mineral resources

Department:
Mineral Resources
REPUBLIC OF SOUTH AFRICA

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

AND

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

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

NAME OF APPLICANT: New Kleinfontein Goldmine (Proprietary) Limited

TEL NO: 011 726 1047

FAX NO: 011 726 1087

POSTAL ADDRESS: P.O. Box 262, Petersfield, Springs, 1566

PHYSICAL ADDRESS: Corner, Cloverfield and Outeniqua Road, Eastvale, Springs, Gauteng

FILE REFERENCE NUMBER SAMRAD: GP 182 MRC

SEPTEMBER 2015

1. IMPORTANT NOTICE

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

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

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

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

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

2. OBJECTIVE OF THE ENVIRONMENTAL IMPACT ASSESSMENT PROCESS

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

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

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

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

(d) determine the—-

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

  (ii) degree to which these impacts—

    (aa) can be reversed;

    (bb) may cause irreplaceable loss of resources, and

    (cc) can be avoided, managed or mitigated;

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

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

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

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

PART A

SCOPE OF ASSSSMENT AND ENVIRONMENTAL IMPACT ASSESSMENT REPORT

3. CONTACT PERSON AND CORRESPONDENCE ADDRESS

a) Details of the EAP who prepared the report

Name of Environmental Assessment Practitioners	Prime Resources (Pty) Ltd
Physical Address:	70 - 7th Avenue, Parktown North, Johannesburg
Postal Address:	PO Box 2316, Parklands, 2121
Telephone Number:	011 447 4888
Fax Number:	011 447 0355
Email:	prime@resources.co.za
Professional Affiliations:	PrEng; PrSciNat, SAIMM

b) Expertise of the EAP

i) The qualifications of the EAP (With evidence attached as Appendix 1)

Prime Resources (Pty) Ltd is a specialist environmental consulting firm providing environmental, social, and related services, which was established in 2003. Prime Resources was founded by Peter Theron (PrEng, SAIMM), the Managing Director and Principal Environmental Consultant of the firm. Peter has a GDE Environmental Engineering from the University of Witwatersrand and over 27 years' experience in the field of environmental science and engineering.

Gené Main (Pr.Sci.Nat, Environmental Science), the Project Manager and Principal Scientist for the proposed project, has a M.Sc. (Botany) from the University of the Western Cape and eight years' experience in the field of environmental science.

Zoë Gebhardt, a Senior Environmental Scientist, has a M.Sc. (Hydrology and Business Management) from Imperial College London and three years' experience in the field of environmental science.

Amanda Mooney, an Environmental Scientist, has a M.Sc. (Zoology) and a M.Sc. (Environmental Management) from the University of Johannesburg and three years' experience in the field of environmental science.

Louise Jones, an Environmental Scientist, has a M.Sc. (Environmental Science) from the University of Witwatersrand and two years' experience in the field of environmental science.

Key Prime Resources Personnel CVs are attached as Appendix 1.

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

A copy of the Prime Resources Company Profile is attached as Appendix 2.

4. DESCRIPTION OF THE PROPERTY

Farm Name:	Ptn 68 and RE of Holfontein 71 IR
Application area (Ha)	13.85 ha
Magisterial district:	Ekurhuleni Metropolitan Municipality
Distance and direction from nearest town	Welgedacht located 1.5 km south-west
21 digit Surveyor General Code for each farm portion	T0IR00000000007100000 T0IR00000000007100068

a) Locality map **(show nearest town, scale not smaller than 1:250000)**

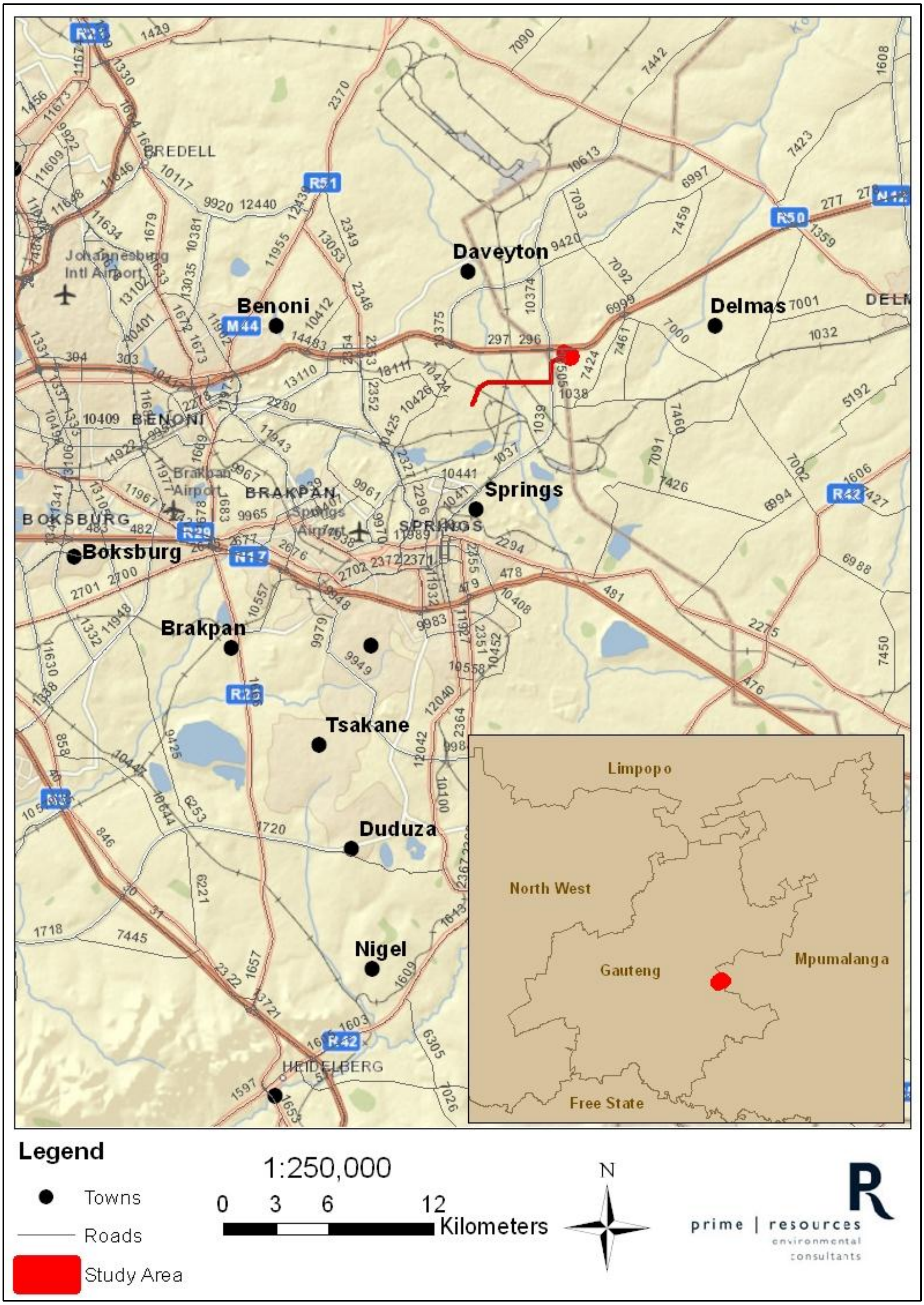

Figure 1: The Holfontein Project locality map

5. DESCRIPTION OF THE SCOPE OF THE PROPOSED OVERALL ACTIVITY (Provide a plan drawn to a scale acceptable to the competent authority but not less than 1: 10 000 that shows the location, and area (hectares) of all the aforesaid main and listed activities, and infrastructure to be placed on site)

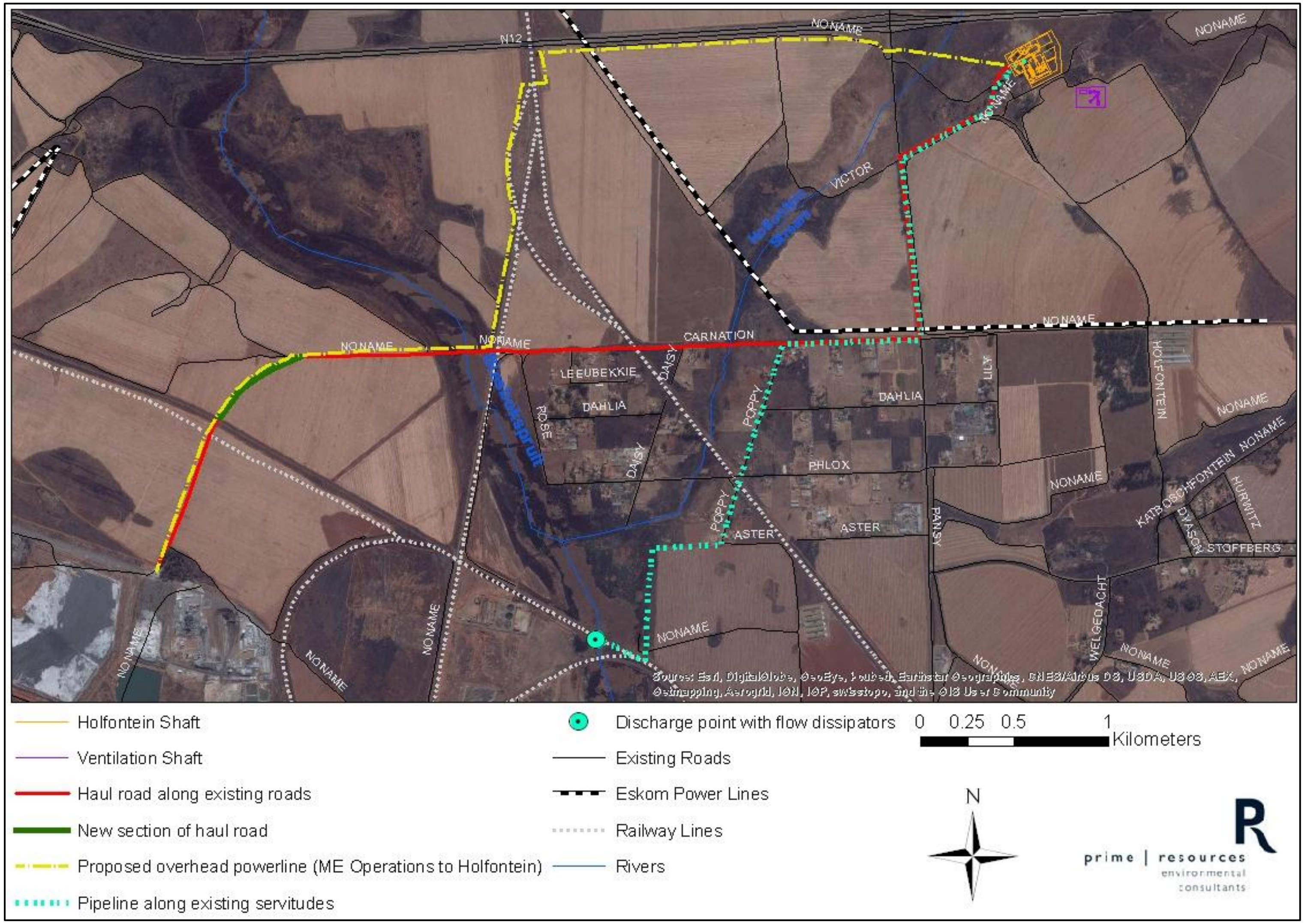

Figure 2: Holfontein preferred final layout

Item	Description	Area (m²)
1	Toilets	110
2	Banksman Cabin	100
3	Substation Building	30
4	Salvage Yard	2500
5	Potable Water Tank	20
6	Modular Sewer Plant	170
7	Water Treatment Plant	440
8	Fuel and Lube Storage Bay	400
9	Pollution Control Dam	3000
10	Compressors	165
11	First Aid Room (Container)	30
12	Existing Rectangular Shaft	75
13	Explosives Loading Area + Emulsion Silo + Container	735
14	Timber Yard + Laydown Area	3200
15	Covered Waiting Area	600
16	Surface Water Tanks	630
17	Fence	NA
18	Turnstiles	18
19	Topsoil Stockpile	3500

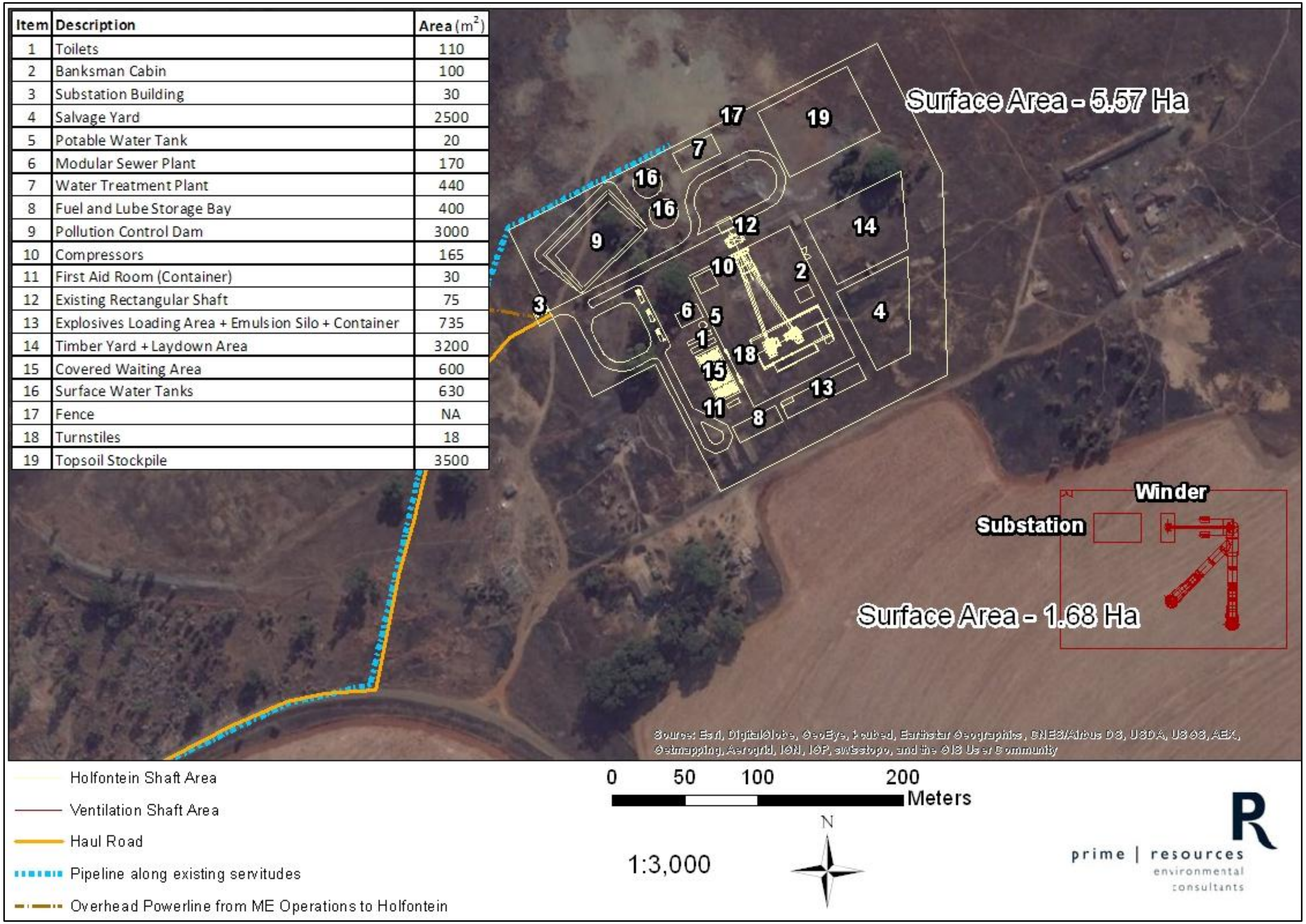

Figure 3: Holfontein preferred final layout (1:3 000)

a) Listed and specified activities

NAME OF ACTIVITY - ALL ACTIVITIES INCLUDING ACTIVITIES NOT LISTED **(e.g. excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.)**	AERIAL EXTENT OF THE ACTIVITY **(Ha or m²)**	LISTED ACTIVITY **(Mark with an X where applicable or affected)**	APPLICABLE LISTING NOTICE
Mining at Holfontein* (Application for the inclusion of the Holfontein Project into the existing NKGM Mining Right Area) *Refurbishing of the existing Holfontein shaft, construction of headgear, two winders, skip, ore storage bin, chute, ventilation shaft, fan and second emergency outlet, winder, substation, turnstiles (employee access system), lamp room, containerised office, first aid room, ablutions and covered waiting area, sewage treatment plant (30 m^3 per day capacity), water treatment facility (640 m^2), salvage yard and waste transfer area (hard-standing impermeable bunded area with a roof and sump), diesel storage tank (23 m^3), explosives loading area, emulsion silo and container, power lines from existing ME Operations (two 6 MVA lines), potable water storage tanks (200 ℓ), Pollution Control Dam (PCD) (3 000 m^2), and surface water tanks (for underground water) (630 m^2 combined footprint of two tanks)	7.25 ha	**X**	<u>GNR983 – Activity No. 27:</u> The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation
Clearing of land for surface infrastructure area associated with the Holfontein shaft, the ventilation shaft and associated infrastructure and for roads, power lines and associated servitudes*	13.85 ha (7.25 ha - Holfontein* infrastructure; 6.6 ha - roads, power lines. pipeline and associated servitudes)	**X**	<u>GNR984 – Activity No. 17:</u> Any activity including the operation of that activity which requires a mining right as contemplated in section 22 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), including associated infrastructure, structures and earthworks, directly related to the extraction of a mineral resource, including activities for which an exemption has been issued in terms of section 106 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
		X	<u>GNR985 – Activity No. 12:</u> The clearance of an area of 300 square metres or more of indigenous vegetation within any critically endangered ecosystem listed in terms of section 52 of the NEMBA

NAME OF ACTIVITY - ALL ACTIVITIES INCLUDING ACTIVITIES NOT LISTED **(e.g. excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.)**	AERIAL EXTENT OF THE ACTIVITY **(Ha or m²)**	LISTED ACTIVITY **(Mark with an X where applicable or affected)**	APPLICABLE LISTING NOTICE
Haul route to existing ME Operations and on site roads	On site roads will be up to 8 m wide to facilitate turning of haul trucks	**X**	GNR983 – Activity No. 24: The development of a road with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 metres
Upgrade of the crossing of the Blesbokspruit	A series of culverts ± 300 m in length across the Blesbokspruit	**X**	GNR983 – Activity No. 12: The development of- (i) canals exceeding 100 square metres in size; (ii) channels exceeding 100 square metres in size; (iii) bridges exceeding 100 square metres in size where such development occurs within a watercourse
		X	GNR983 – Activity No. 19: The infilling or depositing of any material of more than 5 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic metres from a watercourse
		X	GNR984 – Activity No. 24: The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils, but excluding where such extraction or removal is for the rehabilitation of wetlands in accordance with a maintenance management plan
Dewatering of groundwater – will require a Water Use Licence	Max 6 Mℓ/day	**X**	GNR984 – Activity No. 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
Upgrade of the crossing of the Blesbokspruit – will require a Water Use Licence	A series of culverts ± 300 m in length across the Blesbokspruit		
PCD – will require a Water Use Licence	3 000 m^2		
Surface water tanks providing interim holding capacity for underground water – will require a Water Use Licence	630 m^2 combined footprint of two tanks		
Dust suppression on unpaved portions of the haul road – will require a Water Use	2 ℓ /m²-hr (6.4 m		

NAME OF ACTIVITY - ALL ACTIVITIES INCLUDING ACTIVITIES NOT LISTED (e.g. excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.)	AERIAL EXTENT OF THE ACTIVITY (Ha or m²)	LISTED ACTIVITY (Mark with an X where applicable or affected)	APPLICABLE LISTING NOTICE
Licence	wide x 270 m for haul road between the ME operations and Carnation Road and 810 m for the haul road from Pansy Avenue to the Holfontein shaft)		
Sewage treatment plant - will require a Water Use Licence	30 kℓ/day		
Discharge of underground water to the Blesbokspruit will require a Water Use Licence	6 Mℓ/day		
Water treatment facility - will require a Water Use Licence	6 Mℓ/day		

b) Description of the activities to be undertaken (Describe the methodology or technology to be employed, including the type of commodity to be mined and for a linear activity, a description of the route of the activity)

New Kleinfontein Goldmine (Proprietary) Limited (NKGM) "the Applicant" has targeted a gold resource in the Gauteng Province, adjacent to their existing Modder East (ME) Operations, for the extension of their operations to include the development of an underground mining operation - the proposed Holfontein Project. As such, the Applicant is pursuing an amendment to their existing Environmental Management Programme (EMPr) (DMR Ref. PWV 5/3/2/987 and PWV 6/2/2/1136) in terms of Section 102 of the Minerals and Petroleum Resources Development Act, No. 28 of 2002 (MPRDA), as well an application for Environmental Authorisation for activities listed in terms of the National Environmental Management Act, No. 107 of 1998 (NEMA) Environmental Impact Assessment (EIA) Regulations (GNR982 of 2014) triggered by the Holfontein Project.

This EIAR and EMPr are only relevant to the Holfontein Project. This document serves as an addendum to the existing approved ME operations EMPr, it covers the Holfontein Project activities up to the ME operations gate, after which the activities are covered by the existing approved EMPr.

Mining

The purpose of the Holfontein Project is to supplement the drop in production once the NKGM ME Operations tonnage profile begins to decline. The Life of Mine (LoM) schedule for the Holfontein Project has been incorporated into the ME operations LoM.

The Holfontein Project ore body is a shallow dipping reef (Main Reef) of 7 degrees from a depth below surface of 363 m to 645 m below surface. The ore body extends for about 2 300 m on dip and ranges from 170 m to 1 400 m on strike. The underground extent for mining at the Holfontein Project is 126 ha and the above ground extent required for infrastructure, roads, servitudes etc. at the Holfontein Project is 13.85 ha.

The LoM will consist of two years of construction and development, and 8 years of gold production. A further 6 months to a year is assumed for decommissioning and closure.

The Holfontein Project has an existing shaft that was closed / sealed in the early 1940's. In order to refurbish this shaft, the shaft will initially be dewatered and the shaft will be refurbished. Refurbishing of the existing Holfontein shaft will take approximately 20 months. The slyping of the existing decline and the development of a new on-reef decline parallel to the existing excavation, at 80 m per month, will create the main arterial connecting the workings to the shaft.

Production at the Holfontein Project is planned to begin in 2021 and contribute approximately 130 000 tonnes per annum in the first three years. Holfontein will be at steady state production of 380 000 tonnes per year (30 000 tonnes per month) between 2024 and 2028. Year 2028 will be the final year of operation and is expected to produce 312 000 tonnes.

After the operations are finalised, decommissioning will commence. All shafts will be sealed; all surface infrastructure will be dismantled and removed; and all disturbed areas will be ripped, covered with a layer of topsoil and returned as closely as possible to the present state.

Surface Infrastructure and Services

The areas where surface infrastructure and access roads are to be located will be cleared and the topsoil stripped and stockpiled.

The mine will be operated as a section of ME operations with all services and support being provided by ME. Mining is conventional stoping with trackless access. The development will all be on reef. Primary access will be by means of the re-equipped Holfontein shaft. Overburden and ore will be hoisted through the shaft and transported to ME operations by road.

The shaft will consist of a steel headgear, with two winders (between 40 to 50 m in height), to be constructed above the existing rectangular shaft that will operate 24 hours a day on the main shaft. Men and material will use the shaft for both day and night shift. Rock hoisting will be limited to a 12 hour day shift to limit the noise associated with tipping and trucking of ore. Hoisting will take place 23 days a month at 1 200 tonnes per day. The skip (5 tonne capacity) will tip every 2 minutes into a concrete bin (200 tonne capacity). The bin will discharge into trucks below the natural / current ground level. At steady state production a truck will load every 15 minutes. Loading will be by chute and will not require a front end loader. The material loaded will be wet therefore dust will be limited. There will be a trucking loop to avoid trucks having to reverse.

Fuel Storage

A bunded area on surface will contain a fuel storage tank (23 m^3 capacity). Diesel will be supplied by tanker. Fuel will be piped down the shaft to an underground storage area. Lubricants will be stored at ME operations, transported to site, and taken directly underground in containers.

Explosives

Explosives will be stored at ME operations and brought to site as required. There will be an explosives loading area, emulsion silo and container on site at the Holfontein Project.

Electricity

Electrical power will be sourced from ME operations. Two 6 MVA lines, approximately 5.5 m in height and 6.3 m in height across roads and railways will be constructed between ME operations and the proposed substation building at the Holfontein Project adjacent to the proposed ventilation shaft.

Water

Potable water at the containerised office and ablutions will be trucked from ME operations and stored in a potable water storage container.

Excess groundwater produced at Holfontein will be pumped to above-ground surface water tanks (630 m^2 combined footprint of two tanks), after which it will be pumped to a water treatment facility and discharged to the Blesbokspruit via a pipeline (the pipeline is to run within the road reserve). All sludge or brine resulting from the water treatment facility will be transported back to the ME TSF (or as directed by DWS) via road.

All dirty water from the dirty water catchment (entire surface infrastructure area) will be diverted to a PCD (3 000 m^2).

Waste

A salvage yard, timber yard and laydown area will also be constructed on site. There will also be a designated area for the temporary storage of waste, which will be collected, separated and disposed of at a licensed landfill facility. The waste storage area will be bunded, have an impermeable surface, have a sump, and will be covered with a roof.

Non-hazardous domestic and industrial waste comprises typical constituents such as paper/cardboard, empty cans, glass, steel and plastic containers, scrap metal, builder's rubble, piping and tubing (plastic, metal and rubber), timber, batteries and tyres. Some industrial waste produced on site will be hazardous. This will include used oil, degreasers, lubricants and containers in which these were stored.

The volumes applicable to the identified waste stream will fluctuate with the requirements of the mine. There will be no long term storage of any waste materials on site.

Sewage

Containerised toilets will be provided (3 x Male and 1 x Female) (9 m x 3 m containers) on surface. A sewage treatment plant (30 kℓ per day) will be installed. Sewage treatment plant effluent will be treated in the water treatment facility, if required, prior to discharge to the Blesbokspruit via a pipeline. All brine will be transported to the ME TSF (or as directed by DWS) via road.

Hauling

All overburden and ore will be transported from the Holfontein Project to ME operations plant by road using conventional 30 tonne road trucks. The estimated hauling cycle (i.e. return trip) time between the Holfontein Project and the ME plant for a 30 tonne road truck is 30 minutes. Two trucks will operate for 12 hours a day during daylight hours.

The haul route consists of 3 km of existing gravel road and 3 km of existing tarmac surface. The gravel portion will need to be upgraded but will be no wider than 6.4 m. A gravel access road will be constructed from Holfontein Road to the Holfontein shaft area (~ 340 m in length, with a width of 6.4 m) and a gravel portion of haul road (~ 510 m in length, with a width of 6.4 m) will be constructed in proximity to the ME Operations within a cultivated area. The gravel road within the shaft area will be up to 8 m wide to facilitate turning with tighter radii. The river crossing over the Blesbokspruit and its associated wetland will be upgraded to accommodate haul trucks. A series of culverts will be constructed across the floodplain wetland.

Ventilation

A ventilation shaft (± 30 m in height) will be constructed. The main fan arrangement will consist of a single fan station on surface at the top of the upcast shaft. The fan station will be equipped with 2 axial fans with adjustable blades operated in parallel. The ventilation shaft will be equipped with a small headgear for purposes of emergency evacuation. The headgear will also be used weekly for shaft inspection.

A compressor will be situated on surface to supply air to the underground refuge bays, and will run continuously.

Staff

Contractors will be appointed to carry out the construction and decommissioning activities.

For the operational phase, employees will be sourced from the existing ME operations. No new employment opportunities will be created. Mine employees will be transported by bus from ME operations, where there are existing change rooms etc. There will be two nine hour shifts per day. A covered waiting area on surface will be able to accommodate 400 employees (the estimated staff complement per shift). The entire infrastructure area will be fenced off and the employees will enter and exit at the eight turnstiles. A first aid room, office (9 m x 3 m containers) lamp room, and a banksman cabin will also be located on surface.

6. POLICY AND LEGISLATIVE CONTEXT

APPLICABLE LEGISLATION AND GUIDELINES USED TO COMPILE THE REPORT **(a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process)**	**REFERENCE WHERE APPLIED** **(i.e. where in this document has it been explained how the development complies with and responds to the legislation and policy context)**	**HOW DOES THIS DEVELOPMENT COMPLY WITH AND RESPOND TO THE POLICY AND LEGISLATIVE CONTEXT** **(e.g. In terms of the National Water Act:- Water Use Licence has/has not been applied for)**
The Mineral and Petroleum Resources Development Act, No. 28 of 2002 (MPRDA) is the key legislation governing mining activities within South Africa. It details the requirements and processes which need to be followed and adhered to by mining companies. The Department of Mineral Resources (DMR) is the competent authority that deals with all mining related applications.	An integrated application in terms of the MPRDA and NEMA is being undertaken. The NEMA process for the proposed Holfontein Project is described below.	An application for an EMPr amendment in terms of Section 102 of the MPRDA was submitted to the DMR on 9 June 2015, through the SAMRAD online system, to incorporate the Holfontein Prospecting Right Area into the existing New Kleinfontein Goldmine (DMR Ref. PWV 5/3/2/987 and PWV 6/2/2/1136). The DMR accepted the application on (*awaiting notification of acceptance).*
The National Environmental Management Act, No. 107 of 1998 (NEMA) is the enabling legislation intended to provide a framework for integrating environmental management into all developmental activities to promote co-operative environmental governance with regard to decision making by state organs on matters affecting the environment. The EIA Regulations of GNR982, December 2014 serve to regulate the procedure and criteria for submitting, processing and considering decisions for applications for environmental authorisation in order to avoid the commencement of activities which may have a detrimental impact on the environment. These Regulations provide details on the process to be followed for the consultation of stakeholders and IAPs, the identification of the Competent Authority, and the various timeframes and application requirements for environmental authorisation. A further three Regulations, GNR983, GNR984, and GNR985 (all of 2014), provide lists of activities for which environmental authorisation, either in the form of a Basic Assessment or Scoping and EIAR / EMPr, is required before the activity can commence. In instances where Environmental Authorisation is required for a mining project,	This EIAR and EMPr has been prepared to meet the requirements of the EIA Regulations (GNR982 of 2014). Refer to Section 1(a) for the listed activities applicable to the proposed Holfontein Project.	An integrated application in terms of the MPRDA and NEMA is being undertaken. The NEMA application was submitted to the DMR on 9 June 2015 (*awaiting notification of acceptance)*. According to the EIA Regulations (2014) the following are to be submitted in support of the application for Environmental Authorisation: • Scoping Report together with the results of consultation with Interested and Affected Parties (IAPs) and State Departments; • EIAR and EMPr together with the results of consultation with IAPs and State Departments (this document). The Scoping Report was submitted to the DMR on 24 July 2015 (*awaiting notification of acceptance).* The EIAR and EMPR are due to be submitted to

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in terms of the MPRDA as well as NEMA, the DMR is identified as the Competent Authority. An application for Environmental Authorisation in terms of Section 24 of NEMA was submitted on 9 June 2015 to the DMR for the NEMA listed activities triggered by the proposed Holfontein Project (refer to Section 1(a).		the DMR on or before 9 November 2015.
The National Environmental Management Air Quality Act, No. 39 of 2004 (NEMAQA) has placed the responsibility for air quality management on local authorities that will be tasked with baseline characterisation, management and operation of ambient monitoring networks, licensing of listed activities, and emissions reduction strategies. GN893 of 2013 provides the list of activities in terms of Section 21(1)(a) for which licensing is required in terms of Chapter 5 of the Act. This notice further establishes minimum emission standards for the listed activities. The ambient air quality standards (GN1210 of 2009) were determined based on international best practice for PM_{10} (particulates with an aerodynamic diameter of 10 micron), dust-fall, sulphur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb), benzene and recently $PM_{2.5.}$ The $PM_{2.5}$ standards were published in GN486 of 2012. Section 32 of NEMAQA allows for the promulgation of measures to control and monitor dust. The National Dust Control Regulations (GNR827 of 2013) prescribe general measures for the control of dust in all areas, including residential and light commercial areas. Section 33 of NEMAQA relates to rehabilitation of mining operations, which states that an Applicant must notify the minister five years prior to mine closure of the planned closure and provide a closure and rehabilitation plan for the prevention of pollution of the atmosphere by dust after operations have ceased.	Refer to Section 10(a)(iii) for a detailed description of the ambient air quality within the proposed Holfontein Project area; and refer to Section 11 for the potential impacts on ambient air quality. Air quality management has been addressed in the EMPr (Section 4(g)(ii) in Part B of this document). Also refer to Appendix 7 for the specialist air quality study.	None of the activities in terms of the above schedule will be triggered by the proposed Holfontein Project therefore an AEL in terms of NEMAQA is not required. <u>Provision for rehabilitation has been made in the Holfontein Interim Closure Plan (Appendix 20).</u> Air quality monitoring and management measures have been stipulated in the EMPr, to ensure that the Applicant complies with the legislative requirements, following a specialist study to determine the likely impacts to air quality resulting from the proposed activities at the Holfontein Project.
The National Heritage Resources Act, No. 25 of 1999 (NHRA) serves to protect and manage South African heritage and cultural resources, which include places, buildings, structures and equipment of cultural significance, historical settlements and townscapes, archaeological and paleontological sites, graves	Refer to Section 10(a)(iv) for a detailed description of the cultural and heritage resources within the Holfontein Project area; refer to Section 11 for the potential impacts	Of the activities listed, items A and C (i) are triggered by the Holfontein Project. Heritage considerations have formed part of this environmental process. In terms of the

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and burial grounds. The Act protects any heritage resources from damage by developments by stipulating in Section 38 that any person intending on undertaking any form of development which involves the activities listed below must, at the earliest stage of initiation, notify the South African Heritage Resources Association (SAHRA): A. the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length; B. the construction of a bridge or similar structure exceeding 50 m in length; C. any development or other activity which will change the character of a site— i. exceeding 5 000 m^2 in extent; or ii. involving three or more existing erven or subdivisions thereof; or iii. involving three or more erven or divisions thereof which have been consolidated within the past five years; or iv. the costs of which will exceed a sum set in terms of regulations by SAHRA or a provincial heritage resources authority; D. the re-zoning of a site exceeding 10 000 m^2 in extent; or E. any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority. Section 38(8) of the Act states that if heritage considerations are taken into account as part of an application process undertaken in terms of NEMA and the EIA process, there is no need to undertake a separate application in terms of the NHRA.	on these resources. Cultural and heritage resource management have been addressed in the EMPr. (Section 4(g)(iii) in Part B of this document). Also refer to Appendix 8 for the specialist cultural and heritage study.	requirements of the NHRA, a specialist cultural and heritage consultant was appointed to conduct an assessment of the area. No findings of cultural and heritage significance were made within the proposed project site. Findings were made in the surrounding area and mitigation measures for potential indirect impacts on these resources has been included in the EMPr.

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The National Water Act, No. 36 of 1998 (NWA) regulates all matters relating to inland water resources. It thus operates as a management instrument with the lead authority being the Department of Water and Sanitation (DWS). This Act provides mechanisms for the prevention of the pollution of water resources to support the management of water as a renewable resource. Section 21 of the Act lists water uses for which authorisation is required from the DWS, while Section 39 identifies several water uses where the need for a licence is dispensed with. The use of water for which a licence is not required is also described. Regulation GN704 of 1999 provides regulations for the use of water for mining and related activities and is aimed to further protect water resources. These regulations describe how mining activities should be managed to protect water resources. The Act thus plays a crucial role in the mining process as many mining-related activities use water as listed in Section 21, thereby requiring approval from DWS.	Refer to Section 10(a)(vi) and Section 10(a)(vii) for a detailed description of the surface and groundwater resources within the Holfontein Project area; refer to Section 11 for the potential impacts on water resources. Water management has been addressed in the EMPr. (Section 4(g)(iv) in Part B of this document). Also refer to Appendix 10 for the specialist hydrogeology study and Appendix 11 for the specialist hydrology study.	A pre-application consultation meeting was held with the local catchment officer of the DWS on 27 May 2015 at the DWS offices in Pretoria (refer to Appendix 6.2 for the register and meeting minutes), wherein the potential water uses were discussed. A WULA for the Holfontein Project is being prepared and will be submitted to DWS in November 2015. The following water uses apply and will be included in the WULA: 21a – Taking water from a water resource 21c - Impeding or diverting the flow of water in a watercourse 21f - Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit 21g - Disposing of a waste or waste water which may detrimentally impact on a water resource 21i - Altering the bed, banks, course or characteristics of a watercourse 21j - Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people
The National Environmental Management Waste Act, No. 59 of 2008 (NEMWA) Act serves to reform the laws regulating waste management in order to protect public and environmental health by providing measures for the prevention of pollution and ecological degradation and to provide defining requirements for the	Waste management has been addressed in the EMPr (Section 4(g)(xiii) in Part B of this document).	The applicable activities at the mine include the temporary handling and transfer area for general and hazardous waste at the shaft, however, the Applicant intends to store less

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licensing and control of waste management activities. GN921 of 2013 provides definitions for activities which require a waste management licence and identifies the relevant environmental authorisations which are further required for said activities. The Act also provides national norms and standards for the storage of waste above the licence thresholds (GN926 of 2013).		than 100 m^3 of general waste and less than 80 m^3 of hazardous waste at the transfer facilities at any given time, thereby remaining below the licence thresholds. Therefore a Waste Management Licence in terms of NEMWA is not required.
The Hazardous Substances Act, No. 15 of 1973 aims to control substances that may cause injury, ill-health, or death through their toxic, corrosive, irritant, strongly sensitising or flammable nature, or by the generation of pressure. The Act provides for the division of such substances or products into groups in relation to the degree of danger as well as the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products.	Hazardous substance management has been addressed in the EMPr (Section 4(g)(xiv) in Part B of this document).	Hazardous materials such as explosives and hydrocarbons will be handled on site. The Applicant will ensure that any hazardous materials on site are handled in a manner in line with that described in the Act.
The purpose of the National Environmental Management: Biodiversity Act, No. 10 of 2004 (NEMBA) is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. This includes: the protection of species and ecosystems; the sustainable use of indigenous biological resources; the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources; and the establishment of a South African National Biodiversity Institute (SANBI). Section 52 of the Act provides for listing of threatened or protected ecosystems, in one of four categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Protected. The main purpose of listing threatened ecosystems is to reduce the rate of ecosystem and species extinction and includes the prevention of further degradation and loss of structure, function and composition of threatened ecosystems. Threatened terrestrial ecosystems have been delineated based on the South African Vegetation Map, national forest types and priority areas identified in a provincial systematic biodiversity plan, in	Refer to the terrestrial ecology baseline in Section 10 (a)(xi); and refer to Section 11 for the potential impacts on biodiversity. Biodiversity management has been addressed in the EMPr (Section 4(g)(viii) in Part B of this document). Also refer to Appendix 15 specialist terrestrial ecology study.	The proposed project site falls within ecosystems which are listed in terms of Section 52 of NEMBA. The proposed shaft and a portion of the haul road falls into the Blesbokspruit Highveld Grassland ecosystem (Critically Endangered), while the remainder of the haul road is located in the Soweto Highveld Grassland ecosystem (Vulnerable). According to the Gauteng C-Plan various areas which are associated with the Holfontein Project have been listed as Important due to the presence of suitable habitat for Red and Orange Listed plant species, Red Listed mammal species, Red Listed bird species as well as the presence of primary habitat. However, most of

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this case the Gauteng Conservation Plan (C-Plan). Chapter 4, Part 2 of the Act provides for listing of species as threatened or protected. If a species is listed as threatened, it should be further classified as critically endangered, endangered or vulnerable (GNR151 of 2007). The Act also defines restricted activities in relation to a specimen of a listed threatened or protected species (GNR152 of 2007).		the proposed infrastructure falls within disturbed and transformed areas classified by independent specialists as having a low ecological sensitivity. Portions of the existing road to be used as the haul road cross areas classified as having medium to high ecological sensitivity. Plant species of conservation concern within the area include *Hypoxis hemerocallidea* and *Kniphofia typhoides* (Near Threatened), and *Crinum bulbispermum* (Declining). Plant species of conservation concern, not confirmed, but for which suitable habitat exists include *Habenaria bicolor* (Near Threatened) and *Kniphofia typhoides* (Near Threatened) and the provincially protected *Argyrolobium campicola*. If these plant species of conservation concern will be impacted, a permit for the removal and relocation of these species will have to be obtained from DAFF prior to the commencement of the activity. One bird species of conservation concern namely *Glareola nordmanni* (Black-winged Pranticole; Near Threatened) was confirmed to occur within the project area. In addition to this, ten species of conservation concern were considered to have a medium likelihood of utilizing the study area for foraging, based on the presence of suitable habitat. Four mammal species of conservation

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		concern, *Leptailurus serval* (Serval; Near Threatened), *Dasymys incomtus* (African Marsh Rat; Near Threatened), *Rhinolophus clivosus* (Geoffroy's Horseshoe Bat; Near Threatened) and *Atelerix frontalis* (Southern African Hedgehog; Near Threatened) were given a high probability of occurring in the area based on the presence of suitable habitat (grassland and moist grassland) and the Blesbokspruit also supported healthy populations of the rare butterfly, *Metisella meninx* (Marsh Sylph).
The Mine Health and Safety Act, No. 29 of 1996 as amended and the Regulations thereto provide for protection of the health and safety of employees and other persons at mines and, for that purpose to promote a culture of health and safety; to provide for the enforcement of health and safety measures; to provide for appropriate systems of employee, employer and State participation in health and safety matters; to establish representative tripartite institutions to review legislation, promote health and enhance properly targeted research; to provide for effective monitoring systems and inspections, investigations and inquiries to improve health and safety; to promote training and human resources development; to regulate employers' and employees' duties to identify hazards and eliminate, control and minimise the risk to health and safety; to entrench the right to refuse to work in dangerous conditions; and to give effect to the public international law obligations of the Republic relating to mining health and safety.	The commitment to abide by the requirements of the Mine Health and Safety Act, No. 29 of 1996 have been included in the EMPr in the relevant plans.	The Applicant will ensure that operations on site are in line with the requirements of the Act and Regulations.
The Gauteng Province Environmental Management Framework (2014) states that the project area is located in Zone 1, the intention of which is to streamline urban development activities in it and to promote development infill,	This has been taken into consideration in the determining of the need and desirability of the project, refer to Section 7 and Appendix 3.	

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densification and concentration of urban development, in order to establish a more effective and efficient city region that will minimise urban sprawl into rural areas.		
The Ekurhuleni Metropolitan Municipality (EMM) Integrated Development Plan (2013) provides the regional socio-economic context of the project area, which was used to inform the social baseline for the Holfontein Project. The IDP highlights the following core socio-economic challenges currently facing the EMM: systemic poverty and inequality; food scarcity; inadequate human capabilities development; lack of integration in child and family development; inadequate youth development; and high HIV / Aids infection levels.	Refer to the social baseline in Section 10(a)(x). This has also been taken into consideration in the determining of the need and desirability of the project, refer Section 7 and Appendix 3.	The receptor communities identified within the Holfontein Project area, are facing some of the challenges as identified in the IDP are the Holfontein Community (comprised of the Khomponi Community and Holfontein Quarters Community).
According to the EMM Built Environment Performance Plan (2014 -2015), the disadvantaged communities of Etwatwa and Daveyton are target areas for service upgrading, specifically with respect to transport networking and retail development.	Refer to the social baseline in Section 10(a)(x). This has also been taken into consideration in the determining of the need and desirability of the project, refer Section 7 and Appendix 3.	The Holfontein Project lies in close proximity (within 7 km) to these communities and will not have an impact the development targets.
The EMM Growth and Human Development Strategy (2025) indicates the objectives to be met by EMM regarding growth and human development by the year 2025. Objectives include: the provision of social and economic infrastructure and services that will build sustainable communities and contribute to halving poverty; accelerated, labour-absorbing economic growth that increases per annum and that will create long-term sustainable jobs and contribute to halving unemployment; sustainable development; enhanced government efficiency, co-operative governance; and deepening participatory democracy, provincial and national unity, as well as citizenship.	Refer to the social baseline in Section 10(a)(x). This has also been taken into consideration in the determining of the need and desirability of the project, refer Section 7 and Appendix 3.	The Holfontein Project will contribute to the objective of decreasing unemployment as it will sustain the existing employment of ME employees for a production life of the Holfontein Project and income will result in generation of economic activity in the area, and have a multiplier effect on procurement and development opportunities.
The Draft EMM Region C - Spatial Development Framework (2014) provides information regarding spatial characteristics of the project area. EMM has a diverse range of land use and land capability functions including industrial, agricultural and residential. Much of EMM has been allocated to future	Refer to the social baseline in Section 10(a)(x). This has also been taken into consideration in the determining of the need and desirability of the project, refer Section 7	The portion of land to be developed for the purposes of mining has been determined to be unsuitable for agricultural development as a result of past historical mining practices, which

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development and similarly, although Region C appears to be undeveloped, the Spatial Development Framework indicates that much of Region C is largely allocated to future urban development and agriculture.	and Appendix 3.	have compacted the ground and resulted in some contamination of the soil. As a result, this footprint area would not be suitable for future agricultural development. The area will be rehabilitated to natural land with wilderness potential and a low (or improved) ecological sensitivity to suit the end land use in line with planning objectives (i.e. urban development). The area where the ventilation shaft is to be located is currently cultivated (soybean) and has a low agricultural potential. The area in proximity to the ME Operations where the portion of the haul road is to be constructed and widened is currently cultivated (maize) and has a medium agricultural potential. These areas will be rehabilitated to present agricultural potential (with the exception of the ventilation shaft area to be sealed with a concrete cap) to be able to support future agricultural activities.
According to the EMM Bioregional Plan (2014) the Eastern Highveld Grassland and the Soweto Highveld Grassland ecosystems are not protected as less than 5% of the biodiversity targets are met within protected areas. Conservation targets have been aligned with the Gauteng C-Plan.	This has been taken into consideration in the determining of the need and desirability of the project, refer to Section 7 and Appendix 3.	The ecology specialist determined that the proposed site has been transformed and has a low ecological sensitivity, and is therefore does not contribute to conservation target areas.

7. NEED AND DESIRABILITY OF THE PROPOSED ACTIVITIES **(Motivate the need and desirability of the proposed development including the need and desirability of the activity in the context of the preferred location)**

A detailed need and desirability report was prepared for the Scoping Phase according to the NEMA Need and Desirability Guideline (GN891 of 2014), and attached as Appendix 3. Any aspects which could not be addressed during the Scoping Phase, which mostly related to impact assessment, were addressed during the EIA Phase.

8. MOTIVATION FOR THE PREFERRED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE INCLUDING A FULL DESCRIPTION OF THE PROCESS FOLLOWED TO REACH THE PROPOSED DEVELOPMENT FOOTPRINT WITHIN THE APPROVED SITE **(NB!! – This section is about the determination of the specific site layout and the location of infrastructure and activities on site, having taken into consideration the issues raised by interested and affected parties, and the consideration of alternatives to the initially proposed site layout)**

A detailed site screening assessment was conducted as part of the Scoping Phase to identify the preferred site (the report is attached as Appendix 4). The preferred initial layout plan identified as the preferred site from the site selection matrix was provided to relevant State Departments and IAPs during the scoping phase stakeholder engagement process for comment. As no issues and concerns were raised which required the revision of the layout, the preferred initial layout was considered as the preferred final layout which was further assessed during the EIA phase. Changes to the layout as per the issues raised by stakeholders as well as the specialist findings include 1) the relocation of the discharge point to the Blesbokspruit via a pipeline, 2) the pipeline to follow existing servitudes and 3) an increase in the surface infrastructure footprint to include the resizing of the PCD from (1600 m^2 to 3000 m^2) to accommodate dewatered groundwater in case of an emergency situation (i.e. failure of the water treatment facility or pipeline) (refer to Figure 2).

This preferred final layout will be provided to relevant State Departments and IAPs during the EIA phase stakeholder engagement process for comment. If issues and concerns are raised which require the revision of the preferred final layout, this will be done prior to the submission of the EIAR to the Competent Authority for consideration. If there is no need for the layout to be revised following stakeholder engagement the preferred final layout will be considered as the final layout for consideration for Environmental Authorisation.

a) Details of the development footprint alternatives considered **(With reference to the site plan and the location of the individual activities on site, provide details of the alternatives considered with respect to:**

I. the property on which or location where it is proposed to undertake the activity;

II. the type of activity to be undertaken;

III. the design or layout of the activity;

IV. the technology to be used in the activity;

V. the operational aspects of the activity; and

VI. the option of not implementing the activity)

Alternatives have been investigated and assessed for the project during the Scoping Phase. Alternatives assessed include **I.** site; **II.** type of activity to be undertaken; **III.** layout; **IV.** technological aspects; **V.** operational aspect alternatives. From the alternatives assessment (refer to Section 11(b)) the current site, activity, layout and project description was selected as the preferred alternatives as they present the most feasible option with the lowest environmental impacts.

Further alternatives assessed during the EIA phase included discharge point alternatives for the treated dewatered groundwater and sewage effluent, including a point in the Holfontein Stream as well as a point in the Blesbokspruit (refer to Figure 62). Refer to Section 11(b) for the assessment of the impacts of both alternatives.

VI. If the Holfontein Project is not considered, then the ongoing production and associated sustaining of employment and economic benefit will not occur; instead a major downturn at Modder East Operations will occur in approximately 2021. It will however also prevent any increased surface impact at the Holfontein Project area (there is an existing footprint because of the historical mine development), and will prevent the associated environmental and social impacts at the shaft and along the haul route.

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

Scoping Phase – Initial Public Participation Process

Landowner Notification

The current landowner of the Remaining Extent of Holfontein 71 IR (location of majority of surface infrastructure) and Ptn 68 (location of the ventilation shaft) of Holfontein 71 IR was notified of the proposed project through correspondence with the Applicant and by the EAP via email on 12 June 2015 (refer to Appendix 5.1).

The landowner attended the public meeting held on Tuesday 23 June 2015 at the Springs Primary and Secondary School hall at 18h00, where a landowner meeting with the Applicant was requested. In response to the request, a meeting was held at the ME operations on 7 July 2015 at 14h00.

A lease agreement will be drawn up between the Applicant and landowner.

Media Notice

A media notice was published in English in the local newspaper (Springs Advertiser) on 11 June 2015, providing a brief project description, legislative requirements, and the process to be followed. The media notice also informed any Interested and Affected Parties (IAPs) of the process to follow to register on the IAP database, and provided details of the EAP to contact for more information. Refer to Appendix 5.2.

Site Notices

Site notices (in English) were posted up on site and at conspicuous locations within the surrounding communities on 10 June 2015, providing a brief project description, legislative requirements, the process to be followed to register on the IAP database, and provided details of the EAP to contact for more information. Site notices also indicated the location and availability of the Scoping Report, and the legislated commenting periods. Refer to Appendix 5.3.

IAP Registration

An IAP register was opened and representatives from all of the relevant State Departments, as well as any IAPs requesting to register, were added to the database. These IAPs include all the attendees at the various meetings held. Refer to Appendix 5.4.

Commenting Period

The Scoping Report was made available for comment to State Departments (including the Competent Authority) via email or by hand (refer to Appendix 5.5) and placed within the public domain at the security office at New Kleinfontein Goldmine ME operations; at the historical mine hostel in the Khomponi community, with the community representative; and on the Prime Resources website, on 10 June 2015 for a commenting period of 30 days (11 June - 12 July 2015).

A request was made at the public meeting held on 23 June 2015, for the residents of the Holfontein Quarters to be consulted with. On 2 July 2015 a brief meeting was held with the Holfontein Quarters community, and a Scoping Report was made available.

Background Information Document

A Background Information Document (BID) in both English and Zulu was compiled, which briefly described the background and a brief description of the project and potential impacts, the legislated environmental process, availability of the Scoping Report, the process to be followed to follow to register on the IAP database and the contact details for queries. The BID was made available to State Departments and registered IAPs who provided an email address, via email, and to surrounding residents, by hand, on 10 June 2015. A BID was also sent via registered mail to IAPs who only provided a postal address. The BID was also made available to any IAPs requesting further information and was distributed at the public meetings. Refer to Appendix 5.6.

Information Document

An information document serving as a non-technical summary of pertinent information detailed in the Scoping Report was compiled. English and Zulu versions of the information document were provided together with the Scoping Report to the Khomponi and Holfontein Quarters communities to accommodate different literacy levels and language preferences. Refer to Appendix 5.7.

Public Meetings

An SMS was sent to all registered IAPs, who did not receive a BID on 22 June 2015, notifying them of the details of the public meetings to be held (refer to Appendix 5.8). Public meetings were held on Tuesday 23 June 2015, at the Holfontein Project site at 16h00 and at the Springs Primary and Secondary School hall at 18h00. A presentation was given to inform IAPs about the proposed project, the potential impacts, and future investigations, and allowed IAPs an opportunity to ask questions or raise issues and concerns. Refer to Appendix 5.9 and Appendix 5.10.

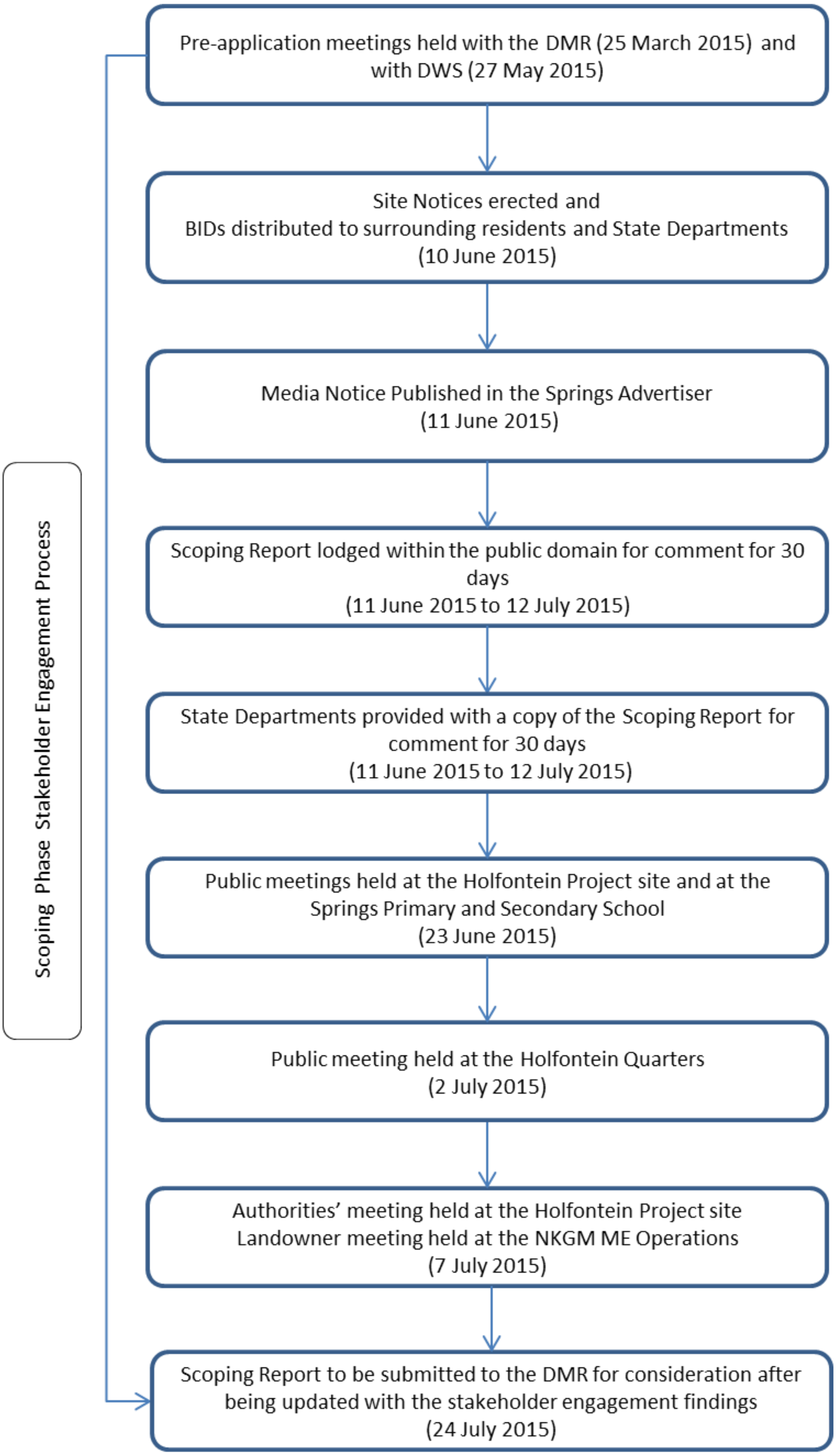
It was requested at the public meeting held on Tuesday 23 June 2015, at the Holfontein Project site that another meeting be held at the Holfontein Quarters located across the N12 highway from the Khomponi Community. In response to this request a meeting was held at the Holfontein Quarters on 2 July 2015 at 11h00 where a presentation was given to inform IAPs about the proposed project, the potential impacts, and future investigations. IAPs were also provided an opportunity to ask questions or raise issues and concerns. Refer to Appendix 5.11.

Authorities Meeting

Authorities were invited, via email on 29 June 2015, to attend a meeting at the Holfontein Project site held at 10h00 on 7 July 2015. Refer to Appendix 5.12 for copies of the meeting notes and attendance register.

Comments and Response Report

A Comments and Response Report was compiled (refer to Section 9(a) below) and submitted to the Competent Authority for consideration after the 30 day commenting period had ended. All written comments received are attached as Appendix 5.13.



EIA Phase – Feedback Engagement Process

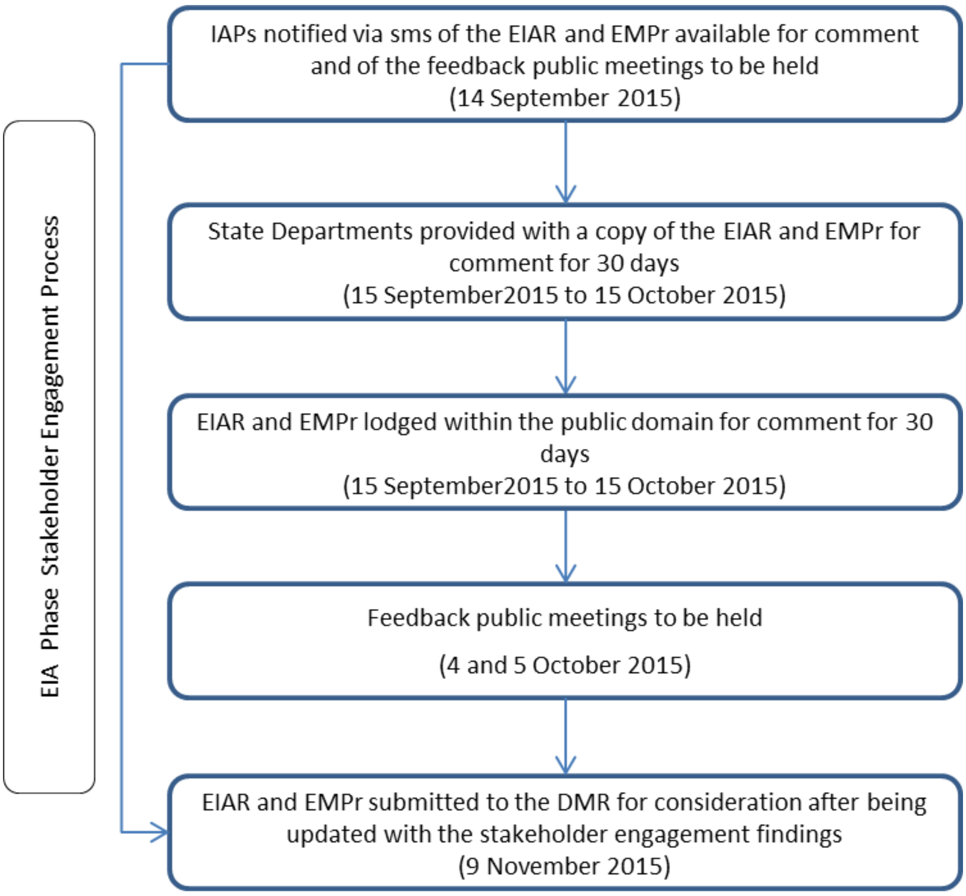
During the EIA phase further stakeholder engagement was conducted. An Environmental Impact Assessment Report (EIAR) and an Environmental Management Programme (EMPr) (this document) was compiled and made available for comment, in the public domain at the same locations as the

Scoping Report, and was made available to State Departments (including the Competent Authority) for a period of 30 days (15 September 2015 to 15 October 2015).

A feedback BID (refer to Appendix 5.14) was emailed to all registered IAPs and distributed to all the residents with the Welgedacht SH area by hand (on 14 September 2015), providing a summary of the potential impacts and outcomes of the investigations.

A SMS and email was sent out to all registered IAPs (on 14 September 2015) notifying them of the localities where the EIAR and EMPr can be viewed, the commenting period, as well as providing the details of the feedback public meetings to be held.

Feedback public meetings will be held at the Khomponi Community on 4 October 2015 and at the Springs Primary and Secondary School on 5 October 2015. Presentations will be made to inform the public about the potential impacts and outcomes of the investigations. Prime Resources will be able to respond to additional issues and concerns raised during the Scoping Phase. The IAP database and Comments and Response Report will be updated throughout the feedback stakeholder engagement process and submitted, together with the EIAR and EMPr, to the Competent Authority for consideration after the 30 day commenting period has ended and the report has been finalised (on 9 November 2015).



a) Summary of issues raised by IAPs (Complete the table summarising comments and issues raised, and reaction to those responses)

INTERESTED AND AFFECTED PARTIES (list the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted)		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND OR RESPONSE WERE INCORPORATED.
AFFECTED PARTIES					
Landowner/s					
Landowner of Ptn 68 and the RE of Holfontein 71 IR - Mr Berman, Leslie	**X** (via Tel - 11 June 2015, via email 12 June 2015)	23 June 2015 (Springs Primary and Secondary School meeting)	Asked what guarantee the landowner would have that all surface infrastructure would be removed from the site and that the shaft would be effectively sealed.	PR explained that this would be addressed in the EIA report. PR also explained that on awarding a Mining Right (MR) the Department of Mineral Resources (DMR) requires all mining companies to determine the quantum (amount) required for closure, in order to address environmental rehabilitation and closure. This amount is to be made available prior to mining commencing, and an assessment must be undertaken annually to determine any change to the financial provision. PR explained that if the mining company fails to rehabilitate the area then the financial provision can be used to rehabilitate the mining area.	Holfontein Interim Closure Plan (Appendix 20)
			Raised concerns around sinkholes, as the deep aquifer is a dolomitic aquifer, a type of rock that may be prone to sinkhole formation.	PR responded to say that this would be further investigated by the groundwater specialist and addressed during the feedback public meeting.	Hydrogeology Impact Assessment (Section 11)
			Asked what the impact of an influx of job seekers into the area would have on the landowner, as they may be faced with additional informal settlement development on their land. Asked how the mine would manage this problem.	PR confirmed that this would be further investigated as part of the EIA phase and would be addressed at the feedback meeting.	Socio-economic Impact Assessment (Section 11)
			Requested clarification regarding the Holfontein Project which would utilise 800 employees (400	PR explained that the planned production at ME operations would gradually decline as	Finalised during Scoping Phase

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			per shift) from the ME Operations. They asked what would happen to the 800 ME Operations employees if the Holfontein Project did not go ahead and wanted to understand how ME operations were able to lose 800 employees to the Holfontein Project.	ME operations reached the planned end of Life of Mine (LOM) and that the Holfontein Project would supplement the ME production rate, in order to achieve a steady state production rate. PR explained that, without the Holfontein Project, planned production at ME would begin to decline and employees would potentially be let go through a downsizing programme but that through the Holfontein Project the employment of these employees would be extended.	
Mr Berman, Mark (on behalf of landowner)		23 June 2015 (Springs Primary and Secondary School meeting)	Explained that some of the questions they wanted to ask were important to them as the landowners and that they understood that PR may not be able to address all of these concerns. He expressed concern that New Kleinfontein Goldmine (Pty) Ltd (NKGM) was not at the meeting in order to address some of these important questions.	PR noted that it was unfortunate that the mine was unable to attend the meeting, however it was agreed by all parties that the landowners needed to be engaged separately via a different platform. In response a landowner meeting was held at the ME operations on 7 July 2015, which the landowner, Applicant and EAP attended.	Finalised during Scoping Phase
			Asked where the powerline between ME Operations and the Holfontein project area would run and how wide the servitude would be.	PR explained that the powerline would run along the N12 but that the width and height of the servitude would need to be confirmed. It was explained that this would be included into the EIA report.	Project Description (Section 5(b))
			Asked how the mine planned their production and LOM.	PR explained that figures and data are modelled to estimate timeframes, such as the LOM, production, and estimate the amount of resource against the feasibility (financial cost) of mining such resource.	Finalised during Scoping Phase
			Asked what the extent of the East Rand Basin was and requested a map illustrating this.	Confirmed that this would be noted and that such a map would be included into the EIA report.	Refer to Figure 4 below the table

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			Asked why the groundwater was going to be discharged to the Holfontein Stream when it could be used by surrounding farmers. Suggested placing the water into a dam to be used by local residents/farmers as South Africa is water scarce.	PR responded to say that the Department of Water and Sanitation (DWS) proposed the discharge option. PR also confirmed that many options had been considered but that the discharge option was considered the most viable.	Finalised during Scoping Phase
			Asked what the impact of dust would be on the health of people living in Welgedacht, as well as the impact on the nearby crops. Asked if the dust would contain any toxic elements.	PR responded to say that this would be investigated for the EIA phase of the project and be addressed at the feedback meeting.	Air Quality Impact Assessment (Section 11)
			Asked where the underground mining would take place and requested a map showing this.	PR apologised that it was not included into the presentation but confirmed that there was a map in the Groundwater Specialist Report, which was available on the PR website as Appendix 9 of the Scoping Report.	Finalised
Mr Berman, Chananya (on behalf of landowner)		23 June 2015 (Springs Primary and Secondary School meeting)	Asked if the PFS has been completed for this project and when the DFS would be completed.	PR noted that a conceptual PFS had been completed but that the DFS would likely only be completed at a later stage, possibly the end of the year.	Finalised during Scoping Phase
			Asked why the air quality in the area / Ekurhuleni Metropolitan Municipality (EMM) was found to be so poor.	PR responded to say that this was as a result of multiple aspects e.g. existing and historical mining operations, Holfontein Hazardous Landfill Facility, vehicles, agricultural activities, etc.	Finalised during Scoping Phase
Lawful occupier/s of the land					
N/A - The project footprint is not occupied					
Landowners or lawful occupiers on adjacent properties					
Khomponi Community	**X** (on site 10 June	Refer to the comments from the Khomponi Community listed below			

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	2015 to provide documentation, and 23 June 2015 for public meeting)				
Ms Skhosana, Thandi and		23 June 2015 (Holfontein site public meeting)	Stated that if the mine would only begin in 4 years' time and only running for 8 years what would happen to the community?	This was noted and it was explained that it would be addressed during the feedback consultation.	Socio-economic Impact Assessment (Section 11)
Mr Mkash, Lucky		23 June 2015 (Holfontein site public meeting)	Asked how the mine would benefit the community.	This was noted and it was explained that it would be addressed during the feedback consultation.	Socio-economic Impact Assessment (Section 11)
Mr Moetsi, Johannes		23 June 2015 (Holfontein site public meeting)	Raised the following concerns: 1. Would the water that is removed from the mine pollute their water or negatively impact them? 2. As residents of the area, would no jobs or employment be provided for them? 3. Would the dust resulting from the mine negatively impact on the health of the community and their children?	The concerns were noted and it was explained that they would be further investigated, and addressed during the feedback consultation.	Hydrology and Hydrogeology Impact Assessments (Section 11) Socio-economic Impact Assessment (Section 11) Air Quality Impact Assessment (Section 11)
			Will the fencing enclose the whole area?	PR indicated on the map that the fencing would only enclose the shaft area and ventilation shaft area, not the greater area or community.	Finalised during Scoping Phase
Mr Kwelinga, Tony		23 June 2015 (Holfontein	Raised the following concerns: 1. If workers are to be brought from ME operations, what about jobs for the Khomponi	The concerns were noted and it was explained that they would be further investigated, and addressed during the	Socio-economic Impact Assessment (Section 11)

INTERESTED AND AFFECTED PARTIES **(list the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted)**		**DATE COMMENTS RECEIVED**	**ISSUES RAISED**	**EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT**	**SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND OR RESPONSE WERE INCORPORATED.**
		site public meeting)	Community residents? 2. Would the community need to be relocated? 3. Would ME operations employees live at/near the Holfontein shaft? Could PR rather come to present information on the weekends as many people are at work during week days and cannot attend?	feedback consultation. PR explained that no formal housing will be provided by ME for employees at Holfontein shaft. Employees will be transported by bus between ME and Holfontein Shaft. PR explained that it would be considered for the feedback meeting.	Noted - Feedback consultation is to be held on the weekend Public Consultation (Section 9)
Mr Bongani		23 June 2015 (Holfontein site public meeting)	Stated that if PR has found that the air quality in the area is currently poor, why do NKGM want to build another mine that will only make it worse?	This was noted and it was explained that it would be further investigated and addressed during the feedback consultation.	Air Quality Impact Assessment (Section 11)
Ms Maloi, Martha		23 June 2015 (Holfontein site public meeting)	Stated that the Khomponi Community want to tell the government / Department / mine that they would like a better place to live.	This was noted.	Finalised during Scoping Phase
Mr Moshashu, Elliot		23 June 2015 (Holfontein site public meeting)	Said that they have lived in this place since 1982 and in 1993 they were told by the farmer that they wouldn't be moved unless they were provided with Reconstruction and Development Programme (RDP) housing.	This was noted.	Finalised during Scoping Phase
Residents		23 June 2015 (Holfontein site public meeting)	A few residents agreed that there was a grave yard on the other side of Pansy Ave, next to the N12.	This was noted and it was explained that this would be further investigated.	Noted and found not to be in the area of influence by the Cultural and Heritage Study (Appendix 8)
Holfontein Quarters Community	**X** (on site 2 July 2015 to provide documentation, and for public meeting)	Refer to the comments from the Holfontein Quarters Community listed below			

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Ms Mnisi, Phinny		2 July 2015 (Holfontein Quarters public meeting)	Stated that PR had presented findings on the plants, animals and environment but had not discussed how the project would affect the community.	PR responded and explained that just the environmental baseline information had been presented, as well as the social / community information, but that the impacts upon both the environment and community would be investigated and addressed through the next phase (EIA phase). PR would return in September to present the impact findings.	Socio-economic Impact Assessment (Section 11)
Ms Mabena, Albina		2 July 2015 (Holfontein Quarters public meeting)	Requested confirmation that there would be no jobs available for the local community and that only ME employees would have jobs.	PR confirmed this would be the case. There would be no new jobs available, however ME employee would retain their jobs for an additional ~10 years.	Finalised during Scoping Phase
Ms Mabena, Sesi		2 July 2015 (Holfontein Quarters public meeting)	Asked whether the mine would be providing housing since they would not be providing any employment.	This was noted and will be further investigated during the EIA phase.	Socio-economic Impact Assessment (Section 11)
Mr Motsweni, Fani		2 July 2015 (Holfontein Quarters public meeting)	Stated that he was concerned about the lack of employment and said that it would be better that the community were compensated rather than provided with housing.	This was noted.	Socio-economic Impact Assessment (Section 11)
Mr Mashaba, Hosiah		23 June 2015 (Holfontein site public meeting)	Explained that he could see this that this project would not benefit their community in any way as the ME employees would be transported to Holfontein and there would be no new jobs available. Asked what this meant for the Khomponi Community. Suggested that the Khomponi Community needed formal housing and that the mine could provide them with housing as their current housing situation	This was noted and it was explained that it would be further investigated and addressed during the feedback consultation.	Socio-economic Impact Assessment (Section 11)

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			(historical mine house and hostel) was informal and dilapidated.		
			Said that the community across the N12 highway formed part of the Holfontein Community and should be included in all public consultation. It was noted that other houses of the Holfontein Community were named as follows: Quarters, Maipew House, Gapeni and Kompong.	PR explained that they were unaware that the Holfontein Community extended to the other side of the highway. The Khomponi Community has been engaged with because of their proximity to the proposed project. However, PR appreciated that it had been drawn to their attention and explained that this would be further investigated. The names provided were for individual houses on the other side of the N12. In order to refer to the whole community on the other side of the N12 the name Holfontein Quarters Community would be used for future reference.	Finalised during Scoping Phase
Municipal councillor					
EMM Ward 67 Councillor - Mr Madihlaba, Masele	**X** (via email on 11 June 2015)	No comment received.			
EMM Ward 72 Councillor - Mr Sheodin, Ramesh	**X** (via email on 11 June 2015)	17 June 2015 (via email)	Questioned how the dewatering of the proposed Holfontein shaft would impact the groundwater levels in the Welgedacht Agricultural Holdings boreholes, which residents rely on as they do not have access to municipal water.	PR responded stating that the concern would be recorded and adequately addressed by specialists during the EIA process, after which PR would respond via email and through the EIAR/EMPr.	Hydrogeology Impact Assessment (Section 11)
		7 July 2015 (Authorities meeting at the site)	Stated that in his experience there would be a large migration of job seekers into the area, irrespective of whether the project would provide further employment or not. Further explained that Welgedacht SH struggles with crime as a result of the Skoonplaas community neighbouring the ME Operations.	PR explained that the specialist would investigate this impact using a conservative approach. PR clarified that the Welgedacht SH is currently not a low crime area.	Socio-economic Impact Assessment (Section 11)

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			Raised concerns regarding a decrease in land value as a result of the mine and potential informal settlement expansion.	PR confirmed that this would be further investigated as part of the EIA phase and would be addressed at the feedback meeting.	Socio-economic Impact Assessment (Section 11)
Municipality					
EMM Department of Environmental Resource Management (Legislative Compliance Division) - Ms Rakgoale, Cecilia	**X** (via email on 11 June 2015)	No comment received			
Organs of state (responsible for infrastructure that may be affected Roads Department, Eskom, Telkom, DWS etc.)					
Eskom - Mr Kotzee, Christo	**X** (via email on 11 June 2015)	No comment received			
Transnet - Mr Mashiane, Frans	**X** (via email on 11 June 2015)	No comment received			
Gauteng Provincial Department of Roads and Transport - Mr	**X** (via email on 11 June 2015)	No comment received			

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Emett, Denis					
Communities					
Holfontein Community	**X** (on site 10 June 2015 to provide documentation, and 23 June 2015 for public meeting)	Refer to comments above from Holfontein Community (Khomponi and Holfontein Quarters) (Landowners or lawful occupiers on adjacent properties)			
Welgedacht SH Community	**X** (on site 10 June 2015 to provide documentation, and 23 June 2015 for public meeting)	Refer to the comments from the Welgedacht SH Community listed below			
Mr Backhoff		23 June 2015 (Holfontein site public meeting)	Asked if Carnation Road would be upgraded as the residents were concerned about the current condition of the road. He also requested that Carnation Road be tarred up to the railway under the bridge. Stated that he was concerned about the safety of children and animals along Carnation Road and that speed limit and speed control measures would need to be put in place for trucks using this road. Stated that Pansy Avenue was a busy road and that there were often accidents at the intersection with Carnation Road. Raised concerns about dust on Carnation Road,	These concerns were noted and it was explained that they would be further investigated and addressed during the feedback consultation.	Air Quality Impact Assessment (Section 11) Socio-economic Impact Assessment (Section 11) Traffic Impact Assessment (Section 11)

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			noting that dust is already a problem due to trucks traveling to/from the waste water treatment works.		
Mr Du Plooy		23 June 2015 (Holfontein site public meeting)	Raised concerns about groundwater pollution from the mine and he stated that the only current water source at his household is from groundwater so this water must not be polluted.	These concerns were noted and it was explained that they would be further investigated and addressed during the feedback consultation.	Hydrogeology Impact Assessment (Section 11)
Ms Govender, Candice		23 June 2015 (Springs Primary and Secondary School meeting)	Asked what the impact of crime would be on the Welgedacht area, particularly along Carnation Road, as a result of transporting people via bus from ME operations to Holfontein.	PR explained that the employees would be transported by bus between ME Operations and Holfontein and be required to clock in at both stations. Thus it would be unlikely that the buses would be stopping on Carnation Road. However, the question was noted and PR confirmed that it would be investigated and addressed in the feedback meeting.	Socio-economic Impact Assessment (Section 11)
		7 July 2015 (Authorities meeting at the site)	Raised a concern regarding who the community could contact with grievances once mining began. Also raised concerns around striking mine workers and how the mine would manage that situation.	PR confirmed that there would be a Grievance Mechanism in place as well as a Community Liaison Officer who would be available for community engagement and grievance management.	Socio-economic Impact Assessment (Section 11) Socio-economic Management Plan (Section 4(g)(vi) of the EMPr - Part B of this document)
Dr Chivonivoni, Tamuka		23 June 2015 (Springs Primary and Secondary School meeting)	Asked if only the Carnation Road residents have been considered as sensitive receptors.	PR confirmed that the whole of the Welgedacht SH are being considered as sensitive receptors, however PR added that the residents of Carnation Road were expected to be impacted more, especially by the haul road activity.	Finalised during Scoping Phase
			Asked how the Holfontein Stream would be impacted due to discharge of groundwater from the mine. Confirmed that his property was on the	PR confirmed that the surface water specialist was investigating this and that this impact would be addressed in the EIA	Alternatives Assessment (Section 11(b))

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			Holfontein Stream and he was thus concerned about this impact.	report and during the feedback meeting.	
		7 July 2015 (Authorities meeting at the site)	Concerned about flooding of his property on Phlox Road. Flooding associated with the Holfontein Stream is currently seasonal and Dr Chivonivoni is concerned that with the constant discharge from the mine the flooding will occur all year round. Explained that he is building a resort further downstream and additional flooding will be problematic for this resort - he asked how the mine would mitigate and manage the flooding situation.	PR confirmed that this would be further investigated as part of the EIA phase and would be addressed at the feedback meeting.	Alternatives Assessment (Section 11(b))
			Asked if there would be any community benefits as a result of the mining project.	PR explained that the existing ME Operations employees would retain their jobs for an additional ~10 years.	Finalised during Scoping Phase
		15 July 2015 (Email)	Technical and Procedural Questions/ Comments: 1. Section 102 of the Minerals and Petroleum Resources Development Act (MPRDA) is no longer the main law that is required for amendment of an existing environmental management programme report (EMPr) and/ or an existing environmental authorisation (EA). The National Environmental Management Act (NEMA) (published in December 2014) is now the main law which deals with all environmental processes for all mine and mining related operations 2. We understand that the existing shaft (Holfontein shaft) is currently closed and sealed; and want to know why it was closed 3. Have those issues been resolved? 4. Are there any negative environmental and	PR responded via email stating that the concern would be recorded and addressed by specialists during the EIA process, after which PR will respond via email and address the concern in the EIAR/EMPr.	1. Legislation Section (Section 6) 2. 3. And 4. Hydrology Study (Appendix 11) 5. and 6. Legislation Section (Section 6)

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			socio-economic impacts associated with the then operation of Holfontein shaft? 5. Does the mine have a water use licence which covers activities at Holfontein shaft? 6. Is the mine licensed to use Holfontein landfill site? 7. What are the closure objectives and plans for the mine and Holfontein shaft? 8. Does the mine have to have a full closure liability cost calculated (by a qualified engineer) for this project? 9. How often does the mine hold stakeholder engagement meetings with its surrounding communities? We would also like to be included on their database and be invited to meetings with the surrounding community/ landowners. 10. Request copies of monitoring reports for the current mine operations. Environmental and Socio-Economic Questions/ Comments: The residents are concerned about the following potential impacts: 1. Increased noise and air pollution due to the proposed project 2. That some of the properties located along Holfontein stream will be more prone to flooding than normal due to the proposed		7. and 8. Holfontein Interim Closure Plan (Appendix 20) 9. and 10. Brought to the attention of NKGM 1. and 2 Noise and Air Quality Impact Assessments (Section 11) 3. Hydrogeology Impact Assessment (Section 11)

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			project 3. We understand that our water has elevated metals concentrations and are concerned that the proposed operations might aggravate the status quo 4. We would like our boreholes to be included in the sample and also be used for monitoring purposes 5. We would like the mine to demonstrate by way of modelling (cones) how the groundwater will be potentially affected by its operations 6. How does the mine intend to manage issues such as dewatering and contamination of groundwater 7. We would like the mine to ensure that biodiversity and aquatic resources are not negatively impacted upon by its operations 8. We are concerned about the number of trucks and labour related vehicles on their roads. We would like to see a traffic study being undertaken and clearly addressing issues such as how many vehicles will be on their roads per hour, safety issues, potential deterioration of their roads, confirmation that existing roads have capacity take on additional traffic from the mine 9. We would like the mine to make sure that our local roads are not covered with soil from the mine (as it will mean we will have to clean their vehicles more often than we		4. Hydrogeology Monitoring Programme (Section 6(c) of the EMPr - Part B of this document) 5. Hydrogeology Impact Assessment (Section 11); and Hydrogeology Study (Appendix 10) 6. Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) 7. Aquatic and Terrestrial Ecology Impact Assessments (Section 11); Water Management Plan (Section 4(g)(iv) and Biodiversity management Plan (Section 4(g)(viii) of the EMPr - Part B of this document) 8.Traffic Impact Assessment (Section 11); Traffic Study (Appendix 16)

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			usually do) 10. Will the mine provide housing for its miners? If yes, where? 11. We are concerned that crime rates will increase due to in-migration to the area 12. We are concerned that the property value in the local area will decrease due to the proposed project and the existing one (cumulative impacts) 13. How will our land use, mainly farming, be affected by the proposed operations (cumulatively)? 14. Is the mine planning to relocate some landowners? These comments are from the landowners within the Welgedacht small holding area who are also local famers.		9. Air Quality Management Plan (Section 4(g)(ii) of the EMPr - Part B of this document) 10. 11. and 12. Socio-Economic Impact Assessment (Section 11) 13. Soil and Land Capability Impact Assessment (Section 11) 14. Socio-Economic Impact Assessment (Section 11)
Mr Mncube, Gibson		23 June 2015 (Springs Primary and Secondary School meeting)	Asked whether groundwater would be impacted by the project.	PR noted that this would be further investigated by the groundwater specialist and addressed during the feedback public meeting.	Hydrogeology Impact Assessment (Section 11)
		7 July 2015 (Authorities meeting at the site)	Concerned about an increase in flooding and explained that his borehole was located close to the river and any additional flooding would submerge the borehole.	PR confirmed that this would be further investigated as part of the EIA phase and would be addressed at the feedback meeting.	Alternatives Assessment (Section 11(b))
Mr Lawrence		7 July 2015 (Authorities meeting at the site)	Raised a concern regarding borehole levels, as their only source of water is from a borehole. Should the borehole levels be impacted by mining, who should the residents contact to raise their concern once mining begins.	This concern was noted and PR said that the impact on boreholes would be fully investigated and addressed.	Hydrogeology Impact Assessment (Section 11)

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Mr de Vries, Johan		7 July 2015 (Authorities meeting at the site)	Raised a concern about his locks being stolen when New Kleinfontein Goldmine (NKGM) undertook exploration drilling on his property.	PR explained that this was noted and would be investigated.	Finalised - Brought to the attention of NKGM
Mr de Vries, Benno		7 July 2015 (Authorities meeting at the site)	Concerned about the negative impact on air quality as a result of dust generated by the haul trucks. Also concerned about traffic safely with regard to children and animals, as well as deterioration of Carnation Road.	PR confirmed that this would be further investigated as part of the EIA phase and would be addressed at the feedback meeting.	Air Quality Impact Assessment (Section 11)
			Raised concerns about traffic safely and possible accidents on Carnation Road and at the intersection with Pansy Avenue.		Traffic Impact Assessment (Section 11)
Mr Patrick		7 July 2015 (Authorities meeting at the site)	Raised a concern about what they would be using to blast underground and if their buildings would be negatively impacted by blasting and tremors.	PR confirmed that explosives would be used underground but explained that it would be more than 300m deep. PR explained that the concern was noted and would be further investigated and if necessary a crack survey would be undertaken prior to any mining activity.	Blasting Impact Assessment (Section 11)
Mr Khan, Mohamed		7 July 2015 (Authorities meeting at the site)	1. Concerned about contamination of borehole water supplying his chicken farm, as it's the only source of water. 2. Noise and dust pollution resulting from the mine and haul trucks 3. An increase in crime as a result of the mine. Mr Khan considers Welgedacht SH a low crime area. Wants the mine to consider employing security to patrol Welgedacht SH. 4. Underground blasting may result in building deterioration and tremors in the Welgedacht SH. 5. If these impacts listed above result in a	PR confirmed that these concerns would be further investigated as part of the EIA phase and would be addressed at the feedback meeting.	Hydrogeology Impact Assessment (Section 11) Noise and Air Quality Impact Assessments (Section 11) Socio-economic Impact Assessment (Section 11) Blasting Impact Assessment (Section 11)

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			decreased land value the mine should consider purchasing the land from the residents instead.		Socio-economic Impact Assessment (Section 11)
Mr Aslam		7 July 2015 (Authorities meeting at the site)	Requested that an extension on the commenting period be granted as Welgedacht SH residents only received notification of the commenting period after it had begun.	PR explained that the commenting period could not be extended due to legislative requirements but further explained that there would be an additional commenting period in September.	Public Consultation (Section 9)
Ms Felicetti, Christine		7 July 2015 (Authorities meeting at the site)	Asked where the power line would run and was also concerned about flooding and borehole levels.	PR explained that the power line would run along the N12 and then down to ME Operations, however PR said this would be mapped and indicated in the EIA report.	Project Description (Section 5(b)) Alternatives Assessment (Section 11(b)) Hydrogeology Impact Assessment (Section 11)
			Asked how long it would take to dewater the shaft.	Confirmed that the shaft would be dewatered slowly over the two year construction period.	Finalised during Scoping Phase
Mr Steinmann, Shawn		29 June 2015 (Tel) 9 July 2015 (Email)	Stated that he is a landowner of a plot in Welgedacht SH on the banks of the Holfontein Stream and questioned how the discharging of dewatered groundwater would impact the potential for flooding along the Holfontein Stream in the Welgedacht SH area.	PR responded via email stating that Mr Steinmann had been added to the IAP database and that the concern would be recorded and adequately addressed by specialists during the EIA process, after which PR will respond via email and address the concern in the EIAR/EMPr.	Alternatives Assessment (Section 11(b))
			Requested clarity regarding the following concerns: 1. If the 100 year flood line will be affected due to the mining and if it would result in further flooding of his plot which is located on the banks of the Holfontein Stream? He also stated that if there is 80mm rain on a	PR responded via email stating that the concern would be recorded and adequately addressed by specialists during the EIA process, after which PR will respond via email and address the concern in the EIAR/EMPr.	Alternatives Assessment (Section 11(b)) Hydrogeology Impact Assessment (Section 11) Air Quality Impact

INTERESTED AND AFFECTED PARTIES (list the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted)		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND OR RESPONSE WERE INCORPORATED.
			day his land affected by flooding for two days, which he wanted to bring to the attention of the EAP. 2. Whether the boreholes will be affected, as they drink borehole water? What are the chances of air pollution and noise pollution, as he has children which may be affected?		Assessment (Section 11)
Ms Erasmus, Linda Ms Jale, Christine		29 June 2015 (Tel)	Stated that she is a landowner of a plot in Welgedacht SH on the banks of the Holfontein Stream and that a portion of her plot is already flooded by the stream. Questioned how the discharging of dewatered groundwater would impact the potential for further flooding along the Holfontein Stream in the Welgedacht SH area and the impact that dewatering may have on groundwater levels and quality in the boreholes in the area, as it is their only source of water.	PR responded stating that the concern would be recorded and adequately addressed by specialists during the EIA process. A copy of the presentation PR made at the public meeting held at the on the 23rd of June, as well as a copy of the Scoping Report were also provided via email.	Alternatives Assessment (Section 11(b)) Hydrogeology Impact Assessment (Section 11)
Ms Erasmus, Linda Ms Erasmus, Natasha		2 July 2015 (Email)	Stated that they had read the Scoping Report and were concerned about the floodlines the potential for further flooding along the Holfontein Stream as the plots located adjacent to the stream already flood. Asked that PR elaborate on how the project might affect their groundwater - their borehole falls within the Karoo aquifer range. Stated that with regards to the notices PR placed for the public consultation meeting on 23 June 2015, they only received word of this after the fact. PR placed a notice along the road of Carnation road and they live in Phlox Road. They also stated that they do not receive the Springs Advertiser in Welgedacht, so they were not aware	PR stated that the concerns would be recorded and adequately addressed by specialists during the EIA process, after which PR will respond via email and address the concern in the EIAR/EMPr. PR indicated that based on the preliminary findings the surface water specialist does not believe that the mine will have a noticeable impact on flooding and that the maximum water contribution from the mine into the Holfontein Stream will not be significant in comparison to existing flood volumes. The groundwater specialist has modelled the groundwater flows and does not believe that the mine will have any	Alternatives Assessment (Section 11(b)) Hydrogeology Impact Assessment (Section 11) Public Consultation (Section 9)

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			of the notice placed. Questioned whether it would be possible to arrange a meeting with the relevant people, or perhaps the mine manager, to discuss the matter further.	significant impact on the Karoo aquifer, thus the boreholes in Welgedacht SH are unlikely be affected. PR thanked Ms Erasmus for drawing their attention to the problem of the media notice in the Springs Advertiser, and stated that the Springs Advertiser is available in the Welgedacht area but needs to be purchased, and as discussed on the phone PR would communicate the feedback meeting date and time to the Welgedacht SH through other means in order to try and ensure everyone is notified. PR indicated the EIA report is currently being compiled and once finalised will be made available to all Interested and Affected Parties (IAPs) in September for perusal, after which a feedback public meeting will be arranged, the date and time of which will be conveyed to all IAPs.	
Ms Erasmus, Linda		7 July 2015 (Authorities meeting at the site)	Raised concerns regarding potential flooding of a low crossing going under the railway line on Phlox Street, making it unusable.	PR confirmed that these concerns would be further investigated as part of the EIA phase and would be addressed at the feedback meeting.	Alternatives Assessment (Section 11(b))
		10 July 2015 (Phone)	Raised concerns about flooding, explaining that her property is seasonally flooded, which is already a severe pre-existing problem, and she is very concerned that the mine discharge will greatly worsen this problem. Also raised a concern about a potential negative impact of the mine on borehole water levels and water quality as the borehole water is Welgedacht SH’s only source of clean water.	PR confirmed that these concerns would be further investigated as part of the EIA phase and would be addressed at the feedback meeting. PR also stated that discharge to the Holfontein Stream versus the Blesbokspruit would be fully investigated.	Alternatives Assessment (Section 11(b)) Hydrogeology Impact Assessment (Section 11)

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Department Land Affairs					
Gauteng DRDLR Chief Director: Land Restitution Support (Gauteng Province) - Ms Benyane, Cindy	**X** (via email 16 July 2015)	No comments have been received to date			
Traditional Leaders					
GDARD Department of Cooperative Governance and Traditional Affairs - Mr Dhlamini, Mandla	**X** (via email 11 June 2015)	11 June 2015 (via email)	Thanked PR for providing him with information regarding the proposed project and noted that he would inform the ward councillor for ward 67 Mr Madihlaba about the project.	PR responded stating that Mr Madihlaba was on the IAP database and had also been informed about the project.	Finalised during Scoping Phase
		7 July 2015 (Authorities meeting at the site)	Said that the community surrounding the project area should be fully engaged and provided with a chance to raise concerns and issues. He requested that the process be transparent. Also suggested that a meeting be arranged with the two relevant ward councillors so that they are able to filter information down to their relevant ward communities.	This was noted and PR explained that the local Holfontein Community, including the Khomponi Community and the Holfontein Quarters Community, as well as the Welgedacht SH Community, had been engaged with and continuous consultation would be undertaken. PR thanked Mr Mandla Dhlamini for his input and noted that this would be taken into consideration.	Finalised during Scoping Phase
Department Environmental Affairs					
GDARD Director of Environment - Mr Mukhola, Steven	**X** (via email 11 June 2015)	No comment received			

INTERESTED AND AFFECTED PARTIES (list the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted)		DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND OR RESPONSE WERE INCORPORATED.
DEA Natural Resource Management - Mr Sambo, Concilence		7 July 2015 (Authorities meeting at the site)	Confirmed that the Blue Gum trees are considered 1B category alien invasive species and control of the spread of these species must be enforced.	This was noted.	Finalised during Scoping Phase
Other Competent Authorities affected					
DAFF Land Use and Soil Management - Ms Mmakola, Phyllystas	**X**(via email 11 June 2015)	7 July 2015 (Authorities meeting at the site)	Asked whether any agricultural areas would be affected.	PR confirmed that the ventilation shaft would be located in a low potential agricultural area of 1.68 ha behind the historical mine hostel.	Finalised during Scoping Phase
			Asked what would be done with alien Blue Gum trees. She explained that if the mine wanted to keep them on site then a demarcation permit would be required in order to ensure that the alien plant species would not invade the area. However, if they were to be removed the mine would need to follow legislative process in removing alien species.	PR confirmed that the Blue Gum trees would most likely remain on site in order to offer partial screening of the mine but confirmed that Environmental Management Plan (EMP) would state that a demarcation permit would be required prior to mining. PR also confirmed that an alien invasive species management plan would be included into the EMP.	Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
DWS Catchment Officer - Ms Maphakela, Phyllis	**X** (via email 11 June 2015)	7 July 2015 (Authorities meeting at the site)	Asked if the quality of the water in the historical mine was known. Asked to what standard the water would be treated.	PR confirmed that the quality of the groundwater in the shaft was found to be good however, the water in the historical mine (300 m deep) was unknown but expected to be poor. PR explained that the water would be treated to a standard dictated by the Department of Water and Sanitation (DWS).	Finalised during Scoping Phase
Gauteng DMR Director General - Mr Mabogo, Rudzani	**X** (via email 11 June 2015)	No comment received			

INTERESTED AND AFFECTED PARTIES (list the names of persons consulted in this column, and mark with an X where those who must be consulted were in fact consulted)	DATE COMMENTS RECEIVED	ISSUES RAISED	EAPS RESPONSE TO ISSUES AS MANDATED BY THE APPLICANT	SECTION AND PARAGRAPH REFERENCE IN THIS REPORT WHERE THE ISSUES AND OR RESPONSE WERE INCORPORATED.
SAHRA – draft Scoping Report has been uploaded to SAHRIS — X (uploaded 12 June 2015)	No comments have been received to date			
OTHER INTERESTED / AFFECTED PARTIES				
Organisations				
Jones and Wagener (on behalf of EnviroServ) - Mr Glendinning, John	19 June 2015 (via email)	Stated that they undertake geohydrological and geotechnical work for EnviroServ's Holfontein Waste Disposal Facility. Required clarity for their client regarding the extent of the dewatering cone within the dolomitic aquifer as a result of the planned activity, as well as an assessment of the associated risk of sinkhole formation.	PR responded that the concerns would be recorded and adequately addressed by specialists during the EIA process, after which PR would respond via email and via the concerns in the EIAR/EMPr.	Hydrogeology Impact Assessment (Section 11)
AfriForum Springs - Mr Parsons, Gert	11 July 2015 (Email)	Concerned about the environmental sensitivity of the area. The cumulative effect of mining in the area, specifically the effect of blasting with regard to an opencast coal mine which was recently authorised by the DMR.	PR confirmed that these concerns would be further investigated as part of the EIA phase and would be addressed at the feedback meeting.	Terrestrial Ecology Impact Assessment (Section 11) Blasting Impact Assessment (Section 11)
Members of the Public				
Mr Sibeko, Kenneth	11 June 2015 (Fax)	Would like to be considered for employment and submitted their CV for consideration	Noted. Any such requests will be provided to New Kleinfontein Goldmine for consideration.	Finalised during Scoping Phase
Mr Mawela, Karabo				
Mr Mkhwananzi, Joshua				
Mr Masina, Bhuti				
Mr Kekane, Samuel	17 June 2015 (Email)			
Mr Monakedi, John	20 August 2015			Finalised

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	(Fax)			
Mr Steenkamp, Wikus	25 August 2015 (Email)			

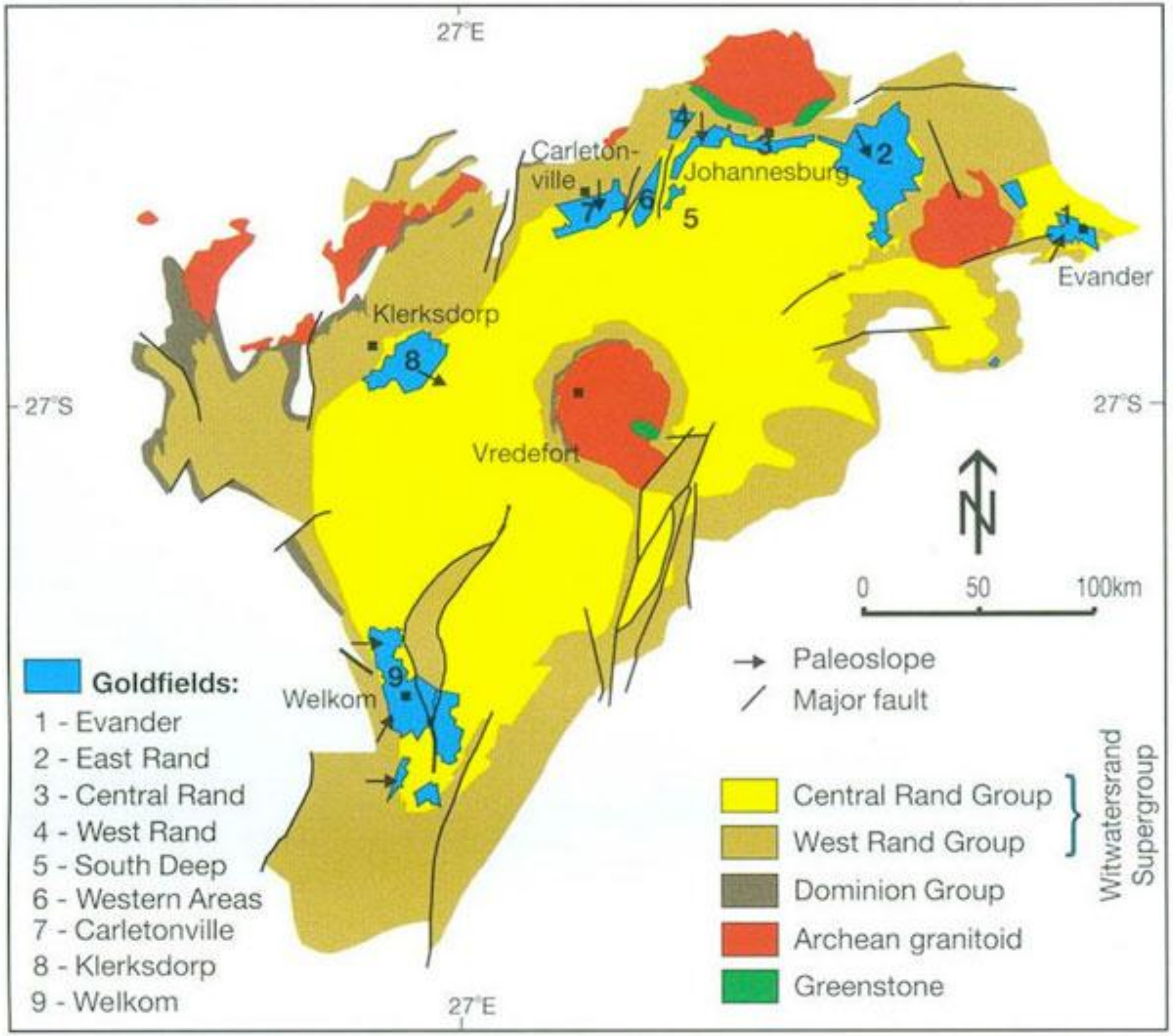


Figure 4: Simplified geology of the Witwatersrand Basin (showing the location of the East Rand gold field)

10. THE ENVIRONMENTAL ATTRIBUTES ASSOCIATED WITH THE DEVELOPMENT FOOTPRINT ALTERNATIVES (The environmental attributed described must include socio-economic, social, heritage, cultural, geographical, physical and biological aspects)

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

iii) Air Quality

The following information was obtained from an air quality study conducted by Prime Resources (attached as Appendix 7).

