H	H	M	H	H	Fully		
Contamination of groundwater resources		Construction Operation Decommissioning	H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Negative visual impacts			M	M	M	L	M	Fully	Unlikely	
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Change in land use			H	H	M	H	H	Fully		
Demolition										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction Operation Decommissioning	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			H	H	M	H	H	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Contamination of groundwater resources			H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Rehabilitation										
Hazardous excavations, surface subsidence and infrastructure that can be harmful to people and animals	All	Construction Operation	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
Loss of soil resources and land capability through pollution		Decommissioning	H	H	M	H	H	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Contamination of groundwater resources			H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Noise pollution			M	M	M	H	M	Fully	Unlikely	
Negative visual impacts			M	M	M	L	M	Fully		
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		
Maintenance and aftercare										
Hazardous excavations and infrastructure that can be harmful to people and animals	All	Construction Operation Decommissioning Closure	H	H	M	H	H	Fully	Possible	Can be managed/mitigated to acceptable levels
Loss of soil resources and land capability through pollution			H	H	M	H	H	Fully		
Loss of soil resources and land capability through physical disturbance			H	H	L	H	H	Fully		
Physical destruction of biodiversity			H	H	M	H	H	Partially		

POTENTIAL IMPACT	ALTERNATIVE	PROJECT PHASES	CONSEQUENCE			PROBABILITY	SIGNIFICANCE	DEGREE TO WHICH IMPACT		
			SEVERITY	DURATION	SPATIAL SCALE			CAN BE REVERSED	CAUSES IRREPLACEABLE LOSS OF RESOURCES	CAN BE AVOIDED/ MANAGED/ MITIGATED
General disturbance of biodiversity			M	H	M	H	H	Partially		
Contamination of surface water resources			H	H	M	M	H	Fully		
Alteration of natural drainage patterns (Loss from containment infrastructure)			M	H	M	H	H	Fully		
Contamination of groundwater resources			H	H	M	H	H	Fully		
Pollution from emissions to air			H	H	M	H	H	Fully		
Negative visual impacts			M	M	M	L	M	Fully	Unlikely	
Loss of or damage to heritage/palaeontological resources			M	H	L	M	M	Partially	Possible	Can be avoided
Positive socio – economic impacts (Economic impact)			H^+	H	H	H	H^+	Fully		Can be managed/mitigated to acceptable levels
Negative socio – economic impacts (Inward migration)			H	H	M	L	H	Fully		
Change in land use			H	H	M	H	H	Fully		

7.6 METHODOLOGY USED IN DETERMINING THE SIGNIFICANCE OF ENVIRONMENTAL IMPACTS

The proposed method for the assessment of environmental issues is set out in the table below. This assessment methodology enables the assessment of environmental issues including: cumulative impacts, the severity of impacts (including the nature of impacts and the degree to which impacts may cause irreplaceable loss of resources), the extent of the impacts, the duration and reversibility of impacts, the probability of the impact occurring, and the degree to which the impacts can be mitigated.

TABLE 21: CRITERIA FOR ASSESSING IMPACTS

Note: Part A provides the definition for determining impact consequence (combining severity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D.

PART A: DEFINITION AND CRITERIA*		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of severity, spatial extent and duration**
Criteria for ranking of the SEVERITY of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

PART B: DETERMINING CONSEQUENCE

SEVERITY = L

DURATION	Long term	**H**	**Medium**	**Medium**	**Medium**
	Medium term	**M**	**Low**	**Low**	**Medium**
	Short term	**L**	**Low**	**Low**	**Medium**

SEVERITY = M

DURATION	Long term	**H**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**

SEVERITY = H

DURATION	Long term	**H**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Medium**	**Medium**	**High**
			L	**M**	**H**
			Localised	Fairly widespread	Widespread

			Within site boundary Site	Beyond site boundary Local	Far beyond site boundary Regional/ national
			SPATIAL SCALE		
PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite/ Continuous	**H**	**Medium**	**Medium**	**High**
	Possible/ frequent	**M**	**Medium**	**Medium**	**High**
	Unlikely/ seldom	**L**	**Low**	**Low**	**Medium**
			L	**M**	**H**
			CONSEQUENCE		

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

***H = high, M= medium and L= low and + denotes a positive impact.**

7.7 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

Potential impacts that were identified during the scoping process by the EIA project team, in consultation with IAPs (public and authorities), are discussed under environmental component headings in this section. These discussions should be read with the corresponding descriptions of the baseline environment in Section 7.4.1 of the scoping report.

The potential impacts associated with all the phases (construction, operations, decommissioning and closure) have been identified and described and reference has been made to the studies/investigations that are required to provide the necessary additional information. **In the absence of site specific assessments the conclusions provided below are conservative. It follows that the assessment provided below is a preliminary assessment which will be refined in the EIA and EMP report with more detailed specialist input, as appropriate**.

With reference to Section 7.1, the site alternatives area (which includes both alternatives for the proposed smelter infrastructure, both alternatives for the proposed access road and all four alternatives for the powerline routing) are being considered as part of the proposed project. The assessment below provides a preliminary impact assessment of the site alternatives area in its entirety (unless differentiation between various alternatives is required). Where an impact assessment is not relevant for the linear infrastructure alternatives (i.e. access road or powerline routing), it has been indicated as such.

7.7.1 GEOLOGY

ISSUE: LOSS AND STERILIZATION OF MINERAL RESOURCES

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

It is possible that mineral resources can become sterilised through the placement of surface infrastructure associated with the proposed project. This potential impact relates specifically to permanent infrastructure/facilities such as the proposed mineralised waste facility, which may remain in perpetuity thereby potentially sterilising any minerals beneath it.

The severity in the unmitigated scenario is expected to be high only if viable resources exist within the preferred site alternatives area and can be reduced to low in the mitigated scenario with planning and co-ordination to help prevent the unacceptable sterilisation of resources. If sterilisation of resources occurs it is likely that the related impact will not extend beyond the life of the project as the slag material could be excavated and relocated in order to allow for underlying ore to be accessed. The physical impact is linked to the spatial extent of the proposed project area. This is a localised spatial extent, however when one considers the economic nature of the impact, it may extend beyond the site into the broader economy. The significance of the impact is high in the unmitigated scenario and could be reduced to low with mitigation.

The additional work required to address this issue is outlined in Section 8.3.1 of this scoping report.

7.7.2 TOPOGRAPHY

ISSUE: HAZARDOUS EXCAVATION, INFRASTRUCTURE AND SURFACE SUBSIDENCE

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Hazardous excavations and infrastructure include all structures into or off which third parties and animals can fall and be harmed. Included in this category is surface subsidence associated with stockpiling of raw materials and mineralised waste. Hazardous excavations and infrastructure occur in all project phases from construction through operation to decommissioning and closure.

The overall severity in the unmitigated scenario is expected to be high. This can reduce to low with the implementation of management measures focused on access control and the design of the mineralised waste facility to prevent and/or mitigate impacts. In the event of injury to third parties or humans, the

potential health impact could be long-term in nature. The spatial scale may extend beyond the project site to the communities to which the injured people or animals belong. The significance of this impact is high without mitigation and could be reduced to low with mitigation. This assessment is relevant for all the access road and powerline routing alternatives in addition to both of the smelter infrastructure area alternatives.

The additional work required to address this issue is described in Section 8.3.2 of this scoping report.