Meteorological Character

According to the MM5 modelled meteorological data obtained for the project area, the prevailing winds for the period of January 2011 to December 2013 originate from the north-east and north-west sectors, with average wind speeds of between 3.60 and 5.70 m/s. Calm conditions (wind speeds < 1 m/s) are experienced for 6.73 % of the period (refer to Figure 5).

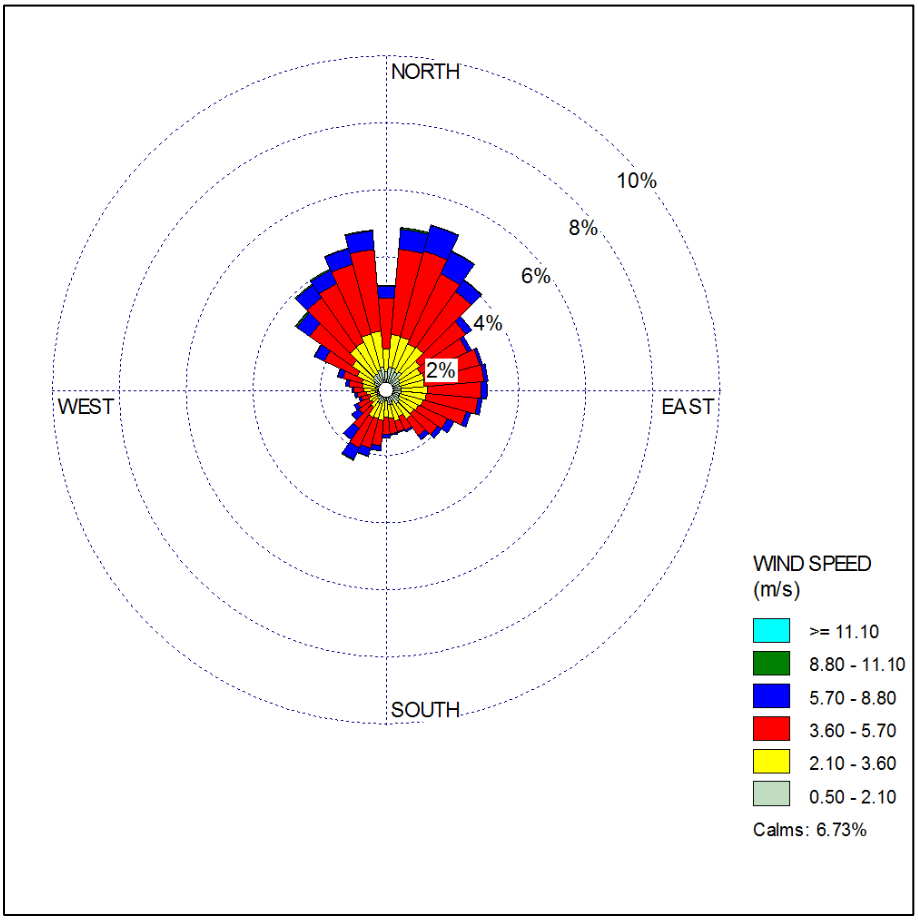


Figure 5: Wind rose depicting the average wind speed and direction for the project area for the period of January 2011 to December 2013

The seasonal variability in the wind field is shown in Figure 6. During spring and summer winds predominantly originate from the north-easterly sector. In autumn and winter wind flow predominantly originates from the north-westerly sector. Calm conditions occur mostly during the summer and autumn months (8.07 % and 7.58 % respectively), and the least during spring months (5.24 %).

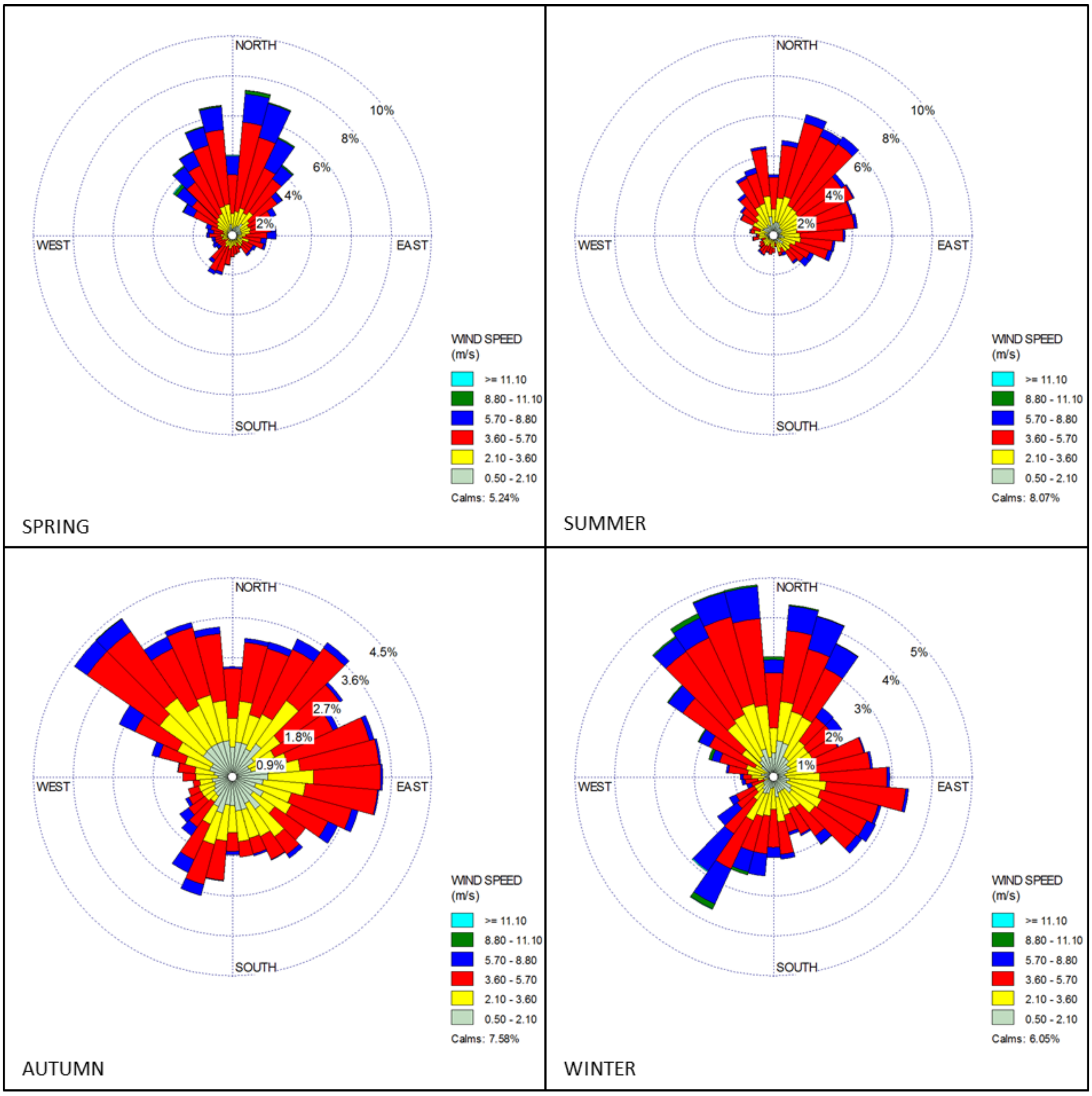


Figure 6: Wind roses depicting the seasonal variability in wind field for the project area for the period of January 2011 to December 2013

Figure 7 and Figure 8 below depict the average monthly temperature and relative humidity, according to the MM5 modelled meteorological data, for the Holfontein Project area for the period of January 2011 to December 2013. The highest average temperature (20°C) was experienced in the summer months December, January and February; and the lowest average temperature (8 °C) was experienced in the winter months of June and July. The average monthly relative humidity was the lowest in November (59 %) and the highest in June (73 %) with the average relative humidity remaining fairly constant throughout the rest of the year.

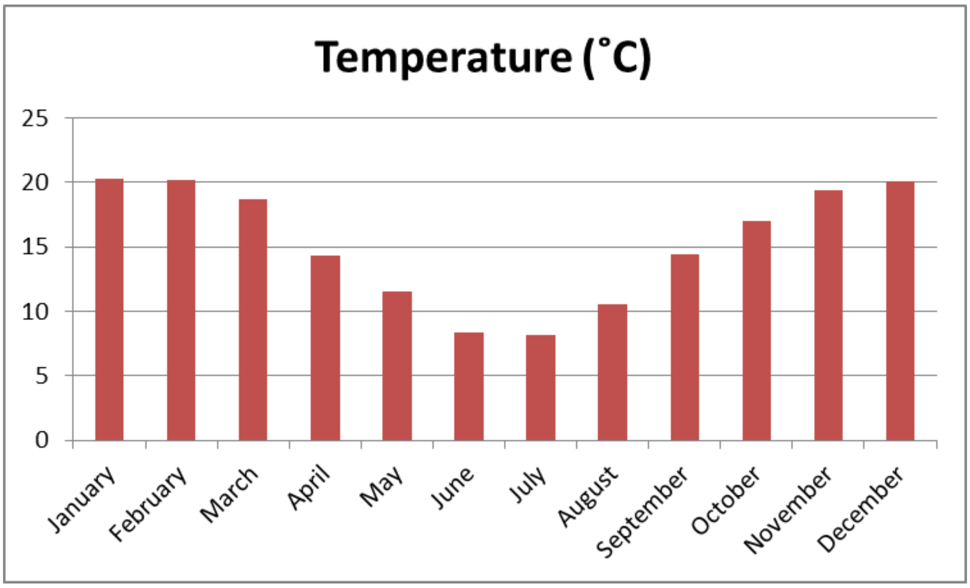


Figure 7: Average monthly temperature for the project area for the period of January 2011 to December 2013

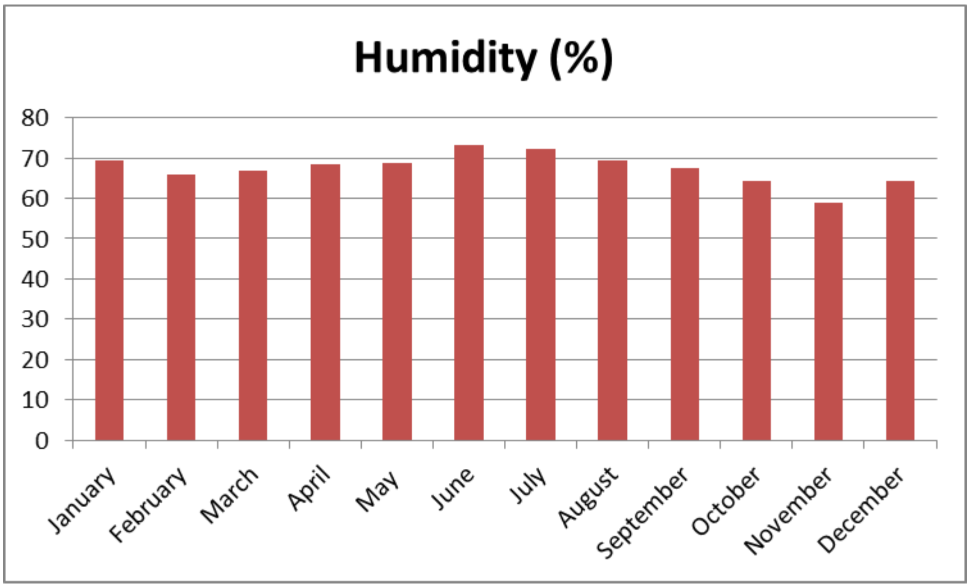


Figure 8: Average monthly relative humidity for the project area for the period of January 2011 to December 2013

Figure 9 below depicts the average monthly precipitation, according to the MM5 modelled meteorological data, for the Holfontein Project area for the period of January 2011 to December 2013. The highest monthly precipitation was experienced in the summer months of December and January (0.3 mm/h and 0.26 mm/h respectively) with the lowest experienced in winter in the month of July (0.0 mm/h).

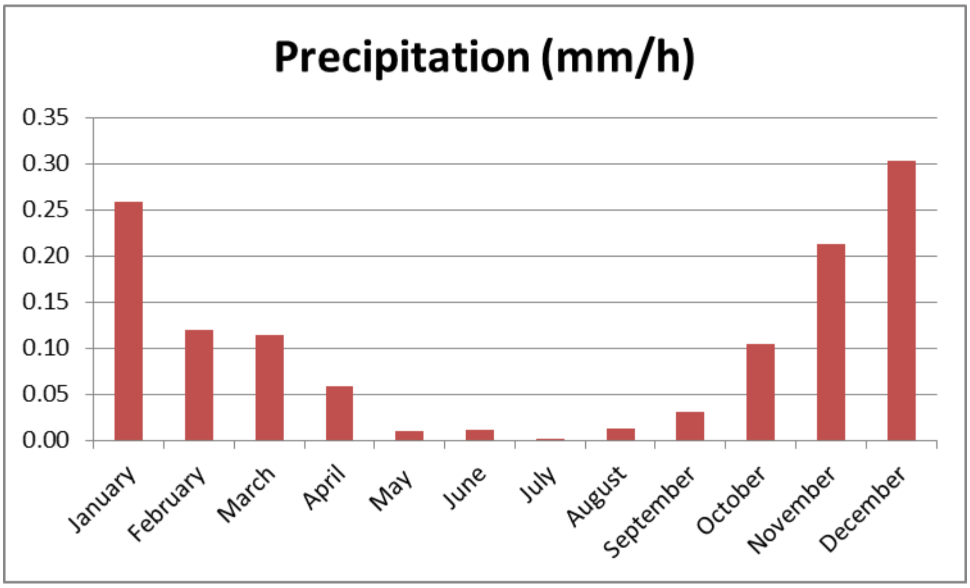


Figure 9: Average monthly precipitation for the project area for the period of January 2011 to December 2013

<u>Background Ambient Air Quality</u>

Local sources of air pollution include:

- Existing mining activities and tailings dam at the adjacent ME operations;
- Fugitive dust emissions from historic limestone quarrying and historic goldmine tailings;
- Fugitive dust emissions from drilling for prospecting activities for the Holfontein Project;
- Fugitive dust emissions from agricultural activities;
- Emissions from the Welgedacht Waste Water Treatment Works (WWTW);
- Emissions from the Holfontein hazardous waste (H:H) landfill facility;
- Household fuel burning at surrounding settlements;
- Vehicle exhaust emissions from vehicles travelling on the N12 highway and surrounding roads;
- Industry including Sappi Enstra and the Impala Platinum Refinery; and
- Agricultural biomass burning.

Air quality monitoring data were obtained for the Etwatwa Station, located 7 km north of the project area, for the period March 2011 to September 2012. When comparing the annual average concentrations of NO_2, SO_2 and PM_{10} with the National Ambient Air Quality Standards (NAAQS) the annual average PM_{10} concentration (104 µg/m^3) exceeded the NAAQS limit value (40 µg/m^3).

<u>Sensitive Receptors</u>

Sensitive receptors include all surrounding permanently occupied areas which may be impacted by the proposed project in terms of air quality. Sensitive receptors include all surrounding permanently occupied areas which may be impacted by the proposed project in terms of air quality. These include the Khomponi Community residing in the historic mine house, mine hostel and surrounding informal dwellings; the Holfontein Quarters located on the opposite side of the N12 (collectively the Khomponi Community and Holfontein Quarters are referred to as the Holfontein Community); as well as the residents of the Welgedacht SH.

iv) Archaeology

According to a cultural and heritage study conducted by Apelser Archaeological Consulting (attached as Appendix 8), no sites of cultural heritage importance were identified within the project site. Sites and features recorded during the assessment were mostly related to the earlier Holfontein mining operations, which include the remains of various structures such as headgear foundation and bases ("feet"), the old Holfontein shaft and some mine buildings.

Background research indicated that there are no known cultural heritage (archaeological or historical) sites or features in the project area, although there are some known Stone Age & Iron Age sites in the larger geographical area further south and north of the project area. The historic mining hostel is located outside the Holfontein Project site and will not be impacted. The historic mine house, which may be of significance, as well as a fenced off cemetery near ME operations were recorded next to the proposed haul route (refer to Figure 10).

The mining related structures located inside the proposed site (Holfontein shaft area) are all dilapidated and consist of foundations only. They are therefore of low significance and can be demolished and no further mitigation is required.

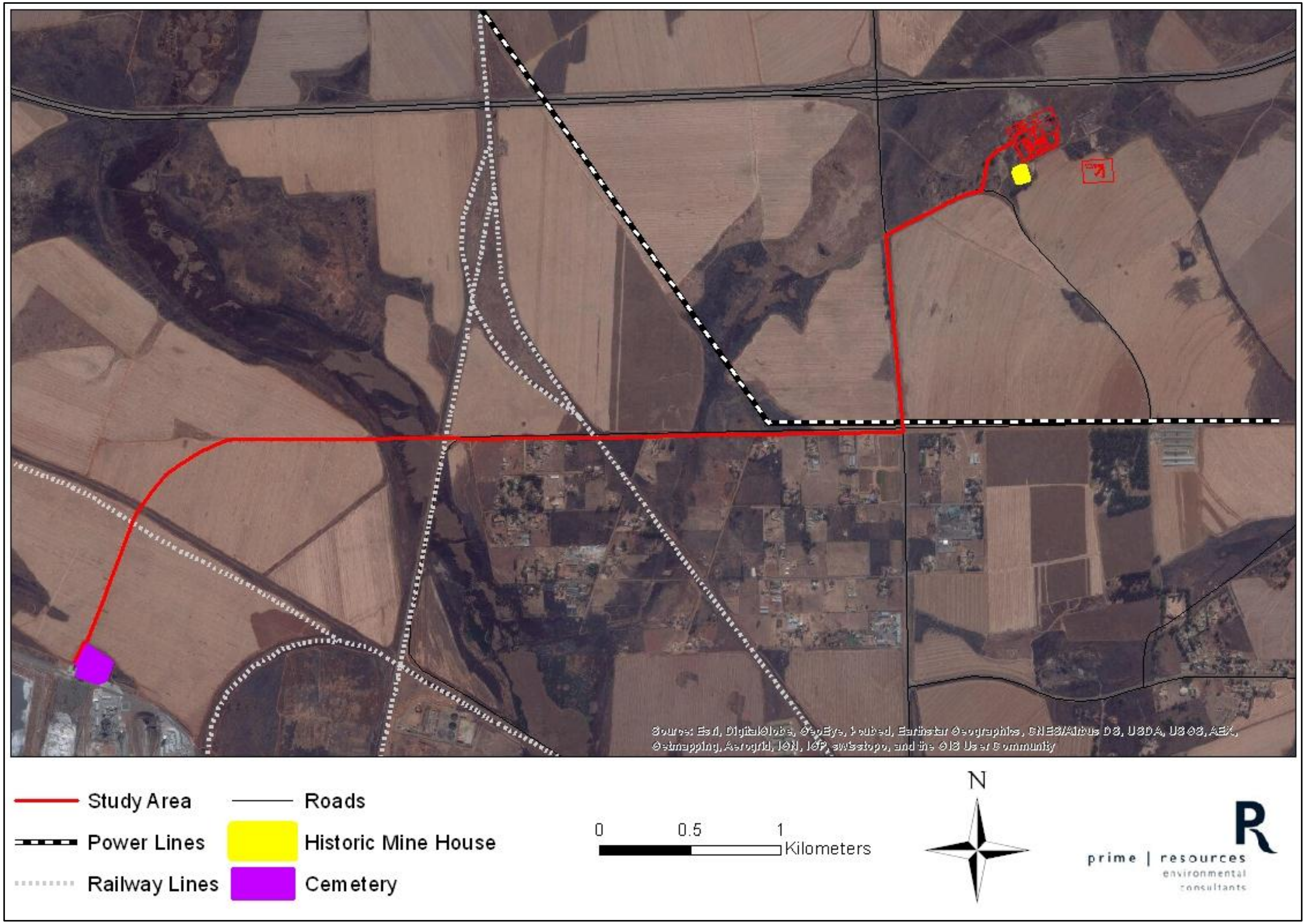


Figure 10: Cultural and heritage resources within the surrounding area

v) Aquatic Ecology

The following information was obtained from the aquatic ecology study conducted by Strategic Environmental Focus (SEF) (attached as Appendix 9).

Water Quality

Aquatic organisms are directly influenced by the quality of the water in which they live. Table 1 presents the in situ water quality results within the project area. Due to the absence and/or unavailability of applicable Resource Water Quality Objectives for the Upper Vaal water management area, the "Ideal Catchment Background" and/or "Acceptable Management Target" values from the in-stream water quality guidelines for the Blesbokspruit catchment area were used for comparative purposes. All values observed to exceed the stipulated guideline range were indicated in red.

Table 1: In situ water quality results obtained for aquatic sampling points within the project area.

SITE	TIME	TEMP (°C)	PH	EC* (mS/m)	TDS** (MG/ℓ)	DISSOLVED OXYGEN (MG/ℓ)	DISSOLVED OXYGEN (%SAT)
Guideline Range / Value***		-	6.5-8.5	<45	<338	>6.0	-
Site 1	11h00	17.9	7.67	44.1	330.8	4.91	51.9
Site 2	13h00	22.1	6.96	43.5	326.3	4.36	45.6
Site 3	15h00	22.6	7.14	60.1	450.8	0.62	6.5
Site 4	11h30	19.9	6.48	31.8	238.5	1.90	20.8

* Electrical Conductivity

** Total Dissolved Solids

*** In-stream Water Quality Guidelines for the Blesbokspruit Catchment

Based on the *in situ* water quality assessment of the assessed section of the Blesbokspruit, there were only two major causes for potential concern: the elevated EC and TDS observed at Site 3, and the low dissolved oxygen concentrations observed at each of the assessed sites, especially at Site 3. It is suspected that Site 3 is heavily polluted with domestic and/or organic waste originating from the Welgedacht WWTW. Nevertheless, it should be noted that the significance of low and/or depleted dissolved oxygen levels in natural systems is not necessarily related to the magnitude of change, but rather to the frequency, timing and duration of these occurrences. Refer to Figure 11.

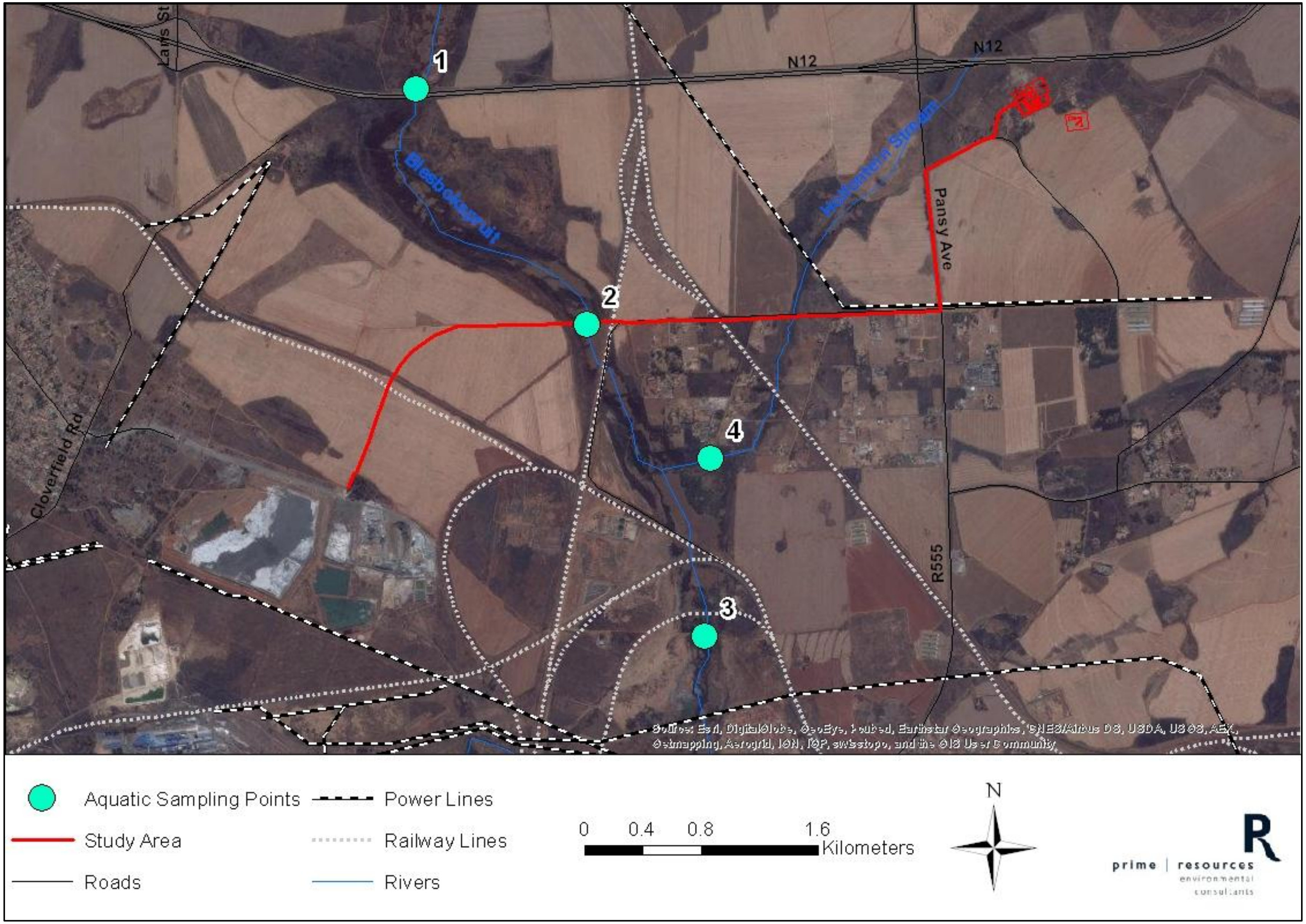


Figure 11: Aquatic sampling sites

Aquatic Habitat

Aquatic habitat observed along the Blesbokspruit system (excluding Site 4) was observed to be in relatively good condition with the general occurrence of each of the three biotopes and the presence of some hydraulic diversity. The conditions of the unnamed tributary of the Blesbokspruit (Site 4) (referred to as the Holfontein Stream for the purposes of this study) were described as poor, due largely to the wetland nature of the system. The in-stream habitat integrity associated with the main-stem section of the Blesbokspruit represented largely modified conditions (Present Ecological Status {PES} Category D) with a large loss of natural habitat, biota and basic ecosystem function, while the riparian area associated with this system was defined as a largely-to-seriously modified habitat (PES Category D/E). The main drivers of this change were suspected to be the physico-chemical deterioration within the river reach and flow modification, as a result of historical industrial inputs and urban runoff from southern Gauteng.

Aquatic Macroinvertebrates

A total of 27 different aquatic macroinvertebrate taxa were collected within the project area, ranging from 13 to 20 taxa per site. Of the collected taxa, only two families exhibited a moderate sensitivity to water quality impairment, namely Aeshnidae (Hawker and Emperor Dragonflies) and Hydrachnellae (Water Mites). Of particular interest was the direct correlation exhibited between the increasing number of non-airbreathing macroinvertebrate taxa and associated ASPT Values (Site 1 > Site 2 > Site 3) against the dissolved oxygen concentrations (Site 1 > Site 2 > Site 3), which suggested that selected airbreathing taxa were relatively common within the project area and that the non-airbreathing taxa were a more accurate measure of water quality conditions exhibited during the assessment. Furthermore, the complete absence of the sensitive mayflies, caddisflies and stoneflies (Ephemeroptera, Trichoptera and Plecoptera) indicated poor water quality, which was also confirmed during the current assessment. Based on PES determinations, it was determined that all the assessed sites were in a seriously modified state (PES Category E), while the downstream site (Site 3) was defined to be in a seriously-to-critically impaired state (PES Category E/F).

Ichthyofauna

A total of 87 individual fish were collected within the project area, comprising of five indigenous species and one alien species. While it was expected that fish species diversity within the wetland area would be limited, the number of fish species was considered to be a positive sign. Comparatively, with the exception of *Cyprinus carpio* and *Tilapia sparrmanii,* each of the fish species collected during a biomonitoring survey of the Blesbokspruit between November 1995 and July 1996 by the Institute for Water Quality Studies were recorded during the current survey.

Based on results, it was determined that the PES of the fish assemblage in the associated section of the upper Blesbokspruit system represented a largely-to-seriously modified state (PES Category D/E) with fewer species present than expected due to a loss of some intolerant forms. However, based on the wetland nature of the area and the occurrence of a higher number of fish species than expected during the current assessment, it is likely that the current condition of the system would be marginally improved when applying a wetland-appropriate PES determination method.

In-stream Biological Integrity and EcoStatus

Based on the In-stream Response Model, the integrated in-stream biological integrity of the upper Blesbokspruit system was defined to be in a poor ecological condition (PES Category E) with a few sensitive taxa absent, as a result of the seriously modified state of the system. However, again, the wetland nature needs to be considered, as aquatic biodiversity within wetlands can be limited relative to riverine ecosystems.

Furthermore, the overall EcoStatus for the upper section of the Blesbokspruit was determined to be in a largely-to-seriously modified condition (PES Boundary Category D/E) with an extensive loss of basic ecosystem function across each of the assessed facets of the assessment.

Ecological Importance and Sensitivity

The abovementioned river reach was considered to be of a moderate ecological sensitivity based on moderate fish and aquatic macroinvertebrate sensitivities to physico-chemical deterioration and flow alteration. A very low sensitivity of the riparian zone was noted, as vertebrate species other than fish utilising the riparian or in-stream habitat are relatively tolerant of water level fluctuations and flow modifications.

vi) Hydrogeology

The hydrogeology study conducted by Groundwater Square (attached as Appendix 10) indicated that the Karoo- and dolomitic aquifers are the most important aquifers in the region surrounding the Holfontein Project.

Hydrocensus

Hydrocensus information of external groundwater users was gathered within a ≥1.5 km radius of the Holfontein shaft (3 km to the north and east) during February 2015. 22 points were surveyed (refer to Figure 12), of which 11 were sampled under application conditions (i.e. collecting samples while boreholes were pumping). Borehole yields based on the hydrocensus in the Karoo aquifer range from 0.02 ℓ/s to 0.2 ℓ/s. Borehole yields in the dolomitic aquifer range from 0.3 ℓ/s to > 20 ℓ/s. Based on the high borehole yields, the representative hydraulic conductivity of the dolomitic aquifer can be 10 times to 100 times greater than that of the Karoo aquifer.

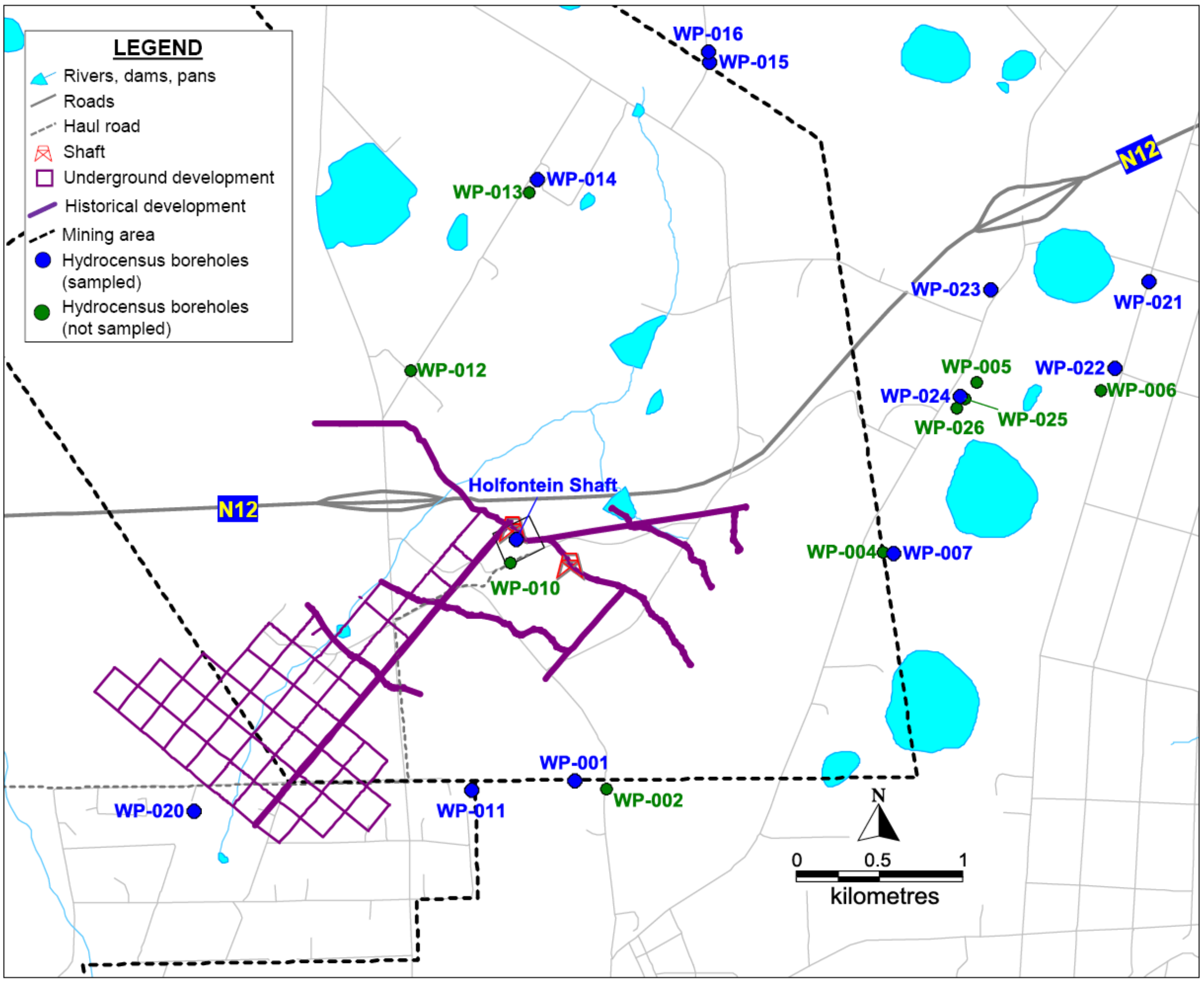


Figure 12: Hydrocensus borehole localities

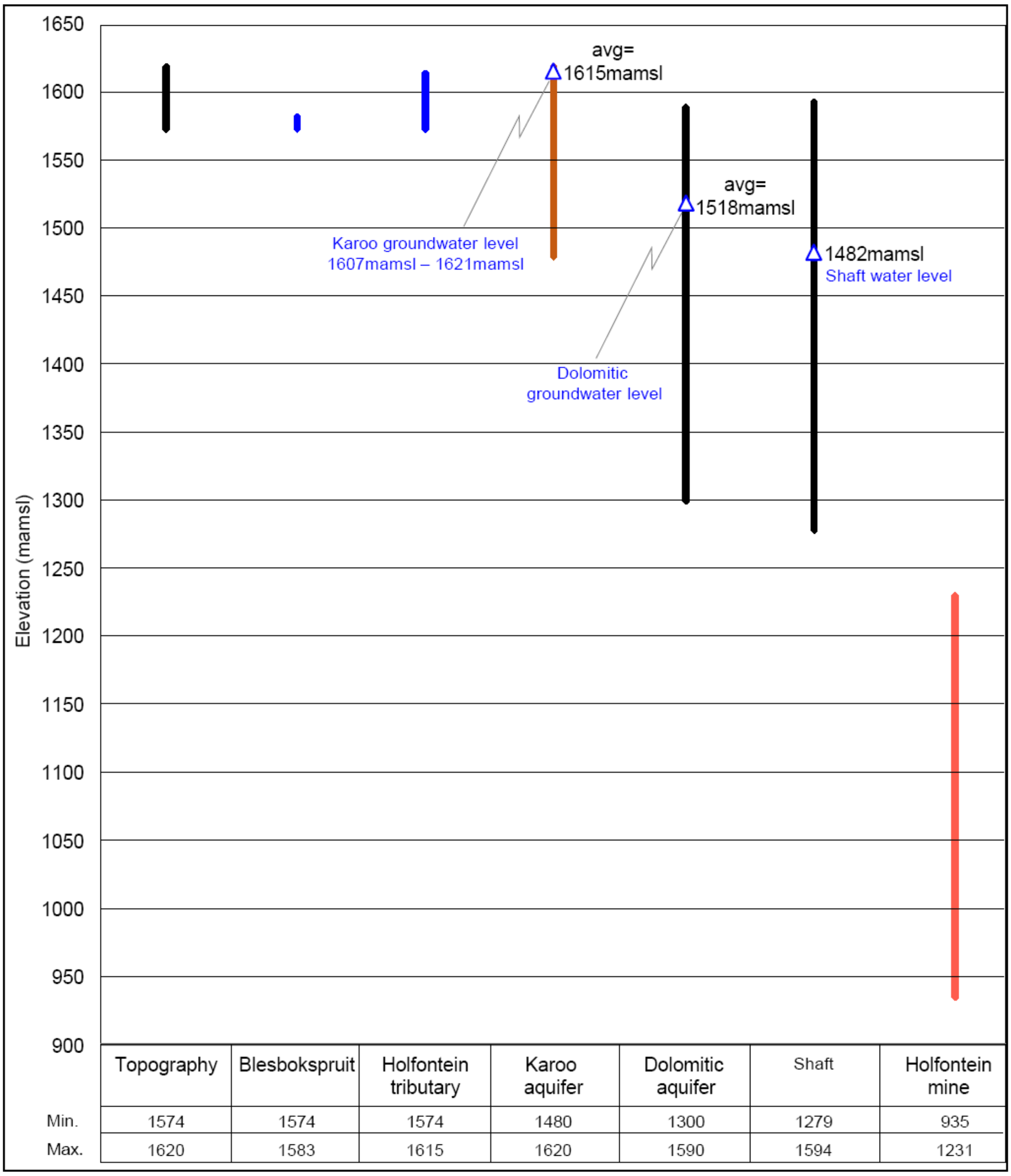
Groundwater Quality

Sampling of the Holfontein shaft was performed in November 2014. Samples were retrieved at depths of 115 m, 215 m and 300 m depths. No contamination from mining could be detected.

In terms of groundwater quality of boreholes investigated in the hydrocensus in February 2015, minor distinctions could be found between samples collected in the Karoo aquifer, and the dolomitic aquifer, which underlays the Karoo aquifer. All dolomitic water falls within the SANS-241, 2006, guideline concentrations. One borehole, WP-007 (at fish farm), appears to be slightly contaminated in terms of Na, Cl and F. It was excluded from the background groundwater quality profile. Compared to the Karoo aquifer, the dolomitic aquifer reflected slightly higher pH, Mg and Total Alkalinity concentrations; Na and Cl concentrations varied across a greater range; there is no clear difference in the SO_4 concentrations of the two aquifer systems (i.e. no clear gold mining or coal mining impacts are reflected). Both the Karoo and dolomitic aquifers can be classified as uncontaminated.

Groundwater Levels

Shallow groundwater levels within the Karoo aquifer range from <5 m to ±15 m deep, resulting in a groundwater flow field which mimics the surface topography. Due to groundwater abstraction, the typical groundwater table in the dolomitic aquifer is in the order of 100 m deep, which is approximately 50 m lower than the Blesbokspruit. The water table in the Holfontein shaft is 36 m deeper than surrounding dolomitic groundwater levels. It is believed that constant pumping from the dolomitic aquifer – and to a lesser extent, regional dewatering of the East Rand Basin – have resulted in additional dewatering of the dolomitic aquifer at depths exceeding 100 m. i.e. if groundwater monitoring boreholes could be drilled deeper than the hydrocensus boreholes, it would likely reflect the same elevations as observed in the Holfontein shaft. Refer to Figure 13.



	Topography	Blesbokspruit	Holfontein tributary	Karoo aquifer	Dolomitic aquifer	Shaft	Holfontein mine
Min.	1574	1574	1574	1480	1300	1279	935
Max.	1620	1583	1615	1620	1590	1594	1231

Figure 13: Summary of aquifer elevations and groundwater levels

Geophysical Survey

A geophysical survey was undertaken to locate geological structures in the project area, targeting the shallow Karoo rock environment. A resistivity survey was undertaken along the traverse line indicated in Figure 14. The data did not indicate any significant continuous linear feature transecting the site.

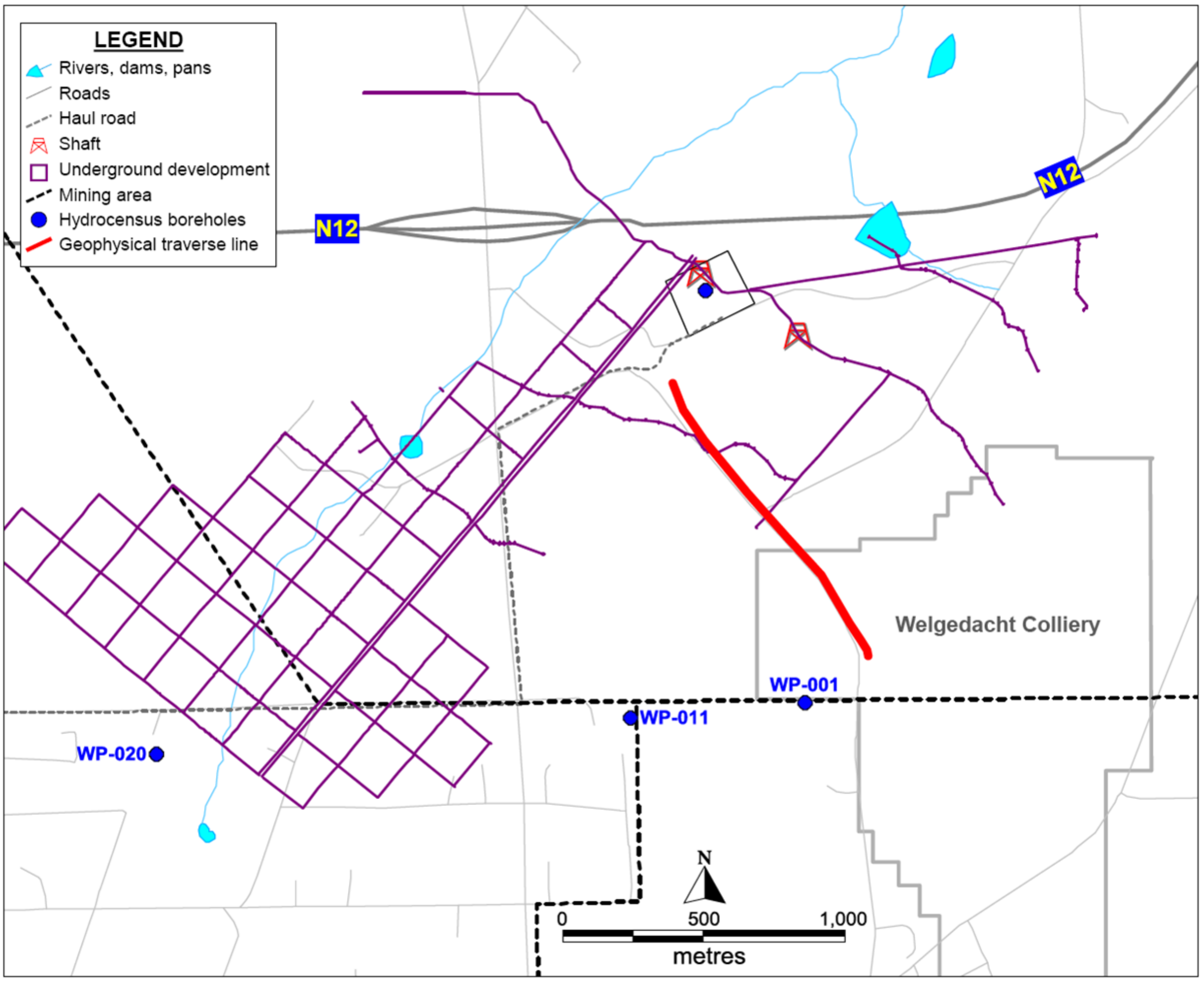


Figure 14: Resistivity survey traverse line

Mine Water Flow

There is not – and will not be - any direct connection between the Holfontein shaft and the historical Welgedacht Colliery, which is located directly south-east of Holfontein, at least 300 m shallower in the Karoo formation. There will also be no connection between the Holfontein shaft and ME. The ME dewatering cone does not extend to the Holfontein Project area.

Groundwater Flow System - Karoo Aquifer

Due to the shallow groundwater table the groundwater flow mimics the surface topography. Very little water seeps into the Karoo aquifer from the local river system, rather Karoo groundwater forms base-flow to some low-lying areas. Given the natural groundwater table in the Karoo aquifer, groundwater movement, downward, through the Karoo aquifer to the dolomitic aquifer will not exceed rainfall recharge to the Karoo aquifer.

Rainfall recharge to the Karoo aquifer is much lower than for the dolomitic aquifers. Rainfall recharge occurs in the following manner:

- Natural- and disturbed grass land;
- Several natural pans occur in the area, especially along the Quaternary Catchment boundary;
- Farming crops of which some are irrigated;
- Agricultural dams and quarries;

- Two clay quarries and two dams (Lushoff Dam and Ericson's Dam) are located at Holfontein H:H Hazardous Waste Disposal Site; and
- The mine workings of the old Welgedacht Colliery, which is located directly southeast of Holfontein, is approximately 63 m deep and falls within the Karoo Aquifer. These mine workings have been flooded and this water will not have a material influence on the Holfontein shaft water balance.

<u>Groundwater Flow System - Dolomitic Aquifer</u>

The following information is indicative of groundwater flow from surrounding areas toward the dolomitic aquifer neighbouring the Holfontein shaft. The shallow dolomitic aquifer to the west of the Blesbokspruit records shallow groundwater levels. Groundwater is actively pumped by farmers, via boreholes identified during the hydrocensus, from the dolomitic aquifer surrounding the Holfontein shaft. The water level in the Holfontein shaft, which is possibly a reflection of the deeper dolomitic aquifer, is 36 m deeper than the average groundwater level in the dolomitic aquifer zone from which local farmers are pumping. North of the dolomitic basal "drop-off" groundwater intersections recorded during exploration ranged between 9 m and 89 m deep, while yields ranged between 0.3 ℓ/s and 3.3 ℓ/s (average 0.9 ℓ/s). South of the dolomitic basal "drop-off" groundwater intersections ranged in depth between 11 m and 236 m, while yields ranged between 0.3 ℓ/s and 8.3 ℓ/s (average 1.5 ℓ/s).

From the observed water level and yielding capacity distribution it would appear that the more productive dolomites around the north-eastern extent of the Holfontein Project area, are separated from the lesser productive dolomites to the north-west, west and south-west (probably by the attenuation of the near-surface syenite sill along the central portion of the project area's south-western boundary.

Hydrocensus information suggests that borehole yields range from 0.3 ℓ/s to >20 ℓ/s (i.e. confirming the lower limit in terms of yield, but it is possible to drill highly productive boreholes in the dolomitic aquifer). The Department of Water and Sanitation (DWS) dolomitic groundwater level monitoring station B2N0052 (located 4.5 km north-east of the Holfontein shaft) indicated yields of ±20 ℓ/s.

Rainfall recharge to the dolomitic environment will be at least three times the rate of recharge to the Karoo aquifer on an annual basis. Inliers of Malmani dolomite are exposed in parts of the Blesbokspruit flood plain, and will contribute significantly to the water balance of the dolomitic aquifer, especially under dewatered conditions. Oxygen and hydrogen isotope compositions in Grootvlei Mine, indicated that surface water contributed between 30 % and 40 % of the underground mine water (i.e. 60 % to 70 % of the underground water is derived from ground and/or fissure water).

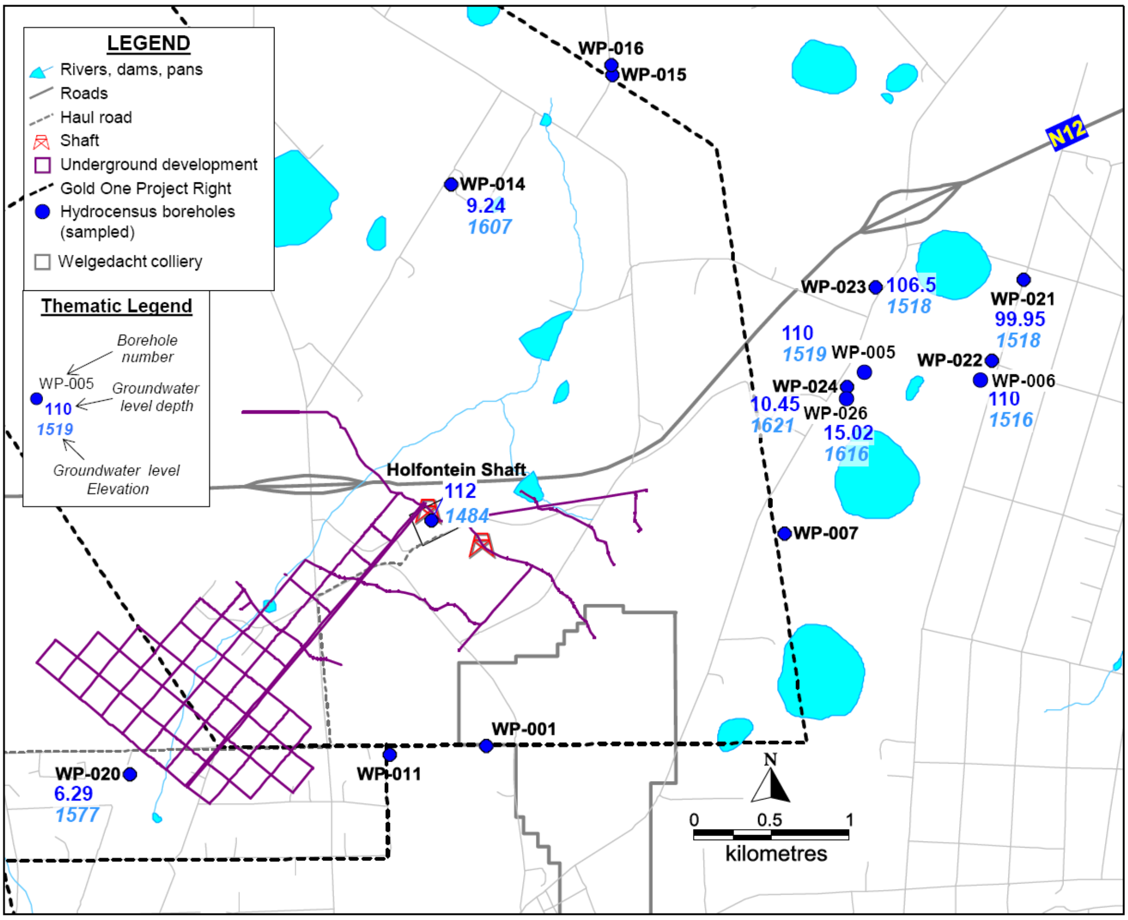


Figure 15: Hydrocensus borehole groundwater levels

vii) Hydrology

Catchment Description

According to the hydrology study undertaken by African Environmental Development in April 2015 (attached as Appendix 11), the Holfontein Project falls within quaternary catchments C21D within the Upper Vaal River Water Management Area (WMA) (refer to Figure 16). The project area includes the Holfontein Stream which originates at the Holfontein hazardous waste (H:H) landfill facility, as a small, non-perennial stream that flows past the existing Holfontein shaft area into the Blesbokspruit. The proposed haul road also crosses the Blesbokspruit.

The upper reaches of the Blesbokspruit drain this quaternary catchment and continue through quaternary catchments C21E and C21F before reaching its confluence with the Suikerbosrant River. The Blesbokspruit flows in a southerly direction from its origin on the farm Vlakfontein 25IR, through the Marievale Bird Sanctuary and past Nigel to its confluence with the Suikerbosrant River. The Suikerbosrant River flows into the Vaal River downstream from the Vaal Dam.

The surface area of the Holfontein Stream catchment up to its confluence with the Blesbokspruit is 25.23 km^2. There are no flow-gauging stations in the Holfontein Stream. The mean annual runoff (MAR) for this catchment is 36.1 mm annum.

Surface drainage from the proposed surface infrastructure area occurs northwards towards the embankment of the N12 Motorway and then westwards along the embankment towards the Holfontein Stream. The slope of the land at and around the existing Holfontein shaft and the proposed surface infrastructure area is not very steep.

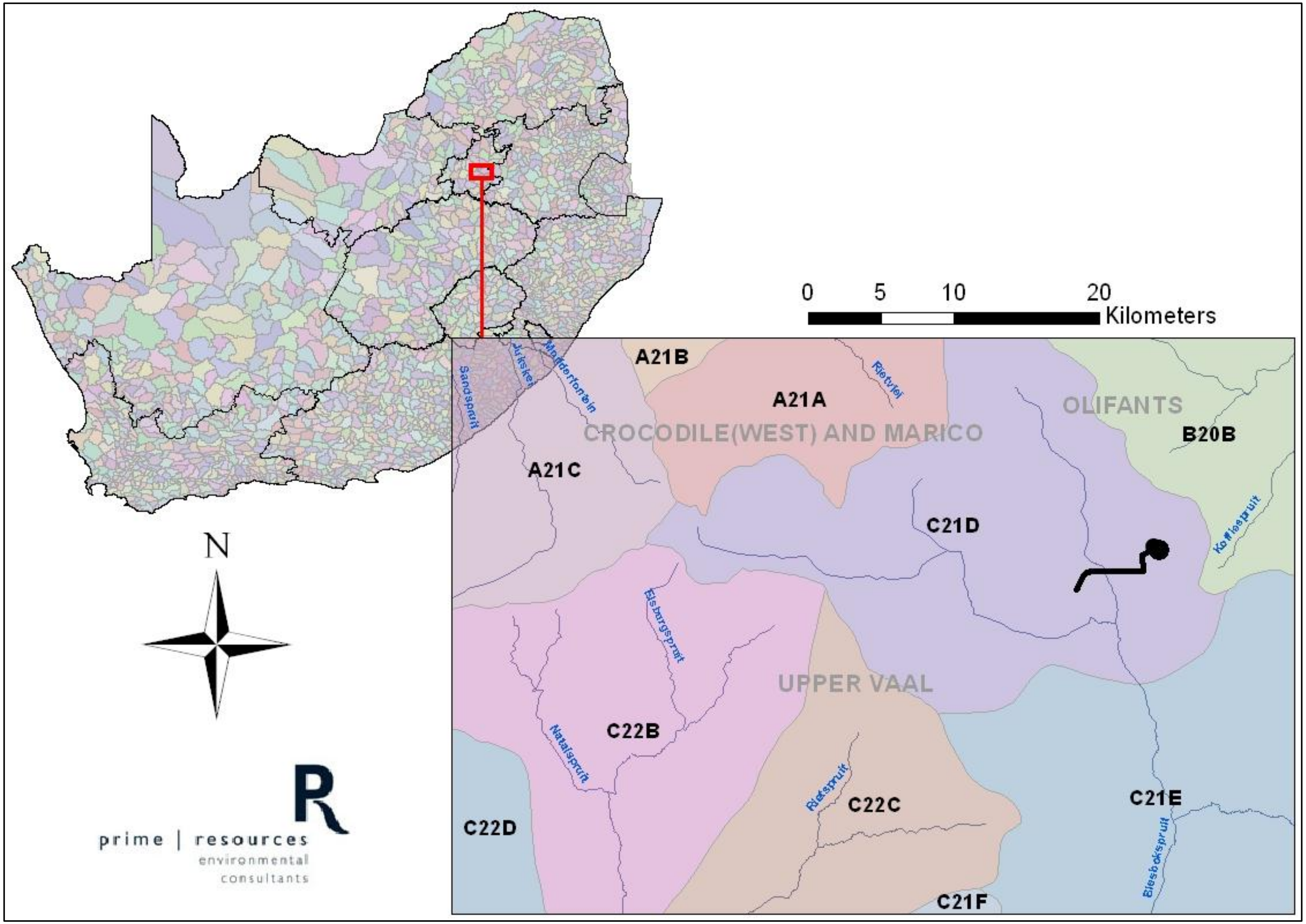


Figure 16: Quaternary catchment and WMA of the project area

50- and 100- Year Flood Lines

To determine the amount of total surface runoff that would occur in a 50-year flood scenario, a typical design storm with a return period of 50 years, falling over an area of 78.5 km^2, was modelled (i.e. a theoretical circular-shaped design thunderstorm with a 5 km radius of the project area). The results indicated that 50- and 100-year floods produced discharges relatively close together, thus only the 100-year flood lines were plotted. A total volume of 1 699 633 m^3 would occur as surface runoff over a 24-hour period produced by a 50-year storm, flowing off natural veld in Veld Zone 4 (Grasslands of Interior Plateau) at the Holfontein Project area. This equates to 21.7 litres per m^2 of surface area of natural veld (i.e. the current situation). The runoff will be altered depending on the ultimate surface types constructed on site.

The 100-year flood lines modelled indicate that the culvert under the railway line running through the Welgedacht SH has adequate capacity to handle the discharge of a 100-year return period storm. The floodlines are represented in Figure 17.

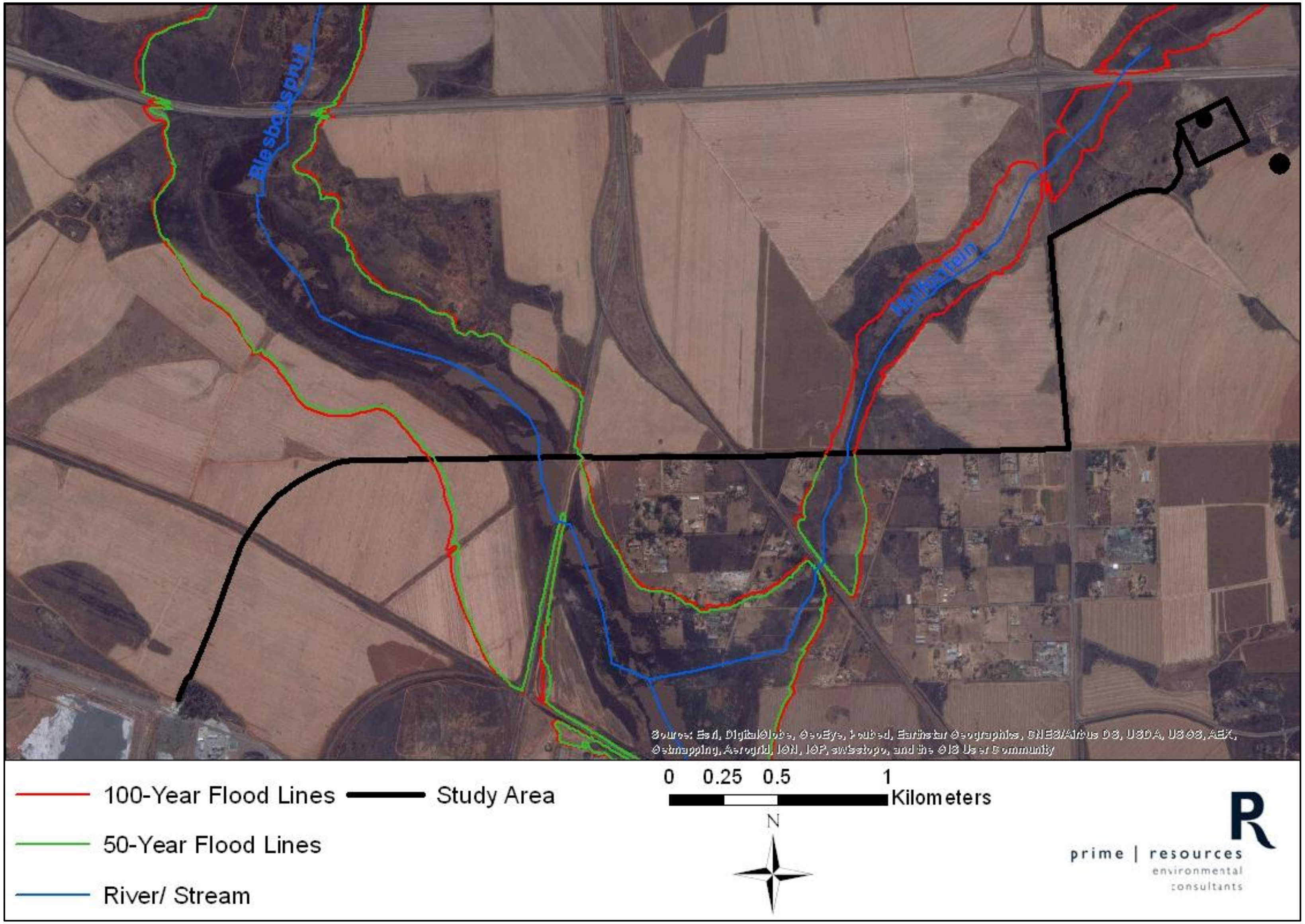


Figure 17: Existing 1:50 and 1:100 year floodlines for the Blesbokspruit and Holfontein Stream

Surface Water Quality

Four samples, upstream and downstream of the project area, were collected for the baseline water quality analysis. The results of the analysis were compared with the South African National Standard, SANS 241:2011 – Edition 1.0 (the official South African drinking water standard).

Table 2: Water quality baseline results for the samples collected upstream and downstream of the project area

Holfontein Surface Water Samples on 03/03/2015						Holfontein Mine Water 20/11/2014	SANS 241: 2011	
Sample ID → Determinant ↓	Units ↓	Holfontein 01	Holfontein 02 (Blesbokspruit)	Holfontein 03	Holfontein 04	Holfontein Shaft*	Standard Limits	Risk
pH	@25ºC	9.1	7.8	7.4	7.7	7.9	≥5.0 - ≤9.7	Operational
Conductivity	mS/m @25ºC	71	49	27	27	47	≤170	Aesthetic
TDS	mg/l	501	346	191	191	332 (Calculated)	≤1200	Aesthetic
Total Hardness	mg/l CaCO3	102	167	84	109	208 (Calculated)		
Total Alkalinity	mg/l CaCO3	120	194	90	83			
Sulphate	mg/l	60	<40 (6)	<40 (9)	<40 (37)	54	250 and 500	Acute Health: ≤500 Aesthetic: ≤250
Nitrate	mg/l N	<0.5	<0.5	<0.5	1.5	2.33	≤11	Acute Health
Chloride	mg/l	94	35	18	<5.0		≤300	Aesthetic
Ammonia	mg/l N	3.5	2.7	2.2	1.8		≤1.5	Aesthetic
Calcium	mg/l	21	42	20	32	41.33	<150 (SANS 241:2006 Class I)	
Magnesium	mg/l	12	15	8.2	7.1	25.33	<70 (SANS 241:2006 Class I)	
Sodium	mg/l	83	37	16	7.2	21	≤200	Aesthetic
Potassium	mg/l	17	9.3	3.9	5.2	4.33	<50 (SANS 241:2006 Class I)	
Uranium	µg/l	0.98	0.39	0.16	0.5		≤15	Chronic Health
Aluminium	µg/l	69.9	26	28	369		≤300	Operational
Antimony	µg/l	0.4	0.046	0.05	0.27		≤20	Chronic Health
Barium	µg/l	22	61	100	59			
Beryllium	µg/l	0.03	0.03	0.015	0.018			
Bismith	µg/l	0.002	0.001	0.002	0.003			
Cadmium	µg/l	0.01	0.03	0.02	0.003		≤3	Chronic Health
Chromium	µg/l	0.09	<0.001	0.1	1.8		≤50	Chronic Health
Cobalt	µg/l	0.3	0.3	1.36	0.2		≤500	Chronic Health
Lanthanum	µg/l	0.039	0.008	0.04	0.1			
Lithium	µg/l	0.69	1	0.4	0.9			
Platinum	µg/l	0.06	<0.001	0.001	0.002			
Selenium	µg/l	0.38	0.5	<0.001	0.36		≤10	Chronic Health
Tellurium	µg/l	0.4	0.046	0.05	0.27			
Thallium	µg/l	0.01	0.01	0.01	0.029			
Tin	µg/l	0.009	0.009	0.005	0.02			
Titanium	µg/l	0.049	<0.001	0.9	9.7			
Vanadium	µg/l	0.68	0.1	0.1	1.6		≤200	Chronic Health
Manganese	µg/l	5.86	156	1543.6	21.6	2	500 and 100	Cronic Health: ≤500 Aesthetic: ≤100
Iron	µg/l	60	48.8	190	174	170	3 000 and 2 000	Cronic Health: ≤2 000 Aesthetic: ≤3 000
Asernic	µg/l	1.77	0.55	<0.001	0.36	6.3	≤10	Chronic Health
Nickel	µg/l	2.67	0.85	1.8	1.76		≤70	Chronic Health
Zinc	µg/l	0.68	5.69	1.7	2.75	3	≤5 000	Aesthetic
Copper	µg/l	0.68	5.69	1.7	2.75		≤2 000	Chronic Health
Lead	µg/l	0.06	0.26	0.3	0.3	6.8**	≤10	Chronic Health
Mercury	µg/l	0.9	0.79	0.69	0.9		≤6	Chronic Health
Molybdenum	µg/l	0.59	0.1	0.35	1.06			

* (Shango Solutions 2014) ** The Shango report recorded the average Pb as 10µg/l, while it should have been 6.8 µg/l

From the results (Table 2), water quality in the Holfontein Stream and the Blesbokspruit is good, with only the ammonia exceeding the SANS 241:2011 standard marginally in all four of the samples. The highest ammonia concentration was recorded in the sample taken immediately downstream from Holfontein hazardous waste (H:H) landfill facility.

Although not triggering the SANS 241:2011 standard, the very high pH at Holfontein 1 (pH 9.1) is an area of concern. It is assumed that the Holfontein hazardous waste (H:H) landfill facility is responsible for this high pH. The conductivity/TDS, sulphate, chloride, calcium, sodium and potassium at this sampling point were also the highest of the four samples, indicating an impact from the landfill site. However, none of these determinants actually exceeded the SANS 241:2011 standard limit.

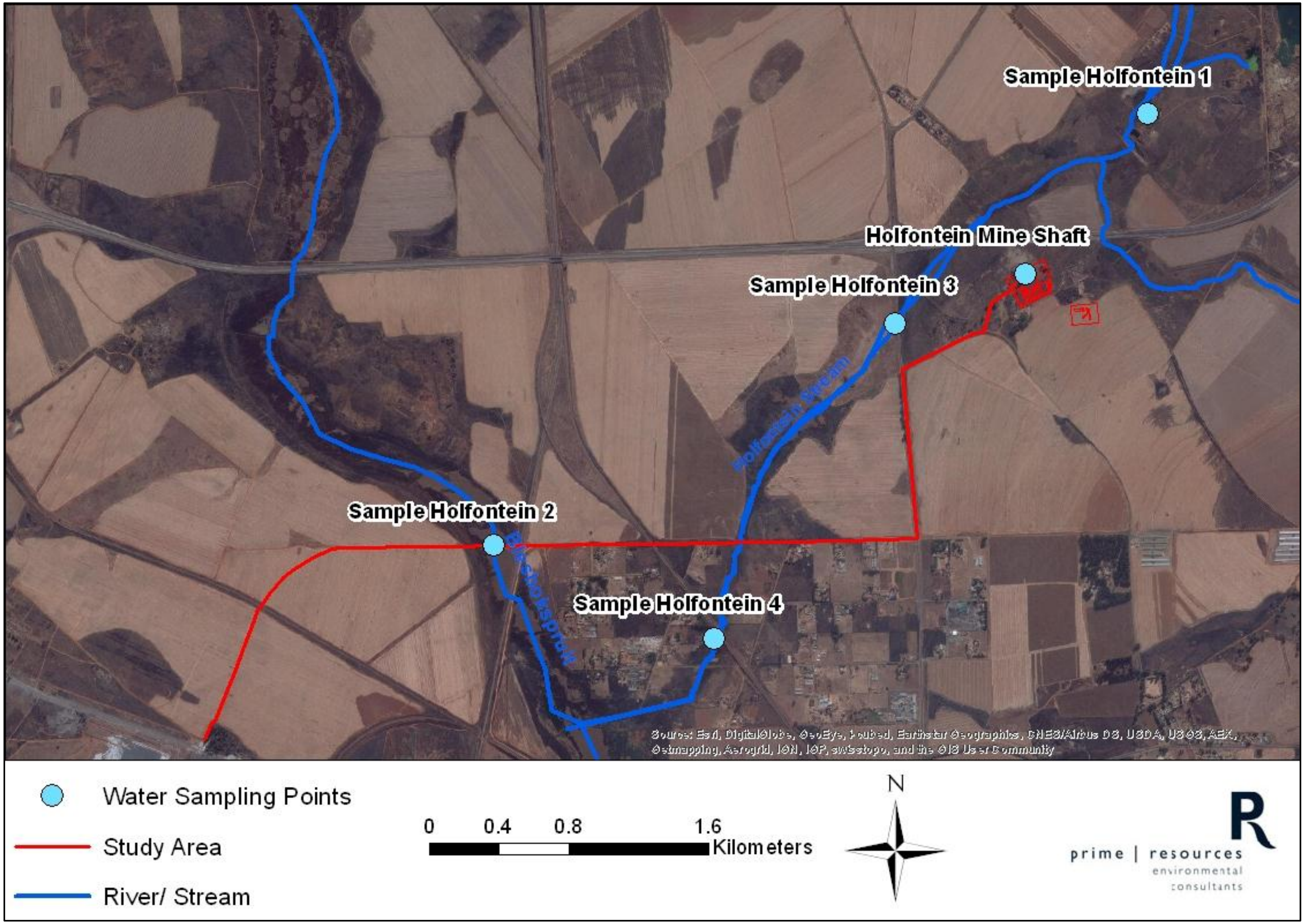


Figure 18: Surface water sampling points

Drainage Density

The drainage density for the Holfontein Stream up to the project area is approximately 0.447 km/km^2 (km watercourse/ km^2 of catchment or"/km"). This is a low drainage density in spite of the rounded shape of the catchment. This is attributable to the very low slope of the catchment.

Surface Water Use

The areas adjacent to the stream near the Holfontein shaft and the proposed surface infrastructure area are used for dry-land maize farming which does not require water from the stream. The only other potential water users of the Holfontein Stream are the riparian plots with riparian rights at the Welgedacht SH and 9 of these small holdings are considered as being water users.

There is also an old and very small farm dam in the Holfontein Stream on the RE of Ptn 43, which could be considered a water use. However, there are only a few shacks on this portion and no pumping equipment at the dam.

viii) Noise

According to the noise study conducted by JH Consulting (attached as Appendix 12) ambient noise measurements were carried out according to SANS Code of Practice 10103:2008 at four locations at or near the project area boundaries (refer to Figure 19).

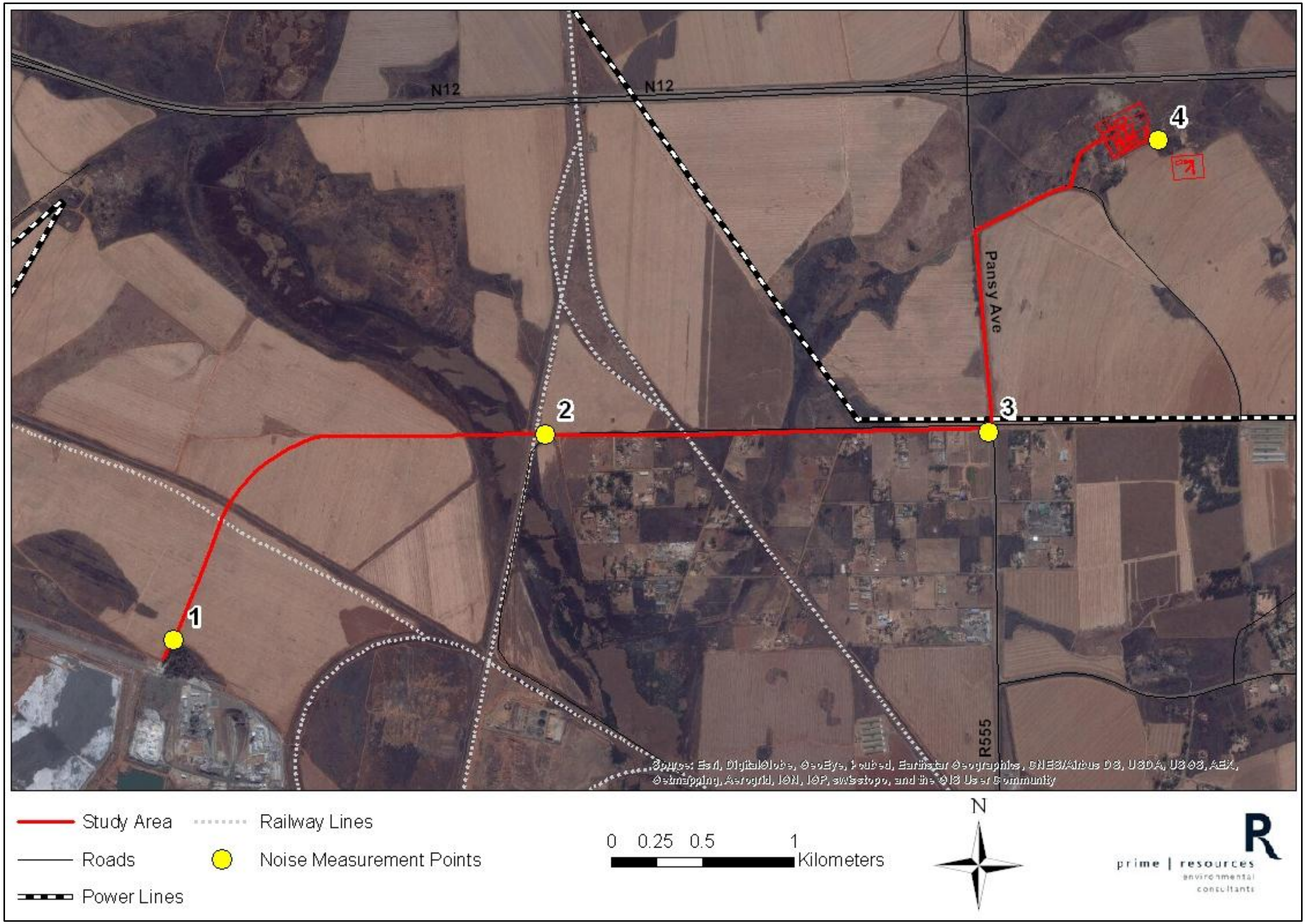


Figure 19: Noise measurement points

Refer to Table 3 for the noise measurements obtained at Measurement Point 1. Noise at this measurement point is generated primarily by the ME processing plant which operates continuously and dominates the background noise. The noise level is therefore consistent throughout the day. The rise in level at the end of the day is likely to be a result of an inversion rather than an actual increase in emitted noise from the plant.

Table 3: Noise measurements taken at Measurement Point 1

TIME	L_{EQ}*	L_{MIN}**
12:21-12:31	48.6	42.6
12:32-12:42	48.1	42.5
12:44-12:54	48.0	42.2
12:56-13:06	52.7	46.6
13:08-13:18	51.2	46.8
17:09-17:19	53.8	49.2
17:20-17:30	55.6	50.5
17:32-17:42	55.3	52.2
17:43-17:53	56.3	50.0
17:55-18:05	57.2	52.5
18:07-18:17	59.7	52.9
23:38-22:48	52.3	45.7
23:50-24:00	53.2	50.4

***Leq = the A-weighted equivalent sound level using the 'I' (Impulse) dynamic response characteristic as recommended in SANS 10103:2008. This is the primary parameter on which assessments are made.**

****Lmin = minimum noise level taken as an expression of the lowest background noise in the absence of intrusive noisy events and random noise events such as pedestrians, animals, birds, and local road or air traffic.**

Measurement Point 2 is located on Carnation Road at its turn to the south, 12 m from the centreline of the road. This is part of the proposed haul road. Refer to Table 4 for the noise measurements obtained at this point. Noise at this measurement point is generated primarily by natural sources such as bids, insects, remote traffic and notably from the ME processing plant, 2 km to the south-west, which is audible under most conditions and forms the background noise. Intrusive noise is limited to occasional trains on the adjacent line, as well as vehicles travelling to the Welgedacht WWTW.

Table 4: Noise measurements taken at Measurement Point 2

TIME	L_{EQ}	L_{MIN}
15:10-15:20	51.3	33.8
15:22-15:32	61.7	33.3
15:34-15:44	42.4	33.8
15:45-15:55	49.7	33.8
19:41-19:51	42.6	39.3
19:53-20:03	42.7	39.5
20:15-20:25	42.1	39.8
21:35-21:45	45.7	39.2
21:47-21:57	44.2	39.9
22:00-22:10	58.3	39.6
22:11-22:21	45.0	41.0

Measurement Point 3 is located at the southwest corner of the intersection of Pansy Avenue and Carnation road, 20 m from the centreline of the Pansy Avenue and 10 m from the centreline of Carnation Road. Refer to Table 5 for the noise measurements obtained at this point. Noise at this measurement point is typical of a main road with consistent traffic flow (600-700 vehicles passing per hour) which dominates the noise climate. The residual background noise is mainly from natural sources, primarily from birds, insects, and domestic activities.

Table 5: Noise measurements taken at Measurement Point 3

TIME	L_{EQ}	L_{MIN}
14:35-14:45	68.1	45.8
14:47-14:57	67.4	38.4
14:57-15:07	68.5	43.8
15:09-15:19	66.9	42.4
15:23-15:33	68.1	38.6
15:34-15:44	67.8	42.4
16:10-16:20	67.4	46.2
16:21-16:31	66.9	40.5
16:33-16:43	67.8	46.1
16:45-16:55	69.2	48.6
16:56-17:06	69.8	42.0
19:10-19:20	68.7	48.6
19:22-19:32	68.2	45.2
21:05-21:15	62.0	34.4
21:17-21:27	65.1	38.7
22:25-22:35	60.5	31.3
22:36-22:46	60.5	30.9

Measurement Point 4 is located at the south-east corner of the proposed infrastructure area and adjacent to the historic mine hostel, and 300 m from the N12 Highway to the north. Refer to Table 6 for the noise measurements obtained at this point. Noise at this measurement point is typical of a rural area dominated by natural noise, primarily from birds, insects and domestic animals, with some noise from domestic activities in the adjacent informal residences as well as continuous background noise from vehicles travelling on the N12 highway.

Table 6: Noise measurements taken at Measurement Point 4

TIME	L_{EQ}	L_{MIN}
13:46-13:56	45.9	35.0
13:58-14:08	41.7	34.6
14:10-14:20	46.9	38.3
14:22-14:32	42.4	34.6
14:33-14:43	41.4	34.6
16:10-16:20	42.4	37.9
16:22-16:32	42.9	38.4
18:39-18:49	50.7	46.7
18:50-19:00	53.2	49.6
20:35-21:45	52.0	41.2
20:46-20:56	53.9	41.6
22:53-23:03	51.5	40.0
23:04-23:14	51.2	42.1

The noise levels in remote locations, such as the project area, are very low (approximately 40 dB(A)). This represents a typical situation for rural areas (refer to Table 7). Similar conditions would be expected along the proposed haul route, except where it comes within the zone of influence of Pansy Avenue and the ME processing plant.

Table 7: SANS10103 recommended noise level limits for suburban and rural areas

TYPE OF DISTRICT	DAYTIME DB(A)	NIGHT-TIME DB(A)
Rural	45	35
Suburban	50	40

Sensitive Receptors

Sensitive receptors consist of two informal residences to the immediate east and south of the surface infrastructure area as well as the Welgedacht SH.

ix) Soil

The following baseline information was obtained from the soil and agricultural / land capability study conducted by Prime Resources (attached as Appendix 14).

Soil Classification

Soils were sampled at four locations, with photographs taken of the soil sampled (refer to Figure 20). The following soil family types were identified: Msinga (Hu1 and Hu2), Mispah (Ms4) and Avalon (Av3) (Table 8).

The dominant soil types near the existing Holfontein shaft comprise of red, brown and greyish soils with low to medium base status.

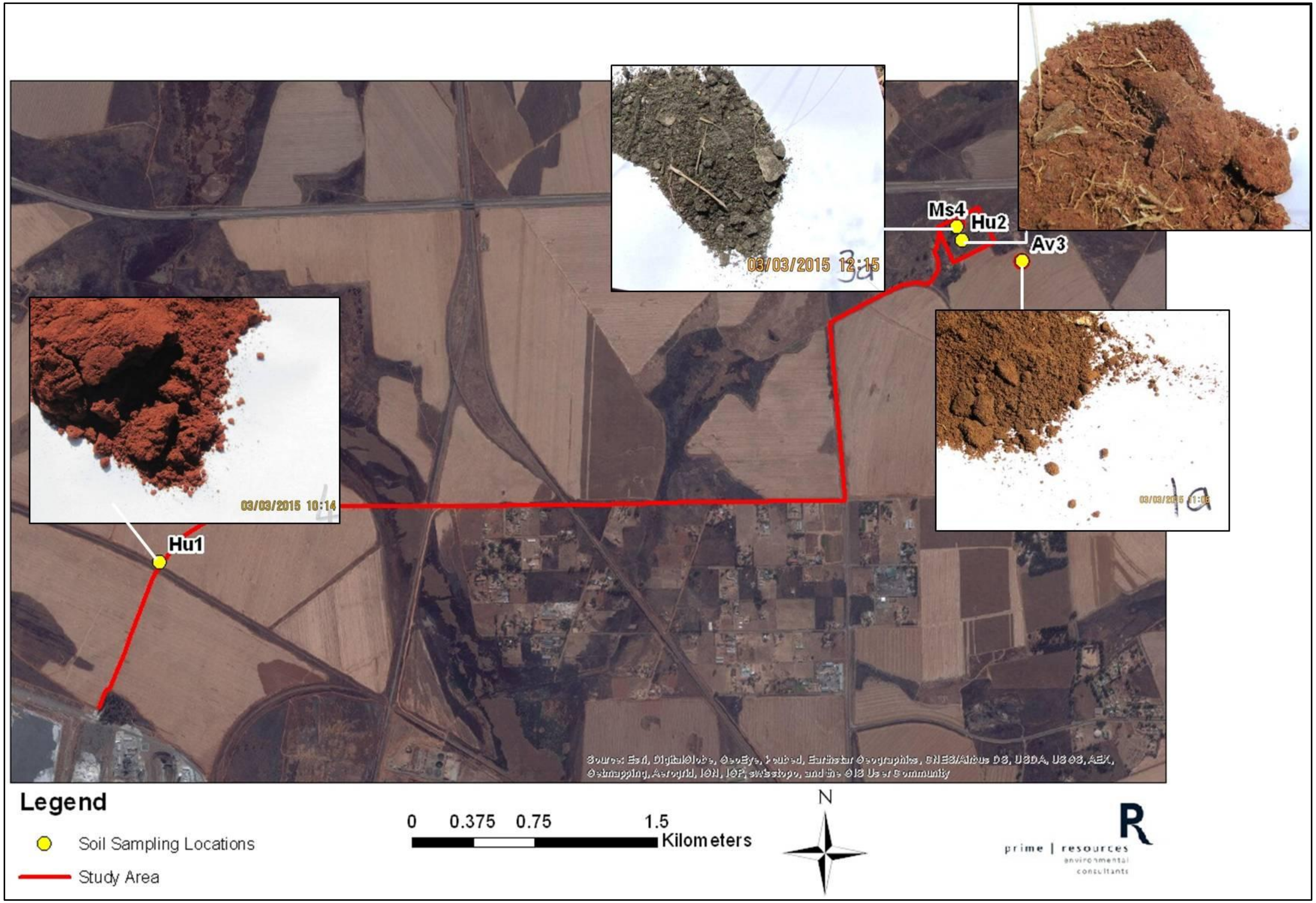


Figure 20: Soil sampling locations, soil map units and photographs showing the soil colour

Table 8: Soil classification and description

Map Unit	Dominant Soil Form and Series	Diagnostic Horizon Sequence	Effective rooting depth (mm)	Clay %	Erosion Hazard	Drainage	Description
Hu1	Hutton Msinga	• Orthic (Dark Reddish/ brown loamy sand to clay) • Red apedal B (Reddish/ brown loamy sand to porous non-blocky clay)	500- 700	15 to 35	Low to moderate	Good	• Soft • High Agricultural Potential
Hu2			300-500				• Rocky • Medium Agricultural Potential
Ms4	Mispah	• Orthic A (Very shallow grey to brown sandy loam to sandy clay loam) • Hard rock	150-300	0 to 15	Moderate to high	Moderate	• Rocky • Low Agricultural Potential
Av3	Avalon	• Orthic A (Dark grey-brown sandy loam to clay loam) • Yellow-brown apedal B (Yellow-brown friable loamy sand to non-structured clay) • Soft plinthic B horizon (Soft iron concretions)	300-600	15 to 35	Moderate to poor	Low	• Soft • Medium Agricultural Potential

The underlying geology of the proposed project area consists of a mixture of three broad types of parent materials. The Holfontein Mine Shaft and Ventilation shaft are underlain by sandstone, arenite and shale of the Vryheid Formation (Karoo Sequence). The Vryheid Formation is shale derived from sand deposited on the floor of the inland Karoo Sea. This formation has generally weathered to form brown and yellow-brown topsoils of moderate to good yield potential, which is often determined by the depth of the topsoil.