7.7.3 SOILS AND LAND CAPABILITY

ISSUE: LOSS OF SOIL AND LAND CAPABILITY THROUGH POLLUTION

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Soil is a valuable resource that supports a variety of ecological functions. Mineral processing projects in general have the potential to damage soil resources through contamination. A loss of soil resources would result in a decrease in the natural rehabilitation and future land use potential of any land. There are a number of sources in all phases that have the potential to pollute soil resources.

The overall severity in the unmitigated scenario is expected to be high and reduces to low in the mitigated scenario as the number of sources and number of pollution events should be significantly less. Most pollution impacts and associated loss in land capability will remain long after closure. In the mitigated scenario most of these potential impacts should either be avoided or be remedied immediately which reduces the duration to less than the mine life. The potential loss of soil resources and associated land capability will extend beyond the project area without mitigation. With mitigation, the potential loss of soil resources and associated land capabilities will be restricted to within the site alternatives area boundary. The significance of this impact is high in the unmitigated scenario and can be reduced to low by the reduction in probability. This assessment is relevant for the access road and powerline routing alternatives in addition to the smelter infrastructure area alternatives.

The additional work required to address this issue is described in Section 8.3.3 of this scoping report.

ISSUE: LOSS OF SOIL AND LAND CAPABILITY THROUGH PHYSICAL DESTRUCTION

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Soil is the key to re-establishing post closure land capability. Soil resources can be disturbed through removal, erosion and compaction which can result in a loss of soil functionality as an ecological driver. There are a number of activities/infrastructure in all phases that have the potential to disturb soils and related land capability.

In the unmitigated scenario the severity is high as soils will be lost to the area of disturbance, soil functionality will be compromised and soils are likely to erode. The loss of soil and related land capability is long term and will continue after the life of the project. The duration of this impact can be reduced to medium with mitigation as most of the soil can be conserved and used for rehabilitation. The potential loss of soil and land capability through physical disturbance will be restricted to within the site alternatives area. The significance of this impact is high in the unmitigated scenario and can be reduced to low with mitigation. This assessment is relevant for the access road and powerline routing alternatives in addition to the smelter infrastructure area alternatives, although destruction of soils will be reduced in the event that the powerline and access road routings can be limited to as short a disturbance footprints/routes as possible.

The additional work required to address this issue is described in Section 8.3.3 of this scoping report.

7.7.4 BIODIVERSITY

ISSUE: PHYSICAL DESTRUCTION OF BIODIVERSITY

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

The placement of infrastructure and activities in all phases has the potential to destroy biodiversity through the physical destruction of specific biodiversity areas, of linkages between biodiversity areas and related species which are considered to be significant because of their status, and/or the role that they play in the ecosystem.

The construction of the proposed powerline required for the project may require the removal of protected species such as the *Vachellia erioloba* (Camel Thorn), which are found to occur along all alternatives for the proposed powerline footprint. Both location alternatives for the smelter infrastructure as well as the preferred alternative for the access road will however largely be limited to previously cultivated lands, thereby limiting destruction of naturally occurring flora and fauna.

Taking into specific consideration the fact that all the proposed powerline routing alternatives may require the removal of Camel Thorn trees suggests that the severity may be high in the unmitigated scenario. In the mitigated scenario, with correct management the severity reduces to medium until closure and to low

thereafter. The loss of biodiversity and related functionality is long term and will continue after the life of the proposed project. In the mitigated scenario, biodiversity may be partially restored during the operational, decommissioning and closure phases. The duration is therefore high in the unmitigated scenario, reducing to medium in the mitigated scenario. Biodiversity processes are not confined to the proposed site alternatives area and as such the spatial scale will extend beyond this boundary with and without mitigation. The significance is high without mitigation as the probability of the impact is definite. The significance can be reduced to medium with correct management measures and con-current rehabilitation and can be further reduced to low at closure with emphasis placed on restoring disturbed areas.

Although some degree of physical destruction of biodiversity is expected for the development of the access road and the actual smelter infrastructure, this assessment is particularly relevant for the powerline routing alternatives given the possible need to remove Camel Thorn trees in order to develop the powerline. It should however be noted that where linear infrastructure routing can be limited to shorter footprints/routes, disturbance to biodiversity could be reduced.

The additional work required to address this issue is described in Section 8.3.5 of this scoping report.

ISSUE: GENERAL DISTURBANCE OF BIODIVERSITY

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

The placement of project infrastructure and activities has the potential to directly disturb vegetation, vertebrates and invertebrates in all project phases.

Biodiversity can be disturbed by anthropogenic activities such as killing of fauna, illegal removal of fauna and flora species, settlement of dust on vegetation, generation of noise that many scare off vertebrates and invertebrates, road kills, general litter and establishment of fires. This is a medium severity in the unmitigated scenario and can be reduced to low in the mitigated scenario with measures focussed on preventing or mitigating the impact to acceptable levels. In the unmitigated scenario, the impacts are long term because this impact is likely to exist beyond the life of mine. With mitigation the impacts should not extend post closure. Biodiversity processes are not confined to the proposed site alternatives area and as such the spatial scale of impacts will extend beyond the site alternatives area boundary in the unmitigated and mitigated scenarios. In the unmitigated scenario, the significance of this potential impact is high as the probability is definite. In the mitigated scenario, the significance is reduced to medium with a reduction in the probability of the impact. This assessment is relevant for the access road and powerline routing alternatives in addition to the smelter infrastructure area alternatives. It should however be noted that where linear infrastructure routing can be limited to shorter footprints/routes, disturbance to biodiversity could be reduced.

The additional work required to address this issue is described in Section 8.3.5 of this scoping report.

7.7.5 SURFACE WATER

ISSUE: ALTERING DRAINAGE PATTERNS

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Pre-project natural drainage across the proposed site alternatives area occurs via sheet flow and/or preferential flow paths (drainage lines and/or watercourses). Both smelter infrastructure location alternatives are located outside of the 1:100 year floodline or 100 m from the watercourse (whichever is greater). The preferred access road alternative does not require any river crossings, however the 2nd road alternative as well as all of the powerline alternatives would require river crossings. These crossings will need to be appropriately designed to take into account recommendations of the biodiversity specialist study so as to minimise impact.

Rainfall and surface water run-off will be collected in all areas that have been designed with water containment infrastructure as required by legislation. The collected run-off will therefore be lost to the catchment and can result in the alteration of drainage patterns. During the construction, operational and decommissioning phase, these activities will continue until such time as project infrastructure can be removed and/or the project areas are rehabilitated. During the closure phase rehabilitation will allow for the restoration of drainage patterns.

When considering the loss of run-off to the catchment as a result of containment infrastructure, the severity of the impact could be moderate in the unmitigated scenario and depends on the amount of run--off lost from the catchment. This can be reduced to low with mitigation measures. Without mitigation, drainage patterns would continue to be impacted upon post-closure and this is a high duration. With mitigation however, run-off patterns should be re-established reducing the duration to medium. In the mitigated and unmitigated scenario the physical alteration of drainage patterns will extend beyond the site alternatives area boundary as flow reduction impacts could extend further downstream. The significance is high in the unmitigated scenario as the probability of the alteration of drainage patterns is definite without mitigation. With mitigation, the re-establishment of run-off patterns reduces the probability of this impact to low. This assessment is relevant for the access road and powerline routing alternatives in addition to the smelter infrastructure area alternatives.

The additional work required to address this issue is described in Section 8.3.6 of this scoping report.