The haul road is underlain by dolomite and chert of the Malmani Formation (Transvaal sequence) and some diamictite and shale of the Dwyka Formation (Karoo Sequence). The Dwyka Formation, which is older than the Vryheid Formation, formed by the mud deposited on the floor of the inland sea as the ice began to melt at the beginning of the de-glaciation. Soils derived from the Dwyka Formation are usually dark grey or black and can be difficult to manage (especially when wet).The parentage of the soils at the project area according to the 1:250000 Geological Series, 2628 East Rand, is shown in Figure 21 below.

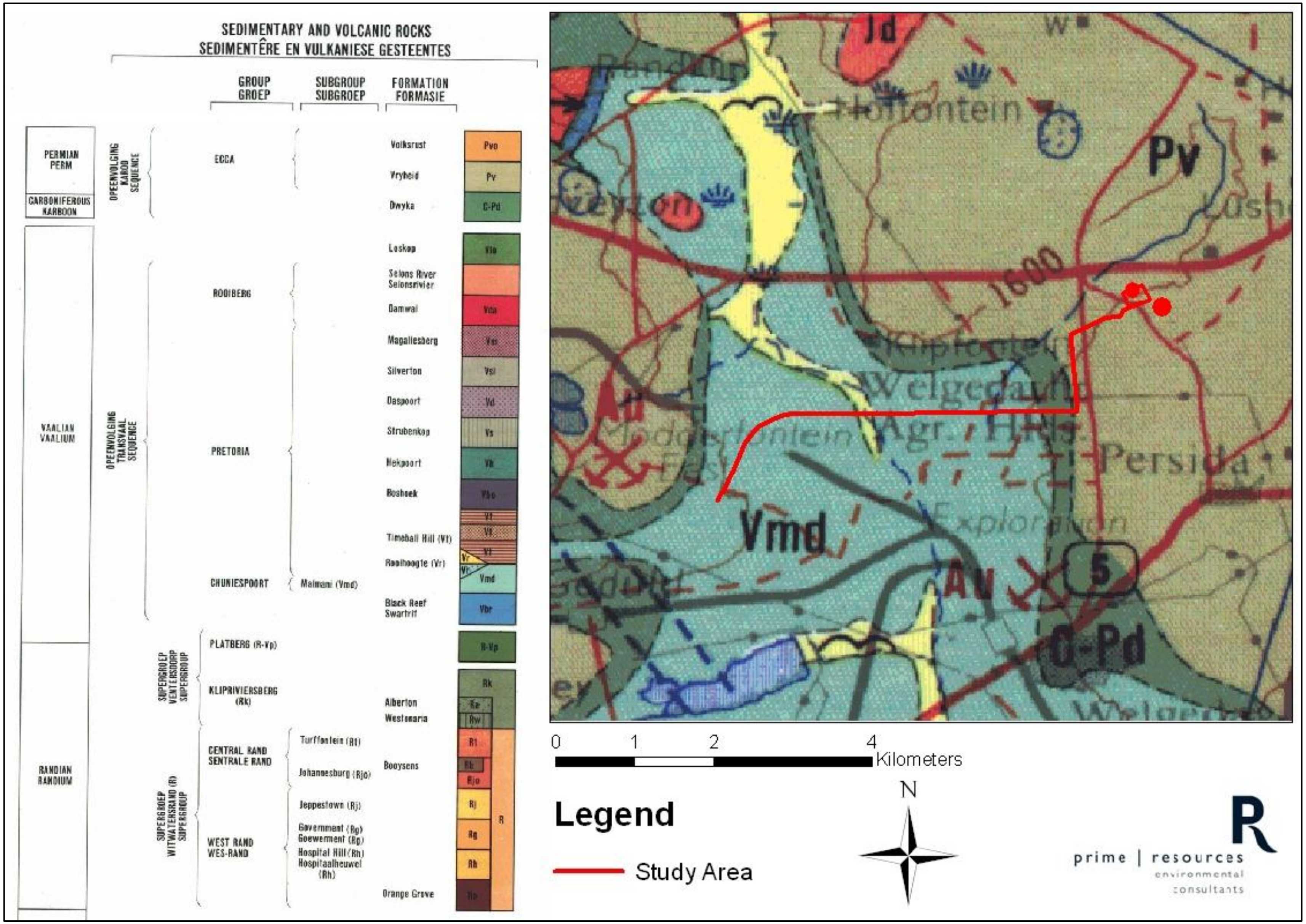


Figure 21: Underlying geology of the project area (1:250000 Geological Series 2628 East Rand)

Land Capability Class

The land capability class takes the % slope, texture, effective rooting depth, permeability and wetness into account. This capability is closely allied to soil yield potential.

The land capability classes identified within the project area are II at Hu 1 (may be used for cultivated crops with some limitations and the management practices are easy to apply), III at Hu2 and Av3 (may be used for cultivated crops but there are severe limitations and the conservation practices are usually more difficult to apply and maintain) and IV at Ms 4 (may be used for cultivated crops but there are very severe limitations and more careful management is required and conservation practices are difficult to apply and maintain; restrictions to land use are greater and the choice of plants is more limited).

Soil Erosion Sensitivity

The soil erosion sensitivity of the sampled soils can be classified as:

- A favourable erodibility index where the land is generally level to gently sloping, with low susceptibility to water erosion (along the haul road);
- A moderate to high erodibility susceptibility, with moderate to high susceptibility to water erosion, which occur along the broad band of slightly sloped land towards a tributary of the Blesbokspruit, north of the Holfontein Mine Shaft and proposed surface infrastructure area. The Mispah soils in this area, where the soils are shallow and can only hold a few millimetres of rainwater and where the vegetation is sparse and cannot arrest or disperse flow, could result in high levels of rainwater runoff during rainfall events;
- Overall, the soils sampled within the project area have a low susceptibility to erosion loss as the soils are not considered to be sodic (i.e. they do not have imbalances in base cations and therefore do not have poor soil structure).

Agricultural Potential

According to the EMM GIS Database the area is classified as high agricultural potential (www.gis.ekurhuleni.gov.za).

The Southern African Agricultural Geo-referenced Information System (AGIS AGRIC) describes soils in this area as a high agricultural and unique dry land area. The project area is split between high potential arable land and moderate potential arable land (refer to Figure 22).

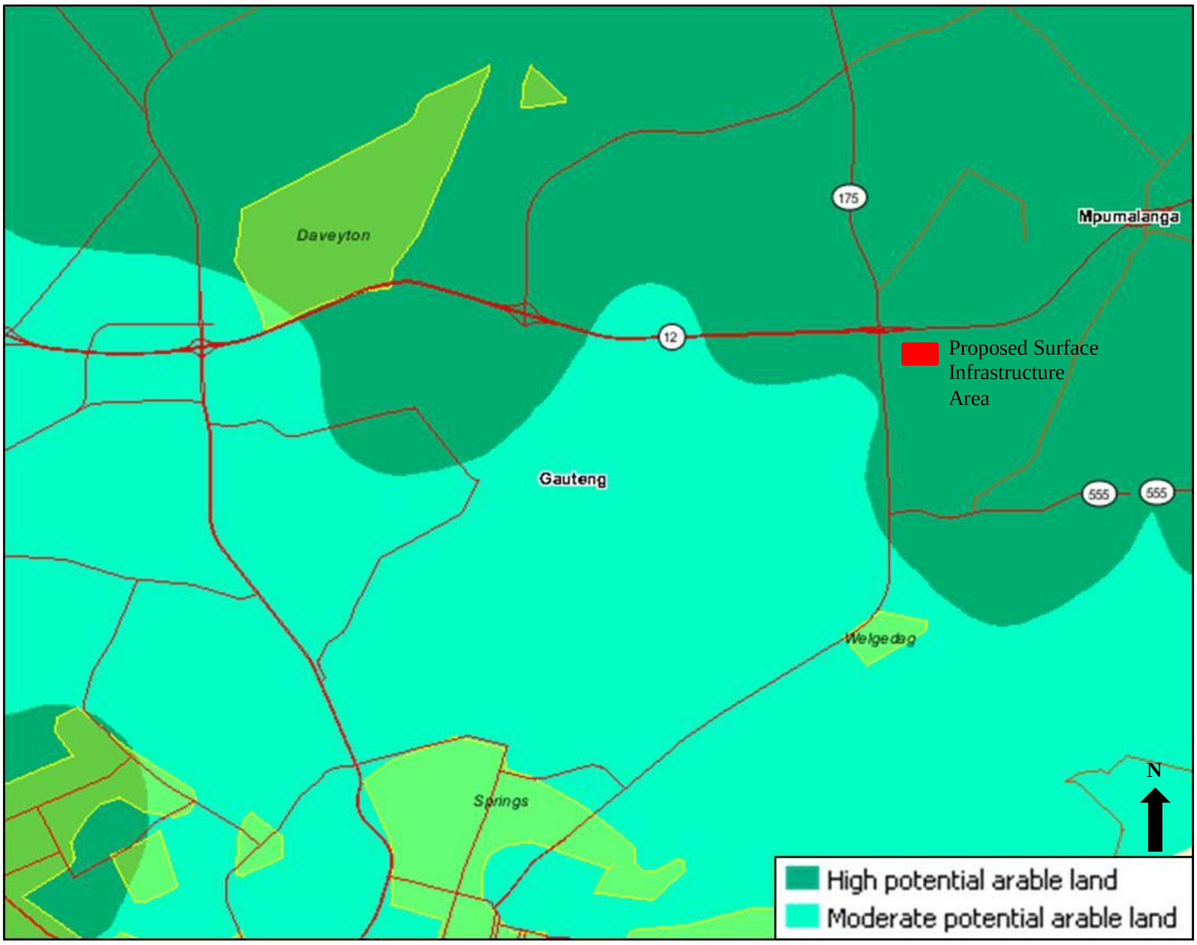


Figure 22: Land Capability (AGIS AGRIC 2012)

From the Gauteng 1:50 000 Soil Survey of the Broad Agricultural Potential, the agricultural potential of the project area ranges from low to high (refer to Figure 23). The Broad Agricultural Potential is derived from a combination of soil form, depth, texture and drainage. The area around the Holfontein shaft is classified as having a high agricultural potential.

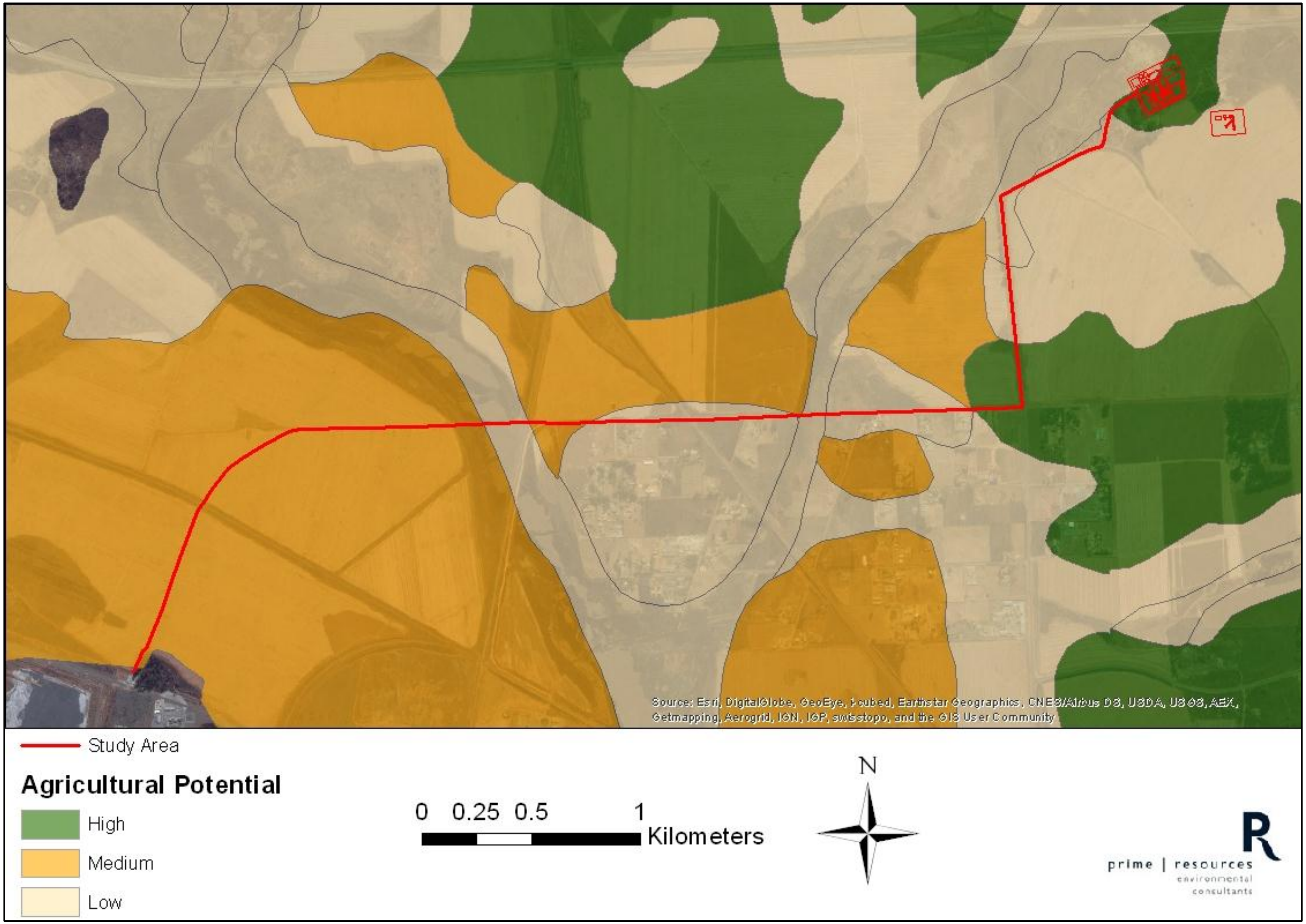


Figure 23: Gauteng 1:50 000 Soil Survey showing the agricultural potential of the project area

Although the footprint around the Holfontein Mine Shaft is classified as having a high agricultural potential in terms of the above databases, from the site observations, the land capability class (III and IV) determination and the results of the soil classification and soil sample analyses, it was found that the soil quality has been impacted by the previous mining practises of the area. Therefore the area is not considered suitable for agriculture. The ground in this area is compacted and has been exposed to wind and water erosion over a long period of time. The area is also impacted by slight contamination (As, Cu, Pb).

The surrounding areas comprise farmlands and this was confirmed during the in-field assessments. Maize is grown in the area classified as having a medium agricultural potential (area along which the haul road will run and a portion of the road is to be constructed through the cultivated area) and soya bean is grown in the area classified as having a low agricultural potential (area where ventilation shaft will be located).

x) Socio-economic

The following information was obtained from the socio-economic study conducted by Prime Resources (attached as Appendix 13).

<u>Socio-Economic Overview</u>

The EMM was established in 2000, and covers an extensive geographical area. Former local administrations of the nine towns in the East Rand – Alberton, Benoni (including Daveyton and Etwatwa), Boksburg, Brakpan (including Tsakane), Edenvale/Lethabong, Germiston, Kempton Park/Tembisa, Nigel (including Duduza) and Springs (including Kwa-Thema) – were amalgamated into the new metropolitan municipality, along with two other councils – the Khayalami Metropolitan and Eastern Gauteng Services Councils.

The Project is located in Region C of the EMM, which is on the Eastern side of Gauteng Province. Region C includes Benoni and Daveyton and is characterised by open spaces, consisting of environmentally sensitive areas and agricultural land. The Regional Spatial Development Framework (RSDF) indicated that Region C is largely allocated to future urban development and agriculture. The main access routes in Region C include the N12 highway, and the R50, R51 and R25 regional routes. The shaft area falls within Ward 67 and the road runs over both Ward 67 and 72 of the EMM, however no social receptors were identified within Ward 72.

<u>Socio-Economic Challenges</u>

The Integrated Development Programme (IDP) highlights the following core socio-economic challenges currently facing the EMM:

- Systemic poverty and inequality: certain interventions such as social grants and indigent support have been implemented in EMM but further integration with other development interventions (such as small business development) is required;
- Food scarcity: poverty in cities is linked to lack of food, as food is a cash commodity. Social support food networks within EMM need to be further explored;

- Inadequate human capabilities development: such as lack of investment into economic and social skills development, which is currently the sole responsibility of formal education institutions but not always sufficiently dealt with by these institutions and excludes anyone not enrolled in such an institution;
- Lack of integration in child and family development: current early childhood development programmes are not linked to family development, this lack of integration results in inconsistent and sometimes ineffective social development;
- Inadequate youth development: this development programme is largely focused on unemployment. It also needs to focus on social development and support for various youth categories; and
- HIV / Aids: EMM has high HIV/Aids infection levels. The current programme has largely been focused on treatment. It needs to also be focused on lifestyle choices and education

There is a high demand for residential and mixed land uses in Region C, emphasising the need for housing provision and retail uses to meet the local community's needs. According to the Council for Scientific and Industrial Research (CSIR), sustainable human settlements cannot be achieved without adequate social facilities that are differentiated according to varying development densities, community size, mobility levels and socio-economic variation.

Region C is experiencing a shortfall in educational, recreational, healthcare and community services. In Region C there are 519 erven (portions of land) zoned for social and community facilities, of these 330 erven are currently undeveloped. The problem in terms of the provision of social and community facilities is therefore not the availability of land for these facilities but rather the physical development of these facilities.

Ward 67 is divided into 7 voting districts. The shaft area falls within the Vukucinge Primary School voting district, and the Ward Councillor and the Gauteng Department of Agriculture and Rural Development (GDARD) have identified the following challenges facing this voting district:

- Sewer spillages;
- No running water;
- No formal sanitation;
- Over-population;
- High level of crime;
- High rate of unemployment;
- Irregular or no electricity supply;
- Absence of a Secondary School;
- Negative and unmitigated effect of heavy flooding during rainy season;
- Poor response from ambulance or emergency service;
- Residents have to walk to local clinics in Etwatwa or Slovo Park;
- Some residents do not have Identity Documents (IDs) because either they are foreign nationals from Lesotho and Zimbabwe thus cannot receive state grants or they are elderly and never obtained them; and
- The original owners of the Reconstruction and Development Programme (RDP) houses are not easily located. Most of the houses have been left with relatives or strangers.

Statistical Profile of Ekurhuleni Metropolitan Municipality

EMM has a total surface area of 1,975 km² that accommodates a population of 3.1 million. EMM is spread over 15.6 % of Gauteng's land mass, houses 5.4 % of the country's population, and 25.5 % of Gauteng's population. Migration into the area is a key challenge. This is visible in the number of informal settlements and informal trading activity. The economically active people constitute 41.5 % of the population. The area contributes approximately 6.1 % to national production. Over the period 1996 to 2011, Ekurhuleni's economy grew by an estimated average of 3.2 % per annum.

Age and Gender

The 2011 census indicated that the EMM has a largely adult population with majority of the population distribution being between 25 and 29 (387,087 people), and unlike Gauteng, EMM has a more male-dominated (206,472 men) population (compared with 180,575 women). EMM has a decreasing population growth rate, as do all Gauteng municipalities.

Education and Employment

EMM education statistics have improved over the last 16 years, with a steady increase in the percentage of people completing Grade 12 and obtaining higher education. Although the unemployment rate increased from 1996 to 2001, it decreased by 11.6 % from 2001 to 2011.

Household Utilities

The percentage of households with electricity for lighting increased by approximately 7 % from 1996 to 2011, while the percentage of households with electricity for cooking increased by approximately 15 % from 1996 to 2011. The percentage of households with access to piped water within their dwelling / yard increased by approximately 3 % from 1996 to 2011, as did the percentage of households with access to flush / chemical toilets.

Informal Settlements

According to the Census there has been a significant increase in the number of households living in formal dwellings in Ekurhuleni since 2001. The number of households living in informal dwellings (shacks) has decreased by 25,211 over the ten year period 2001 to 2011 and the proportion of households living in informal dwellings (shacks) has declined considerably from 22 % in 2001 to 14 % in 2011. According to the 2011 Census, roughly 30 % of households living in informal dwellings (shacks) in EMM regard themselves as owners, with a considerable 44 % who stated that they occupy the dwelling for free. 21 % of households stated that they rent their dwellings.

While the EMM achieved an increase in the percentage of households supplied with basic services (such as running water, formal sanitation and electricity), on average access to basic services within informal settlements did not improve significantly between 2001 and 2011.

Statistical Profile of Region C and Ward 67

Region C accommodates a total population of 401,270, while Ward 67 accommodates 37,500 of that. There are estimated to be 134,000 households within Region C with a population density of 403 people per km^2. The ratio of males to females is 1:1 and the predominant age category is 0-4 years, unlike that of the greater EMM which has a predominant age group of 25 to 29.

The RSDF identified that Region C has a relatively low average population density due to majority of the region's land remaining unoccupied because of a lack of living and work opportunities in the central and northern parts of the region. In 2012, 37.1 % of the region's total population was living in poverty; a significantly higher percentage than that of the greater EMM. The social facilities in Region C are concentrated in the built-up areas, and they appear to be in line with the requirements; however the Governance Report for Ward 67 highlights areas within the Ward where informal settlements are still greatly lacking in basic services and infrastructure.

Socio-Economic Profile of the Project Area

The following receptor communities were identified:

- The Khomponi Community, living at the existing historical Holfontein Mine
- The Holfontein Quarters Community, living across the N12 highway from the historical Holfontein Mine
    - These two communities are collectively referred to as the Holfontein Community
- The residents living within the Welgedacht SH along Carnation Road.

The locations of these communities were mapped in order to better understand their proximity to the proposed project components. The living conditions of the communities are further described below.

The Holfontein Community

The Holfontein Community is made up of two community areas, one living adjacent to the Holfontein shaft within the historical mine hostel (approximately 100 m from the proposed mining area), historical mine house (approximately 50 m from the proposed mining area) and informal dwellings (the closest being next to the fence of the proposed mining area). They have identified themselves as the Khomponi Community (Figure 24).

The second community area is on the other side of the N12, within Holfontein historical mine houses, which fall within the Breswol Agricultural Holdings (AH). They have identified themselves as the Holfontein Quarters Community (Figure 25), approximately 850 m from the proposed mining area).

The Khomponi Community

The Khomponi Community is living within the historical mine hostel and house, as well as informal dwellings in proximity to the hostel and house (Figure 24). The Khomponi Community has been identified as an informal settlement. This community has an estimated population of 200 to 250 people. The hostel is made up of 4 housing blocks (see Photo 1 below) which are home to 33 households, while the house is home to 3 households. There are 8 informal dwellings surrounding both the house and hostel. According to members of this community, some of them first settled in the area 35 years ago. The majority of the residents are from Gauteng; however there are also residents originating from Mpumalanga, Limpopo and Mozambique. The main language spoken is Zulu but residents from Limpopo speak Pedi.

A few of the older residents receive pensions through the South African Social Security Agency (SASSA) but the majority of them cannot apply for pensions as they do not have Identity Documents (IDs). Similarly, a few of the women receive child grants but many do not as they do not have IDs. The mobile clinic does not visit the Khomponi Community as it is considered too small, and the nearest clinic is in Slovo Park, approximately 5 km away. There is a small tuck shop within the hostel, run by one of the residents, however the nearest formal shops and police station are in Sundra (approximately 7 km walking distance).

Age and Gender

The community ranges from ages of 1 to 71, and the older members of the community appear to be financially supported by the younger adults. The majority of the younger women have small children. The male to female ratio appears to be 1:1.

Education and Employment

Approximately 50 % of the working males (20 and older) have piece jobs (ad hoc) on local farms or in local industry. None of them have permanent or contracted employment. A small percentage of the older women have employment in Sundra as domestic workers.

Approximately 20 of the children attend primary and secondary school in Sundra (which falls into Ward 7 of the Victor Khanya Local Municipality, Mpumalanga). The children walk down the unpaved road and wait for a school bus which collects them from Pansy Avenue. Approximately a third of the adults have completed Grade 10, 11 or 12.

Household Utilities

The community has no running water, formal sanitation or electricity. A large Jo-Jo water tank is filled weekly by the municipality (see Photo 8), however this tank is not cleaned, which poses a health risk to the community. The community has been provided with three chemical toilets (Kharki Toilet Hire), which are cleaned out once a week by the municipality (see Photo 5). Two toilets are located at the hostel and one at the house. Non-ventilated pit latrines are also utilised. The community members use candles for lighting, paraffin for cooking and wood for heating (see Photos 2 and 3).

Sense of Place

The Khomponi community members consider themselves to be a peaceful community, and did not report any major incidents over the last year. It was reported that criminals occasionally hide stolen goods in the grass surrounding the community. The community members added that when approached, these criminals have become threatening towards residents and as a result most of the residents avoid being outside at night.

The hostel and house were observed to be in poor condition and the residents expressed concerns with regard to leaking roofs, especially during the rainy season (see Photo 1). Subsistence farming is undertaken on a small scale to grow pumpkins and maize for food (see Photo 6). Although the basic service provision needs of the community are being met they are still considered an informal settlement, as they do not have access to running water, electricity or formal sanitation. However, it should also be noted that this community is well established. They have created a functional home for themselves and expressed concern about being relocated and / or losing their homes. Children were observed playing next to the road within the community, and a few dogs were noted running along the road, in and around the community.

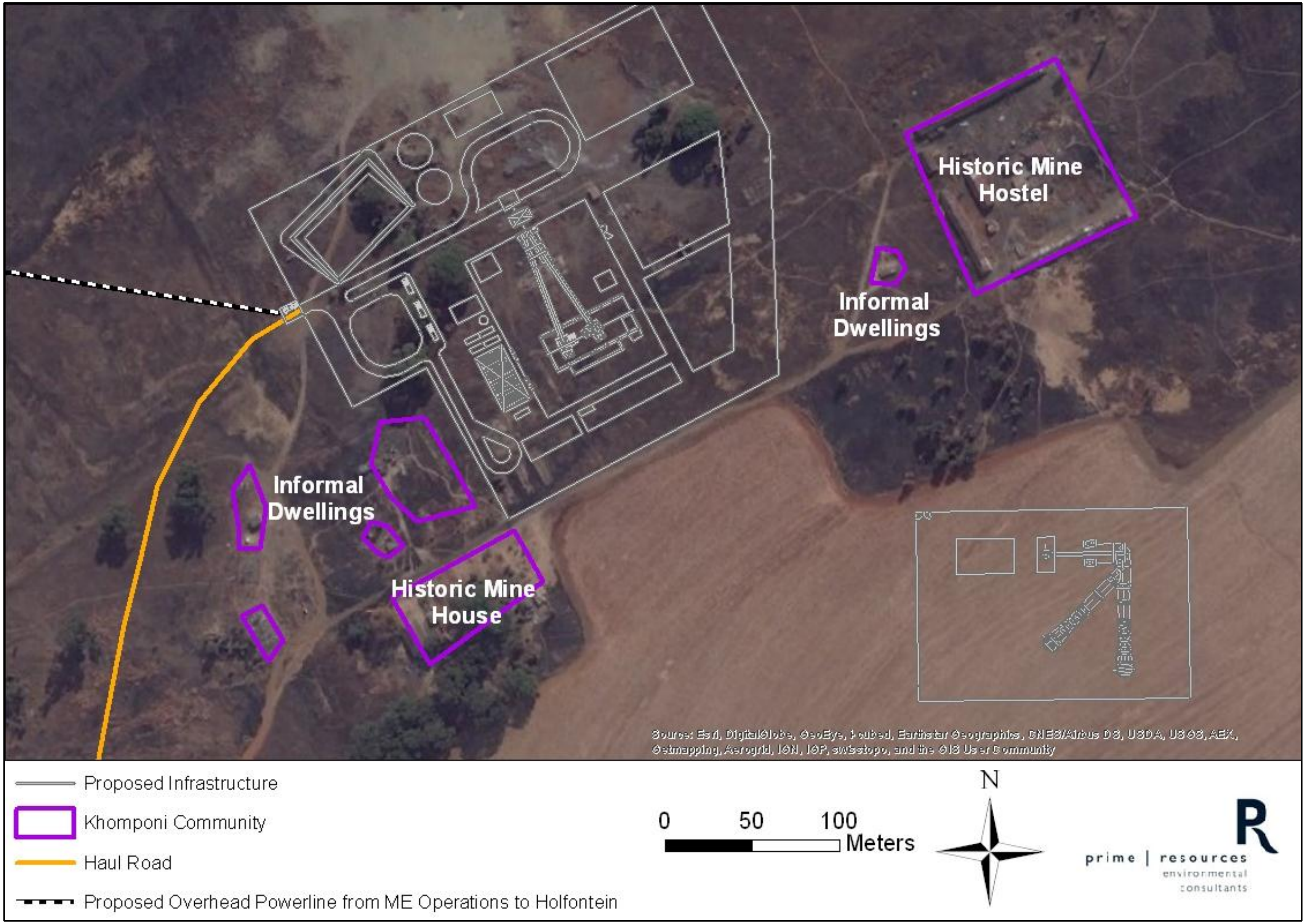


Figure 24: The Khomponi Community dwellings, surrounding the Holfontein shaft area

Photo 1: A housing block at the hostels.

Photo 2: Cooking on a paraffin stove.

Photo 3: Wood stockpile at the hostel.

Photo 4: Washing clothing in a wheelbarrow.

Photo 5: Chemical toilet at the hostel.

Photo 6: Small scale subsistence farming is undertaken at the hostel.

Photo 7: The central building near the hostel blocks, which is used as a church.	Photo 8: The Jo-Jo water tank located at the hostel, in the centre of the complex.

<u>The Holfontein Quarters Community</u>

The Holfontein Quarters Community is living within the historical mine houses (approximately 850 m from the proposed mining area), which fall within the Breswol AH on the other side of the N12 (Figure 25). This community occupies 13 houses (Photo 9 and 10), which each have a garage / outbuilding (some of which had been converted into housing), with an estimated 2 families / households per house. The main language spoken is Zulu but a few residents speak Pedi.

The mobile clinic does not visit the Holfontein Quarters community as it is considered too small and the nearest clinic is in Slovo Park, approximately 7 km away or in Etwatwa, approximately 4 km away. The nearest formal shops and police station are also in Etwatwa. Residents have access to taxis along Modder Road to get to Etwatwa (Figure 25).

Age and Gender

The community ranges from ages of 1 to 65. The many of the younger women have small children. The male to female ratio appears to be 1:1.

Education and Employment

Approximately 80 % of the working males (20 and older) have permanent / contract jobs at the Holfontein Hazardous Waste Landfill site.

Most of the children attend primary and secondary school in Slovo Park. A municipal school bus collects the children from Modder Road to take them to school.

Household Utilities

The community has no running water (see Photo 11), formal sanitation or electricity. Two large Jo-Jo water tanks are filled twice a week by the municipality (see Photo 12), however these tanks are not cleaned which poses a health risk to the community. The community have no formal sanitation and only have access to non-ventilated pit latrines. The community members use candles for lighting, paraffin for cooking and wood for heating.

Sense of place

The houses were observed to be in better condition than that of the house and hostel in the Khomponi Community, however many of the window panes had been broken and replaced with plastic or corrugated iron. Although the basic service provision needs of the community are being met they are still considered an informal settlement, as they do not have access to running water, electricity or formal sanitation. However, it should also be noted that similarly to the Khomponi Community, this community is well established and has created a functional home for themselves. Children were observed playing within the community, and a few dogs and chickens were noted in and around the area.

	
Photo 9: Holfontein Quarters Community live in 13 historical mine houses.	Photo 10: Each house has a garage / outbuilding, some of which had been converted into housing.
	
Photo 11: Laundry and washing is done using buckets	Photo 12: The two Jo-Jo tanks are refilled twice a week

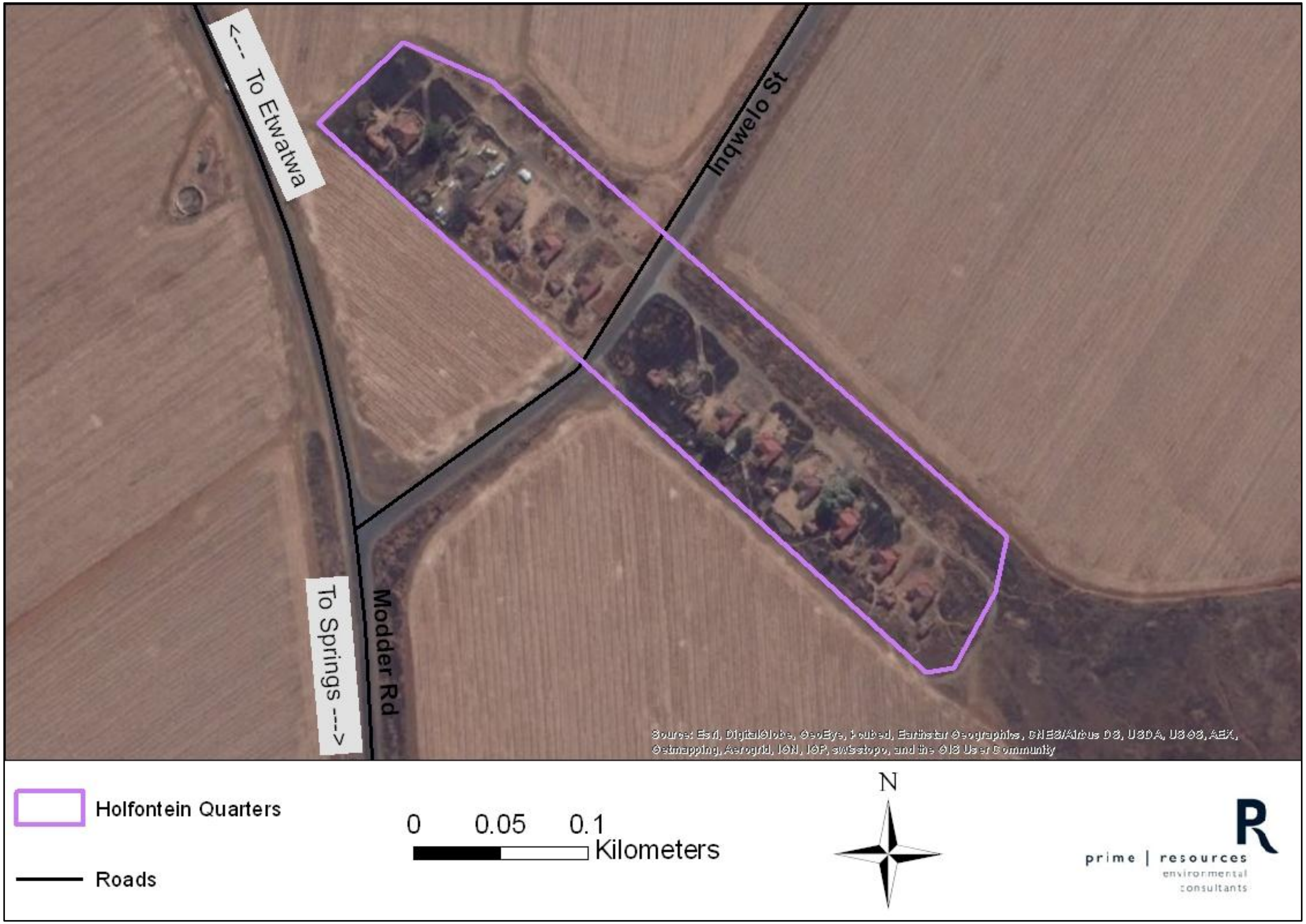


Figure 25: The Holfontein Quarters Community dwellings, on the other side of the N12

The Welgedacht Small Holdings (SH)

The Welgedacht SH community were identified as possible sensitive receptors to the Holfontein Project (Figure 26). The Welgedacht SH are dissected by four main roads running from east to west, off Pansy Avenue, namely Carnation Road, Dahlia Road, Phlox Road and Aster Road. These main roads are intersected by north-south running roads namely, Rose Avenue, Daisy Avenue and Poppy Avenue. The portions of land are used as either private residences, businesses or grazing land. The table below lists the residents and business owners who have registered on the Interested and Affected Parties (IAPs) database.

Table 9: Welgedacht SH registered IAPs

RESIDENT / BUSNIESS OWNER	PORTION NO.	DESCRIPTION
CARNATION ROAD		
East Rand Water Care Association (ERWAT)	1	Business: Welgedacht Waste Water Treatment Works (WWTW), which treats up to 35 Mℓ/d
Mr H. Backhoff	3	Private residence (see Photo 13)
Mr J. Backhoff	50	Open portion
Mr J. de Vries Mr B. de Vries	54	Business (Super Service Refrigeration) and private residence (see Photo 14)
	55	Open portion
Ms C. Govender Ms S. Govender	56	Private residence (see Photo 15)
Ms L. Swan	62	Business (Dialogic Management Services)
DAHLIA ROAD		
Ms C. Felicetti	12	Private residence
Mr Aslam	53	Private residence
Mr J. Backhoff	63	Business (Backhoff Transport CC)
Mr M. Khan	74	Business (Chicken Farm) and private residence
PHLOX ROAD		
Ms L. Erasmus	27	Private residence
Dr T. Chivonivoni	29	Business (Fish Farm) and private residence
Mr V. Fourie	83	Business
Mr K. Du Plooy	93	Private residence
POPPY AVENUE		
Mr Lawrence	43	Private residence
Mr Spencer	46	Private residence
Mr G. Mncube	47	Private residence
Mr H. Mxasa	51	Private residence

Some of the open portions of land had livestock (cows and/or sheep) grazing on them (see Photo 16) and may be used for subsistence farming practices.

	
Photo 13: Portion 3, Carnation Road (Backhoff residence)	Photo 14: Portion 54, Carnation Road (de Vries residence)
	
Photo 15: Portion 56, Carnation Road (Govender residence)	Photo 16: Open portion with cattle grazing

Age and Gender

The approximate age of residents and business owners is between 30 and 70 years old and the male to female ratio appears to be 1:1.

Employment and Education

The private residences were large and well looked after, with well-maintained gardens and significant security. Some of the homes had solar panels and at least 3 or 4 of the properties had dogs. It can thus be inferred that most private resident owners either run their own businesses from home or are employed elsewhere and are medium to high income earners. Unfortunately no information could be obtained regarding education levels.

Household Utilities

The houses and businesses in Welgedacht SH all use borehole water as their primary water source and do not have access to reticulated municipal water supply. It is assumed that most properties have access to formal sanitation and electricity.

Sense of Place

The private residence owners described their area as an originally low crime area, which is quiet and peaceful. However, some residents noted that there has been an increase in crime in the area over the last few years. Some residents have existing problems with seasonal flooding from the Holfontein Stream and Blesbokspruit.

Figure 26: Farm portions within the Welgedacht SH

xi) Terrestrial Ecology

According to the terrestrial ecology study conducted by SEF (attached as Appendix 15), the project area falls within the Grassland Biome, and comprises of two vegetation types. The proposed shafts as well as the eastern section of the proposed haul road are located in the Eastern Highveld Grassland vegetation type (classified as Endangered), while the remainder of the haul road is located in the Soweto Highveld Grassland vegetation type (also classified as Endangered). Eastern Temperate Freshwater Wetlands are associated with the Blesbokspruit and are located north and east of the haul road (refer to Figure 27). These vegetation types are further comprised of vegetation units (refer to Figure 28).

The National Environmental Management: Biodiversity Act, No. 10 of 2004 (NEMBA) provides for listing threatened or protected ecosystems. The proposed shaft and portion of the haul road falls into the Blesbokspruit Highveld Grassland ecosystem which is currently listed as Critically Endangered, while the remainder of the haul road is located in the Soweto Highveld Grassland ecosystem which is currently listed as Vulnerable (refer to Figure 29).

According to the Gauteng C-Plan V3.3 (2011) various areas which are associated with the Holfontein Project have been listed as Important due to the presence of suitable habitat for Red and Orange Listed plant species, Red Listed mammal species, Red Listed bird species as well as the presence of primary habitat (refer to Figure 30).

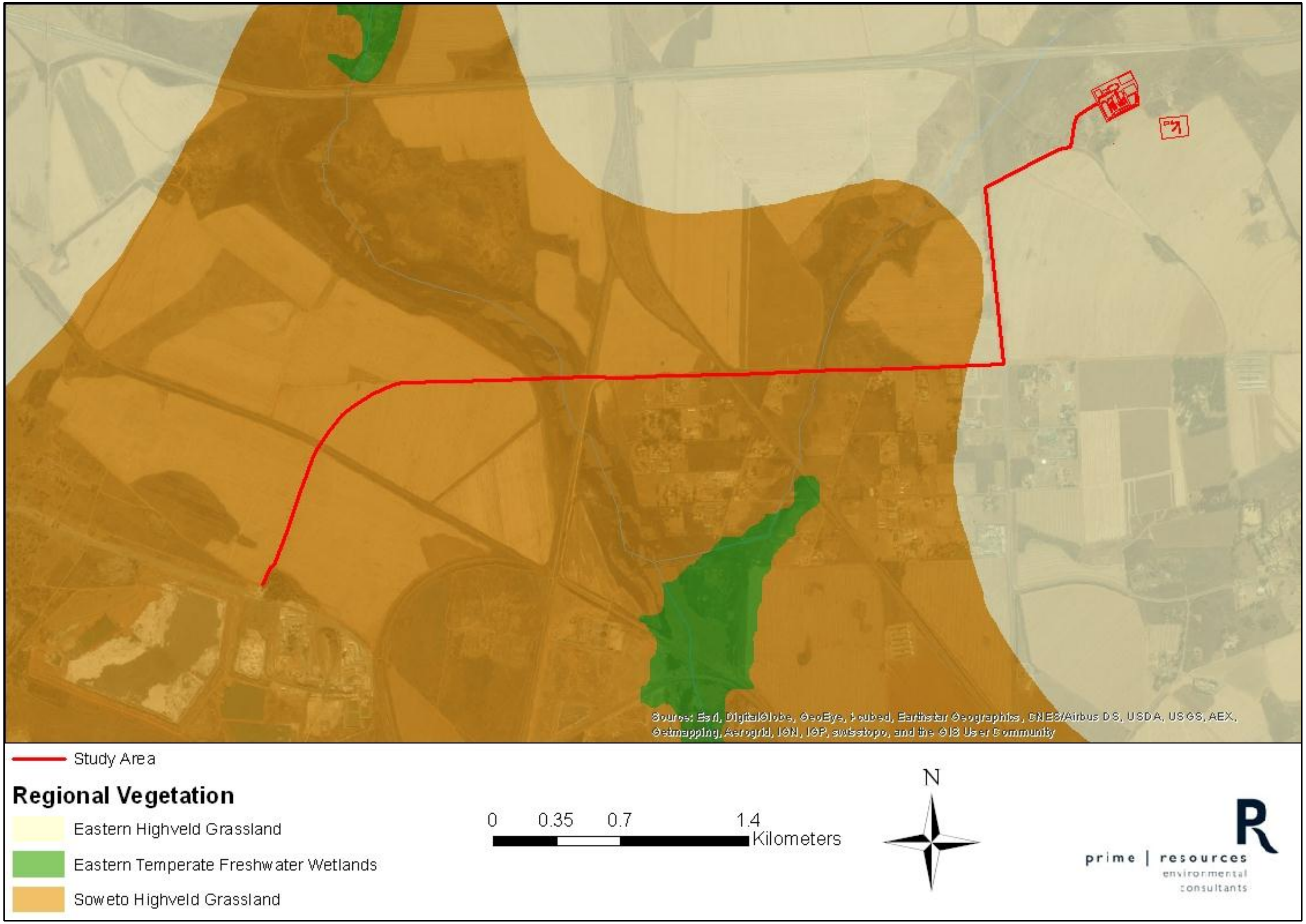


Figure 27: Regional vegetation within the project area (SANBI-BGIS)

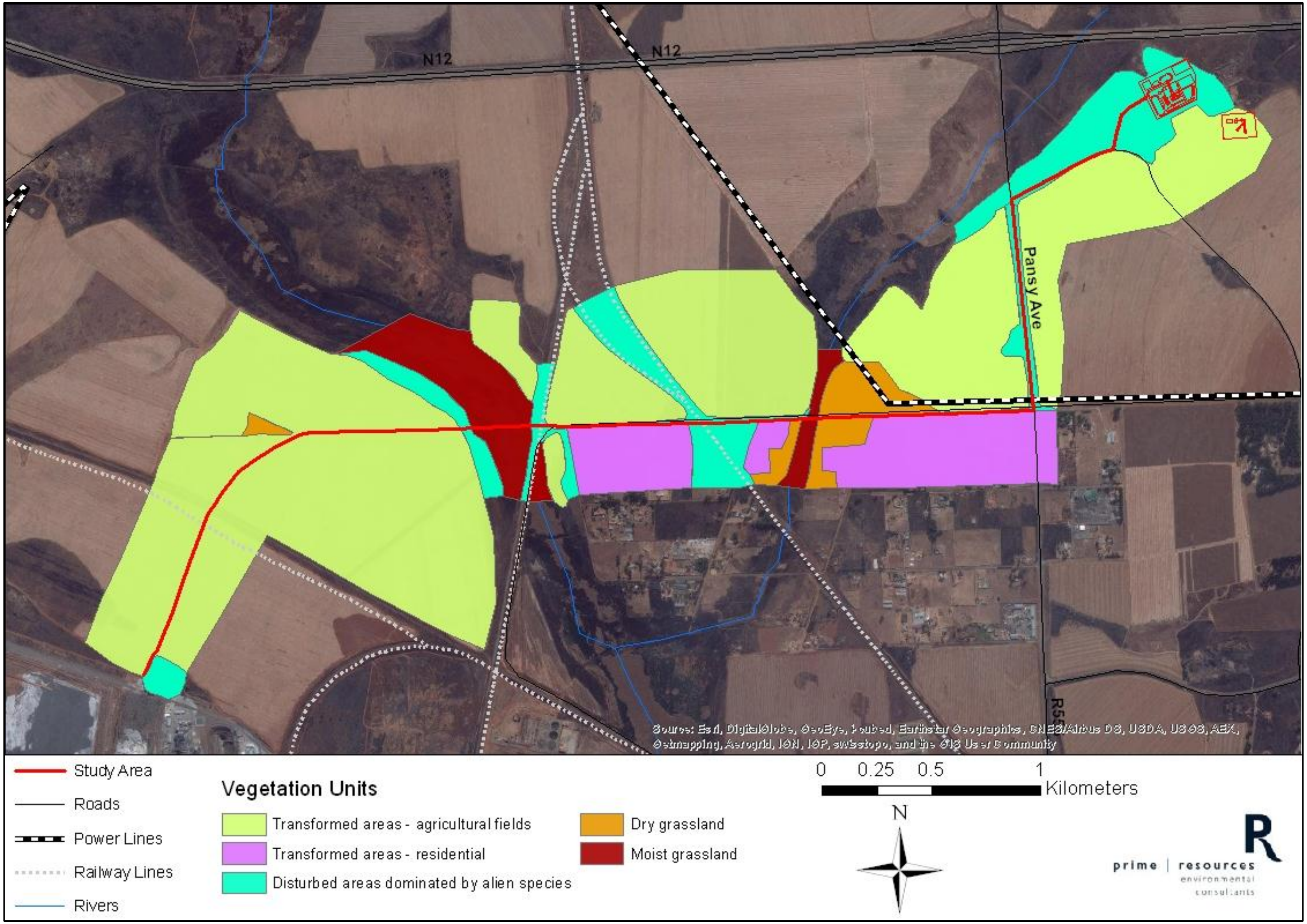


Figure 28: Vegetation units within the project area (SEF, 2015)

Figure 29: Ecosystems within the project area (SANBI-BGIS, NEMBA)

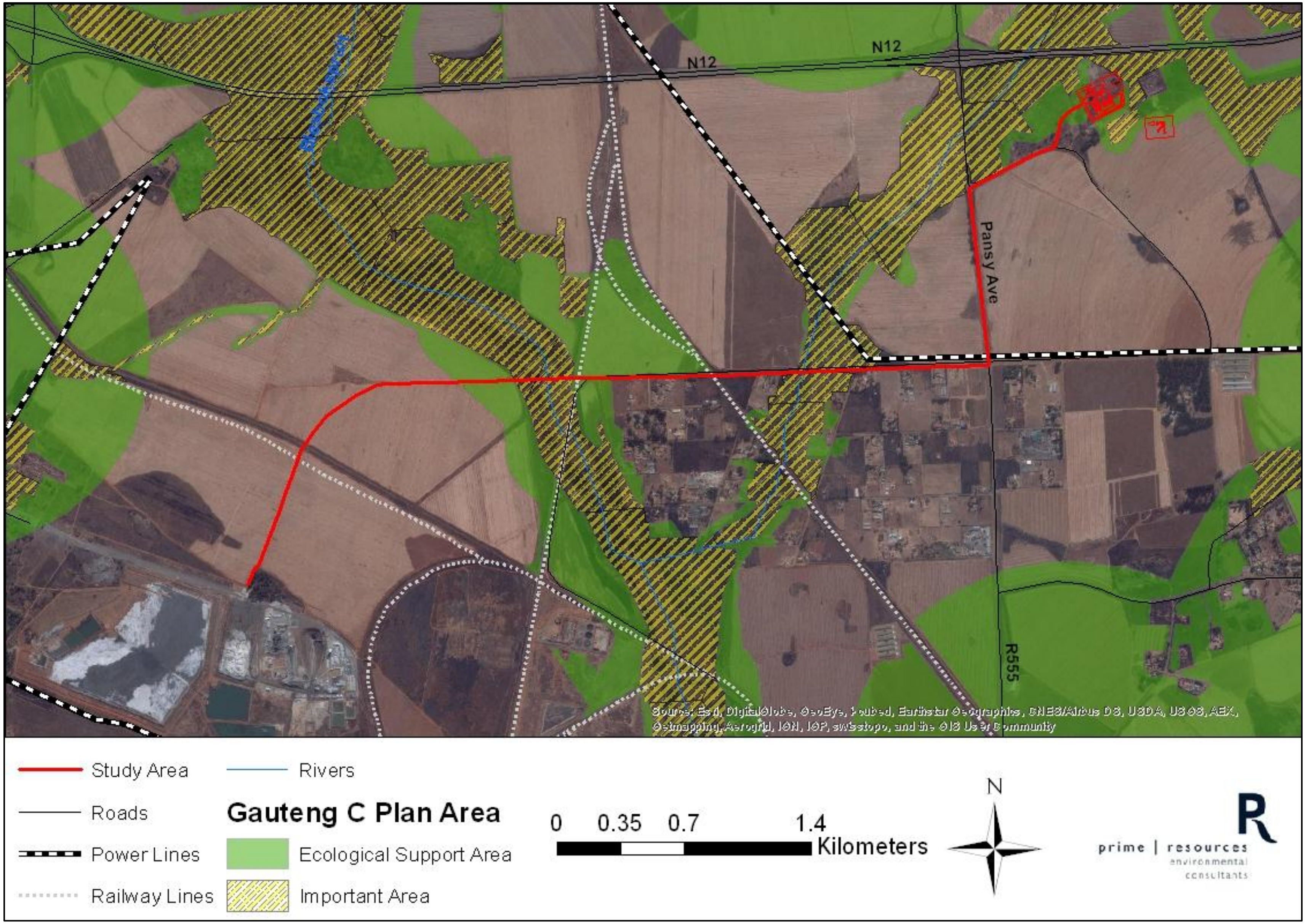


Figure 30: Areas identified in the Gauteng Conservation Plan (V3.3, 2011)

Plant species of conservation concern identified within the area include *Hypoxis hemerocallidea* and *Kniphofia typhoides* (Near Threatened) identified in the dry grassland and *Crinum bulbispermum* (Declining) confirmed adjacent to the Blesbokspruit in the moist grassland (refer to Figure 31).

Plant species of conservation concern, not confirmed, but for which suitable habitat exists include *Habenaria bicolor* (Near Threatened) and *Kniphofia typhoides* (Near Threatened) and the provincially protected *Argyrolobium campicola*.

One bird species of conservation concern namely *Glareola nordmanni* (Black-winged Pranticole; Near Threatened) was confirmed to occur within the project area. In addition to this, ten species of conservation concern were considered to have a medium likelihood of utilizing the study area for foraging, based on the presence of suitable habitat.

Four mammal species of conservation concern, *Leptailurus serval* (Serval; Near Threatened), *Dasymys incomtus* (African Marsh Rat; Near Threatened), *Rhinolophus clivosus* (Geoffroy's Horseshoe Bat; Near Threatened) and *Atelerix frontalis* (Southern African Hedgehog; Near Threatened) were given a high probability of occurring in the area based on the presence of suitable habitat (grassland and moist grassland) and the Blesbokspruit also supported healthy populations of the rare butterfly, *Metisella meninx* (Marsh Sylph) (refer to Figure 31).

The Blesbokspruit Important Birds and Biodiversity Area (IBA) is located approximately 10 km south of the Holfontein project area.

The site was assessed in terms of its conservation importance from a biodiversity (floral and faunal) perspective, as well as the ecological sensitivity and connectivity to other natural areas of the site to the proposed activity. Findings indicated that the proposed infrastructure falls within disturbed and transformed areas classified as having a low ecological sensitivity. Only portions of the existing road to be used as the haul road intersect dry and moist grasslands which are classified as having medium to high ecological sensitivity (refer to Figure 31).

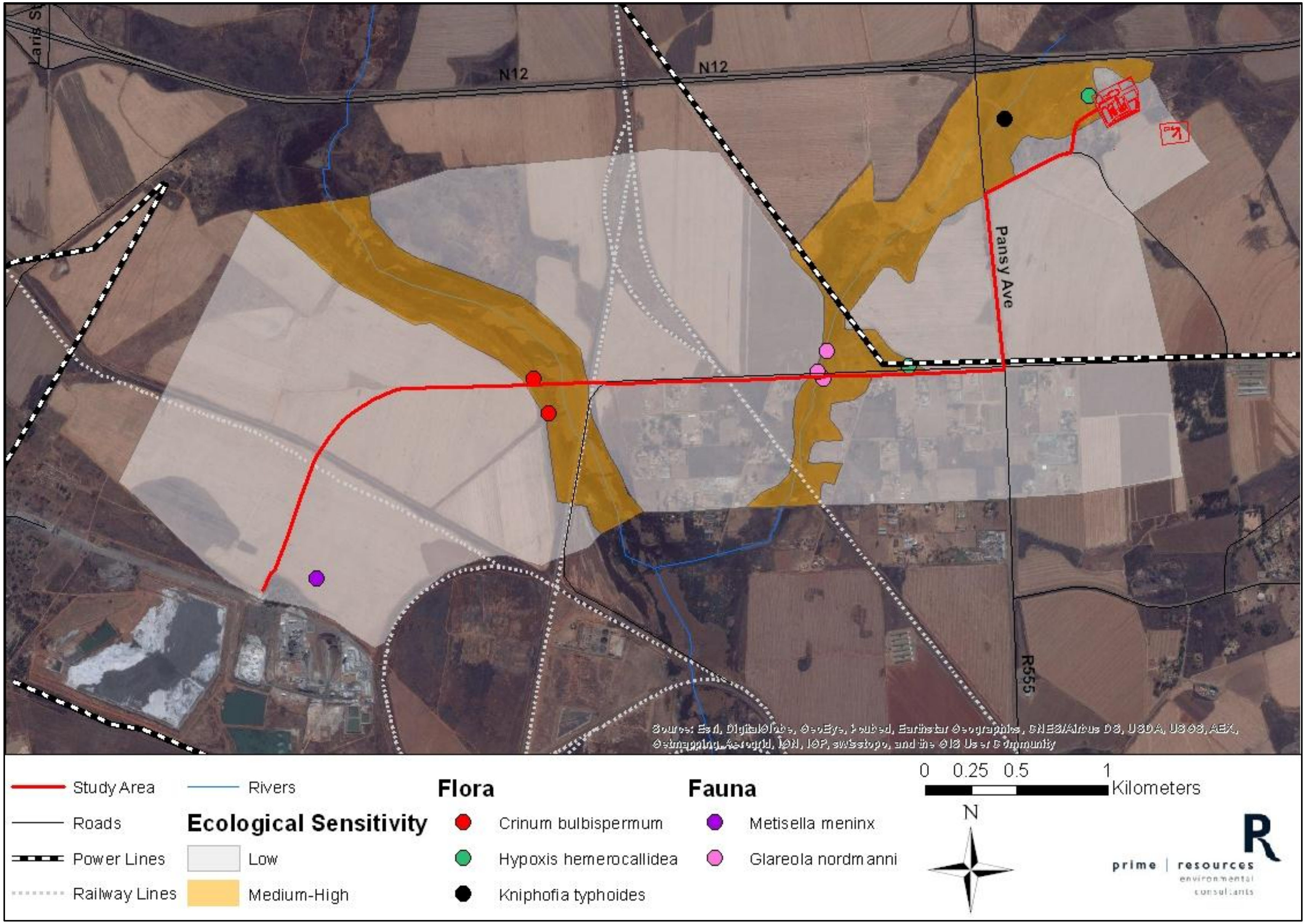


Figure 31: Ecological sensitivity of the project area

xii) Traffic

A traffic study was carried out by Siyazi (attached as Appendix 16). The road network associated with the project area includes the N12, Pansy Avenue, Holfontein Road, Carnation Road and an unnamed unpaved road (refer to Figure 32). The proposed project is located south of the N12 and east of Pansy Avenue. Pansy Avenue, Carnation Road and the unnamed unpaved road will serve as the haul roads between ME operations and the Holfontein Project.

The sections of the roads associated with the Holfontein Project can be described as follows:

Holfontein Road

- Local road providing access to surrounding farms and Holfontein shaft from Pansy Avenue;
- Road authority is Gauteng Department of Roads and Transport;
- Class number is R5;
- 30 m road reserve;
- One lane per direction;
- 3.5 m wide lanes;
- Asphalt surface;
- Speed limit not stated but 60km/h is recommended.

Pansy Avenue

- Minor arterial road providing access to the N12;
- Road authority is Gauteng Department of Roads and Transport;
- Class number is R3;
- 40 m road reserve;
- One lane per direction;
- 3.5 m wide lanes;
- Asphalt surface;
- Speed limit is 60km/h.

Carnation Road

- Local road providing access to farms and Welgedacht SH;
- Road authority is Gauteng Department of Roads and Transport;
- Class number is R5;
- 30 m road reserve;
- One lane per direction;
- 3.2 m wide lanes;
- Asphalt surface;
- Speed limit is 60km/h;
- Eskom Power line running alongside road.

Unnamed unpaved road off Carnation Road

- Local road providing access to farms;
- Class number is R5;
- Single unpaved road;
- 5.0 m wide lane;
- Gravel;

- Speed limit not stated but 40km/h is recommended;
- Road crosses over the Blesbokspruit.

Traffic Counts

Intersection assessments were undertaken at two intersections along Pansy Avenue [(at Holfontein Road (Point A) and Carnation Road (Point B)] (Figure 32 below). These intersections are currently performing at acceptable levels of service.

The following results were obtained from the traffic count conducted on 27th February 2015:

Table 10: Peak Hour Traffic volumes at the intersections of Pansy Avenue with Holfontein Road and Pansy Avenue with Carnation Road

	POINT A- HOLFONTEIN ROAD INTERSECTION	POINT B- CARNATION ROAD INTERSECTION
AM PEAK (06:45 – 07:45)		
Number of vehicles	917	941
PM PEAK (15:15 – 16:15)		
Number of vehicles	764	760

According to the noise study conducted by JH Consulting (attached as Appendix 12), the types of vehicles noted at the intersection of Pansy Avenue with Carnation Road included:

TIME	VEHICLE TYPES NOTED
14:35-14:45	C=107, HGV=17
14:47-14:57	C=98, HGV=4
14:57-15:07	C=101, HGV=5
15:09-15:19	C=114, HGV=9
15:23-15:33	C=110, HGV=9
15:34-15:44	C=100, HGV=6
16:10-16:20	C=98, HGV=6
16:21-16:31	C=94, HGV=4
16:33-16:43	C=117, HGV=9
16:45-16:55	C=126, HGV=4
16:56-17:06	C=103, HGV=8
19:10-19:20	C=50, HGV=10
19:22-19:32	C=30, HGV=8
21:05-21:15	C=12, HGV=0
21:17-21:27	C=26, HGV=6
22:25-22:35	C=2, HGV=2
22:36-22:46	C=7, HGV=2

C – Car
HGV – Heavy Goods Vehicle or Bus

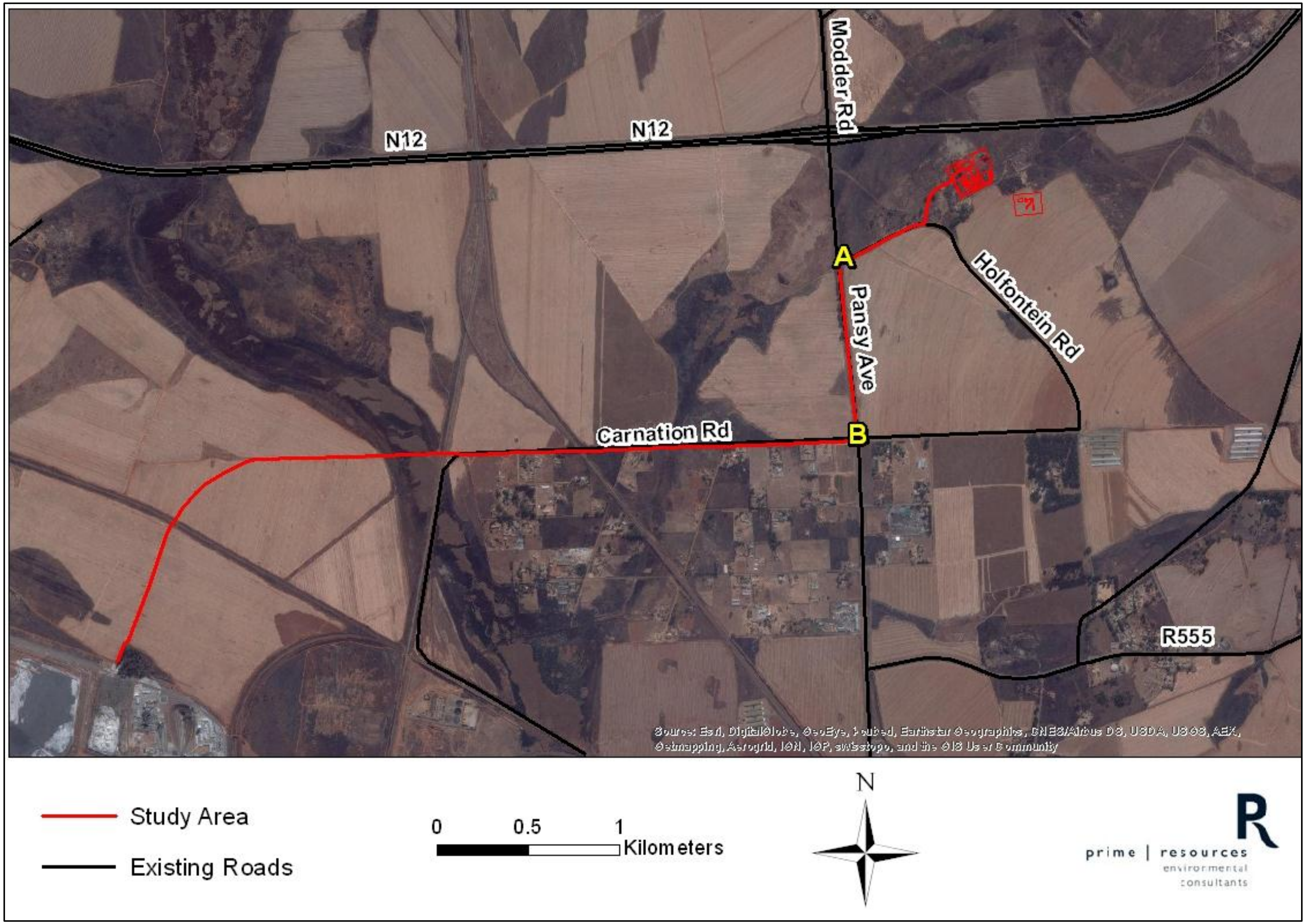


Figure 32: Roads and intersections associated with the project area

xiii) Visual Aesthetics

The following information was obtained from the visual study conducted by Prime Resources (attached as Appendix 17).

Landscape Characterisation

Two site visits were conducted at different times of the year, in September 2014 and March 2015. Crop height and landscape colour differed between the different times of year. Ploughing was taking place on the surrounding farms in September and the natural vegetation was dormant and brown giving the landscape a brown appearance. Crops were fully grown in March and the natural vegetation was active and green giving the landscape a green appearance. The Holfontein Stream and associated wetland are within sighting distance from the proposed site and when in flow they are indirectly visible by greener vegetation along the banks.

Landscape Quality

From the landscape quality assessment it was determined that the landscape quality of the study area (wider area in general) was Moderate and proposed site (site proposed for surface infrastructure, as it is currently, prior to any new development) was Low. The proposed site, prior to development, had a lower landscape quality score compared with that of the study area. Therefore, it was determined that it detracts from the overall scenic quality of the study area. This can be attributed to the fact that the proposed site has been disturbed by historic mining activities.

Sense of Place

Sense of place can be described as a viewer's sense of belonging and the extent to which a person can recognize or recall a place as being distinct from other places. In terms of land use the character of the landscape can be defined as mostly agricultural. The noise character at the Holfontein Project site is typical of a rural area dominated by natural noise primarily from birds, insects and domestic animals, with some noise from domestic activities in the adjacent informal residences as well as continuous background noise from vehicles on the N12 highway. The proposed site is not considered significant in terms of cultural heritage. The proposed site does not have distinct features that would allow for a wide spectrum of users or viewers to recognise it, indicating that it does not have a strong sense of place. The residents of the adjacent residences however have a firm sense of belonging and community and perceive the community as being peaceful.

Viewshed Analysis

Visibility was determined by means of a viewshed analysis for the mine infrastructure with the greatest potential visibility (shaft headgear and ventilation shaft). From the analyses it was determined that due to the undulating topography, visibility will be irregular. Field verification also confirmed a degree of visual absorption capacity in terms of vegetation screening due to the tall trees located at the proposed site as well as crops in the summer months.

The analysis revealed that based on the screening provided by topography alone, the proposed headgear has the potential to be visible from approximately 60 % of the area of potential impact (10 km radius) mostly from the west of the proposed site (refer to Figure 33), and the proposed ventilation shaft has the potential to be visible from approximately 40 % of the area of potential impact (10 km radius) also mostly from the west of the proposed site (refer to Figure 34).

The degree of visibility is influenced by distance and it was determined that the highest visibility of the proposed infrastructure would be in the foreground i.e. within a 1.5 km radius from the proposed site; visibility will decrease in the middle ground, between 1.5 km and 10 km, would have a lesser visibility; and although visibility will be possible from distances further than 10 km from the proposed site, the visual impact at this distance is expected to be low or insignificant because of the relatively small dimension of the mine in the total field of vision.

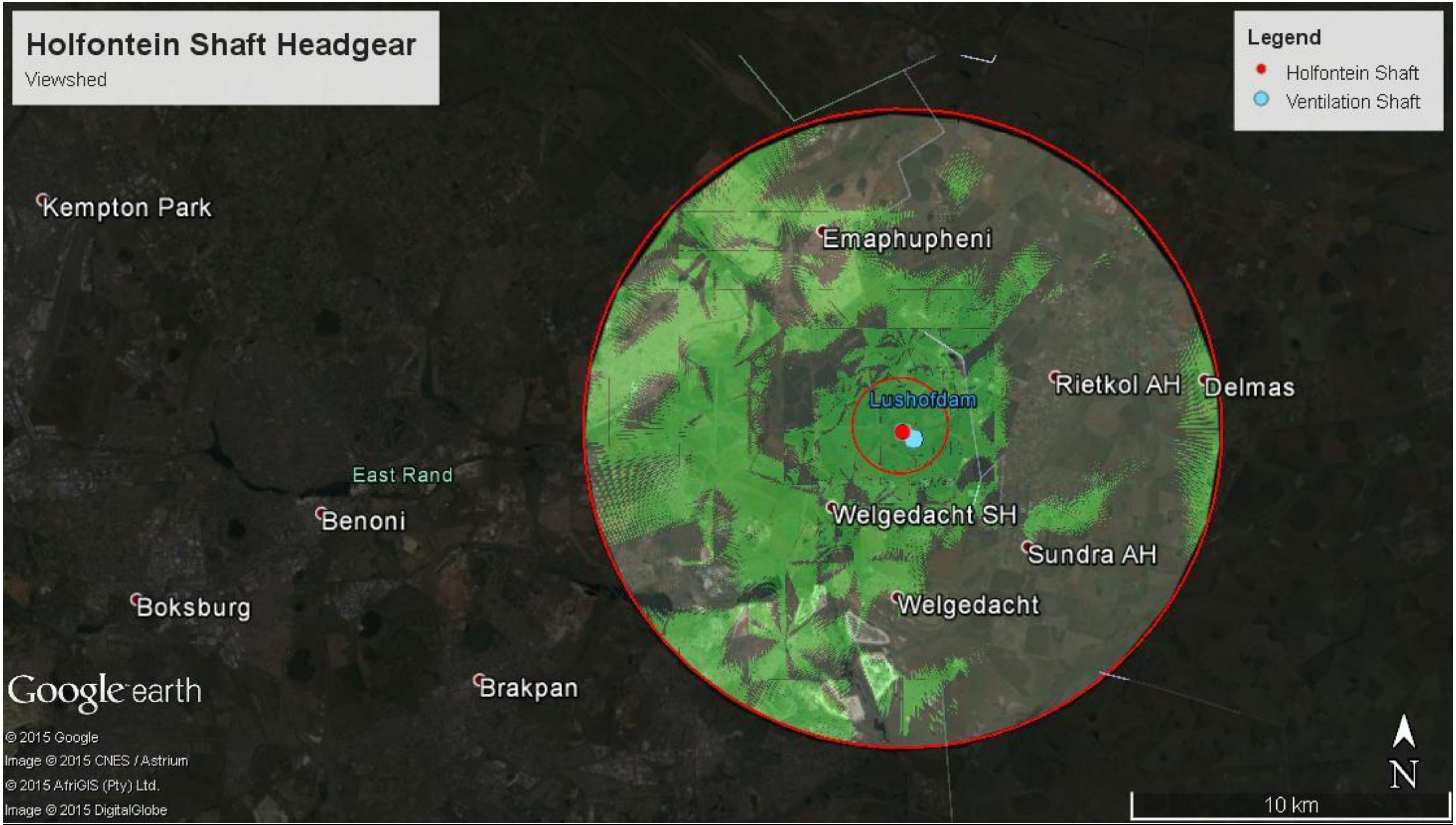


Figure 33: Holfontein shaft viewshed (areas from where the shaft is visible are indicated in green)

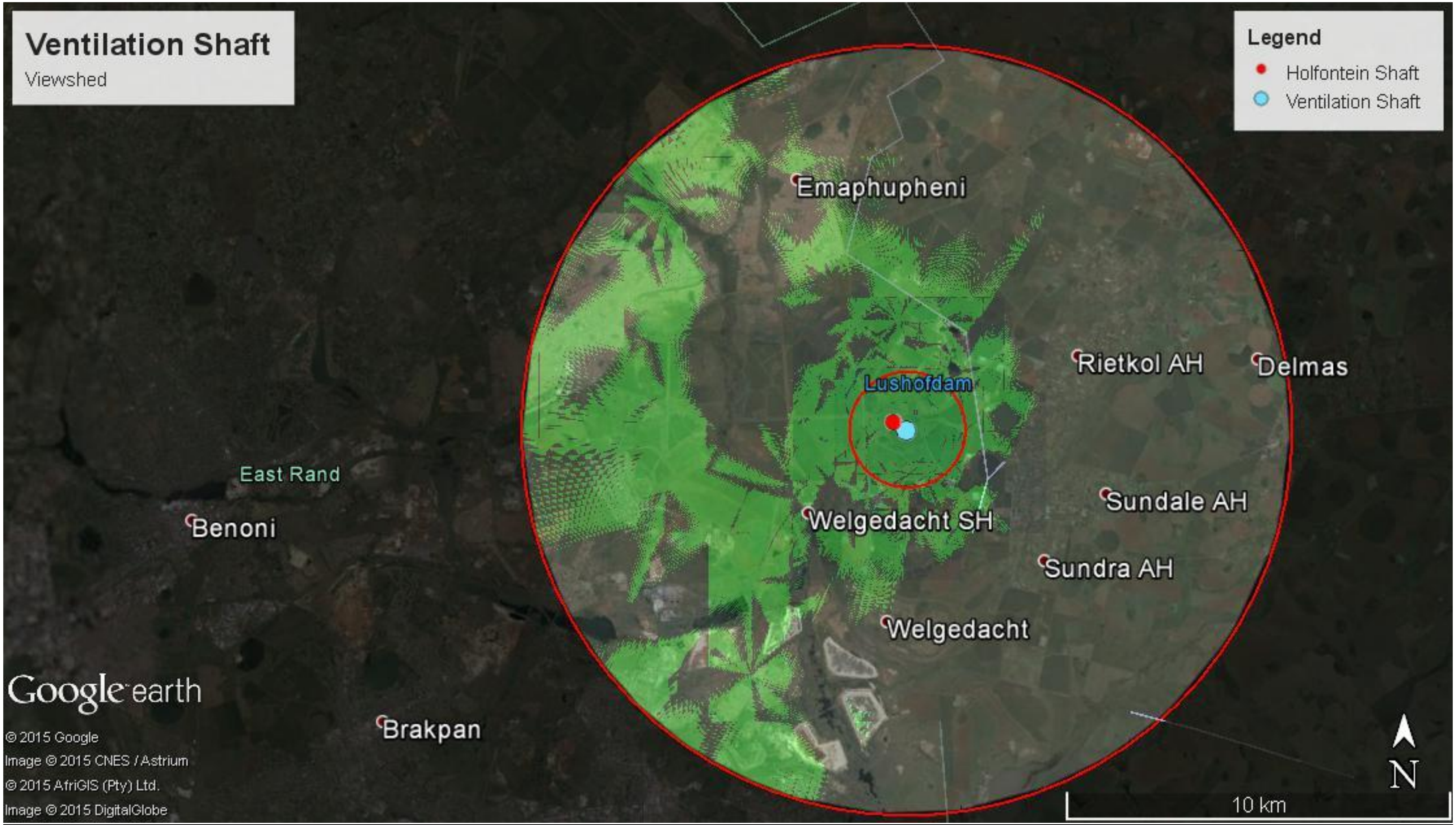


Figure 34: Ventilation shaft viewshed (areas from where the shaft is visible are indicated in green)

Visual Absorption Capacity

The Visual Absorption Capacity (VAC) is the capacity of the receiving environment to absorb the potential visual impact of the proposed development while maintaining existing characteristics. The VAC is primarily a function of the vegetation, and will be high if the vegetation is tall, dense and continuous. The topography, being gently undulating, does not provide significant background in terms of high ground or ridges. The development of mining operations in the area has over time established a degree of visual impact which in itself may be regarded as an absorption factor, as the proposed development is similar in size and substance to the existing developments.

Field verification at specific viewpoints (refer to Figure 35) confirmed a degree of visual absorption capacity in terms of vegetation screening due to the tall trees located at the proposed site as well as crops in the summer months.

Sensitive Visual Receptors

Visual receptors were determined using the viewshed analysis and field verification. A sensitivity assessment of the identified visual receptors was then carried out. The residents of the historic mine hostel and mine managers house as well as of the adjacent informal residences are the most sensitive visual receptors and are likely to be the most impacted due to their proximity to- and their permanent unobstructed view of the proposed development (refer to Figure 36). Occasional viewers will be present on roads around the proposed development with those on the N12 and surrounding farm roads within the foreground (1.5 km of the proposed site) identified as the most sensitive.

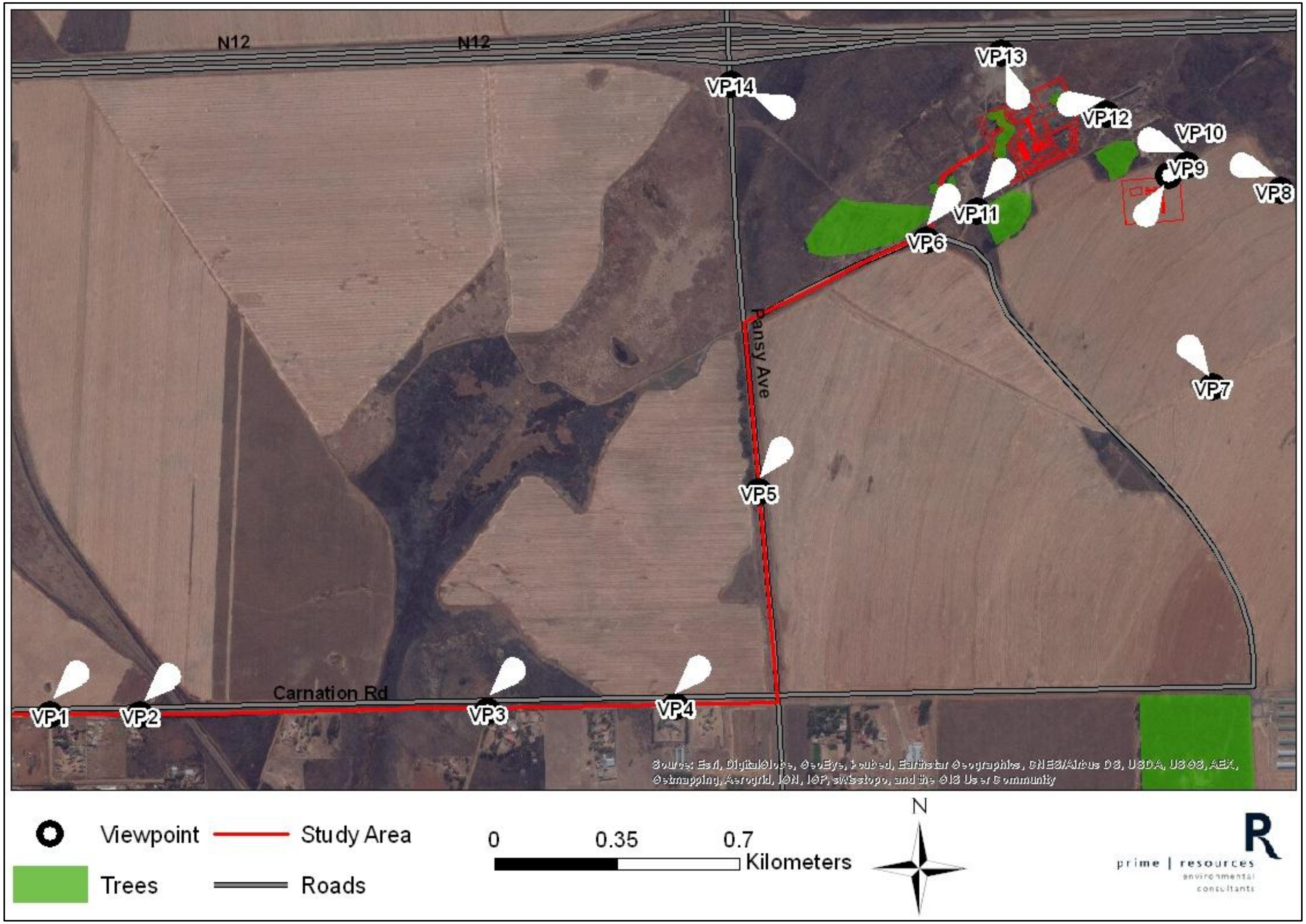


Figure 35: Viewpoints

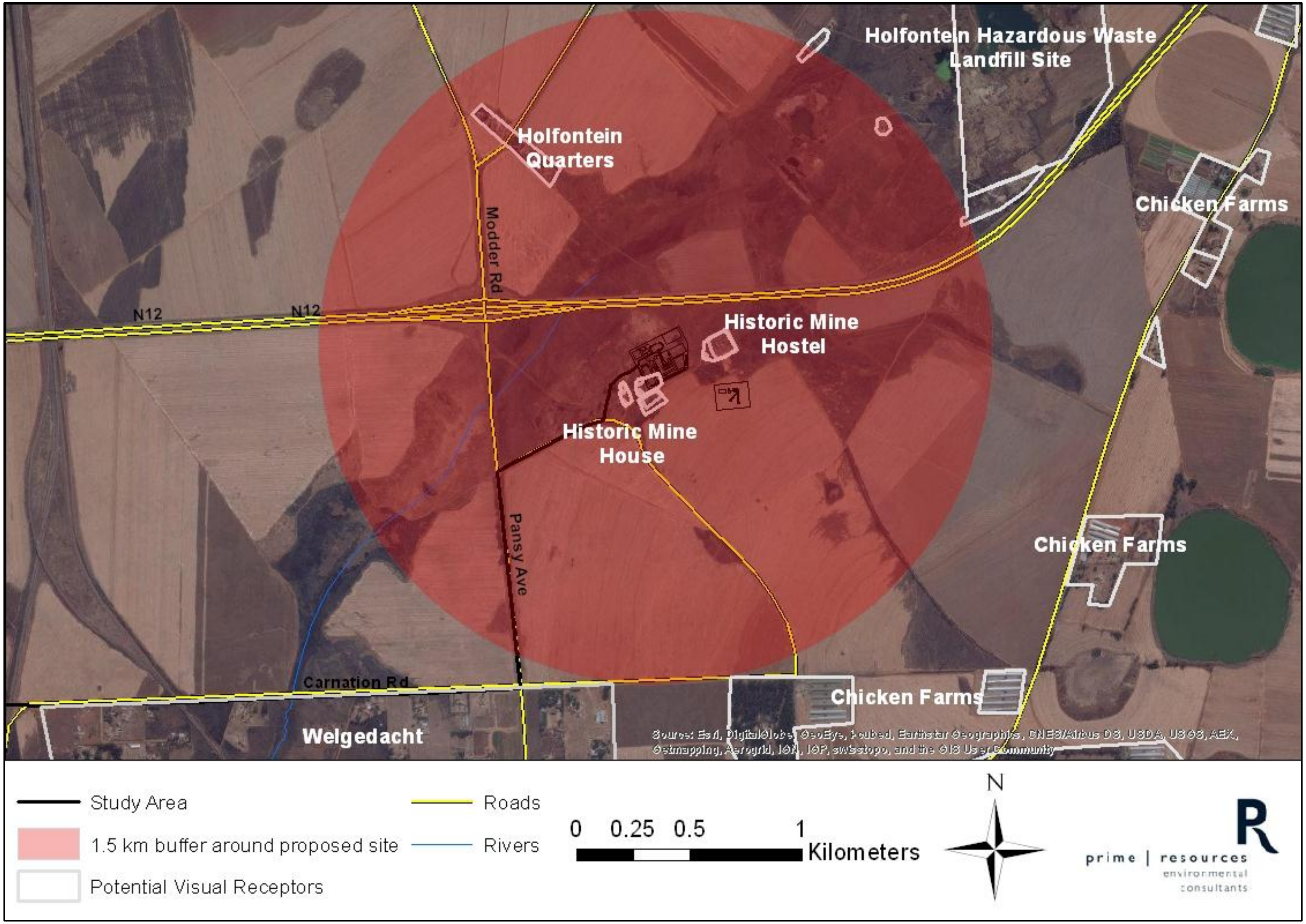


Figure 36: Sensitive visual receptors (red indicates the foreground)

xiv) Wetlands

A wetland study was conducted by SEF (attached as Appendix 18) from which the following baseline information was obtained. According to the assessment, three hydro-geomorphic units (HGM), comprising three HGM types, were delineated and classified within the project area and within 500 m surrounding the proposed surface infrastructure. The HGM types included a valley bottom floodplain wetland, an unchannelled valley bottom wetland and a hillslope seepage wetland connected to a watercourse.

The Blesbokspruit wetland was artificially transformed from the early 1930s to a permanently inundated status as a result of various discharges of large quantities of water from surrounding underground gold mines, Sappi Enstra Paper Mill and upstream Welgedacht WWTW. Consequently, while the associated section of the Blesbokspruit watercourse was observed to express a non-perennial nature, the system was still suspected to be supported by a number of upstream industrial discharges as well as increasing urban runoff from developing areas in southern Gauteng.

<u>NFEPA Wetlands</u>

Freshwater Ecosystem Priority Area (FEPA) wetlands identified within the project area and vicinity include the Blesbokspruit wetland as well as several tributaries of the Blesbokspruit wetland (refer to Figure 37).

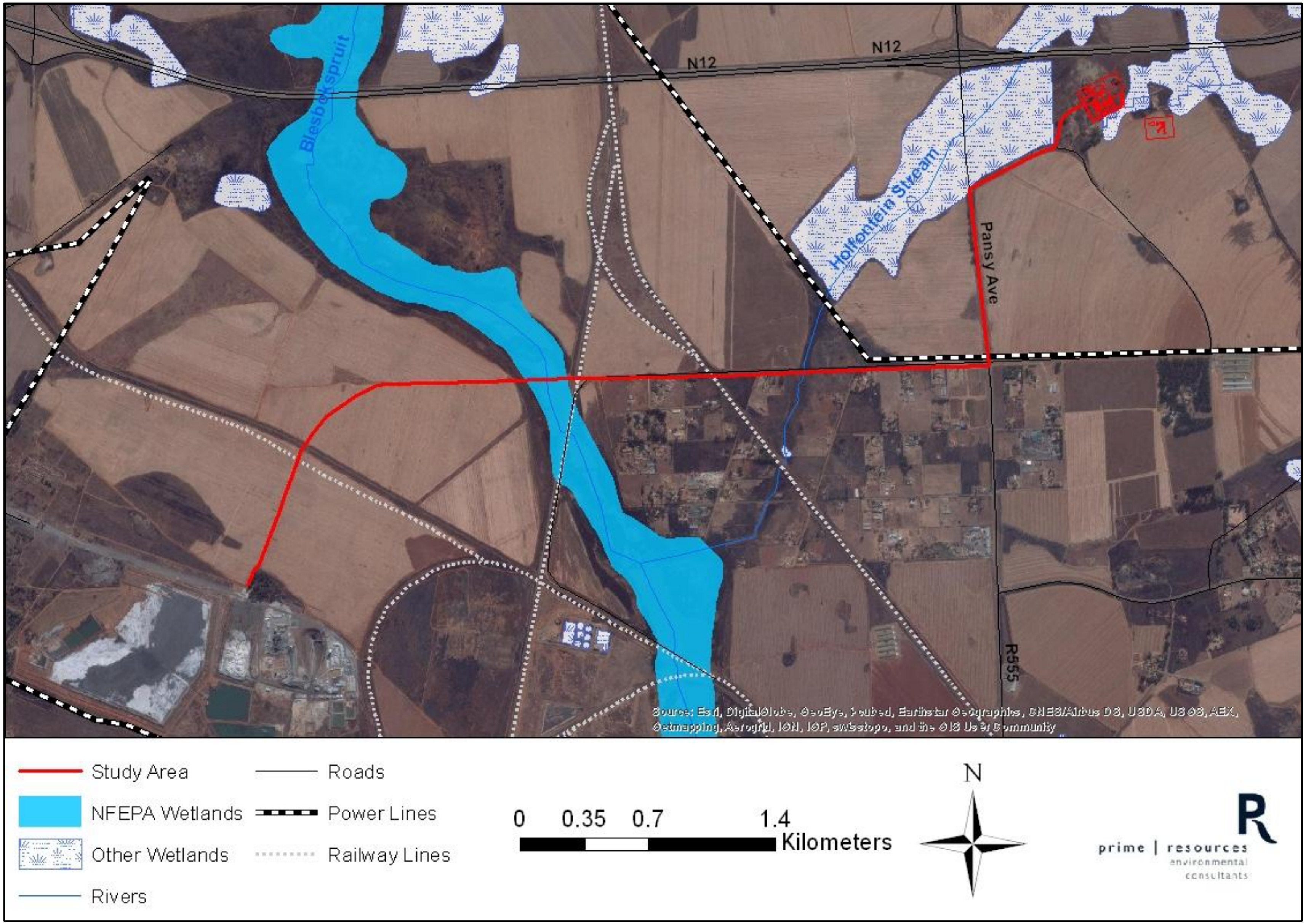


Figure 37: NFEPA map of the project area

Hydric Soils

Hydric soil forms identified within temporary and seasonal wetland zonation supported the Longlands, Pinedene Sepane, Tukulu, Bloemdal, Bainsvlei and Glenrosa soil forms. The Katspruit and Champagne soil forms were identified within the permanent zonation of wetland habitat.

Wetland Vegetation

Permanent wetland areas in the project area contained *Phragmites australis*, *Typha capensis*, *Leersia hexandra* and *Persicaria* sp., with a mixture of facultative and terrestrial species (mostly graminoids and weeds) dominating the seasonal and temporary wetland areas, including species such as *Imperata cylindrica, Agrostis lachnantha, Verbena bonariensis, Eragrostis plana, Helichrysum rugulosum, Andropogeon eucomus, Panicum schinzii, Hemarthria altissima, Crinum bulbispermum (declining) Kyllinga spp., Cyperus marginatus, Pycereus macranthus, P. nitidus, Schoenoplectus brachyceras, Juncus sp., Satyrium sp., Kniphofia typhoides (Near Threatened), Fimbristylis sp.* and *Isolepis setacea.*

Delineated Wetland Areas

Three hydro-geomorphic units (HGM) namely a valley bottom floodplain wetland, an unchannelled valley bottom wetland and a hillslope seepage wetland connected to a watercourse, were delineated and classified within the study area and within 500 m of the proposed surface infrastructure (refer to Figure 38).