ISSUE: CONTAMINATION OF SURFACE WATER RESOURCES

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Projects of this nature will generally present a number of pollution sources that can have a negative impact on surface water quality if unmanaged in all project phases. The following pollution sources may exist: fuel and lubricants, sewage, mineralised waste, dirty water circuit, chemicals, non-mineralised waste (hazardous, general), and erosion of particles from exposed soils in the form of suspended solids.

In the unmitigated scenario the severity is high and can be reduced to medium with mitigation measures focussed on diverting clean water away from the proposed site alternatives area and containing contaminated run-off and process water for re-use. In the unmitigated scenario pollution events can extend beyond the life of the project. With mitigation, pollution events can be prevented or mitigated within the life of the project. In the unmitigated and mitigated scenario a pollution event may extend beyond the site alternatives area boundary. The significance in the unmitigated scenario is high and can be reduced to moderate/low with mitigation. This assessment is relevant for the access road and powerline routing alternatives in addition to the smelter infrastructure area alternatives. It is expected that given that the preferred alternative for the access road would not require any river crossings, the likelihood of surface water contamination may be reduced.

The additional work required to address this issue is described in Section 8.3.6 of this scoping report.

7.7.6 GROUNDWATER

ISSUE: REDUCING GROUNDWATER LEVELS AND AVAILABILITY

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure
			N/A

Discussion

Groundwater levels could be reduced through the abstraction of groundwater from boreholes (should SCSC decide to use borehole water to cater for its process water requirements) during the operational phase. It should however be noted that the proposed smelter operation is not expected to be a water intensive operation and process water requirements will therefore be limited. Notwithstanding this, if the abstraction of groundwater within the proposed site alternatives area causes a reduction or loss of water to third party users, this is a high severity in the unmitigated scenario. With mitigation this can be reduced to low. The duration of the impact is linked to the duration of the activity which is expected to be for the life of the proposed project. If the reduction of groundwater levels influences third party users the impact

will extend beyond the site boundary. In the unmitigated scenario the significance of this impact is high and can be reduced to low with mitigation.

The access route and powerline routing alternatives are not applicable to this assessment. If the abstraction of groundwater from boreholes is not a viable option for SCSC, this activity will not be undertaken as part of the proposed project.

The additional work required to address this issue is described in Section 8.3.7 of this scoping report.

ISSUE: CONTAMINATION OF GROUNDWATER RESOURCES

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Groundwater could become contaminated through the incorrect stockpiling of potentially polluting waste materials, and spillage of substances on the site during the construction and decommissioning of infrastructure. Possible sources of groundwater contamination during the operational phase include seepage from accidental spills and leaks, and seepage from stockpiles and the mineralised waste facility. This is a high severity in the unmitigated scenario and can be reduced to medium with pollution prevention and/or mitigation measures. In the unmitigated scenario, groundwater contamination is long term in nature. With mitigation the impact can be limited to the life the proposed project. In both the unmitigated and mitigated scenario, groundwater pollution may extend beyond the site alternatives area boundary. The significance is high in the unmitigated scenario and can be reduced to medium/low with mitigation. This assessment is relevant for the access road and powerline routing alternatives in addition to the smelter infrastructure area alternatives.

The additional work required to address this issue is described in Section 8.3.7 of this scoping report.

7.7.7 AIR QUALITY

ISSUE: POLLUTION FROM EMISSIONS TO AIR

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Mineral processing projects present a number of air pollution sources that can have a negative impact on ambient air quality and surrounding land uses in all phases. Pollution sources include land clearing activities, materials handling, wind erosion from stockpiles, wind erosion of disturbed areas, vehicle movement along unpaved roads, dust generation from process plants, and gas emissions mainly from

the smelter complex, vehicles and generators. Main gas emissions being considered for the purposes of the project are fugitive dust and process emissions. These include inhalable particulate matter less than 10 microns in size (PM_{10}) and larger total suspended particulates (TSP) as well as PM2.5 (particulate matter less than 2.5 microns in size), Cr6+ (chrome 6), SO2 (sulphur dioxide) and NOx (mono-nitrogen oxides).

These could have a negative impact on ambient air quality and could result in down-stream health impacts for nearby sensitive receptors if unmanaged. This is a high severity in the unmitigated scenario and can be reduced with measures to reduce emissions. Without mitigation the duration of the impacts could extend beyond closure. With mitigation, the duration of impacts will be limited to the phase prior to closure. The spatial scale of the potential impact extends off site in both the mitigated and unmitigated scenarios. The significance of this impact is high in the unmitigated scenario and can be reduced with mitigation. This assessment is relevant for the access road and powerline (mainly during construction) routing alternatives in addition to the smelter infrastructure area alternatives.

The additional work required to address this issue is described in Section 8.3.8 of this scoping report.

7.7.8 NOISE

ISSUE: INCREASE IN DISTURBING NOISE LEVELS

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure
			N/A

Discussion

The project is associated with various noise generating activities in the construction, operational and decommissioning phases. An increase in ambient noise levels has the potential to disturb nearby sensitive receptors. The severity in the unmitigated scenario is expected to be medium and can be reduced to low with mitigation measures. In both the unmitigated and mitigated scenarios the noise pollution impacts will occur until the closure phase of the project when the noise generating activities are stopped. This is a medium duration. In the unmitigated and mitigated scenarios the noise impacts will extend beyond the project boundary. The significance is medium in the unmitigated scenario and can be reduced to low with mitigation. This assessment is relevant for the access road and smelter infrastructure area alternative, however is not relevant for the powerline alternatives (after construction is complete).

The additional work required to address this issue is described in Section 8.3.9 of this scoping report.

7.7.9 VISUAL ASPECTS

ISSUE: NEGATIVE VISUAL IMPACTS

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

The proposed project area is considered to have a moderate scenic quality (Section 7.4.1.10).

Visual impacts on this receiving environment may be caused by activities and infrastructure in all project phases. The more significant visual impacts relate to the larger infrastructure components (such as the furnaces (and stacks) and the mineralised waste dump), and to lighting at night time. After closure the infrastructure should be rehabilitated and/or removed.

The severity in the unmitigated scenario is moderate when considered in the context of the existing Union Section mining operation located immediately to the north-west of the proposed site alternatives area. The severity is unlikely to reduce with mitigation until the closure phase when the site has been rehabilitated (in the mitigated scenario). Without mitigation the duration will be long term however with mitigation the impacts are unlikely to extend post closure because the site alternatives area will have been rehabilitated. The spatial scale will extend beyond the project boundary in both the unmitigated and mitigated scenario. The significance of this impact is medium to high in the unmitigated scenario. In the mitigated scenario the significance of the impact is medium before closure and low after closure given that the proposed project area will have been rehabilitated. This assessment is relevant for the access road and powerline routing alternatives in addition to the smelter infrastructure area alternatives.

The additional work required to address this issue is described in Section 8.3.10 of this scoping report.

7.7.10 TRAFFIC

ISSUE: DISTURBANCE OF ROADS BY PROJECT RELATED TRAFFIC

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure
			N/A

Discussion

Traffic impacts are expected from construction through to the end of the decommissioning phase when trucks, buses, and private vehicles make use of the public transport network surrounding the proposed site alternatives area. The key potential traffic related impacts are on road capacity and public safety when additional traffic is added to the existing transport network. In the unmitigated scenario the severity is high. In the mitigated scenario the severity reduces to medium because the frequency of potential accidents is expected to reduce. Any serious injury or death is a long term impact in both the unmitigated

and mitigated scenarios. The spatial scale is medium in both the unmitigated and mitigated scenario given that any injuries or fatalities will extend to the communities to which injured people/animals belong. The significance is high in the unmitigated scenario and can be reduced to medium with mitigation with a reduction in probability.

This assessment is relevant for both smelter infrastructure area alternatives, and both access road routing alternatives. The assessment is not relevant for the powerline routing alternatives post construction.

The additional work required to address this issue is described in Section 8.3.13 of this scoping report.

7.7.11 HERITAGE/CULTURAL AND PALEONTOLOGICAL RESOURCES

ISSUE: LOSS OF OR DAMAGE TO HERITAGE AND/OR PALEONTOLOGICAL RESOURCES

No palaeontological resources are expected to be found on site, however this will be verified during the EIA and EMP phase. The potential impact on palaeontological resources is therefore not assessed further however the mitigation measures cover the steps to be taken should there be any chance finds.

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure
			N/A

Discussion

There are a number of activities/infrastructure in all phases prior to closure that have the potential to remove, damage or destroy heritage/cultural resources should they be encountered, either directly or indirectly, and result in the loss of the resource for future generations. In the unmitigated scenario the severity is medium because to date no resources have been identified on site. With mitigation measures in place that aim to minimise the disturbance of heritage/cultural sites, the severity is reduced to low. If the heritage/cultural resources are removed, damaged or destroyed the impact duration is long term. In the mitigated scenario the duration reduces to less than the project life. The spatial scale will be localised to the site alternatives area boundary in both the unmitigated and mitigated scenario. The significance of the impact is medium and can be reduced to low with mitigation with a reduction on probability. This assessment applies to all project alternatives (smelter infrastructure area, access road routing and powerline routing).

The additional work required to address this issue is described in Section 8.3.11 and 8.3.12 of this scoping report.

7.7.12 SOCIO-ECONOMIC ISSUES

ISSUE: ECONOMIC IMPACT

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

All activities associated with the proposed project will have a net positive socio-economic impacts in all phases on the local, regional and national economies. Direct benefits are derived from wages, taxes and profits. Indirect benefits through the procurement of goods and services, and the increased spending power of employees. The severity in both the unmitigated and mitigated scenario is a high positive. The positive economic impacts described above will generally be limited to the life of the project. After closure there may still be some positive impacts through maintenance and aftercare activities and through the continuation of positive skills development and wealth generation. In both the mitigated and unmitigated scenarios, the spatial scale of the impact is high because it will extend far beyond the proposed project area on a regional and national scale. The significance of the impact in both the unmitigated and mitigated scenarios is a high positive as the probability of the impact is definite.

Potential negative economic impacts that also need to be considered include the impacts of reduced economic activity and land value for surrounding land owners and users.

This assessment applies to all project alternatives (smelter infrastructure area, access road routing and powerline routing) since the socio-economic impacts of the project cannot be assessed by isolating the linear infrastructure.

The additional work required to address this issue is described in Section 8.3.14 of this scoping report.

ISSUE: INWARD MIGRATION (NEGATIVE SOCIO-ECONOMIC)

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

The proposed project may have negative socio-economic impacts in all phases as follows:

- Influx of people into the area in search of work, leading to informal settlements and associated problems of crime, disease, and social disruption
- Increased pressure on housing and related services (water, power, roads, sanitation, rubbish removal, schooling, medical)
- Reduced quality of life for surrounding landowners

Taking the above into consideration the severity has been rated as high without mitigation. In the normal course, social impacts associated with each phase of the project will occur for the life of the project, but negative social issues associated with inward migration can continue beyond the closure of the mine, particularly in the unmitigated scenario. In both the unmitigated and mitigated scenarios, the impacts of inward migration could extend beyond the site boundary to nearby communities. The significance is high without mitigation. In the mitigated scenario, impacts associated with inward migration can be reduced. This assessment applies to all project alternatives (smelter infrastructure area, access road routing and powerline routing) since the negative socio-economic impacts of the project cannot be assessed by isolating the linear infrastructure from the main smelter infrastructure.

The additional work required to address this issue is described in Section 8.3.16 of this scoping report.

7.7.13 LAND USE

ISSUE: CHANGE IN LAND USE

Project phase/s in which impact could occur

Construction	Operational	Decommissioning	Closure

Discussion

Activities and infrastructure may have an impact on land uses within and surrounding the proposed project area in all phases.

SCSC owns the property on which the preferred alternative for smelter infrastructure is located and it is understood from information provided to SLR that previous third party land use agreements for grazing and/or cropping activities have lapsed. Given that the proposed project infrastructure (for the preferred alternative) will be concentrated within the western portion of the site alternatives area, there is potential for other land uses (grazing and cropping) to take place on the rest of the farm, however this would need to be managed by SCCS in order to ensure alignment with project planning. The preferred alternative for the powerline traverses SCSC property as far as possible and where the powerline traverses third party property it will follows an existing Eskom disturbance corridor (servitude). The preferred alternative for the access route traverses third party land. Given that the proposed road would follow an existing linear infrastructure disturbance corridor (existing railway servitude), it is expected that third party land uses (which might comprise livestock and game grazing and cropping) could continue largely unaffected.

Land uses surrounding the proposed site alternatives area include: residential, mining and agriculture (ad-hoc livestock grazing and game).

These land uses within and surrounding the proposed site alternatives area may be affected by one or more of the following environmental and social impacts discussed above.

In the unmitigated scenario the severity is high and can be reduced to medium/low with mitigation that is focussed on prevention and/or controls for each environmental and social impact type. In the unmitigated scenario the impact on land use will extend beyond project closure. With mitigation the land use impacts are expected to be limited to the phases prior to closure. The spatial scale extends beyond the proposed site alternatives area in both the unmitigated and mitigated scenario. The unmitigated significance is high where environmental and social impacts are uncontrolled; the probability that land uses will be impacted by the project is definite. With mitigation this reduces to medium prior to closure and to low post closure. This assessment is relevant for the access road and powerline routing alternatives in addition to the smelter infrastructure area alternatives.

The additional work required to address this issue relates to all the identified impacts as described in Section 8.3 of this scoping report.

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

The table below provides a list of the potential impacts identified by the EAP or raised by interested and affected parties, as well as the possible management and mitigation measures. The level of residual risk after management or mitigation is also estimated. This will be refined during the EIA phase with specialist input as appropriate.