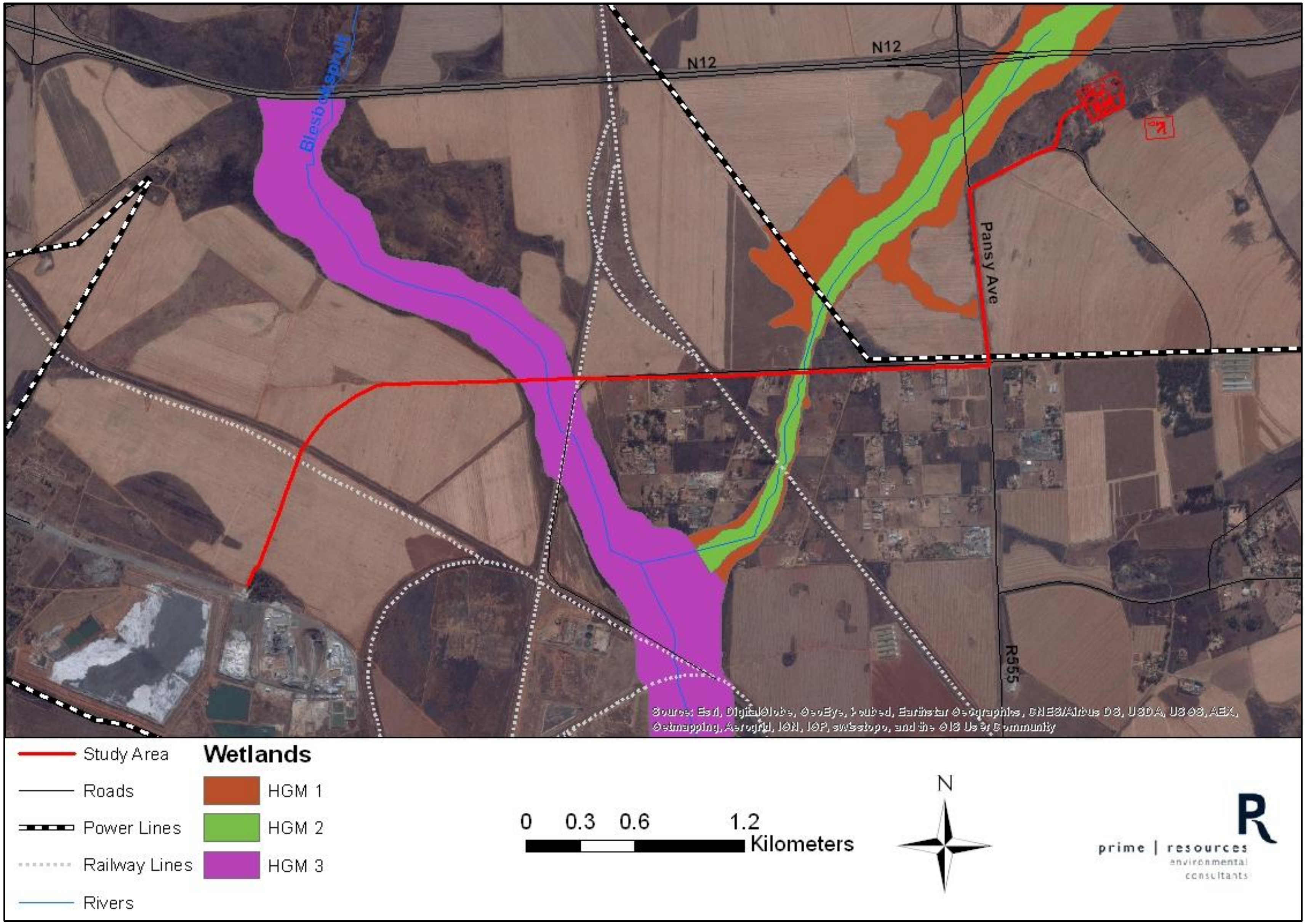


Figure 38: Delineated wetlands around the project area

Functional and Present Ecological State

HGM 1- Unchannelled valley bottom wetland

- PES and associated wetland functionality within the project area were reduced as a result of the historic and current anthropogenic land uses;
- PES Category C, representing a moderately modified system;
- Water inputs (derived from its catchment) and water retention and distribution patterns have been altered;
- The largest impact on the hydrology was canalisation within a naturally unchannelled system;
- Highest ecosystem services scores for sediment trapping, phosphate removal, nitrate removal, erosion control and maintenance of biodiversity (refer to Figure 39 below).

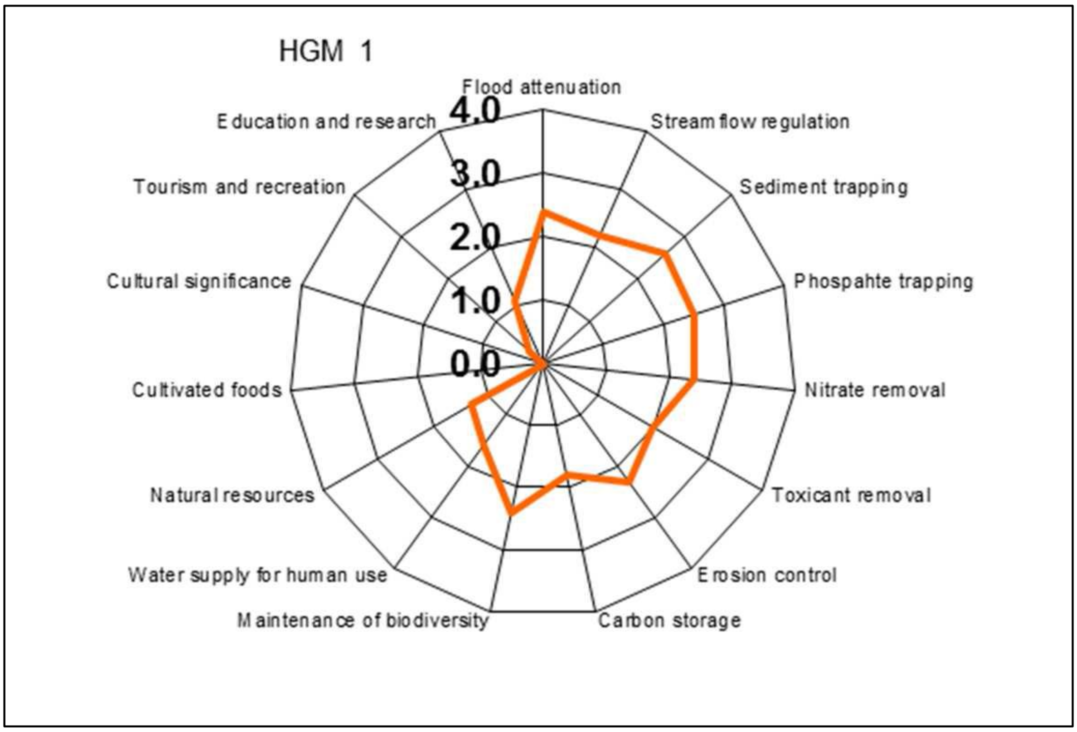


Figure 39: Spiderweb diagram depicting ecosystem services for HGM 1

HGM 2- Hillslope seepage connected to a watercourse

- PES and associated wetland functionality within the project area were reduced as a result of the historic and current anthropogenic land uses;
- PES Category C, representing a moderately modified system;
- Water inputs (derived from its catchment) and water retention and distribution patterns have been moderately altered;
- Highest ecosystem services scores for stream flow regulation, sediment trapping, toxicant and nitrate removal, erosion control and biodiversity (refer to Figure 40 below).

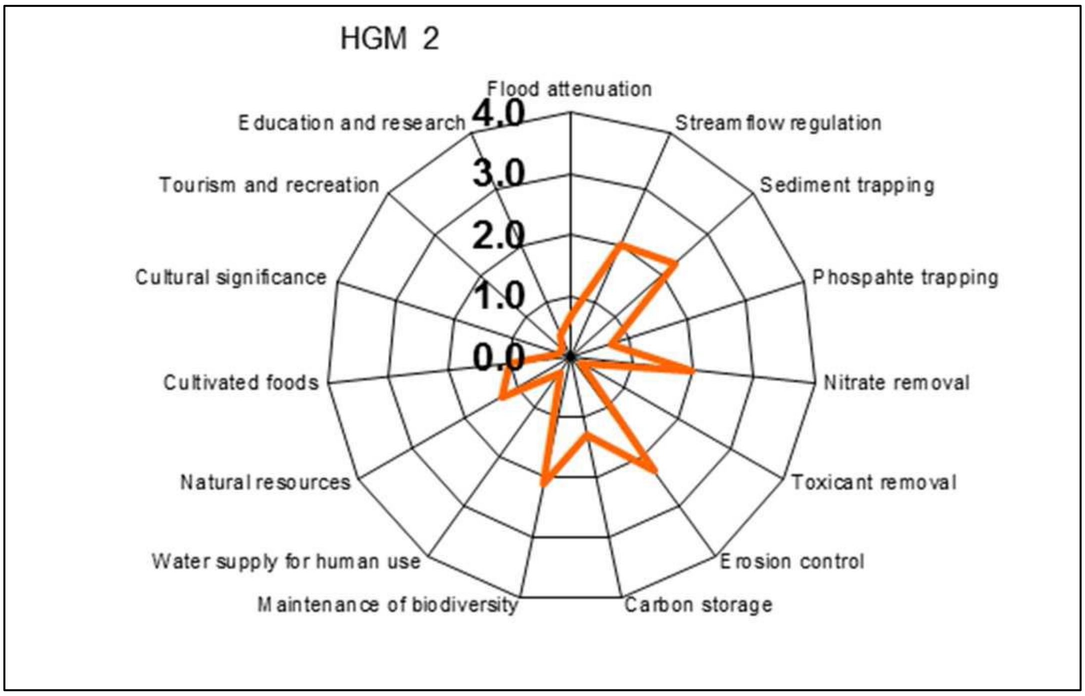


Figure 40: Spiderweb diagram depicting ecosystem services for HGM 2

HGM 3- Valley bottom floodplain wetland

- Can provide water to several downstream users throughout the year, particularly during the dry winter months;
- Regulates flow and controls erosion and flooding in the surrounding areas by absorbing excess of running and discharged waters from various sources as a result of the extensive reedbeds that have developed;
- PES Category F, representing a critically modified system;
- The largest impact on the hydrology and geomorphology of the system was the construction of several linear impeding features combined with increased water inputs from mines, industry and sewerage works, which have changed the wetland from a narrow meandering nonperennial stream with an associated "wet meadow" wetland, to a permanently inundated floodplain;
- As a result of the large size and regional importance in terms of functionality, HGM 3 received relatively high ecosystem services scores compared to other wetlands in the vicinity (refer to Figure 41).

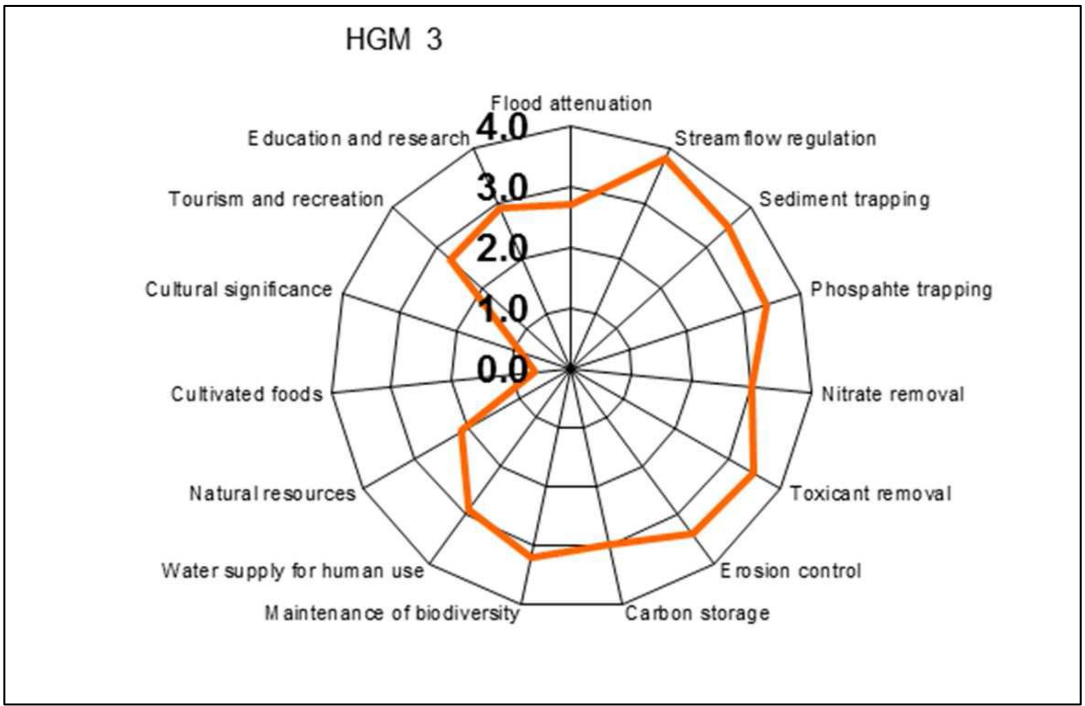


Figure 41: Spiderweb diagram depicting ecosystem services for HGM 3

Ecological Importance and Sensitivity Assessment

Wetlands within the project area serve to improve habitat within and potentially downstream of the project area through the provision of various ecosystem services, including sediment trapping, nitrate removal, toxicant removal, erosion control, carbon storage, maintenance of biodiversity and flood attenuation. PES scores were determined for wetlands within the project area using Wet-Health Level 2 assessment which indicated that two of the wetlands were in a moderately modified state and one wetland, the Blesbokspruit wetland, was critically modified. The Ecological Importance and Sensitivity Assessment was undertaken to rank water resources in terms of provision of goods and services or valuable ecosystem functions which benefit people, biodiversity support and ecological value, and reliance of subsistence users.

Ecological Importance and Sensitivity assigned to the HGM units ranged from low to high depending on their specific attributes within the project area. The **moderate** Ecological Importance and Sensitivity assigned to **HGM 1** unit can be attributed to potential and confirmed biodiversity features such as *Kniphofia typhoides* (Near Threatened) and *Crinum bulbispermum* (declining) associated with the unchannelled valley bottom. HGM 1 also plays a supporting ecological and hydrological role to HGM 3 (Ramsar site). **HGM 2** was considered to be of **low** ecological functional and human benefit importance although from a hydrological importance it does support HGM 2. It also provides extended grazing opportunities compared to terrestrial grasslands as a result of the higher moisture content of graminoids that is available later in the season. The most important wetland in terms of Ecological Importance and Sensitivity (moderate - high score) was the Blesbokspruit Floodplain as a result of the Ramsar status directly downstream of **HGM 3** in combination with several confirmed biodiversity features and hydrological functional importance associated with the wetland in the project area.

b) Description of the current land uses

Land use data for the Holfontein Project area was obtained from the Ekurhuleni GIS Data 2007 Land Use Map. The land use associated with the proposed surface infrastructure is classified as residential, with the historical mine buildings being occupied. The land use associated with the proposed ventilation shaft is classified as low value cultivation/ agriculture (refer to the photographs below and Figure 42). The haul road route currently exists as asphalt and gravel roads – no new roads will be constructed aside from the access road branching off of Holfontein Road.

The initial and follow up site visits (2 September 2014 and 4 March 2015) confirmed the current land uses (refer to the photographs below).

- Within the proposed surface infrastructure area there are concrete foundations and various remnants associated with the existing (historical) Holfontein mine shaft (Photo 1).
- Along the boundary of the proposed surface infrastructure area, the historical mine buildings are occupied, and have associated subsistence farming activities (Photo 2 and 3).
- The ventilation shaft location is within an agricultural area that was supporting soya bean at the time of the site visits.

Photo 1: Remnants of historical infrastructure at the Holfontein Mine Shaft

Photo 2: Occupied historical mine buildings in the vicinity of the proposed project area

Photo 3: Occupied historical mine buildings in the vicinity of the proposed project area

i) Description of specific environmental features and infrastructure on the site

The infrastructure within the proposed site is limited to historical mining remains (Photos 1, 4 and 5). There is also indigenous vegetation present within the project site (Photo 6) and cultivated land (soya bean) in the area where the ventilation shaft is to be located (Photo 7).

Photo 4: Historic mining remains – concrete foundations of the Holfontein shaft

Photo 5: Historic mining remains – concrete foundations of the Holfontein shaft

Photo 6: Natural vegetation within the project area

Photo 7: Soya bean farming

ii) Environmental and current land use map (Show all environmental, and current land use features)

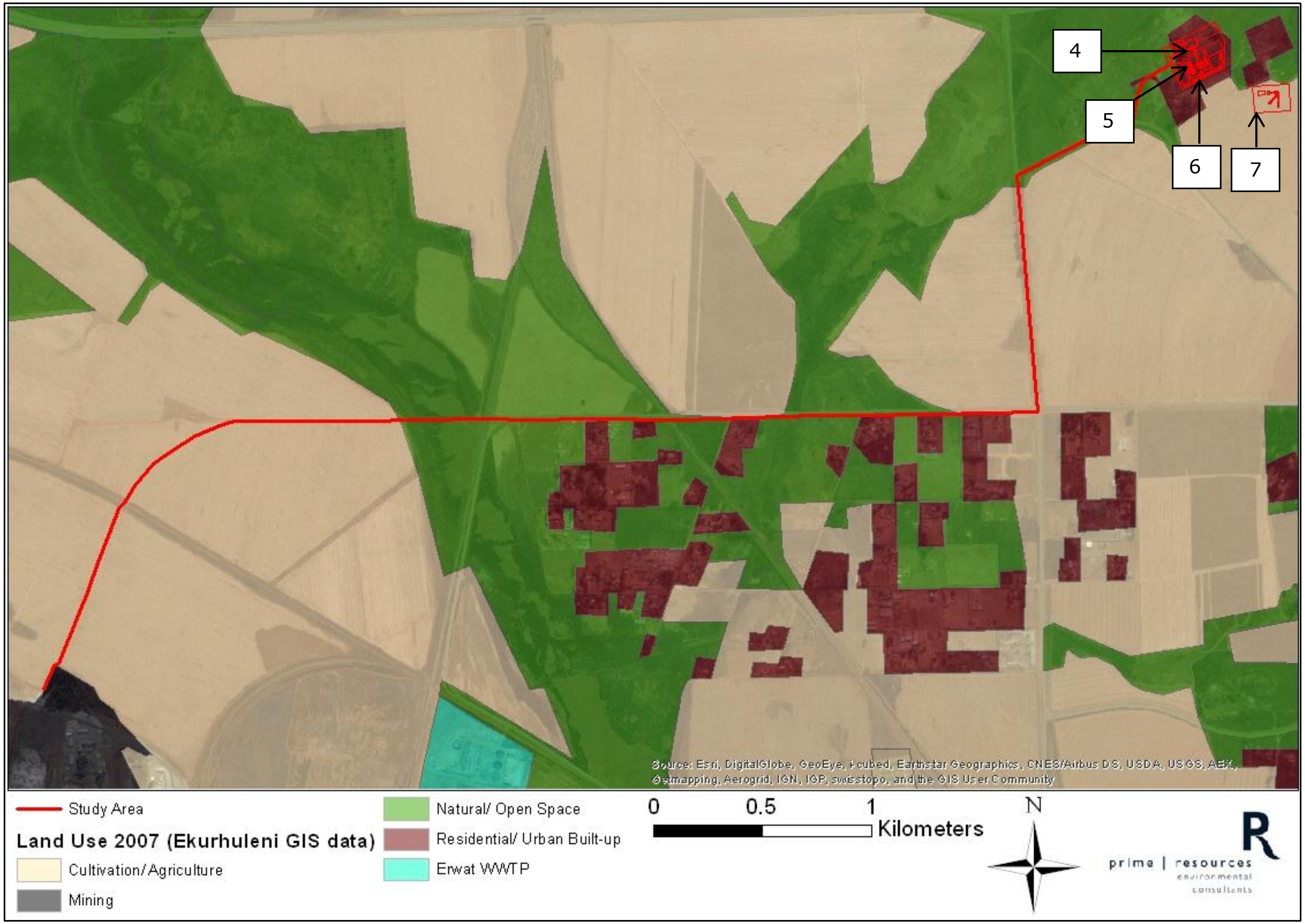


Figure 42: Ekurhuleni 2007 Land Use Map for the project area (numbers correlate with photo numbers)

11. IMPACTS AND RISKS IDENTIFIED INCLUDING THE NATURE, SIGNIFICANCE, CONSEQUENCE, EXTENT, DURATION AND PROBABILITY OF THE IMPACTS, INCLUDING THE DEGREE TO WHICH THESE IMPACTS CAN BE MITIGATED

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

Air Quality

Construction Phase

The construction phase of the project is anticipated to last for a period of approximately 2 years (of which only 6 months will involve clearing and construction of surface infrastructure; the remainder will involve dewatering and refurbishing the shaft). Prior to any earthworks taking place, affected areas will be cleared (i.e. stripped of vegetation), resulting in the generation of particulate emissions (i.e. $PM_{2.5}$, PM_{10} and TSP). Particulate emissions will also be generated by construction/ building activities such as earthworks, material handling, cutting, grinding, sawing, filling of skips, stripping of waste rock, use of chutes, and vehicle entrainment on unpaved roads. Stockpiled materials (i.e. topsoil) as well as exposed areas are subject to wind erosion if not managed appropriately.

Gaseous emissions will be generated via vehicle tailpipe emissions from construction vehicles, and include nitrogen oxides (NOx), carbon monoxide (CO) and sulphur dioxide (SO_2). Vehicle tailpipe emissions from construction vehicles and equipment are considered negligible due to the low volume of vehicles and equipment to be utilised which will be confined to site for most of the construction period.

Dust Fallout (TSP)

The modelled average daily dust fallout from construction activities at the surrounding sensitive receptors falls below the National Dust Regulations' acceptable fallout of 600 $mg/m^2/day$ for residential areas (refer to Figure 43). Therefore, the likelihood of the occurrence of nuisance impacts resulting from dust fallout due to construction activities is considered to be low.

The modelled average daily dust fallout beyond the site boundary, not within residential areas, is below the acceptable dust fallout of 1 200 $mg/m^2/day$ for non-residential areas. The modelled average daily dust fallout across surrounding cultivated areas ranges between 6 and 50 $mg/m^2/day$ for the construction phase scenario (refer to Figure 43). As the dust fallout across surrounding cultivated areas is expected to be low, the likelihood of impacts on crop growth is considered to be low.

- The potential impact on the ambient air quality will cease once the construction-related dust generating activities cease at the end of construction.
- The potential nuisance impact of dust can be mitigated by implementing dust suppression

measures. The potential impact on air quality at surrounding sensitive receptors has a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.

- The potential impact of dust on crop growth can be mitigated by implementing dust suppression measures. The potential impact on air quality at surrounding sensitive receptors has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

PM_{10} and $PM_{2.5}$

Average Daily and Annual Concentrations

The modelled average daily and annual PM_{10} concentrations generated from construction activities fall below the NAAQS limit values of 75 µg/m^3 and 40 µg/m^3 respectively at all the surrounding sensitive receptors for the construction phase scenario (Figure 44 and Figure 45 respectively). Therefore, the likelihood of potential health impacts from PM_{10} emissions generated from construction activities is considered to be low.

The modelled average daily and annual $PM_{2.5}$ concentrations generated from construction activities fall below the applicable NAAQS limit values of 40 µg/m^3 and 20 µg/m^3 respectively (compliance with these limit values is required as of 1 January 2016) at all the surrounding sensitive receptors for the construction phase scenario (Figure 46 and Figure 47 respectively). Therefore, the likelihood of potential health impacts from $PM_{2.5}$ emissions generated from construction activities is considered to be low.

- The potential impact on the ambient air quality will cease once the construction-related dust generating activities cease at the end of construction.
- The potential health impact of fine particles (PM_{10} and $PM_{2.5}$) generated can be mitigated by implementing dust suppression measures. The potential impact on air quality at surrounding sensitive receptors has a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.

SO_2

The SO_2 emissions from construction vehicles were not modelled as they are of lower significance than those generated during operations. Construction vehicles will mostly be confined to the construction site which is in an open area and allows for dilution.

- The potential impact on the ambient air quality will cease once the construction-related emission-generating activities cease at the end of construction.
- The potential health impact of generated gaseous emissions can be mitigated by implementing vehicle maintenance measures, reducing vehicle idling and using a low sulphur diesel. The potential impact on air quality at surrounding sensitive receptors has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

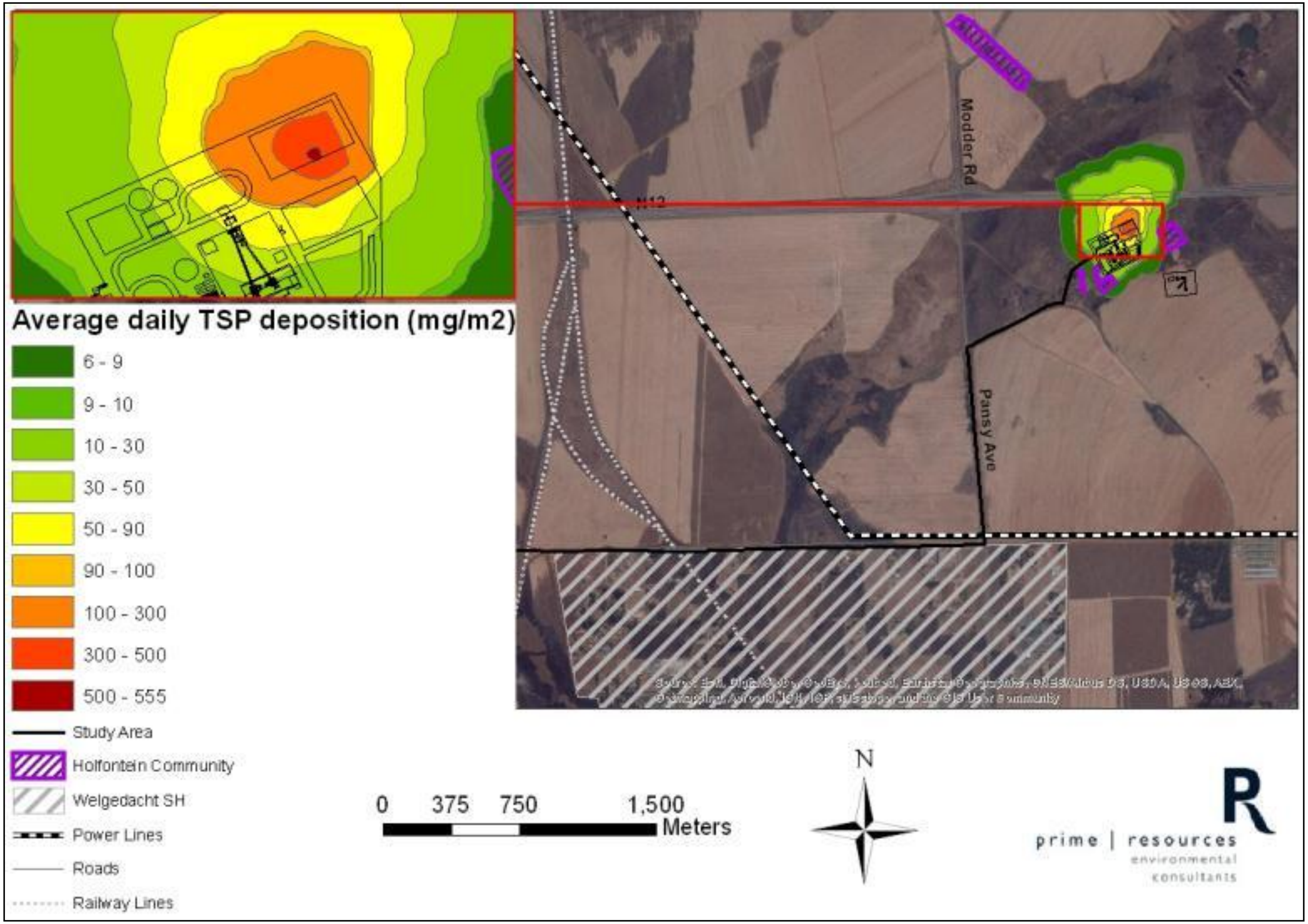


Figure 43: Average daily dust fallout for the construction phase

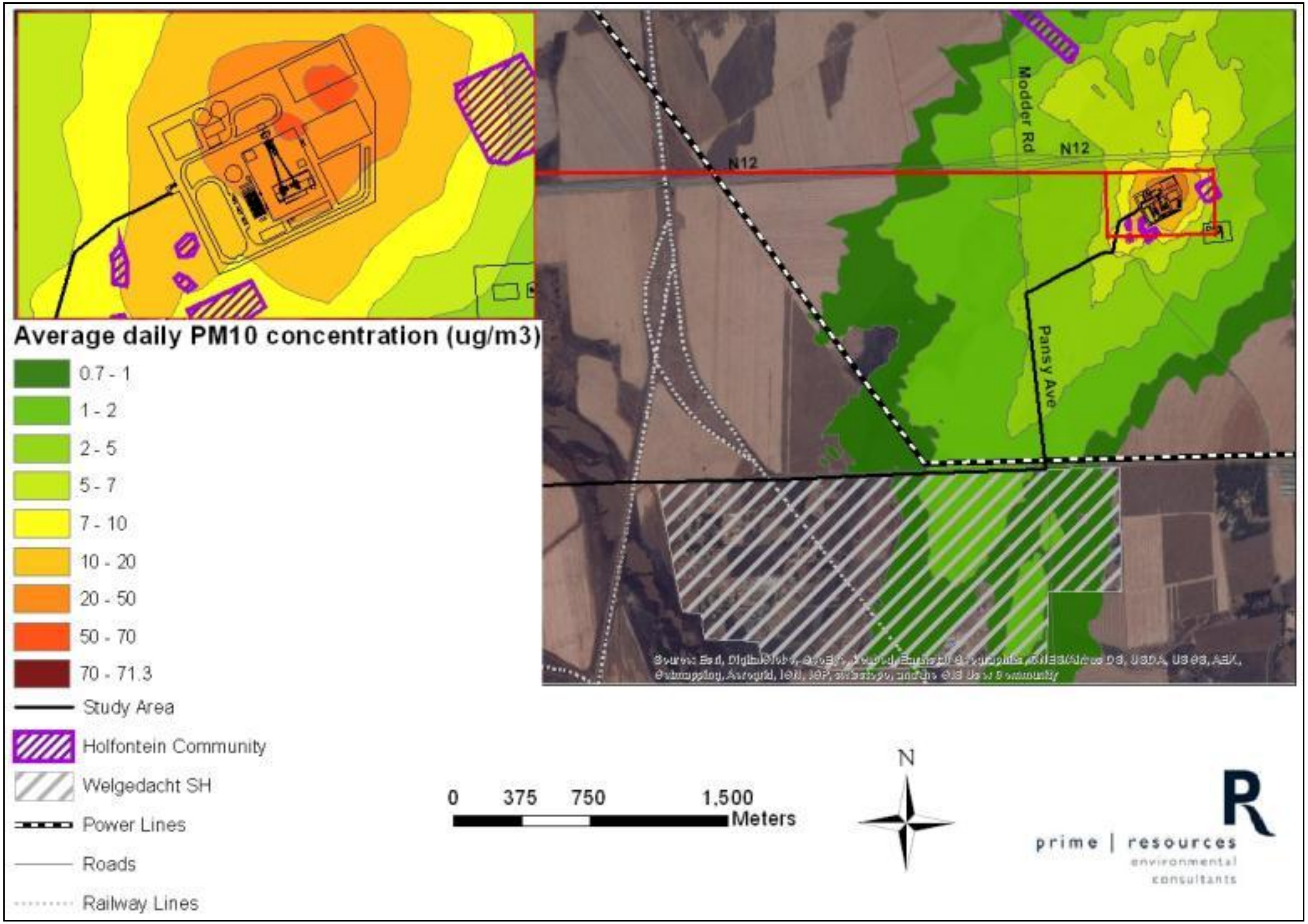


Figure 44: Average daily PM_{10} concentrations for the construction phase

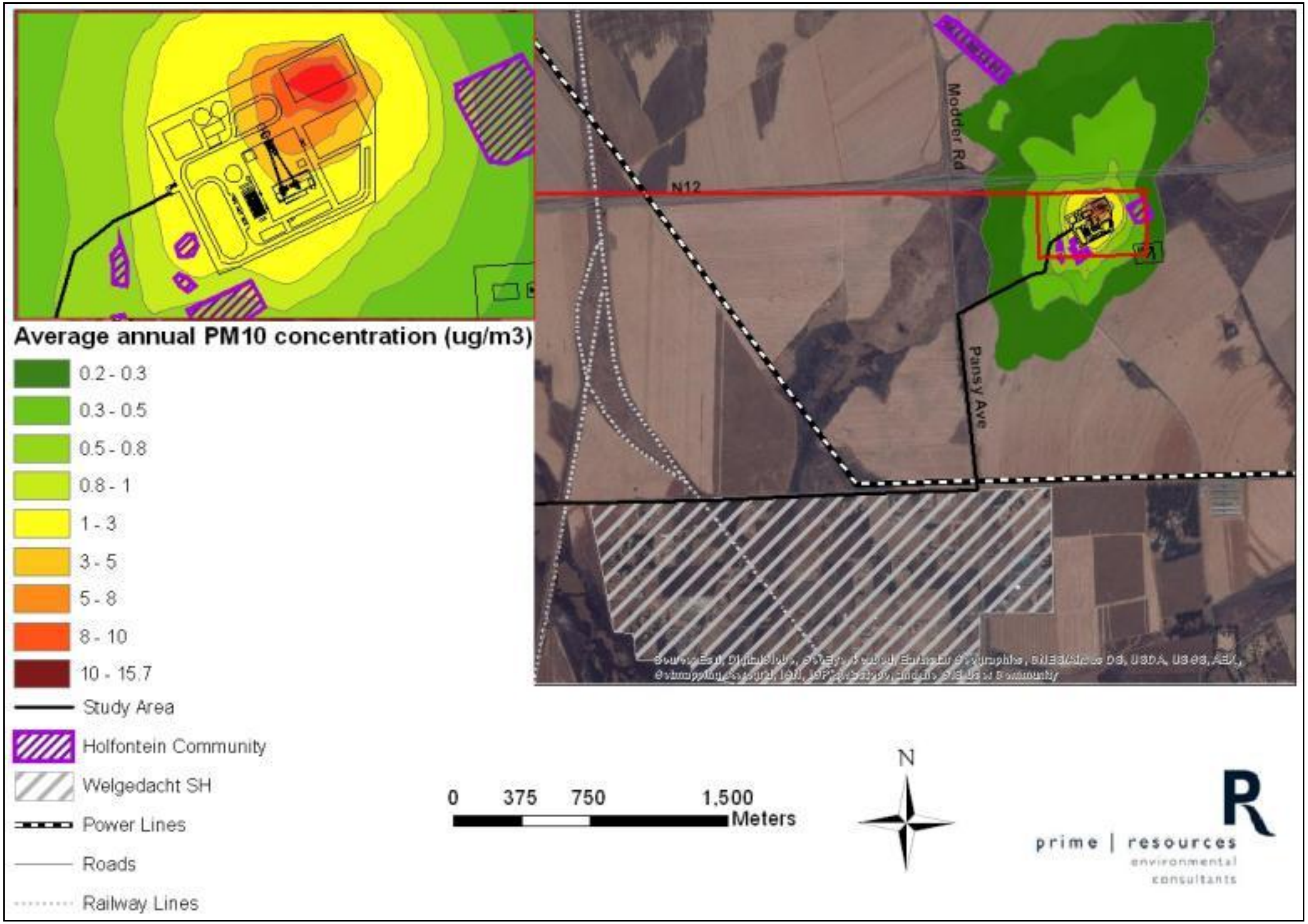


Figure 45: Average annual PM_{10} concentrations for the construction phase

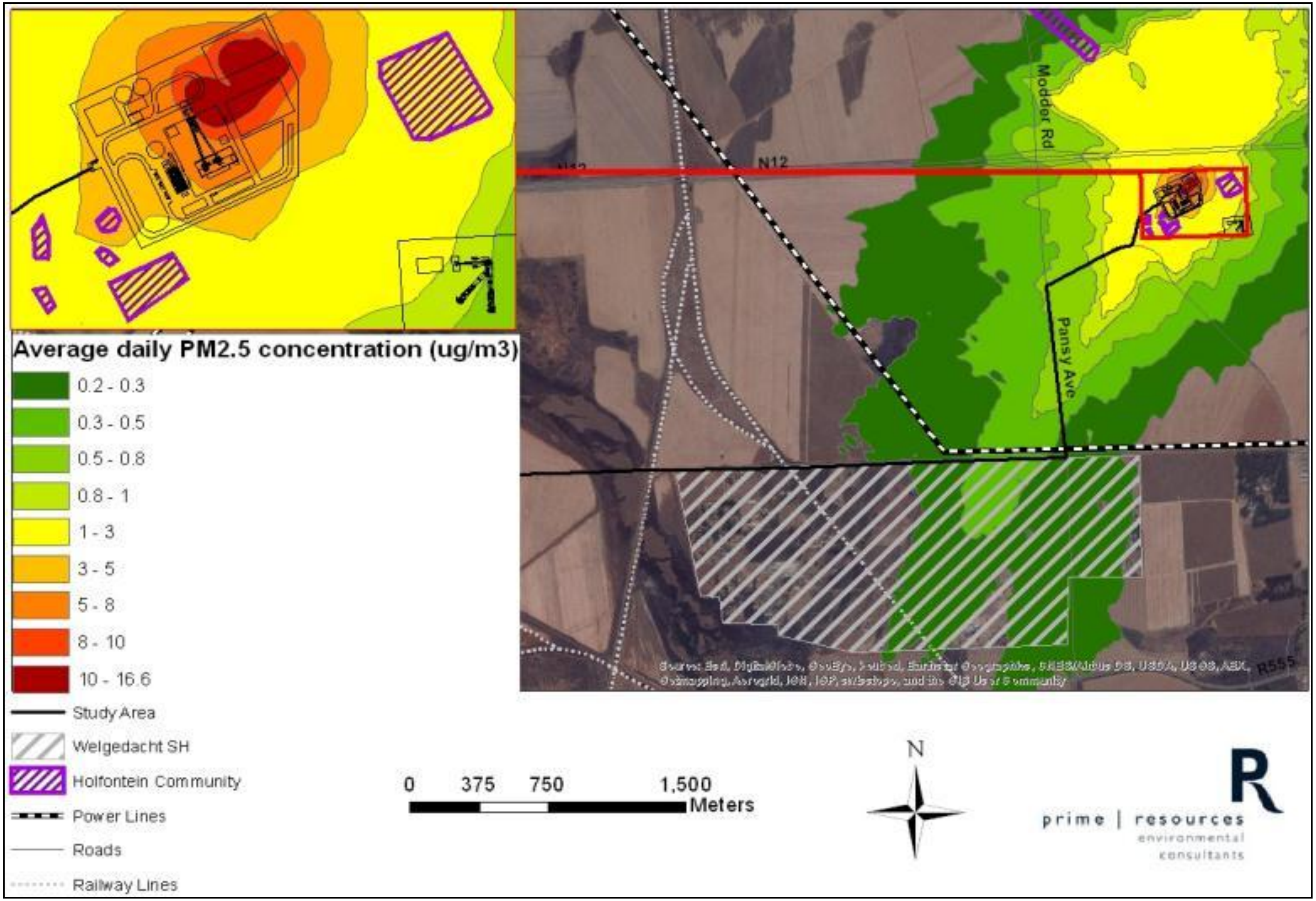


Figure 46: Average daily $PM_{2.5}$ concentrations for the construction phase

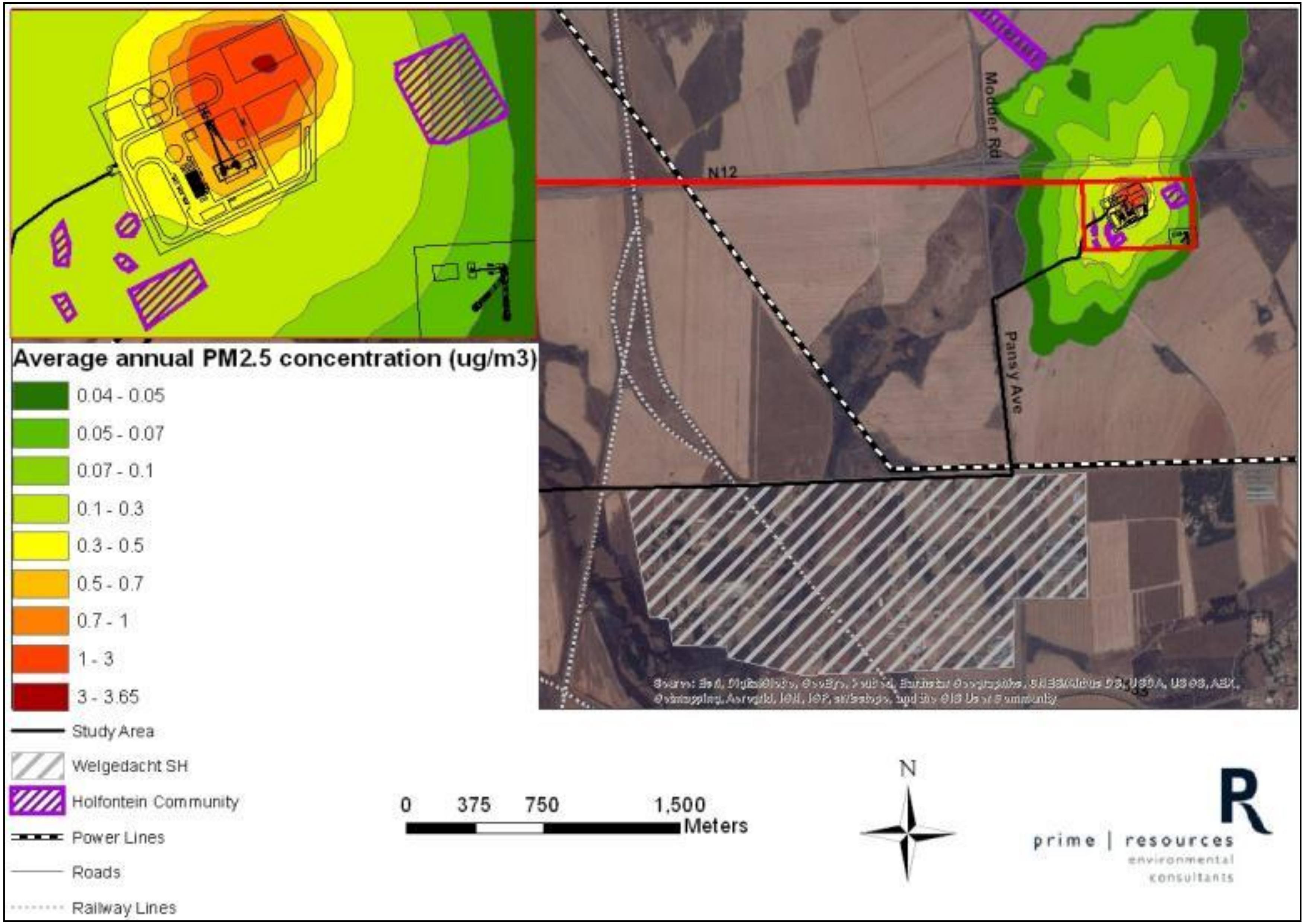


Figure 47: Average annual $PM_{2.5}$ concentrations for the construction phase

Operation Phase

The operational phase of the project is anticipated to last for approximately 8 years. During the operational phase, particulate emissions (i.e. $PM_{2.5}$, PM_{10} and TSP) will be generated from ore hoisting and loading, vehicle entrainment on unpaved roads from hauling activities (40 trips per day), wind erosion from the topsoil stockpile, and the transportation of personnel by bus (15 trips per day from the ME Operations to accommodate two work shifts; 400 employees per shift).

Generation of particulate emissions is fairly constant throughout the year. Abnormal conditions may arise due to intermittent grading (maintenance of unpaved portions of the haul route) and ventilation shaft emissions. Particulate emissions will be generated from the ventilation shaft, associated with the underground mining activities including blasting, drilling and the operation of underground vehicles.

Gaseous emissions will be generated via vehicle tailpipe emissions and the ventilation shaft. Vehicle tailpipe gaseous emissions include NOx, CO and SO_2. Gas emissions from the ventilation shaft generated from diesel exhaust and blasting fumes from underground mining activities will be negligible given the combination of dilution by water in the shaft and the designed volumetric flow rate of 0.06 m^3/s/kW through the underground workings.

Dust Fallout (TSP)

The modelled average daily dust fallout at the surrounding sensitive receptors mostly fall within the National Dust Control Regulations acceptable dust fallout of 600 mg/m^2/day for residential areas for Scenario 1 (24 hour operations), with the exception of the informal dwellings located directly adjacent to the western site boundary, where the dust fallout exceeds the acceptable limit, as it falls within 600 - 800 mg/m^2/day (refer to Figure 48). For Scenario 2 (12 hour hoisting, loading and hauling operations - 06h00 to 18h00), average daily dust fallout concentrations at all of the surrounding sensitive receptors fall below the acceptable dust fallout of 600 mg/m^2/day for residential areas (refer to Figure 49). Therefore, the likelihood of the occurrence of nuisance impacts resulting from dust fallout due to operational activities for Scenario 2 is considered to be low.

The modelled average daily dust fallout outside of the site boundary (approximately 112 m to the north / north-east of the project boundary) in the direction of the N12 highway indicates an exceedance of the acceptable dust fallout (below 1 200 mg/m^2/day for non-residential areas) for Scenario 1. Exceedances are noted approximately 28 m north of the project boundary for Scenario 2. Refer to Figure 49 and Figure 50 respectively. However, due to the conservative nature of the model, the predicted concentrations are expected to be greater than those that will likely occur in reality. Therefore, the likelihood of the occurrence of nuisance impacts resulting from dust fallout due to operational activities occurring between 06h00 and 18h00 is considered to be low. There are also no receptors within 28 m of the project boundary (to the north) that will be affected under Scenario 2.

The modelled average daily dust fallout across the surrounding cultivated areas ranges between 80 and 300 mg/m^2/day for both Scenario 1 and 2 (refer to Figure 49 and Figure 50 respectively), and this falls below the acceptable dust fallout of 1 200 mg/m^2/day for non-residential areas. As the dust fallout across surrounding cultivated areas is expected to be low, the likelihood of impacts on crop growth is considered to be low.

- The potential impact on the ambient air quality will cease once the dust generating activities cease at the end of the LoM.
- The potential nuisance impact of dust can be mitigated by implementing dust suppression measures. The potential impact on air quality at surrounding sensitive receptors has a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.
- The potential impact of dust on crop growth can be mitigated by implementing dust suppression measures. The potential impact on air quality at surrounding sensitive receptors has a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.

PM_{10} and $PM_{2.5}$

Average Daily and Annual Concentrations

The modelled average daily PM_{10} concentrations indicate exceedances in the NAAQS limit value for residential areas (75 µg/m^3) at the historic mine house and associated informal dwellings for both Scenario 1 (i.e. operating 24 hours a day) and 2 (i.e. hoisting, loading and hauling limited to between 06h00 and 18h00). Refer to Figure 51 and Figure 51 respectively. The historic mine house will be exposed to concentrations of 60 – 100 µg/m^3 for Scenario 1, and concentrations of 30 – 50 µg/m^3 for Scenario 2. The informal dwellings adjacent to the mine boundary are exposed to concentrations of approximately 50 – 80 µg/m^3 for both Scenario 1 and 2. With the implementation of the recommended dust suppression measures (controlled emissions), modelled average daily PM_{10} concentrations at all of the surrounding sensitive receptors are below the NAAQS limit value of 75 µg/m^3 for residential areas (refer to Figure 52).

It must be noted that the fine particulates generated from ore handling activities will also contain a metal fraction likely comprising of uranium and arsenic, which may increase the potential health risk. Therefore, potential health impacts from PM_{10} emissions generated from operational activities may arise if effective mitigation measures (as recommended) are not implemented.

The modelled average annual PM_{10} concentrations at the surrounding sensitive receptors are below the NAAQS limit value of 40 µg/m^3 at all of the surrounding sensitive receptors, for both Scenario 1 and 2 (refer to Figure 53 and Figure 54 respectively).

The modelled average daily and annual $PM_{2.5}$ concentrations generated from operational activities do not exceed the NAAQS limit values of 40 µg/m^3 and 20 µg/m^3 respectively (compliance with these limit values is required as of 1 January 2016) at all the surrounding sensitive receptors for Scenario 1 (refer to Figure 55 and Figure 56 respectively). Therefore, the likelihood of potential health impacts from $PM_{2.5}$ emissions generated from operational activities is considered to be low.

- The potential impact on the ambient air quality will cease once the dust generating activities cease at the end of the LoM.
- The potential health impact of fine particles (PM_{10}) generated can be mitigated by implementing dust suppression measures. The potential impact on air quality at surrounding sensitive receptors has a **High** significance rating prior to and after the implementation of the

recommended mitigation measures.

SO_2

From the modelling results, SO_2 emissions from the tailpipes of the haul trucks travelling along the proposed haul route will not result in exceedances in the NAAQS limit value at the surrounding sensitive receptors, which were identified as the residences of the Welgedacht SH (refer to Figure 57, Figure 58 and Figure 59). The NAAQS limit values are 350 $\mu g/m^3$ for 1 hour, 125 $\mu g/m^3$ over 24 hours, and 50 $\mu g/m^3$ annually). Therefore, the likelihood of potential health impacts from SO_2 emissions generated from haul trucks is considered to be low. However, these results only provide a high level indication of concentration as the AERMOD model does not accurately account for thermal plume rise of vehicle tailpipe emissions.

- The potential impact on the ambient air quality will cease once the emission-generating activities cease at the end of the LoM.
- The potential health impact of gaseous emissions generated can be mitigated by implementing vehicle maintenance measures, reducing vehicle idling and using a low sulphur diesel. The potential impact on air quality at surrounding sensitive receptors has a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.

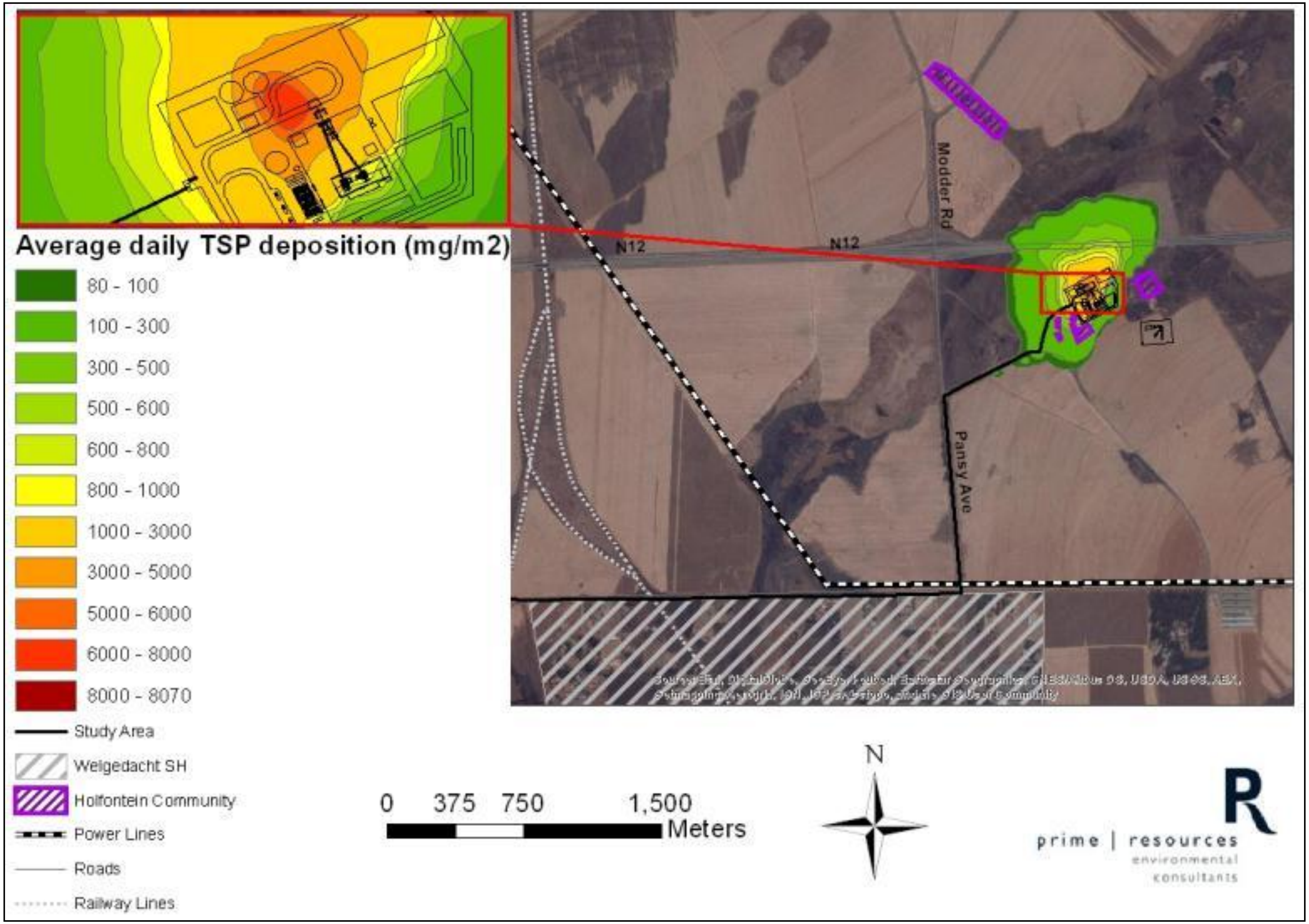


Figure 48: Average daily dust fallout (Scenario 1) for the operational phase

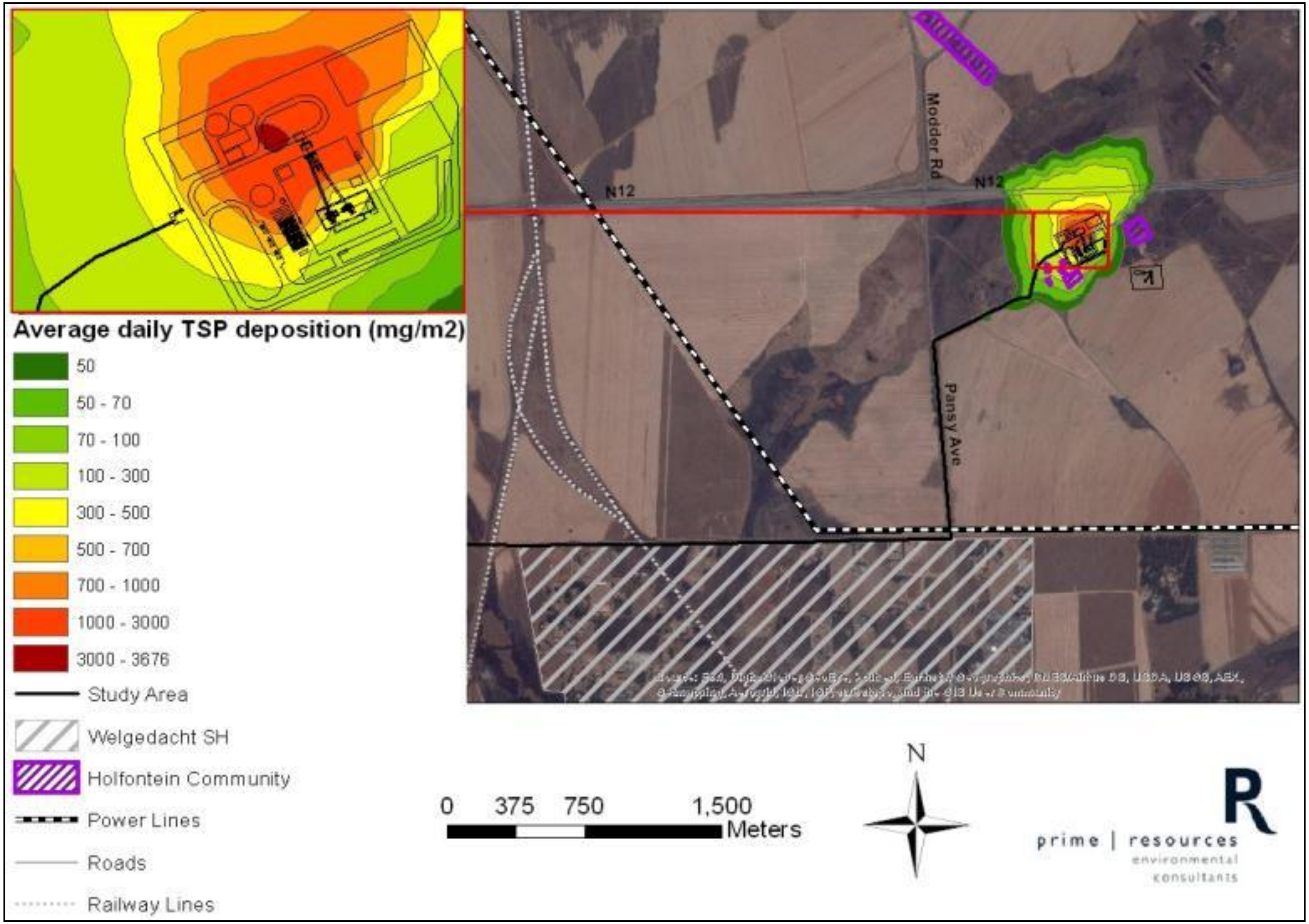


Figure 49: Average daily dust fallout (Scenario 2) for the operational phase

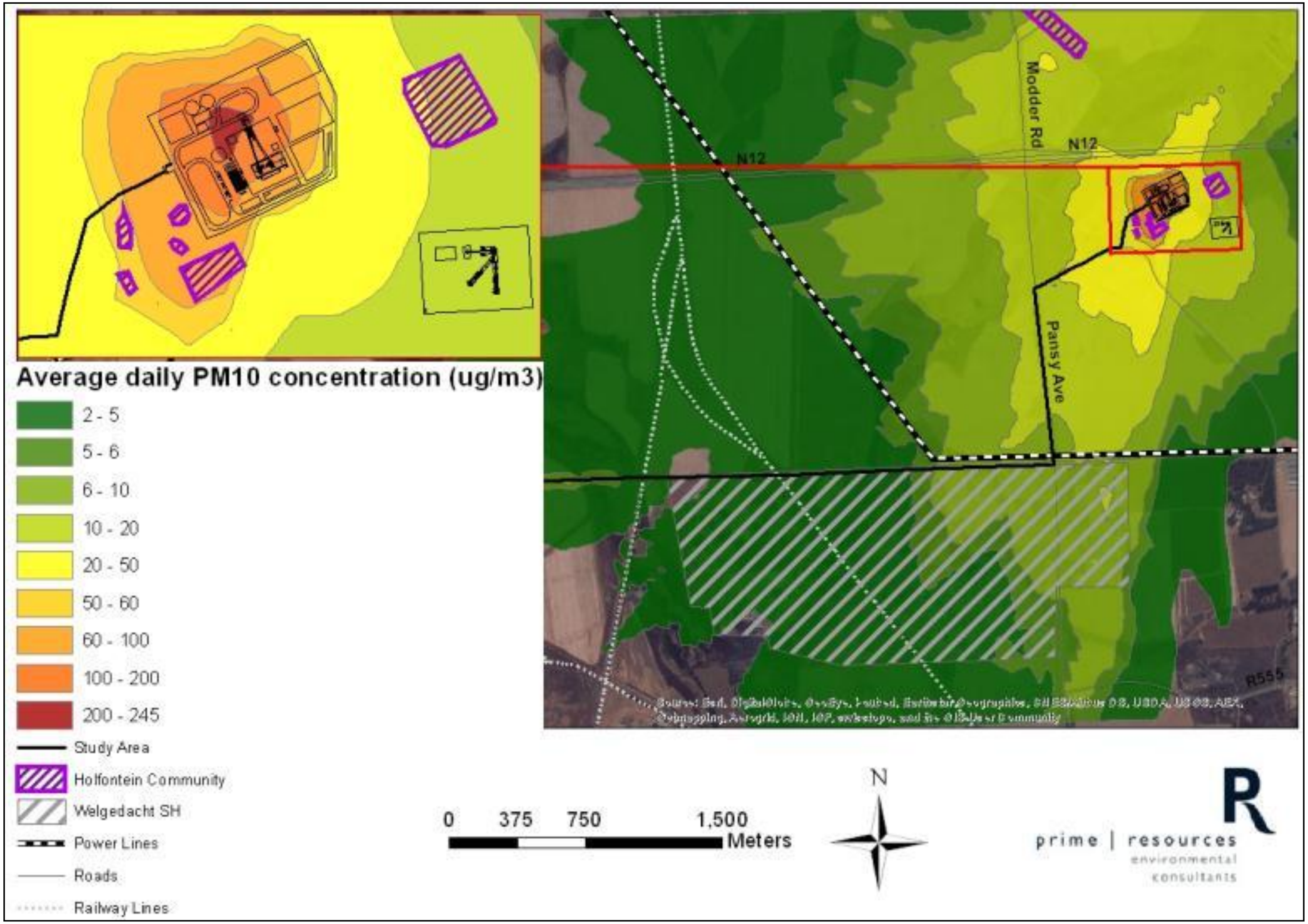


Figure 50: Average daily PM_{10} concentrations (Scenario 1) for the operational phase

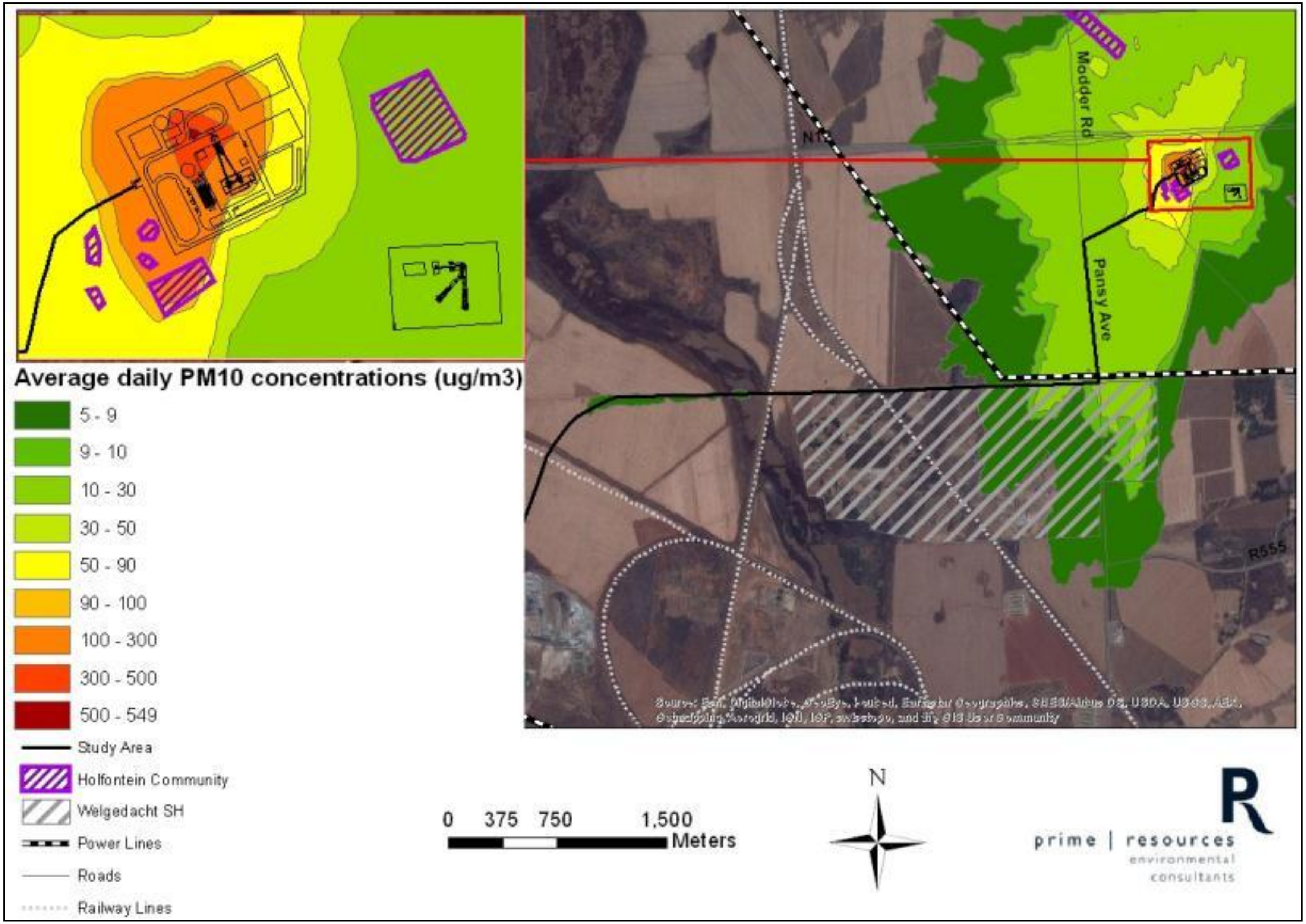


Figure 51: Average daily PM_{10} concentrations (Scenario 2) for the operational phase

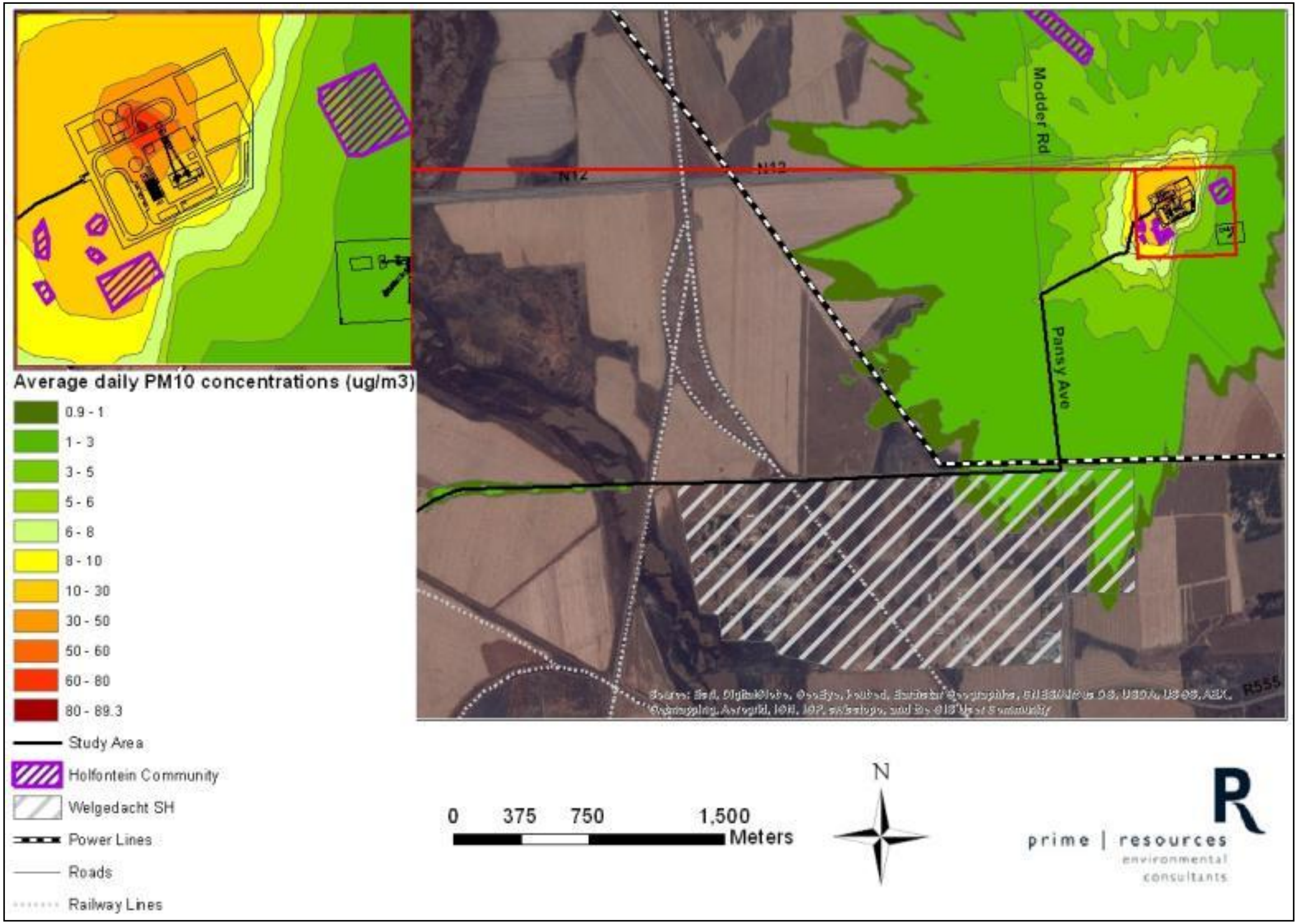


Figure 52: Average daily PM_{10} concentrations (Scenario 2, Controlled Emissions) for the operational phase

Figure 53: Average annual PM_{10} concentrations (Scenario 1) for the operational phase

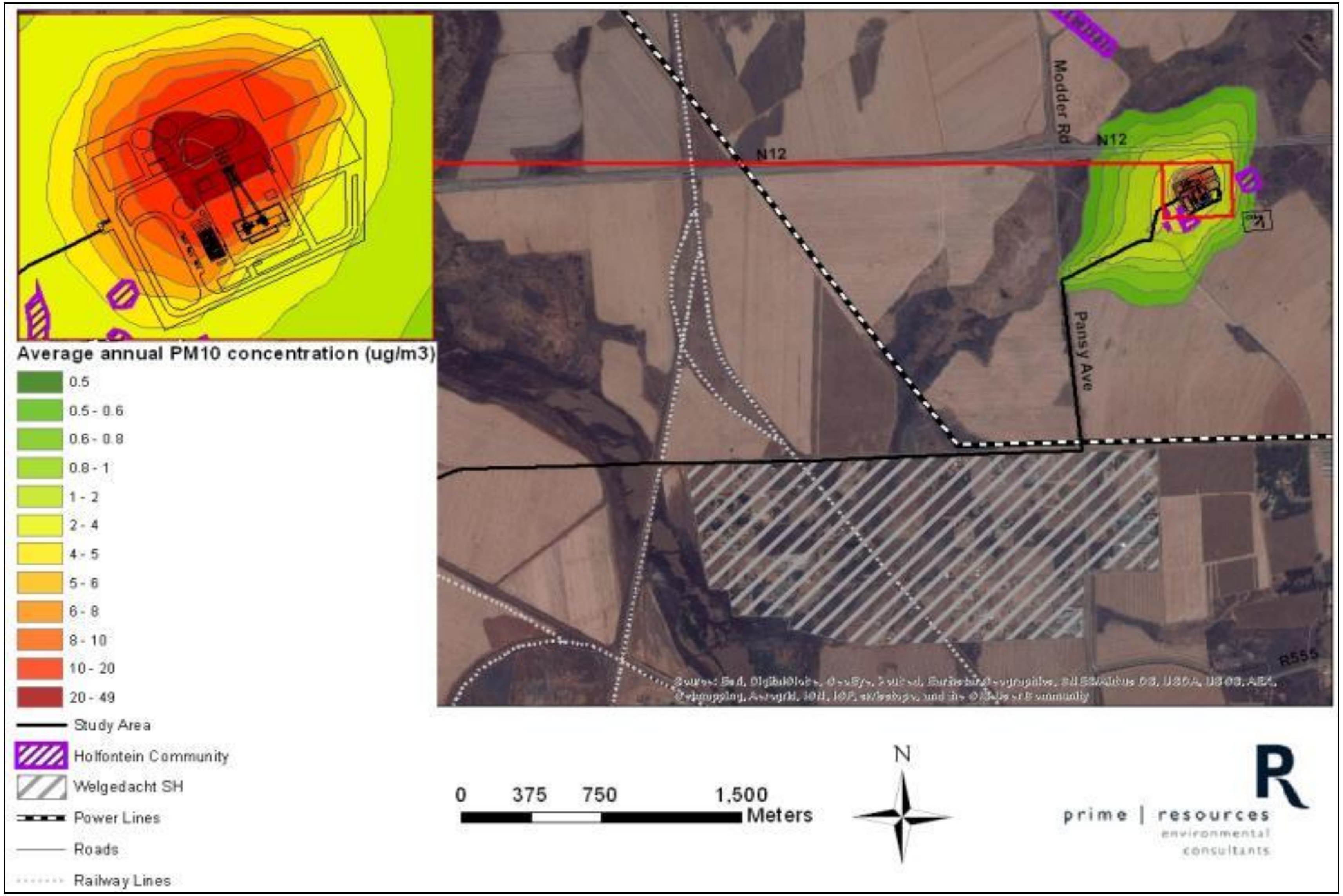


Figure 54: Average annual PM_{10} concentrations (Scenario 2) for the operational phase

Figure 55: Average daily $PM_{2.5}$ concentrations (Scenario 1) for the operational phase

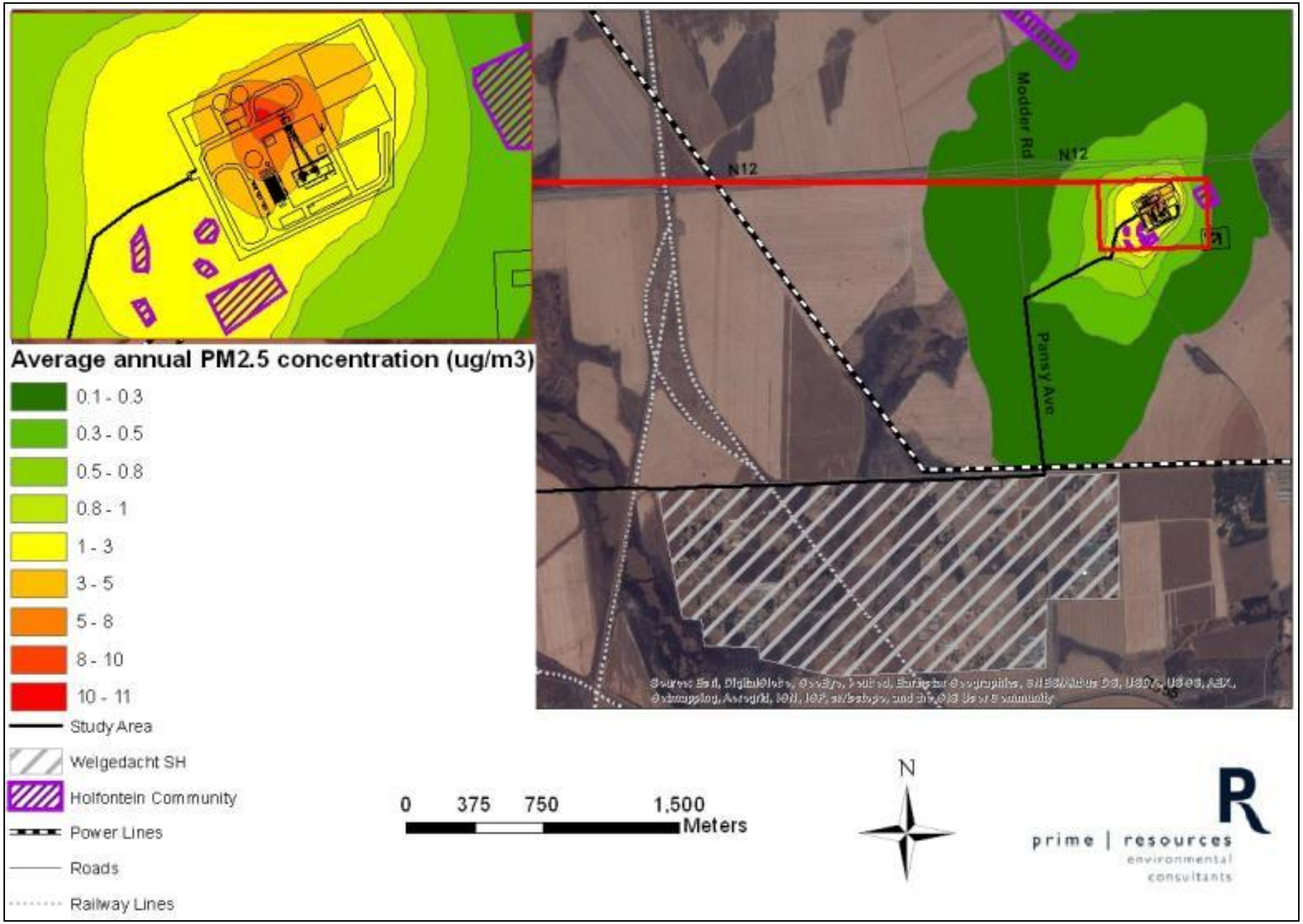


Figure 56: Average annual $PM_{2.5}$ concentrations (Scenario 1) for the operational phase

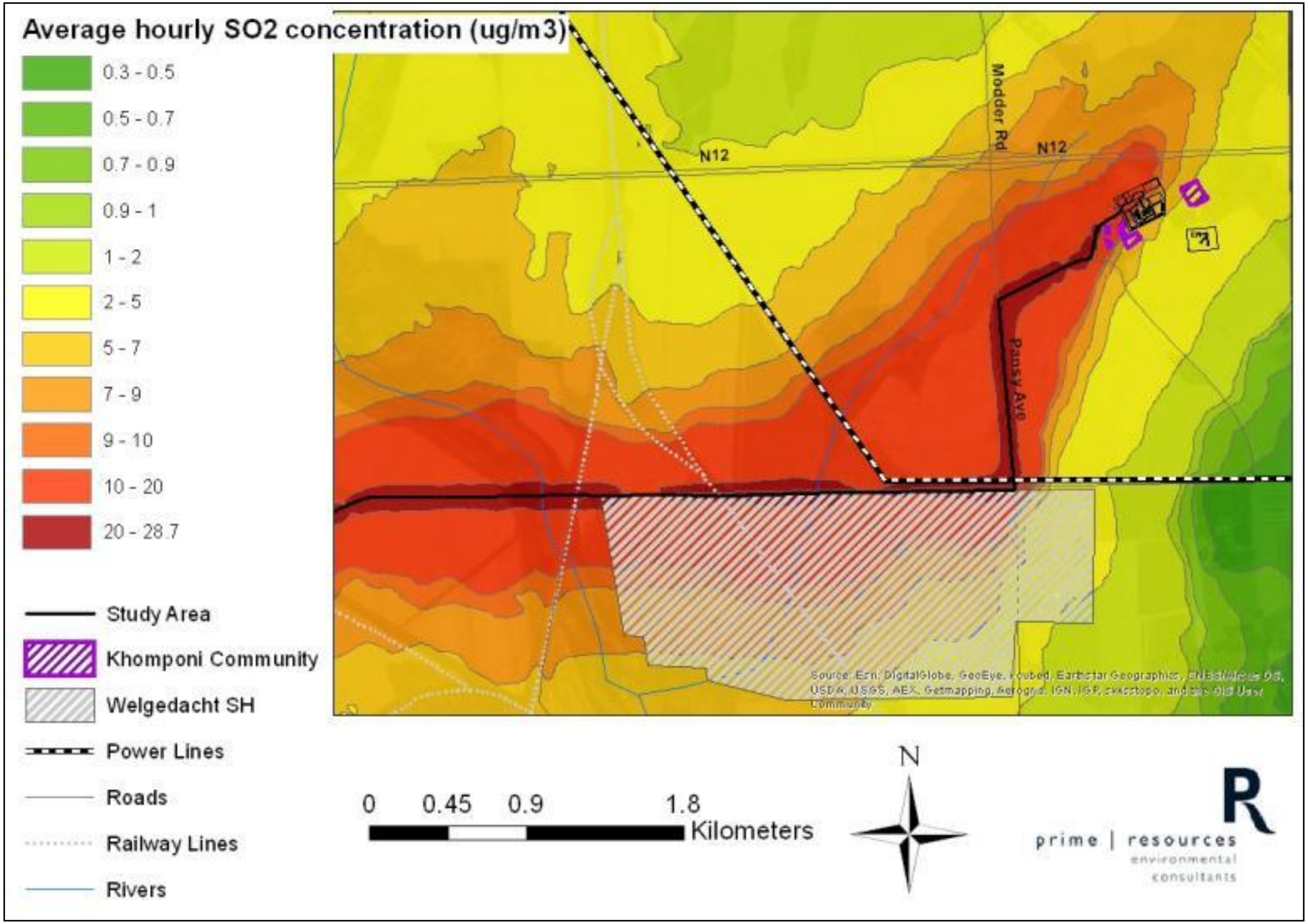


Figure 57: Average hourly SO_2 concentrations (Scenario 1) for the operational phase

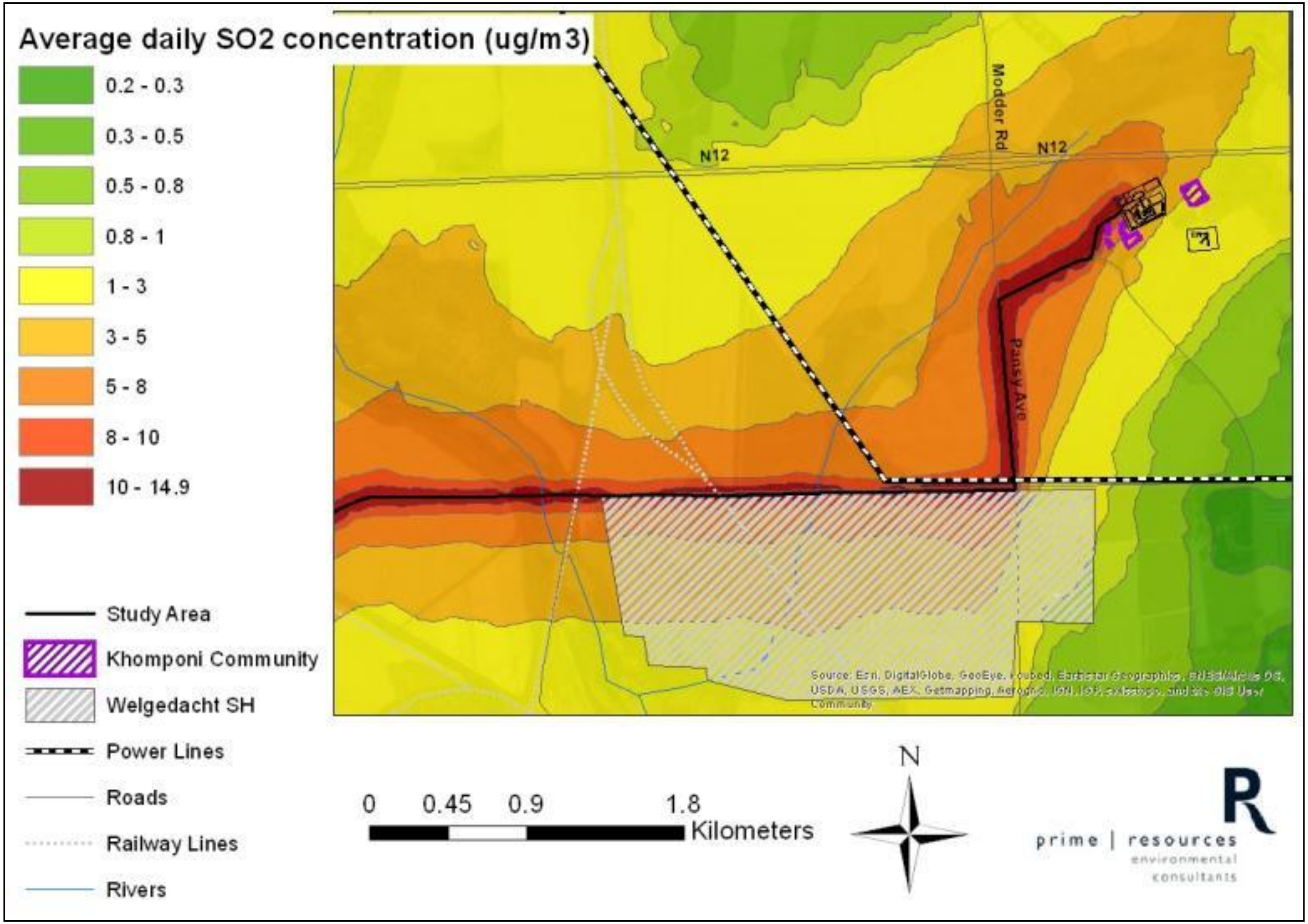


Figure 58: Average daily SO_2 concentrations (Scenario 1) for the operational phase

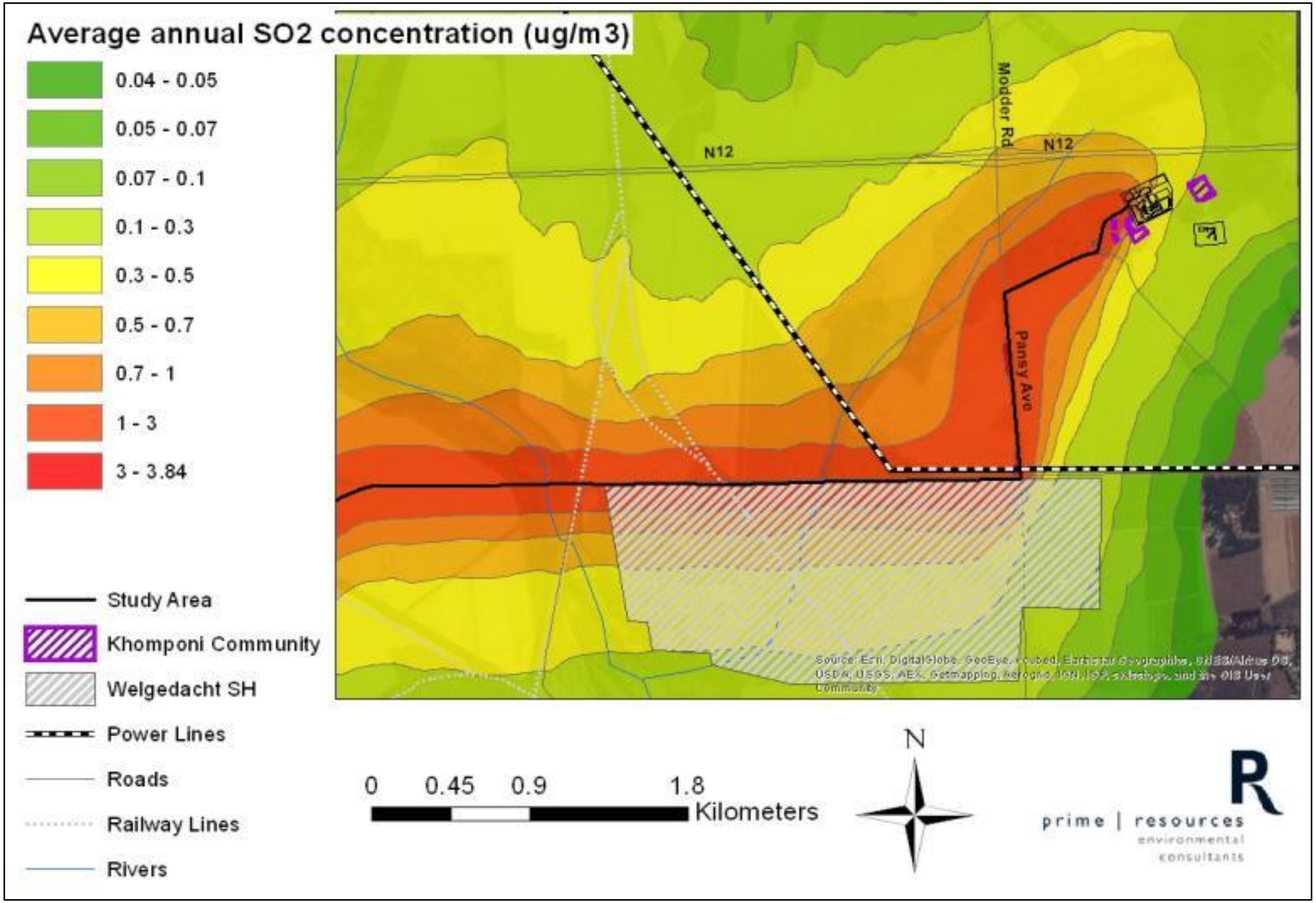


Figure 59: Average annual SO_2 concentrations (Scenario 1) for the operational phase

The existing air quality impacts at the ME Operations relating to emissions generated by rock crushing activities, materials handling and transfer, ore crushing and screening activities, the tailings storage facility and the processing plant will be supplemented but not exacerbated by the supplementation of rock and ore from the Holfontein shaft.

Decommissioning Phase

It was assumed that all hoisting and hauling operations will have ceased by the decommissioning phase of the project. The potential for impacts during this phase will depend on the extent of demolition and rehabilitation efforts. It is expected that emissions during decommissioning will be similar to those generated during the construction phase with a similar duration (approximately 6 months to 1 year).

Post-Closure Phase

Residual impacts on the ambient air quality are unlikely unless the planned rehabilitation is unsuccessful (i.e. vegetation does not successfully re-establish) resulting in exposed areas, which will be susceptible to wind erosion.

- The potential impact on the ambient air quality ceases once the area is successfully re-vegetated.
- The potential nuisance impact of dust generated from wind erosion of bare areas can be mitigated by successfully rehabilitating the disturbed footprint. The potential impact on air quality at surrounding sensitive receptors has a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.

Operation, Decommissioning and Post-Closure Phases

It has been recommended to pave the unpaved portion of Carnation Road (between the Blesbokspruit crossing and the paved portion of Carnation Road). If this implemented it will result in a positive impact as it will reduce dust generation from vehicle entrainment on unpaved roads throughout the LoM. It will also result in a positive residual impact as Carnation Road will be left in an upgraded state in comparison with the pre-mining state.

- The potential positive impact of paving a portion of Carnation Road, to reduce dust generated from vehicle entrainment on unpaved roads has a **Medium Positive** significance rating.

Table 11: Air quality impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Land clearing activities ▪ Grading of roads ▪ Excavations for hard-standing areas ▪ Construction of infrastructure ▪ Vehicle entrainment on unpaved roads ▪ Vehicle tailpipe emissions ▪ Waste rock handling ▪ Topsoil stockpiling	▪ Dust will be generated from construction activities which may result in nuisance impacts at sensitive receptors	6 [6]	2 [2]	2 [1]	3 [2]	Medium [Low]	30 [18]
	▪ Fine particulates will be generated from construction activities which may result in health impacts at sensitive receptors	8 [8]	2 [2]	2 [1]	3 [2]	Medium [Low]	36 [22]
	▪ Dust will be generated from construction activities which may have an impact on crops	4 [4]	2 [2]	2 [1]	3 [2]	Low [Low]	24 [14]
Operation Phase							
▪ Ore handling ▪ Wind erosion from stockpiles ▪ Vehicle entrainment on unpaved roads ▪ Ventilation shaft emissions ▪ Vehicle tailpipe emissions	▪ Dust will be generated from operational activities which may result in nuisance impacts at sensitive receptors	6 [6]	4 [4]	2 [2]	3 [2]	Medium [Low]	36 [24]
	▪ Dust will be generated from operational activities which may have an impact on crops	4 [4]	4 [4]	2 [2]	3 [2]	Medium [Low]	30 [20]
	▪ Fine particulates (which contain a metal fraction from ore handling activities) will be generated from operational activities which may result in health impacts at sensitive receptors	10 [10]	4 [4]	2 [2]	5 [4]	High [High]	80 [64]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Ventilation shaft emissions ▪ Vehicle tailpipe emissions	▪ Gases will be generated from operational activities which may result in health impacts at sensitive receptors	8 [8]	4 [4]	2 [2]	3 [2]	Medium [Low]	42 [28]
Decommissioning Phase							
▪ Decommissioning activities ▪ Vehicle entrainment on unpaved roads ▪ Vehicle tailpipe emissions	▪ Dust will be generated from decommissioning activities which may result in nuisance impacts at sensitive receptors	6 [6]	2 [2]	2 [1]	3 [2]	Medium [Low]	30 [18]
	▪ Fine particulates will be generated from decommissioning activities which may result in health impacts at sensitive receptors	8 [8]	2 [2]	2 [1]	3 [2]	Medium [Low]	36 [22]
	▪ Dust will be generated from decommissioning activities which may have an impact on crops	4 [4]	2 [2]	2 [1]	3 [2]	Low [Low]	24 [14]
Post-Closure Phase							
▪ Unsuccessful rehabilitation	▪ Dust may be generated from wind erosion of exposed areas due to unsuccessful rehabilitation	6 [6]	2 [2]	2 [1]	3 [2]	Medium [Low]	30 [18]
Operation, Decommissioning and Post-Closure Phases							
▪ Paving of the unpaved portions of Carnation Road	▪ Positive impact on air quality at sensitive receptors (Welgedacht SH) as it will reduce dust generated from vehicle entrainment on unpaved roads	2	5	1	5	Medium [Positive impact]	40+

Archaeology

No findings of cultural and heritage significance were made within the Holfontein Project footprint where site clearance is to occur the proposed mine infrastructure. The only site / feature recorded within the footprint to be cleared was related to the historic Holfontein mining operations, which include the remains of various structures such as headgear foundation and bases and the old Holfontein shaft. These structures are all dilapidated and consist of foundations only. They were therefore found to be of low significance and can be demolished.

The historic mine hostel, which is currently occupied, is located outside of the Holfontein Project footprint and will not be impacted. The historic mine house (also occupied and also outside of the footprint), may be of significance as it is in a relatively good state of preservation. The access road that previously passed near this house as per the initial layout in the scoping phase has been re-routed so that the house will not be impacted. No further mitigation is therefore required.

Construction Phase

Alongside the proposed haul road, in proximity to the ME operations, is a cemetery that contains historical and modern graves. It is situated approximately 30 m away from the haul road, and while unlikely, any road expansion in the direction of the cemetery may result in damage to the graves within the cemetery. The cemetery was identified during 2006 by the Mine who indicated their willingness to keep the cemetery intact and to preserve it while still allowing access to descendants. As graves have a high significance rating from a cultural heritage perspective it is recommended that the cemetery continue to be preserved and that a 30 m buffer be maintained between the proposed haul road and the cemetery boundary fence to mitigate any potential impact on the graves.