TABLE 22: POSSIBLE MITIGATION MEASURES AND ANTICIPATED LEVEL OF RESIDUAL RISK

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Mineralised waste	Loss and sterilization of mineral resources	• Incorporate cross discipline planning to avoid mineral sterilisation. • Mineralised waste facility developed and designed so as not to limit the potential to exploit deeper minerals	Low
Earthworks Civil works Smelter plant Transportation Mineralised waste Water supply and use Power supply and use Support services Demolition Rehabilitation Maintenance and aftercare	Hazardous excavations, surface subsidence and infrastructure	• Access control, barriers and warning signs at hazardous areas • Operate the mineralised waste facility in a manner to address stability related safety risks to third parties and animals • Monitoring and maintenance post closure to observe whether the relevant long-term safety objectives have been achieved and to identify the need for additional intervention where the objectives have not been met • Where SCSC has caused injury or death to third parties and/or animals, appropriate compensation will be provided. • In case of injury or death due to hazardous excavations, an emergency response procedure must be implemented.	Low
Site preparation Earthworks Civil works Processing plant Transport system Mineralised waste Non-mineralised waste Water supply and use Power supply and use Support services General site management Demolition Rehabilitation Maintenance and aftercare	Loss of soil resources through pollution	• Basic infrastructure design that is adequate to contain polluting substances • Training of workers to prevent pollution • Equipment and vehicle maintenance • Fast and effective clean-up of spills • Effective waste management • In case of major spillage incidents an emergency response procedure must be implemented.	Low
Earthworks Smelter plant	Loss of soil resourced through physical destruction	• Limit site clearance to what is absolutely necessary • Develop and implement a soil management plan that addresses soil stripping, stockpiling and use for rehabilitation.	Low

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Transport system Mineralised waste Non-mineralised waste Water supply and use Power supply and use Support services General site management Demolition Rehabilitation Maintenance and aftercare			
Site preparation Earthworks Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Physical destruction of biodiversity	• Limit site clearance to what is absolutely necessary • Preconstruction surveys of the development footprints for species suitable for search and rescue operations. • Avoid sensitive areas as far as practically possible • Collection of pods of *Vachellia erioloba* (Camel Thorn) and *Vachellia haematoxylon* (Grey Camel Thorn) should be collected in order to aid in the re-establishment of these species. • Obtain relevant permits prior to removal of protected tree species • A comprehensive monitoring programme of the protected trees within the area must be undertaken. This monitoring should be conducted on an individual tree basis as well as monitoring on a community level. • Implementation of an alien invasive species programme • Implementation of a biodiversity action plan to ensure that the undeveloped areas within the property are properly conserved and maintained • Effective rehabilitation to as close to pre-project conditions as practically possible.	Medium
Site preparation Earthworks Smelter plant Transport system Power supply and use	General disturbance of biodiversity	• Limit dust emissions and soiling of vegetation. • Training of employees on the value of biodiversity • Zero tolerance for harming and harvesting fauna and flora • Limit light and noise disturbance as far as practically possible	Medium

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare		• Effective waste management and pollution prevention • Effective rehabilitation to as close to pre-project conditions as practically possible. • Prevention and combatting veld fires though establishment and maintaining of fire breaks and through the education of employees in order to comply with the National Veld and Forest Fire Act No. 101 of 1998.	
Earthworks Civil works Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Contamination of surface water resources	• Project infrastructure will be constructed and operated so as to comply with the National Water Act No. 36 of 1998 and Regulation 704 (4 June 1999): o Clean and dirty water system will be separate o Clean run-off will be diverted away from the site o Dirty water will be contained o The necessary exemptions and approvals will be obtained for activities and infrastructure located within 100m or within the 1:100 year floodline of the relevant drainage channels. • Conduct surface water monitoring and implement remedial actions as required • Effective equipment and vehicle maintenance • Fast and effective clean-up of spills • Effective waste management • Education and training of workers • Effective rehabilitation of residue facility and the overall site.	Medium/Low
Earthworks Civil works Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste	Alteration of natural drainage patterns	• Obtain the necessary authorisations in terms of the NWA and exemptions in terms of Regulation 704 (4 June 1999) for activities and infrastructure located within 100m or within the 1:100 year floodline of the relevant drainage channels. • Develop and implement a stormwater management plan to minimise containment areas and divert clean water away from the site. • Effective rehabilitation to as close to pre-project conditions as practically possible.	Low

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Support services General site management Demolition Rehabilitation Maintenance and aftercare			
Earthworks Civil works Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Contamination of groundwater	• Infrastructure will be constructed and operated so as to comply with the National Water Act No. 36 of 1998 and Regulation 704 (4 June 1999) • Infrastructure that has the potential to pollute groundwater will be identified and included into a groundwater pollution management plan which will be implemented as part of the operational phase • Conduct groundwater monitoring and implement remedial actions as required. This includes compensation for project related loss of third party water supply (should groundwater levels be reduced due to groundwater abstraction through boreholes). • Effective equipment and vehicle maintenance • Fast and effective clean-up of spills • Effective waste management • Education and training of workers • Effective rehabilitation of residue facility and the overall site.	Medium/Low
Water supply and use	Reducing groundwater levels and availability	• Conduct groundwater monitoring and implement remedial actions where required. This includes compensation for project related loss of third party water supply. • This monitoring programme should include third party boreholes.	Low
Site preparation Earthworks Civil works Smelter plant Transport system Power supply and use Mineralised waste Non-mineralised waste	Air pollution	• Limit disturbed areas • Supress dust effectively on unpaved roads and at material transfer points as required • Implement and maintain effective off gas cleaning equipment • Monitor pollutants of concern and implement additional mitigation as required • Maintain vehicles and equipment in good working order. •	Medium

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Support services General site management Demolition Rehabilitation Maintenance and aftercare			
Site preparation Earthworks Civil works Smelter plant Transport system Power supply and use Mineralised waste Non-mineralised waste Support services Demolition Rehabilitation	Noise pollution	• Maintain vehicles and equipment in good working order • Conduct noise monitoring in the unlikely event that SCSC receives noise related complaints. • Implement noise attenuation measures as appropriate	Low
Site preparation Earthworks Civil works Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Visual impact	• Limit disturbed areas • Supress dust to prevent a visual dust cloud • Con-current rehabilitation • Effective waste management • Implement effective use of lighting which reduces light spill • Effective rehabilitation of the overall site	Medium and low at closure
Transport system	Road disturbance and traffic safety	• Construct safe access point	Medium

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
		• Educate employees (temporary and permanent) about road safety • Enforce strict vehicle speeds • If a person or animal is injured by transport activities an emergency response procedure must be implemented.	
Site preparation Earthworks Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Loss of heritage/palaeontological resources	• Limit the area of disturbance as far as practically possible • Training of workers about the heritage and cultural sites that may be encountered and about the need to conserve these. • These resources are protected by the National Heritage Resources Act (No 25 of 1999) and may not be affected (demolished, altered, renovated, removed) without approval. In the event that resources are identified, a chance find emergency procedure should be implemented.	Low
Site preparation Earthworks Civil works Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Economic impact	• Maximise positive impacts and minimise negative impacts on surrounding land owners and users. • Employ local people and procure goods and services locally as far as practically possible • Ensure that closure planning considerations address the re-skilling of employees for the downscaling, early closure and long-term closure scenarios.	High positive

ACTIVITY WHETHER LISTED OR NOT LISTED	POTENTIAL IMPACT	POSSIBLE MITIGATION	POTENTIAL FOR RESIDUAL RISK
Site preparation Earthworks Civil works Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Inward migration	• Effective communication with local communities to manage expectations with regard to employment and other opportunities • Cooperation with authorities and surrounding land owners and users with regard to security management and prevention of informal settlements • Worker training on health and safety related issues.	Low
Site preparation Earthworks Civil works Smelter plant Transport system Power supply and use Water supply and use Mineralised waste Non-mineralised waste Support services General site management Demolition Rehabilitation Maintenance and aftercare	Land use	• Effectively manage all social and environmental impacts Effective rehabilitation of the overall site for post closure land use.	Medium and low at closure

7.9 THE OUTCOME OF THE SITE SELECTION MATRIX AND CONCLUDING STATEMENT ON PREFERRED ALTERNATIVES

With reference to Section 7 (and specifically Table 7), two smelter complex infrastructure areas, two access road alternatives, and four powerline routing alternatives were considered (refer to Figure 5). Based on the outcome of the site selection matrix, both alternatives for infrastructure are equally preferable. Key to the development of the project infrastructure however is access to land, and given that SCSC has been denied access to Portion 2 of Grootkuil (where infrastructure area alternative 2 is located) (see Figure 5) then by default infrastructure area alternative 1 becomes the preferred alternative. In addition, alternative 1 for the access road routing and powerline routing are the preferred alternatives. It should be noted that alternative 1 for the proposed access road has been presented as an “access road corridor” in Figure 5. The exact routing within this corridor will be refined during the EIA phase and the EIA and EMP report will present the final preferred routing within the corridor.

8 PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT

8.1 DESCRIPTION OF ALTERNATIVES TO BE CONSIDERED INCLUDING THE OPTION OF NOT GOING AHEAD WITH THE ACTIVITY

During the EIA and EMP phase, the alternatives that will be considered are as follows:

- Layout within preferred site (if deemed necessary)
- Operational aspects (e.g. water supply options, transport methods, access road options, powerline route options, mineralised waste disposal (dependent on outcome of waste assessment investigation))
- The “no-go” alternative

A description of these alternatives is provided in Section 7.1.

8.2 DESCRIPTION OF THE ASPECTS TO BE ASSESSED AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

This section below provides a list of potential impacts on environmental and socio-economic aspects in respect of each of the main project actions / activities and processes that will be assessed during the EIA and EMP phase. The potential impacts are presented for each of the project phases in tabular format (Table 23).

TABLE 23: LIST OF POTENTIAL IMPACTS AS THEY RELATE TO PROJECT ACTIONS / ACTIVITIES / PROCESSES

MAIN ACTIVITY/PROCESS	PHASE	IMPACTS (UNMITIGATED)
Site preparation	Construction Operation Decommissioning	Hazardous excavations and infrastructure Physical destruction of biodiversity General disturbance of biodiversity Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Earthworks	Construction Operation Decommissioning	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts

MAIN ACTIVITY/PROCESS	PHASE	IMPACTS (UNMITIGATED)
		Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Civil works	Construction Operation Decommissioning	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Smelter plant	Construction Operation Decommissioning	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Transport systems	Construction Operation Decommissioning	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Road disturbance and traffic safety Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Power supply and use	Construction Operation Decommissioning	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts

MAIN ACTIVITY/PROCESS	PHASE	IMPACTS (UNMITIGATED)
		Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Water supply and use	Construction Operation Decommissioning	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Reduction of groundwater levels and availability Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Mineralised waste	Construction Operation Decommissioning	Loss and sterilization of mineral resources Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Non-mineralised waste management (general and hazardous)	Construction Operation Decommissioning	Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Support services	Construction Operation Decommissioning	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution

MAIN ACTIVITY/PROCESS	PHASE	IMPACTS (UNMITIGATED)
		Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
General site management	Construction Operation Decommissioning	Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Demolition	Construction Operation Decommissioning	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution Negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Rehabilitation	Construction Operation Decommissioning	Hazardous excavations, surface subsidence and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Noise pollution negative visual impacts Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use
Maintenance and aftercare	Construction Operation Decommissioning Closure	Hazardous excavations and infrastructure Loss of soil resources and land capability through pollution Loss of soil resources and land capability through physical disturbance Physical destruction of biodiversity General disturbance of biodiversity Contamination of surface water resources Alteration of natural drainage patterns Contamination of groundwater Pollution from emissions to air Negative visual impacts

MAIN ACTIVITY/PROCESS	PHASE	IMPACTS (UNMITIGATED)
		Loss of heritage/palaeontological resources Positive socio-economic impacts (Economic impact) Negative socio-economic impacts (Inward migration) Change in land use

8.3 DESCRIPTION OF ASPECTS TO BE ASSESSED BY SPECIALISTS

This section describes the nature and extent of further investigations required in the Environmental Impact Assessment, including any specialist reports that may be required, and sets out the proposed approach to the EIA and EMP phase.

The proposed terms of reference for further investigations required for the completion of the EIA study are discussed below. It is important to note that where relevant, the specialist studies cater for requirements to support the water use license application and the waste management license application. The results of these studies will be collated into a combined EIA and EMP report.

8.3.1 GEOLOGY

It is proposed that no further specialist investigations are required. The impacts will be assessed qualitatively with and detailed management measures will be provided in the EIA and EMP report by SLR.

8.3.2 TOPOGRAPHY

It is proposed that no further specialist investigations are required. The impacts will be assessed qualitatively and detailed management measures will be provided in the EIA and EMP report by SLR.

8.3.3 SOILS, LAND USE AND LAND CAPABILITY

It is proposed that a specialist soils and land capability investigation be undertaken by Terra Africa Environmental Consultants. The soils and land capability investigation will have the following objectives:

- The determination of the soil, land use and land capability baseline through a site survey including the analysis of soil samples.
- The identification of soil forms and the description of soil profiles of the surveyed proposed project area
- Description of the physical and chemical composition of the soil forms identified within the proposed project area
- Description of the land capability and current land use supported by the local soil conditions
- The assessment of possible impacts of the proposed project on soil, agricultural potential and land capability

- To have input, together with SLR, into project alternatives and management measures going forward.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.4 BLASTING

It is proposed that no further specialist investigations are required. Should blasting be undertaken for the proposed project, it will be done for construction purposes only. Any impacts potentially arising from this will be assessed qualitatively and detailed management measures will be provided in the EIA and EMP report by SLR.

8.3.5 BIODIVERSITY (FLORA AND FAUNA)

It is proposed that the detailed (flora, fauna and aquatic system (including wetland study)) investigation be conducted by Scientific Aquatic Services (SAS). The investigation has the following objectives:

- Perform investigations to identify and map different habitats, concentrating on areas proposed for new infrastructure
- Assign species to each habitat through various trapping and sampling methods
- Rank each habitat type based on conservation importance (in terms of provincial biodiversity priorities) and ecological sensitivity
- Identify potential impacts (including cumulative) on ecology
- To have input, together with SLR, into project alternatives and ecology management measures going forward.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.6 HYDROLOGY (SURFACE WATER)

It is proposed that a specialist hydrology assessment will be undertaken by SLR. The hydrology study will have the following objectives:

- Baseline hydrology including average rainfall, average evaporation, storm intensities, review of watercourse network, flow data and mean annual runoff and peak flow estimation for the un-named tributary of the Brakspruit (which borders the eastern boundary of the proposed smelter infrastructure area).
- Floodline modelling (of the unnamed tributary bordering the eastern boundary of the proposed smelter infrastructure area).