- In the unlikely event that any destruction occurs, it will result in the irreversible loss of significant heritage resources.
- The potential impact can be mitigated by implementing a buffer zone between the cemetery and haul road. The potential impact on graves in the cemetery from the widening of the portion of gravel road has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Table 12: Archaeology impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Clearance of land for the widening of the unpaved portion of the haul road between Carnation Road and the ME operations	▪ Damage to graves in the existing fenced-off cemetery	10 [10]	5 [5]	1 [1]	1 [0]	Low [Low]	16 [0]

Aquatic Ecology

Construction Phase

The clearing of natural vegetation at the surface infrastructure area and at the proposed ventilation shaft area, for the construction of the proposed mine infrastructure, will likely result in a marginal increase of surface runoff directly into the Holfontein Stream.

- The potential impact will continue throughout the construction period.
- The potential impact can be mitigated through adequate management of stormwater runoff. The altered hydrology of the Holfontein Stream and resultant aquatic habitat alteration has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

The additional volumes to be discharged to the Blesbokspruit (treated groundwater and sewage effluent) may result in potential scouring of the downstream habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA Ramsar site.

- The potential impacts will continue throughout the construction period.
- The potential impact can be mitigated through the construction of flow diffusing structures at the discharge point as per the recommendations of the wetland specialist, and the maintaining of a lower rate of discharge (maximum 6 Mℓ per day). The altered hydrology of the Blesbokspruit and resultant aquatic habitat alteration have a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Hydrocarbon-based fuels and/or lubricants spilled from vehicles and equipment used during construction, the incorrect stockpiling of topsoil, as well as potential litter deposited by construction personnel are likely to be washed into the Holfontein Stream resulting in a potential for water quality deterioration. In addition, while the water quality of the flooded shaft was suggested to be in relatively good condition and largely compliant with drinking water standards, it was believed that the quality of the discharge would deteriorate as the dewatering process progresses. Therefore, the quality of the water discharged into the Blesbokspruit catchment may be a potential cause for concern if not treated to appropriate standards (to be determined by the Department of Water and Sanitation (DWS)) at the proposed water treatment facility. Deterioration of the water quality of the Blesbokspruit catchment due to pollution will deter aquatic biota from the area resulting in a decrease (or at least a change) in biodiversity.

- The potential impact will cease after the potential sources of pollution are removed and the water quality of the Blesbokspruit catchment is allowed to return to baseline conditions.
- The potential impact can be mitigated through implementing good housekeeping in terms of spills and littering, constructing adequate clean and dirty water management infrastructure at the commencement of construction, treating the water to be discharged to meet qualities as stipulated by DWS, and monitoring the water quality

of the water to be discharged. The deteriorated water quality of the Blesbokspruit catchment and the resultant impact on aquatic biota has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Operation Phase

The additional volumes to be discharged to the Blesbokspruit may result in potential scouring of the downstream habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA Ramsar site.

- The potential impacts will cease once the discharging activities cease (at the end of the LoM).
- The potential impact can be mitigated through the construction of flow diffusing structures at the discharge point as per the recommendations of the wetland specialist. The altered hydrology of the Blesbokspruit and resultant aquatic habitat alteration due to the discharge of treated groundwater and sewage effluent from the water treatment facility has a **Medium** significance rating prior to the implementation of the recommended mitigation measures, and a **Low** significance rating after their implementation.

The potential surface runoff from the operational areas as well as the haul roads (not collected by the PCD) is likely to dissolve any exposed metals, sediments and pollutants within the area and expected to decrease the abundance and diversity of aquatic biota inhabiting the sections of the Holfontein Stream and Blesbokspruit where the runoff would enter these watercourses. The inability to maintain treatment standards of the discharged water from the water treatment facility will also pollute the Blesbokspruit.

- The potential impact will cease once pollution sources are removed and the water quality of the Holfontein Stream and Blesbokspruit is allowed to return to baseline conditions (at the end of the LoM).
- The potential impact can be mitigated through implementing good housekeeping in terms of spills from haul trucks, maintaining adequate clean and dirty water management infrastructure, treating the water to be discharged to meet qualities as stipulated by DWS, and monitoring the water quality of the water to be discharged. The deteriorated water quality of the Holfontein Stream and Blesbokspruit due to polluted runoff and discharging inadequately treated water and the resultant impact on aquatic biota has a **Medium** significance rating prior to the implementation of the recommended mitigation measures, and a **Low** significance rating after their implementation.

The inability to maintain treatment standards of the discharged water from the water treatment facility will pollute the Blesbokspruit catchment. If the quality is maintained the input is expected to potentially dilute the currently deteriorated water quality within the Blesbokspruit catchment to some extent and possibly alleviate the water quality conditions within the downstream system.

- The potential negative and positive impacts will cease once discharging activities cease (at the end of operations).

- The potential impact can be mitigated by treating the water to be discharged to meet qualities required by DWS, and monitoring the water quality of the water to be discharged using the Direct Estimation of Ecological Effect Potential (DEEEP) approach.
- The potential deterioration in water quality of the Blesbokspruit catchment has a **Medium** significance rating prior to the implementation of the recommended mitigation measures, and a **Low** significance rating after their implementation.
- The positive impact of discharging good quality water to the Blesbokspruit catchment has a **Low Positive** significance rating.

Decommissioning Phase

A potential for water quality deterioration of the Holfontein Stream exists from hydrocarbon-based fuels and/or lubricants spilled from vehicles and equipment used during decommissioning as well as potential litter deposited by personnel washed into the Holfontein Stream; and unsuccessful rehabilitation resulting in erosion and subsequent sedimentation of the Holfontein Stream. Deterioration of the water quality of the Holfontein Stream due to pollution will deter aquatic biota from the area resulting in a decrease in aquatic biodiversity.

- The potential impact will cease once the sources of pollution are removed and the water quality of the Holfontein Stream returns to baseline conditions (at the end of the LoM).
- The potential impact can be mitigated through implementing good housekeeping in terms of spills and littering and successfully rehabilitating the area (as per the recommendations detailed in the Interim Closure Plan). The deteriorated water quality of the Holfontein Stream biota has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Table 13: Aquatic ecology impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Increased surface runoff (due vegetation clearing)	▪ Altered hydrology of the Holfontein Stream and resultant aquatic habitat alteration	4 [2]	2 [2]	2 [1]	3 [2]	Low [Low]	24 [10]
▪ Dewatering of the Holfontein shaft and discharging groundwater into the Blesbokspruit	▪ Potential scouring of the downstream habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA	6 [4]	2 [2]	3 [2]	2 [1]	Low [Low]	22 [8]
▪ Spillages of hydrocarbon-based fuels and lubricants from construction vehicles and equipment ▪ Littering by construction personnel ▪ Dewatering of the Holfontein shaft and discharging the dewatered water into the Blesbokspruit	▪ Pollution of the Blesbokspruit catchment and resultant decrease in biodiversity	4 [2]	2 [2]	2 [2]	3 [1]	Low [Low]	24 [6]
Operation Phase							
▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Blesbokspruit	▪ Potential scouring of the downstream habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA	6 [4]	3 [3]	3 [2]	4 [3]	Medium [Low]	48 [27]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ The potential polluted surface runoff from the operational areas as well as the haul roads (not collected by the PCD) entering sections of the Holfontein Stream and Blesbokspruit	▪ Pollution of the Holfontein Stream and Blesbokspruit and resultant decrease in biodiversity	4 [2]	3 [3]	2 [2]	4 [3]	Medium [Low]	36 [21]
▪ The inability to maintain treatment standards of the discharged water from the water treatment facility may pollute the Blesbokspruit catchment	▪ Pollution of the Blesbokspruit catchment and resultant decrease in biodiversity	4 [2]	3 [3]	2 [2]	4 [3]	Medium [Low]	36 [21]
▪ Ability to maintain standards of the discharged water from the water treatment facility into the Blesbokspruit	▪ Good quality water discharged alleviating downstream exasperated water quality conditions of the Blesbokspruit	4	3	2	3	Low [Positive impact]	27+
Decommissioning Phase							
▪ The removal of the water management infrastructure ▪ Spillages of hydrocarbon-based fuels and lubricants from vehicles and equipment ▪ Littering by personnel ▪ Increased surface runoff (due to unsuccessful rehabilitation of denuded areas)	▪ Pollution of the Holfontein Stream and resultant deterring of aquatic biota from the area and decreasing biodiversity	4 [2]	2 [2]	2 [2]	3 [1]	Low [Low]	24 [6]

Blasting

Operation Phase

NKGM (ME Operations) has indicated that blasting at depths as expected for the Holfontein Project, will have no damaging surface impacts. Seismic monitoring and independent assessments have shown that blasting at 350 metres below surface in the ME area does not result in surface vibrations significant enough to cause damage. The Holfontein Project will undertake blasting at even greater depths, reaching close to 700 m beneath the Welgedacht SH. No blasting will be undertaken near surface.

Hydrogeology

Construction Phase

Seepage of hydrocarbon-based fuels and/or lubricants spilled from vehicles and equipment used during construction as well as spillages of building materials such as cement, tar, etc. may result in the contamination of shallow groundwater resources.

- The potential impact will cease after the sources of pollution are removed (at the end of construction).
- The potential impact can be mitigated through implementing good housekeeping measures in terms of spill prevention and clean-up, and constructing adequate clean and dirty water management infrastructure at the commencement of construction. The contamination of shallow groundwater resources has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

The construction of the ventilation shaft is unlikely to dewater local aquifers, as it will be constructed after employing a pre-grouting approach. Standard shaft-sinking operational procedures to be employed include the drilling of a dedicated borehole at the proposed ventilation shaft position. Potential high-yielding fissures/fractures are identified and cement-grouted prior to shaft sinking.

In order to refurbish the Holfontein shaft, it will be concurrently dewatered and refurbished over an estimated 20 to 24 months. Dewatering of the Holfontein shaft to a depth of 112 metres below surface (mbs) may result in localised dewatering of the Karoo aquifer. Dewatering of the Holfontein shaft and underground workings from a depth of roughly 112 mbs to the level of mining (450 mbs) may result in localised dewatering of the dolomitic aquifer and Witwatersrand quartzites.

A dewatering cone will manifest around the Holfontein shaft, and immediately above the underground workings. This dewatering may result in localised dewatering of the Karoo and dolomitic aquifer units. Dewatering will result in dolomitic groundwater levels dropping by up to 10 m in the immediate vicinity of the Holfontein shaft. The influence of the dewatering cone is unlikely to be observed beyond a 400 m radius from the Holfontein shaft. Therefore, none of the surrounding borehole users should be impacted (including the residents of Welgedacht SH and the Holfontein hazardous waste (H:H) landfill facility), as according to the hydrocensus there are no borehole users within a 400 m radius.

- The potential impact is reversible once dewatering ceases at the end of the LoM and levels return to baseline levels.

- The potential impact can be mitigated through sealing high-yielding fissures / faults / dykes. The localised dewatering of the surrounding aquifers due to the dewatering of the Holfontein shaft and underground workings has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

The dewatering of the Holfontein shaft and underground workings may result in a decrease in underground water qualities due to the groundwater coming into contact with surrounding ore which has been exposed to oxygen, resulting in the partial oxidation of sulphide rock.

- The potential impact will cease once dewatering ceases at the end of the LoM and qualities return to baseline conditions.
- The potential impact can be mitigated by dewatering within a period of less than 24 months and continuously dewatering groundwater inflow during operations. Dewatering of the Holfontein shaft and underground workings resulting in a decrease in underground water qualities has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Operation Phase

Most of the surface activities which can potentially impact the local groundwater resources, will take place within the surface infrastructure area which will be considered a dirty water catchment area. All pollutant-causing activities will take place on impermeable surfaces and all contaminated runoff diverted to sumps and subsequently diverted to the PCD. Consequently, the activities on surface are not expected to influence the local groundwater resources. However, the water quality of the local groundwater resources may be impacted if there is inadequate dirty water management and contaminated water migrates away from the dirty water catchment and seeps into the local aquifers.

- The potential impact ceases after the potential sources of pollution are removed and the quality of the shallow groundwater resources returns to baseline conditions (after the LoM).
- The potential impact can be mitigated through adequately maintaining the clean and dirty water management infrastructure. The contamination of shallow groundwater resources due to pollution from construction activities has a **Medium** significance rating prior to the implementation of the recommended mitigation measures, and a **Low** significance rating after their implementation.

Some of the groundwater will be used underground (i.e. not pumped to surface) for hydro power equipment, dust suppression, cleaning and washing. Through this process the groundwater may become contaminated. Seepage of contaminated recycled groundwater into the surrounding aquifers may result in a decrease in surrounding groundwater qualities.

- The potential impact will cease after the sources of pollution are removed (at the end of operations).
- The potential impact can be mitigated through implementing dirty water management measures underground. The contamination of surrounding groundwater resources due to pollution from recycling groundwater underground has a **Medium** significance rating prior to the implementation of the recommended mitigation measures, and a

Low significance rating after their implementation.

After dewatering the shaft and existing underground workings, fissure water will flow into the Holfontein shaft and underground workings. Inflows into the Holfontein shaft (the shaft dimensions are 2 m by 12 m) will be as a function of the aquifer hydraulic characteristics and the degree to which water-yielding fissures / fractures are grouted. Fissure water inflows into the Holfontein shaft are estimated at 0.2 Mℓ/d to 0.6 Mℓ/d from the dolomitic aquifer, which will be encountered from 80 to 112 mbs, and even up to 200 mbs.

Fissure inflow volumes to the underground workings (deeper than 200 mbs) will increase from 1.5 Mℓ/d over the eight year LoM eventually reaching an estimated 3 Mℓ/d to 4 Mℓ/d (i.e. estimated to be less than the worst case scenario figure of 7 Mℓ/d assessed in the EIA). This groundwater inflow will have to be dewatered throughout the LoM to ensure safe mining conditions. As a result, it is expected that the aquifers immediately above the underground workings (i.e. the Witwatersrand quartzites) will dewater slightly during mining. If major water-bearing structures / conduits (e.g. fissures / faults / dykes) are not sealed sufficiently, additional fissure water inflow may result from the dolomites overlying the Witwatersrand quartzites. It is therefore important that mitigation measures be introduced where major water inflows are encountered underground.

Dewatering will result in dolomitic groundwater levels dropping by up to 10 m in the immediate vicinity of the Holfontein shaft. The influence of the dewatering cone is unlikely to be observed beyond a 400 m radius from the Holfontein shaft. Therefore, none of the surrounding borehole users should be impacted (including the residents of Welgedacht SH and the Holfontein hazardous waste (H:H) landfill facility), as according to the hydrocensus there are no borehole users within a 400 m radius.

- The potential impact will cease once dewatering ceases at the end of the LoM.
- The potential impact can be mitigated through sealing fissures / faults / dykes. The localised dewatering of the surrounding aquifers due to the dewatering of the Holfontein shaft and underground workings, and the subsequent impact on surrounding groundwater users through lowered groundwater levels in surrounding boreholes has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

The dewatering of the Holfontein shaft and underground workings may result in a decrease in underground water qualities due to the groundwater coming into contact with surrounding ore which has been exposed to oxygen resulting in the partial oxidation of sulphide rock. However, given the uncontaminated aquifers in which the Holfontein shaft and underground workings will be positioned, groundwater dewatered is unlikely to be contaminated (estimated at approximately 500 mg/ℓ of SO_4) if groundwater inflow is continuously pumped out during operations.

- The potential impact will cease once dewatering ceases at the end of the LoM.
- The potential impact can be mitigated by continuously dewatering fissure inflow. Dewatering of the Holfontein shaft and underground workings resulting in a decrease in underground water qualities has a **Medium** significance rating prior to the implementation of the recommended mitigation measures, and a **Low** significance rating after their implementation.

Although the dolomitic aquifers are high-yielding, these are not karstic, and therefore are not likely to cause sinkholes.

Decommissioning Phase

Seepage of hydrocarbon-based fuels and/or lubricants spilled from vehicles and equipment used during decommissioning as well as the removal of the dirty water management infrastructure (including the PCD) may result in the contamination of shallow groundwater resources.

- The potential impact is will cease after the sources of pollution are removed at the end of the LoM.
- The potential impact can be mitigated through implementing good housekeeping in terms of spills and adequately emptying the dirty water management infrastructure prior to dismantling and removal. The contamination of shallow groundwater resources due to pollution from decommissioning activities has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Post-closure Phase

After mine closure, pre-mining groundwater levels will re-establish in approximately 5 to 15 years, depending on the fissure water inflows into the underground workings.

- This potential impact does not require mitigation.

It is unlikely that the underground water quality will acidify. Concentrations will however increase as a function of the time it remains underground, increasing from 500 mg/ℓ to 1 500 mg/ℓ of SO_4 after 2 years, and 2 000 mg/ℓ of SO_4 after 7 years. During the flooding phase, water will accumulate in the deepest sections of the mine, where SO_4 will vary from 400 mg/ℓ to 1 200 mg/ℓ.

After flooding, no more oxygen will be present in the mine voids, i.e. no available oxygen for Acid Mine Drainage generation. Inflowing water will then dilute and replace the mine water and SO_4 will decrease significantly, depending on how effectively the mine water is replaced in all mine voids. After 20 to 30 years, the concentration of contaminant/s in the mine water quality may only be slightly higher than that of the inflowing water.

Groundwater will flow toward the mine during mining and immediately post-closure while the mined-out void is recharging. A very limited potential exists for a major pollution plume to establish after mine closure due to the dewatered state of the local dolomitic aquifer as a result of large scale abstraction from farming activities. Mine water will be confined to the mined-out zone with limited pressure to mobilise a plume. Therefore, it is unlikely that any groundwater management will be required post-closure.

- The potential impact will cease after the groundwater levels stabilise.
- The potential impact cannot be mitigated. The potential deterioration of groundwater qualities has a **High** significance rating prior to the stabilisation of groundwater levels and qualities and a **Low** significance rating after the stabilisation of groundwater levels and qualities have occurred (after 20 to 30 years).

Table 14: Hydrogeology impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Spillages of hydrocarbon-based fuels and lubricants from construction vehicles and equipment ▪ Spillages of building materials such as cement, tar, etc.	▪ Potential contamination of shallow groundwater resources	2 [2]	2 [2]	1 [1]	2 [1]	Low [Low]	10 [5]
▪ Dewatering of the Holfontein shaft up to a level of 112 m to allow for refurbishment	▪ Localised dewatering of the Karoo aquifer	4 [2]	2 [2]	1 [1]	3 [2]	Low [Low]	21 [10]
▪ Dewatering of the Holfontein shaft and underground workings from a depth of roughly 112 m below surface to the level of mining	▪ Localised dewatering of the dolomitic and Witwatersrand quartzites aquifers	6 [2]	2 [2]	2 [1]	2 [1]	Low [Low]	20 [5]
	▪ Impact on surrounding groundwater users through lowered groundwater levels in surrounding boreholes	4 [2]	2 [2]	2 [2]	3 [3]	Low [Low]	24 [18]
	▪ Decrease in underground water qualities	4 [2]	2 [2]	2 [2]	3 [2]	Low [Low]	24 [12]
Operation Phase							
▪ Ore handling on surface ▪ Inadequate maintenance of clean and dirty water management infrastructure	▪ Potential contamination of shallow groundwater resources through seepage of contaminated runoff	6 [2]	4 [4]	2 [2]	3 [1]	Medium [Low]	36 [8]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Recycling of groundwater in underground sections including hydro power equipment, dust suppression, cleaning and washing and the seepage of contaminated recycled groundwater into the surrounding aquifer	▪ Decrease in surrounding groundwater qualities	6 [4]	3 [2]	2 [2]	3 [2]	Medium [Low]	33 [16]
▪ Dewatering of the underground workings to ensure safe mining conditions	▪ Potential for inter-mine groundwater flow with neighbouring operational and historical mines which may subsequently result in decreased groundwater quality	2 [2]	3 [3]	2 [2]	2 [1]	Low [Low]	14 [7]
▪ Karoo aquifer and dolomitic aquifer water can seep/drain into underground mine workings along major fissures, fault zones or dykes	Impact on surrounding groundwater users through lowered groundwater levels in surrounding boreholes	6 [2]	4 [3]	2 [2]	2 [1]	Low [Low]	24 [12]
Decommissioning Phase							
▪ Removal of all surface infrastructures and selective removal of underground infrastructure ▪ Seepage of spillages of hydrocarbon-based fuels and lubricants from vehicles and equipment ▪ The removal of the water management infrastructure	▪ Potential contamination of groundwater resources through seepage	2 [2]	2 [2]	1 [1]	2 [1]	Low [Low]	10 [5]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Recharge of dewatered underground workings	▪ Movement of substantial volumes of mine water from one mining section to/from Holfontein section which may subsequently result in decreased groundwater quality	2 [2]	5 [5]	2 [2]	2 [1]	Low [Low]	18 [9]
	▪ Impact on groundwater users due to the flooding of mining sections.	2 [2]	2 [2]	2 [2]	3 [3]	Low [Low]	18 [18]
▪ Flooding of the underground workings and Holfontein shaft	▪ Decrease in groundwater qualities	6 [2]	4 [3]	2 [2]	5 [2]	High [Low]	60 [14]
Post-Closure Phase							
▪ Flooding of the underground workings and Holfontein shaft to pre-mining levels for all aquifer units	▪ Decrease in groundwater qualities	6 [2]	4 [3]	2 [2]	5 [2]	High [Low]	60 [14]
	▪ Potential of surface decant of mine water	6 [2]	5 [2]	2 [1]	1 [1]	Low [Low]	13 [5]
	▪ Impact on surrounding groundwater users through groundwater levels in surrounding boreholes returning to pre-mining levels	2 [2]	2 [2]	2 [2]	3 [3]	Low [Low]	18 [18]

Hydrology

Construction Phase

Surface vegetation will be cleared from areas intended for surface infrastructure construction, leaving areas bare. Bare areas will increase the potential for erosion which could further result in the sedimentation of the Holfontein Stream.

- The potential impact will cease as the bare areas become re-vegetated and eroded areas are repaired (at the end of LoM).
- The potential impact can be mitigated through adequate management of stormwater runoff by constructing a temporary berm between the Holfontein shaft and the Holfontein Stream until the stormwater management infrastructure is constructed, and timing the construction to take place during dry months. The impact of sedimentation of the Holfontein Stream has a **Low** significance rating prior to and after the implementation of mitigation measures.

Dewatering of the Holfontein shaft will take place to allow for refurbishment. During this period water of good quality will be discharged into the Blesbokspruit catchment. Discharge will occur at a rate of 1.2 ℓ/s (0.104 Mℓ/day) during initial dewatering (2 years). Water currently in the shaft will gradually be replaced with water from the old haulages and stopes and the water quality is likely to deteriorate (i.e. increasing in sulphate concentration). The water in the shaft will need to be treated to DWS standards prior to discharge.

- The potential impact of downstream contamination (from dewatering the shaft) will cease once discharge ceases (at the end of LoM).
- The potential impact can be mitigated by commissioning the water treatment facility prior at construction and treating the water to be discharged to meet qualities as stipulated by DWS, as well as monitoring the water quality of the water to be discharged. The pollution of the Blesbokspruit catchment due to discharging of contaminated water has a **Medium** significance rating prior to and after the implementation of the recommended mitigation measures.

The Blesbokspruit will be able to accommodate the additional flow from discharging treated water from Holfontein, for both the base flow and flood peak scenarios, without resulting in erosion or elevated water levels. Therefore, the impact of discharge to the Blesbokspruit has a **Low** significance rating if a point downstream of the confluence of the Holfontein Stream and Blesbokspruit is selected. The potential impact of additional water volume in the catchment will cease once discharging ceases.

If this discharge point is selected it may also result in a positive impact on the water quality of the Blesbokspruit in the vicinity of the Welgedacht Waste Water Treatment Works (WWTW). The water quality in this section of the Blesbokspruit is currently impacted by the treated sewage effluent discharged from the WWTW. The mixture of the discharged mine water and treated sewage effluent could be complimentary as the mine water would decrease the chemical oxygen demand and dilute other nutrients in the sewage effluent, while the sewage effluent would dilute the mining-related determinants, notably the SO_4. The positive impact on the water quality of the lower section of the Blesbokspruit due to the mixing of mine water and sewage effluent has a **Low**

Positive significance rating.

Old and corroded material, which could potentially contain uranium and other radioactive substances, will be hoisted to surface and stored in the salvage yard. This material may contain contaminants and potentially radioactive elements with the potential to contaminate surface runoff. Contaminated surface runoff may enter the Holfontein Stream, subsequently polluting the watercourse.

- The potential impact will cease once the pollution sources are removed (at the end of the LoM).
- The potential impact can be mitigated by constructing adequate dirty water management infrastructure prior to refurbishment activities commencing, including fitting the salvage yard area with drains that will direct runoff water to the PCD. The deteriorated water quality of the Holfontein Stream due to contaminated surface runoff has a **Medium** significance rating prior to the implementation of mitigation measures, and a **Low** significance rating after their implementation.

Operation Phase

The loading of haul trucks and hauling of waste rock to the ME Operations rock crushing facility may result in spillage of waste rock along the haul route. This spillage may contaminate surface runoff entering the Holfontein Stream or Blesbokspruit, polluting these watercourses.

- The potential impact will cease once pollution sources are removed and the water quality of the Holfontein Stream and Blesbokspruit return to baseline conditions.
- The potential impact can be mitigated by ensuring that haul road surfaces (including crossings) are maintained and by covering haul trucks with a tarpaulin. The pollution of the Holfontein Stream and by contaminated runoff has **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Water from the underground workings (maximum of ~7 Mℓ/day assessed) as well as the effluent from the sewage treatment plant (30 kℓ/day) will be treated prior to discharge. The discharge of ineffectively treated water may pollute the Blesbokspruit catchment.

- The potential impact will cease once discharge ceases.
- The potential impact can be mitigated by treating the water to be discharged to meet qualities as stipulated by DWS and monitoring the water quality of the water to be discharged. The deteriorated water quality of the Blesbokspruit catchment due to discharging inadequately treated water has a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.

The impacts of discharging treated dewatered groundwater and sewage effluent to the Blesbokspruit during the operational phase are the same as those described for the construction phase with a longer duration. Therefore, the impact of discharge to the Blesbokspruit has a **Medium** significance rating prior to the implementation of mitigation measures, and a **Low** significance rating after their implementation. The positive impact on the water quality of the lower section of the Blesbokspruit due to the mixing of mine water and sewage effluent has a **Medium Positive** significance rating.

During operations the water treatment facility will begin producing by-product (i.e. liquid sludge that will be trucked via tanker truck to the ME Operations). Storage of this sludge on site until volumes warrant removal, and potential spillage along the route, may contaminate surface runoff entering the Holfontein Stream or Blesbokspruit, polluting these watercourses.

- The potential impact will cease once pollution sources are removed (when discharge ceases at the end of LoM).
- The potential impact can be mitigated by adequately training staff responsible for storing and transporting sludge and ensuring that dirty water catchment systems are in place and operating effectively. The impact has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

The use of explosives underground will result in water high in nitrogen compounds being dewatered and subsequently being discharged to the Blesbokspruit catchment. Nitrogen compounds may result in excessive growth of aquatic vegetation which will subsequently impede water flow, particularly at culverts.

- The potential impact will cease once blasting ceases, at the end of the LoM.
- The potential impact can be mitigated by ensuring that the water treatment facility is operating effectively, and by implementing regular maintenance as required to address excessive vegetation growth. The impact has a **Medium** significance rating prior to- and a **Low** significance rating after the implementation of the recommended mitigation measures.

Decommissioning Phase

Decommissioning activities may result in hazardous material spills. Stormwater runoff may become contaminated and enter the Holfontein Stream, potentially polluting the watercourse.

- The potential impact will cease once decommissioning activities cease.
- The potential impact can be mitigated by leaving the dirty water management infrastructure in place until all other infrastructure has been removed, as detailed in the Holfontein Interim Closure Plan. The impact has a **Low** significance rating prior to and after the implementation of mitigation measures.

During decommissioning a potential source of pollution (i.e. discharging of treated groundwater and sewage effluent from the Holfontein Project) will be removed from the Blesbokspruit catchment. The ceasing of discharge activities will result in a positive impact on the Blesbokspruit catchment as the water quality and hydrology will return to baseline conditions.

- The potential positive impact of the removal of a potential pollution source from the Blesbokspruit catchment has a **Medium - Positive** significance rating.

Post-Closure Phase

The groundwater level in the shafts will stabilise post-closure, probably to the same elevation as baseline or current levels (unless a large water strike occurs during operations). Therefore, no residual negative impact on surface water, such as decant to surface, is foreseen.

- The unlikely impact cannot be mitigated. Only the quality of any decant can be treated to ensure that contamination of surrounding watercourses does not occur. The impact has a **Low** significance rating.

Table 15: Hydrology impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Clearing of vegetation across the surface infrastructure areas	▪ Sedimentation of the Holfontein Stream	2 [2]	2 [2]	1 [1]	2 [2]	Low [Low]	10 [10]
▪ Dewatering of the Holfontein shaft and discharge to the Blesbokspruit catchment	▪ Inadequately treated water discharged may pollute the Blesbokspruit	4 [4]	2 [2]	2 [1]	5 [5]	Medium [Medium]	40 [35]
	▪ Increased flow of the Blesbokspruit	4 [2]	2 [2]	2 [2]	3 [2]	Low [Low]	24 [12]
	▪ Increased water quality of the Blesbokspruit due to dilution with the sewage effluent from the WWTW	4	2	2	3	Low [Positive impact]	24+
▪ Old and corroded material potentially containing uranium and other radioactive substances will be hoisted to surface	▪ Material may contaminate surface runoff which could enter the Holfontein Stream, subsequently polluting the watercourse	6 [2]	2 [2]	2 [2]	3 [3]	Medium [Low]	30 [18]
Operation Phase							
▪ The loading of haul trucks and hauling of waste rock to the ME Operations	▪ Spillage of waste rock along the haul route may contaminate surface runoff entering the Holfontein Stream or Blesbokspruit polluting these watercourses	2 [2]	2 [2]	2 [2]	2 [1]	Low [Low]	12 [6]
▪ Dewatering of the underground workings and discharge to the Blesbokspruit catchment	▪ Ineffectively treated water discharged may pollute the Blesbokspruit catchment	4 [4]	4 [4]	2 [1]	5 [5]	Medium [Low]	50 [25]
	▪ Increased flow of the Blesbokspruit	4 [2]	4 [4]	2 [2]	3 [2]	Medium [Low]	30 [16]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
	▪ Increased water quality of the Blesbokspruit due to dilution with the sewage effluent from the WWTW	4	4	2	3	Medium [Positive impact]	30+
▪ By-product from water treatment facility begins trucked to the ME Operations ▪ Storage of the sludge on site until volumes warrant removal	▪ Ineffective storage and spillage along route may contaminate surface runoff entering the Holfontein Stream or Blesbokspruit, polluting these watercourses	2 [2]	3 [3]	1 [1]	4 [4]	Low [Low]	24 [24]
▪ Discharge of water high in nitrogen compounds due to underground blasting activities to the Blesbokspruit catchment	▪ Nitrogen compounds may result in excessive growth of aquatic vegetation with the resulting impeding of water flow in watercourses particularly at culverts	6 [6]	4 [4]	2 [2]	4 [2]	Medium [Low]	48 [24]
Decommissioning Phase							
▪ Dismantling and removal of infrastructure and rehabilitation using heavy vehicles and equipment	▪ Stormwater runoff may become contaminated by spilled hazardous materials and enter the Holfontein Stream, potentially polluting the watercourse	2 [2]	2 [2]	1 [1]	2 [1]	Low [Low]	10 [5]
▪ Ceasing of discharging activities	▪ A potential source of pollution will be removed from the Blesbokspruit catchment	4	5	2	5	Medium [Positive impact]	55+
Post-Closure Phase							
▪ The groundwater level in the shafts will stabilise post-closure	▪ Potential decant and runoff to the Holfontein Stream	6 [6]	5 [5]	2 [2]	1 [1]	Low [Low]	13 [3]

Noise

Construction Phase

Construction activities associated with the Holfontein Project are not likely to increase the noise level by more than that experienced for the operational phase, and will be short term in comparison.

- The potential impact on the ambient noise levels will cease once construction activities cease.
- The potential impact can be mitigated by enclosing noisy equipment such as generators, fitting efficient silencers, enclosing engine compartments of construction vehicles and equipment, and maintaining vehicles and equipment conscientiously. Construction activities resulting in an increase in ambient noise levels at sensitive receptors adjacent to the Holfontein shaft and ventilation shaft (i.e. the residents of the Khomponi Community) have a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.
- Construction of the haul route resulting in an increase in ambient noise levels at sensitive receptors along the haul route (i.e. the residents of Welgedacht SH along Carnation Road) has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Operation Phase

The Holfontein shaft and ventilation shaft will operate continuously. Hoisting, loading of haul trucks and hauling of ore to the processing plant at the ME Operations is assumed to take place only during daytime hours (06h00-18h00). Other than the continuous noise from the ventilation shaft, the activity within the site boundaries expected to generate the most noise will be the loading of haul trucks during daytime hours. These activities will result in a 2.4 dB (ventilation shaft) and a 4.1 dB (loading of haul trucks) exceedance of the recommended daytime level of 50 dB(A) at sensitive receptors adjacent to the Holfontein shaft and ventilation shaft (i.e. the residents of the Khomponi Community) (refer to Figure 60). These increases are considered acceptable in terms of the WHO Guidelines for Ambient Sound Levels, as they do not exceed the recommended levels by more than 5 dB. The increase in noise levels during daytime will be easily discernible by surrounding sensitive receptors but will not result in a significant noise impact.

At night the continuous operation of the ventilation shaft will result in a 13.1 dB exceedance of the recommended night time level of 40 dB(A) at sensitive receptors in proximity to the ventilation shaft (i.e. residents of the historic mine hostel and associated informal dwellings) (refer to Figure 61). The increase at night will result in a significant noise impact at sensitive receptors in proximity to the ventilation shaft and is therefore likely to result in sporadic complaints from the nearest residences.

- The potential impact on ambient noise levels will cease once operations cease at the end of the LoM.

- The potential impact can be mitigated by constructing noise barriers, enclosing noisy equipment and infrastructure, implementing noise minimising operational and administrative procedures and for the ventilation shaft, vertical axial fans are recommended to be installed below surface level and vertical attenuated exhaust / intake stacks must be utilised. The impact of the noise generating activities at the Holfontein shaft area and ventilation shaft area on sensitive receptors has a **Medium** significance rating prior to, and a **Low** significance rating after, the implementation of the recommended mitigation measures.

The haul route from the Holfontein shaft to the ME Operations processing plant is expected to be to the south-west via the Holfontein Road, Pansy Avenue and Carnation Road and its new extension. Hauling will only occur during daytime hours (06h00–18h00). Approximately 40 return journeys are to be generated per day, or 7 vehicle pass-bys per hour for a 12-hour activity period. Noise generated from hauling activities is predicted to be 46 dB(A) which is well within the 50dB(A) daytime limit and only 1-3 dB exponential increase in baseline conditions will be experienced. Therefore, the noise increase is predicted to not be discernible to a person at distances greater than 30 m from the road centreline, and just discernible to sensitive receptors within 25 m from the road centreline (i.e. the nearest dwellings in Welgedacht SH along Carnation Road). Hauling activities are not expected to result in a significant noise impact.

- The potential impact on ambient noise levels will cease once hauling activities cease at the end of the LoM.
- The potential impact can be mitigated by fitting efficient silencers and enclosing engine compartments of haul trucks and maintaining vehicles conscientiously. The impact of the noise generated from hauling activities on sensitive receptors has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

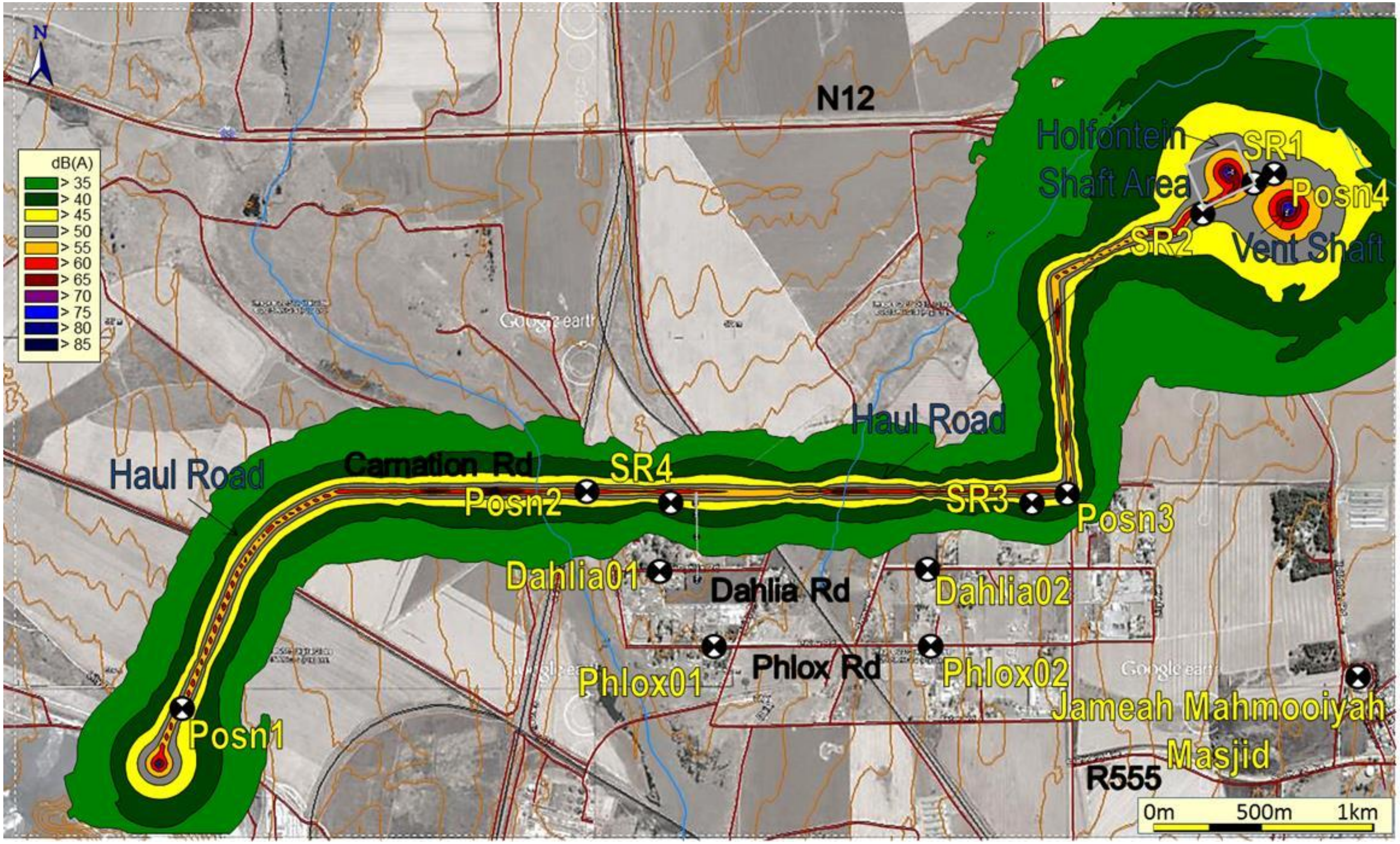


Figure 60: Predicted noise contours for the daytime mining operations

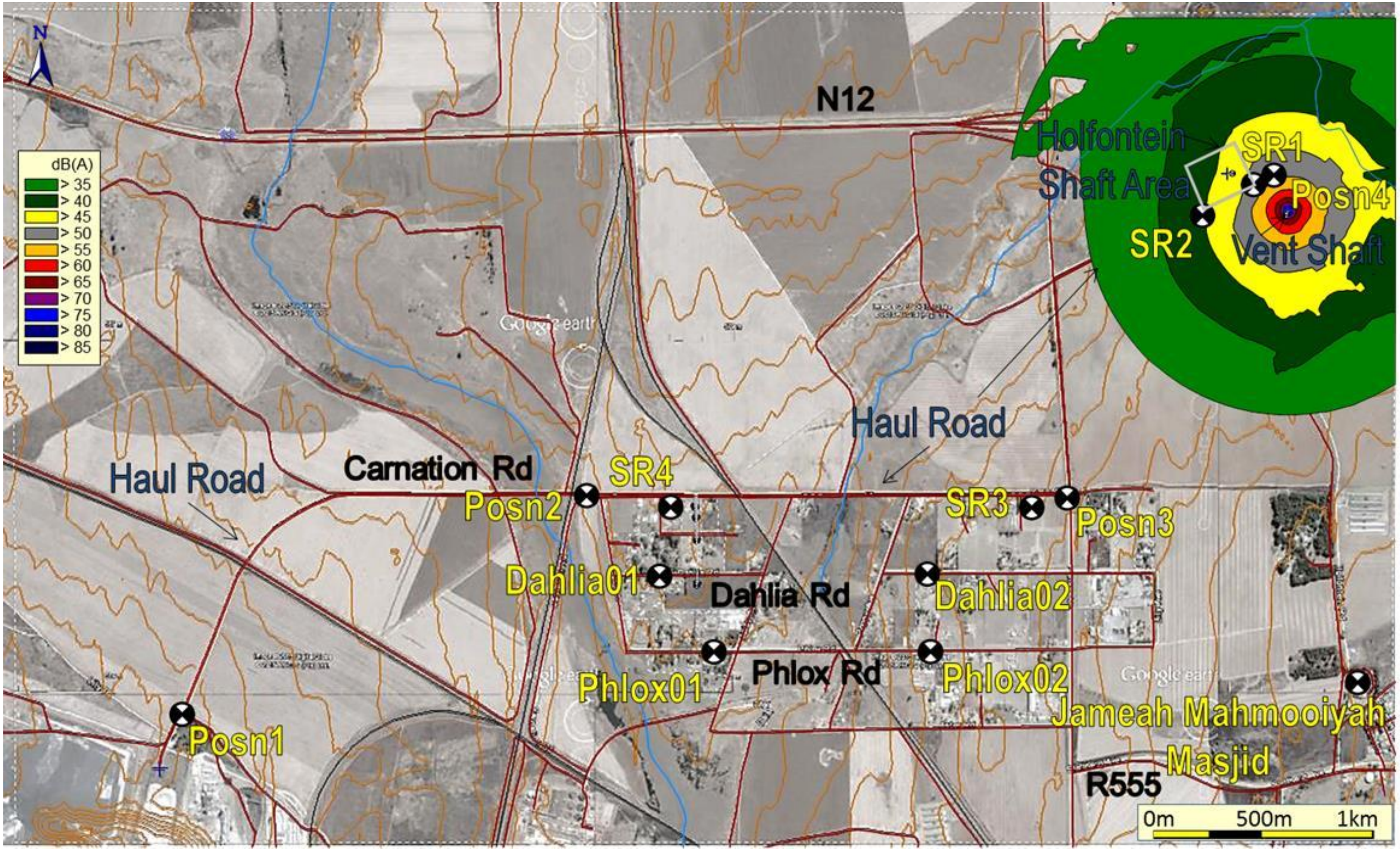


Figure 61: Predicted noise contours for the night-time mining operations

Decommissioning Phase

No significant noise impacts are expected during the decommissioning phase. This impact is likely to be lower than that of the construction phase and of an even shorter duration.

- The potential impact on ambient noise levels will cease once decommissioning activities cease.
- The potential impact can be mitigated by enclosing noisy equipment such as generators, fitting efficient silencers and enclosing engine compartments of vehicles and equipment as well as maintaining vehicles and equipment conscientiously. Decommissioning activities resulting in an increase in ambient noise levels at sensitive receptors adjacent to the Holfontein shaft and ventilation shaft (i.e. the residents of the Khomponi Community) and sensitive receptors along the haul route (i.e. the residents of Welgedacht SH along Carnation Road) has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Table 16: Noise impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Construction activities at the Holfontein shaft and ventilation shaft areas	▪ Increase in ambient noise levels at sensitive receptors adjacent to the Holfontein shaft and ventilation shaft (i.e. the residents of the Khomponi Community)	4 [3]	2 [2]	2 [1]	4 [3]	Medium [Low]	32 [18]
▪ Construction of the haul route	▪ Increase in ambient noise levels at sensitive receptors along the haul route (i.e. the residents of Welgedacht SH along Carnation Road)	2 [2]	2 [2]	2 [1]	3 [2]	Low [Low]	18 [10]
Operation Phase							
▪ Truck loading activities at the Holfontein shaft and the continuous operation of the ventilation shaft	▪ Increase in ambient noise levels at sensitive receptors adjacent to the Holfontein shaft and ventilation shaft (i.e. the residents of the Khomponi Community)	4 [2]	4 [4]	2 [1]	4 [3]	Medium [Low]	40 [21]
▪ Hauling activities	▪ Increase in ambient noise levels at sensitive receptors along the haul route (i.e. the residents of Welgedacht SH along Carnation Road within 25 m of the centreline of the road)	2 [2]	4 [4]	2 [1]	3 [2]	Low [Low]	24 [14]
Decommissioning Phase							

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Decommissioning activities at the Holfontein shaft and ventilation shaft areas	▪ Increase in ambient noise levels at sensitive receptors adjacent to the Holfontein shaft and ventilation shaft (i.e. the residents of the Khomponi Community)	4 [2]	2 [2]	2 [1]	3 [2]	Low [Low]	24 [10]
▪ Maintaining of the haul route prior to closure	▪ Increase in ambient noise levels at sensitive receptors along the haul route (i.e. the residents of Welgedacht SH along Carnation Road)	2 [2]	2 [2]	2 [1]	3 [2]	Low [Low]	18 [10]

Socio-economic

Construction, Operation and Decommissioning Phases

ME Operations are currently operating at steady state production. This production rate will be maintained until 2021 when the mine production will begin declining. Ordinarily this decline would result in company downsizing. However, the Holfontein Mine will be used to supplement the drop in production once the ME tonnage profile begins to decline. This will ensure that ME employees will retain their employment positions for the Holfontein LoM.

- This positive impact can be further improved through the effective implementation of the SLP Human Resources Development (HRD) Programme. This impact is expected to have a **High Positive** significance rating prior to and after the implementation of the recommended measures.

New and existing mines across South Africa continue to attract job seekers into the areas in which they operate. More often than not, this results in the development of informal settlements in the vicinity of these mines. Although the proposed Holfontein Project will not offer any new employment opportunities, as existing employees will be derived from the ME Operations, there is a likelihood that it will still attract optimistic job seekers into the area, and more specifically into the Khomponi Community, as it is situated adjacent to the site. There is also the possibility that construction / decommissioning contractors will decide to settle near to the site during the work week in order to reduce their cost of transport to and from the site. This may result in the construction of additional informal dwellings in and around the Khomponi Community. Migration of job seekers into the area is expected to be a largely permanent impact. However, due to the relatively short life of the mine, this in-migration will be limited. The in-migration may also be further limited once job seekers realise that there are no employment opportunities available; those that have settled may then relocate in search of alternate employment.

- This impact is expected to be residual as any in-migration will likely result in permanent occupation. The impact is difficult to mitigate but management of the impact is possible. The significance of this impact is impossible to predict. The magnitude of the impact has thus been rated very high / unknown and the probability has been rated definite / unknown, resulting in a **High** significance rating which cannot be mitigated.

The potential influx of job seekers into the region will result in overcrowding of the Khomponi Community, and potentially other areas nearby. These informally settled areas already have limited access to services and infrastructure and overcrowding will increase the pressure on the already limited social infrastructure and service provision (particularly water and sanitation).

- This impact is expected to be residual as any in-migration will likely result in permanent occupation. This impact cannot be mitigated. However, measures can be implemented to in order to prevent the exacerbation of this impact. This impact is expected to have a **High** significance rating.

The Khomponi Community considers itself to be a relatively peaceful community with a fairly strong sense of place. Influx of strangers and job seekers into the area can result in unexpected conflicts arising between original and new residents. Newcomers moving into the community can result in an increase in crime within the community and this is expected to become disruptive and negatively impact on the residents' current quality of life. Unreported rape is still a growing concern in EMM. There may be a potential increase in reported and unreported rape cases within the local community, as newcomers moving into the community may take advantage of unemployed women and teenage girls living in the community. There may also be a resulting increase in promiscuity, consistent with the existing EMM HIV infection rates, and the prevalence of HIV/AIDS among the local community and new job seekers moving into the area is expected to increase.

The growth of this informal settlement may also result in an increase in crime rates in the surrounding areas, specifically the nearest formal suburb of Welgedacht SH. This impact is difficult to quantify as it is directly dependent on the migration of job seekers into the area, which itself is impossible to predict. The Welgedacht SH is approximately 2 km away from the Holfontein shaft area, so there is some potential for them to be impacted by the potential expansion of the informal settlement and any associated increase in crime rates. There is also a perception by the Welgedacht SH residents that any resulting increase in crime rates will have a negative impact on Welgedacht SH land value.

- This impact is expected to be residual as any in-migration will likely result in permanent occupation. This impact cannot be mitigated. However, measures can be implemented to in order to prevent the exacerbation of this impact. This impact is expected to have a **High** significance rating.

With the potential expansion of the Khomponi Community as a result of the mine, residents of the Khomponi Community may establish tuck shops and canteens in the Holfontein project area in order to supply mine employees and new residents with food and drink. If these activities are not controlled they may contribute to the migration of job seekers into the project area and may result in social ills such a rowdy behaviour, drunkenness and disturbance to the Khomponi Community.

- This impact is expected to be residual as any in-migration will most likely result in permanent occupation. This impact cannot be mitigated. However, measures can be implemented to in order to manage this impact. This impact is expected to have a **Medium** significance rating.

The increased noise and traffic as well as a change in the visual landscape are likely to alter the current living space of the Khomponi Community dramatically. Their quality of life and sense of place may be altered and / or lost as a result of the close proximity to the proposed project.

- This impact is difficult to quantify and the magnitude of the impact has thus been rated very high / unknown and the probability has been rated definite / unknown, resulting in a high negative significance. This impact is expected to be a residual impact, as it will not necessarily cease once the LoM has ended and the mine has been closed. This impact cannot be mitigated. However, measures can be implemented to in order to manage this impact. This impact is expected to have a

High significance rating.

Children and dogs were noted alongside the Holfontein Road, which runs into the Khomponi Community. Children also walk down the Holfontein Road to Pansy Avenue in order to catch the school bus. Although the proposed haul road will be routed around the community (in order to prevent haul trucks travelling through the residential areas), the additional heavy vehicle traffic on the gravel road between Pansy Avenue and the Khomponi Community is likely to result in increased pedestrian and domestic animal accidents and mortality.

- This impact of decreased road safety due to the presence of heavy vehicles used for construction and decommissioning as well as haul trucks will cease once activities cease at the end of the LoM.
- This impact can be mitigated by implementing road safety measures. This impact is expected to have a **High** significance rating prior to, and a **Medium** significance rating after, the implementation of the recommended measures.

Impacts relating to traffic have been further assessed in the traffic impact assessment below.

Impacts of visual intrusion on the landscape character due to the infrastructure (specifically the headgear as this is of significant height) and visual nuisance of lighting at night at the shafts may result in nuisance impacts on surrounding sensitive receptors as detailed in the visual aesthetics impact assessment below.

Dust generating activities at Holfontein may result in a decrease in ambient air quality and the subsequent nuisance impacts, health impacts and impacts on crop growth. These are detailed in the air quality impact assessment above.

The potential for Karoo and Dolomitic aquifers to be negatively impacted upon in terms of quality and quantity due to dewatering and underground mining activities, and the subsequent impact on surrounding borehole users, is detailed in the hydrogeology impact assessment above.

Noise generating activities at Holfontein may result in an increase in ambient noise levels and nuisance impacts at adjacent sensitive receptors, as detailed in the noise impact assessment above.

There is the potential for a decrease in land capability within the mining footprint to occur as a result of ineffective on-site management and rehabilitation, as detailed in the soil and land capability impact assessment below.

Post-Closure Phase

The potential influx of job seekers into the region and the resultant indirect impacts of overcrowding leading to pressure on existing infrastructure and services; overcrowding leading to social ills and decreased quality of life; and the establishment of tuck shops and canteens in the Holfontein project area are expected to be residual, as they will not necessarily cease once the LoM has ended and the mine has been closed. These impacts cannot be mitigated. However, measures can be implemented to in order to manage this impact. These impacts are expected to have **High** significance ratings.

Table 17: Socio-economic impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Mining operations	▪ Continued employment for ME Operations employees	8 [10]	4 [4]	2 [2]	5 [5]	High [High]	70 [80]
	▪ Migration of job seekers into the project area	10 [10]	5 [3]	2 [2]	5 [4]	High [High]	85 [60]
▪ Migration of job seekers into the project area	▪ Overcrowding leading to pressure on existing infrastructure and services	10	5	1	4	High	64
	▪ Overcrowding leading to social ills and decreased quality of life	10	5	2	4	High	68
	▪ Establishment of tuck shops and canteens in the Holfontein project area in order to supply mine employees and new residents with food and drink	6	4	1	4	Medium	44
▪ Construction activities ▪ Wind erosion from bare areas and topsoil stockpile ▪ Vehicle entrainment on unpaved roads	▪ Decrease in air quality as a result of dust and fine particles	8 [8]	2 [2]	2 [1]	3 [2]	Medium [Low]	36 [22]
	▪ Impact of dust on the growth of surrounding crops	4 [4]	2 [2]	2 [2]	3 [2]	Medium [Low]	24 [16]
▪ Construction and presence of the Holfontein shaft and ventilation shaft headgear ▪ Dust from construction activities ▪ Litter from personnel ▪ Inadequate waste management	▪ Proposed infrastructure will result in a visual intrusion	6 [6]	4 [4]	2 [2]	5 [5]	High [High]	60 [60]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Dewatering of the shaft	▪ Impact on groundwater users due to dewatering activities of mining sections	6 [2]	4 [2]	2 [2]	2 [2]	Low [Low]	24 [12]
▪ Construction vehicles on the surrounding roads	▪ Road safety – increased danger / pedestrians and livestock mortality rates as a result of additional haul vehicle traffic on haul route	8 [6]	4 [4]	1 [1]	5 [3]	High [Medium]	65 [33]
▪ Clearing of haul roads and ventilation shaft footprint	▪ Decrease in land capability as a result of ineffective on-site management and rehabilitation	8 [6]	5 [5]	1 [1]	4 [2]	Medium [Low]	56 [24]
▪ Overcrowding ▪ increased noise and traffic and a change in the visual landscape	▪ Loss of sense of place	10	5	1	5	High	80
Operation Phase							
▪ Mining operations	▪ Continued employment for ME Operations employees	8 [10]	4 [4]	2 [2]	5 [5]	High [High]	70 [80]
	▪ Migration of job seekers into the project area	10 [10]	5 [3]	2 [2]	5 [4]	High [High]	85 [60]
▪ Migration of job seekers into the project area	▪ Overcrowding leading to pressure on existing infrastructure and services	10	5	1	4	High	64
	▪ Overcrowding leading to social ills and decreased quality of life	10	5	2	4	High	68
	▪ Establishment of tuck shops and canteens in the Holfontein project area in order to supply mine employees and new residents with food and drink	6	4	1	4	Medium	44

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Ore handling activities ▪ Hauling activities ▪ Wind erosion from the topsoil stockpile	▪ Decrease in air quality as a result of dust and fine particles	8 [8]	2 [2]	2 [1]	3 [2]	Medium [Low]	36 [22]
	▪ Impact of dust on the growth of surrounding crops	4 [4]	4 [4]	2 [2]	3 [2]	Medium [Low]	30 [20]
▪ Loading of haul trucks at the shaft via a chute ▪ Operation of the ventilation shaft	▪ Increase in ambient noise levels at the shaft as a result of truck loading activities at Holfontein shaft and the continuous operation on the vent shaft	4 [2]	4 [4]	2 [1]	4 [3]	Medium [Low]	40 [21]
▪ Presence of the Holfontein shaft and ventilation shaft headgear ▪ Dust from operational activities ▪ Litter from personnel	▪ Proposed infrastructure will result in a visual intrusion	6 [6]	4 [4]	2 [2]	5 [5]	High [High]	60 [60]
▪ Lighting at the Holfontein mine surface infrastructure area and ventilation shaft area	▪ Visual nuisance factors such as extensive lighting used at night	6 [4]	4 [4]	2 [1]	5 [3]	Medium [Low]	50 [27]
▪ Dewatering of the underground mining sections to ensure safe working conditions	▪ Impact on groundwater users due to dewatering activities of mining sections	6 [2]	4 [2]	2 [2]	2 [2]	Low [Low]	24 [12]
▪ Hauling activities	▪ Road safety – increased danger / pedestrians and livestock mortality rates as a result of additional haul vehicle traffic on haul route	8 [6]	4 [4]	1 [1]	5 [3]	High [Medium]	65 [33]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Stockpiling of soil ▪ Presence of the haul road (in the proximity of the ME Operations) and ventilation shaft within areas with low and medium agricultural potential	▪ Decrease in land capability as a result of ineffective on-site management and rehabilitation	8 [6]	5 [5]	1 [1]	4 [2]	Medium [Low]	56 [24]
▪ Overcrowding ▪ increased noise and traffic and a change in the visual landscape	▪ Loss of sense of place	10	5	1	5	High	80
Decommissioning Phase							
▪ Construction activities ▪ Rehabilitation activities	▪ Decrease in air quality as a result of dust and fine particles	8 [8]	2 [2]	2 [1]	3 [2]	Medium [Low]	36 [22]
▪ Vehicles used for decommissioning on surrounding roads	▪ Road safety – increased danger / pedestrians and livestock mortality rates as a result of additional haul vehicle traffic on haul route	8 [6]	4 [4]	1 [1]	5 [3]	High [Medium]	65 [33]
▪ Inadequate rehabilitation of the haul roads and ventilation shaft footprint	▪ Decrease in land capability as a result of ineffective on-site management and rehabilitation	8 [6]	5 [5]	1 [1]	4 [2]	Medium [Low]	56 [24]
▪ Migration of job seekers into the project area	▪ Overcrowding leading to pressure on existing infrastructure and services	10	5	1	4	High	64
	▪ Overcrowding leading to social ills and decreased quality of life	10	5	2	4	High	68
	▪ Establishment of tuck shops and canteens in the Holfontein project area in order to supply mine employees and new residents with food and drink	6	4	1	4	Medium	44

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Overcrowding ▪ increased noise and traffic and a change in the visual landscape	▪ Loss of sense of place	10	5	1	5	High	80
Post-Closure Phase							
▪ Rehabilitation	▪ Decrease in land capability as a result of ineffective on-site management and rehabilitation	8 [6]	5 [5]	1 [1]	4 [2]	Medium [Low]	56 [24]
▪ Migration of job seekers into the project area	▪ Overcrowding leading to pressure on existing infrastructure and services	10	5	1	4	High	64
	▪ Overcrowding leading to social ills and decreased quality of life	10	5	2	4	High	68
	▪ Establishment of tuck shops and canteens in the Holfontein project area in order to supply mine employees and new residents with food and drink	6	4	1	4	Medium	44
▪ Overcrowding	▪ Loss of sense of place	10	5	1	5	High	80

<u>Soil and Land Capability</u>

Construction Phase

Excessive stormwater runoff from cleared areas, constructed hard-standing areas within the mining footprint areas, and roads may accentuate the problem of erosion. Stockpiled soil is at risk from wind and water erosion.

- The potential impacts will cease once the stockpiled soils are replaced during rehabilitation and the cleared areas are re-vegetated.
- The potential impacts can be mitigated through adequate management of stormwater runoff and by implementing erosion prevention measures. The impact of the potential increase in erosion is considered to be of **Medium** significance prior to and after the implementation of the mitigation measures.

The presence of construction vehicles and heavy earthmoving machinery may result in the compaction of soil as well as the contamination of the soil due to hydrocarbon leaks. There is also the potential for the contamination of soil from construction materials such as cement.

- The potential impact is reversible once the source of pollution is removed and the soils have been ripped and remediated.
- The potential impact can be mitigated by effectively storing and handling hydrocarbons, maintaining equipment and vehicles, and minimising areas to be disturbed by heavy vehicle movement. The impact of soil contamination is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Ineffective stockpile management may have a negative impact on the soil quality, fertility and agricultural potential of stockpiled soils.

- The potential impact is reversible once the soils have been replaced during rehabilitation.
- The potential impact can be mitigated by assessing the soil fertility of the stockpiled soils and fertilising as required to sustain normal plant growth. The impact of stockpiling on soil quality and fertility is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Construction of a portion of the haul road in the vicinity of the ME Operations and the ventilation shaft will result in the loss of areas of medium and low agricultural potential respectively.

- This loss is reversible for the medium agricultural potential areas where the road will be constructed and widened, once the road is rehabilitated at the end of the LoM.
- The loss of low agricultural potential land is irreversible as the ventilation shaft will be sealed with a concrete cap at the end of the LoM; the land can therefore not be returned to agricultural use.
- The potential impact can be mitigated by effectively stockpiling the soils stripped from

these areas for use during rehabilitation. The impact of the loss of areas with low to medium agricultural potential is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Operation Phase

Excessive stormwater runoff from cleared areas, constructed hard-standing areas within the mining footprint, and roads may accentuate the problem of erosion. Stockpiled soil is at risk from wind and water erosion.

- The potential impact is reversible over time if the cleared areas are re-vegetated and returned to baseline conditions.
- The potential impact can be mitigated through adequate management of stormwater runoff, by putting erosion prevention measures in place and through effective stockpile management. The impact of the potential increase in erosion is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

The presence of haul vehicles may result in contamination of the soil due to hydrocarbon leaks. Inappropriate storage and handling of hazardous substances, as well as general and hazardous waste, may result in the contamination of soil. Spills and runoff due to ineffective dirty water management on site may also lead to soil contamination.

- The potential impact is reversible once the source of pollution is removed and the soils have been ripped and remediated.
- The potential impact can be mitigated by effectively storing and handling hazardous materials and waste, maintaining equipment and vehicles, and maintaining the dirty water management infrastructure. The impact of soil contamination is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Ineffective stockpile management may have a negative impact on the soil quality, fertility and agricultural potential of stockpiled soils.

- The potential impacts will cease once the stockpiled soils are replaced during rehabilitation and the cleared areas are re-vegetated.
- The potential impact can be mitigated by assessing the soil fertility of the stockpiled soils and fertilising as required to sustain normal plant growth. The impact of stockpiling on soil quality and fertility is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Decommissioning Phase

The presence of vehicles and heavy earthmoving machinery may result in compaction of soil as well as contamination of the soil due to hydrocarbon leaks. Inappropriate storage and handling of hazardous substances as well as general and hazardous waste may result in the contamination of soil. Spills and runoff due to ineffective dirty water management on site may also lead to soil contamination.

- The potential impact will cease once the sources of pollution are removed.
- The impact can be mitigated by effectively storing and handling hazardous materials and waste; maintaining equipment and vehicles; maintaining the dirty water management infrastructure on site until all other infrastructure has been removed; and minimising areas to be disturbed by heavy vehicle movement. The impact of soil contamination is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Ineffective stockpile management and rehabilitation could have a negative impact on soil quality, fertility and agricultural potential subsequently affecting the future land capability.

- The potential impact will cease once the soils have been replaced during rehabilitation.
- The potential impact can be mitigated by assessing the soil fertility of the stockpiled soils and fertilising as required to sustain normal plant growth. The impact of stockpiling on soil quality and fertility is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Excessive stormwater runoff from newly rehabilitated areas, where vegetation has not successfully re-established may result in erosion.

- The potential impact will cease upon successful establishment of vegetation and when eroded areas repaired.
- The potential impact can be mitigated by successfully rehabilitating denuded areas as per the Interim Closure Plan. The impact of the potential increase in erosion is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Sealing of the ventilation shaft will result in the permanent loss of low agricultural potential land.

- The loss of low agricultural potential land is irreversible as the ventilation shaft will be sealed with a concrete cap at the end of the LoM; the land can therefore not be returned to agricultural use.
- The impact of the loss of low potential agricultural land is considered to be of **Medium** significance and the potential impact cannot be mitigated.

Post-Closure Phase

Excessive stormwater runoff from newly rehabilitated areas, where vegetation has not successfully re-established may result in erosion.

- The potential impact will cease upon successful establishment of vegetation and when eroded areas repaired.

- The potential impact can be mitigated by successfully rehabilitating denuded areas as per the Interim Closure Plan. The impact of the potential increase in erosion is considered to be of **Medium** significance prior to the implementation of the mitigation measures, but can be reduced to a **Low** significance with their implementation.

Table 18: Soil and land capability impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Clearing of vegetation across the surface infrastructure areas ▪ Construction of hard-standing areas ▪ Stripping and stockpiling of soil	▪ Increase in surface runoff may result in increased soil erosion ▪ Stockpiles may be eroded by exposure to wind and runoff	8 [8]	5 [5]	1 [1]	4 [3]	Medium [Medium]	56 [42]
▪ Heavy vehicles and earth moving machinery on site ▪ Construction of surface infrastructure	▪ Potential hydrocarbon leaks and spillages of construction material may result in contamination of soils ▪ Heavy vehicles and earth moving machinery may result in compaction of soils	8 [6]	2 [2]	1 [1]	4 [3]	Medium [Low]	44 [27]
▪ Stripping and stockpiling of soil ▪ Construction of roads and the ventilation shaft	▪ Reduced soil quality, fertility, and agricultural potential ▪ Loss of low and medium potential agricultural soil (ventilation shaft/ haul road)	8 [6]	4 [4]	1 [1]	4 [2]	Medium [Low]	52 [22]
Operation Phase							
▪ Constructed hard-standing areas and roads, and within the mining footprint	▪ Excessive stormwater runoff may result in increased soil erosion	8 [8]	5 [5]	1 [1]	4 [3]	Medium [Medium]	56 [42]
▪ Heavy vehicles ▪ Storage of hazardous substances and waste	▪ Potential hydrocarbon leaks, and hazardous material and waste spills may result in soil contamination	8 [6]	2 [2]	1 [1]	4 [3]	Medium [Low]	44 [27]
▪ Ineffective stockpile management	▪ Reduced soil quality, fertility, and agricultural potential	8 [6]	5 [5]	1 [1]	4 [2]	Medium [Low]	56 [24]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Decommissioning Phase							
▪ Removing of surface infrastructure and access roads etc. ▪ Newly rehabilitated areas, which have not yet been vegetated or where vegetation has not re-established	▪ Excessive stormwater runoff may result in increased soil erosion	8 [4]	5 [5]	1 [1]	4 [2]	Medium [Low]	56 [20]
▪ Heavy vehicles and earth moving machinery on site ▪ Decommissioning activities	▪ Potential hydrocarbon leaks and spillages of hazardous materials may result in contamination of soils ▪ Heavy vehicles and earth moving machinery may result in compaction of soils	8 [6]	2 [2]	1 [1]	4 [3]	Medium [Low]	44 [27]
▪ Ineffective rehabilitation	▪ Reduced soil quality, fertility and agricultural potential	8 [6]	5 [5]	1 [1]	4 [2]	Medium [Low]	56 [24]
Post-Closure Phase							
▪ Newly rehabilitated areas, which have not yet been vegetated or where vegetation has not re-established	▪ Excessive stormwater runoff may result in increased soil erosion	8 [4]	5 [5]	1 [1]	4 [2]	Medium [Low]	56 [20]
▪ Sealing of ventilation shaft	▪ Loss of low potential agricultural soil	4 [4]	5 [5]	1 [1]	5 [5]	Medium [Medium]	50 [50]

Terrestrial Ecology

Construction Phase

The clearing of vegetation at the Holfontein shaft for the construction of infrastructure, widening of the haul road and the upgrading of the Blesbokspruit culvert could lead to the destruction of natural vegetation. The area associated with the Holfontein shaft was highly disturbed and dominated by alien plant species, however, at least one species of conservation concern, *Hypoxis hemerocallidea* (Declining), was confirmed immediately north west of the shaft area (on the boundary of the footprint area). The widening of the haul road, especially the Carnation Road section, could impact on the dry grasslands as well as moist grasslands (including the Blesbokspruit) adjacent to these sections. The upgrading of culvert could impact on the moist grassland species, especially *Leersia hexandra* which is the host plant for the rare butterfly *Metisella meninx* (Marsh Sylph).

- The potential impact is irreversible and may result in the permanent loss of species of conservation concern.
- The potential impact can be mitigated through keeping the area to be disturbed to a minimum, and avoiding or relocating species of conservation concern. The impact on natural vegetation (including species of conservation concern) from construction activities has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

During construction, vegetation will be removed and soil disturbed. The seed of alien invasive plant species occurring nearby could spread into the areas containing natural vegetation (dry and moist grasslands). Although numerous alien invasive plant species were confirmed within the site as well as the immediate surroundings, the moist grasslands and the dry grasslands adjacent to Carnation Road were not heavily infested with alien invasive plant species at the time of the survey.

- The potential impact is reversible if the alien invasive plant species are monitored and eradicated before becoming established.
- The potential impact can be mitigated through keeping the area to be disturbed for construction activities to a minimum and implementing monitoring and eradication of alien invasive plants. The impact of increase in alien invasive plant species due to construction activities has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

The surrounding environment could be polluted by contaminants associated with the construction phase. Contaminants are likely to be washed into the lower lying moist grasslands associated with the Holfontein Stream and Blesbokspruit impacting species of conservation concern. In addition to this, these contaminants could further be washed downstream impacting the Blesbokspruit IBA Ramsar site. The inability to maintain treatment standards of the discharged water from the water treatment facility may pollute the Blesbokspruit.

- The potential impact will cease once the source of pollution is removed and once discharge ceases (at the end of the LoM).
- The potential impact can be mitigated through implementing good housekeeping in terms of spills management, managing topsoil and stormwater runoff, and ensuring that the discharge water is treated to DWS standards prior to discharge. The impact of pollution of the surrounding environment due to construction activities has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

Operation Phase

The disturbance of surrounding vegetation due to vehicle and personnel movement may result in the introduction and spread of alien invasive plant species.

- The potential impact is reversible if the alien invasive plant species are monitored and eradicated before becoming established.
- The potential impact can be mitigated through keeping the area to be disturbed for construction activities to a minimum and implementing monitoring and eradication of alien invasive plants. The impact of increase in alien invasive plant species due to construction activities has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

The potential surface runoff from the operational areas as well as the haul roads (not collected by the PCD) is likely to dissolve any exposed metals, sediments and pollutants. Contaminants are likely to be washed into the lower lying moist grasslands associated with the Holfontein Stream and Blesbokspruit impacting species of conservation concern. In addition to this, these contaminants could further be washed downstream impacting on the Blesbokspruit IBA. The inability to maintain treatment standards of the discharged water from the water treatment facility may pollute the Blesbokspruit.

- The potential impact will cease once the source of pollution is removed and once discharge ceases (at the end of the LoM).
- The potential impact can be mitigated through implementing good housekeeping in terms of spills management, managing topsoil and stormwater runoff, and ensuring that the discharge water is treated to DWS standards prior to discharge. The impact of pollution of the surrounding environment due to construction activities has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

The power lines could result in avifaunal mortalities due to collisions (electrocution), especially where these lines cross the Blesbokspruit.

- The potential impact on avifauna will cease once the power lines are removed during decommissioning.
- The potential impact can be mitigated through implementing the recommended power line design modifications and bird strike monitoring. The impact of power lines on

avifauna has a **High** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

The proposed Holfontein Project is likely to increase the impact on faunal species (i.e. vehicle collisions) within the area through an increase in traffic volumes. It is anticipated that the most significant impact from the increase in traffic volumes will be between the Holfontein shaft and Pansy Road (adjacent to the disturbed moist grassland) as well as where Carnation Road crosses the moist grasslands.

- The potential impact on fauna will cease once hauling ceases at the end of operations.
- The potential impact can be mitigated through implementing speed reduction measures and cutting away the vegetation along either side of the road at the two high risk areas mentioned above. The impact of the presence of haul roads and culverts as well the hauling activities on fauna has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

Decommissioning and Post-closure Phases

The unsuccessful rehabilitation of disturbed and denuded areas can lead to a decrease in biodiversity due to the establishment of grass monocultures, invasion by alien invasive plant species, and erosion. Although the areas associated with the Holfontein shaft were dominated by alien plant species, the dry and moist grasslands supported indigenous species, including species of conservation concern. The successful rehabilitation of the Holfontein shaft area could however have a positive effect on biodiversity through an increase in indigenous species compared with that of the baseline state.

- The potential impact is reversible if the vegetation establishes successfully, erosion is repaired timeously, and alien invasive plant species are eradicated prior to becoming established. The potential impact can be mitigated through successfully rehabilitating denuded areas as per the Interim Closure Plan. The impact of unsuccessful rehabilitation and the subsequent ecological degradation has a **High** significance rating prior to the implementation of the recommended mitigation measures and a **Medium** significance rating after their implementation.
- The positive impact of successful rehabilitation and the increase in indigenous species and biodiversity of the area has a **High Positive** significance rating.

Table 19: Terrestrial ecology impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ The clearing of vegetation for the construction of infrastructure ▪ Widening of the haul road and upgrading of culverts within wetland habitats	▪ Destruction of natural vegetation including plant species of conservation concern and/or provincially protected plant species	6 [2]	5 [1]	2 [0]	4 [2]	Medium [Low]	52 [6]
▪ The clearing of vegetation for the construction of infrastructure ▪ Widening of the haul road and upgrading of culverts	▪ Introduction and spread of alien invasive plant species into natural areas	6 [2]	5 [3]	1 [1]	4 [2]	Medium [Low]	48 [12]
▪ Spillages of hydrocarbon-based fuels and lubricants from construction vehicles and equipment ▪ Littering by construction personnel ▪ Spillages of building materials such as cement, tar, etc. ▪ Soil runoff resulting in sedimentation	▪ Pollution of the surrounding environment	6 [2]	4 [1]	2 [1]	4 [2]	Medium [Low]	48 [12]
Operation Phase							
▪ Disturbance of surrounding vegetation due to vehicle and personnel movement	▪ Introduction and spread of alien invasive plant species into natural areas	6 [2]	5 [3]	1 [1]	4 [2]	Medium [Low]	48 [12]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Blesbokspruit (if inadequately treated)	▪ Pollution of the surrounding environment	6 [2]	4 [1]	2 [1]	4 [2]	Medium [Low]	48 [12]
▪ Presence of overhead power lines	▪ Avifaunal collision with overhead power lines	6 [2]	4 [1]	2 [1]	4 [2]	Medium [Low]	48 [12]
▪ Hauling activities of trucks on the haul road including culverts	▪ Interference with faunal behaviour and movement	6 [2]	4 [1]	2 [1]	4 [2]	Medium [Low]	48 [12]
Decommissioning and Post-closure Phases							
▪ Unsuccessful rehabilitation of denuded areas	▪ Introduction and spread of alien invasive plant species into natural areas	6 [2]	5 [3]	1 [1]	4 [2]	Medium [Low]	48 [12]
	▪ Ecological degradation	8 [6]	5 [4]	3 [1]	5 [3]	High [Medium]	80 [33]
▪ Successful rehabilitation	▪ Increase in indigenous species and biodiversity	8	5	1	5	High [Positive impact]	70+

Traffic

Construction Phase

Heavy construction vehicles may cause damage to the road surfaces.

- The potential impact is reversible if the road surfaces are maintained.
- The potential impact can be mitigated through adequate monitoring and maintenance of intersections and road sections in the direct vicinity of the Holfontein Shaft. The impact of the potential damage caused to the road surfaces by vehicles is considered to be of **Low** significance prior to and after the implementation of the mitigation measures.

Construction vehicles making right-turn movements (at intersections of Pansy Road and Carnation Road, and Pansy Road and Holfontein Road) may reduce road traffic safety.

- The potential impact will cease with the provision of dedicated right-turn lanes.
- The impact of the reduced road traffic safety is considered to be of **Medium** significance rating prior to the implementation of mitigation measures and a **Low** significance rating after their implementation.

Construction vehicles entering Pansy Avenue may reduce road traffic safety due to reduced speed of the heavy vehicles entering fast flowing traffic

The potential impact will cease with the construction of acceleration lanes.

- The impact of the reduced road traffic safety is considered to be of **Low** significance prior to and after the implementation of the mitigation measures.

Loading and off-loading of construction workers along roads at intersections may reduce road traffic safety.

- The potential impact will cease once construction ceases.
- The potential impact can be mitigated by providing loading and offloading areas on site. The impact of the reduced road traffic safety is considered to be of **Medium** significance rating prior to the implementation of mitigation measures and a **Low** significance rating after their implementation.

Operation Phase

Heavy vehicles hauling ore may cause damage to the road surfaces.

- The potential impact is reversible if the road surfaces are maintained.
- The potential impact can be mitigated through adequate monitoring and maintenance of haul route road conditions. The impact of the potential damage caused to the road surfaces by vehicles is considered to be of **Medium** significance rating prior to the implementation of mitigation measures and a **Low** significance rating after their implementation.

Slow haul trucks on the roads may cause other vehicles to speed and haul trucks may also speed. Speeding vehicles will reduce road traffic safety.

- The potential impact will cease after the mining operations cease.
- The potential impact can be mitigated by introducing speed limit signage and constructing speed humps along Carnation Road if required. The impact of the reduced road traffic safety is considered to be of **Low** significance prior to and after the implementation of the mitigation measures.

Mine vehicles making right-turn movements (at intersections of Pansy Road and Carnation Road, and Pansy Road and Holfontein Road) may reduce road traffic safety.

- The potential impact will cease once the mining operations cease.
- The potential impact can be mitigated by providing dedicated right-turn lanes where heavy vehicles are expected to make turning movements. The impact of the reduced road traffic safety is considered to be of **High** significance rating prior to the implementation of mitigation measures and a **Medium** significance rating after their implementation.

Mine related vehicles entering Pansy Avenue may reduce road traffic safety due to reduced speed of the heavy vehicles entering fast flowing traffic.

- The potential impact is reversible after the mining operations cease. The potential impact can be mitigated by providing acceleration lanes to allow heavy vehicles to gain speed and enter main traffic flow along Pansy Avenue. The impact of the reduced road traffic safety is considered to be of **High** significance rating prior to the implementation of mitigation measures and a **Medium** significance rating after their implementation.

Pedestrian safety along the haul route may be reduced.

- The potential impact will cease once the mining operations cease.
- The potential impact can be mitigated by constructing pedestrian walkways where necessary. The impact of the reduced pedestrian safety is considered to be of **Low** significance prior to and after the implementation of the mitigation measures.

Loading and off-loading of workers along roads at intersections may reduce road traffic safety.

- The potential impact will cease once the mining operations cease.
- The potential impact can be mitigated by providing loading and offloading areas on site. The impact of the reduced road traffic safety is considered to be of **Medium** significance rating prior to the implementation of mitigation measures and a **Low** significance rating after their implementation.

Decommissioning Phase

Vehicles making right-turn movements (at intersections of Pansy Road and Carnation Road, and Pansy Road and Holfontein Road) may reduce road traffic safety.

- The potential impact will cease once the mining operations cease.

- The potential impact can be mitigated by providing dedicated right-turn lanes where heavy vehicles are expected to make turning movements. The impact of the reduced road traffic safety is considered to be of **High** significance rating prior to the implementation of mitigation measures and a **Medium** significance rating after their implementation.

Loading and off-loading of workers along roads at intersections may reduce road traffic safety.

- The potential impact will cease once the mining operations cease.
- The potential impact can be mitigated by providing loading and offloading areas on site. The impact of the reduced road traffic safety is considered to be of **Medium** significance rating prior to the implementation of mitigation measures and a **Low** significance rating after their implementation.

Post-Closure Phase

The removal of additional traffic on the road as well as the upgraded Carnation Road to remain post-closure will have a positive impact with a **Medium Positive** significance rating.

Table 20: Traffic impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Heavy vehicles (construction vehicles) and vehicles transporting workers	▪ Damage to road surfaces	4 [2]	2 [2]	2 [2]	3 [2]	Low [Low]	24 [12]
▪ Vehicle right-turn movements	▪ Reduced road traffic safety	8 [4]	4 [4]	2 [2]	5 [3]	High [Medium]	70 [30]
▪ Mine related vehicles entering Pansy Avenue		4 [2]	2 [2]	2 [2]	2 [2]	Low [Low]	16 [16]
▪ Loading and off-loading of workers along roads at intersections		6 [2]	4 [4]	1 [1]	4 [0]	Medium [Low]	44 [0]
Operation Phase							
▪ Heavy vehicles hauling ore and transporting workers	▪ Damage to road surfaces	8 [4]	4 [4]	2 [2]	3 [2]	Medium [Low]	42 [20]
▪ Vehicles speeding	▪ Reduced road traffic safety ▪ Reduced pedestrian safety	4 [4]	1 [1]	2 [2]	2 [2]	Low [Low]	14 [14]
▪ Vehicle right-turn movements		8 [4]	4 [4]	2 [2]	5 [3]	High [Medium]	70 [30]
▪ Mine related vehicles entering Pansy Avenue		6 [4]	4 [4]	2 [2]	5 [3]	High [Medium]	60 [30]
▪ Mine related vehicles travelling along haul route		2 [2]	4 [4]	2 [2]	2 [2]	Low [Low]	16 [16]
▪ Loading and off-loading of workers along roads at intersections		6 [2]	4 [4]	1 [1]	4 [0]	Medium [Low]	44 [0]
Decommissioning Phase							
▪ Vehicle right-turn movements	▪ Reduced road traffic safety ▪ Reduced pedestrian safety	8 [4]	4 [4]	2 [2]	5 [3]	High [Medium]	70 [30]

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Mine related vehicles entering Pansy Avenue		4 [2]	2 [2]	2 [2]	2 [2]	Low [Low]	16 [16]
▪ Loading and off-loading of workers along roads at intersections		6 [2]	4 [4]	1 [1]	4 [0]	Medium [Low]	44 [0]
Post-Closure Phase							
▪ Little to no activity associated with the site during	▪ Positive impact ▪ Removal of additional traffic on the road ▪ Leaving behind an upgraded Carnation Road	2	5	1	5	Medium [Positive impact]	40+

Visual Aesthetics

Construction Phase

The proposed infrastructure, particularly the Holfontein shaft headgear (approximately 50 m in height) and the ventilation shaft headgear (approximately 30 m in height), will result in visual intrusion and have an impact on the visual landscape as the landscape does not have the visual absorption capacity (i.e. the vegetation screening capacity) to completely absorb (i.e. screen) these structures.

- The potential impact will cease when the infrastructure is dismantled at the end of the LoM.
- The potential impact can be mitigated to a limited degree using camouflaging and non-reflective materials for construction, and screening techniques. The potential impact of visual intrusion on the landscape character has a **High** significance rating prior to and after the implementation of the recommended mitigation measures.

Dust will be generated from construction activities and if not mitigated effectively dust may have a negative impact on the visual aesthetics of the area.

- The potential impact will cease when the dust generating activities cease at the end of construction.
- The potential impact can be mitigated by implementing dust suppression measures. The potential impact of dust on the visual aesthetics of the area has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

Operation Phase

The proposed infrastructure will result in visual intrusion and have an impact on the visual landscape as the landscape does not have the visual absorption capacity to completely absorb these structures.

- The potential impact will cease once the infrastructure is dismantled at the end of the LoM.
- The potential impact can be mitigated to a limited degree using screening techniques. The potential impact of visual intrusion on the landscape character has a **High** significance rating prior to and after the implementation of the recommended mitigation measures.

During the operational phase dust will be generated from the materials handling operations, vehicle entrainment from unpaved roads, as well as wind erosion from stockpiles. If not mitigated effectively dust may have a negative impact on the visual aesthetics of the area.

- The potential impact will cease when the dust generating activities cease at the end of the LoM.
- The potential impact can be mitigated by implementing dust suppression measures. The potential impact of dust on the visual aesthetics of the area has a **Medium**

significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating with their implementation.

Night-time lighting will be required at the Holfontein Project as it will be operating 24 hours a day. Because of the relatively flat topography, limited levels of development within the surrounding area and the extent of the proposed development (i.e. the significant height of the headgear), it is anticipated that night-time lighting will have an impact on the visual landscape and will be a nuisance to residents in proximity.

- The potential impact will cease when the infrastructure is dismantled at the end of the LoM.
- The potential impact can be mitigated by avoiding unnecessary illumination and implementing methods to minimise light spill. The potential impact of lighting at night on the landscape character has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating with their implementation.

Decommissioning and Post-Closure Phases

The process of decommissioning, which will include the dismantling of infrastructure and removing the material from site, is expected to cause a negative visual impact as a result of dust generation, but overall a positive visual impact because of the removal of mine infrastructure.

- The potential impact will cease when the dust generating activities cease.
- The potential impact can be mitigated by implementing dust suppression measures. The potential impact of dust on the visual aesthetics of the area has a **Medium** significance rating prior to and a **Low** significance rating after the implementation of the recommended mitigation measures.
- The impact of landscape restoration will be positive and has a **High Positive** significance rating.

Table 21: Visual aesthetics impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Construction of the mine infrastructure specifically those with significant heights (headgear at the shaft and ventilation shaft)	▪ Visual intrusion on the landscape character	6 [6]	4 [4]	2 [2]	5 [5]	High [High]	60 [60]
▪ Dust will be generated by construction activities (clearing of vegetation, construction of infrastructure, grading of roads, excavations etc.)	▪ Negative impact on the visual aesthetics	4 [2]	2 [2]	1 [1]	4 [3]	Low [Low]	28 [21]
Operation Phase							
▪ The mine infrastructure specifically those with significant heights (headgear at the shaft and ventilation shaft)	▪ Visual intrusion on the landscape character	6 [6]	4 [4]	2 [2]	5 [5]	High [High]	60 [60]
▪ Night-time lighting will be required at the Holfontein site as it will be operating 24 hours a day	▪ Negative impact on the visual character and a nuisance to surrounding residents	6 [4]	4 [4]	2 [1]	5 [3]	Medium [Low]	50 [27]
▪ Dust will be generated by operational activities (materials handling, vehicle entrainment on unpaved roads etc.)	▪ Negative impact on the visual aesthetics	6 [6]	4 [4]	2 [2]	3 [2]	Medium [Low]	36 [24]
Decommissioning Phase							

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Dust will be generated from decommissioning activities (dismantling of infrastructure and breaking of hard surfaces etc.)	▪ Negative impact on the visual aesthetics	4 [2]	4 [4]	1 [1]	4 [3]	Medium [Low]	36 [21]
▪ Infrastructure will be removed and the footprint rehabilitated	▪ Restoration or improvement of the landscape character	4	5	2	5	High [Positive impact]	55+
Post-Closure Phase							
▪ Infrastructure will be removed and the footprint rehabilitated	▪ Restoration of the landscape character	4	5	2	5	High [Positive impact]	55+

<u>Wetlands</u>

Construction Phase

Runoff from cleared areas for the construction of surface infrastructure to the Holfontein Stream will have an increased flow velocity compared with the baseline conditions. This increased velocity may result in erosion of wetland habitats and a resultant decrease in the PES and wetland functionality of the wetlands associated with the Holfontein Stream.

- The potential impact is reversible as increased runoff will not result in complete loss of wetland habitat and the habitat will re-establish over time as vegetation re-establishes over denuded areas attenuating stormwater runoff and stormwater management infrastructure is constructed.
- The potential impact can be mitigated by managing erosion on site. The impact has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

The additional volumes to be discharged to the Blesbokspruit may result in potential erosion of the floodplain wetland associated with the Blesbokspruit and a resultant decrease in the PES and wetland functionality.

- The potential impact will cease once discharging activities cease.
- The potential impact can be mitigated through the construction of flow-diffusing structures at the discharge point. The impact has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.

The widening of the haul road and upgrading of the Blesbokspruit culvert could infringe on or destroy wetland habitat, if uncontrolled construction processes are allowed. It may further impact on the Ramsar wetland site located downstream. However, the laminar flow within the Blesbokspruit floodplain wetland could be improved as a result of the proper construction of the river crossing.

- The potential impact is irreversible as it may result in the permanent loss of wetland habitat.
- The potential impact can be mitigated through implementing good construction techniques and timing. The impact has a **High** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.
- The positive impact on the floodplain wetland as a result of the upgrade to the low level crossing will result in a more natural flow regime for the floodplain wetland. The positive impact on the wetland associated with the Blesbokspruit has a **High Positive** significance rating.

Water quality of the Holfontein Stream may deteriorate as a result of construction-related pollutants entering the stream.

- The potential impact will cease once the sources of pollution are removed.
- The potential impact can be mitigated through implementing good housekeeping,

adequate topsoil and stormwater management, having adequate ablutions, and constructing adequate clean and dirty water management infrastructure at the commencement of construction. The impact has a **High** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

The quality of the water discharged into the Blesbokspruit catchment may be a potential cause for concern if not treated to appropriate standards (to be decided by the DWS) at the proposed water treatment facility.

- The potential impact will cease once the sources of pollution are removed and discharge ceases.
- The potential impact can be mitigated by treating the water to be discharged to meet qualities as stipulated by DWS and monitoring the water quality of the water to be discharged. The impact has a **High** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

Operation Phase

Runoff diverted by the stormwater management infrastructure to the Holfontein Stream will have an increased flow velocity, which may result in erosion of wetland habitats and a resultant decrease in the PES and wetland functionality.

- The potential impact is irreversible as it may result in the permanent loss of wetland habitat.
- The potential impact can be mitigated by implementing attenuation techniques to diffuse surface water runoff to the Holfontein Stream. The impact has a **High** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

The additional volumes to be discharged may result in potential erosion of the floodplain wetland associated with the Blesbokspruit and a resultant decrease in the PES and wetland functionality.

- The potential impacts will cease once discharging activities cease.
- The potential impact can be mitigated through the construction of flow diffusing structures at the discharge point. The impact has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

The inability to maintain treatment standards of the discharged water from the water treatment facility may pollute the Blesbokspruit catchment.

- The potential impact will cease once discharging activities cease.
- The potential impact can be mitigated through treating the water to be discharged to meet qualities as stipulated by DWS, and monitoring the water quality of the water to be discharged. The impact has a **High** significance rating prior to the

implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

Decommissioning and Post-Closure Phase

Unsuccessful rehabilitation of the footprint could potentially result in an increase in stormwater runoff from denuded areas received by the Holfontein Stream.

- The potential impact is reversible as increased runoff will not result in complete loss of wetland habitat and the habitat will re-establish over time as vegetation re-establishes over denuded areas attenuating stormwater runoff.
- The potential impact can be mitigated by successfully rehabilitating the footprint as per the Interim Closure Plan. The impact has a **Low** significance prior to and after the implementation of the recommended mitigation measures.

A positive residual impact on wetlands associated with the Blesbokspruit will be experienced due to the upgrade to the low level crossing, which is to remain in place after closure, as it will result in a more natural flow regime for the floodplain wetland. The positive impact on the wetland associated with the Blesbokspruit has a **High Positive** significance rating.

Table 22: Wetlands impact ratings

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
Construction Phase							
▪ Increased surface runoff velocity due to land clearing	▪ Erosion of the wetland habitat associated with the Holfontein Stream due to increased hydrology and surface runoff and the resultant loss of wetland characteristics	4 [4]	3 [2]	2 [1]	3 [1]	Low [Low]	27 [7]
▪ Dewatering of the Holfontein shaft and discharging groundwater into the Blesbokspruit	▪ Potential scouring of the downstream wetland habitat associated with the Blesbokspruit	6 [4]	2 [2]	3 [2]	2 [1]	Low [Low]	22 [8]
▪ Widening of the haul road and upgrading of culverts within wetland habitats	▪ Destruction of wetland habitat and resultant impact on wetland functionality	6 [4]	5 [2]	2 [1]	5 [3]	High [Low]	65 [21]
▪ Upgrading of culverts within wetland habitats associated with Blesbokspruit	▪ Positive impact on the integrity of the floodplain wetland associated with the Blesbokspruit at the low level crossing	6	5	2	5	High [Positive]	65+
▪ Topsoil runoff into wetland areas (due vegetation clearing) ▪ Spillages of hydrocarbon-based fuels and lubricants from construction vehicles and equipment ▪ Littering by construction personnel ▪ Dewatering of the Holfontein shaft and discharging the dewatered water into the Blesbokspruit catchment	▪ Surface water pollution including sedimentation of the Holfontein Stream and Blesbokspruit and resultant impact on wetland functionality of wetlands associated with these watercourses	8 [4]	4 [2]	5 [1]	4 [2]	High [Low]	68 [14]
Operation Phase							

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Increased surface runoff velocity due to diversion by stormwater management infrastructure	▪ Erosion of the wetland habitat associated with the Holfontein Stream due to increased hydrology and surface runoff and the resultant loss of wetland characteristics	8 [4]	5 [3]	2 [1]	4 [3]	High [Low]	60 [24]
▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Blesbokspruit	▪ Erosion of the wetland habitat associated with the Blesbokspruit due to increased hydrology and surface runoff and the resultant loss of wetland characteristics	8 [4]	4 [3]	2 [1]	3 [2]	Medium [Low]	32 [16]
▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Blesbokspruit catchment	▪ Surface water pollution of the Blesbokspruit catchment and resultant impact on wetland functionality of the wetlands associated with the Blesbokspruit if water is inadequately treated	8 [4]	4 [2]	5 [1]	4 [2]	High [Low]	68 [14]
Decommissioning Phase							
▪ Unsuccessful rehabilitation of disturbed wetland areas ▪ Increased surface runoff (due to unsuccessful rehabilitation of denuded areas)	▪ Erosion of the wetland habitat associated with the Holfontein Stream and the resultant loss of wetland PES and functionality	4 [4]	3 [2]	2 [1]	3 [1]	Low [Low]	27 [7]
Post-Closure Phase							
▪ Upgrading of culverts within wetland habitats associated with Blesbokspruit	▪ Positive impact on the integrity of the floodplain wetland associated with the Blesbokspruit at the low level crossing	6	5	2	5	High [Positive]	65+

PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
						RATING	VALUE
▪ Unsuccessful rehabilitation of disturbed wetland areas ▪ Increased surface runoff (due to unsuccessful rehabilitation of denuded areas)	▪ Erosion of the wetland habitat associated with the Holfontein Stream and the resultant loss of wetland PES and functionality	4 [4]	3 [2]	2 [1]	3 [1]	Low [Low]	27 [7]

Cumulative Impacts

Air Quality

The Highveld area is associated with poor air quality and elevated concentrations of criteria pollutants and has therefore been proclaimed as the Highveld Priority Area (HPA). The proposed project site falls within the HPA and the ambient air quality is considered to be significantly impacted. According to the air quality monitoring data obtained from SAAQIS for the Etwatwa Station, the annual average concentration of PM_{10} (104 µg/m^3) already exceeds the standard allowable concentration (40 µg/m^3). As background concentrations already exceed the NAAQS allowable concentration, the cumulative impact (in terms of the contribution of PM_{10} from the proposed development) on the ambient air quality is likely to be high.

Residents of the Welgedacht SH raised concerns during the public consultation process about the dust generated on Carnation Road due to vehicles travelling to and from the Welgedacht WWTW. Any dust generated due to the Holfontein Project haul trucks and buses will amplify the nuisance impact of dust already experienced by surrounding residents.

Archaeology

There are currently no impacts on the heritage resources in the surrounding areas as the cemetery, located near the ME operations, has been fenced off. Therefore, no cumulative impacts are foreseen.

Aquatic Ecology

The water quality in the Blesbokspruit is deteriorated which has prevented aquatic biota from inhabiting the area and resulted in a decrease in biodiversity. If polluted runoff or inadequately treated discharge from the proposed activities enters the Blesbokspruit, it will worsen the already deteriorated water quality. However, if the runoff and treated water is of a good quality, it could dilute the existing poor quality water, resulting in an increase in the water quality and potentially an improved aquatic biodiversity.

Hydrogeology

In terms of groundwater quality, both the Karoo and dolomitic aquifers can be classified as uncontaminated. Therefore, any potential impact on groundwater quality would not be considered a cumulative impact.

Due to existing groundwater abstraction, the typical groundwater table in the dolomitic aquifer is in the order of 100 m deep, which is approximately 50 m lower than the Blesbokspruit. No impacts on groundwater levels in surrounding boreholes are foreseen as the dewatering cone is contained to within 400 m of the shaft. In the event that the mine encounters significant groundwater as a result of a water strike, there may be a cumulative impact on the already lowered water levels.

Hydrology

The water quality of the downstream section of the Blesbokspruit is currently impacted by treated sewage effluent discharged from the WWTW. The mixture of the discharged mine water and treated sewage effluent could be complimentary as the mine water would decrease the chemical oxygen demand and dilute other nutrients in the sewage effluent, while the sewage effluent would dilute the mining-related determinants, notably the SO_4.

Flooding of the plots in the Welgedacht SH area located along the banks of the Holfontein Stream is already a natural occurrence due to the plots being situated within the floodlines. It must be noted that these floodlines are determined based on the existing surface runoff in the catchment and are not related to the potential discharging of groundwater. Discharging to the Blesbokspruit downstream of the Holfontein Stream and Blesbokspruit confluence will not result in any cumulative impact on flooding experienced.

Noise

The area generally experiences low ambient noise levels. The area is predominantly open veld and cultivated / grazing lands with no excessively noisy industries in the vicinity, except in the region of the existing ME processing plant and adjacent to Pansy Avenue which carries significant traffic. Carnation Road primarily carries local traffic associated with the businesses and dwellings located in the Welgedacht SH. The background noise levels at Welgedacht SH are typically around 45-50 dB(A) during daytime (06h00-18h00) which is the recommended zone value of 50dB(A) for a suburban residential area. The background noise levels at the Holfontein shaft area are typically 40-45 dB(A) characteristic of a semi-rural environment. The proposed activities associated with the Holfontein Project will have an exponential increase on the surrounding ambient noise levels. However, the only significant exponential increase in ambient noise levels is expected at the sensitive areas adjacent to the Holfontein shaft (i.e. the Khomponi Community) due to the operation of the ventilation shaft at night.

Socio-economic

The potential influx of job seekers into the region, and into the Khomponi Community, will increase the pressure on already limited social infrastructure and service provision (particularly water and sanitation).

Cumulative socio-economic impacts are as per the impacts listed for air quality, hydrogeology, hydrology, noise, soil and land capability, traffic and visual aesthetics as these affect the sensitive receptors identified for the environmental aspects.

Soil and Land Capability

Previous mining activities within the proposed project area have resulted in some contamination of the soils. Inappropriate storage and handling of hazardous substances and waste may result in further contamination of the soil. The ground within the proposed project area is also already compacted from previous mining activities and further compaction will occur as a result of the project. Historical mining and industry have transformed land and this has reduced the overall agricultural productivity of the area. This project will have a small but definite cumulative impact on agricultural land as a result of the ventilation shaft cap remaining after closure.

Terrestrial Ecology

The Holfontein shaft area is dominated by alien invasive plant species. If recommended mitigation measures are not implemented the Holfontein Project may result in the increase and spread of alien invasive plant species into surrounding natural areas.

Traffic

According to concerns raised by Welgedacht SH residents there are frequent accidents at the intersection of Pansy Avenue and Carnation Road. The Holfontein Project will result in heavy vehicles (haul trucks) travelling on Pansy Avenue and Carnation Road, which may result in an increase in traffic accidents, therefore having a cumulative impact on traffic safety, specifically at the intersection of Pansy Avenue and Carnation Road.

Visual Aesthetics

The NKGM ME operations as well as other mining operations are located within this region. The cumulative visual impact resulting from additional changes to the landscape caused by the proposed Holfontein Project, in conjunction with existing developments, is considered to be moderate.

Wetlands

The three wetlands associated with nearby watercourses are already in modified states due to the influence of anthropogenic activities. The potential destruction of the wetland habitats due to project activities would have a resultant impact on the PES and functionality of the wetlands and would have a cumulative impact on the already modified wetland systems.

Residual Impacts

The potential residual impacts and management thereof are further discussed in the Holfontein Interim Closure Plan (Appendix 20).

If the closure strategy as detailed in the Holfontein Interim Closure Plan (Appendix 20) is successfully carried out, the residual risk is considered acceptable as the majority of the impacts are positive in nature or reduced to a low negative significance rating. The only exceptions where the risk could not be mitigated to a low negative significance rating are:

- The loss of low potential agricultural soil where the ventilation shaft will be sealed and capped with a concrete plug (50 m^2); and
- Migration of job seekers into the project area and the indirect impacts arising from in-migration.

a) Methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks **(Describe how the significance, probability, and duration of the aforesaid identified impacts that were identified through the consultation process was determined in order to decide the extent to which the initial site layout needs revision)**

The Prime Resources (Pty) Ltd Impact Assessment Methodology and rationale was used to assess the significance of the potential impacts of the preferred final layout and alternatives on the surrounding biophysical and socio-economic environment.

The methodology encompasses an assessment of the nature, extent, duration, probability and significance of the identified potential impacts. The significance of both positive and negative potential impacts were determined through the evaluation of impact consequence and likelihood of occurrence.

The following risk assessment model has been used for determination of the significance of impacts.

SIGNIFICANCE = (MAGNITUDE + DURATION + SCALE) X PROBABILITY

The maximum potential value for significance of an impact is 100 points. Environmental impacts can therefore be rated as high, medium or low significance on the following basis:

- High environmental significance 60 – 100 points
- Medium environmental significance 30 – 59 points
- Low environmental significance 0 – 29 points

MAGNITUDE (M)	DURATION (D)
10 – Very high (or unknown)	5 – Permanent
8 – High	4 – Long-term (ceases at the end of operation)
6 – Moderate	3 – Medium-term (4-8 years)
4 – Low	2 – Short-term (0-3 years)
2 – Minor	1 – Immediate
SCALE (S)	**PROBABILITY (P)**
5 – International	5 – Definite (or unknown)
4 – National	4 – High probability
3 – Regional	3 – Medium probability
2 – Local	2 – Low probability
1 – Site	1 – Improbable
0 – None	0 – None

b) The positive and negative impacts that the proposed activity (in terms of the initial site layout) and alternatives will have on the environment and the community that may be affected (Provide a discussion in terms of advantages and disadvantages of the initial site layout compared to alternative layout options to accommodate concerns raised by affected parties)

Alternatives were assessed during the Scoping Phase resulting in the preferred final layout selected to be further assessed during the EIA phase. Further alternatives assessed during the EIA phase included discharge point alternatives for the treated dewatered groundwater and sewage effluent, which in the Holfontein Stream and in the Blesbokspruit, via a pipeline (refer to Figure 62).

Issues and concerns were raised by residents of the Welgedacht SH regarding the initially proposed discharge point (within the Holfontein Stream, adjacent to the proposed site infrastructure). There were concerns that the discharge from this point would increase the extent of flooding of those plots situated within the floodlines of the Holfontein Stream.

Appointed specialists were further concerned about the environmental sensitivity of the area and the potential impacts of discharge from this point on the aquatic biodiversity of the Blesbokspruit catchment.

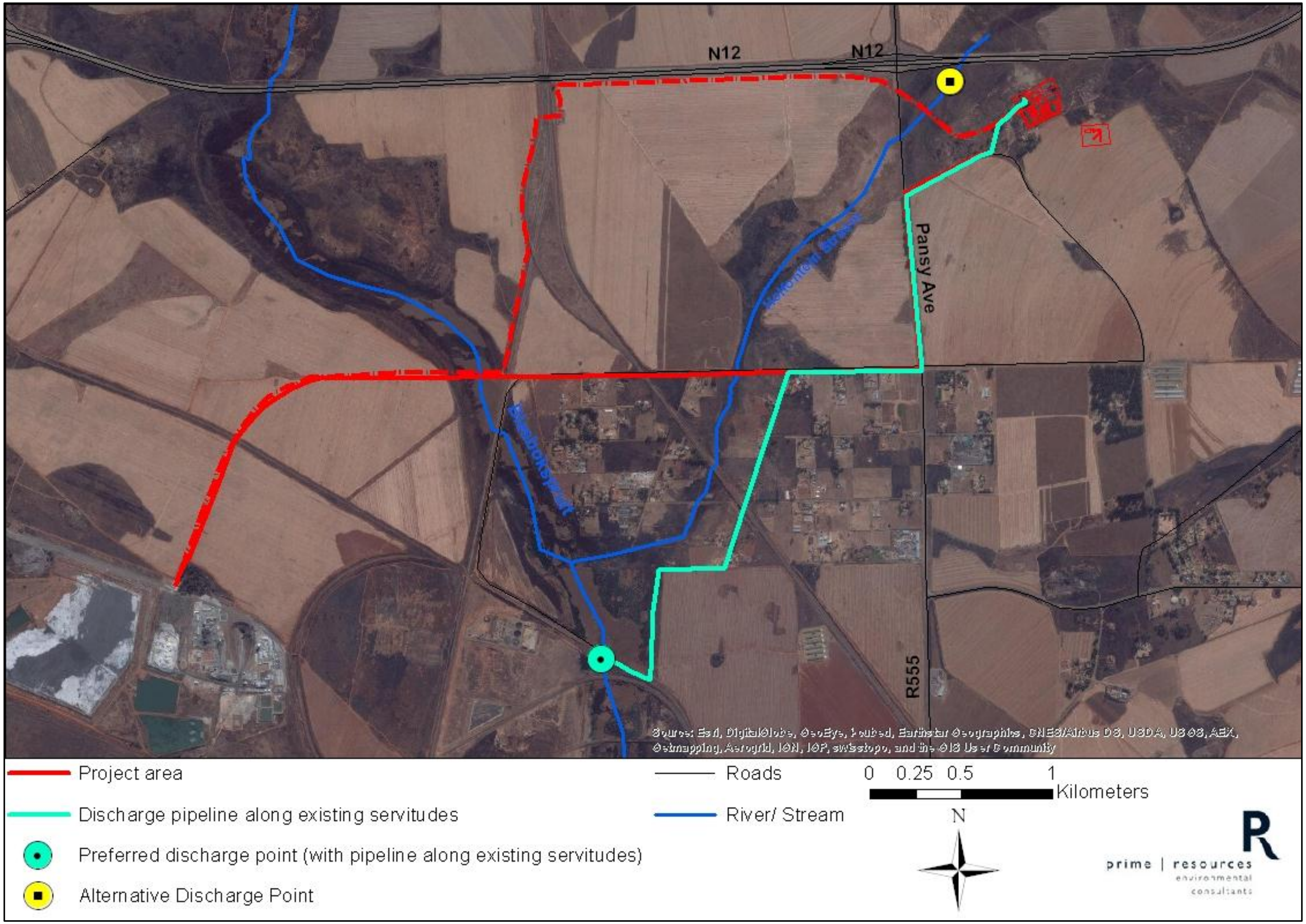


Figure 62: Discharge point alternatives

The two discharge point options were assessed by the relevant specialists. The alternatives assessment is detailed below. Refer to Table 23

DISCHARGE POINT 1 – HOLFONTEIN STREAM	DISCHARGE POINT 2 – BLESBOKSPRUIT
Aquatic ecology	
Construction Phase	
The proposed discharge of treated groundwater will potentially alter the current hydrology of the wetland as it is expected to result in a 10 % increase in the average daily flow rate throughout the year. The necessary upgrades required at the culvert structures associated with the Holfontein Stream crossings may cause the hydraulic diversity to marginally increase, and therefore potentially improve the biological diversity. They may however result in the occurrence of unexpected species, and there is the associated risk of erosion which may cause the biota to disappear for lack of suitable habitat. The potential impact will cease once discharge ceases, at the end of the LoM. The potential impact cannot be mitigated. The impact has a **Medium** significance rating.	The proposed discharge of treated groundwater may result in scouring of the downstream habitat and cause flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA Ramsar site. The potential impact will cease once discharging activities cease. The potential impact can be mitigated through the construction of flow diffusing structures at the discharge point. The impact has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures. No upgrades will be required to culverts as a result of this discharge point.
Operation Phase	
Due to the continued dewatering of the underground workings and the water from the sewage treatment plant (~7 Mℓ/day), the volume of water flowing in the Holfontein Stream is expected to substantially increase relative to the average baseline flow rate of ~1 Mℓ/day. It is highly likely that some of the aquatic species will be flushed downstream and/or unable to establish under these conditions resulting in a decrease in biodiversity. The additional water volume discharged is likely to increase the potential for erosion of available habitat within the Holfontein Stream, which would potentially cause a deterioration of the currently available habitat, resulting in a decrease in biodiversity. The potential impact will cease once discharging ceases. The potential impact can be mitigated to some extent through adequate management of stormwater runoff, construction of flow diffusers at the discharge point and erosion-protection structures within the stream bed. The impact has a **High** significance rating prior to the implementation of mitigation measures and a **Medium** significance rating after implementation.	The proposed discharge of treated groundwater may result in scouring of the downstream habitat and cause flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA Ramsar site. The potential impact will cease once discharging activities cease. The potential impact can be mitigated through the construction of flow diffusing structures at the discharge point. The impact has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.
Hydrology	

Construction Phase	
Dewatering of the Holfontein shaft will take place to allow for refurbishment. During this period water of good quality will be discharged into the Blesbokspruit catchment. Discharging to the Holfontein Stream will increase the base flow which will result in the flow in the Holfontein Stream changing from being predominantly non-perennial to being a perennial stream. This increase in base flow may result in the establishment of more prolific aquatic plants that could impede the flow of floodwaters and cause increased flood elevations. The increase in base flow will exasperate flooding issues currently being experienced by Welgedacht SH residents with plots located within the floodlines along the Holfontein Stream, downstream of the Phlox Road culvert. The potential impact will cease once discharging ceases. The potential impact can be mitigated by upgrading the Carnation Road and Phlox Road culverts to accommodate the additional flow. The impact has a **Medium** significance rating prior to and after the implementation of the recommended mitigation measures.	The Blesbokspruit will be able to accommodate the additional flow volumes, for both the base flow and flood peak scenarios, without resulting in erosion or elevated water levels. No mitigation is required. The impact has a **Low** significance rating. Discharge into the Blesbokspruit will also result in a positive impact on the water quality of the Blesbokspruit in the vicinity of the WWTW. The water quality in this section of the Blesbokspruit is currently impacted by the treated sewage effluent discharged from the WWTW. The mixture of the discharged mine water and treated sewage effluent could be complimentary as the mine water would decrease the chemical oxygen demand and dilute other nutrients in the sewage effluent, while the sewage effluent would dilute the mining-related determinants, notably the SO_4. The positive impact has a **Low Positive** significance rating.
Operation Phase	
Discharging to the Holfontein Stream during the operational phase results in the same impacts as described for the construction phase, however, the magnitude of the impact will be greater due to the higher volumes to be discharged (~7 Mℓ/day). It must be noted however that the difference in flood elevation for all the return periods, with the additional 7 Mℓ/day discharged from the Holfontein shaft, will be negligible (i.e. there will be no noticeable cumulative impact on flooding of plots located within the floodlines during a flood event). If the volumes to be dewatered are lower than the estimated worst case scenario of 7 Mℓ/day, the impacts will also have a lower significance rating. The potential impact will cease once discharging ceases. The potential impact can be mitigated by upgrading the Carnation Road and Phlox Road culverts to accommodate the additional flow. The impact has a **Medium** significance rating prior to and after the implementation of the recommended mitigation measures.	The impacts of discharging treated dewatered groundwater and sewage effluent to the Blesbokspruit during the operational phase are the same as those described for the construction phase. The increase magnitude or volume of discharge water makes no difference to the water levels and flooding / base flow. No mitigation is required. The impact has a **Low** significance rating. The positive impact on the water quality of the downstream section of the Blesbokspruit (adjacent to the WWTW) has a **Low Positive** significance rating.
Terrestrial Ecology	
Construction and Operation Phase	
The discharge of treated groundwater into the Holfontein Stream could impact the grass *Leersia hexandra*. *L. hexandra*	Discharge into the Blesbokspruit will have no impact on the plant species associated with the

typically grows in stagnant or very slow flowing water and it is possible that the increase in flow rate could remove suitable habitat for this species. This plant is also a host plant for the rare butterfly species, the Marsh Sylph. The potential impact is irreversible as it may result in the permanent loss of species of conservation concern. The potential impact cannot be mitigated. The impact has a **Medium** significance rating.	Holfontein Stream. In the event that these species are also present in the Blesbokspruit, there will be no impact on them because the discharge will not result in increased water levels.
<u>Wetlands</u>	
Construction Phase	
The proposed discharge of treated groundwater will potentially alter the current hydrology of the wetland as it is expected to result in a 10 % increase in the average daily flow rate throughout the year. An increase in stream flow is likely to initiate erosion processes such as gully erosion and channelization within the unchannelled valley bottom wetland system, potentially resulting in a loss of ecosystem services and degradation of PES and therefore wetland functionality. The potential impact is irreversible as it may result in the permanent loss of wetland habitat. The potential impact cannot be mitigated. The impact has a **Medium** significance rating.	The proposed discharge of treated groundwater will potentially erode the floodplain wetland associated with the Blesbokspruit, causing a resultant decrease in the PES and wetland functionality. The potential impact will cease once discharging activities cease. The potential impact can be mitigated through the construction of flow diffusing structures at the discharge point. The impact has a **Low** significance rating prior to and after the implementation of the recommended mitigation measures.
Operation Phase	
Due to the continued dewatering of the underground workings and the water from the sewage treatment plant (~7 Mℓ/day), the volume of water flowing in the Holfontein Stream is expected to substantially increase relative to the average baseline flow rate of ~1 Mℓ/day. It is highly likely that the unchannelled wetland system associated with the Holfontein Stream would no longer function effectively. Erosion processes such as gully erosion and channelization within the unchannelled valley bottom wetland system will occur, potentially resulting in a significant loss of ecosystem services and degradation of PES, and therefore wetland functionality. The potential impact is irreversible as it may result in the permanent loss of wetland habitat. The potential impact cannot be mitigated. The impact has a **High** significance rating.	Discharging treated dewatered groundwater and sewage effluent to the Blesbokspruit during the operational phase may result in erosion of the floodplain wetland associated with the Blesbokspruit and a resultant decrease in the PES and wetland functionality. The potential impact will cease once discharging activities cease. The potential impact can be mitigated through the construction of flow diffusing structures at the discharge point. The impact has a **Medium** significance rating prior to the implementation of the recommended mitigation measures and a **Low** significance rating after their implementation.

From the findings of the alternatives assessment, discharging to the Blesbokspruit via a pipeline has been identified as the preferred alternative to be included in the final layout to be considered for Environmental Authorisation, as it is the best environmental and socio-economic option overall.

Refer to Section 11 for the positive and negative impacts that the proposed Holfontein Project (final layout) may have on the biophysical and socio-economic environment.

Table 23: Discharge point alternatives assessment ratings

ENVIRONMENTAL ATTRIBUTE	PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
							RATING	VALUE
	Construction Phase							
Aquatic Ecology	▪ Dewatering of the Holfontein shaft and discharging groundwater into the Holfontein Stream ▪ Upgrading of crossings of the Holfontein Stream along the haul route	▪ Altered hydrology of the Holfontein Stream and resultant aquatic habitat alteration	4 [2]	2 [2]	2 [1]	4 [3]	Medium [Low]	32 [15]
	▪ Dewatering of the Holfontein shaft and discharging groundwater into the Blesbokspruit	▪ Potential scouring of the downstream habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA	6 [4]	2 [2]	3 [2]	2 [1]	Low [Low]	22 [8]
Hydrology	▪ Dewatering of the Holfontein shaft and discharge to the Holfontein Stream	▪ Increased base flow of the Holfontein Stream exasperating flooding issues	4 [2]	2 [2]	2 [2]	5 [5]	Medium [Medium]	40 [30]
	▪ Dewatering of the Holfontein shaft and discharge to the Blesbokspruit	▪ Increased flow of the Blesbokspruit	4 [2]	2 [2]	2 [2]	3 [2]	Low [Low]	24 [12]
		▪ Increased water quality of the Blesbokspruit due to dilution with the sewage effluent from the WWTW	4	2	2	3	Low [Positive impact]	24+

ENVIRONMENTAL ATTRIBUTE	PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
							RATING	VALUE
Terrestrial ecology	▪ Dewatering of the Holfontein shaft and discharging the dewatered water into the Holfontein Stream	▪ Destruction of natural vegetation	6 [2]	5 [1]	2 [0]	4 [2]	Medium [Low]	52 [6]
Wetlands	▪ Dewatering of the Holfontein shaft and discharging the dewatered water into the Holfontein Stream	▪ Erosion of the wetland habitat associated with the Holfontein Stream due to increased hydrology and surface runoff and the resultant loss of wetland characteristics	6 [4]	4 [2]	5 [1]	3 [2]	Medium [Low]	45 [14]
	▪ Dewatering of the Holfontein shaft and discharging groundwater into the Blesbokspruit	▪ Potential scouring of the downstream wetland habitat associated with the Blesbokspruit	6 [4]	2 [2]	3 [2]	2 [1]	Low [Low]	22 [8]
	Operation Phase							
Aquatic Ecology	▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Holfontein Stream	▪ Altered hydrology of the Holfontein Stream and resultant aquatic habitat alteration	8 [4]	3 [3]	3 [2]	5 [1]	High [Low]	70 [9]
		▪ Increase in erosion of the banks of the Holfontein Stream and resultant aquatic habitat alteration and sedimentation of the stream altering the water quality in turn deterring aquatic biota from the area and decreasing biodiversity	8 [4]	3 [3]	3 [2]	5 [1]	High [Low]	70 [9]

ENVIRONMENTAL ATTRIBUTE	PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
							RATING	VALUE
	▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Blesbokspruit	▪ Potential scouring of the downstream habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA	6 [4]	3 [3]	3 [2]	4 [3]	Medium [Low]	48 [27]
Hydrology	▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Holfontein Stream	▪ Increased base flow of the Holfontein Stream exasperating flooding issues	6 [4]	3 [3]	2 [2]	5 [5]	Medium [Medium]	55 [45]
Hydrology	▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Blesbokspruit	▪ Increased flow of the Blesbokspruit	4 [2]	3 [3]	2 [2]	3 [2]	Low [Low]	27 [14]
Hydrology		▪ Increased water quality of the Blesbokspruit due to dilution with the sewage effluent from the WWTW	4	3	2	3	Low [Positive impact]	27+
Terrestrial ecology	▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Holfontein Stream	▪ Destruction of natural vegetation	6 [2]	5 [1]	2 [0]	4 [2]	Medium [Low]	52 [6]

ENVIRONMENTAL ATTRIBUTE	PROCESS	IMPACT	MAGNITUDE (M)	DURATION (D)	SCALE (S)	PROBABILITY (P)	SIGNIFICANCE	
							RATING	VALUE
Wetlands	▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Holfontein Stream	▪ Erosion of the wetland habitat associated with the Holfontein Stream due to increased hydrology and surface runoff and the resultant loss of wetland characteristics	8 [4]	5 [3]	2 [1]	4 [3]	High [Low]	60 [24]
	▪ Discharge of water dewatered from the underground workings and originating from the sewage treatment plant, via the proposed water treatment facility into the Blesbokspruit	▪ Erosion of the wetland habitat associated with the Holfontein Stream due to increased hydrology and surface runoff and the resultant loss of wetland characteristics	8 [4]	4 [3]	2 [1]	3 [2]	Medium [Low]	32 [16]

c) The possible mitigation measures that could be applied and the level of risk (With regard to the issues and concerns raised by affected parties provide a list of the issues raised and an assessment/ discussion of the mitigations or site layout alternatives available to accommodate or address their concerns, together with an assessment of the impacts or risks associated with the mitigation or alternatives considered)

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Impact of dust on crops	This impact has been assessed in Section 11 above. As the dust fallout across surrounding cultivated areas is expected to be low, the likelihood of impacts on crop growth is therefore considered to be low. The potential impact of dust on crop growth can be mitigated by implementing dust suppression measures. Dust suppression measures have been included in the Air Quality Management Plan in Section 4(g)(ii) of the EMPr - Part B of this document.
Cumulative impact as the area is a priority area in terms of air quality	The cumulative impact has been assessed in Section 11 above. As the background PM_{10} concentrations already exceed the NAAQS allowable concentration, the cumulative impact (in terms of the contribution of PM_{10} from the proposed development) on the ambient air quality is likely to be high. Dust suppression measures have been included in the Air Quality Management Plan in Section 4(g)(ii) of the EMPr - Part B of this document.
Toxic elements in dust	This impact has been assessed in Section 11 above. It was found that the fine particulates generated from ore handling activities will contain a metal fraction likely comprising of uranium and arsenic, which may increase the potential health risk. Therefore, potential health impacts from PM_{10} emissions generated from operational activities may arise if effective mitigation measures (such as dust suppression) are not implemented. Dust suppression measures have been included in the Air Quality Management Plan in Section 4(g)(ii) of the EMPr - Part B of this document.
Impact on health	This impact has been assessed in Section 11 above. Potential health impacts from PM_{10} emissions generated from operational activities (specifically ore handling activities) may arise if effective mitigation measures (such as dust suppression, covering haul trucks and enclosing the chute) are not implemented. Dust suppression measures, covering haul trucks and enclosing the chute have been included in the Air Quality Management Plan in Section 4(g)(ii) of the EMPr - Part B of this document. Air quality (dust fallout) monitoring will be conducted throughout the LoM as per the Air Quality Monitoring Programme in Section 6(a) of the EMPr - Part B of this document to determine whether standards are being exceeded.
Cumulative impact of dust from vehicle entrainment on Carnation Road	This impact has been qualitatively assessed in Section 11 above. It has been recommended that the unpaved portion of the haul route - between the Blesbokspruit crossing and paved portion of the Carnation Road - must be paved to obtain 100 % control efficiency. This is a precaution, as the cumulative impact of dust on residents in proximity could not be quantified. Paving this portion of Carnation Road has been included in the Air Quality Management Plan in Section 4(g)(ii) of the EMPr - Part B of this document.
Impact on surrounding water levels (boreholes)	This impact has been assessed in Section 11 above. It was found that limited dewatering (pumping) of the surrounding dolomitic aquifer may occur immediately above the underground workings. Levels are expected to drop by up to 10 m over time, within a 400 m radius of the Holfontein shaft. No private
Dewatering cone within dolomitic aquifer	

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	boreholes were noted to be located within 400 m of the shaft, and therefore no users will be impacted by this localised reduction in groundwater levels. The impact on surrounding aquifer levels will be mitigated where required by sealing high-yielding fissures, faults and dykes to reduce inflow. This commitment has been included in the Water Management Plan in Section 4(g)(iv) of the EMPr - Part B of this document. Groundwater monitoring as per the Hydrogeology Monitoring Programme in Section 6(c) of the EMPr - Part B of this document will be conducted throughout the LoM and post-closure until levels have stabilised to determine whether the water levels of surrounding aquifers is being impacted.
Contamination of groundwater resources	This impact has been assessed in Section 11 above, it was found that most of the activities which may pollute the groundwater will take place within the surface infrastructure area (a dirty water catchment area). All contaminated runoff from this area will be contained and will not result in groundwater pollution. Management measures to prevent groundwater pollution have been included in the Water Management Plan in Section 4(g)(iv) of the EMPr - Part B of this document. Sulphate concentrations will increase as the underground workings and shafts flood after mine closure, causing a decrease in groundwater qualities. It is however, unlikely that acid mine drainage will occur and it is foreseen that contaminated water will be confined to the mined-out areas so will not impact surrounding groundwater users. After groundwater levels have stabilised (20-30 years), the mine water quality will improve. The groundwater level in the shafts will stabilise at pre-mining levels (i.e. present levels), unless a large water strike occurs during operations. Therefore, no surface decant is foreseen. Groundwater monitoring as per the Hydrogeology Monitoring Programme in Section 6(c) of the EMPr - Part B of this document will be conducted throughout the LoM and post-closure until levels have stabilised to determine whether the water quality of surrounding aquifers is being impacted.
Cumulative contamination of groundwater resources (existing high metals)	According to the groundwater study both the Karoo and dolomitic aquifers can be classified as uncontaminated in terms of water quality. As indicated above, contamination (if any) is expected to be contained within the mined out workings. Refer to Section 10(a)(vi).
Pollution as a result of discharge	These impacts have been assessed in Section 11 above. Discharging ineffectively treated water may pollute the Blesbokspruit. This will be avoided by ensuring that the water treatment plant is functioning effectively, and regularly monitoring the quality of water before discharge as per the Water Management Plan in Section 4(g)(iv) of the EMPr - Part B of this document. Surface water quality monitoring will be conducted as per the Hydrology Monitoring Programme detailed in Section 6(c) of the EMPr - Part B of this document, throughout the LoM to determine whether operations are impacting the watercourses. According to the hydrology specialist, discharging treated water to the Blesbokspruit at the selected discharge point (adjacent to the Welgedacht Waste Water Treatment Works) will result in improved water quality of the Blesbokspruit, due to dilution of mine water with sewage effluent.
Cumulative impact on flooding as a result of discharge	The option to discharge to the Blesbokspruit via a pipeline rather than to the Holfontein Stream was selected to avoid additional impacts on the seasonal

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	flooding of properties downstream of the Holfontein Shaft. According to the hydrology specialist, no impact on baseflow or seasonal flooding will occur as a result of discharging groundwater to the Blesbokspruit at the point selected. Refer to Section 11(b) for the alternatives assessment conducted.
Impact of mine on environmental sensitivity and aquatic biodiversity	These impacts have been assessed in Section 11 above. Erosion may occur at the discharge point which may have an impact on aquatic biodiversity. This will be avoided by constructing flow diffusers at the discharge point. This commitment has been included in the Water Management Plan in Section 4(g)(iv) of the EMPr - Part B of this document. Hazardous materials may pollute the aquatic environment and subsequently impact the aquatic biodiversity. This will be mitigated by effectively managing hazardous materials as per the Hydrocarbon Management Plan in Section 4(g)(xii) of the EMPr - Part B of this document and the Hazardous Substances / Hazardous Waste Management Plan in Section 4(g)(xiv) of the EMPr - Part B of this document and constructing adequate clean and dirty water management infrastructure as per the Water Management Plan in Section 4(g)(iv) of the EMPr - Part B of this document. Upgrading the crossing of the Blesbokspruit may result in loss of wetland habitat. This will be mitigated by minimising wetland areas to be disturbed and constructing culverts according to the specialist recommendations. Upgrading the crossing appropriately will have a positive impact on the wetland as it will allow for more natural flow. Measures for upgrading the crossing to avoid destruction of the aquatic habitat has been included in the Water Management Plan in Section 4(g)(iv) of the EMPr - Part B of this document.
Safety of children and animals along Carnation Road Speed limit and speed control measures for Carnation Road Cumulative impact of trucks on traffic safety at intersection of Carnation Road and Pansy Avenue	These impacts have been assessed in Section 11 above. Haul trucks on the haul road may result in reduced road traffic safety and reduced pedestrian safety. This will be mitigated by providing dedicated right-turn lanes where trucks are expected to make turning movements, providing acceleration lanes to allow haul trucks to gain speed and enter main traffic flow along Pansy Avenue, introducing speed limit signage, and constructing speed humps along Carnation Road. These measures have been included as commitments in the Traffic Management Plan in Section 4(g)(ix) of the EMPr - Part B of this document.
Additional (illegal) informal settlement Potential increase in crime at Welgedacht SH Potential decrease in land value	These impacts have been assessed in Section 11 above. It was found that mining activities may result in the migration of job seekers into the area. This impact cannot be predicted and is likely to persist even after mine closure as in-migration may lead to permanent settlement. The growth of the informal settlement may also result in an increase in crime rates in the surrounding areas. This impact is impossible to predict, as it is directly dependent on the migration of job seekers into the area, which can also not be predicted. The growth of the informal settlement and an increase in crime rates may result in a decrease in land value. These impacts will be managed as they arise but measures will be put in place to ensure that the impacts are not exacerbated. The compilation of an In-migration Management Plan has been included as a commitment in the Socio-economic Management Plan in Section 4(g)(vi) of the EMPr - Part B of this document.

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Additional residents within Khomponi Community	This impact has been assessed in Section 11 above. It was found that mining activities at Holfontein may cause job seekers to come into and settle in the Khomponi Community. Mine employees may also settle in the Khomponi Community although the mine will not provide housing in Khomponi and will discourage employees from moving into the area. This impact cannot be predicted and is likely to be permanent. More people living in the community may lead to overcrowding which will lead to competition for water and sanitation. People settling in the community may lead to an increase in crime and drug abuse in the community. Job seekers coming into the Khomponi Community may set up tuck shops and canteens to supply mine workers and new residents, which may attract more people to the community. The compilation of an In-migration Management Plan has been included as a commitment in the Socio-economic Management Plan in Section 4(g)(vi) of the EMPr - Part B of this document.
Concerned about buildings being negatively impacted by blasting and tremors	This impact has been qualitatively assessed in Section 11 above. Blasting at 350 metres below surface in the same area does not result in surface vibrations significant enough to cause damage to surface structures. The Holfontein Project will undertake blasting at depths reaching close to 700 m beneath the Welgedacht Small Holdings. No blasting will be undertaken near surface. Therefore, blasting at depths as expected for the Holfontein Project will have no damaging surface impacts.
Possibility of sinkhole formation	According to the groundwater specialist, although the dolomitic aquifers are high-yielding, they are not karstic, and therefore unlikely to cause sinkholes.
Noise from proposed operations	These impacts have been assessed in Section 11 above. Major noise impacts will be experienced by the community adjacent to the Holfontein shaft (i.e. the Khomponi Community). The loading of trucks during the day at the Holfontein shaft result in the generation of noise. This will be controlled by building a 6 m high wall on the western side of the operations, and a 6 m berm between the dwellings and the Holfontein shaft area, which has been included as a commitment in the Noise Management Plan in Section 4(g)(v) of the EMPr - Part B of this document. The ventilation shaft will operate the whole day and will be noisy, especially at night, which may disturb the Khomponi Community members living close to the ventilation shaft. This will be controlled by enclosing the ventilation shaft and lifting the outlet to reduce the noise as much as possible. This has been included as a commitment in the Noise Management Plan in Section 4(g)(v) of the EMPr - Part B of this document. Noise monitoring will take place throughout the LoM as per the Noise Monitoring Programme detailed in Section 6(e) of the EMPr - Part B of this document to ensure that noise levels are not exceeding standards. The noise specialist has indicated that noise impacts from haul trucks along the haul route are not foreseen, as the most significant noise will be heard within 30 m of the haul road. Hauling will also only take place during daylight hours (06h00 and 18h00).
Concerns about being relocated	No landowners or land occupiers will need to be relocated as a result of the Holfontein Project.
Employment opportunities	Employees will be sourced from the existing employees at Modder East - no

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	new employment opportunities will be created.
Community benefits / compensation	The existing NKGM Local Economic Development Initiatives as per the Social and Labour Plan, which are the Slovo Park cooperative and the Mini Hospital in Lindilani Ext. 9, will be extended for the life of the Holfontein Project.
Raising grievances	The compilation of a grievance mechanism has been included as a commitment in the Socio-economic Management Plan in Section 4(g)(vi) of the EMPr - Part B of this document.
Potential for strike action and how the mine would manage the impacts	NKGM will maintain good relationships as well as transparent and two way communications with employees and workers' organisations to ensure that strike action is avoided where possible.

d) Motivation where no alternative sites were considered

Not applicable as alternatives have been considered, refer to Section 11(b) above.

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

(Provide a statement motivating the final site layout that is proposed)

Alternatives were assessed during the Scoping Phase resulting in the preferred final layout selected to be further assessed during the EIA phase. Specialists assessed the potential impacts of the preferred final layout and from the findings of the assessments further alternatives assessed during the EIA phase were related to discharge point location.

The preferred final layout with the preferred discharge point alternative would not result in any fatal flaws in terms of environmental and socio-economic impacts if the recommended mitigation measures are implemented.

f) Full description of the process undertaken to identify, assess and rank the impacts and risks the activity will impose on the preferred site **(In respect of the final site layout plan through the life of the activity. Including (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures)**

Impacts of the Holfontein Project preferred final layout (refer to Figure 2) and alternatives on each aspect were identified by the relevant independent specialist commissioned for the project, who provided this information to the EAP through the submission of an impact assessment report (refer to Section 11(h) below for the list of specialists commissioned) which informed this EIAR.

The Prime Resources (Pty) Ltd Impact Assessment Methodology and rationale (described in Section 11(a) above) was used by the specialists to assess the significance of the potential impacts of the preferred final layout and alternatives. Refer to Section 11 above for the list of potential impacts identified, the assessment of their significance and the extent which they can be mitigated.

g) Assessment of each identified potentially significant impact and risk (This section of the report must consider all the known typical impacts of each of the activities (including those that could or should have been identified by knowledgeable persons) and not only those that were raised by registered interested and affected parties - the supporting impact assessment conducted by the EAP must be attached as an appendix)

ACTIVITY WHETHER LISTED OR NOT LISTED (e.g. Excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.)	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc.)	ASPECTS AFFECTED	PHASE IN WHICH IMPACT IS ANTICIPATED (e.g. construction, commissioning, operational Decommissioning, closure, post-closure)	SIGNIFICANCE (if not mitigated)	MITIGATION TYPE (modify, remedy, control, or stop through e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity, modify through alternative method, control through noise control, control through management and monitoring through rehabilitation)	SIGNIFICANCE (if mitigated)
Mining at Holfontein	Continued employment for ME Operations employees	Socio-economic	Construction; Operation; Decommissioning; Post-Closure	High+	This positive impact can be further improved through the effective implementation of the SLP Human Resources Development (HRD) Programme	High+
	Migration of job seekers into the project area	Socio-economic	Construction; Operation; Decommissioning; Post-Closure	High	Cannot be mitigated	High
	Migration of job seekers into the project area - Overcrowding leading to pressure on existing infrastructure and services	Socio-economic	Construction; Operation; Decommissioning; Post-Closure	High	Cannot be mitigated	High
	Migration of job seekers into the project area - Overcrowding leading to social ills and decreased quality of life	Socio-economic	Construction; Operation; Decommissioning; Post-Closure	High	Cannot be mitigated	High

	Migration of job seekers into the project area - Establishment of tuck shops and canteens in the Holfontein project area in order to supply mine employees and new residents with food and drink	Socio-economic	Construction; Operation; Decommissioning; Post-Closure	High	Cannot be mitigated	High
	Overcrowding leading to loss of sense of place	Socio-economic	Construction; Operation; Decommissioning; Post-Closure	High	Cannot be mitigated	High
Vehicles and machinery on site	Dust and vehicle tailpipe emissions resulting in a decrease in ambient air quality	Air quality ; Socio-economic	Construction	Medium	Implement dust suppression measures and emission reduction measures	Low
	Pollution of the Holfontein Stream by hydrocarbons and resultant decrease in biodiversity	Aquatic Ecology	Construction; Decommissioning	Low	Implementing good housekeeping in terms of spills; constructing adequate clean and dirty water management infrastructure	Low
			Operation	Medium		Low
	Potential contamination of shallow groundwater resources by hydrocarbons	Hydrogeology; Socio-economic	Construction; Decommissioning	Low		Low
	Noise increasing ambient noise levels	Noise; Socio-economic	Construction; Decommissioning	Medium	Enclosing noisy equipment such as generators; fitting efficient silencers and enclosing engine compartments of construction vehicles and equipment; and maintaining vehicles and equipment conscientiously	Low
	Contamination of soil by hydrocarbons and compaction of soils	Soil and Land Capability	Construction; Operation; Decommissioning	Medium	Implementing good housekeeping in terms of spills; constructing adequate clean and dirty water management infrastructure; and minimising areas to be disturbed by vehicles and heavy machinery	Low
	Pollution of the environment by hydrocarbons	Terrestrial Ecology	Construction; Operation; Decommissioning	Medium	Implementing good housekeeping in terms of spills; constructing adequate clean and dirty water management infrastructure	Low
	Contamination of wetlands by hydrocarbons	Wetlands	Construction	High		Low
Land clearing activities	Dust resulting in a decrease in ambient air quality	Air quality; Socio-economic	Construction	Medium	Implement dust suppression measures	Low

	Increased runoff leading to altered hydrology of the Holfontein Stream and resultant aquatic habitat alteration	Aquatic Ecology	Construction	Medium	Adequate management of stormwater runoff	Low
	Short term increase in groundwater recharge	Hydrogeology	Construction	Low		Low
	Sedimentation of the Holfontein stream	Hydrology	Construction	Low	Constructing a temporary berm between the Holfontein shaft and the Holfontein Stream until the stormwater management infrastructure is constructed; and timing construction to take place during the dry months	Low
	Increase in surface runoff may result in increased soil erosion	Soil and Land Capability	Construction	Medium	Implement erosion prevention measures	Medium
	Destruction of natural vegetation including plant species of conservation concern and/or provincially protected plant species	Terrestrial Ecology	Construction	Medium	Relocation permits to be obtained from DAFF for species of conservation concern, according to NEMBA, prior to construction; and a botanist is to be commissioned to identify and relocate any species of conservation of concern within the footprint to be cleared in order to mitigate the loss of biodiversity	Low
	Introduction and spread of alien invasive plant species into natural areas		Construction; Operation	Medium	Implementing monitoring and eradication of alien invasive plants	Low
Construction and grading of roads	Dust resulting in a decrease in ambient air quality	Air quality; Socio-economic	Construction; Operation	Medium	Implement dust suppression measures	Low
	Damage to graves	Archaeology; Socio-economic		Low	Implementing a 30 m buffer between the cemetery and the haul road	Low
	Noise increasing ambient noise levels	Noise; Socio-economic	Construction	Low	Enclosing noisy equipment such as generators; fitting efficient silencers and enclosing engine compartments of construction vehicles and equipment; and maintaining vehicles and equipment conscientiously	Low
	Loss of medium potential agricultural soil (haul road in proximity to the ME Operations)	Soil and Land Capability; Socio-economic	Construction; Operation	Medium	Adequately rehabilitate the area to medium agricultural potential	Low
	Destruction of natural	Terrestrial	Construction	Medium	Relocation permits to be obtained	Low

	vegetation including plant species of conservation concern and/or provincially protected plant species	Ecology			from DAFF for species of conservation concern, according to NEMBA, prior to construction; and a botanist is to be commissioned to identify and relocate any species of conservation of concern within the footprint to be cleared in order to mitigate the loss of biodiversity	
Blesbokspruit culvert construction	Interference with faunal behaviour and movement	Terrestrial Ecology	Construction	Medium	Upgrading the Blesbokspruit culvert as far as practically possible per the ecology and wetland specialists' recommendations	Low
	Destruction of wetland habitat and resultant impact on wetland functionality	Wetlands	Construction	High	Minimise wetland areas to be disturbed; implementing good construction techniques and timing; and constructing adequate culverts as per the recommendations of the wetland specialist	Low
	Positive impact on the integrity of the floodplain wetland associated with the Blesbokspruit at the low level crossing		Permanent	High+	Positive impact, therefore no mitigation required	-
Construction of infrastructure	Dust resulting in a decrease in ambient air quality	Air quality; Socio-economic	Construction	Medium	Implement dust suppression measures	Low
	Pollution of the Holfontein Stream by construction materials and resultant decrease in biodiversity	Aquatic Ecology	Construction	Low	Implementing good housekeeping in terms of spills; constructing adequate clean and dirty water management infrastructure	Low
	Potential contamination of shallow groundwater resources by construction materials	Hydrogeology; Socio-economic	Construction	Low		Low
	Loss of low potential agricultural soil (ventilation shaft)	Soil and Land Capability; Socio-economic	Permanent	Medium	Cannot be mitigated	Medium
	Avifaunal collision with overhead power lines	Terrestrial Ecology	Construction; Operation; Decommissioning	Medium	Mark the power lines to avoid bird strikes; and remove the power lines at decommissioning	Low
	Visual intrusion on the landscape character from infrastructure with significant heights	Visual aesthetics; Socio-economic	Construction; Operation	High	Using camouflaging and non-reflective materials to construct the infrastructure; and using screening techniques	High

	Night-time lighting may result in a negative impact on the visual character and a nuisance to surrounding residents			Medium	Implementing methods to minimise light spill	Low
Waste rock handling and hauling to ME Operations	Dust resulting in a decrease in ambient air quality	Air quality; Socio-economic	Construction	Medium	Implement dust suppression measures	Low
	Spillage of waste rock along the haul route may contaminate surface runoff entering the Holfontein Stream or Blesbokspruit polluting these watercourses	Hydrology	Construction	Low	Ensuring that haul road surfaces (including crossings) are maintained; and by covering haul trucks with a tarpaulin	Low
Topsoil stockpiling	Dust resulting in a decrease in ambient air quality	Air quality; Socio-economic	Construction; Operation	Medium	Implement dust suppression measures	Low
	Stockpiles may be eroded by exposure to wind and runoff	Soil and Land Capability; Socio-economic	Construction; Operation	Medium	Implement erosion prevention measures	Medium
	Reduced soil quality, fertility, and agricultural potential			Medium	Adequate stockpile management	Low
Dewatering of the shaft	Localised dewatering of surrounding aquifers and potential impact on surrounding groundwater users through lowered groundwater levels in surrounding boreholes	Hydrogeology; Socio-economic	Construction	Low	Sealing high-yielding fissures/faults/dykes	Low
	Decrease in underground water qualities			Low	Dewatering within a period of less than 24 months	Low
Refurbishing of the Holfontein shaft	Old and corroded material potentially containing uranium and other radioactive substances will be hoisted to surface and material may contaminate surface runoff which could enter the Holfontein Stream, subsequently polluting the watercourse	Hydrology	Construction	Medium	Constructing adequate dirty water management infrastructure prior to refurbishment activities commencing, including fitting the salvage yard area with drains that will direct runoff water to the PCD	Low
Dewatering of the groundwater inflows to the underground workings	Localised dewatering of surrounding aquifers and potential impact on surrounding groundwater	Hydrogeology; Socio-economic	Operation	Low	Sealing high-yielding fissures/faults/dykes	Low

	users through lowered groundwater levels in surrounding boreholes					
Treating groundwater and sewage effluent at the water treatment facility	Inability to maintain treatment standards of the discharged water from the water treatment facility may pollute the Blesbokspruit catchment	Aquatic Ecology	Construction; Operation	Medium	Treating the water to be discharged to meet qualities as stipulated by DWS; and monitoring the water quality of the water to be discharged using the DEEEP approach	Low
	Ineffective storage and spillage along route may contaminate surface runoff entering the Holfontein Stream or Blesbokspruit, polluting these watercourses	Hydrology	Construction; Operation	Low	Adequately training staff transporting sludge; ensuring that the water treatment facility is operating effectively; and adequate storage of sludge	Low
Discharging of the treated groundwater and sewage effluent to the Blesbokspruit via a pipeline	Scouring of the downstream habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA	Aquatic Ecology	Construction	Low	Construction of flow diffusing structures at the discharge point	Low
			Operation	Medium		Low
		Wetlands	Construction	Low		Low
			Operation	Medium		Low
	Ineffectively treated water discharged may pollute the Blesbokspruit catchment	Hydrology	Construction	Medium	Treating the water to be discharged to meet qualities as stipulated by DWS; and monitoring the water quality of the water to be discharged	Medium
			Operation	Medium		Low
	Increased flow of the Blesbokspruit		Construction; Operation	Low	Construction of flow diffusing structures at the discharge point	Low
	Increased water quality of the Blesbokspruit due to dilution with the sewage effluent from the WWTW		Construction; Operation	Low+	Positive impact, therefore no mitigation required	-
	Nitrogen compounds may result in excessive growth of aquatic vegetation with the resulting impeding of water flow in watercourses particularly at culverts		Operation	Medium	Positive impact can be obtained by discharge to the recommended discharge point to allow for mixing of mine discharge with effluent from the WWTW	Low
	Ineffectively treated water discharged may	Terrestrial Ecology	Construction; Operation	Medium	Treating the water to be discharged to meet qualities as	Low

	pollute the Blesbokspruit catchment	Wetlands	Construction; Operation	High	stipulated by DWS; and monitoring the water quality of the water to be discharged	Low
Ore handling and truck loading	Dust (with metal fraction potentially increasing the health risk)	Air quality; Socio-economic	Operation	High	Implement dust suppression measures	High
	Potential contamination of shallow groundwater resources through seepage of contaminated runoff	Hydrogeology; Socio-economic	Operation	Medium	Maintain adequate clean and dirty water management infrastructure	Low
	Noise increasing ambient noise levels	Noise; Socio-economic	Operation	Medium	Constructing a berm between the noise generating activities and sensitive receptors	Low
Hauling of ore to ME operations	Dust and vehicle tailpipe emissions decreasing ambient air quality	Air quality; Socio-economic	Operation	Medium	Implement dust suppression measures and emission reduction measures	Low
	Noise increasing ambient noise levels	Noise; Socio-economic	Operation	Low	Enclosing noisy equipment such as generators; fitting efficient silencers and enclosing engine compartments of construction vehicles and equipment; and maintaining vehicles and equipment conscientiously	Low
	Interference with faunal behaviour and movement	Terrestrial Ecology	Operation	Medium	Implementing speed reduction measures and cutting away the vegetation along either side of the road at the two high risk areas mentioned above	Low
	Damage to road surfaces	Traffic; Socio-economic	Construction; Operation; Decommissioning	Medium	Adequate monitoring and maintenance of intersections and road sections	Low
	Reduced road traffic safety			High	Providing dedicated right-turn lanes where heavy vehicles are expected to make turning movements; providing acceleration lanes to allow heavy vehicles to gain speed and enter main traffic flow along Pansy Avenue; introducing speed limit signage and constructing speed humps along Carnation Road if required	Medium
	Reduced pedestrian safety			Low	Providing loading and offloading area on site; and by constructing pedestrian walkways should pedestrian volumes along haul route rise	Low

Ventilation shaft operations	Dust and shaft emissions decreasing ambient air quality	Air quality; Socio-economic	Operation	Medium	Implement dust suppression measures and emission reduction measures	Low
	Noise increasing ambient noise levels resulting in a nuisance to surrounding residents	Noise; Socio-economic	Operation	Medium	Vertical axial fans are recommended to be installed below surface level; and vertical attenuated exhaust/intake stacks to be utilised	Low
Decommissioning activities	Dust and vehicle tailpipe emissions decreasing ambient air quality	Air quality; Socio-economic	Decommissioning	Medium	Implement dust suppression measures and emission reduction measures	Low
	Stormwater runoff may become contaminated by spilled hazardous materials and enter the Holfontein Stream, potentially polluting the watercourse	Hydrology	Decommissioning	Low	Remove the water management infrastructure last	Low
	Ceasing of discharging activities - A potential source of pollution will be removed from the Blesbokspruit catchment			Medium+	Positive impact, therefore no mitigation required	-
	Noise increasing ambient noise levels	Noise; Socio-economic	Decommissioning	Low	Enclosing noisy equipment such as generators; fitting efficient silencers and enclosing engine compartments of construction vehicles and equipment; and maintaining vehicles and equipment conscientiously	Low
	Excessive stormwater runoff may result in increased soil erosion	Soil and Land Capability	Decommissioning	Medium	Adequate rehabilitation	Low
	Unsuccessful rehabilitation of denuded areas may result in the introduction and spread of alien invasive plant species into natural areas	Terrestrial Ecology	Decommissioning; Post-closure	Medium	Adequate rehabilitation	Low
	Infrastructure will be removed and the footprint rehabilitated resulting in the restoration of the landscape character	Visual aesthetics; Socio-economic	Decommissioning; Post-closure	High+	Positive impact, therefore no mitigation required	-
Rehabilitation	Dust from wind erosion of bare areas decreasing ambient air quality	Air quality; Socio-economic	Decommissioning; Post-closure	Medium	Adequate rehabilitation	Low
	Excessive stormwater	Soil and Land	Decommissioning;	Medium	Adequate rehabilitation	Low

	runoff may result in increased soil erosion	Capability; Socio-economic	Post-closure			
	Ineffective rehabilitation may result in reduced soil quality, fertility and agricultural potential			Medium	Adequate rehabilitation	Low
	Ineffective rehabilitation resulting in ecological degradation and spread in alien invasive vegetation species	Terrestrial ecology	Decommissioning; Post-closure	High	Adequate rehabilitation	Medium
	Successful rehabilitation resulting in an increase in biodiversity			High+	Positive impact, therefore no mitigation required	-
	Unsuccessful rehabilitation of disturbed wetland areas; an increased surface runoff (due to unsuccessful rehabilitation of denuded areas) may result in erosion of the wetland habitat associated with the Holfontein Stream and the resultant loss of wetland PES and functionality	Wetlands	Decommissioning; Post-closure	Low	Adequate rehabilitation	Low
Recharge of dewatered underground workings	Decrease in groundwater qualities	Hydrogeology; Socio-economic	Decommissioning; Post-closure	Low	Cannot be mitigated	Low
	Potential of surface decant of mine water	Hydrogeology Hydrology		Low	Cannot be mitigated	Low

The supporting impact assessment compiled by the EAP, informed by specialist input, is attached as Appendix 19.

h) Summary of specialist reports **(This summary must be completed if any specialist reports informed the impact assessment and final site layout process and must be in the following tabular form - attach copies of Specialist Reports as appendices)**

Air Quality	Prime Resources	Appendix 7
Archaeology	Anton Pelser Archaeological Consulting	Appendix 8
Aquatic Ecology	Strategic Environmental Focus	Appendix 9
Hydrogeology	Groundwater Square	Appendix 10
Hydrology	African Environmental Development	Appendix 11
Noise	JH Acoustic Consulting	Appendix 12
Socio-economic	Prime Resources	Appendix 13
Soil and Land Capability	Prime Resources	Appendix 14
Terrestrial Ecology	Strategic Environmental Focus	Appendix 15
Traffic	Siyazi Gauteng	Appendix 16
Visual Aesthetics	Prime Resources	Appendix 17
Wetlands	Strategic Environmental Focus	Appendix 18

LIST OF STUDIES UNDERTAKEN	RECOMMENDATIONS OF SPECIALIST REPORTS	SPECIALIST RECOMMENDATIONS THAT HAVE BEEN INCLUDED IN THE EIA REPORT (Mark with an X where applicable)	REFERENCE TO APPLICABLE SECTION OF REPORT WHERE SPECIALIST RECOMMENDATIONS HAVE BEEN INCLUDED
Air Quality	Access tracks used for soil stripping during the loading and unloading cycle must be watered. Soil stripping must be limited to areas required for the construction of surface infrastructure and free fall height during topsoil stockpiling must be limited to 3 m.	X	Holfontein Air Quality Management Plan (Section 4(g)(ii) of the EMPr - Part B of this document)
	A water spray dust suppression system must be implemented during earthmoving and dozing operations. Excavation area to be hosed down prior to removal of material in order to obtain 50 % control efficiency and earthmoving activities must be phased to reduce the source area (i.e. total exposed area at one time).	X	
	Frequency of disturbance of exposed areas must be reduced and exposed areas must be re-vegetated as soon as possible to obtain 40% control efficiency.	X	
	To reduce emissions due to wind erosion at the topsoil stockpile a water spray dust suppression system must be implemented to keep the topsoil stockpile moist to reduce wind erosion and obtain 50% control efficiency.	X	
	To minimise dust from vehicle entrainment on unpaved roads: • Development of access roads must be limited and the locations clearly defined as per the project layout; • All existing unpaved roads must be graded prior to operations. Grading is to be avoided during dry windy conditions; • Speed of construction vehicle and haul trucks travelling on unpaved roads must be limited to 40 km/h; • Dust suppression through level 1 watering (2 ℓ/m² per hr) to obtain 50 % control efficiency must be implemented on unpaved access and haul roads; • Surface improvement must be implemented in the form of gravel to cap the road surface of unpaved roads; and • The unpaved portion of the haul route - between the Blesbokspruit crossing and paved portion of the Carnation Road - must be paved to obtain 100 % control efficiency. This is a precaution, as the cumulative impact of dust on residents in proximity could not be quantified. • All unpaved roads must be regularly maintained (using graders) to minimise the generation of dust. Grading is to be avoided during dry windy conditions and limited to affected areas only; • Dust suppression through level 1 watering (2 ℓ/m²-hr) to obtain 50% control efficiency must be implemented on unpaved access and haul roads;	X	

	• Routes must be clearly marked and drivers must only travel on the marked haul route; and • Limit speeds of haul trucks and buses transporting personnel travelling on unpaved roads to 40 km/h.		
	The following measures must be implemented to reduce emissions generated from materials handling: • Truck overloading must be prevented to reduce spillage of waste rock and ore during loading, unloading and hauling; • The haul trucks must be covered with a tarpaulin while transporting waste rock and ore from the Holfontein shaft to the ME operations to obtain 99 % control efficiency; • It must be ensured that the waste rock and ore being hauled is wet to obtain 50% control efficiency; • Any spillage of waste rock or ore from haul trucks along the haul route must be cleared and disposed of appropriately at the ME operations; • A water spray dust suppression system must be used at the bin during truck loading of ore, to obtain 50% control efficiency; • Free fall height from the skip to the bin during ore stockpiling must be limited; and • Sheltering measures to reduce wind speed must be implemented (i.e. enclosing the chute).	**X**	Holfontein Air Quality Management Plan (Section 4(g)(ii) of the EMPr - Part B of this document)
	Adequate equipment maintenance must be undertaken to reduce emissions: • An inspection and maintenance programme to service equipment in accordance with the equipment manufacturer specifications must be implemented; • Low sulphur diesel must be used to fuel vehicles and equipment; and • Vehicle idling must be limited.	**X**	
	It is recommended that the precautionary principle be implemented in terms of the management of cumulative dust in order to address concerns that have been raised by residents occupying properties directly adjacent to the proposed haul route. Therefore, it is recommended that the unpaved portion of the haul route between the Blesbokspruit crossing and the paved portion of Carnation Road be paved, which will mitigate any dust generated from vehicle entrainment on unpaved roads.	**X**	
	The existing air quality impacts at the ME Operations (related to rock crushing activities, materials handling and transfer, ore crushing and screening activities, the processing plant, and the tailings storage facility) which are to be extended by the supplementation of rock and ore from the Holfontein shaft must continue to be managed as per the commitments in the approved ME Operations EMP. It must be ensured that provisions are in place to manage the extension of the air quality impacts as determined by the additional LoM of the Holfontein Project. It is expected that the ME Operations EMP will need to be updated to address the additional ore and waste rock (and tailings material) to be received from Holfontein, prior to reaching the LoM as stated within the current approved 2007 EMP.	**X**	Holfontein Air Quality Management Plan (Section 4(g)(ii) of the EMPr - Part B of this document)
	Rehabilitation should be conducted with the aim of 100 % control efficiency in terms of dust generated from wind erosion across exposed areas. Therefore, the area must be fully rehabilitated and vegetation must be self-sustaining.	**X**	Holfontein Interim Closure Plan (Appendix 20)
	A weather station must be installed on site to at least monitor wind speed and	**X**	Holfontein Air Quality

	direction as well as rainfall to assist with interpretation and understanding of the dust fallout.		Management Plan (Section 4(g)(ii) of the EMPr - Part B of this document)
	Daily site inspections by environmental personnel should be conducted to provide an indication on the effectiveness of the dust control measures. Visual monitoring must be conducted in for activities which are expected to generate the most dust if not managed effectively (i.e. areas such as the skip, bin and chute at the shaft as well as the unpaved portions of the haul route). Haul trucks should be covered before leaving the site, random inspections should be done to ensure this is being implemented. Inspections for- and the clearing of spillage of ore from haul trucks along the entire haul route must also be included in the inspections.	**X**	
	As per the requirements of the National Emission Reporting Regulations (GN283 of 2015) the Applicant is to register as a data provider with- and also submit emission reports, in the format required, to the online National Atmospheric Emissions Inventory System (NAEIS). Reports must be submitted for the preceding calendar year to the NAEIS by 31 March for each calendar year.	**X**	
	It is imperative that air quality (dust fallout) monitoring be conducted, as per the air quality monitoring programme at the recommended monitoring sites, throughout the LoM to determine whether the emissions generated at the mine correlate with those modelled and fall within the National Dust Control Regulations at mine boundaries and surrounding sensitive receptors, specifically the historic mine house and informal settlements located to the west of the boundary. If they do not correlate with modelled concentrations and exceed the standards, additional management measures must be implemented to ensure that the standards are met.	**X**	Air Quality Monitoring Programme (Section 6(a))
	In response to any community complaints relating to air quality impacts which may be received, which can be corroborated by monitoring results, consultation with relevant residents must be undertaken to establish additional air quality (dust fallout) monitoring sites.	**X**	Holfontein Air Quality Management Plan (Section 4(g)(ii) of the EMPr - Part B of this document)
	Dust fallout should be reported on monthly by the external service provider employed to conduct the air quality (dust fallout) monitoring.	**X**	Air Quality Monitoring Programme (Section 6(a))
	Progress reporting must take place at regular intervals (at least quarterly) during operations. Results from site inspections, monitoring results and a summary of any complaints relating to air quality received must be combined to determine if monitoring objectives are being met and the effectiveness of management measures. Progress in terms of air quality management should be reported to all interested and affected parties, including authorities and persons which may be affected by emissions from the proposed project. Corrective action must be taken (i.e. the implementation of contingency measures) in the event that monitoring objectives have not been met.	**X**	Holfontein Air Quality Management Plan (Section 4(g)(ii) of the EMPr - Part B of this document)
	The operating hours of discharging of ore into the bin, loading of trucks and hauling must be limited to between 06h00 and 18h00.	**X**	
	Mine health and safety requirements in terms of air quality within the boundaries of the proposed development must also be adhered to and compliance thereto audited regularly.	**X**	

Archaeology	An architectural historian must be consulted to undertake a detailed study of the historic mine house if it is to be impacted. It should be noted that the historic mine house is currently occupied. The access road that previously passed near the historic mine house as per the initial layout in the scoping phase has been re-routed so that the house will not be impacted. No further mitigation is therefore required.		
	The cemetery near the ME operations must continue to be preserved and that a 30 m buffer be maintained between the proposed haul road and the cemetery boundary fence to mitigate any potential impact on the graves.	**x**	Holfontein Archaeology Management Plan (Section 4(g)(iii) of the EMPr - Part B of this document)
Aquatic Ecology	Topsoil, leaf and plant litter must be stockpiled until the decommissioning phase separately in low heaps upslope of the proposed shaft area to prevent contaminated surface runoff occurring within these stockpiles, which can then be used later for rehabilitation purposes.	**x**	Holfontein Soil Management Plan (Section 4(g)(vii) of the EMPr - Part B of this document)
	Runoff from proposed haul roads must be managed by means of adjacent drainage canals and flow dissipaters to avoid potential erosion problems.	**x**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	The proposed design of the upgraded culvert structures within the Blesbokspruit and Holfontein Stream should align with maintaining the natural function of the wetland area and as a result, the flow should remain laminar and diffuse within the channel. Only the Blesbokspruit crossing will be upgraded (i.e. the construction of a series of culverts) to accommodate the haul trucks travelling along the haul route. The existing Holfontein Stream crossing will not require upgrading. Therefore, the wetland area associated with the Holfontein Stream crossing will not be impacted.	**x**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	In the event that the proposed discharge of the shaft directly into the Holfontein Stream occurs during the Construction Phase, its release should be continuously regulated to ensure that the associated wetland system can handle the additional water volumes without the occurrence of erosion. However, due to the substantially higher discharge volumes proposed during the Operational Phase, it is rather recommended that the discharge point be relocated to the Blesbokspruit		

	and that infrastructure required be implemented from the onset. The discharge point to the Blesbokspruit instead of the Holfontein Stream as recommended by the aquatic ecology and wetland specialists has been chosen as the preferred alternative.		
	All construction materials including fuels and oil should be stored in a demarcated area that is contained within a bunded impermeable surface to avoid spread of any potential contamination, as suggested by the proposed mine plan.	**X**	Holfontein Hydrocarbon Management Plan (Section 4(g)(xii) of the EMPr - Part B of this document)
	Littering and contamination of water sources during construction must be mitigated by effective construction camp management and provision of sufficient refuse bins and ablution facilities throughout the construction area.	**X**	Holfontein Waste Management Plan (Section 4(g)(xiii) of the EMPr - Part B of this document)
	Spillages must be cleaned immediately and the areas treated with suitable materials.	**X**	Holfontein Hydrocarbon Management Plan (Section 4(g)(xii) of the EMPr - Part B of this document)
	Clean and dirty water separation infrastructure should be implemented and maintained to effectively collect/direct contaminated water to the proposed PCD. Suitable flow diversion structures, such as diversion berms and/or collection canals, should be established around the border of the proposed operational areas so as to prevent substantial surface runoff contamination	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Drainage systems should be maintained regularly in order to minimize the runoff of harmful chemical substances into the associated systems.	**X**	
	The quality of the discharge from the water treatment plant should be continuously monitored against the stipulated water quality guidelines (e.g. Blesbokspruit Forum guidelines, General Authorisation discharge limits, etc.) to prevent the potential water quality deterioration of the wetland system. In the event that the quality of the discharge deteriorates substantially, it is recommended that the treatment method be immediately reviewed and adapted until the required water quality standards are restored.	**X**	
	In the case of pollution of any surface or groundwater, the Regional Representative of the DWS must be informed immediately.	**X**	
	Due to the elevated water volumes expected within the adjoining Blesbokspruit, it was recommended that the discharge point be re-located from the Holfontein Stream to a site along the Blesbokspruit. However, given the location of the Blesbokspruit Ramsar site directly downstream, it is imperative that the additional volumes do not flood and/or destroy the available bird habitats that currently give the area its status. Therefore, a clear understanding of the implications of the flow release into the Blesbokspruit should be obtained prior to implementation using a scenario-based Reserve Determination process. It is further suggested that the water be piped to the Blesbokspruit within the servitude of the proposed haul road, so as to limit the extent of the environmental footprint and that the discharge point should be located directly upstream of the upgraded culverts to avoid potential scouring of the downstream habitat. A discharge point to the Blesbokspruit instead of the Holfontein Stream, as		Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)

	recommended by the aquatic ecology and wetland specialists, has been chosen as the preferred alternative. Based on the recommendations of the hydrology specialist a point further downstream in the Blesbokspruit (rather than at the crossing as suggested by the wetland specialist) has been chosen to prevent flooding and water quality impacts. As part of the WULA process a scenario-based Reserve Determination process should be carried out by DWS to identify the implications of the release of the discharge volumes to the Blesbokspruit. The WUL conditions will then specify the release volumes and flow rates.		
	The pipe should be regularly inspected and maintained to ensure that no leaks are observed and potential erosion is avoided (i.e. use of flow dissipaters at discharge point).	**X**	
	Regular inspections and maintenance should be undertaken at both treatment facilities (i.e. sewage treatment plant and water treatment plant) in order to facilitate an optimal treatment process throughout the Operational Phase.	**X**	
	These treatment facilities should not be over-capacitated with overwhelming volumes of water at the expense of quality and as such, the maximum operating capacity of these facilities should always be considered. In the event of additional volumes needing treatment, additional facilities should be constructed or current facilities should be Improved / expanded to accommodate these volumes. Also, amendments to discharge volumes in the applicable WUL should be approved by the DWS.	**X**	
	It is recommended that a monitoring programme utilising the Direct Estimation of Ecological Effect Potential (DEEEP) approach be established for both treatment facilities at a screening level, and conducted on a quarterly basis to assess and monitor the efficacy of these facilities. Discharge effluent should be sampled, as well as water from within the channel at a point upstream and downstream of the discharge pipe and should be analysed and compared. In the event that the effluent sample indicates a mortality/inhibition greater the 50%, it is further recommended that a definitive assessment be performed on the effluent sample. Furthermore, in the event that toxicity is elevated (i.e. water quality within the discharge deteriorates), an adaptive management process should be applied and the treatment method employed at the time should be reviewed and improved.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Ensure that all Best Management Guidelines as published by the DWS are employed and strictly adhered to during all phases of the mining process.	**X**	
	All stormwater infrastructure (including the PCD), as well as the water treatment facility, should remain intact and operational until all infrastructure associated with the operational areas have been dismantled and removed from the site, so as to ensure collection of any potential contamination.	**X**	Holfontein Interim Closure Plan (Appendix 20)
	Sediment contained within the PCD should be assessed, and disposed on in an environmentally appropriate manner.	**X**	
Hydrogeology	The cumulative impact of the Holfontein Main Reef ore, on the Tailings Storage Facility at ME Operations, should be investigated. The cumulative impact of the Holfontein Main Reef ore on the on the Tailings Storage Facility at ME Operations is to be investigated prior to the commencement of construction for the Holfontein Project.	**X**	Conditions of Authorisation (Section 13(b))

	The hydrocensus within a ≥1.5 km radius of the Holfontein shaft (3 km to the north and east) should be updated prior to mining.	**X**	Hydrogeology Monitoring Programme (Section 6(c) of the EMPr - Part B of this document)
	Monitoring recommendations were made to verify predictions and record groundwater quality and groundwater level impacts: • Groundwater monitoring must be done as per WUL specifications. Monthly monitoring during construction or as stipulated in the WUL. • Measuring groundwater levels at hydrocensus boreholes and the recommended monitoring boreholes to be drilled in both the Karoo and Dolomitic aquifer units within a 1 km radius of the Holfontein shaft. • Monthly monitoring of dewatered qualities at the Water Tanks and PCD specifically EC, pH and SO_4. Water qualities must monitored prior to treatment and after treatment, prior to discharge. • Water qualities of recycled and other water must be measured on a continuous basis. Recycled water must be monitored for salinity levels to prevent an adverse build-up of TDS. • For the closure phase it is recommended that water levels are measured monthly. • Groundwater monitoring to be continued for a period of at least 5 years after closure. • Water quality measurements in the Shaft (as per the Shaft Wolf procedure) must take place for at least 5 years after flooding to confirm stratification. Shaft quality measurements at the same schedule as is currently taking place (refer to Shaft Wolf schedule). • Quarterly groundwater monitoring during post closure until a steady state water level and groundwater quality is reached; likely minimum 5years to allow for recovery of dolomitic levels. • Groundwater level and groundwater quality monitoring, specifically EC, pH and SO_4. • Post closure water quality measurements on a quarterly basis, as required by the IWWMP and IWULA for closure objectives.	**X**	
	Grouting and sealing of shaft systems is an integral part of the construction activities. It is also important that mitigation measures (sealing fissures/faults/dykes) be introduced where major water inflows are encountered underground.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	It is recommended that the geochemical model be updated during the LoM in order to calibrate and validate its results and to construct an effective closure plan. The geochemical model must assess the effectiveness of potential mitigation measures.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Interim Closure Plan (Appendix 20)
	A dedicated borehole should be drilled (presumed standard procedure) at proposed Ventilation Shaft position, to identify high-yielding fissures/fractures and seal these prior to shaft sinking.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this
	As far as practically possible, water-bearing fissures which are encountered	**X**	

	during the refurbishment of the Holfontein Shaft should be sealed to minimise groundwater inflows, i.e. minimising the operational phase mine water balance.		document)
	All water dams must be lined according to DWS engineering design standards to prevent contaminated water from seeping into the local groundwater system. Designs of the dams must be done according to specifications and as-built drawings must be submitted.	**X**	
	Construction phase clearing of all soils must be minimized.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Measure and map all fissure related water features.	**X**	
	Excess water must be pumped to the surface water storage facilities for re-use. Water quality should be recorded to determine if water should be treated prior to discharge (if DWS standards are exceeded). Volumes of excess water must be measured and reported as % of available surface storage capacity, if the flows exceed 1Mℓ/day. If excess flow is encountered, volumes must be reported daily.	**X**	
	All mining water must be treated as contaminated, although current monitoring suggests that the water is clean in terms of DWS standards.	**X**	
	Water discharged into the Blesbokspruit must meet DWS standards.	**X**	
	Dewatering qualities must be measured at the surface water tanks and PCD.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Hydrogeology Monitoring Programme (Section 6(c) of the EMPr - Part B of this document)
	Water qualities of recycled and other water must be measured on a continuous basis. Recycled water must be monitored for salinity levels to prevent an adverse build-up of TDS.	**X**	
	The IWWMP requirements for operational mines require a volume flow control sheet of all water and waste streams. A daily/ weekly or monthly measurement frequency may apply to the water balance and waste stream.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Barrier pillars must be left in place between Holfontein and future mining activities, if ever planned. If future mining activities take place close to, or around the Holfontein section, a monitoring system must be designed and implemented to ensure that all hydraulic heads in the dolomitic aquifer are measured. Barrier pillar water measurements.	**X**	Holfontein Interim Closure Plan (Appendix 20)
	As a further safety precaution, the shafts must be sealed.	**X**	
	Current regional shaft water level depth measurements by DWS should continue.	**X**	
Hydrology	Upgrade the river and wetland crossing by spreading culverts across the width of the wetland, while using smaller culverts in the centre of the stream ensuring that channel formation is minimised. Each of these culvert outlets should be designed that the energy of the flowing water is dissipated where it leaves to downstream side of the culvert.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	It is recommended that NKGM implement a maintenance programme where the vegetation growth downstream of the discharge point is monitored and when it becomes excessive, that steps be taken to clear the inlets of the vegetation.	**X**	

	It is recommended that the mine water be discharged directly into the Blesbokspruit at a point opposite the WWTW as it would be the best environmental option overall.	**X**	Project Description (Section 5(b))
	It is essential that the promotion of any additional channel formation at the Blesbokspruit crossing be avoided, by constructing proper in- and outlets to be properly constructed (and adequately sized) culverts under the road. Particularly the outlet of a culvert system must be constructed in such a manner that the energy in the flowing water is dissipated across a wide area to prevent channel formation. In addition, the culvert system must be able to accommodate at least a pre-determined flow rate.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	If condensation occurs at the ventilation shaft, an evaporation pond must be constructed. The sediment from this pond must be removed and sent to ME for processing, together with the ore produced at the main Holfontein shaft.	**X**	
	The first item that must be constructed is the pipeline from the shaft to the discharge point for mine water.	**X**	
	The sediment that has accumulated in the PCD must be removed to either ME Operations or to the Holfontein hazardous waste (H:H) landfill facility, depending on the gold content in the sediment and whether the residue is radioactive or not.	**X**	
	Monitoring recommendations include: • To ensure that at least one sample is collected upstream, one immediately downstream from the mine and one at the confluence of the Holfontein Stream with the Blesbokspruit, the same three sampling points in the Holfontein Stream should be monitored on a monthly basis during the life of the mine in the Holfontein Stream. • The Blesbokspruit immediately downstream from the haul road crossing should also be monitored monthly. Water samples must also be collected/analysed prior to and during the construction phase of the mine. • Additionally, the water discharged from the Holfontein Shaft must also be monitored monthly (using the EC and pH being recorded daily, using a portable instrument, which is calibrated regularly). • The following determinants must be analysed for: ○ pH ○ EC ○ Total Hardness ○ Total Alkalinity ○ Sulphate ○ Nitrate ○ Chloride ○ Ammonium ○ Calcium ○ Magnesium ○ Sodium ○ Potassium ○ Iron ○ Manganese ○ Uranium • It is furthermore also recommended that every 6 months, i.e. in July	**X**	Hydrology Monitoring Programme (Section 6(d) of the EMPr - Part B of this document)

	and January, coinciding with the middle of the dry and rainy seasons, an additional full ICP-MS analysis be carried out on all the samples, to determine the micro-determinants not analysed for during the monthly analyses.		
	Carry out construction during dry season if possible.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Construct temporary berm between Main shaft and stream. No berm necessary at the ventilation shaft. During rainy season, inspect berm after thunderstorms. Repair if necessary until site has been constructed and clean and dirty drain separation has been implemented.	**X**	
	Ensure that water treatment plant is operational before dewatering commences.	**X**	
	Ensure water treatment plant is on line to meet DWS WUL requirements. Measure EC of water discharged into stream daily.	**X**	
	Ensure that lay down area/salvage yard, where material is stored, is fitted with drains to the PCD. Ensure that PCD is constructed prior to other infrastructure and ensure that construction of drains to PCD is completed before refurbishment of the shaft begins.	**X**	
	Radiation Measurement of all material brought from underground by mine's appointed Radiation Officer. Remove material as soon as possible to an area of safety off the Holfontein Site. Have radiation officer declare material safe for removal off site.	**X**	
	Ensure that haul road surface is always in good condition. Inspect regularly and repair frequently. Ensure that watercourse crossings are maintained in good condition.	**X**	
	Haul trucks must be covered with a tarpaulin.	**X**	
	Ensure water treatment plant operates efficiently. Daily monitoring of EC of discharged water.	**X**	
	Ensure that WUL water quality conditions are met or exceeded. Monthly monitoring of water quality at sampling points.	**X**	Hydrology Monitoring Programme (Section 6(d) of the EMPr - Part B of this document)
	Inspect discharge point and culvert for channel formation. Mitigate if needed.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Ensure spillages of sludge from the water treatment facility do not occur by properly training of responsible personnel.	**X**	
	Daily visual inspection by responsible person for water treatment facility to ensure that sludge is not routed to stormwater drain or PCD.	**X**	
	Ensure that water treatment plant is working optimally.	**X**	
	Inspect river monthly during summer months and implement cutting of reeds/vegetation when needed.	**X**	
	Continue to carry out water quality sampling until no more mining impact is noticeable in analyses results (when water quality returns to baseline water quality).	**X**	Hydrology Monitoring Programme (Section 6(d) of the EMPr - Part B of this document)
	Sequence of demolition must ensure that polluting infrastructure is removed before surface drains and PCD are removed. PCD and drains to PCD must be one of the last items to be removed. Sludge accumulated in PCD must be and adequately disposed.	**X**	Holfontein Interim Closure Plan (Appendix 20)
	Ongoing monitoring of water level in both shafts until levels stabilise.	**X**	Hydrogeology

			Monitoring Programme (Section 6(c) of the EMPr - Part B of this document)
Noise	Formal complaints regarding noise disturbance should be responded to using an agreed protocol.	**X**	Holfontein Noise Management Plan (Section 4(g)(v) of the EMPr - Part B of this document)
	Undertake hoisting and hauling operations for only 12 hours a day (from 06h00 to 18h00). Ensure that any agreements entered into regarding operating times are adhered to.	**X**	
	Ensure the proper design and maintenance of silencers on diesel-powered equipment, enclose engine compartments, damp mechanical vibrations, systematic maintenance of all forms of equipment, training of personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events (i.e. greater than 10 dB above the baseline conditions).	**X**	
	Where possible earthworks and material stockpiles should be placed so as to protect the boundaries from noise from individual operations and, which for greatest effect should be placed directly behind them. If a levee is constructed, it should be of such a height (5.6 m) as to effectively act as a noise barrier, if line of sight calculations show this to be practicable. In particular, stockpiles should form a berm surrounding hoisting and loading areas to provide a natural noise barrier between the operations and the surrounding residences.	**X**	
	Standardised noise measurements should be carried out on individual equipment at the delivery to site to construct a reference data base and regular checks carried out to ensure that equipment is not deteriorating and to detect increases which could lead to increase in the noise impact over time and increased complaints.	**X**	Holfontein Noise Management Plan (Section 4(g)(v) of the EMPr - Part B of this document)
	Noise monitoring should be carried out by an independent agency taking daytime and night time readings at six-monthly intervals close to Measurement Position 4 to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted (5dB rise or based on complaints).	**X**	Holfontein Noise Monitoring Programme (Section 6(e) of the EMPr - Part B of this document)
	Reduce noise at source by acoustic treatment, etc. Isolate bin and chute in an acoustic enclosure, etc. Compressors and generators, if used on site, should be installed in separate acoustically treated buildings.	**X**	Holfontein Noise Management Plan (Section 4(g)(v) of the EMPr - Part B of this document)
	Vertical axial fans are recommended installed below surface level and utilising vertical attenuated exhaust/intake stacks.	**X**	
Socio-economic	NKGM must compile a Community Development Plan (CDP) specifically for the Holfontein Project. It is recommended that NKGM collaborate with EMM and local government. The following initiatives can be considered for inclusion in the CDP: • Provision of additional water tanks and water supply boreholes for the Holfontein Community; • Investigation into possible installation of a modular sewage treatment plant or composting toilets for the Holfontein Community; • Formalising of 1 or 2 tuck shops outside the mine entrance, which could be run by the Holfontein Community; and • Upgrading and maintenance of Carnation Road will ensure a reduction in dust generation and will provide Welgedacht SH residents with a better	**X**	Holfontein Socio-economic Management Plan (Section 4(g)(x) of the EMPr - Part B of this document)

	road than the existing one.		
	A Stakeholder Engagement Plan (SEP) and Grievance Mechanism must be drawn up for the Holfontein Project. The main objectives of a SEP are as follows: • Identification of stakeholders / IAPs • Disclosure of planned project activities; • Identification of concerns and grievances from stakeholders; • Harnessing of local expertise and knowledge from IAPs; • Ongoing disclosure of project activities and monitoring results; and • Response to grievances and enquiries of stakeholders (via a Grievance Mechanism).	**X**	
	It is recommended that NKGM establish a Community Engagement and Security Forum (CESF) to ensure that stakeholders are notified and consulted throughout the LoM: • Ensuring that the authority and IAP contact details are updated; • Informing IAPs of the establishment of the CESF and providing them with the opportunity to join the forum, attend meetings, and receive any relevant information; • Facilitating meetings during construction and operation, taking minutes of these meetings, and distributing meeting minutes prior to the next meeting (it is recommended that these meetings be held every second month); • Distributing information relevant to community health and safety to stakeholders (including environmental monitoring data, the Emergency Preparedness and Response (EPR) Plan, Grievance Mechanism (GM), issues and concerns raised); • Maintaining communication channels throughout the life of the project; • Drafting an action plan to enable the affected communities and relevant government agencies to understand the potential safety and security impacts, and disseminating the plan to IAPs prior to construction; • Timeously communicating any changes to the proposed project, impacts and/or mitigation and monitoring methods, and ensuring that proper legal procedures will be followed; and • Maintaining an accident register and compiling accident reports (for the haul route). This accident register should be submitted to the CESF on a monthly basis.	**X**	
	In order to prevent conflict between the mine and the surrounding community, a security policy must be compiled. Keys aspects of this policy include: • Security personnel must be thoroughly vetted, to ensure that none of the individuals hired have been involved in past human rights abuses; • Roles of security personnel must be limited to protecting the work force and safeguarding physical assets; • Security personnel must be encouraged to have as little interaction with the community as possible; and • Security personnel need to be properly trained in the use of armed force and violence, as well as conduct towards community members.	**X**	Holfontein Socio-economic Management Plan (Section 4(g)(x) of the EMPr - Part B of this document)
	An In-Migration Management Plan must be developed to reduce the in-migration of job-seekers into the area, and to mitigate the negative impacts associated with this potential in-migration. The In-Migration Management Plan must encompass the following:	**X**	Holfontein Socio-economic Management Plan (Section 4(g)(x) of the EMPr - Part B of

	• Information dissemination, recruitment and supply chain transparency; • The lack of employment and formal procurement opportunities available for this particular project needs to be clearly communicated to all IAPs and general public to ensure that there is no expectation of employment or procurement; • The policy of using existing employees from ME Operations must be maintained and no exceptions made; • Contractors must be encouraged to provide transport for their employees, and / or to discourage settlement within the Holfontein area; • Contractors must apply a similar policy for employment in that no employment will be provided at the gate (at the project area); • While the need for project security is understandable, such security measures (such as fencing and/or patrols) can have further implications on the surrounding residents' safety and mobility. A mechanism needs to be implemented to allow free access to their community, while still restricting the uncontrolled influx of job seekers into the area; and • Regular engagements with the local residents of the Khomponi Community and the security personnel through workshops and meetings should build a relationship between these parties. It is recommended that this Plan be compiled in collaboration with the EMM, local authorities and residents of the area.		this document)
	NKGM personnel and contractors must be familiar with relevant environmental and social commitments within the authorised EMPr. Managers will need to be appropriately trained and familiarised with respect to the EMPr in order to possess the skills necessary to impart EMPr requirements to their subordinates. All personnel involved in the construction and operation of the project must undergo a training and awareness programme on health, safety, environmental and social requirements and obligations prior to commencing activities.	**X**	Holfontein Socio-economic Management Plan (Section 4(g)(x) of the EMPr - Part B of this document)
	Community Health and Safety training must be conducted to assist NKGM in raising awareness with the local community (Holfontein Community and Welgedacht SH) regarding project-associated risks. The objectives of the community health and safety training will be: • Raising awareness associated with all project activities; • Identification of health concerns and associated behaviour, including HIV/AIDS awareness, hygiene, related to potential sewage / chemical toilet spills; water quality and use; • Encouraging the use of safety initiatives undertaken by NKGM, including fencing and creation of a pedestrian walkway; and • Identification of dangerous / hazardous site activities, including haul roads, PCD, discharge point and pipeline, and the shafts.	**X**	Holfontein Socio-economic Management Plan (Section 4(g)(x) of the EMPr - Part B of this document)
	The Khomponi Community and Welgedacht SH will need to be monitored in order to ensure that potential socio-economic impacts associated with the Holfontein Project) are recorded and documented, which will facilitate effective mitigation and management, as per the Socio-economic Monitoring Programme.	**X**	Holfontein Socio-economic Monitoring Programme (Section 6(f) of the EMPr - Part B of this document)
	Measures recommended by the air quality specialist must be implemented.	**X**	Holfontein Air Quality Management Plan (Section 4(g)(ii) of the

			EMPr - Part B of this document)
	Measures recommended by the noise specialist must be implemented.	X	Holfontein Noise Management Plan (Section 4(g)(v) of the EMPr - Part B of this document)
	Measures recommended by the visual specialist must be implemented.	X	Holfontein Visual Management Plan (Section 4(g)(x) of the EMPr - Part B of this document)
	Measures recommended by the hydrogeology and hydrology specialists must be implemented.	X	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Measures recommended by the traffic specialist must be implemented.	X	Holfontein Traffic Management Plan (Section 4(g)(ix) of the EMPr - Part B of this document)
Soil and Land Capability	Soil must be retained in position for as long as possible, and removed immediately ahead of construction / earthworks in that area to avoid erosion.	X	Holfontein Soil Management Plan (Section 4(g)(vii) of the EMPr - Part B of this document)
	Each soil horizon should be stripped and stored/ stockpiled, under supervision, for future rehabilitation purposes.	X	
	Soil storage stockpiles should be restricted where possible to heights of less than 4-5 m and side slopes should be stabilised at a slope of 1:6.	X	
	Equipment, human and animal movement on the soil stockpiles should be limited to avoid soil damage to the soils and seed bank.	X	
	If soil is contaminated, the first management priority is to treat the pollution by means of *in situ* bioremediation. The acceptability of this option must be verified by an appropriate soils expert on a case by case basis, before it is implemented. If remediation is not possible, the contaminated soil should be excavated and removed from site, handled accordingly and discarded as potentially hazardous waste.	X	Holfontein Hydrocarbon Management Plan (Section 4(g)(xii) of the EMPr - Part B of this document)
	Periodic soil contamination assessments, entailing soil analyses for pH, EC and the metals, metalloids, hydrocarbons and anions listed in in terms of the "Soil Screening Values from GNR 331 of 2014 National Norms and Standards for the Remediation of Contaminated Land and Soil Quality" should be carried out.	X	Holfontein Soil Monitoring Programme (Section 6(g) of the EMPr - Part B of this document)
	Stormwater management measures, to attenuate stormwater volumes and decrease velocity, should be in place during vegetation clearing operations to prevent soil losses due to water erosion.	X	Holfontein Soil Management Plan (Section 4(g)(vii) of the EMPr - Part B of this document) & Holfontein Water

			Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Exposed (bare) areas should be stabilised with vegetation and/or erosion control blankets. Establishing and maintaining vegetation as a soil cover is the most common practical technique for controlling erosion on disturbed soils.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
	Erosion control of all banks, including the existing eroded drainage channels, must take place so as to reduce erosion and sedimentation.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	All areas susceptible to erosion (including roads, bare areas and drainage channels) must be monitored on a monthly basis to ensure that there is no undue soil erosion resultant from activities. If erosion is identified it must not be allowed to develop on a large scale before effecting repairs.	**X**	Holfontein Soil Monitoring Programme (Section 6(g) of the EMPr - Part B of this document) & Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Areas within the surface infrastructure area where vegetation has not been cleared should be mowed as grasses which are not for a period of three years become moribund and die off, resulting in its place being usurped by poorer grasses.	**X**	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
	A representative sampling of the stockpiled soils should be analysed prior to rehabilitation to determine the nutrient status and chemistry of the utilisable materials. As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay% and Organic Carbon.	**X**	Holfontein Soil Monitoring Programme (Section 6(g) of the EMPr - Part B of this document)
	Stockpiled soil should be used to rehabilitate disturbed sites. The utilisable soil removed during the construction phase, must be redistributed in a manner that	**X**	Holfontein Soil Management Plan

	achieves an approximate uniform stable thickness consistent with the approved post development end land use, and will attain a free draining surface profile. A minimum layer of 50 mm should be replaced over the project area to return the area to a pre-mining state.		(Section 4(g)(vii) of the EMPr - Part B of this document)
	Fertility remediation requirements should be verified at the time of rehabilitation, and informed by the results of sampling. Input from a soil specialist should be obtained regarding fertility remediation requirements, which should be adhered to prior to re-vegetation. The chemical soil composition should be ameliorated to closely match the baseline values as far as possible, particularly for pH and EC.	**X**	Holfontein Soil Management Plan (Section 4(g)(vii) of the EMPr - Part B of this document) & Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
	Rehabilitated areas should be cordoned off to limit equipment, human and animal movement on the rehabilitated areas.	**X**	Holfontein Interim Closure Plan (Appendix 20)
	Re-vegetation must be carried out according to the Closure Plan.	**X**	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document) & Holfontein Interim Closure Plan (Appendix 20)
	Monitor the recovery of vegetation annually for a period of two years following rehabilitation.	**X**	Biodiversity Monitoring Programme (Section 6(b) of the EMPr - Part B of this document) & Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document) & Holfontein Interim Closure Plan (Appendix 20)
	All areas susceptible to erosion must be monitored annually and repair and prevention measures implemented (if erosion is noted) until a closure certificate is issued.	**X**	Holfontein Soil Monitoring Programme (Section 6(g) of the EMPr - Part B of this document) & Holfontein Water

			Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Interim Closure Plan (Appendix 20)
Terrestrial Ecology	The area associated with the Holfontein shaft should be fenced to prevent vehicles and workers from impacting on natural areas immediately north west of the shaft. It is recommended that temporary construction barriers are erected to prevent construction vehicles and workers from entering areas containing natural vegetation (dry and moist grasslands).	**X**	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
	Construction materials should not be stored within areas which contain natural vegetation (and classified as medium to high sensitivity).	**X**	
	Construction materials (concrete, topsoil, tar, etc.) used to widen the road and/or construct culverts should not be spilled into the moist grasslands as this will not only pollute the immediate areas, but pollutants will be transported to sensitive areas such as the Blesbokspruit Important Bird Area downstream.	**X**	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
	Vegetation adjacent to the Carnation Road which was disturbed during any of the construction activities should be rehabilitated to prevent erosion and contamination of lower laying areas (moist grasslands).	**X**	
	The amount of treated groundwater discharged into the Holfontein Stream should be carefully controlled to ensure that sensitive areas containing *Leersia hexandra* are not flooded. In addition to this, discharge points recommended by the aquatic and wetland impact reports should be considered to minimize this impact. A discharge point to the Blesbokspruit instead of the Holfontein Stream, as recommended by the aquatic ecology and wetland specialists, has been chosen as the preferred alternative.		
	During construction (including construction of culverts and/or bridges over moist grasslands associated with the haul road), the areas containing natural vegetation (which have been classified as being of medium to high ecological sensitivity in this report), should be protected and no vehicles or workers should be allowed to enter these areas as this will disturb the natural vegetation, making the area vulnerable to infestations by alien plants already present in the vicinity.	**X**	
	All alien seedlings and saplings within the natural areas must be identified by a suitably qualified botanist or ecologist and removed as they become evident for the duration of construction and operational phase. Manual / mechanical removal is preferred to chemical control.	**X**	
	All areas which have been disturbed during the construction phase including the widening of the haul road must be rehabilitated with indigenous species to prevent alien species from colonizing these areas.	**X**	
	All vehicles must be parked in a designated area and containers should be used to prevent any oil and/or fuel leaks.	**X**	Holfontein Hydrocarbon Management Plan (Section 4(g)(xii) of the EMPr - Part B of this

			document)
	An ecologically-sound stormwater management plan must be implemented during construction and appropriate water diversion systems put in place.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Chemicals and fuel should be stored in appropriate rooms with concrete floors to prevent contamination of the surrounding environment.	**X**	Holfontein Hazardous Substances/Waste Management Plan (Section 4(g)(xiv) of the EMPr - Part B of this document)
	Any oil or fuel spillages should be dealt with immediately.	**X**	Holfontein Hydrocarbon Management Plan (Section 4(g)(xii) of the EMPr - Part B of this document)
	Rubbish bins must be made available at the Holfontein shaft, and waste should be disposed of at an official landfill site. Rubbish should be picked up on a weekly basis.	**X**	Holfontein Waste Management Plan (Section 4(g)(xiii) of the EMPr - Part B of this document)
	The development of new electrical infrastructure poses a collision risk to avifauna and volant (flying) mammals (i.e. bats). A possible high collision risk area within the Holfontein study area could be where the lines cross the Blesbokspruit as it is possible that this area is used as a flight corridor for water fowl moving to and from the Blesbokspruit IBA. Although no high risk species were observed during the ecological survey, it is recommended that that an ECO monitors the newly constructed power lines once a week (during the operational phase) to determine if there are bird collisions associated with the overhead lines. It is important to identify which bird species are affected by the collisions in the long term to ensure that wires are marked appropriately (in response to the collision data) and all the data which has been collected on bird collisions should be submitted to the Endangered Wildlife Trust and Birdlife South Africa.	**X**	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
	It is anticipated that the most significant impact from the increase in traffic volumes will be between the Holfontein shaft and Pansy Road (adjacent to the disturbed moist grassland) as well as where Carnation Road crosses the moist grasslands. The following is recommended to decrease the impact on faunal species: • Speed bumps should be constructed in the sections described above to prevent speeding that would otherwise result in increase in faunal strikes; • It is recommended that the road verges of the road between the Holfontein shaft and Pansy Road is mowed in autumn and winter. This will make the area less suitable to small prey species favoured by owls; and • Road related faunal mortalities should be recorded to identify any additional high collision risk areas. Mitigation measures recommended in this report should then also be adapted to these areas.	**X**	

	The road culverts proposed for the Holfontein Stream and Blesbokspruit crossings could impact in faunal movement. However, to encourage faunal species to use these culverts the following is recommended: • Vegetation disturbed during the construction of the culverts should be rehabilitated with indigenous, moist grassland species to ensure sufficient cover which will encourage faunal species to enter the culverts; • The Blesbokspruit crossing is likely to be a hotspot for amphibian movement and it is therefore recommended that the road is raised by at least 1m to prevent amphibians from traversing the road. To further discourage amphibian crossing, the road verges should be steeply sloped so amphibians can't climb onto the road; and • Culverts used in the Blesbokspruit should furthermore make provision for semiaquatic and terrestrial species, this can be achieved by constructing sufficient culverts on the edges of the moist grassland (which is not permanently inundated); • The Holfontein Stream crossing currently consists of steep sides, making it unlikely that amphibians will move from the moist grassland onto Carnation Road as a means of moving along the watercourse. Therefore, no barriers for faunal movement (particularly amphibians) are required. Only the Blesbokspruit crossing will be upgraded (i.e. the construction of a series of culverts) to accommodate the haul trucks travelling along the haul route. The existing Holfontein Stream crossing will not require upgrading. Therefore, the ecology in the area of the Holfontein Stream crossing will not be disturbed.	X	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document) & Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	All underpasses and/or culverts should be constructed according to GDARD's recommendations for pipelines which include the following: ○ Underpasses should be at least 1.5m high and 1.0m wide and dressed with a minimum of 10cm sand layer; ○ Underpasses should be provided with small grates in the road surface to allow light penetration into the underpass; and ○ Accumulated material should be cleared at least once annually, at the start of the rainy season. It will not be economically feasible to construct a bridge with a 1.5 m freeboard above the water level across the Blesbokspruit due to the short life of the Holfontein Project and the limited use post-mining, as the road traverses a farming area. The crossing will be upgraded as per the additional specialist recommendations to ensure a positive impact on the flow of the associated floodplain wetland.	X	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
	The Biodiversity Management Plan as recommended by the ecology specialist must be implemented.	X	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
	A qualified botanist should be consulted to assist during the rehabilitation to increase species diversity.	X	Holfontein Interim Closure Plan (Appendix 20)
	Rehabilitation should be done with indigenous shrubs and grasses species propagated from species dominating the surrounding vegetation types.	X	
	Fuel storage facilities should be removed immediately upon completion of	X	

	decommissioning phase.		
	If possible, overhead power lines should be removed during the decommissioning phase.	x	
	It is recommended that shafts are not sealed completely during the decommissioning phase but gaps of approximately 20cm² are left since shafts are often used as roosting sites by various bat species. However, if this is not possible due to health and safety regulations, alternative bat roosting sources such as bat boxes or bat houses can be constructed. It will be recommended that the shafts are sealed completely to ensure the safety of the public post-closure and as precaution to mitigate potential groundwater decant.	x	Holfontein Biodiversity Management Plan (Section 4(g)(viii) of the EMPr - Part B of this document)
Traffic	Conduct routine maintenance and prepare a road maintenance plan in conjunction with Gautrans on public roads where trucks will operate.	x	Holfontein Traffic Management Plan (Section 4(g)(ix) of the EMPr - Part B of this document)
	Detailed investigations should be conducted in conjunction with Gauteng Department of Roads and Transport (Gautrans) in terms of the existing quality and potential life span of the existing road surface layers of the route along which excavated ore, consumables and workers will be transported.	x	
	From visual inspection the tarred section of Carnation Road is failing and requires repairs/ upgrades. The extent of repairs should be determined as part of detail design phase by pavement specialist. This would be advisable to ensure that mine related traffic can transport ore and workers at all times.	x	
	The short section of gravel road along Carnation Road should be upgraded and tarred.	x	
	The road section from the railway underpass to the ME Operations should be widened to accommodate the passing of haul trucks and construction vehicles	x	
	Provide dedicated right turn lanes where heavy vehicles are expected to make turning movements.	x	
	As part of recommended upgrades, consultation would be required by detail design engineer.	x	
	To reduce the safety risks for workers along roads at intersections, it is recommended that a loading and off-loading area is constructed. Employees are to be bussed from the ME Operations during operations. This would not be feasible for the construction and operation periods only. It has been included in the EMPr stating if the case where employees will not be bussed from the ME Operations arises.	x	Holfontein Traffic Management Plan (Section 4(g)(ix) of the EMPr - Part B of this document)
	Construct speed humps along Carnation Road if required.	x	
	Proper road markings, reflective road studs (LED) and road signs should be provided and maintained at intersections under investigation as well as the proposed haulage route to ensure visibility during night time, proper visibility of intersection lane geometry and sufficient information to road users.	x	
	Provide acceleration lanes to allow heavy vehicles to gain speed and enter main traffic flow along Pansy Ave.	x	
	To reduce the safety risks for pedestrians and livestock, it is recommended that a gravel sidewalk is constructed on at least one side of the haul road.	x	
Visual Aesthetics	The extent of the areas to be disturbed should be limited in area to only that which is essential.	x	Holfontein Visual Management Plan (Section 4(g)(x) of the

			EMPr - Part B of this document)
	The dust suppression measures as per the air quality impact assessment conducted must be implemented.	X	Holfontein Air Quality Management Plan (Section 4(g)(ii) of the EMPr - Part B of this document)
	Avoid the unnecessary removal of vegetation, especially trees, where these partially or totally screen infrastructure.	X	Holfontein Visual Management Plan (Section 4(g)(x) of the EMPr - Part B of this document)
	Make use of the space between sensitive visual receptors and the mine to create a visual buffer. Existing agricultural activities on this land should be continued or these fields must be rehabilitated to a natural state using indigenous vegetation. Indigenous trees suitable for screening must be planted along the boundary. A berm and concrete wall is being recommended to act as an acoustic barrier but will also serve as a visual screen.		
	Keep vertical dimensions of tall infrastructure at minimum heights.	X	
	Keep the mine layout to the smallest possible footprint.	X	
	Signage related to the proposed development is to be discrete.	X	
	Avoid the use of highly reflective materials in construction. If this cannot be avoided reflective materials should be painted a colour to allow it blend in with the landscape as much as possible. The colour is to be carefully selected, and is to be in the dark grey, brown or green range, to minimise visibility and avoid reflectivity.	X	
	Due to the height of the proposed headgear (approximately 50 m) and ventilation shaft (approximately 30 m) it would not be possible to screen the shafts from view. To lessen the visual intrusion, camouflage should be utilised i.e. painting it a colour to allow it blend in with the landscape as much as possible. The colour is to be carefully selected, and to be in the dark grey, brown or green range, to minimise visibility and avoid reflectivity.	X	
	The associated infrastructure to be built will be partially screened by the topography and surrounding vegetation. To screen the proposed infrastructure from the adjacent residences which will have an unobstructed view, screen fencing should be utilised. A berm and concrete wall is being recommended to act as an acoustic barrier but will also serve as a visual screen.		Holfontein Visual Management Plan (Section 4(g)(x) of the EMPr - Part B of this document)
	The operations should be kept in a tidy state i.e. prevent litter, to minimise further visual impact.	X	Holfontein Waste Management Plan (Section 4(g)(xiii) of the EMPr - Part B of this document)
	Completely remove all structures during decommissioning.	X	Holfontein Interim Closure Plan (Appendix 20)
	Rehabilitate all disturbed areas, to reflect the pre-mining state or better.	X	
	Avoid unnecessary illumination, but safety/security and operational requirements may limit the extent to which this can be implemented.	X	Holfontein Visual Management Plan (Section 4(g)(x) of the EMPr - Part B of this document)
	Provide lights with cover fittings that limit lateral and upwards "light spill", and position lights to shine towards the intended areas of illumination rather than using floodlights.	X	
	Limit the heights at which lights are positioned where possible will reduce "light	X	

	spill".		
	Make use of Low Pressure Sodium lighting or other types of low impact lighting.	X	
	Low wattage bulbs can be used to further reduce the impact.	X	
	Motion sensor activated lighting may be used instead of lights that illuminate continuously.	X	
	Any complaints received regarding visual impacts should be investigated and measures implemented to address the complaint.	X	Holfontein Socio-economic Management Plan (Section 4(g)(vi) of the EMPr - Part B of this document)
Wetlands	The current low water bridge across the Blesbokspruit should be upgraded to ensure that flow within the Blesbokspruit is improved. Culverts should be spaced at regular intervals across the whole width of the wetland to ensure that there is free movement of water.	X	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	The culverts should also be designed to be deep enough to allow for interflow within the wetland soils (culverts therefore likely to be more than 2 m deep as measured from current surface water levels).		
	Culverts should also be high enough to allow enough freeboard for faunal movement (minimum 1.5 m above normal water/ground level and extend to the periphery of the wetland boundary in order to prevent faunal species from crossing over the road unnecessarily). It will not be economically feasible to construct a bridge with a 1.5 m freeboard above the water level across the Blesbokspruit due to the short life of the Holfontein Project and the limited use post-mining, as the road traverses a farming area. The crossing will be upgraded (i.e. a series of culverts constructed) with the culverts situated on either side of the crossing in the inundated portions of the moist grassland being 1.5 m above normal ground level as well as according to the additional specialist recommendations to ensure a positive impact on the flow of the associated floodplain wetland as well as aquatic fauna.	X	
	A turbidity curtain (flexible, barrier used to trap sediment in water bodies) should be installed on the downstream side of the crossing for the construction period. Construction for the Blesbokspruit should be planned for winter in order to reduce the risk of floods and excessive sedimentation.	X	
	The footprint of the haul road and associated construction activities must be kept to an absolute minimum within the direct vicinity of wetlands, e.g. crossing of the Holfontein Stream. Work procedures must be carefully planned in these areas to avoid impacts to wetland habitat, e.g. use of silt fences to control sediment.	X	Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	The design of stormwater drainage systems must ensure there is no contamination, eutrophication or increased erosion of the wetland areas: • Drainage systems and runoff from the haul road should be spaced at regular intervals within terrestrial areas as far as possible to ensure that the minimum amount of stormwater is received by wetlands directly. • Drainage systems must be maintained regularly. The construction of surface stormwater drainage systems during the construction phase must be done in a manner that would protect the quality and quantity of the downstream system (e.g. the use of swales which could then be	X	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)

	grassed for the operational phase).		
	Stormwater outflows should not enter directly into a wetland. The velocity of water that may reach wetlands should be slowed before it is intercepted by virgin soils using a siltation and erosion control structure such as attenuation swales.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	Re-vegetation of disturbed areas must be undertaken with site indigenous species. Areas where soil compaction or ruts developed should be rehabilitated.	**X**	Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	Avoid unnecessary construction activities in identified wetlands and in the direct vicinity of the wetland (i.e. within 50 m of identified wetland boundaries) at all cost through proper demarcation and appropriate environmental awareness training. These buffers must be demarcated with red tape / fencing under guidance of the ECO. The Contractor has a responsibility to inform all staff of the need to be vigilant against any practice that will have a harmful effect on wetlands habitat. This information shall form part of the Environmental Education Programme to be effected by the Contractor, including the following: • No construction shall take place in areas of high sensitivity such as wetlands or 50m buffer zone; • Any proclaimed weed or alien species that germinates during the contract period shall be cleared by hand before flowering; • Infilling, excavation, drainage, dumping of building material and hardened surfaces (including buildings and asphalt) should not occur in any of the wetland, riparian or within the 50m buffer zone as a minimum, but should preferably be done as far away as practically possible from these areas; • Imported fill material should be monitored during and after construction for the presence of any alien species. Any such species should be removed immediately; • Emergency plans and spill kits must be in place in case of pollutant spillages; • All stockpiles must be protected from erosion, stored on flat areas where runoff will be minimised, and be surrounded by bunds. It should also only be stored for the minimum amount of time necessary; • Erosion control of all banks must take place so as to reduce erosion and sedimentation into drainage channels or wetland areas; • Silt traps and culverts should be regularly maintained and cleared so as to ensure effective drainage; • Littering and contamination of water sources during construction must	**X**	Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)

	be mitigated by effective construction camp management; • All construction materials including fuels and oil should be stored in a demarcated area that is contained within a bunded impermeable surface to avoid spread of any contamination. The storage areas should be constructed as far away as practically possible outside of wetlands, riparian and buffer zones; and • Cement and plaster should only be mixed within mixing trays. Washing and cleaning of equipment should also be done within a bermed area, in order to trap any cement or plaster and avoid excessive soil erosion. These sites must be rehabilitated prior to commencing the operational phase.		
	Only good quality water (as prescribed by DWS) should be discharged into the Blesbokspruit catchment. It is recommended that a continuous water quality monitoring station be installed to monitor water quality from the treatment plant. In the event that poor quality water is detected that does not meet the prescribed DWS conditions, discharge of mine water to the Blesbokspruit catchment must be discontinued until such time as the water quality of the treated discharge can be improved.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	It is recommended that appropriate clean and dirty water separation systems (including the PCD) that would be required during the operational phase be installed at the start of the construction phase. Such an approach would ensure that most of the construction impacts from the shaft infrastructure development be effectively contained.	**X**	
	Make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas.	**X**	Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	Vegetation and soil must be retained in position for as long as possible, and removed immediately ahead of construction / earthworks in that area.	**X**	
	Runoff from roads must be managed to avoid erosion and pollution problems. Where excessive loose sediment is created, attenuation swales and / or soils screens should be installed.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	Construction vehicles are to be maintained in good working order, to reduce the probability of leakage of fuels and lubricants.	**X**	Holfontein Hydrocarbon Management Plan (Section 4(g)(xii) of the EMPr - Part B of this document)
	A walled concrete platform, dedicated store with adequate flooring or bermed area should be used to accommodate chemicals such as fuel, oil, paint, herbicide and insecticides, as appropriate, in well-ventilated areas.	**X**	Holfontein Hazardous Substances / Waste Management Plan (Section 4(g)(xiv) of the EMPr - Part B of this document)
	Storage of potentially hazardous materials should be above any 100-year flood line. These materials include fuel, oil, cement, bitumen etc. Sufficient care must be taken when handling these materials to prevent pollution.	**X**	
	Surface water draining off contaminated areas containing oil and petrol would need to be channelled towards a sump which will separate these chemicals and oils. Oil residue shall be treated with oil absorbent such as Drizit or similar and	**X**	Holfontein Hydrocarbon Management Plan (Section 4(g)(xii) of the

	this material removed to an approved waste site.		EMPr - Part B of this document)
	Concrete and tar shall only be mixed on mixing trays and in areas which have been specially demarcated for this purpose. All concrete and tar that is spilled outside these areas shall be promptly removed by the Contractor and taken to an approved dumpsite. After all the concrete / tar mixing is complete all waste concrete / tar shall be removed from the batching area and disposed of at an approved dumpsite. Stormwater shall not be allowed to flow through the batching area. Cement sediment shall be removed from time to time and disposed of in a manner as instructed by the Consulting Engineer.	**X**	Holfontein Hazardous Substances / Waste Management Plan (Section 4(g)(xiv) of the EMPr - Part B of this document)
	All construction materials liable to spillage are to be stored in appropriate structures with impermeable flooring.	**X**	
	Portable septic toilets are to be provided and maintained for construction crews. Maintenance must include their removal without sewage spillage. Portable septic toilets are to be located outside of the 1:100 year floodline. Under no circumstances may ablutions occur outside of the provided facilities.	**X**	
	No uncontrolled discharges from the construction crew camps to any surface water resources shall be permitted. Any discharge points need to be approved by the relevant authority (DWS).	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	It is recommended that a continuous water quality monitoring station be installed to monitor water quality from the treatment plant.	**X**	
	In the case of pollution of any surface or groundwater, the Regional Representative of the DWS must be informed immediately.	**X**	
	Where construction in proximity to sewer lines is unavoidable then excavations must be done by hand while at all times ensuring that the soil beneath the sewer lines is not destabilised.	**X**	Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	Store all litter carefully so it cannot be washed or blown into any of the water courses within the study area. Provide bins for construction workers and staff at appropriate locations, particularly where food is consumed. The construction site should be cleaned daily and litter removed. Conduct ongoing staff awareness programs so as to reinforce the need to avoid littering.	**X**	Holfontein Waste Management Plan (Section 4(g)(xiii) of the EMPr - Part B of this document)
	An alternative discharge point situated on the Blesbokspruit is recommended as to prevent potential negative impacts on the Holfontein Stream. The suggested alternative discharge point could be incorporated into the proposed culverts for the haul road crossing of the Blesbokspruit where it is likely to have minimal erosional potential if discharge is spread across several culverts (across the width of the Blesbokspruit crossing). A discharge point to the Blesbokspruit instead of the Holfontein Stream, as recommended by the aquatic ecology and wetland specialists, has been chosen as the preferred alternative. Based on the recommendations of the hydrology specialist a point further downstream in the Blesbokspruit (rather than at the crossing as suggested by the wetland specialist) has been chosen to prevent flooding and water quality impacts.	**X**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document)
	An ecologically-sensitive stormwater management plan should be developed in conjunction with the design team that does not allow concentrated stormwater (clean water from catchment redirected around shaft infrastructure as well as	**X**	

	clean water released from the shaft area e.g. sewerage treatment plant) to enter into a wetland or watercourse directly, but instead makes use of flow diffusers and retention and attenuation areas (such as artificial wetland areas, attenuation swales/ponds, retention areas, baffles and gabion structures)		
	Final designs for the stormwater infrastructure, clean and dirty water separation, mine water discharge points layout, rehabilitation and monitoring plans for the development are to be completed by the development design team in collaboration with a suitably-qualified wetland specialist so as to ensure persistence of wetland functioning in the larger study area. The designs are currently underway and the recommendations of the wetland specialist have been taken into account.		
	The design of the attenuation, soil profile rewetting and diffuse infrastructure should take place in conjunction with a wetland specialist: • Compacted infill material, historically placed between the wetland and the shaft area should be removed and soil profiles rewetted in order to increase hydrological support and interflow to the seepage wetlands (HGM 2). • One way of rewetting soil profiles is through designing and implementation of diffuse release channels that are placed on contour well above the seepage wetland habitat. • Clean water from attenuation and clean and dirty-water separation facilities could be released into the diffuse release contour channels and or the size of the diffuse release contour channels could be increased to serve as combined attenuation and diffuse release infrastructure. • It is cardinal that the diffuse release channels are constructed exactly on contour as to spread the water evenly along the whole length of the infiltration channel.	**x**	Holfontein Water Management Plan (Section 4(g)(iv) of the EMPr - Part B of this document) & Holfontein Wetland Management Plan (Section 4(g)(xi) of the EMPr - Part B of this document)
	Appropriate rehabilitation (including reshaping to natural ground level and re-vegetation with indigenous species) of surface infrastructure to take place during the decommissioning phase.	**x**	Holfontein Interim Closure Plan (Appendix 20)
	A comprehensive wetland monitoring program which focuses on wetland habitat in the vicinity of the shaft infrastructure, the Holfontein Stream crossing as well as the Blesbokspruit crossing and downstream environment potentially influenced by proposed discharge should be designed by a suitably qualified wetland specialist following the finalisation of construction and rehabilitation plans, and initiated prior to the start of the construction phase. The existing Holfontein Stream crossing will not require upgrading. Therefore, the wetlands in the area of the Holfontein Stream crossing will not be disturbed.	**x**	Wetland Monitoring Programme (Section 6(h)of the EMPr - Part B of this document)
	Further, the ECO should be briefed by a wetland specialist on specific monitoring issues during the construction phase. Appropriate mitigation needs to be implemented after consultation with relevant specialist should any problems or issues be identified.	**x**	

i) Environmental impact statement

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

All the potential impacts identified, for each phase of the LoM, with a significance rating of medium (significance value ≥ 31) or above after the implementation of mitigation measures, as detailed in the EMPr (Section 4(g) - Part B of this document), were considered key and are discussed below.

Air Quality

During the operational phase particulate emissions (i.e. $PM_{2.5}$, PM_{10} and TSP) will be generated from ore hoisting and loading, vehicle entrainment from hauling and employee transportation on unpaved roads, and wind erosion from the topsoil stockpile/s. The modelled average daily PM_{10} concentrations indicate exceedances in the NAAQS limit value for residential areas (75 $\mu g/m^3$) at the historic mine house and associated informal dwellings. It must also be noted that the fine particulates generated from ore handling activities will also contain a metal fraction likely comprising of uranium and arsenic, which may increase the potential health risk. Therefore, potential health impacts from PM_{10} emissions generated from operational activities may arise if effective mitigation measures (such as dust suppression) are not implemented.

Paving of a section of Carnation Road (the currently unpaved section) will result in a positive impact on the surrounding air quality by reducing dust generation from vehicle entrainment throughout the LoM and beyond (a positive residual impact on ambient air quality).

Hydrology

Dewatering of the Holfontein shaft will take place during the construction phase to allow for refurbishment of the shaft. It will be necessary to treat the underground water in a water treatment plant prior to discharge, to meet with the water quality requirements of DWS (to be determined). Discharge of ineffectively treated water will pollute the Blesbokspruit catchment. It is essential that the water treatment plant is commissioning and installed during construction, so that all water to be discharged from the shaft can be treated. The potential impact can be mitigated monitoring discharge water quality continuously, and ensuring that the treatment plant is always operating optimally. The mine has further put in place an emergency facility for the containment of water should the treatment plant or pipeline not be functioning correctly.

Socio-economic

The potential influx of job seekers into the region and the resultant indirect impacts of overcrowding within the Khomponi Community will lead to pressure on existing infrastructure and services (specifically water and sanitation), and an associated increase in social ills, and decreased quality of life. The establishment of tuck shops and canteens in the Holfontein project area will likely occur in order to supply mine employees and new residents with food and drink. These impacts are expected to be residual, as they will not necessarily cease once the LoM has ended and the mine has been closed. The in-migration of job seekers will most likely lead to permanent occupation. These impacts cannot be mitigated. However, measures can be implemented to in order to prevent the exacerbation of these impacts.

Traffic and road safety issues are a concern. Children and dogs were noted alongside Holfontein Road, which runs into the Khomponi Community. Children also walk along Holfontein Road to Pansy Avenue in order to catch the school bus. Although the proposed haul road will be routed around the community, the additional heavy vehicle traffic on Holfontein Road is likely to result in increased pedestrian and domestic animal accidents and mortality. These potential impacts can be mitigated by implementing road safety measures such as speed reduction and construction of a pedestrian walkway.

The increased noise and traffic as well as a change in the visual landscape is are likely to alter the current living space of the Khomponi Community dramatically. Their quality of life and sense of place may be altered as a result of the close proximity to the proposed project. This impact is expected to be a residual impact. Specific impacts from noise and traffic can be mitigated to some extent.

Soil and Land Capability

Excessive stormwater runoff from cleared areas, and constructed hard-standing areas and roads, may accentuate the problem of erosion during the construction and operation phases. The potential impact can be managed by monitoring erosion and managing stormwater runoff and during rehabilitation when the cleared areas are re-vegetated. Stockpiled soil is at risk from wind and water erosion throughout the LoM. This can be mitigated through adequate management of stormwater runoff and by putting erosion prevention measures in place.

Sealing of the ventilation shaft will result in the permanent loss of 50 m^2 of the low agricultural potential land in this area.

Terrestrial Ecology

The unsuccessful rehabilitation of disturbed and denuded areas can lead to a decrease in biodiversity, as a result of erosion and invasion by alien species into the nearby dry and moist grasslands supporting indigenous species, including species of conservation concern. The potential impact is reversible if erosion is repaired timeously and the alien invasive plant species are eradicated prior to becoming established.

The successful rehabilitation of the Holfontein shaft area will have a positive impact on biodiversity.

Traffic

Mine vehicles on and making right-turn movements onto / off Pansy Avenue may reduce road traffic safety. The potential impact can be mitigated by providing dedicated right-turn lanes and acceleration lanes at suitable sections of the haul route.

Visual Aesthetics

The mine infrastructure, specifically the headgear at the shaft and ventilation shaft, will result in visual intrusion on the landscape character for the LoM. The potential impact can only be mitigated to a limited degree by using camouflaging and non-reflective materials and by screening techniques. The infrastructure and therefore the impact will be removed at decommissioning.

Wetlands

Upgrading of the existing Blesbokspruit crossing will result in a positive impact on the wetland associated with the Blesbokspruit, as it will result in a more natural flow regime for the floodplain wetland. The positive impact will be residual as the upgraded culvert is to remain post-closure.

ii) Final Site Map **(Provide a map at an appropriate scale which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers)**

Refer to Figure 63 below for a composite map which superimposes the proposed overall activity and its associated structures and infrastructure on the environmental sensitivities.

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

A summary of the positive and negative impacts of the proposed Holfontein Project is provided under Section 11. A summary of the positive and negative impacts of the alternative considered during the EIA phase (alternative discharge point) is provided under Section 11(b).

j) Proposed impact management objectives and the impact management outcomes for inclusion in the EMPr **(Based on the assessment and where applicable the recommendations from specialist reports, the recording of proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation)**

Refer to Section 4(f) of the EMPr (Part B of this document) for the proposed impact management objectives and the impact management outcomes.

k) Final proposed alternatives **(Provide an explanation for the final layout of the infrastructure and activities on the overall site as shown on the final site map together with the reasons why they are the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment)**

Specialists assessed the potential impacts of the preferred final layout and from the findings of the assessments further alternatives assessed during the EIA phase included discharge point alternatives for the treated water. The findings indicated that the preferred final layout with the preferred discharge point alternative would not result in any fatal flaws in terms of environmental and socio-economic impacts if the recommended mitigation measures (refer to Section 4(g) of the EMPr Part B) are implemented.

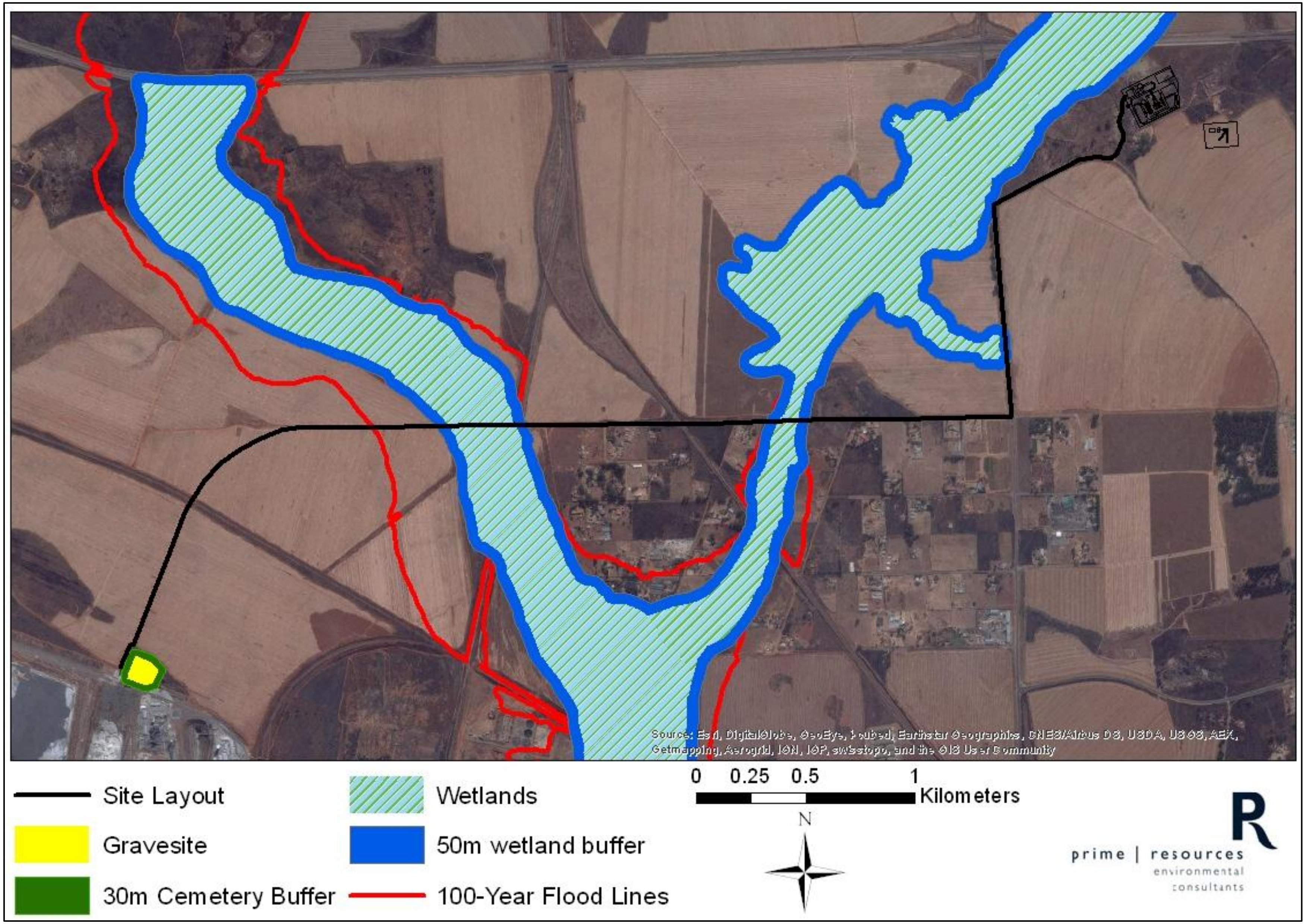

Figure 63: Composite map indicating the buffer zones recommended by the various specialists

l) Aspects for inclusion as conditions of Authorisation (Any aspects which have not formed part of the EMPr that must be made conditions of the Environmental Authorisation)

None, as all the relevant aspects have been included as commitments as per this EMPr (Part B of this document) in terms of mitigation (detailed in Section 4(g)), monitoring (detailed in Section 6); as well as within the Holfontein Interim Closure Plan (Appendix 20).

12. DESCRIPTION OF ANY ASSUMPTIONS, UNCERTAINTIES AND GAPS IN KNOWLEDGE (Which relate to the assessment and mitigation measures proposed)

Air Quality Impact Assessment

- The air quality impact assessment was informed by atmospheric dispersion modelling, which is based on various assumptions. Air quality (dust fallout) monitoring must be conducted at the sensitive receptors identified throughout the LoM to validate the results of the atmospheric dispersion modelling and enable management measures to be taken where warranted.
- Site specific information was not available for the metal content of the ore. The metal fraction of dust to be generated from ore handling activities could therefore not be estimated to inform the air quality impact assessment. The precautionary principle was therefore applied and the impact of fine particles from ore handling activities were given a high significance rating as the metal fraction may result in an increase in potential health risks.

Noise Impact Assessment

- The noise impact assessment was informed by the results of a modelling exercise, based on various assumptions. Noise monitoring must be conducted at the sensitive receptors identified throughout the LoM to detect deviations from predicted noise levels and enable corrective measures to be taken where warranted.

Hydrogeology Impact Assessment

- The hydrogeology impact assessment was informed by a geochemical modelling exercise, based on various assumptions. It is recommended that the geochemical model be updated during the LoM in order to calibrate and validate the results of the hydrogeology impact assessment.

Hydrology Impact Assessment

- The collection of water samples from the Holfontein Stream for water quality analysis coincided with a particularly "dry" rainy season. Therefore it is likely that the flow in the stream was lower than what it might have been in an average rainy season. Water quality monitoring before, during and after mining is therefore essential. There was further no flow downstream in the Holfontein Stream, and during a "normal" rainy season, the flow in the stream could be greater.
- It is assumed that the water level will stabilise at the same elevation as it was prior to re-commissioning of the mine (i.e. as it is at present).

Terrestrial Ecology Impact Assessment

- In order to obtain a comprehensive understanding of the dynamics of the fauna and flora on the site, studies should include investigations through different seasons, over a number of years and should include extensive sampling. Due to project time constraints, such long term research was not feasible, and impacts described in the terrestrial ecology impact assessment were based on a two day field survey conducted in March 2015.

Traffic Impact Assessment

- It was assumed that the anticipated average rate of growth in through-traffic along relevant roads under investigation is 3 % per annum between 2015 and 2025 (main and secondary road background traffic growth without the proposed Project) and that the absorption rate by all other types of completed development will maintain the same status for the next ten years.

Socio-economic Impact Assessment

- The 2011 South African Census is the most current source of official statistics and has been used to generate a baseline profile of the EMM. This data may now be out of date and no longer accurately reflect the current socio-economic profile.
- The data and information collected through the questionnaire and interview process was undertaken by verbal consultation with community members and stakeholders. Some misinterpretation may have occurred as a result of language differences and translation inaccuracies. Similarly, verbal consultation may have resulted in personal bias from the interviewer or interviewee. It was later found that the questionnaires were not as valuable as general discussions with various community members, which provided more useful information.
- As completion of the questionnaire was not obligatory, only six completed questionnaires were received back from the Welgedacht SH community, and these were used to describe the relevant baseline characteristics.

Soil and Land Capability Assessment

- Soil mapping was inferred from extrapolations from the observation points and available soil maps. The boundaries between the mapped soils are not sharp but rather gradual in reality.
- Agricultural potential was classified on the basis of non-irrigated agriculture.
- Soils classified as suitable for arable agriculture could also be suited to other less intensive agricultural land uses, such as pastures, natural grazing, and wildlife.

Visual Impact Assessment

- Visual perception is a subjective experience, as it is influenced largely by personal values. A degree of subjectivity is therefore bound to influence the rating of visual impacts. In order to limit such subjectivity, a combination of quantitative and qualitative assessment methods was used in the visual impact assessment.

Wetland Impact Assessment

- In order to obtain definitive data regarding the biodiversity, hydrology and functioning of particular wetlands, studies should ideally be conducted over a number of seasons and over a number of years. The wetland study relied on information gained during a three day field survey conducted during a single season, desktop information for the area, and professional judgement and experience.

- Soil form classification was made by a wetland ecologist and not a specialised soil scientist, which could potentially result in different interpretations of diagnostic horizons. Further, delineations of wetland areas were largely dependent on the extrapolation of field indicator data obtained during field surveys and from interpretation of geo-referenced orthophotos and other imagery. As such, inherent orthorectification errors associated with data capture and transfer to electronic format are likely to decrease the accuracy of wetland boundaries in many instances. The delineations conducted do provide a high confidence with respect to the identification and location of valley bottom wetlands. Although hillslope seepage wetlands were ground-truthed in several areas, the extent and variability of these wetlands would potentially render delineations of the seepages potentially less accurate in some instances, particularly within areas of current cultivation.

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

a) Reasons why the activity should be authorized or not

The findings of the EIA indicated that the preferred final layout with the preferred discharge point alternative would not result in any fatal flaws in terms of environmental and socio-economic impacts, if the recommended mitigation measures (Section 4(g) of the EMPr Part B of this document) are implemented.

b) Conditions that must be included in the authorisation

- Provision must be made for the management of all existing impacts at the ME operations that will be extended by the Holfontein Project (e.g. air emissions from processing plant) prior to the commencement of construction.
- Lease agreement between the Applicant and Landowner, of the RE (location of majority of surface infrastructure) and Ptn 68 (location of the ventilation shaft) of Holfontein 71 IR, is to be finalised prior to the commencement of construction.
- Permission / agreement must be obtained / reached from the relevant landowners of Ptns 22 and 82 of Welgedacht 74 IR for the upgrade and/or widening of a portion of the haul route in proximity to the ME Operations, and for the construction of flow diffusers at the discharge point, respectively.
- Relocation permits for any plant species of conservation concern to be impacted and demarcation permits for alien invasive species which are to remain on site (i.e. the blue gum trees) are to be obtained prior to the commencement of construction activities.
- At the commencement of construction, prior to clearing activities, a qualified botanist is to be commissioned to identify and relocate plant species of conservation concern which may be impacted.
- The culvert design for the crossing of the Blesbokspruit must be subjected to review by a qualified wetland ecologist.
- The cumulative impact of the Holfontein Main Reef ore on the on the Tailings Storage Facility at ME Operations is to be investigated prior to the commencement of construction for the Holfontein Project.
- The commitments as per this EMPr (Part B) in terms of mitigation (detailed in Section 4(g)) as well as monitoring (detailed in Section 6) must be adhered to.

- The operating hours as detailed in the project description in Part A (Section 5) must be abided by.
- Rehabilitation and closure must be undertaken as per the Holfontein Interim Closure Plan (attached as Appendix 20) and as agreed with the Competent Authority (DMR), as per the Environmental Authorisation.

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

All recommended measures have been included as commitments in this EMPr (Part B) which must be adhered to.

d) Rehabilitation requirements

Rehabilitation requirements have been provided for in the Holfontein Interim Closure Plan (attached as Appendix 20) which must be adhered to.

e) Period for which the Environmental Authorisation is required

The period for which authorisation is required will be from the year 2016 to the year 2029. The period of authorisation allows for a longer LoM than discussed elsewhere in the documentation. This is to allow for the potential earlier commencement of construction, as determined by environmental authorisation and economic feasibility studies. IAPs will be notified of any potential earlier construction dates, and all pre-construction mitigation measures will be implemented regardless of the commencement date. Construction is however currently foreseen to commence in 2019 as per the Mine Work Programme.

14. UNDERTAKING (Confirm that the undertaking required to meet the requirements of this section is provided at the end of the EMPr and is applicable to both the Environmental Impact Assessment report and the Environmental Management Programme report)

The undertaking at the end of the EMPr (Part B, Section 9) is applicable to both the Environmental Impact Assessment report (this section, Part A) and the Environmental Management Programme report (Part B).

F) FINANCIAL PROVISION (State the amount that is required to both manage and rehabilitate the environment in respect of rehabilitation)

As per Regulation 6(3) of the NEMA Regulations on Financial Provision (GN940 of 2014) the sum and calculations of the financial provision have been included in the EMPr (Part B - 5(a)(v)).

The financial provision for the proposed activities at Holfontein has been calculated to be R 2 744 034.85 **should rehabilitation activities be undertaken by the Applicant (Year 1 - 2019)**. Should the Mine be faced with unforeseen closure the financial provision required by the DMR was calculated to be R 3 816 404.00.

a) Explain how the aforesaid amount was derived

The amount required for rehabilitation was calculated using the DMR Guideline for Calculation of the Quantum for Closure Related Financial Provision. Refer to Section 5(a)(v) in the EMPr -Part B of this document.

b) Confirm that this amount can be provided for from operating expenditure **(Confirm that the amount, is anticipated to be an operating cost and is provided for as such in the Mining work programme, Financial and Technical Competence Report or Prospecting Work Programme as the case may be)**

NKGM currently have financial guarantees in place with the DMR for the existing ME operations, as per the requirements of Section 53 of the MPRDA. Quantum for Closure-Related Financial Provision for the Holfontein Project will be included in NKGM's overall Financial Provision. It is anticipated that the additional Financial Provision for Holfontein Project will be added to the current Financial Provision for ME Operations.

15. DEVIATIONS FROM THE APPROVED SCOPING REPORT AND PLAN OF STUDY

a) Deviations from the methodology used in determining the significance of potential environmental impacts and risks **(Provide a list of activities in respect of which the approved scoping report was deviated from, the reference in this report identifying where the deviation was made, and a brief description of the extent of the deviation)**

There has been no deviation from the methodology used in determining the significance of potential environmental impacts and risks or the plan of study as detailed in the Scoping Report.

In terms of activities, the deviation from the activities in the Scoping Report is that the discharge point has been relocated from the Holfontein Stream to the Blesbokspruit as it was identified as having fewer potential environmental and socio-economic impacts.

b) Motivation for the deviation

The alternative discharge points were considered based on the findings of the wetland and aquatic ecology specialist impact assessments. These specialist studies found that the impact on the hydrology of the Holfontein Stream due to the discharge would result in the significant loss of aquatic habitat and aquatic vegetation species, which could not be adequately mitigated, whereas discharge to the Blesbokspruit would result in an impact with a low significance rating.

16. OTHER INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

a) Compliance with the provisions of sections 24(4)(a) and (b) read with section 24 (3) (a) and (7) of the National Environmental Management Act (Act 107 of 1998). the EIA report must include the:-

b) Impact on the socio-economic conditions of any directly affected person **(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any directly affected person including the landowner, lawful occupier, or, where applicable, potential beneficiaries of any land restitution claim, attach the investigation report as an appendix and confirm that the applicable mitigation is reflected herein)**

Directly affected persons include

- Current employees of the Modder East Operations;

- Mr Leslie Toby Berman, the landowner of the two relevant properties (RE of Holfontein 71 IR and Ptn 68 of Holfontein 71 IR) where the listed activities are to take place;
- AH Du Plessis Landgoed (Pty) Ltd, the landowner of Ptn 22 of Welgedacht 74 IR on which a portion of the haul route in proximity to the ME Operations is to be constructed and/or widened;
- East Rand Water Care Company, the landowner of Ptn 82 of Welgedacht 74 IR on which the flow diffusers and discharge point will be located;
- The Khomponi community, currently residing in the historical mine buildings and informal structures nearby; and
- The residents of the Welgedacht SH, particularly those living adjacent to the haul route and along the Holfontein Stream.

The socio-economic study (Appendix 13) identifies the impacts on the socio-economic conditions of directly affected persons. The study provides more detail and attaches a likelihood and significance value to each of these impacts.

- The positive impact of continued employment for ME Operations employees;
- Migration of job seekers into the project area and the resultant potential impacts:
    - Pressure on existing infrastructure and services;
    - Social ills and decreased quality of life; and
    - Establishment of tuck shops and canteens in the Holfontein project area, which has the potential to attract additional people in search of income-generating activities..
- Decrease in air quality as a result of dust and potential nuisance impacts, health impacts and impact on crop growth;
- Increase in ambient noise levels and the resultant potential nuisance impacts;
- Proposed infrastructure will result in visual intrusion on the landscape character;
- Extensive lighting used at night may be a nuisance to surrounding residents;
- Potential impact on groundwater users due to dewatering resulting in decreased levels in surrounding boreholes;
- Increased danger to pedestrians and livestock as a result of additional vehicles on the haul route;
- Decrease in land capability as a result of ineffective on-site management and rehabilitation; and
- Loss of sense of place due to overcrowding, increased noise and traffic, and a change in the visual landscape.

Refer to Section 11 for the detailed socio-economic impact assessment.

c) Impact on any national estate referred to in section 3(2) of the National Heritage Resources Act **(Provide the results of Investigation, assessment, and evaluation of the impact of the mining, bulk sampling or alluvial diamond prospecting on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) with the exception of the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act, attach the investigation report as an appendix and confirm that the applicable mitigation is reflected herein)**

A baseline cultural and heritage study was conducted by Apelser Archaeological Consulting in April 2015 (attached as Appendix 8). A number of sites and features were identified in the project area, all relating to historical gold mining at Holfontein. The features within the project area (i.e. shaft-related infrastructure) have been identified as not being of significance from a cultural heritage point of view and can therefore be demolished.

The study identified a site located adjacent to the project site, an old house, which possibly dates to the 1940s. The study states that the structure is in a relatively good state of preservation, and that an architectural historian must be consulted to undertake a detailed study of this structure if the structure was to be impacted by the project. It must be noted however that this historical mine house is currently inhabited. Further, the access road that was proposed to pass near this house has been re-routed so that the house will not be directly impacted by the project.

Alongside the proposed haul road, in proximity to the ME operations, is a cemetery that contains historical and modern graves. It is situated approximately 30 m away from the haul road, and any road expansion and truck activity could possibly impact on the cemetery. The cemetery was identified during 2006 by the Mine who indicated their willingness to keep the cemetery intact and to preserve it while still allowing access to descendants. As graves have a high significance rating from a cultural heritage point of view it is recommended that the site continue to be preserved and that a 30 m buffer be maintained between the proposed haul road and the boundary fence of the cemetery. This mitigation measure has been included in the EMPr (this document, Section 4(g)(iii)).

d) Other matters required in terms of sections 24(4)(a) and (b) of the Act (the EAP managing the application must provide the competent authority with detailed, written proof of an investigation as required by section 24(4)(b)(i) of the Act and motivation if no reasonable or feasible alternatives, as contemplated in sub-regulation 22(2)(h), exist. - the EAP must attach such motivation as an appendix)

Site, layout, technological and operational alternatives have been assessed for the project during the Scoping Phase, and further alternatives have been assessed as part of the EIA phase, as required by section 24(4)(b)(i) (refer to Section 11(b) of the EIA - Part A of this document). The preferred final layout was determined to have the fewest potential impacts (refer to Figure 2). Should further alternatives be identified during the EIA phase stakeholder engagement process, these will be assessed before finalising the site layout.

This EIAR addresses the following requirements in terms of sections 24(4)(a) and (b) of the Act:

SECTION OF NEMA	CONTENTS	DESCRIPTION OF HOW THE ASPECT HAS BEEN ADDRESSED
Section 24(4)(a)		
24(4)(a)	Procedures for the investigation, assessment and communication of the potential consequences or impacts of activities on the environment – must ensure, with respect to every application for an environmental authorisation—	Refer to Section 11(a) for the methodology used for the assessment of impacts.
24(4)(a)(i)	Coordination and cooperation between organs of state in the consideration of assessments where an activity falls under the jurisdiction of more than one organ of state;	The Scoping Report and EIAR were made available to all the relevant organs of state: EMM as the municipality; DAFF as the authority for agricultural land and

SECTION OF NEMA	CONTENTS	DESCRIPTION OF HOW THE ASPECT HAS BEEN ADDRESSED
		flora; Transnet as the authority for the existing rail infrastructure; Eskom as the authority for existing electricity infrastructure; DWS for the activities requiring a WUL; GDARD as the authority regarding environmental matters; SAHRA as the authority regarding cultural heritage matters; Gauteng DRT as the authority regarding road infrastructure; DRDLR as the authority regarding land affairs; and COGTA as the authority regarding traditional affairs - for comment during the stakeholder engagement processes. The DMR remains the Competent Authority.
24(4)(a)(ii)	That the findings and recommendations flowing from an investigation, the general objectives of integrated environmental management laid down in this Act and the principles of environmental management set out in section 2 are taken into account in any decision made by an organ of state in relation to any proposed policy, programme, process, plan or project;	The findings and recommendations of specialist investigations, and general objectives and the principles of environmental management are addressed in Section 4(f) of the EMPr - Part B of this document.
24(4)(a)(iii)	That a description of the environment likely to be significantly affected by the proposed activity is contained in such application;	Refer to Section 10 for a detailed description of the baseline environment likely to be affected by the project.
24(4)(a)(iv)	Investigation of the potential consequences for or impacts on the environment of the activity and assessment of the significance of those potential consequences or impacts; and	Refer to Section 11 for the assessment of potential impacts.
24(4)(a)(v)	Public information and participation procedures which provide all interested and affected parties, including all organs of state in all spheres of government that may have jurisdiction over any aspect of the activity, with a reasonable opportunity to participate in those information and participation procedures; and	Refer to Section 9 which details the scoping phase and EIA phase stakeholder engagement processes followed.
24(4)(A)	Where environmental impact assessment has been identified as the environmental instrument to be utilised in informing an application for environmental authorisation, subsection (4)(b) is applicable	Environmental impact assessment has been identified as the environmental instrument therefore (4)(b) is applicable.
Section 24(4)(b)		
24(4)(b)	Must include, with respect to every application for an environmental authorisation and where applicable—	
24(4)(b)(i)	Investigation of the potential consequences or impacts of the alternatives to the activity on the environment and assessment of the significance of those potential consequences or impacts, including the option of not implementing the activity;	Alternatives have been investigated and assessed for the project thus far, including the option of not implementing the activity. The final layout was assessed during the EIA phase and, based on the outcome, recommendations made in

SECTION OF NEMA	CONTENTS	DESCRIPTION OF HOW THE ASPECT HAS BEEN ADDRESSED
		terms of further layout and technological alternatives which may be required. Refer to Section 11(b).
24(4)(b)(ii)	Investigation of mitigation measures to keep adverse consequences or impacts to a minimum;	Mitigation measures for potential have been identified. Refer to Section 4(g) of the EMPr - Part B of this document.
24(4)(b)(iii)	Investigation, assessment and evaluation of the impact of any proposed listed or specified activity on any national estate referred to in section 3(2) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999), excluding the national estate contemplated in section 3(2)(i)(vi) and (vii) of that Act;	Heritage considerations formed part of this environmental process. The National Heritage Resources Act has been taken into account, and a heritage assessment has been undertaken. Refer to Section 10(a)(iv) and Section 11.
24(4)(b)(iv)	Reporting on gaps in knowledge, the adequacy of predictive methods and underlying assumptions, and uncertainties encountered in compiling the required information;	These have already been addressed in the specialist baseline studies conducted (refer to various appendices). Also refer to Section 12
24(4)(b)(v)	Investigation and formulation of arrangements for the monitoring and management of consequences for or impacts on the environment, and the assessment of the effectiveness of such arrangements after their implementation;	Management and monitoring measures have been specified in Section 4(g) and Section 6 of the EMPr - Part B of this document. Implementation and suitability of the EMPr will be audited every second year as required by Regulation 54 of the MPRDA and audited as per the Environmental Authorisation in terms of Regulation 34 of the NEMA EIA Regulations (GNR982 of 2014).
24(4)(b)(vi)	Consideration of environmental attributes identified in the compilation of information and maps contemplated in subsection (3); and	Refer to Section 10 for maps indicating geographical areas, including the sensitivity, extent, interrelationship and significance of such attributes informed by maps compiled by relevant departments.
24(3)	The Minister, or an MEC with the concurrence of the Minister, may compile information and maps that specify the attributes of the environment in particular geographical areas, including the sensitivity, extent, interrelationship and significance of such attributes which must be taken into account by every competent authority.	
24(4)(b)(vii)	Provision for the adherence to requirements that are prescribed in a specific environmental management Act relevant to the listed or specified activity in question.	Listed activities for the Holfontein Project have been identified. Refer to Section 5(a). Environmental impact assessment has been identified as the environmental instrument in terms of NEMA. No AEL is required as per NEMAQA. No WML is required as per NEMWA. Permits from DAFF will be required as per NEMBA. The area does not fall within a protected area as per NEMPAA.

PART B

ENVIRONMENTAL MANAGEMENT PROGRAMME REPORT

1. DETAILS OF THE EAP (Confirm that the requirement for the provision of the details and expertise of the EAP are already included in PART A herein as required)

The details of the EAP are provided in Part A, Section 3.

2. DESCRIPTION OF THE ASPECTS OF THE ACTIVITY (Confirm that the requirement to describe the aspects of the activity that are covered by the environmental management programme is already included in PART A herein as required)

The aspects of the activity covered by the EMPr are detailed in Part A, Section 5.

3. COMPOSITE MAP (Provide a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers)

Refer to Figure 63.

4. DESCRIPTION OF IMPACT MANAGEMENT OBJECTIVES INCLUDING MANAGEMENT STATEMENTS

a) Determination of closure objectives (ensure that the closure objectives are informed by the type of environment described herein)

The main objective will be to return the area to the present or better state (i.e. aligned to the baseline environment described herein).

Further objectives include:

- Ensure adherence to local, provincial and national regulatory requirements;
- Develop a landform that is free draining, established (in terms of re-vegetation) and aesthetically acceptable (inconspicuous in relation to the existing landscape);
- Ensure that the ecological sensitivity is returned to the present (or improved) state (i.e. low ecological sensitivity natural land at the Holfontein shaft and haul road areas and low ecological sensitivity transformed agricultural land at the ventilation shaft area);
- Ensure that the agricultural potential is returned to the present (or improved) potential (i.e. wilderness potential at the Holfontein shaft area, low agricultural potential for the ventilation shaft area and medium agricultural potential for the haul road to be constructed and widened in the proximity of ME Operations) and that the land is acceptable for the end land use in line with planning objectives (i.e. agriculture and urban development) and as agreed with authorities and all parties concerned; and
- Ensure that community safety is not adversely impacted (i.e. the area is stable and that shafts are sealed effectively).

The Holfontein Interim Closure Plan (Appendix 20) provides specific goals for each of the above-mentioned aspects to achieve the main closure objective for the proposed Holfontein project.

b) The process for managing any environmental damage, pollution, pumping and treatment of extraneous water or ecological degradation as a result of undertaking a listed activity

Management of impacts as a result of undertaking a listed activity will be as per the measures detailed in the EMPR (this document) in Section 0 below.

c) Potential risk of acid mine drainage (Indicate whether or not the mining can result in acid mine drainage)

Water from the overlying aquifers will flow into the mine at 3 to 4 Mℓ/d during the operational phase. Oxygen is present in the mine and partial oxidation of sulphide rock will occur. After closure the mine is expected to flood in approximately 5 to 15 years, depending on the rate of fissure water inflows into the underground workings. It is unlikely that the underground water quality will acidify. Concentrations of sulphate (SO_4) will however increase over time, from 500 mg/ℓ to 1 500 mg/ℓ after 2 years, and to 2 000 mg/ℓ after 7 years. During the flooding phase, water will accumulate in the deepest sections of the mine, where SO_4 concentrations will vary from 400 mg/ℓ to 1 200 mg/ℓ.

After flooding, no more oxygen will be present in the mine voids; i.e. no available oxygen for acid mine drainage generation. Inflowing water will dilute and replace the mine water and SO_4 concentrations will decrease significantly. It is anticipated that after 20 to 30 years, the concentration of SO_4 in the mine water quality will be only slightly higher than that of the inflowing water.

Importantly, this contamination will be limited to the extent of the mined out areas only.

i) Steps taken to investigate, assess, and evaluate the impact of acid mine drainage

A geochemical modelling exercise was conducted to estimate the mine water quality of the underground operation. Samples of the lithology were obtained to inform the geochemical modelling exercise. Refer to the groundwater impact assessment study for full details of the modelling exercise (refer to Appendix 10).

ii) Engineering or mine design solutions to be implemented to avoid or remedy acid mine drainage

According to the findings of the geochemical modelling exercise conducted there is a low probability of acid mine drainage occurring, therefore it is unlikely that design solutions to avoid or remedy acid mine drainage will be required. However, an important management measure relates to the monitoring of the mine water and surrounding groundwater quality as per the hydrogeology monitoring programme in Section 6(c). It was also recommended that the geochemical model be updated during the LoM in order to calibrate and validate the results and inform the final Closure Plan.

iii) Measures that will be put in place to remedy any residual or cumulative impact that may result from acid mine drainage

According to the findings of the geochemical modelling exercise conducted there is a low probability of acid mine drainage occurring, therefore there is a low probability of residual or cumulative impacts occurring as a result of acid mine drainage. Groundwater will flow toward the mine during mining and immediately post-closure while the mined-out void is recharging. A very limited potential exists for a major pollution plume to establish after mine closure due to the dewatered state of the local dolomitic aquifer as a result of large scale abstraction from farming activities. Mine water will be confined to the mined-out zone with limited pressure to mobilise a plume. Therefore, it is unlikely that any groundwater management will be required post-closure.

Groundwater monitoring must continue post-closure to confirm that no impact on groundwater quality is occurring. In the unlikely event that monitoring results indicate a decrease in groundwater quality, management options must be investigated, with input from a groundwater specialist, and the recommended management measures implemented.

d) Volumes and rate of water use required for the mining, trenching or bulk sampling operation

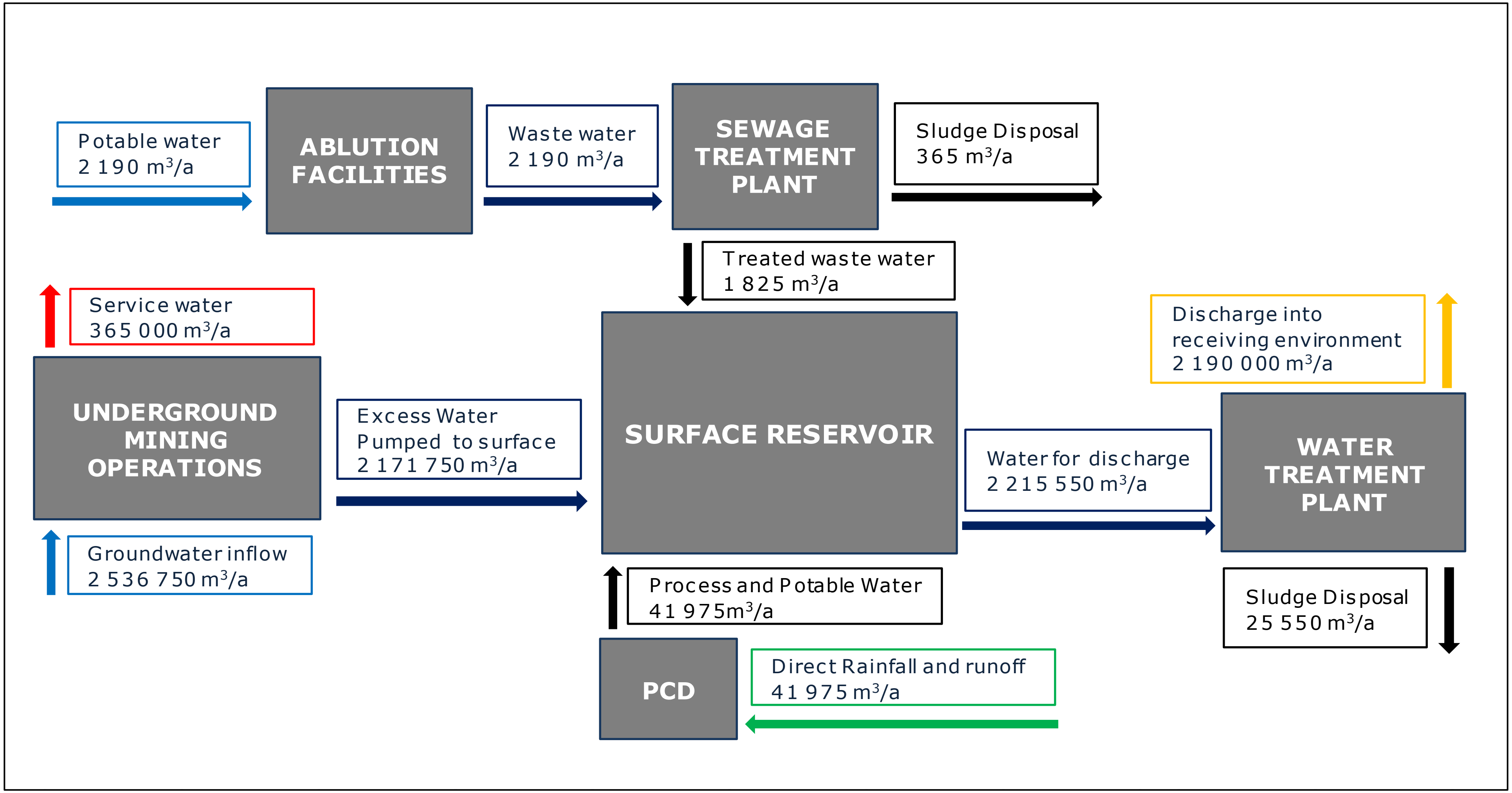

Figure 64: Holfontein annual water balance

i) State whether a Water Use Licence has been applied for

A Water Use Licence is being applied for, and is to be submitted to DWS. The following water uses apply to the proposed Holfontein Project and are included in the Water Use Licence Application.

SECTION 21 OF NWA	WATER USE	DESCRIPTION OF WATER USE
A	Taking water from a water resource	• Dewatering of the underground workings
J	Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people	
C	Impeding or diverting the flow of water in a watercourse	• Expansion/upgrade of the culvert/crossing of the Blesbokspruit
I	Altering the bed, banks, course or characteristics of a watercourse	
C	Impeding or diverting the flow of water in a watercourse	• Discharge of treated mine water from the Water Treatment Facility into the Blesbokspruit thereby altering the hydrological regime of the Blesbokspruit wetland
I	Altering the bed, banks, course or characteristics of a watercourse	
C	Impeding or diverting the flow of water in a watercourse	• Infrastructure within 500m of a wetland ○ Pollution Control Dam ○ Surface Water Tank 1 ○ Surface Water Tank 2 ○ Sewage Treatment Plant ○ Water Treatment Facility
I	Altering the bed, banks, course or characteristics of a watercourse	
F	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit	• Discharge of treated mine water from the Water Treatment Facility into the Blesbokspruit
G	Disposing of a waste or waste water which may detrimentally impact on a water resource	• Pollution Control Dam will receive all dirty water runoff and will act as an emergency holding facility should the pump or pipeline to ME fail. • Dewatered groundwater will be pumped to Surface Water Tank 1 and 2. • Water Treatment Facility will process wastewater from Surface Water Tank 1 and 2, and pump treated water via a pipeline to the Blesbokspruit. • Sewage Treatment Plant will discharge a treated sewage effluent to Surface Water Tanks 1 and 2. • Dust Suppression

e) Impacts to be mitigated in their respective phases (Measures to rehabilitate the environment affected by the undertaking of any listed activity)

LISTED ACTIVITIES	PHASE OF OPERATION IN WHICH ACTIVITY WILL TAKE PLACE (planning and design, pre-construction, construction, operational, rehabilitation, closure, post-closure)	SIZE AND SCALE OF DISTURBANCE (volumes, tonnages and hectares or m²)	MITIGATION MEASURES (describe how each of the recommendations herein will remedy the cause of pollution or degradation and migration of pollutants)	COMPLIANCE WITH STANDARDS (a description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)	TIME PERIOD FOR IMPLEMENTATION (describe the time period when the measures in the environmental management programme must be implemented. Measures must be implemented when required with regard to rehabilitation specifically this must take place at the earliest opportunity, therefore state either:-.. upon cessation of the individual activity or upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be)
Mining at Holfontein (GNR983 – Activity No. 27)	Construction, operational	7.25 ha	Implementing good housekeeping measures to avoid contamination of the surrounding environment; implementing management measures to avoid or minimise nuisance impacts (dust, noise, visual impacts); implementing management measures to avoid safety impacts (traffic management and socio-economic management)	DWS to stipulate water quality standards; Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas	Mitigation can cease upon cessation of mining
Clearing of land for surface infrastructure area associated with the Holfontein shaft, the ventilation shaft and associated infrastructure and for roads, power lines	Construction	7.25 ha (Holfontein infrastructure)	Construction of stormwater management facilities to avoid increased surface runoff entering surrounding watercourses; successfully rehabilitating the land disturbed during construction to align with baseline	Land to be rehabilitated to suit pre-determined end land use as agreed upon with authorities (agriculture and urban development) as per the Holfontein Interim Closure Plan	Mitigation can cease upon cessation of the individual activity (clearing of land and construction of surface infrastructure)

and associated servitudes (GNR984 – Activity No. 17 and GNR985 – Activity No. 12)	Construction	6.6 ha (roads, power lines, pipeline and associated servitudes)	A botanist is to be commissioned to identify and relocate any species of conservation of concern within the footprint to be cleared in order to mitigate the loss of biodiversity.	Relocation permits to be obtained from DAFF for species of conservation concern	Prior to the commencement of construction; mitigation can cease at cessation of individual activity (construction)
			Dust suppression measures must be implemented in order to mitigate the impact of dust generated from clearing of roads and associated servitudes.	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas	During construction; mitigation can cease at cessation of individual activity (construction)
			Erosion protection measures to avoid increased surface runoff being received by surrounding watercourses	Erosion monitoring during construction and operation	During construction and operation
Haul route to existing ME Operations and on site roads will be to facilitate turning of haul trucks (GNR983 – Activity No. 24)	Construction, operational	Existing road 6.2 km in length	Hauling of ore and transportation of employees between Holfontein Shaft and ME operations may result in traffic safety impacts. The traffic safety measures and road upgrades recommended will mitigate the traffic safety impacts	Recommended upgrades being signed off by the Gauteng Department of Roads and Transport prior to the commencement of construction	During construction and operation; mitigation can cease upon cessation of mining
			Hauling of ore and transportation of employees between Holfontein Shaft and ME operations may result in dust generation. If the haul route between the ME operations and Pansy Avenue is paved it will mitigate the dust generated	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas	During construction and operation; mitigation can cease upon cessation of mining
	Construction, operational	up to 8 m wide for on-site roads	Vehicles travelling on unpaved internal roads will result in dust generation	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas	Upon the cessation of mining
Upgrade of the crossing of the Blesbokspruit (GNR983 – Activity No. 12; GNR983 – Activity No. 19; GNR984 – Activity No. 24; and GNR984 – Activity No. 6)	Construction	A series of culverts ± 300 m in length across the Blesbokspruit	Implementing good construction techniques and timing, as well as constructing adequate culverts as per the recommendations of the specialists and as per the approved WUL designs will mitigate the destruction of wetlands and subsequent loss of wetland habitat	Obtain WUL from DWS and construct crossing as per the approved WUL designs	Construction; mitigation can cease upon cessation of the individual activity (construction of river crossing)
Dewatering of groundwater (GNR984 – Activity No. 6)	Construction, operational	6Mℓ/day	Comply with WUL conditions for dewatering volumes and update model with flow rates to determine whether volumes are higher or lower than anticipated	Obtain WUL from DWS for dewatering	Upon the cessation of mining
PCD (GNR984 – Activity No. 6)	Construction, operational	3 000 m^2	Constructing the PCD as per the approved WUL designs will prevent pollution of the surrounding environment	Obtain WUL from DWS	Upon the cessation of mining

Surface water tanks providing interim holding for underground water (GNR984 – Activity No. 6)	Construction, operational	630 m^2 combined footprint of two tanks	Constructing the surface water tanks as per the approved WUL designs will prevent pollution of the surrounding environment	Obtain WUL from DWS	Upon the cessation of mining
Dust suppression on unpaved portions of the haul road (GNR984 – Activity No. 6)	Construction, operational	2 ℓ /m²-hr (6.4 m wide x 270 m for haul road between the ME operations and Carnation Road and 810 m for the haul road from Pansy Avenue to the Holfontein shaft)	As per the WUL obtained from DWS to prevent pollution of the surrounding environment; use only treated water for dust suppression	Obtain WUL from DWS	Upon the cessation of mining
Sewage treatment plant (GNR984 – Activity No. 6)	Construction, operational	30 kℓ/day	Adequate maintenance of the plant will be undertaken and the capacity of the plant will not be exceeded	Obtain WUL from DWS	Upon the cessation of mining
Discharge of underground water to the Blesbokspruit (GNR984 – Activity No. 6)	Construction, operational	6Mℓ/day	The dewatered groundwater as well as the effluent from the sewage treatment plant will be treated at the water treatment facility prior to discharge to prevent contamination of the Blesbokspruit catchment; flow diffusers will be constructed at the discharge point to prevent erosion of the downstream habitat	Obtain WUL from DWS for discharging to the Blesbokspruit. Discharge water quality must meet the standards to be stipulated by DWS in the WUL	Upon the cessation of mining
Water treatment facility (GNR984 – Activity No. 6)	Construction, operational	6Mℓ/day	Adequate maintenance of the facility will be undertaken and the capacity of the facility will not be exceeded; sludge will be stored and transported appropriately to prevent spillages	Obtain WUL from DWS for the water treatment facility	Upon the cessation of mining

f) Impact management outcomes (A description of impact management outcomes, identifying the standard of impact management required for the aspects requiring management)

ACTIVITY WHETHER LISTED OR NOT (e.g. excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.)	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc.)	ASPECTS AFFECTED	PHASE IN WHICH IMPACT IS ANTICIPATED (e.g. construction, commissioning, operational Decommissioning, closure, post-closure)	MITIGATION TYPE (modify, remedy, control, or stop through e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity, modify through alternative method, control through noise control, control through management and monitoring remedy through rehabilitation)	STANDARD TO BE ACHIEVED (Impact avoided, noise levels, dust levels, rehabilitation standards, end use objectives etc.)
Mining at Holfontein (GNR983 – Activity No. 27)	Dust (nuisance impacts), fine particulates (health impacts)	Air quality; Socio-economic	Construction, operation, decommissioning	Dust suppression measures as per the Air Quality Management Plan (Section 4(g)(ii))	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas
	Spillages of hydrocarbons (from construction vehicles and equipment), building materials such as cement, tar, etc.	Aquatic ecology; Geohydrology; Soil and land capability; Terrestrial ecology; Wetlands	Construction, operation, decommissioning	Good housekeeping in terms of hydrocarbons - as per the Hydrocarbon Management Pan (Section 4(g)(xii)), Hazardous Substances/Waste Management Plan (Section 4(g)(xiv))and General Waste Management Plan (Section 4(g)(xiii))	Avoid pollution of the environment by hydrocarbons, construction materials and waste; manage these aspects as per relevant management plans
	Increase in ambient noise levels	Noise; Socio-economic	Construction, operation, decommissioning	Enclosing noisy equipment and infrastructure, fitting efficient silencers, enclosing engine compartments of construction vehicles and equipment, maintaining vehicles and equipment, constructing noise barriers, and implementing noise minimising operational and administrative procedures - as per the Noise Management Plan (Section 4(g)(v))	Noise standards (SANS 10103:2008) must be met
	Heavy vehicles and earth moving machinery may result in compaction of soils	Soil and land capability; Socio-economic	Construction, decommissioning	Minimise areas to be disturbed by heavy vehicles as per the Soil Management Plan (Section 4(g)(vii))	Avoid compaction of soils; manage impacts as per management plan
	Degradation of agricultural soil	Soil and land capability; Visual aesthetics;	Construction, operation	Rehabilitate to baseline agricultural potential as per the Holfontein Interim Closure Plan (Appendix 20)	Rehabilitate the disturbed agricultural areas to the baseline agricultural potential

		Socio-economic			
	Visual intrusion from infrastructure with significant heights; night-time lighting (nuisance)	Visual aesthetics; Socio-economic	Construction phase; Operation phase	Using camouflaging and non-reflective materials; screening techniques; implementing methods to minimise light spill as per the Visual Management Plan (Section 4(g)(x))	Minimise the visual intrusion on the landscape character; manage impacts as per relevant management plan
	Avifaunal collision with overhead power lines	Terrestrial ecology	Construction phase; Operation phase	Mark the power lines to avoid bird strikes; monitor; remove the power lines at decommissioning - as per the Biodiversity Management Plan (Section 4(g)(viii))	Avoid bird strikes / collisions
	Excessive stormwater runoff may result in increased soil erosion	Soil and land capability	Operation phase	Adequate management of stormwater runoff, by putting erosion prevention measures in place and through effective stockpile management - as per the Water Management Plan (Section 4(g)(iv))	Avoid erosion from runoff and of the topsoil stockpile
	Continued employment for ME Operations employees	Socio-economic	Construction phase; Operation phase; Decommissioning Phase;	This positive impact can be further improved through the effective implementation of the SLP HRD Programme	Implement SLP HRD Programme
	Migration of job seekers into the project area, and associated indirect impacts of overcrowding, pressure on resources, social ills, decreased quality of life, loss of sense of place	Socio-economic	Construction phase; Operation phase; Decommissioning Phase; Post-closure Phase;	Cannot be mitigated. However, measures can be implemented to in order to prevent the exacerbation of this impact - erosion - as per the Socio-economic Plan (Section 4(g)(vi))	Avoid the exacerbation of migration of job seekers into the project area and subsequent indirect impacts
	Materials potentially containing uranium and other radioactive substances will be hoisted to surface - may contaminate surface runoff	Hydrology; Aquatic and Terrestrial Ecology	Construction phase	Constructing adequate dirty water management infrastructure prior to refurbishment activities commencing, including fitting the salvage yard area with drains that will direct runoff water to the PCD - as per the Water Management Plan (Section 4(g)(iv))	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practice Guidelines
	Underground water use may contaminate groundwater	Geohydrology; Socio-economic	Operation phase	Implementing dirty water management measures underground - as per the Water Management Plan (Section 4(g)(iv))	Avoid pollution of surrounding groundwater aquifers
	Increase in ambient noise levels as a result of the ventilation shaft	Noise; Socio-economic	Operation phase	Vertical axial fans to be installed below surface level and utilise vertical attenuated exhaust/intake stacks - as per the Noise Management Plan (Section 4(g)(v))	Noise standards (SANS 10103:2008) to be met

	Introduction and spread of alien invasive plant species into natural areas	Terrestrial ecology	Operation phase	Keep areas to be disturbed to a minimum - as per the Biodiversity Management Plan (Section 4(g)(viii))	Avoid the introduction and spread of alien invasive plant species into natural areas
	Dust may be generated from wind erosion of exposed areas due to unsuccessful rehabilitation	Air quality; Socio-economic	Post-closure phase	Adequate rehabilitation as per the Holfontein Interim Closure Plan (Appendix 20)	Land to be rehabilitated to suit pre-determined end land use as agreed upon with the DMR - recommending (agriculture and urban development) in line with the EMM spatial development framework
	Flooding of the underground workings and Holfontein shaft resulting in a decrease in groundwater qualities	Geohydrology; Socio-economic	Post-closure phase	Cannot be mitigated, however contamination plume is only expected within mined out workings, and quality will improve once levels stabilise	Groundwater monitoring carried out to confirm this
	Potential of surface decant of groundwater	Geohydrology Hydrology	Post-closure phase	Decant cannot be mitigated however, it is unlikely that decant will occur. The water quality of decant can be treated to mitigate the impact on surface water resources as necessary	Groundwater monitoring carried out to confirm this
	Ineffective rehabilitation resulting in reduced soil quality, fertility and agricultural potential; and erosion	Soil and land capability; Socio-economic; Terrestrial biodiversity	Decommissioning phase; Post-closure phase	Successfully rehabilitating denuded areas and to ensure a free draining rehabilitated landscape as per the Holfontein Interim Closure Plan (Appendix 20)	Land to be rehabilitated as per Interim Closure Plan
	Ineffective rehabilitation resulting in ecological degradation and spread in alien invasive vegetation species	Terrestrial ecology	Decommissioning phase; Post-closure phase	Successfully rehabilitating areas as per the Holfontein Interim Closure Plan (Appendix 20)	Land to be rehabilitated to pre-mining state (low ecological sensitivity) at least or an improved state
	Unsuccessful rehabilitation of disturbed wetland areas may result in degraded wetland environments	Wetlands	Decommissioning phase; Post-closure phase	Successfully rehabilitating areas as per the Holfontein Interim Closure Plan (Appendix 20)	Wetland monitoring to confirm that wetland areas have been adequately rehabilitated to baseline state
Clearing of land for surface infrastructure area associated with the Holfontein shaft, the ventilation shaft and associated infrastructure and for roads, power lines and associated servitudes	Dust (nuisance impacts), fine particulates (health impacts)	Air quality; Socio-economic	Construction	Dust suppression measures as per the Air Quality Management Plan (Section 4(g)(ii))	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas
	Altered hydrology of the Holfontein Stream and resultant aquatic habitat alteration	Aquatic ecology	Construction phase	Stormwater management measures as per the Water Management Plan (Section 4(g)(iv))	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	Sedimentation of the	Hydrology	Construction phase	Constructing a berm between the	Construct water management

(GNR984 – Activity No. 17 and GNR985 – Activity No. 12)	Holfontein Stream			cleared area and the Holfontein Stream until the water management infrastructure is constructed as per the Water Management Plan (Section 4(g)(iv))	infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	Increase in surface runoff may result in increased soil erosion and stockpiles may be eroded by exposure to wind and runoff	Soil and land capability	Construction phase	Stormwater management measures as per the Water Management Plan (Section 4(g)(iv))	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	Destruction of natural vegetation including plant species of conservation concern and/or provincially protected plant species and introduction of alien invasive vegetation species	Terrestrial ecology	Construction	Relocation permits to be obtained from DAFF for species of conservation concern, prior to construction. A botanist is to be commissioned to identify and relocate any species of conservation of concern within the footprint to be cleared in order to mitigate the loss of biodiversity - as per the Biodiversity Management Plan (Section 4(g)(viii))	All species of conservation concern, to be removed from areas to be cleared, prior to construction. Botanist to confirm this.
	Introduction and spread of alien invasive plant species into natural areas			Implementing monitoring and eradication of alien invasive plants - as per the Biodiversity Management Plan (Section 4(g)(viii))	Avoid the introduction and spread of alien invasive plant species into natural areas
	Potential damage to graves in the existing fenced-off cemetery from widening of the haul road	Archaeology; Socio-economic	Construction phase	Implement a buffer of 30 m between the cemetery and haul road as per the Archaeology Management Plan (Section 4(g)(iii))	Avoid damage to graves within the cemetery
	Loss of medium potential agricultural soil (haul road in proximity to the ME Operations)	Soil and land capability; Socio-economic	Construction phase	Successfully rehabilitate the area to medium agricultural potential land as per the Holfontein Interim Closure Plan (Appendix 20)	Successfully rehabilitate the area to be disturbed for the construction of the haul route to medium agricultural potential land
Haul route to existing ME Operations and on site roads will be to facilitate turning of haul trucks (GNR983 – Activity No. 24)	Dust (nuisance impacts), fine particulates (health impacts)	Air quality; Socio-economic	Operation	Dust suppression measures as per the Air Quality Management Plan (Section 4(g)(ii))	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas
	Roads may result in excessive stormwater runoff resulting in increased soil erosion	Soil and land capability	Construction, Operation phase	Adequate management of stormwater runoff, by putting erosion prevention measures in place and through effective stockpile management - as per the Water Management Plan (Section 4(g)(iv))	Avoid erosion from runoff and of the topsoil stockpile
	The potential polluted surface runoff from the operational areas as well as the haul roads	Aquatic ecology; Hydrology; Soil and land capability	Construction phase; Operation phase	Implementing good housekeeping in terms of spills from haul trucks; maintaining adequate clean and dirty water management infrastructure;	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines

	(including potential spillages from haul trucks)			maintain the haul road and crossings; covering haul trucks - as per the Water Management Plan (Section 4(g)(iv))	
	Increase in ambient noise levels along the haul route	Noise; Socio-economic	Operation phase	Impact is unlikely to require any mitigation; however fitting efficient silencers and enclosing engine compartments of haul vehicles and as well as maintaining vehicles will reduce the noise generated - as per the Noise Management Plan (Section 4(g)(v))	Noise standards (SANS 10103:2008) to be met
	Interference with faunal behaviour and movement	Terrestrial ecology	Operation phase	Implementing speed reduction measures and cutting away the vegetation along either side of the road at the two high risk areas mentioned above, as well as upgrading the Blesbokspruit culvert - as per the Biodiversity Management Plan (Section 4(g)(viii))	Minimise vehicle collisions with fauna
	Damage to road surfaces; Reduced road traffic safety; Reduced pedestrian safety	Traffic; Socio-economic	Construction phase; Operation phase	Adequate monitoring and maintenance of intersections and road sections; providing dedicated right-turn lanes where heavy vehicles are expected to make turning movements; providing loading and offloading area on site; providing acceleration lanes to allow heavy vehicles to gain speed and enter main traffic flow along Pansy Avenue; by constructing pedestrian walkways should pedestrian volumes along haul route rise; introducing speed limit signage and constructing speed humps along Carnation Road if required - as per the Traffic Management Plan (Section 4(g)(ix))	Minimise traffic accidents
Upgrade of the crossing of the Blesbokspruit (GNR983 – Activity No. 12; GNR983 – Activity No. 19; GNR984 – Activity No. 24; and GNR984 – Activity No. 6)	Destruction of wetland habitat and resultant impact on wetland functionality	Wetlands	Construction phase	Minimise wetland areas to be disturbed; implementing good construction techniques and timing - as per the Wetland Management Plan (Section 4(g)(xi))	Minimise disturbance to wetland areas
Dewatering of groundwater (GNR984 – Activity No. 6)	Localised dewatering of the surrounding aquifers potentially impacting surrounding	Geohydrology; Socio-economic	Construction phase; Operation phase	Sealing of high-yielding fissures/fractures - as per the Water Management Plan (Section 4(g)(iv))	Seal high-yielding fissures/fractures to reduce inflow

	borehole users; potential deterioration in groundwater quality				
PCD storage tanks (GNR984 – Activity No. 6)	-	-	-	Is a mitigation measure in itself to contain dirty water to avoid contamination of the environment	Ensure that the PCD is adequately maintained to avoid spills and contamination of the environment
Surface water tanks providing interim holding for underground water (GNR984 – Activity No. 6)	-	-	-	Is a mitigation measure in itself to contain dirty water to avoid contamination of the environment	Ensure that the tanks are adequately maintained to avoid spills and contamination of the environment
Dust suppression on unpaved portions of the haul road (GNR984 – Activity No. 6)	-	-	-	Is a mitigation measure in itself for the control of dust to mitigate the impact on air quality	Ensure that dust suppression is carried out as per the WUL and does not result in pollution of the environment
Sewage treatment plant (GNR984 – Activity No. 6)	Potential for contamination of soil / watercourse if the plant is not functioning effectively.	-	-	Effluent must be treated through the water treatment facility and it must be ensured that the capacity of the plant is not exceeded	Ensure that the plant is adequately maintained to avoid leaks and spills
Discharge of underground water to the Blesbokspruit (GNR984 – Activity No. 6)	Potential scouring of the downstream wetland habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA	Aquatic ecology; Wetlands	Construction phase; Operation phase	Construct flow diffusers to slow the velocity of the water to be discharged to prevent erosion - as per the Water Management Plan (Section 4(g)(iv))	Avoid erosion due to discharge
	Discharge of ineffectively treated water may pollute the Blesbokspruit catchment	Hydrology; Terrestrial ecology; Wetlands	Construction phase; Operation phase	Treating the water to be discharged to meet qualities as stipulated by DWS and monitoring the water quality of the water to be discharged - as per the Water Management Plan (Section 4(g)(iv))	Standards stipulated by DWS to be strictly adhered to
	Potential erosion of the Blesbokspruit at the discharge point	Hydrology	Operation phase	Construct flow diffusers to slow the velocity of the water to be discharged to prevent erosion - as per the Water Management Plan (Section 4(g)(iv))	Avoid erosion due to discharge

	Discharge of water high in nitrogen compounds due to underground blasting activities to the Blesbokspruit catchment may result in excessive growth of aquatic vegetation with the resulting impeding of water flow		Operation phase	Positive impact can be obtained by discharge to the recommended discharge point to allow for mixing of mine discharge with effluent from the WWTW	Discharge to the recommended discharge point to improve water quality of the Blesbokspruit
Water treatment facility (GNR984 – Activity No. 6)	The inability to maintain treatment standards of the discharged water from the water treatment facility may pollute the Blesbokspruit catchment and result in a subsequent loss in aquatic biodiversity	Aquatic ecology	Construction phase; Operation phase	Treating the water to be discharged to meet qualities as stipulated by DWS and monitoring the water quality of the water to be discharged using the DEEEP approach - as per the Water Management Plan (Section 4(g)(iv))	Standards stipulated by DWS to be strictly adhered to
	Ineffective storage and spillage of sludge along route to the ME operations may contaminate surface runoff entering the Holfontein Stream or Blesbokspruit, polluting these watercourses	Hydrology	Construction phase; Operation phase	Adequately training staff transporting sludge; ensuring that the water treatment facility is operating effectively; and adequate storage of the sludge - as per the Water Management Plan (Section 4(g)(iv))	Avoid spillage of sludge from the water treatment facility

g) Impact management actions (A description of impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in the paragraphs above will be achieved)

ACTIVITY WHETHER LISTED OR NOT (e.g. excavations, blasting, stockpiles, discard dumps or dams, Loading, hauling and transport, Water supply dams and boreholes, accommodation, offices, ablution, stores, workshops, processing plant, storm water control, berms, roads, pipelines, power lines, conveyors, etc.)	POTENTIAL IMPACT (e.g. dust, noise, drainage surface disturbance, fly rock, surface water contamination, groundwater contamination, air pollution etc.)	MITIGATION TYPE (modify, remedy, control, or stop through e.g. noise control measures, storm-water control, dust control, rehabilitation, design measures, blasting controls, avoidance, relocation, alternative activity, modify through alternative method, control through noise control, control through management and monitoring Remedy through rehabilitation)	TIME PERIOD FOR IMPLEMENTATION (describe the time period when the measures in the environmental management programme must be implemented Measures must be implemented when required with regard to rehabilitation specifically this must take place at the earliest opportunity, therefore state either:-.. upon cessation of the individual activity or upon the cessation of mining, bulk sampling or alluvial diamond prospecting as the case may be)	COMPLIANCE WITH STANDARDS (a description of how each of the recommendations herein will comply with any prescribed environmental management standards or practices that have been identified by Competent Authorities)
Mining at Holfontein (GNR983 – Activity No. 27)	Dust (nuisance impacts), fine particulates (health impacts)	Dust suppression measures as per the Air Quality Management Plan (Section 4(g)(ii))	Construction phase	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas
	Spillages of hydrocarbons (from construction vehicles and equipment), building materials such as cement, tar, etc.	Good housekeeping in terms of hydrocarbons - as per the Hydrocarbon Management Pan (Section 4(g)(xii)), Hazardous Substances/Waste Management Plan (Section 4(g)(xiv))and General Waste Management Plan (Section 4(g)(xiii))	Construction phase	MSDS must be referred to and hazardous materials stored, handled and transported as per the Hazardous Substances Act No. 15 of 1973 and relevant Regulations
	Increase in ambient noise levels	Enclosing noisy equipment and infrastructure, fitting efficient silencers, enclosing engine compartments of construction vehicles and equipment, maintaining vehicles and equipment, constructing noise barriers, and implementing noise minimising operational and administrative procedures - as per the Noise Management Plan (Section 4(g)(v))	Construction phase	Noise standards (SANS 10103:2008) must be met
	Heavy vehicles and earth moving machinery may result in compaction of soils	Minimise areas to be disturbed by heavy vehicles as per the Soil Management Plan (Section 4(g)(vii))	Construction phase	-
	Degradation of agricultural soil	Rehabilitate to baseline agricultural potential as per the Holfontein Interim Closure Plan	Decommissioning phase	Land to be rehabilitated to ensure area represents baseline state

		(Appendix 20)		
	Visual intrusion from infrastructure with significant heights; night-time lighting (nuisance)	Using camouflaging and non-reflective materials; screening techniques; implementing methods to minimise light spill as per the Visual Management Plan (Section 4(g)(x))	Construction phase	-
	Avifaunal collision with overhead power lines	Mark the power lines to avoid bird strikes; monitor; remove the power lines at decommissioning - as per the Biodiversity Management Plan (Section 4(g)(viii))	Construction phase	-
	Excessive stormwater runoff may result in increased soil erosion	Adequate management of stormwater runoff, by putting erosion prevention measures in place and through effective stockpile management - as per the Water Management Plan (Section 4(g)(iv))	Operation phase	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	Continued employment for ME Operations employees	This positive impact can be further improved through the effective implementation of the SLP HRD Programme	Construction phase	Implement SLP HRD Programme
	Migration of job seekers into the project area, and associated indirect impacts of overcrowding, pressure on resources, social ills, decreased quality of life, loss of sense of place	Cannot be mitigated. However, measures can be implemented to in order to prevent the exacerbation of this impact - erosion - as per the Socio-economic Plan (Section 4(g)(vi))	Construction phase	Implement best practice in terms of socio-economic management
	Materials potentially containing uranium and other radioactive substances will be hoisted to surface - may contaminate surface runoff	Constructing adequate dirty water management infrastructure prior to refurbishment activities commencing, including fitting the salvage yard area with drains that will direct runoff water to the PCD - as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	Underground water use may contaminate groundwater	Implementing dirty water management measures underground - as per the Water Management Plan (Section 4(g)(iv))	Operation phase	Implement water management as per GN704 of 1999 and the DWA Best Practise Guidelines
	Increase in ambient noise levels as a result of the ventilation shaft	Vertical axial fans to be installed below surface level and utilise vertical attenuated exhaust/intake stacks - as per the Noise Management Plan (Section 4(g)(v))	Operation phase	Noise standards (SANS 10103:2008) must be met
	Introduction and spread of alien invasive plant species into natural areas	Keep areas to be disturbed to a minimum - as per the Biodiversity Management Plan (Section 4(g)(viii))	Operation phase	-

	Dust may be generated from wind erosion of exposed areas due to unsuccessful rehabilitation	Adequate rehabilitation as per the Holfontein Interim Closure Plan (Appendix 20)	Decommissioning phase	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas
	Flooding of the underground workings and Holfontein shaft resulting in a decrease in groundwater qualities	Cannot be mitigated, however contamination plume is only expected within mined out workings, and quality will improve once levels stabilise	-	-
	Potential of surface decant of groundwater	Decant cannot be mitigated however, it is unlikely that decant will occur. The water quality of decant can be treated to mitigate the impact on surface water resources as necessary	-	-
	Ineffective rehabilitation resulting in reduced soil quality, fertility and agricultural potential; and erosion	Successfully rehabilitating denuded areas and to ensure a free draining rehabilitated landscape as per the Holfontein Interim Closure Plan (Appendix 20)	Decommissioning phase	Land to be rehabilitated to suit pre-determined end land use as agreed upon with the DMR - recommending (agriculture and urban development) in line with the EMM spatial development framework
	Ineffective rehabilitation resulting in ecological degradation and spread in alien invasive vegetation species	Successfully rehabilitating areas as per the Holfontein Interim Closure Plan (Appendix 20)	Decommissioning phase; Post-closure phase	Land to be rehabilitated to ensure area represents baseline state (low ecological sensitivity) or an improved state
	Unsuccessful rehabilitation of disturbed wetland areas may result in degraded wetland environments	Successfully rehabilitating areas as per the Holfontein Interim Closure Plan (Appendix 20)	Decommissioning phase; Post-closure phase	Land to be rehabilitated to ensure area represents baseline state (wetland functionality and PES)
Clearing of land for surface infrastructure area associated with the Holfontein shaft, the ventilation shaft and associated infrastructure and for roads, power lines and associated servitudes (GNR984 – Activity No. 17 and GNR985 – Activity No. 12)	Dust (nuisance impacts), fine particulates (health impacts)	Dust suppression measures as per the Air Quality Management Plan (Section 4(g)(ii))	Construction phase	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas
	Altered hydrology of the Holfontein Stream and resultant aquatic habitat alteration	Stormwater management measures as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	Sedimentation of the Holfontein Stream	Constructing a berm between the cleared area and the Holfontein Stream until the water management infrastructure is constructed as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	Increase in surface runoff may result in	Stormwater management measures as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Construct water management infrastructure as per GN704 of 1999

	increased soil erosion and stockpiles may be eroded by exposure to wind and runoff			and the DWA Best Practise Guidelines
	Destruction of natural vegetation including plant species of conservation concern and/or provincially protected plant species and introduction of alien invasive vegetation species	Relocation permits to be obtained from DAFF for species of conservation concern, prior to construction. A botanist is to be commissioned to identify and relocate any species of conservation of concern within the footprint to be cleared in order to mitigate the loss of biodiversity - as per the Biodiversity Management Plan (Section 4(g)(viii))	Construction phase	Relocation permits to be obtained from DAFF for species of conservation concern, according to NEMBA, prior to construction.
	Introduction and spread of alien invasive plant species into natural areas	Implementing monitoring and eradication of alien invasive plants - as per the Biodiversity Management Plan (Section 4(g)(viii))	Construction phase	-
	Potential damage to graves in the existing fenced-off cemetery from widening of the haul road	Implement a buffer of 30 m between the cemetery and haul road as per the Archaeology Management Plan (Section 4(g)(iii))	Construction phase	-
	Loss of medium potential agricultural soil (haul road in proximity to the ME Operations)	Successfully rehabilitate the area to medium agricultural potential land as per the Holfontein Interim Closure Plan (Appendix 20)	Construction phase	Land to be rehabilitated to ensure area represents baseline state (medium agricultural potential)
Haul route to existing ME Operations and on site roads will be to facilitate turning of haul trucks (GNR983 – Activity No. 24)	Dust (nuisance impacts), fine particulates (health impacts)	Dust suppression measures as per the Air Quality Management Plan (Section 4(g)(ii))	Operation phase	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation Standards for residential areas
	Roads may result in excessive stormwater runoff resulting in increased soil erosion	Adequate management of stormwater runoff, by putting erosion prevention measures in place and through effective stockpile management - as per the Water Management Plan (Section 4(g)(iv))	Construction, Operation phase	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	The potential polluted surface runoff from the operational areas as well as the haul roads (including potential spillages from haul trucks)	Implementing good housekeeping in terms of spills from haul trucks; maintaining adequate clean and dirty water management infrastructure; maintain the haul road and crossings; covering haul trucks - as per the Water Management Plan (Section 4(g)(iv))	Construction phase; Operation phase	Construct water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
	Increase in ambient noise levels along the haul route	Impact is unlikely to require any mitigation; however fitting efficient silencers and enclosing engine compartments of haul vehicles and as well as maintaining vehicles will reduce the noise	Operation phase	Noise standards (SANS 10103:2008) must be met

		generated - as per the Noise Management Plan (Section 4(g)(v))		
	Interference with faunal behaviour and movement	Implementing speed reduction measures and cutting away the vegetation along either side of the road at the two high risk areas mentioned above, as well as upgrading the Blesbokspruit culvert - as per the Biodiversity Management Plan (Section 4(g)(viii))	Operation phase	-
	Damage to road surfaces; Reduced road traffic safety; Reduced pedestrian safety	Adequate monitoring and maintenance of intersections and road sections; providing dedicated right-turn lanes where heavy vehicles are expected to make turning movements; providing loading and offloading area on site; providing acceleration lanes to allow heavy vehicles to gain speed and enter main traffic flow along Pansy Avenue; by constructing pedestrian walkways should pedestrian volumes along haul route rise; introducing speed limit signage and constructing speed humps along Carnation Road if required - as per the Traffic Management Plan (Section 4(g)(ix))	Construction phase; Operation phase	Recommended upgrades being signed off by the Gauteng Department of Roads and Transport prior to the commencement of construction
Upgrade of the crossing of the Blesbokspruit (GNR983 – Activity No. 12; GNR983 – Activity No. 19; GNR984 – Activity No. 24; and GNR984 – Activity No. 6)	Destruction of wetland habitat and resultant impact on wetland functionality	Minimise wetland areas to be disturbed; implementing good construction techniques and timing - as per the Wetland Management Plan (Section 4(g)(xi))	Construction phase	-
Dewatering of groundwater (GNR984 – Activity No. 6)	Localised dewatering of the surrounding aquifers potentially impacting surrounding borehole users; potential deterioration in groundwater quality	Sealing of high-yielding fissures/fractures - as per the Water Management Plan (Section 4(g)(iv))	Construction phase; Operation phase	-
PCD storage tanks (GNR984 – Activity No. 6)	-	Is a mitigation measure in itself to contain dirty water to avoid contamination of the environment	-	Construct and maintain water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
Surface water tanks providing interim holding for underground water (GNR984 – Activity No. 6)	-	Is a mitigation measure in itself to contain dirty water to avoid contamination of the environment	-	Construct and maintain water management infrastructure as per GN704 of 1999 and the DWA Best Practise Guidelines
Dust suppression on unpaved portions of the haul road (GNR984	-	Is a mitigation measure in itself for the control of dust to mitigate the impact on air quality	-	Dust generated must fall below the threshold as per the NEMAQA National Dust Control Regulation

– Activity No. 6)				Standards for residential areas
Sewage treatment plant (GNR984 – Activity No. 6)	Potential for contamination of soil / watercourse if the plant is not functioning effectively.	Effluent must be treated through the water treatment facility and it must be ensured that the capacity of the plant is not exceeded	-	Ensure that the water to be discharged is treated to the standards stipulated in the WUL
Discharge of underground water to the Blesbokspruit (GNR984 – Activity No. 6)	Potential scouring of the downstream wetland habitat as well as flooding and/or the destruction of the available bird habitats of the downstream Blesbokspruit IBA	Construct flow diffusers to slow the velocity of the water to be discharged to prevent erosion - as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Ensure that the water is discharged as per the volumes and rates stipulated in the WUL; construct flow diffusers as per the designs
	Discharge of ineffectively treated water may pollute the Blesbokspruit catchment	Treating the water to be discharged to meet qualities as stipulated by DWS and monitoring the water quality of the water to be discharged - as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Ensure that the water to be discharged is treated to the standards stipulated in the WUL
	Potential erosion of the Blesbokspruit at the discharge point	Construct flow diffusers to slow the velocity of the water to be discharged to prevent erosion - as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Ensure that the water is discharged as per the volumes and rates stipulated in the WUL; construct flow diffusers as per the designs
	Discharge of water high in nitrogen compounds due to underground blasting activities to the Blesbokspruit catchment may result in excessive growth of aquatic vegetation with the resulting impeding of water flow	Positive impact can be obtained by discharge to the recommended discharge point to allow for mixing of mine discharge with effluent from the WWTW	Operation phase	Ensure that the water to be discharged is treated to the standards stipulated in the WUL at the stipulated discharge point
Water treatment facility (GNR984 – Activity No. 6)	The inability to maintain treatment standards of the discharged water from the water treatment facility may pollute the Blesbokspruit catchment and result in a subsequent loss in aquatic biodiversity	Treating the water to be discharged to meet qualities as stipulated by DWS and monitoring the water quality of the water to be discharged using the DEEEP approach - as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Ensure that the water to be discharged is treated to the standards stipulated in the WUL
	Ineffective storage and spillage of sludge along route to the ME operations may contaminate surface	Adequately training staff transporting sludge; ensuring that the water treatment facility is operating effectively; and adequate storage of the sludge - as per the Water Management Plan (Section 4(g)(iv))	Construction phase	Ensure that the water treatment facility is operated as per the WUL and does not result in pollution of the environment

	runoff entering the Holfontein Stream or Blesbokspruit, polluting these watercourses			

The sections below detail the management plans to be implemented to manage the potential impacts of the proposed Holfontein Project on the biophysical and socio-economic aspects of the environment.

i) Environmental Control Officer

An Environmental Control Officer (ECO) must be appointed at Holfontein to ensure that the various management plans detailed herein are implemented and that the necessary auditing, reporting and monitoring are conducted. The ECO should have an appropriate 3-year Bachelor's degree / National Diploma in Natural, Engineering or Environmental Sciences or related field and preferably experience in a related or similar field. Until such time as it is possible to employ a suitably qualified ECO, the services of a contracted specialist must be employed to perform the necessary management / monitoring procedures.

ii) Air Quality Management Plan

The Air Quality Management Plan was informed by the air quality study (attached as Appendix 7).