- Stormwater management plan (to meet the requirements of the WULA (for the smelter infrastructure area)
- A wet and dry season water balance to inform the storm water inputs to the operation's water management system.
- Identify quantity and quality potential impacts (including cumulative) on surface water resources.
- To have input, together with the SLR EIA team, into project alternatives and surface water management measures going forward.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.7 GROUNDWATER

It is proposed that a specialist groundwater investigation will be conducted by SLR. The study will have the following objectives:

- A hydrocensus to determine the baseline condition of groundwater quality and quantity within a 5km radius of the proposed project area
- Develop a numerical model for the proposed area
- Geochemical analysis and waste assessment of the most significant potential pollution source(s)
- Model the potential pollution dispersion from the most significant potential pollution source(s) and model the dewatering impact associated with groundwater abstraction if this is a chosen water supply alternative
- Assess the significance contamination impacts
- To have input, together with the SLR EIA team, into project alternatives and management measures going forward

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.8 AIR QUALITY

It is proposed that a specialist air quality impact assessment will be undertaken by Airshed Planning Professionals (Pty) Ltd. The study will have the following objectives:

- Analysis of meteorological, topographical and land-use data to determine atmospheric dispersion potential
- Establishing an air emissions inventory
- Confirmation of potential third party receptor sites

- Assess the impact of air emissions on identified third party receptors using an air dispersion model
- Recommendations for the establishment of an air quality monitoring programme
- To have input, together with SLR EIA team into project alternatives and air quality management measures going forward

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.9 NOISE

It is proposed that a specialist noise impact assessment will be undertaken by Airshed Planning Professionals (Pty) Ltd. The study will have the following objectives:

- The measurement and assessment of existing environmental noise levels within the vicinity of the proposed project area and at potential third party receptors.
- The identification of existing sources of environmental noise such as communities, mining, industries and public roads
- Predict the potential additional impact of project related noise sources on identified receptors
- To have input, together with SLR, into project alternatives and management measures going forward
- Recommendations for the establishment of a noise monitoring programme

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.10 VISUAL ASPECTS

It is proposed that a specialist visual impact assessment will be undertaken by Newtown Landscape Architects cc (NLA). The study will have the following objectives:

- Field survey of the proposed project area and photography from sensitive viewing points
- Assessment of the impacts of the proposed project and its cumulative effect when considered together with other (mining) operations
- Rate the project specific impacts
- Have input, together with SLR, other specialists and the technical project team, into project management measures.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.11 HERITAGE/CULTURAL RESOURCES

It is proposed that a specialist visual impact assessment will be undertaken by Julius Pistorius cc. The study will include the following objectives:

- Identification and mapping (through literature review and field work) of archaeological, cultural and heritage resources
- Assessment of the significance of the identified resources
- Provide input, together with SLR and the technical project team into project alternatives and management measures going forward.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.12 PALAEONTOLOGICAL RESOURCES

It is proposed that a specialist visual impact assessment will be undertaken by Professor Bruce Rubidge of BPI Palaeontology. The study will have the following objectives:

- Identify and map (through literature review) all paleontological resources in the proposed project area
- Assess the significance of the identified resources
- Assess the impact of the proposed project on the paleontological resources
- Provide input, together with SLR into project alternatives and management measures going forward.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.13 TRANSPORT SYSTEMS

It is proposed that a traffic impact investigation be undertaken by Siyazi Gauteng (Pty) Ltd. The study includes the following objectives:

- Determination of the baseline traffic conditions surrounding the proposed project area
- Calculate trip generation and distribution calculations
- To provide a basic geometric design input in terms of the proposed access intersection
- Assess the impacts of the proposed project on existing road capacity and safety

- Provide input, together with SLR and the technical project team into project alternatives management measures going forward.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.14 ECONOMIC AND SUSTAINABILITY ANALYSIS

It is proposed that an economic study will be undertaken by Mercury Financial Consultants (Pty) Ltd. This study has the following objectives:

- A preliminary analysis to identify and prioritise economic impact considerations.
- Gather information on the economic environment and context of the proposed development (includes defining measurable indicators of valued economic components) and a desktop land value investigation.
- Prediction of possible economic impacts, identifying trade-offs between the adverse and beneficial impacts of the proposed project
- Quantification of possible outcomes in financial terms (as well as attaching risk factors) by using financial modelling techniques.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.3.15 CLOSURE COST ESTIMATE

It is proposed that a closure cost estimate be undertaken by SLR in accordance with Section 24P of NEMA.

8.3.16 SOCIO-ECONOMIC ISSUES

It is proposed that a social impact study will be undertaken by SLR in conjunction with external consultants, where appropriate. This study has the following objectives:

- Gather relevant socio-economic information using primary and secondary sources. This information will inform the baseline description, impact identification, impact descriptions, impact assessments, and formulation of mitigation and management measures.
- Secondary data will include the review of existing baseline data (eg. census information), relevant reports about the area, existing ESIA documents in the area, integrated development plans, and applicable legislation (with a focus on the social environment).
- Primary data will be gathered through a series of key informant interviews with selected stakeholders, including relevant government representatives and selected neighbouring land owners. Feedback from the public participation process will also be used to inform the SIA.

- Draft a comprehensive and relevant socio-economic baseline description.
- Identify potential project impacts (positive and negative), assess the significance of the impacts and draft appropriate mitigation and management measures to ensure that the residual significance rating is 'As Low and Reasonably Practicable'. Mitigation and management measures will be incorporated in the EMP by SLR.

The assessment and detailed management measures will be provided in the EIA and EMP report by SLR. A copy of the specialist report will be provided in the EIA and EMP.

8.4 PROPOSED METHOD OF ASSESSING THE ENVIRONMENTAL ASPECTS INCLUDING THE PROPOSED METHOD OF ASSESSING ALTERNATIVES

A description of the method that will be used during the EIA phase to assess the environmental aspects including project alternatives is provided in Section 7.6.

8.5 THE PROPOSED METHOD OF ASSESSING DURATION AND SIGNIFICANCE

A description of the method that will be used during the EIA phase to assess the duration and significance of the identified impacts is provided in Section 7.6.

8.6 THE STAGES AT WHICH THE COMPETENT AUTHORITY WILL BE CONSULTED

Proposed consultation meetings for the EIA phase include:

- A pre-application meeting with DEA
- A site visit and meeting with DEA, LEDET, DWS, DAFF, DRDLR, DPWRT (if requested)
- A general authorities meeting at the end of the EIA phase to present the main findings of the EIA prior to submission of the EIA and EMP report if requested.

8.7 PARTICULARS OF THE PUBLIC PARTICIPATION PROCESS WITH REGARD TO THE IMPACT ASSESSMENT PROCESS THAT WILL BE CONDUCTED

8.7.1 STEPS TO BE TAKEN TO NOTIFY INTERESTED AND AFFECTED PARTIES

IAPs on the project database will be provided with information in the form of summary documents and will be notified when the EIA and EMP report will be available for public review via electronic mail, post and bulk SMS. IAPs may be invited to attend a public feedback meeting during the EIA phase (if required).

8.7.2 DETAILS OF THE ENGAGEMENT PROCESS TO BE FOLLOWED

The stakeholder engagement process in the EIA Phase will include the following:

- Public and/or stakeholder meeting/s to give feedback on the findings of the EIA (if required)
- Circulation of the EIA and EMP report for public review. This report will include any issues and concerns raised by IAPs and regulatory authorities
- Notification of IAPs on the database of the relevant DEA decisions.

8.7.3 DESCRIPTION OF THE INFORMATION TO BE PROVIDED TO INTERESTED AND AFFECTED PARTIES

The following information will be included in the EIA and EMP reports which will be made available for public review:

- Detailed description of the proposed project
- A site layout
- Details of the list of activities to be authorised in terms of NEMA and NEM:WA
- Scale and extent of activities to be authorised in terms of NEMA and NEM:WA
- The duration of the activity
- An assessment of the environmental and socio-economic impacts identified during the environmental assessment process, through input from IAPs, regulatory authorities and specialists
- Detailed management measures to reduce and control environmental and socio-economic impact
- Copies of the specialist reports undertaken for the proposed project

8.8 DESCRIPTION OF THE TASKS THAT WILL BE UNDERTAKEN DURING THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

The description of the tasks that will be undertaken during the EIA phase is provided below in Table 24 below.

TABLE 24: EIA AND EMP ACTIVITIES AND TIMING

OBJECTIVES	CORRESPONDING ACTIVITIES AND ESTIMATED DATES
Further investigations	
• Describe the affected environment • Define potential impacts • Give management and monitoring recommendations	• Investigations by technical project team and SLR of issues identified during the scoping stage including investigations into alternatives.
EIA and EMP phase	
• Assessment of potential environmental impacts • Design requirements and management and mitigation measures • Receive feedback on application	• Compilation of the EIA and EMP report (May to June 2016) • Distribute the EIA and EMP report to IAPs, DEA and other regulatory authorities for review (August 2016). • Public feedback meetings with IAPs (if required) (September 2016). • Record comments (September/October 2016). • Submit final report to DEA for decision making (September/October 2016)

OBJECTIVES	CORRESPONDING ACTIVITIES AND ESTIMATED DATES
	• Circulate record of decision to all registered IAPs (January/February 2017).

8.9 MEASURES TO AVOID, REVERSE, MITIGATE, OR MANAGE IDENTIFIED IMPACTS AND TO DETERMINE THE EXTENT OF THE RESIDUAL RISKS THAT NEED TO BE MANAGED AND MONITORED

Refer to Table 22 for a list of measures to reverse, mitigate or manage identified impacts including the residual risks that need to be managed and monitored. It should be noted that this table has been compiled with the preliminary available information and will be refined during the EIA phase.

9 OTHER MATTERS REQUIRED IN TERMS OF SECTIONS 24(4)(A) AND (B) OF THE ACT

No other matters are required in terms of Section 24(4)(A) and (B) of the act.

10 UNDERTAKING REGARDING CORRECTNESS OF INFORMATION

I, Caitlin Hird, herewith undertake that the information provided in the foregoing report is correct, and that the comments and inputs from the stakeholder and interested and affected parties (including the projects responses) has been correctly recorded in the report.

_____ Date: 06/04/2016

Signature of the EAP

11 UNDERTAKING REGARDING LEVEL OF AGREEMENT

I, Caitlin Hird, herewith undertake that the information provided in the foregoing report is correct, and that the level of agreement with interested and affected parties and stakeholder has been correctly recorded and reported herein.

Signature of the EAP

Date: 06/04/2016.

12 REFERENCES

Airshed Planning Professionals (Pty) Ltd, Air Quality Specialist Report for the Proposed Siyanda Smelter Project in the Limpopo Province, November 2015.

Airshed Planning Professionals (Pty) Ltd, Noise Impact Specialist Report for the Proposed Siyanda Smelter Project in the Limpopo Province, April 2015.

BPI Palaentology, Palaeontological Investigation for the proposed Siyanda smelter project, December 2015

Integrated Development Plan (IDP) 2015/16 for the Waterberg District Municipality, 2015

Julius Pistorius cc, Phase 1 Heritage Impact Assessment for the proposed Siyanda smelter project, July 2015

Mercury Financial Consultants, Economic Assessment for the proposed Siyanda smelter project, November 2015

Newtown Landscape Architects (NLA), Visual Impact Assessment report for the proposed Siyanda Chrome Smelter, August 2015

Scientific Aquatic Services (SAS), Floral, Faunal, Wetland and Aquatic Ecological Assessment for the proposed Siyanda Ferrochrome Smelter, Northam, Limpopo Province, September 2015

Siyazi, Traffic Impact Assessment for the Proposed Siyanda Smelter project to be located near Northam in the Limpopo Province, October 2015.

SLR Consulting (Africa) (Pty) Ltd, Siyanda Surface Water study, September 2015.

SLR Consulting (Africa) (Pty) Ltd, Siyanda Groundwater study, September 2015.

SLR Consulting (Africa) (Pty) Ltd, Siyanda Social Impact Assessment, November 2015.

Terra Africa Environmental Consultants, Siyanda Smelter Project Soil, Land Use and Land Capability Report, November 2015.

APPENDIX A: PROOF OF EAP REGISTRATION

APPENDIX B: CURRICULUM VITAE

APPENDIX C: LOCAL AND REGIONAL SETTING

APPENDIX D: SITE PLAN

APPENDIX E: INFORMATION SHARING WITH IAPS AND REGULATORY AUTHORITIES

- NEMA/NEMWA application form (not yet available for inclusion in submission for public review. Only included in submission to DEA)
- Database
- Background information document in English and Setswana
- Site notices in English and Setswana and photos of the site notices
- Advertisements placed in the Kwevoel and Sowetan newspapers
- Invitations sent to IAPs to notify them of the public meeting
- Invitations sent to Regulatory authorities to notify them of the authorities meeting
- Minutes of the public meetings including the attendance register
- Minutes of the regulatory authorities meeting including the attendance register
- Correspondence from the land claims commissioner

APPENDIX F: COMMENTS AND RESPONSE REPORT

APPENDIX G: STAKEHOLDER DATABASE

RECORD OF REPORT DISTRIBUTION

Project Number:	710.19057.00001
Title:	Scoping report for the proposed development of the Siyanda Ferrochrome Smelter
Report Number:	1
Proponent:	Siyanda Chrome Smelting Company (Pty) Ltd (SCSC)

Name	Entity	No. of copies	Date issued	Issuer
Millicent Solomons/Masina Letsoane	Department of Environmental Affairs	2 (hard copies) & 2 (electronic copies) (DRAFT)	April 2016	C Hird
Vusi Maluleke	Limpopo Department of Economic Development, Environment and Tourism	1	April 2016	C Hird
Lethabo Ramashalla	Department of Water and Sanitation	1	April 2016	C Hird
Online Submission	South African Heritage Resource Agency	1 (electronic only)	April 2016	C Hird
Head of Department	Department of Agriculture, Forestry and Fisheries	1	April 2016	C Hird
Mr Machubene (Director of Engineering Services)	Department of Rural Development and Land Reform	1	April 2016	C Hird
Mr Jonathan Gafane (Environmental Specialist)	Department of Public Works, Roads and Transport	1	April 2016	C Hird
Maboe Mampa (Manager)	Waterberg District Municipality	1	April 2016	C Hird
Mr Nqwana	Thabazimbi Local Municipality	1	April 2016	C Hird
Humprey Tabane	Northam Library	1	April 2016	C Hird
Maritsa Buys	Swartklip Recreation Centre	1	April 2016	C Hird
Cllr Nomawesele Dilika	Kwetsheza Community (home of ward councillor)	1	April 2016	C Hird
Sebelina Mogale & Stephen Moatshe	Mmantserre Community (Tribal Authority) c/o Sebelina Mogale & Stephen Moatshe	1	April 2016	C Hird
Sefikile Community	Bakgatla ba Kgafela Tribal Authority c/o Mr Lebogang Mataboge	1	April 2016	C Hird
Pier De Vries	Union Section Mine (Anglo Platinum)	1	April 2016	C Hird
David Kovarsky	Siyanda Chrome Smelting Company (SCSC)	1	April 2016	C Hird
Carol Kenyon	SLR Consulting (South Africa) (Pty) Ltd	1	April 2016	C Hird