The following table contains Air Quality Management (AQM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented as necessary. The relevant timeframes are indicated.

Table 24: Air quality management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Construction, operation and Decommissioning Phases			
AQM 1	Health and safety	▪ Mine health and safety requirements in terms of air quality within the boundaries of the proposed development must also be adhered to and compliance thereto audited regularly.	ECO
AQM 2	Unpaved roads	▪ Speed of construction vehicles and haul trucks travelling on unpaved roads must be limited to 40 km/h.	ECO / Construction -or Site manager
AQM 3		▪ Dust suppression through watering (2 ℓ/m² per hr) must be implemented on unpaved access and haul roads.	ECO
AQM 4	Equipment maintenance	▪ An inspection and maintenance programme to service equipment in accordance with the equipment manufacturer specifications must be implemented.	ECO / Construction -or Site manager
AQM 5		▪ Low sulphur diesel must be used to fuel vehicles and equipment.	ECO / Construction -or Site manager
AQM 6		▪ Vehicle idling must be limited.	ECO / Construction -or Site manager
AQM 7	Air quality (dust fallout) monitoring	▪ Dust fallout monitoring must be conducted as per the Air Quality Monitoring Programme.	ECO
AQM 8	Impact on sensitive receptors	▪ Any complaints relating to dust must be recorded and additional management measures must be investigated to address these if monitoring indicates exceedances in the standards.	ECO
Construction Phase			
AQM 9	Topsoil stripping	▪ Access tracks used for soil stripping during the loading and unloading cycle must be watered.	ECO / Construction manager
AQM 10		▪ Soil stripping must be limited to areas required for the construction of surface infrastructure.	ECO / Construction manager
AQM 11		▪ Free fall height during topsoil stockpiling must be limited to 3 m.	ECO / Construction manager
AQM 12	Earthworks	▪ A water spray dust suppression system must be implemented during earthmoving and dozing operations. Excavation area to be hosed down prior to removal of material.	ECO / Construction manager
AQM 13		▪ Earthmoving activities must be phased to reduce the source area (i.e. limit the total exposed area at one time).	ECO / Construction manager

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
AQM 14	Exposed areas	▪ Frequency of disturbance of exposed areas must be reduced.	ECO / Construction manager
AQM 15		▪ Exposed areas must be re-vegetated as soon as possible.	ECO / Construction manager
AQM 16	Unpaved roads	▪ Development of access roads must be limited and the locations clearly defined as per the project layout.	ECO / Construction manager
AQM 17		▪ All existing unpaved roads must be graded prior to operations. Grading is to be avoided during dry windy conditions.	ECO / Construction manager
AQM 18		▪ Surface improvement must be implemented in the form of gravel to cap the road surface of unpaved roads.	ECO / Construction manager
AQM 19		▪ The unpaved portion of the haul route - between the Blesbokspruit crossing and paved portion of the Carnation Road - must be paved (refer to Figure 65).	ECO / Construction manager
AQM 20	Materials handling	▪ Truck overloading must be prevented to reduce spillage of waste rock during loading, unloading and hauling.	ECO / Construction manager
AQM 21		▪ The haul trucks must be covered with a tarpaulin and it must be ensured that the waste rock material being hauled is wet.	ECO / Construction manager
AQM 22		▪ Sheltering measures to reduce wind speed must be implemented (i.e. enclosing the chute), thereby ensuring that particulates which may contain harmful metals are contained during ore hoisting and truck loading.	ECO / Construction manager
AQM 23	Weather station	▪ A weather station must be installed on site to at least monitor wind speed and direction as well as rainfall to assist with interpretation and understanding of the dust fallout.	ECO
Operational Phase			
AQM 24	Topsoil stockpile	▪ A water spray dust suppression system must be implemented to keep the topsoil stockpile moist to reduce wind erosion.	ECO / Site manager
AQM 25	Unpaved roads	▪ All unpaved roads must be regularly maintained (using graders) to minimise the generation of dust. Grading is to be avoided during dry windy conditions and limited to affected areas only.	ECO / Site manager
AQM 26	Materials handling	▪ Free fall height from the skip to the bin during ore stockpiling must be limited.	ECO / Site manager
AQM 27		▪ A water spray dust suppression system must be used at the bin during truck loading of ore.	ECO / Site manager
AQM 28		▪ Truck overloading must be prevented to reduce spillage of ore during loading, unloading	ECO / Site manager

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		and hauling.	
AQM 29		▪ It must be ensured that the ore being hauled is wet and the haul trucks must be covered while transporting ore from the Holfontein shaft to the ME operations.	ECO / Site manager
AQM 30		▪ Any spillage of ore from haul trucks along the haul route, although unlikely if the above measures are implemented, must be cleared and disposed of appropriately at the ME operations.	ECO
AQM 31	Site inspections	▪ Daily site inspections by environmental personnel must be conducted to provide an indication on the effectiveness of the dust control measures. Visual monitoring must be conducted in for activities which are expected to generate the most dust if not managed effectively (i.e. areas such as the skip, bin and chute at the shaft as well as the unpaved portions of the haul route). Haul trucks must be covered before leaving the site, random inspections must be done to ensure this is being implemented. Inspections for- and the clearing of spillage of ore from haul trucks along the entire haul route must also be included in the inspections.	ECO
AQM 32	Reporting	▪ Progress reporting must take place at regular intervals (at least quarterly) during operations. Results from site inspections, monitoring results and a summary of any complaints relating to air quality received must be combined to determine if monitoring objectives are being met and the effectiveness of management measures. Progress in terms of air quality management must be reported to all interested and affected parties, including authorities and persons which may be affected by emissions from the proposed project. Corrective action must be taken (i.e. the implementation of contingency measures) in the event that monitoring objectives have not been met.	ECO
AQM 33		▪ As per the requirements of the National Emission Reporting Regulations (GN283 of 2015) the Applicant is to register as a data provider with- and also submit emission reports, in the format required, to the online National Atmospheric Emissions Inventory System (NAEIS). Reports must be submitted for the preceding calendar year to the NAEIS by 31 March for each calendar year.	ECO
AQM 34	Operating hours	▪ The operating hours of discharging of ore into the bin, loading of trucks and hauling must be limited to between 06h00 and 18h00.	ECO / Site manager
Decommissioning Phase			

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
AQM 35	Rehabilitation	▪ The area must be fully rehabilitated and vegetation must be self-sustaining as per the Holfontein Interim Closure Plan to prevent bare areas which are susceptible to wind erosion.	ECO

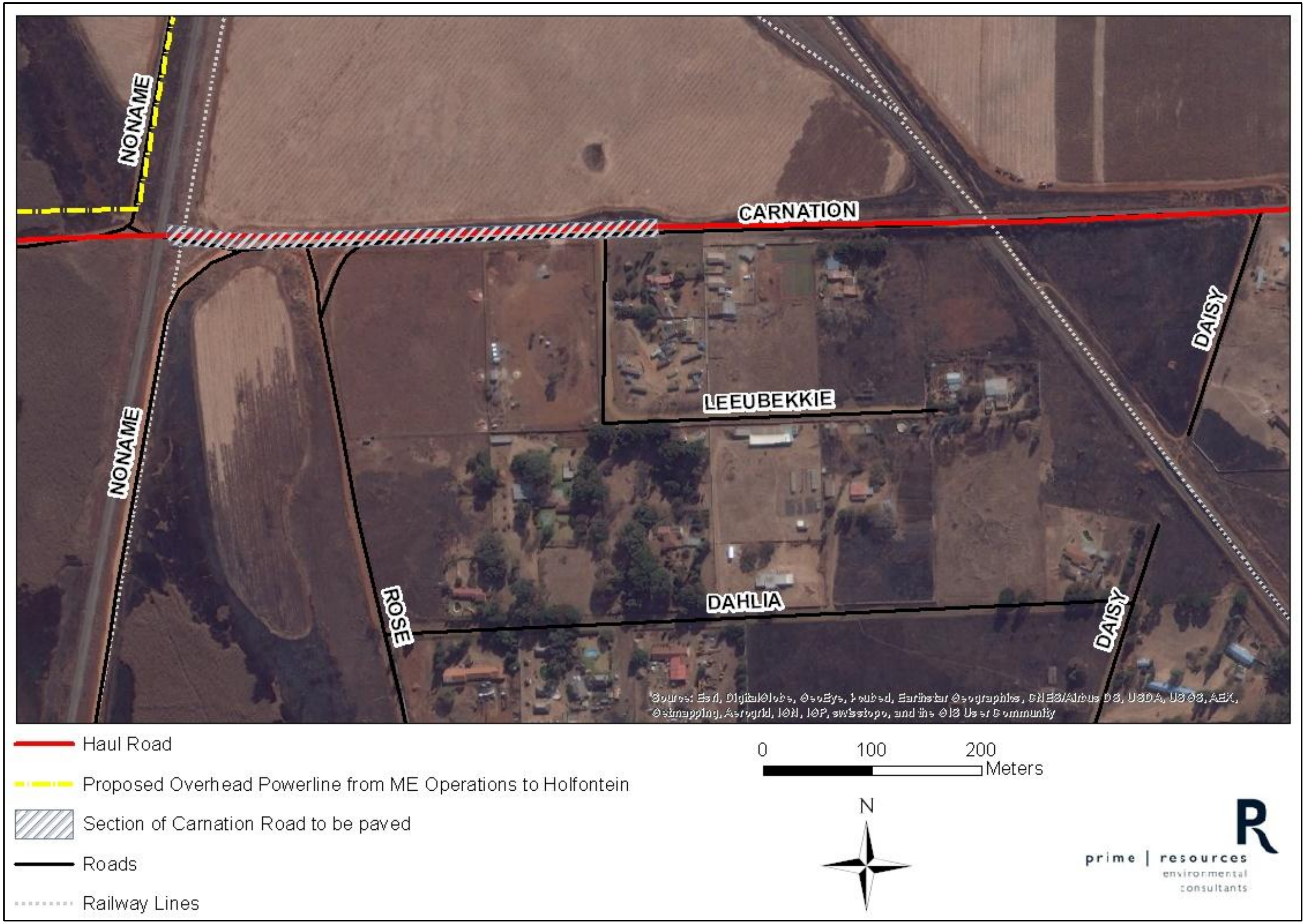

Figure 65: Section of Carnation Road to be paved

iii) Archaeological Management Plan

This Archaeological Management Plan was informed by the cultural and heritage study (attached as Appendix 8).

The following table contains Archaeological Management (AM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 25: Archaeology management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Prior to Construction Phase			
AM 1	Awareness	▪ Personnel and contractors must be educated regarding the possible presence of subterranean archaeological and/or historical sites, features or artefacts, as part of environmental awareness training during induction.	ECO
Construction and Operation Phases			
AM 2	Cemetery	▪ No development is allowed within 30 m of the fence of the cemetery.	ECO / Construction manager
AM 3		▪ The cemetery should continue to be maintained and descendants should continue to be allowed safe access to grave sites.	ECO / Construction manager
AM 4	Chance finds	▪ If any unmarked archaeological findings are discovered during activities, the excavation must stop and the ECO must be notified immediately. ▪ The ECO must then contact SAHRA to investigate the archaeological findings.	ECO / SAHRA
AM 5		▪ Activities at the unmarked archaeological sensitive area will be allowed to recommence once SAHRA has investigated the site and given their permission to remove the findings and/or to allow the continuation of the proposed operations. Any mitigation or management measures recommended by the specialist, after assessment of the find, must be implemented.	ECO/ Heritage Specialist

iv) Water Management Plan

The aquatic ecology aspect of the Water Management Plan below was informed by the aquatic ecology study (attached as Appendix 9). The hydrogeology aspect of the Water Management Plan was informed by the Hydrogeology Study (attached as Appendix 10). The hydrology aspect of the Water Management Plan below was informed by the hydrology study (attached as Appendix 11).

The following table contains Water Management (WAM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 26: Water management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Prior to Construction Phase			
WAM 1	WUL	▪ Ensure that the WUL has been awarded prior to the commencement of construction.	ECO
WAM 2	Blesbokspruit culvert design	▪ The current low water bridge across the Blesbokspruit must be upgraded to ensure that flow within the Blesbokspruit is improved: ○ Culverts must be spaced at regular intervals across the whole width of the wetland to ensure that there is free movement of water; ○ The culverts should also be designed to be deep enough to allow for interflow within the wetland; and ○ A turbidity curtain (flexible, barrier used to trap sediment in water bodies) must be installed on the downstream side of the crossing for the construction period.	Design Engineers
WAM 3		▪ Upgrade the river and wetland crossing by spreading culverts across the width of the wetland, while using smaller culverts in the centre of the stream ensuring that channel formation is minimised. Each of these culvert outlets must be designed that the energy of the flowing water is dissipated where it leaves to downstream side of the culvert.	Design Engineers
WAM 4	Design of stormwater drainage systems	▪ The design of stormwater drainage systems must ensure there is no contamination, eutrophication or increased erosion of the wetland areas: ○ Drainage systems and runoff from the haul road must be spaced at regular intervals within terrestrial areas as far as possible to ensure that the minimum amount of stormwater is received by wetlands directly.	Design Engineers
WAM 5	Design of the attenuation, soil profile rewetting and diffuse infrastructure	▪ The design of the attenuation, soil profile rewetting and diffuse infrastructure should take into account: ○ Compacted infill material, historically placed between the wetland and the shaft area must be removed and soil profiles rewetted in order to increase hydrological support and interflow to the seepage wetlands (HGM 2) of the Holfontein Stream; ○ Rewetting soil profiles must be done through designing and implementing diffuse release channels that are placed on contour well above the seepage wetland habitat; ○ Clean water from attenuation and clean and dirty-water separation facilities must be released into the diffuse release contour channels and or the size of the diffuse	Design Engineers

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		release contour channels could be increased to serve as combined attenuation and diffuse release infrastructure; and ○ The diffuse release channels must be constructed exactly on contour as to spread the water evenly along the whole length of the infiltration channel.	
		Construction Phase	
WAM 6	Construction of the clean and dirty water management system	▪ The clean and dirty water management system (including the PCD) is to be constructed at the commencement of construction activities; thereafter the water treatment facility (including the pipeline from the shaft to the discharge point in the Blesbokspruit for mine water) prior to the commencement of discharging activities, to ensure that any dewatered groundwater can be stored without causing any surface water pollution and treated prior to discharge.	ECO / Construction Manager
WAM 7		▪ All water dams must be lined according to DWS engineering design standards to prevent contaminated water from seeping into the local groundwater system. Designs of the dams must be done according to specifications and as-built drawings must be submitted to DWS.	ECO / Construction Manager
WAM 8		▪ Suitable flow diversion structures, such as diversion berms and/or collection canals, must be established around the border of the proposed operational areas so as to prevent substantial surface runoff contamination.	ECO / Construction Manager
WAM 9	Construction of stormwater drainage systems	▪ The construction of surface stormwater drainage systems during the construction phase must be done in a manner that would protect the quality and quantity of the downstream system (e.g. the use of swales which could then be grassed for the operational phase).	ECO / Construction Manager
WAM 10	Stormwater runoff management	▪ Stormwater management measures, to attenuate stormwater volumes and decrease velocity, must be in place during vegetation clearing operations to prevent soil losses due to water erosion.	ECO / Construction Manager
WAM 11		▪ Stormwater outflows should not enter directly into a wetland. The velocity of water that may reach wetlands must be slowed before it is intercepted by virgin soils using a siltation and erosion control structure such as attenuation swales.	ECO / Construction Manager
WAM 12	Sedimentation of watercourses	▪ Construction phase clearing of all soils must be minimised.	ECO / Construction Manager
WAM 13		▪ Construct a temporary berm between the Holfontein shaft and Holfontein Stream. No berm is necessary at the ventilation shaft. During rainy season, inspect berm after	ECO / Construction Manager

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		thunderstorms and repair if necessary. The berm must be maintained until the clean and dirty water management infrastructure has been constructed.	
WAM 14	Borehole drilling	▪ A dedicated borehole must be drilled at proposed ventilation shaft position, to identify high-yielding fissures/fractures and seal these prior to shaft sinking.	ECO / Construction Manager
WAM 15		▪ The recommended monitoring boreholes as per the Geohydrology Monitoring Programme must be drilled at the commencement of construction activities.	ECO / Construction Manager
WAM 16	Inflows during shaft refurbishment	▪ As far as practically possible, water-bearing fissures which are encountered during the refurbishment of the Holfontein shaft must be sealed to minimise groundwater inflows, i.e. minimising the operational phase mine water balance.	ECO / Construction Manager
WAM 17	Uncontrolled discharges	▪ No uncontrolled discharges from the construction crew camps to any surface water resources must be permitted. Any discharge points need to be approved by the relevant authority (DWS).	ECO / Construction Manager
WAM 18	Construction timing	▪ Construction must be planned for winter (i.e. the dry months) in order to reduce the risk of floods and excessive sedimentation.	ECO / Construction Manager
WAM 19	Treatment	▪ Ensure that the water treatment facility is operational to meet DWS water quality specifications before dewatering commences. Measure EC of water to be discharged daily, when EC begins to deteriorate the water treatment facility must be commissioned.	ECO
WAM 20	Shaft refurbishment	▪ Ensure that lay down area/salvage yard, where corroded materials removed from the shaft are to be placed, is fitted with drains to the PCD prior to the commencement of refurbishment.	ECO / Construction Manager
WAM 21		▪ Radiation measurement of all material brought from underground must be carried out by the appointed radiation officer. Remove material as soon as possible to an area of safety off-site after the radiation officer declares material safe for removal.	ECO
WAM 22	Waste rock spillage	▪ Ensure that the haul road surface is always in good condition (including crossings). Carry out daily inspections and repair as necessary.	ECO
WAM 23		▪ Haul trucks must be covered with a tarpaulin.	ECO
Construction and Operation Phases			
WAM 24	WUL	▪ Ensure that the conditions of any awarded WUL are strictly adhered to.	ECO

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
WAM 25	Best practise	▪ Ensure that all Best Management Guidelines as published by the DWS are adhered to.	ECO
WAM 26	Inflows into the underground workings	▪ Measure and map all fissure related water features.	ECO
WAM 27		▪ Grouting and sealing fissures/faults/dykes must be introduced where major water inflows are encountered underground.	ECO
WAM 28	Dewatering	▪ Excess groundwater must be pumped to the surface water storage facilities for re-use. Volumes of excess water must be measured and reported as % of available surface storage capacity, if the flows exceed 1 Mℓ/day. If excess flow is encountered, volumes must be reported daily.	ECO
WAM 30	Stormwater runoff management	▪ Runoff from proposed haul roads must be managed by means of adjacent drainage canals and flow dissipaters to avoid potential erosion problems.	ECO
WAM 31		▪ Any attenuation swales must be grassed for the operational phase and the siltation and erosion control structures maintained regularly.	ECO
WAM 32	Clean and dirty water management	▪ Clean and dirty water separation infrastructure must be maintained to effectively collect/direct contaminated water to the proposed PCD.	ECO
WAM 33	Treatment	▪ All mining water must be treated as contaminated. Dewatering qualities must be measured at the surface water tanks and PCD to determine if water must be treated prior to discharge (if DWS standards are exceeded). Monthly monitoring of dewatered qualities at the Water Tanks and PCD specifically EC, pH and SO_4. Refer to the Geohydrology Monitoring Programme and Hydrology Monitoring Programme.	ECO
WAM 34		▪ Water qualities must monitored prior to treatment and after treatment, prior to discharge. Daily monitoring of EC of water to be discharged must take place. Water discharged into the Blesbokspruit must meet DWS standards. Refer to the Hydrology Monitoring Programme.	ECO
WAM 35		▪ Water qualities of recycled groundwater must be measured on a continuous basis. Recycled water must be monitored for salinity levels to prevent an adverse build-up of TDS.	ECO
WAM 36		▪ The sewage treatment plant and the water treatment facility should not be over-capacitated with overwhelming volumes of water at the expense of quality and as such, the maximum operating capacity of these facilities should always be considered. In the	ECO

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		event of additional volumes needing treatment, additional facilities must be constructed or current facilities must be improved / expanded to accommodate these volumes. Also, amendments to discharge volumes in the applicable WUL must be approved by the DWS.	
WAM 37	Sewage treatment plant brine	▪ Brine from the sewage treatment plant must be removed to the ME Operations.	ECO
WAM 38	PCD sediment	▪ The sediment that has accumulated in the PCD must be removed to the ME Operations.	ECO
WAM 39	Water treatment facility sludge	▪ Sludge from water treatment facility must be removed to the ME Operations.	ECO
WAM 40	Spillage of sludge	▪ Ensure spillages of sludge from water treatment facility do not occur while transporting to the ME Operations by properly training responsible personnel.	ECO
WAM 41		▪ Ensure that water treatment facility is working optimally to avoid sludge spillages.	ECO
WAM 42	Inspection and maintenance	▪ Drainage systems must be maintained regularly in order to minimize the runoff of harmful chemical substances into the associated systems.	ECO
WAM 43		▪ The pipe transporting water to be discharged must be regularly inspected and maintained to ensure that no leaks are observed and potential erosion is avoided.	ECO
WAM 44		▪ Regular inspections and maintenance must be undertaken at both treatment facilities (i.e. sewage treatment plant and water treatment facility) in order to facilitate an optimal treatment process.	ECO
WAM 45		▪ Daily visual inspection by responsible person for water treatment facility to ensure that sludge is not routed to stormwater drain or PCD.	ECO
WAM 46	Channel formation	▪ Inspect the Blesbokspruit culvert and discharge point for any channel formation and repair if noted.	ECO
WAM 47	Discharge management	▪ The quality of the discharge from the water treatment plant must be continuously monitored against the water quality stipulated by the DWS to prevent the potential water quality deterioration of the Blesbokspruit catchment. In the event that the quality of the discharge deteriorates substantially, it is recommended that the treatment method be immediately reviewed and adapted until the required water quality standards are restored.	ECO ECO
WAM 48		▪ Flow dissipaters must be used at the discharge point to avoid potential erosion.	ECO

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
WAM 49	Pollution reporting	▪ In the case of pollution of any surface or groundwater, the Regional Representative of the DWS must be informed immediately.	ECO
WAM 50	Aquatic monitoring	▪ It is recommended that a monitoring programme utilising the Direct Estimation of Ecological Effect Potential (DEEEP) approach be established as detailed in the Hydrology Monitoring Programme.	ECO
WAM 51	Vegetation proliferation	▪ Inspect the Blesbokspruit downstream of the discharge point for on a monthly basis in the summer months for excessive growth of aquatic vegetation, which may impede flow. If excessive growth, which is impeding flow, is noted implement cutting of vegetation.	ECO
WAM 52	Geochemical modelling	▪ It is recommended that the geochemical model be updated during the life of the mine in order to calibrate and validate its results and to construct an effective closure plan. The geochemical model must assess the effectiveness of potential mitigation measures.	ECO
WAM 53	Geohydrology monitoring	▪ Monitoring must be conducted as per the Geohydrology Monitoring Programme to verify predictions and record groundwater quality and groundwater level impacts.	ECO
WAM 54	Hydrology monitoring	▪ Monitoring must be conducted as per the Hydrology Monitoring Programme.	ECO
WAM 55	Condensate	▪ If condensate forms at the ventilation shaft, an evaporation pond must be constructed. The sediment from this pond must be transported to the ME Operations.	ECO
Decommissioning Phase			
WAM 56	WUL	▪ Ensure that the conditions of any awarded WUL are strictly adhered to.	ECO
WAM 57	Rehabilitation	▪ Refer to the Holfontein Interim Closure Plan, detailing the rehabilitation management measures.	ECO
WAM 58	Monitoring	▪ The Hydrology -and Geohydrology Monitoring Programmes must be implemented.	ECO
Post-Closure Phase			
WAM 59	Monitoring	▪ The Hydrology -and Geohydrology Monitoring Programmes for post-closure must be implemented until a closure certificate is awarded.	ECO

v) Noise Management Plan

The Noise Management Plan was informed by the Noise Study (attached as Appendix 12).

The following table contains noise management (NM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 27: Noise management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Construction Phase			
NM 1	Berms	▪ Erect a waste rock berm, screen or barrier around ore hoisting and loading areas (5.6 m in height) to provide a natural noise barrier between the boundary of the activities and sensitive receptors (refer to Figure 66).	ECO / Construction manager
NM 2	Ventilation shaft	▪ Vertical axial fans must be installed below surface level and vertical attenuated exhaust/intake stacks must be utilised.	ECO / Construction manager
NM 3	Holfontein shaft	▪ Isolate bin and chute by installing an acoustic enclosure.	ECO / Construction manager
Operation Phase			
NM 4	Operating hours	▪ Hoisting, loading and hauling operations must be limited to daylight hours (06h00-18h00).	ECO / Site manager
Construction, Operation and Decommissioning Phases			
NM 5	Vehicles and equipment	▪ Enclose engine compartments of vehicles.	ECO / Construction / Site manager
NM 6		▪ Damp mechanical vibrations of vehicles and equipment.	ECO / Construction / Site manager
NM 7		▪ Properly design and maintain silencers on diesel-powered vehicles and equipment.	ECO / Construction / Site manager
NM 8		▪ Implement systematic maintenance of all forms of equipment and vehicles.	ECO / Construction / Site manager
NM 9	Training and awareness	▪ Train personnel to adhere to operational procedures that reduce the occurrence and magnitude of individual noisy events (i.e. more than 60 dB).	ECO / Construction / Site manager
NM 10	Fixed equipment	▪ Isolate compressors and generators in separate acoustically treated enclosures or buildings.	ECO / Construction / Site manager
NM 11	Complaints	▪ Any complaints relating to noise must be recorded and the ECO must respond to complaints appropriately. If necessary, further mitigation must be investigated and implemented.	ECO
NM 12	Audits	▪ Standardised noise measurements must be carried out on individual equipment at delivery to site to construct a reference database. Regular checks must be carried out to ensure that equipment is not deteriorating and to detect increases which could lead to increase in the noise impact over time.	ECO / Construction / Site manager
NM 13	Monitoring	▪ Monitoring must be conducted as detailed in the Noise Monitoring Programme.	ECO

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
NM 14	General health and safety	▪ Mine Health and Safety and Occupational Health and Safety Regulations relevant to noise management must also be adhered to within site boundaries and compliance audited regularly.	ECO

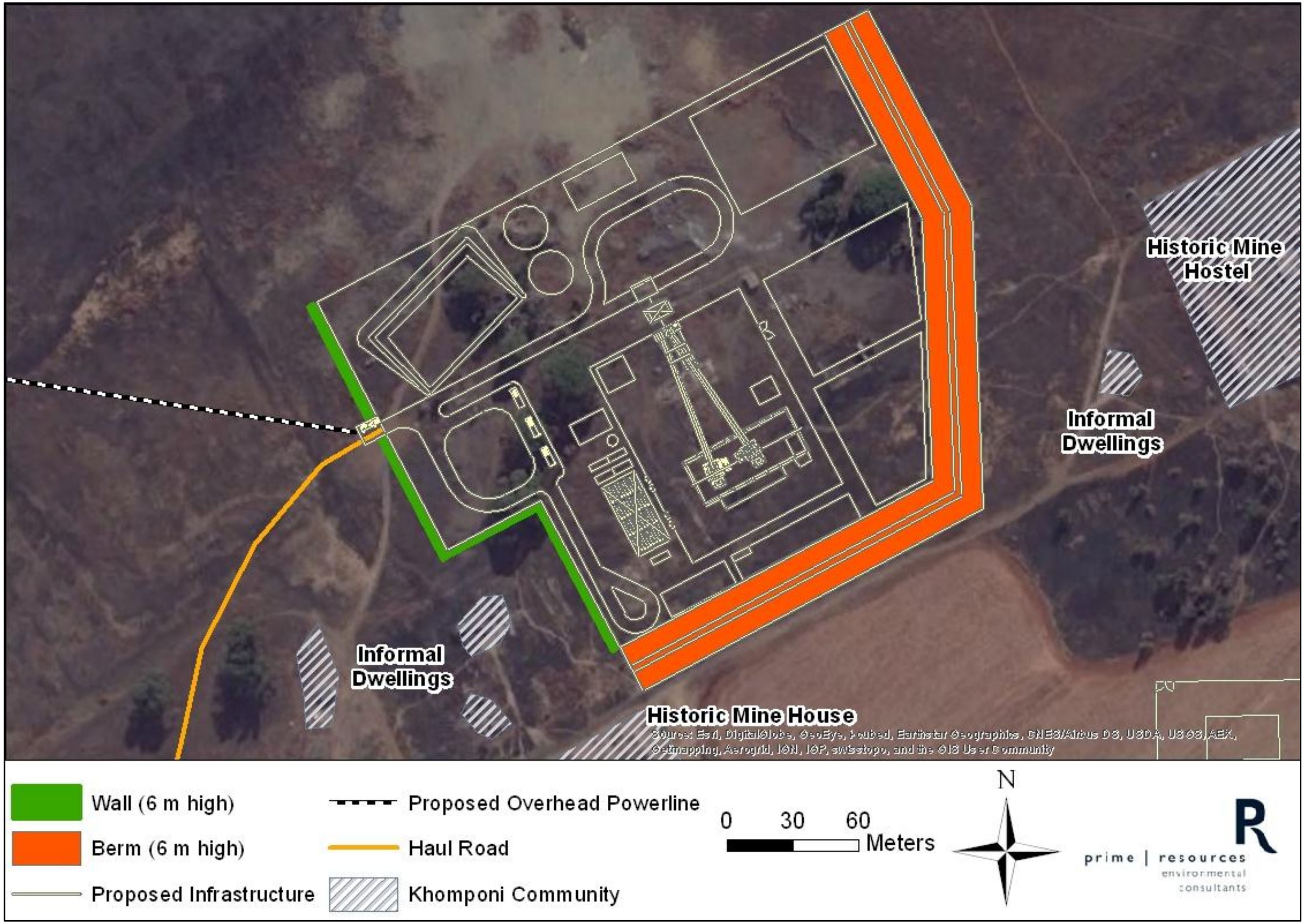

Figure 66: Recommended berm to act as noise barrier

vi) Socio-Economic Management Plan

The Socio-Economic Management Plan outlines the best practice for the management of socio-economic impacts as a result of the Holfontein Project as per the socio-economic study (attached as Appendix 13).

The following table contains Socio-Economic Management (SEM) measures to meet the above goal. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 28: Socio-Economic Management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Prior to Construction Phase			
SEM 1	Community development	• NKGM must compile a Community Development Plan (CDP) specifically for the Holfontein Project. It is recommended that NKGM collaborate with EMM and local government. The following initiatives can be considered for inclusion in the CDP: o Provision of additional water tanks and water supply boreholes for the Holfontein Community; o Investigation into possible installation of a modular sewage treatment plant or composting toilets for the Holfontein Community; o Formalising of 1 or 2 tuck shops outside the mine entrance, which could be run by the Holfontein Community; and o Upgrading and maintenance of Carnation Road will ensure a reduction in dust generation and will provide Welgedacht SH residents with a better road than the existing one.	ECO and / or SLP Officer
SEM 2	Stakeholder engagement	▪ A Stakeholder Engagement Plan (SEP) and Grievance Mechanism must be drawn up for the Holfontein Project. The main objectives of a SEP are as follows: o Identification of stakeholders / IAPs o Disclosure of planned project activities; o Identification of concerns and grievances from stakeholders; o Harnessing of local expertise and knowledge from IAPs; o Ongoing disclosure of project activities and monitoring results; and o Response to grievances and enquiries of stakeholders (via a Grievance Mechanism).	ECO and / or SLP Officer
SEM 3	Community engagement	▪ It is recommended that NKGM establish a Community Engagement and Security Forum (CESF) to ensure that stakeholders are notified and consulted throughout the LoM: o Ensuring that the authority and IAP contact details are updated; o Informing IAPs of the establishment of the CESF and providing them with the opportunity to join the forum, attend meetings, and receive any relevant information; o Facilitating meetings during construction and operation, taking minutes of	ECO and / or SLP Officer

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		these meetings, and distributing meeting minutes prior to the next meeting (it is recommended that these meetings be held every second month); ○ Distributing information relevant to community health and safety to stakeholders (including environmental monitoring data, the Emergency Preparedness and Response (EPR) Plan, Grievance Mechanism (GM), issues and concerns raised); ○ Maintaining communication channels throughout the life of the project; ○ Drafting an action plan to enable the affected communities and relevant government agencies to understand the potential safety and security impacts, and disseminating the plan to IAPs prior to construction; ○ Timeously communicating any changes to the proposed project, impacts and/or mitigation and monitoring methods, and ensuring that proper legal procedures will be followed; and ○ Maintaining an accident register and compiling accident reports (for the haul route). This accident register should be submitted to the CESF on a monthly basis.	
SEM 4	Community security	▪ In order to prevent conflict between the mine and the surrounding community, a security policy must be compiled. Keys aspects of this policy include: ○ Security personnel must be thoroughly vetted, to ensure that none of the individuals hired have been involved in past human rights abuses; ○ Roles of security personnel must be limited to protecting the work force and safeguarding physical assets; ○ Security personnel must be encouraged to have as little interaction with the community as possible; and ○ Security personnel need to be properly trained in the use of armed force and violence, as well as conduct towards community members.	ECO and / or SLP Officer
SEM 5	In-migration management	▪ An In-Migration Management Plan must be developed to reduce the in-migration of job-seekers into the area, and to mitigate the negative impacts associated with this potential in-migration. The In-Migration Management Plan must encompass the following: ○ Information dissemination, recruitment and supply chain transparency;	ECO and / or SLP Officer

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		○ The lack of employment and formal procurement opportunities available for this particular project needs to be clearly communicated to all IAPs and general public to ensure that there is no expectation of employment or procurement; ○ The policy of using existing employees from ME Operations must be maintained and no exceptions made; ○ Contractors must be encouraged to provide transport for their employees, and / or to discourage settlement within the Holfontein area; ○ Contractors must apply a similar policy for employment in that no employment will be provided at the gate (at the project area); ○ While the need for project security is understandable, such security measures (such as fencing and/or patrols) can have further implications on the surrounding residents' safety and mobility. A mechanism needs to be implemented to allow free access to their community, while still restricting the uncontrolled influx of job seekers into the area; and ○ Regular engagements with the local residents of the Khomponi Community and the security personnel through workshops and meetings should build a relationship between these parties. ▪ It is recommended that this Plan be compiled in collaboration with the EMM, local authorities and residents of the area.	
Construction, Operation and Decommissioning Phases			
SEM 6	Employee and contractor training	▪ NKGM personnel and contractors must be familiar with relevant environmental and social commitments within the authorised EMPr. Managers will need to be appropriately trained and familiarised with respect to the EMPr in order to possess the skills necessary to impart EMPr requirements to their subordinates. All personnel involved in the construction and operation of the project must undergo a training and awareness programme on health, safety, environmental and social requirements and obligations prior to commencing activities.	ECO / Contractor Manager
SEM 7	Community training	▪ Community Health and Safety training must be conducted to assist NKGM in raising awareness with the local community (Holfontein Community and Welgedacht SH) regarding project-associated risks. The objectives of the community health and safety	ECO and / or SLP Officer

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		training will be: ○ Raising awareness associated with all project activities; ○ Identification of health concerns and associated behaviour, including HIV/AIDS awareness, hygiene, related to potential sewage / chemical toilet spills; water quality and use; ○ Encouraging the use of safety initiatives undertaken by NKGM, including fencing and creation of a pedestrian walkway; and ○ Identification of dangerous / hazardous site activities, including haul roads, PCD, discharge point and pipeline, and the shafts.	
SEM 8	Community development	▪ The measures in the CDP must be implemented. Maintenance must be provided for the measures implemented throughout the LoM.	ECO and / or SLP Officer
SEM 9	Stakeholder engagement	▪ The SEP must be implemented. Ongoing stakeholder engagement will play a key role in monitoring socio-economic impacts and the effectiveness of mitigation and management strategies. Remedial actions must be taken where the mitigation and management strategies are ineffective.	ECO and / or SLP Officer
SEM 10		▪ The Grievance Mechanism should be monitored on an ongoing basis and any grievances should be adequately responded to in a timeous fashion.	ECO and / or SLP Officer
SEM 11	Community engagement	▪ The CESF should be engaged with on an ongoing basis and remedial actions taken in response to any issues raised through this avenue.	ECO and / or SLP Officer
SEM 12	Community security	▪ The security policy must be adhered to and updated with remedial actions for any security issues which arise.	ECO and / or SLP Officer
SEM 13	In-migration management	▪ The In-Migration Management Plan must be adhered to.	ECO and / or SLP Officer
SEM 14	Monitoring	▪ The Khomponi Community and Welgedacht SH will need to be monitored in order to ensure that potential socio-economic impacts associated with the Holfontein Project) are recorded and documented, which will facilitate effective mitigation and management, as per the Socio-economic Monitoring Programme.	ECO and / or SLP Officer
SEM 15	Employee development	▪ The SLP Human Resources Development (HRD) Programme must be effectively implemented.	ECO and / or SLP Officer
SEM 16	Air quality impacts	▪ Measures as per the Air Quality Management Plan must be implemented.	ECO

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
SEM 17	Noise pollution	▪ Measures as per the Noise Management Plan must be implemented.	ECO
SEM 18	Visual intrusion and nuisance	▪ Measures as per the Visual Management Plan must be implemented.	ECO
SEM 19	Impact on groundwater users	▪ Measures as per the Water Management Plan must be implemented.	ECO
SEM 20	Traffic related impacts	▪ Measures as per the Traffic Management Plan must be implemented.	ECO
SEM 21	Land capability impacts	▪ Measures as per the Soil and Land Capability Management Plan must be implemented.	ECO
Decommissioning Phase			
SEM 22	Community development	▪ The measures provided as per the CDP must be handed over to EMM to maintain post-closure.	ECO and / or SLP Officer

vii) Soil Management Plan

The Soil Management Plan was informed by the Soil and Land Capability (attached as Appendix 14).

The following table contains Soil Management (SM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 29: Soil management measures

Management Measure Ref No.	Aspect	Management Measure	Responsible Party
Construction and Operation Phase			
SM 1	Stripping	• Vegetation and soil must be retained in position for as long as possible, and removed immediately ahead of construction / earthworks in that area to avoid erosion.	ECO / Construction manager
SM 2		• In the case of the proposed project area there will be little topsoil to stockpile as most of the topsoil layer will be stripped during vegetation clearing. Subsoil (30-100 cm) must be stripped prior to excavation and construction. Each soil horizon must be stripped and stored separately. • Ensure subsoil stripping and stockpiling for future rehabilitation purposes are conducted correctly under supervision.	ECO / Construction manager
SM 3	Stockpiling	• Soils must be stockpiled preferably according to soil type and natural horizon sequence (Hu 1, Ms 4 and Av 3 should all be stockpiled individually). The topsoil / subsoil stockpiles must be relocated to a flat area where erosion and contamination of the stockpile will not occur.	ECO / Construction manager
SM 4		• Any soil storage stockpiles must be restricted where possible to heights of less than 4-5 m so as to avoid damage to the soil seed bank.	ECO / Construction manager
SM 5		• The stockpile side slopes must be stabilised at a slope of 1:6, this will promote vegetation growth (use locally adapted perennial or annual seed mixture of grasses) and reduce runoff related erosion.	ECO / Construction manager
SM 6		• Once stockpiled, indigenous grass cover must be implemented (either through natural propagation if the seed bank is sufficient or through seeding) as soon as possible and remain covered until required for rehabilitation.	ECO / Construction manager
SM 7		• Equipment, human and animal movement on the soil stockpiles must be limited to avoid soil damage to the soils and seed bank.	ECO / Construction/ Site manager

Management Measure Ref No.	Aspect	Management Measure	Responsible Party
SM 8	Contamination	• If soil is contaminated, measures as described in the Hydrocarbon Management Plan or Hazardous Substances / Waste Management Plan must be implemented, based on the source of contamination. • Periodic soil contamination assessments, entailing soil analyses for pH, EC and the metals, metalloids, hydrocarbons and anions listed in in terms of the "Soil Screening Values from GNR 331 of 2014 National Norms and Standards for the Remediation of Contaminated Land and Soil Quality" must be carried out.	ECO
SM 9	Erosion	• Stormwater management measures must be put in place according to the Water Management Plan to attenuate stormwater volumes and decrease velocity.	ECO / Construction manager
SM 10		• Stabilise exposed (bare) areas with vegetation and/or erosion control blankets. Establishing and maintaining vegetation as a soil cover is the most common practical technique for controlling erosion on disturbed soils. Water flow inhibiting grasses such as Vetiver or biodegradable Jute mesh erosion control blanket must be established on undeveloped (open) areas and along the lower ends of the site, in order to retard overland water flow and erosion. These are suitable for short to medium term erosion protection. The effect of the Jute mesh can be enhanced by putting it over a loose blanket of thatching grass or reeds, if locally available. A 70 % dead grass or reed cover will slow down flow, minimise wind erosion and suppress weed growth. The open weave nature of the Jute mesh blankets helps retard water flow velocity, while allowing sunlight infiltration to encourage vegetation growth. Alternatively, strips of instant turf can be planted a few meters apart during spring or late summer, with tuft runner grasses in between.	ECO / Construction/ Site manager
SM 11		• Erosion control of all banks must take place so as to reduce erosion and sedimentation. Eroding embankments need to be sloped to a gradient of not more than 1:3 and appropriately re-vegetated.	ECO / Construction/ Site manager
SM 12		• All areas susceptible to erosion (including roads, bare areas and drainage channels) must be monitored on a monthly basis to ensure that there is no undue soil erosion resultant from activities. If erosion is identified it must not be allowed to develop on a large scale before effecting repairs.	ECO / Construction/ Site manager
SM 13	Soil fertility	• Areas within the surface infrastructure area where vegetation has not been cleared must be mowed as	ECO / Construction/ Site manager

Management Measure Ref No.	Aspect	Management Measure	Responsible Party
		grasses which are not mowed for a period of three years become moribund and die off, resulting in its place being usurped by poorer grasses.	
Decommissioning Phase			
SM 14	Sampling	• A representative sampling of the stockpiled soils must be analysed prior to rehabilitation to determine the nutrient status and chemistry of the utilisable materials. As a minimum the following elements will be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay% and Organic Carbon.	ECO / Site manager
SM 15	Rehabilitation	• Stockpiled soil must be used to rehabilitate disturbed sites. The utilisable soil removed during the construction phase, must be redistributed in a manner that achieves an approximate uniform stable thickness consistent with the approved post development end land use, and will attain a free draining surface profile. A minimum layer of 50 mm must be replaced over the project area to return the area to a pre-mining state.	ECO / Site manager
SM 16		• Soil contaminated with hydrocarbons must be moved to an allocated area where it will be rehabilitated and soil that cannot be rehabilitated must be disposed of at an appropriate landfill facility.	ECO / Site manager
SM 17		• The fertility remediation requirements need to be verified at the time of rehabilitation, and informed by the results of sampling. Input from a soil specialist must be obtained regarding fertility remediation requirements, which must be adhered to prior to re-vegetation. The chemical soil composition must be ameliorated to closely match the baseline values as far as possible, particularly for pH and EC.	ECO
SM 18		• Rehabilitated areas must be cordoned off to limit equipment, human and animal movement on the rehabilitated areas.	ECO / Site manager
SM 19	Re-vegetation	• Re-vegetation must be carried out according to the Holfontein Interim Closure Plan.	ECO/ Botanist
Post- Closure Phase			
SM 20	Monitoring and maintenance	• Monitor the recovery of vegetation according to the Biodiversity Monitoring Programme. • All areas susceptible to erosion must be monitored annually and repair, maintenance and prevention measures implemented (if erosion is noted) until a closure certificate is awarded.	ECO / Botanist/ Site manager

viii) Biodiversity Management Plan

The Biodiversity Management Plan was informed by the terrestrial ecological study (attached as Appendix 15).

The following table contains Biodiversity Management (BDM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 30: Biodiversity management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Prior to Construction Phase			
BDM 1	Permits	▪ Relocation permits for any plant species of conservation concern to be impacted (i.e. *Hypoxis hemerocallidea* present in the dry grassland adjacent to the proposed haul road and *Kniphofia typhoides* present in the moist grasslands associated with the Blesbokspruit crossing) -and demarcation permits for alien invasive species which are to remain on site (i.e. the blue gum trees on the site where the Holfontein shaft is to be located) are to be obtained from DAFF prior to the commencement of construction activities.	ECO
BDM 2	Blesbokspruit culvert design	▪ The Blesbokspruit crossing is likely to be a hotspot for amphibian movement and it is therefore recommended that the road is raised by at least 1 m to prevent amphibians from traversing the road. To further discourage amphibian crossing, the road verges must be steeply sloped so amphibians can't climb onto the road.	Design Engineers
BDM 3		▪ Culverts used in the Blesbokspruit should furthermore make provision for semiaquatic and terrestrial species. This can be achieved by constructing sufficient culverts on the edges of the moist grassland (which is not permanently inundated).	
BDM 4		▪ All underpasses and/or culverts must be constructed as far as practically possible according to GDARD's recommendations for pipelines which include the following: ▪ Underpasses must be at least 1.5 m high and 1.0 m wide and dressed with a minimum of 10 cm sand layer; ▪ Underpasses must be provided with small grates in the road surface to allow light penetration into the underpass; and ▪ Accumulated material must be cleared at least once annually, at the start of the rainy season.	
Construction Phase			
BDM 5	Protected floral species	▪ At the commencement of construction, prior to clearing activities, a qualified botanist is to be commissioned to identify and relocate plant species of conservation concern which may be impacted.	ECO / Botanist

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
BDM 6	Fencing	▪ It is recommended that temporary construction barriers are erected to prevent construction vehicles and workers from entering areas containing natural vegetation (dry and moist grasslands). The area associated with the Holfontein shaft must be fenced to prevent vehicles and workers from impacting on natural areas immediately north-west of the shaft.	ECO / Construction manager
BDM 7	Culverts	▪ The road culverts proposed for the Blesbokspruit crossing could impact in faunal movement. However, to encourage faunal species to use the culverts, the culverts must be built as per the recommended design and the following is also recommended: ▪ Vegetation disturbed during the construction of the culverts must be rehabilitated with indigenous, moist grassland species to ensure sufficient cover, which will encourage faunal species to enter the culverts.	ECO / Construction manager
BDM 8	Handling of construction materials	▪ Construction materials should not be stored within areas which contain natural vegetation (and classified as medium to high sensitivity).	ECO / Construction manager
BDM 9		▪ Construction materials (concrete, topsoil, tar, etc.) used to widen the road and/or construct culverts should not be spilled into the moist grasslands as this will not only pollute the immediate areas, but pollutants will be transported to sensitive areas such as the Blesbokspruit IBA downstream.	ECO / Construction manager
BDM 10	Vegetation disturbance	▪ Vegetation adjacent to the Carnation Road which was disturbed during any of the construction activities must be rehabilitated to prevent erosion and contamination of lower laying areas (moist grasslands).	ECO / Construction manager
BDM 11	Vehicle collisions with fauna	▪ Speed bumps must be constructed between the Holfontein shaft and Pansy Road (adjacent to the disturbed moist grassland) as well as where Carnation Road crosses the moist grasslands to prevent speeding that would otherwise result in increase in faunal strikes in these high risk areas.	ECO / Construction manager
BDM 12	Alien invasive plant species management	▪ All areas which have been disturbed during the construction phase including the widening of the haul road must be rehabilitated with indigenous species to prevent alien invasive vegetation species from colonizing these areas.	ECO / Construction manager
BDM 13		▪ During construction (including construction of culverts over moist grasslands associated with the haul road), the areas containing natural vegetation (which have been classified as	ECO / Construction manager

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		being of medium to high ecological sensitivity), must be protected and no vehicles or workers must be allowed to enter these areas as this will disturb the natural vegetation, making the area vulnerable to infestations by alien plants already present in the vicinity.	
BDM 14	Initial rehabilitation	▪ Rehabilitation must take place at the end of construction at initial disturbed areas along the pipeline route, at the upgraded Blesbokspruit crossing, along the verges of widened roads, and potentially at the pipeline discharge point.	ECO
Construction and Operation Phases			
BDM 15	Awareness	▪ Environmental awareness training must be implemented as per the environmental awareness plan educating personnel and contractors on how to interact with the environment.	ECO
BDM 16	Hydrocarbon management	▪ Hydrocarbons must be managed according to the Hydrocarbon Management Plan to avoid contamination of the environment.	ECO
BDM 17	Waste management	▪ Waste must be managed according to the Waste Management Plan to avoid contamination of the.	ECO
BDM 18	Hazardous substance management	▪ Hazardous substances and hazardous waste must be managed according to the Hazardous Substances / Waste Management Plan to avoid contamination of the environment.	ECO
BDM 20	Stormwater management	▪ An ecologically-sound stormwater management plan must be implemented during construction and appropriate water diversion systems put in place. Refer to the Water Management Plan.	ECO
BDM 21	Water quality	▪ Monitor water quality on a regular basis. Refer to the Water Management plan.	ECO
BDM 22	Faunal collisions with power lines	▪ The development of new electrical infrastructure poses a collision risk to avifauna and volant (flying) mammals (i.e. bats). A possible high collision risk area within the Holfontein study area could be where the lines cross the Blesbokspruit as it is possible that this area is used as a flight corridor for water fowl moving to and from the Blesbokspruit IBA. It is recommended that that an ECO monitors the newly constructed power lines once a week for bird collisions associated with the overhead lines. It is important to identify which bird species are affected by the collisions in the long term to ensure that wires are marked appropriately (in response to the collision data) and all the data which has been collected on bird collisions must be submitted to the Endangered Wildlife Trust and Birdlife South	ECO

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		Africa.	
BDM 23	Vehicle collisions with fauna	▪ It is recommended that the road verges of the road between the Holfontein shaft and Pansy Road is mowed in autumn and winter. This will make the area less suitable to small prey species favoured by owls to minimise the likelihood of vehicle collisions with fauna.	ECO
BDM 24		▪ Road related faunal mortalities must be recorded to identify any additional high collision risk areas. Mitigation measures recommended in this report should then also be adapted to these areas.	ECO
BDM 25	Alien invasive plant species management	▪ Alien invasive vegetation eradication and monitoring must be conducted throughout the construction and operation phases as detailed in the Biodiversity Monitoring Programme.	ECO / Botanist
BDM 26	Biodiversity monitoring	▪ Biodiversity monitoring must be conducted as per the Biodiversity Monitoring Programme.	ECO
BDM 27	Burning	▪ The dry grasslands associated with the project (i.e. dry grassland adjacent to the proposed haul road) must be burned every second year to remove moribund plant material.	ECO
Decommissioning Phase			
BDM 28	Awareness	▪ Environmental awareness training must be implemented as per the environmental awareness plan educating contractors on the measures in this plan giving an indication on how to interact with the environment.	ECO
BDM 29	Alien invasive plant species management	▪ Alien invasive vegetation eradication and monitoring must be conducted throughout the decommissioning phase as detailed in Biodiversity Monitoring Programme.	ECO / Botanist
BDM 30	Faunal roosting sites	▪ The mine should consider placing bat roosting sources such as bat boxes or bat houses at the rehabilitated site.	ECO
BDM 31	Rehabilitation	▪ Rehabilitation must be carried out according to the Holfontein Interim Closure Plan.	ECO
Post-Closure Phase			
BDM 32	Rehabilitation monitoring	▪ Alien invasive vegetation eradication and monitoring must continue post-closure as per the Biodiversity Monitoring Programme.	ECO / Botanist
BDM 33		▪ The recovery of vegetation must be monitored as per the Biodiversity Monitoring Programme.	ECO / Botanist

ix) Traffic Management Plan

The Traffic Management Plan was informed by the traffic study (attached as Appendix 16).

The following table contains Traffic Management (TM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 31: Traffic management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Construction, Operation and Decommissioning Phases			
TM 1	Road Conditions	▪ The mine in conjunction with the Gautrans must maintain the haul road surface to ensure transportation of materials and to accommodate mine trucks at all times.	ECO / Construction manager
TM 2	Upgrades to the intersections : Holfontein and Pansy Avenue and Carnation Road and Pansy Avenue	▪ Provide dedicated right turn lanes where heavy vehicles are expected to make turning movements (refer to Figure 67); ▪ Detailed investigations must be conducted in conjunction with Gauteng Department of Roads and Transport (Gautrans) in terms of the existing quality and potential life span of the existing road surface layers of the route along which excavated ore, consumables and workers will be transported; and ▪ Ensure that the necessary approval (if any) has been obtained for the upgrades from Gautrans prior to construction and consultation with a design engineer would be required.	Construction manager
TM 3	Upgrades to Carnation Road	▪ From visual inspection the tarred section of Carnation Road is failing and requires repairs/ upgrades. The extent of repairs must be determined as part of detail design phase by pavement specialist. This would be advisable to ensure that mine related traffic can transport ore and workers at all times. ▪ The short section of gravel road along Carnation Road must be upgraded and tarred (refer to Figure 65). ▪ The road section from the railway underpass to the ME Operations must be widened to accommodate the passing of haul trucks and construction vehicles.	Construction manager
TM 4	Safety upgrades to Carnation Road	▪ Proper road markings, reflective road studs (LED) and road signs must be provided and maintained at intersections under investigation as well as the proposed haulage route to ensure visibility during night time, proper visibility of intersection lane geometry and sufficient information to road users; ▪ Introduce speed limit signage, limit speed to 60 km/ hr; ▪ Construct speed humps if required; and ▪ A road maintenance plan needs to be prepared in conjunction with Gautrans on public roads where trucks will operate.	ECO / Construction manager
TM 5	Loading and off-loading area on site	▪ To reduce the safety risks for workers along roads at intersections, it is recommended that a loading and off-loading area is constructed if workers are no longer going to be transported to site by bus.	Construction manager
TM 6	Safety upgrades to Pansy Avenue	▪ Proper road markings, reflective road studs (LED) and road signs must be provided and maintained at intersections under investigation as well as the proposed haulage route to ensure visibility during night time, proper visibility of intersection lane geometry and sufficient information to road users; ▪ Provide acceleration lanes to allow heavy vehicles to gain speed and enter main traffic flow along Pansy Avenue;	ECO / Construction manager

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		▪ Detailed investigations must be conducted in conjunction with Gautrans in terms of the existing quality and potential life span of the existing road surface layers of the route along which excavated ore, consumables and workers will be transported; ▪ Ensure that the necessary approval (if any) has been obtained for the upgrades from Gautrans prior to construction; and ▪ A road maintenance plan needs to be prepared in conjunction with Gautrans on public roads where trucks will operate.	
TM 7	Pedestrian walkways	▪ To reduce the safety risks for pedestrians and livestock, it is recommended that a gravel sidewalk is constructed on at least one side of the haul road (refer to Figure 68)	ECO / Construction manager

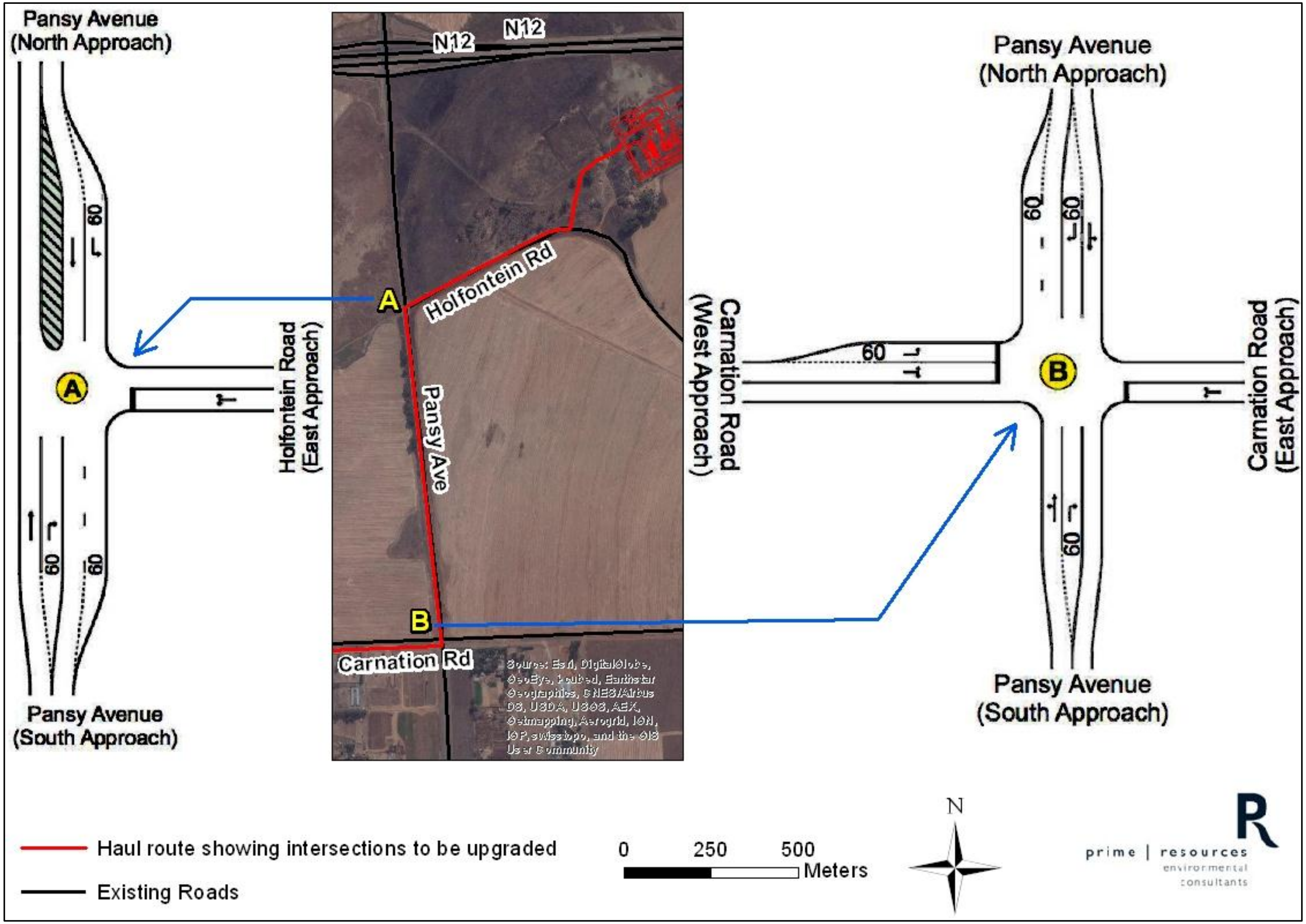

Figure 67: Required intersection upgrades to Pansy Avenue

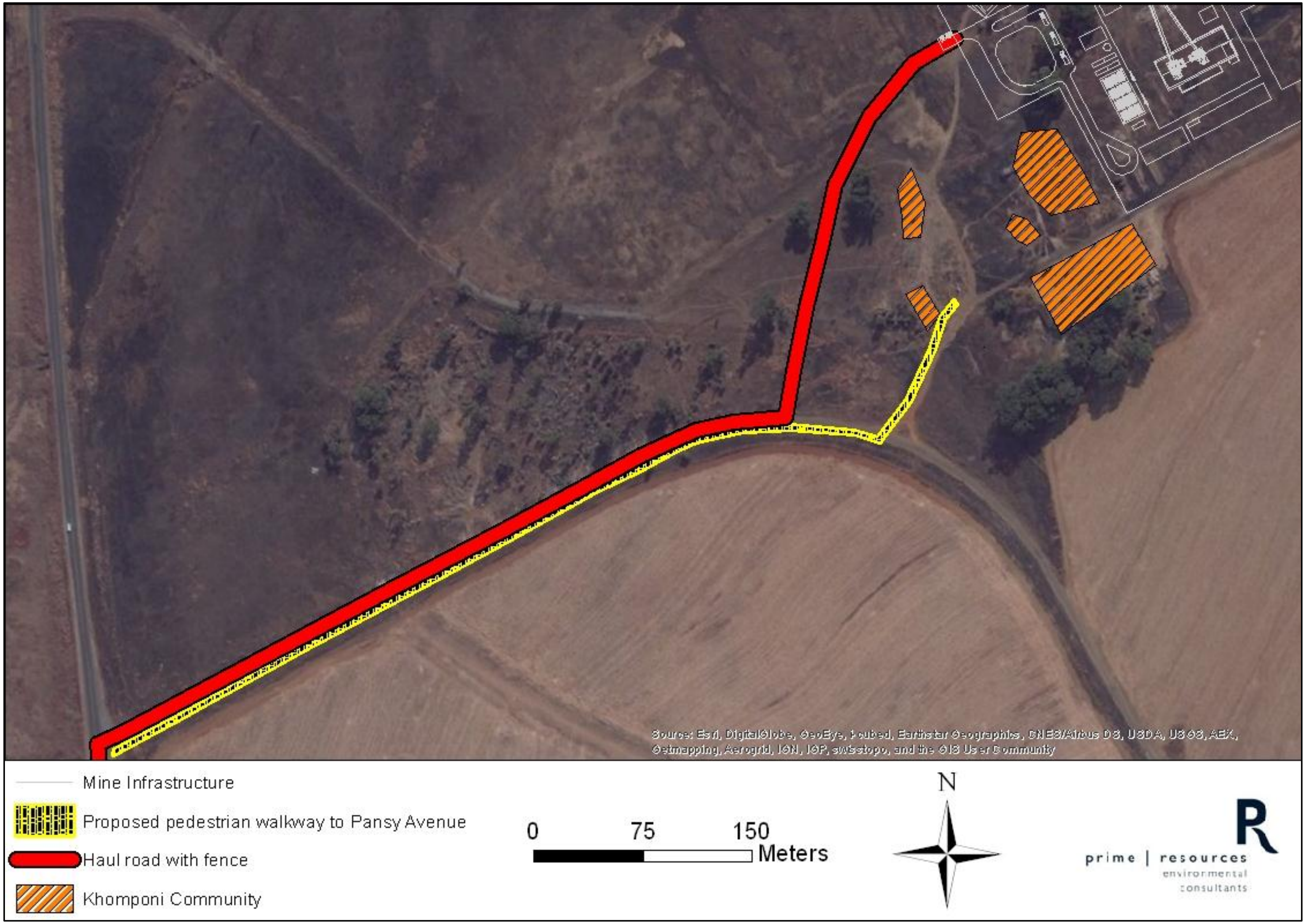

Figure 68: Required pedestrian walkway along Holfontein Road

x) Visual Management Plan

The Visual Management Plan was informed by the visual study (attached as Appendix 17).

The following table contains Visual Management (VM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 32: Visual management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Construction Phase			
VM 1	Site disturbance	▪ The extent of the areas to be disturbed must be limited in area to only that which is essential.	ECO / Construction manager
VM 2		▪ Keep the mine layout to the smallest possible footprint.	ECO / Construction manager
VM 3		▪ Avoid the unnecessary removal of vegetation, especially trees (i.e. the blue gum trees on site), where these partially or totally screen infrastructure.	ECO / Construction manager
VM 4	Screening	▪ Make use of the space between sensitive visual receptors and the mine to create a visual buffer. Existing agricultural activities on this land must be continued or these fields must be rehabilitated to a natural state using indigenous vegetation.	ECO / Construction manager
VM 5		▪ The associated infrastructure to be built will be partially screened by the topography and surrounding vegetation. To screen the proposed infrastructure from the adjacent residences which will have an unobstructed view, the berm suggested in the Noise Management Plan must be constructed.	
VM 6	Visual intrusion	▪ Keep vertical dimensions of tall infrastructure at minimum heights.	ECO / Construction manager
VM 7		▪ Signage related to the proposed development is to be discrete.	ECO / Construction manager
VM 8		▪ Avoid the use of highly reflective materials in construction. If this cannot be avoided reflective materials must be painted a colour to allow it blend in with the landscape as much as possible. The colour is to be carefully selected, and is to be in the dark grey, brown or green range, to minimise visibility and avoid reflectivity.	ECO / Construction manager
VM 9		▪ Due to the height of the proposed headgear (approximately 50 m) and ventilation shaft (approximately 30 m) it would not be possible to screen the shafts from view. To lessen the visual intrusion, camouflage must be utilised i.e. painting it a colour to allow it blend in with the landscape as much as possible. The colour is to be carefully selected, and to be in the dark grey, brown or green range, to minimise visibility and avoid reflectivity.	ECO / Construction manager
VM 10	Lighting at night	▪ Avoid unnecessary illumination.	ECO / Construction manager
VM 11		▪ Provide lights with cover fittings that limit lateral and upwards "light spill", and position lights to shine towards the intended areas of illumination rather than using floodlights.	ECO / Construction manager

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
VM 12		▪ Limit the heights at which lights are positioned where possible will reduce "light spill".	ECO / Construction manager
VM 13		▪ Motion sensor activated lighting may be used instead of lights that illuminate continuously.	ECO / Construction manager
Construction, Operation and Decommissioning Phases			
VM 14	Dust	▪ The dust suppression measures as per the Air Quality Management Plan must be implemented.	ECO
VM 15	Litter	▪ The operations must be kept in a tidy state i.e. prevent litter, to minimise further visual impact. Waste must be managed as per the Waste Management Plan.	ECO
VM 16	Lighting at night	▪ Make use of Low Pressure Sodium lighting or other types of low impact lighting.	ECO
VM 17		▪ Low wattage bulbs can be used to further reduce the impact.	ECO
VM 18	Complaints	▪ Any complaints received regarding visual impacts must be investigated and measures implemented to address the complaint as per the Socio-economic Management Plan.	ECO
Decommissioning Phase			
VM 19	Infrastructure removal	▪ Completely remove all structures during decommissioning.	ECO
VM 20	Rehabilitation	▪ Rehabilitate all disturbed areas, to reflect the pre-mining state or better as per the Holfontein Interim Closure Plan.	ECO

xi) Wetland Management Plan

The Wetland Management Plan was informed by the wetland study (Attached as Appendix 18).

The following table contains Wetland Management (WM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 33: Wetland management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Prior to Construction Phase			
WM 1	Design of the attenuation, soil profile rewetting and diffuse infrastructure	▪ The design of the attenuation, soil profile rewetting and diffuse infrastructure should take place as per the Water Management Plan.	Design Engineers / Wetland Specialist
Construction Phase			
WM 2	WUL	▪ No construction activities must commence within 500 m from a wetland prior to authorisation thereof by DWS in the form of an authorised WUL.	ECO
WM 3	Construction areas and buffer zones	▪ The footprint of the haul road (including culverts) and associated construction activities must be kept to an absolute minimum within the direct vicinity of wetlands.	ECO / Construction manager
WM 4		▪ Avoid unnecessary construction activities in identified wetlands and in the direct vicinity of the wetland (i.e. within 50 m of identified wetland boundaries) at all cost through proper demarcation and appropriate environmental awareness training. These buffers must be demarcated with red tape / fencing under guidance of the ECO.	ECO / Construction manager
WM 5		▪ Make use of existing roads and tracks where feasible, rather than creating new routes through vegetated areas.	ECO / Construction manager
WM 6		▪ Vegetation and soil must be retained in position for as long as possible, and removed immediately ahead of construction / earthworks in that area.	ECO / Construction manager
WM 7	Construction near sewer lines	▪ Where construction in proximity to sewer lines is unavoidable then excavations must be done by hand while at all times ensuring that the soil beneath the sewer lines is not destabilised.	ECO / Construction manager
WM 8	Awareness	▪ The contractor has a responsibility to inform all staff of the need to be vigilant against any practice that will have a harmful effect on wetlands habitat. This information shall form part of the Environmental Education Programme to be effected by the Contractor, including the following: ○ No construction shall take place in areas of high sensitivity such as wetlands or 50 m buffer zone; ○ Any proclaimed weed or alien species that germinates during the contract period shall be cleared by hand before flowering; ○ Infilling, excavation, drainage, dumping of building material and hardened surfaces (including buildings and asphalt) should not occur in any of the wetland,	ECO / Construction manager

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		riparian or within the 50 m buffer zone as a minimum, but should preferably be done as far away as practically possible from these areas; ○ Imported fill material must be monitored during and after construction for the presence of any alien species. Any such species must be removed immediately; ○ Emergency plans and spill kits must be in place in case of pollutant spillages; ○ All stockpiles must be protected from erosion, stored on flat areas where runoff will be minimised, and be surrounded by bunds. It should also only be stored for the minimum amount of time necessary; ○ Erosion control of all banks must take place so as to reduce erosion and sedimentation into drainage channels or wetland areas; ○ Silt traps and culverts must be regularly maintained and cleared so as to ensure effective drainage; ○ Littering and contamination of water sources during construction must be mitigated by effective construction camp management; ○ All construction materials including fuels and oil must be stored in a demarcated area that is contained within a bunded impermeable surface to avoid spread of any contamination. The storage areas must be constructed as far away as practically possible outside of wetlands, riparian and buffer zones; and ○ Cement and plaster should only be mixed within mixing trays. Washing and cleaning of equipment should also be done within a bermed area, in order to trap any cement or plaster and avoid excessive soil erosion. These sites must be rehabilitated prior to commencing the operational phase.	
WM 9	Erosion and sedimentation management	▪ Wetland vegetation and soil must be retained in position for as long as possible, and removed immediately ahead of construction / earthworks in that area.	ECO / Construction manager
WM 10		▪ Work procedures must be carefully planned in wetland areas to avoid impacts to wetland habitat. Runoff from roads must be managed to avoid erosion and sedimentation of wetland areas. Where excessive loose sediment is created, attenuation swales and / or soils screens must be installed.	ECO / Construction manager
WM 11	Culverts	▪ Culverts must be constructed as per the design detailed in the Water Management Plan.	ECO / Construction manager
WM 12	Stormwater drainage	▪ Stormwater drainage systems must be constructed as per the design detailed in the	ECO / Construction manager

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
	systems	Water Management Plan to ensure that there is no contamination, eutrophication or increased erosion of the wetland areas.	
WM 13	Initial rehabilitation	▪ Any wetland areas disturbed due to construction activities must be rehabilitated at the cessation of construction activities. Re-vegetation of disturbed areas must be undertaken with site indigenous species and areas where soil compaction or ruts developed must be rehabilitated.	ECO / Construction manager
Construction and Operation Phases			
WM 14	Water treatment	▪ Water to be discharged must be treated as per the Water Management Plan to ensure wetlands are not contaminated.	ECO
WM 15		▪ It is recommended that a continuous water quality monitoring station be installed to monitor water quality from the treatment plant. Refer to the Water Management Plan.	ECO
WM 16	Stormwater drainage systems	▪ Stormwater runoff must be managed as per the Water Management Plan to ensure wetlands are not impacted.	ECO
WM 17	Discharge	▪ Water must be discharged as per the Water Management Plan to ensure wetlands are not impacted.	ECO
WM 18	Clean and dirty water management	▪ Hydrocarbons are to be managed according to the Hydrocarbon Management Plan to avoid contamination of wetlands by hydrocarbons.	ECO
WM 19		▪ Runoff from roads must be adequately managed, as per the Water Management Plan, to avoid contamination.	ECO
WM 20		▪ Sufficient care must be taken when handling hazardous substances/wastes, as per the Hazardous Substance/Waste Management Plan to prevent pollution of wetlands.	ECO
WM 21		▪ Clean and dirty water must be managed as per the Water Management Plan to ensure wetlands are not contaminated.	ECO
WM 22	Monitoring	▪ Monitoring must be carried out as per the Wetland Monitoring Programme.	ECO
WM 23		▪ The ECO must be briefed by a wetland specialist on specific monitoring issues during the construction phase. Appropriate mitigation needs to be implemented after consultation with relevant specialist should any problems or issues be identified.	ECO
Decommissioning Phase			
WM 24	Contamination of wetlands	▪ Hydrocarbons are to be managed according to the Hydrocarbon Management Plan to	ECO

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		avoid contamination of wetlands by hydrocarbons.	
WM 25		▪ Runoff from roads must be adequately managed, as per the Water Management Plan, to avoid contamination.	ECO
WM 26		▪ Sufficient care must be taken when handling hazardous substances/wastes, as per the Hazardous Substance/Waste Management Plan to prevent pollution of wetlands.	ECO
WM 27	Monitoring	▪ Monitoring must be carried out as per the Wetland Monitoring Programme.	ECO
WM 28	Rehabilitation	▪ Refer to the Holfontein Interim Closure Plan, detailing the rehabilitation management measures.	ECO

xii) Hydrocarbon Management Plan

The Hydrocarbon Management Plan outlines the best practice for the handling and storage of hydrocarbons at Holfontein.

The following table contains Hydrocarbon Management (HCM) measures to meet the above goals. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 34: Hydrocarbon management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Construction, Operation and Decommissioning Phases			
HCM 1	Drip trays and storage	▪ All generators will be placed on drip trays to catch spills and leaks, while all maintenance work on equipment, vehicles, machinery, etc. will be done over a plastic tarpaulin or steel drip trays situated within dirty water catchment areas.	ECO / Site manager
HCM 2		▪ Any pumps, machinery or other equipment that require oil, diesel, etc., that are to remain in one position for longer than two days will be placed on drip trays which are to be emptied regularly. Any effluent from the drip trays and any spilled oils and fuels will be collected and stored in 210 litre drums within the service-bay area before being collected and disposed of by a licensed waste removal company.	ECO / Site manager
HCM 3		▪ The servicing of vehicles and equipment will only be permitted at designated areas such as the workshop which have impermeable surfaces.	ECO / Site manager
HCM 4		▪ Store fuel, oils and other lubricants in a bunded storeroom with a capacity to contain 110% of the total volume thereof.	ECO
HCM 5		▪ Storage of hydrocarbons must be outside of the 100-year flood line of surrounding watercourses.	ECO
HCM 6	Vehicle and equipment maintenance	▪ Ensure that all mechanical equipment and vehicles used are kept in good working order to prevent any leakage of oil, petrol, diesel, hydraulic and other associated fluids.	ECO
HCM 7		• Vehicles used during the construction phase must be parked in a designated area and containers must be used to prevent any oil leaks	Site Manager
HCM 8	Disposal	▪ The Mine must keep copies of all disposal certificates on-site.	ECO
HCM 9	Fuel and lubricants	▪ The fuel storage facility and associated bund walls will be maintained according to the SANS for the "storage and distribution of petroleum products in above ground bulk installations" (SANS 10089-1:2003, edition 4.1).	ECO
HCM 10		▪ The contractor(s) supplying fuel and lubricants to the Mine are required to have an emergency management system in place in order to deal with possible vehicle accidents or	ECO / emergency personnel

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
		accidental spillage. This would typically involve emergency teams that would have the capacity to neutralise spills and begin rehabilitation of the affected area within hours.	
HCM 11	Spills	▪ Keep spill kits or sorp materials on hand to clean up hazardous hydrocarbon spills. Once used, this material will be treated as hazardous waste and disposed of accordingly at a permitted hazardous waste site.	ECO
HCM 12		▪ Should an oil spill occur as a result of leaking equipment, machinery or vehicles, it is to be cleaned utilising oil remediation solvents or commercial hydrocarbon spill kits of which the Mine is to maintain a supply on site.	ECO
HCM 13		▪ A 210 litre drum for the collection of spilled oils and fuels, together with a drip tray to catch spills and leaks before they can contaminate soil and underlying groundwater, must be available on-site at all times.	ECO
HCM 14		▪ Implement a spill response plan and train personnel to react efficiently to address any spillage.	ECO
HCM 15	Dirty water	▪ The catchment berms demarcating the dirty water catchment will be maintained at a minimum height of 0.5 m to ensure that any spilled hydrocarbons transported by stormwater will not enter the clean water catchment.	ECO / Site manager
HCM 16		▪ Surface water draining off areas where it may be contaminated by hydrocarbons must be channelled towards a sump and oil trap which will remove hydrocarbons. Oil residue shall be treated with oil absorbent such as Drizit or similar and this material removed to a licensed landfill facility.	ECO
Decommissioning Phase			
HCM 17	Spills	▪ Fuel storage facilities must be removed immediately upon completion of decommissioning phase.	ECO
HCM 18	Remediation and rehabilitation	▪ Soil contaminated with hydrocarbons must be moved to an allocated area where it will be rehabilitated and soil that cannot be rehabilitated must be disposed of at an appropriate landfill facility.	ECO
HCM 19		▪ In the case of pollution of any surface or groundwater, the Regional Representative of the DWS must be informed immediately.	ECO

xiii) General Waste Management Plan

The General Waste Management Plan outlines the best practice for the temporary handling and transfer of general waste at Holfontein.

The following table contains General Waste Management (GWM) measures to meet the above goal. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 35: General waste management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Construction, Operation and Decommissioning Phases			
GWM 1	Awareness	▪ Include effective waste management into environmental awareness training given to all personnel and contractors during induction.	ECO
GWM 2	Waste drums / bins / skips	▪ The mine will ensure that an adequate number of waste drums / bins / skips are available within the dirty water catchment area on site, upon a suitably hardened surface surrounded by trenches / berms and reporting to the PCD. Waste must be stored in a manner that it cannot be washed or blown into the environment.	ECO / Site manager
GWM 3		▪ Waste drums / bins / skips will be collected regularly and disposed of by the appointed contractor at the nearest landfill facility which is suitably licensed in terms of the requirements of NEMWA. Domestic waste includes, but is not limited to plastics, cans, food remains and glass.	ECO
GWM 4	Burning and burying	▪ No waste is permitted to be buried or burned on site.	ECO
GWM 5	Litter	▪ The site must be cleaned daily and litter removed and stored in the bins provided.	ECO / Site manager
GWM 6	Washing	▪ The washing of clothing, lunch dishes or vehicles is prohibited on site, except within specifically demarcated areas.	ECO
GWM 7	Recycling	▪ Waste streams must be recycled or re-used (where possible) before disposal is considered. Recyclable material must be collected by a licensed recycling contractor.	ECO
GWM 8	Storage	▪ The temporary storage capacity of general waste management / transfer facilities must be limited to 100 m^3 in total. The volumes being temporarily stored must be monitored on a continuous basis and the relevant contractor contacted to clear the temporary facilities on a regular basis or on an ad-hoc basis if it is evident that the facilities are reaching capacity.	ECO / Site manager
GWM 9		▪ In such instances, new storage containers should not be placed on-site as this will only serve to increase the storage capacity on-site, thereby requiring a license in terms of NEMWA. If, however, it becomes evident that 100 m^3 is insufficient in terms of required capacity, the relevant licensing process must be initiated.	ECO / Site manager
GWM 10	Disposal	▪ Waste must be disposed of at a licensed landfill facility on a weekly basis.	ECO

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
GWM 11	Waste transport	▪ In order to avoid waste blowing away or falling while stored or transported, the following must be implemented: ○ Ensure that the waste is loaded securely for transport when it leaves the site; ○ Waste transported off site must be covered; and ○ Skips must be constructed of steel and possess a sealable drain outlet.	ECO

xiv) Hazardous Substances / Hazardous Waste Management Plan

The Hazardous Substances / Hazardous Waste Management Plan details the best practice for the temporary handling and transfer of hazardous waste material.

The following table contains hazardous substances / hazardous waste management (HSHWM) measures to meet the above goal. The table indicates the person responsible to ensure that these commitments are adhered to and implemented. The relevant timeframes are indicated.

Table 36: Hazardous substances / hazardous waste management measures

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
Construction, Operation and Decommissioning Phases			
HSHWM 1	Legal and permitting	▪ The mine will comply with the Hazardous Substances Act, No. 15 of 1973 and apply for the necessary permits from the Department of Health if required.	ECO
HSHWM 2	Data	▪ The mine will keep Material Safety Data Sheets (MSDS) on site for all hazardous substances kept on site and comply with the requirements of all MSDS.	ECO
HSHWM 3	Awareness	▪ Include effective and relevant information regarding the handling and storage of hazardous substances / waste into environmental awareness training provided to personnel and contractors during induction.	ECO
HSHWM 4	Ore handling and spills	▪ The loading areas must be impermeable to water and runoff must be diverted to a PCD.	ECO
HSHWM 5		▪ Trucks may not be overloaded and the ore load must be spread evenly within the truck to prevent spillage from the trucks. Trucks must be covered with a tarpaulin to prevent or limit spillage; and ▪ Regular inspection along haul roads and loading areas must be undertaken to initiate removal of spillage quickly.	ECO
HSHWM 6	Explosives	▪ Explosives must be handled at the designated explosives handling facility under the conditions stated in the MSDS.	ECO
HSHWM 7		▪ Old explosives and the explosives packaging will be dealt with as legally required by industry practice, in an explosive destruction facility (this should form a condition of contract for any blasting contractors utilised).	ECO / Site manager
HSHWM 8	Hazardous substances Storage and handling	▪ A walled concrete platform, dedicated store with adequate flooring or bermed area must be used to accommodate substances such as paint, herbicide and insecticides etc., as appropriate according to their specific MSDS, in well-ventilated areas.	ECO
HSHWM 9		▪ Storage areas for of potentially hazardous materials must be outside of the 100-year flood line of surrounding watercourses.	ECO
HSHWM 10		▪ Cement must be stored- and cement batching must be undertaken on an impermeable surface.	ECO / Construction manager
HSHWM 11	Spills	▪ Any large spills of hazardous substances will initially be controlled by on-site emergency response personnel, who will be aided by professional contractors depending on the nature of the material spilled. Hydrocarbon spills must be managed as per the Hydrocarbon Management Plan.	ECO / Emergency personnel

MANAGEMENT MEASURE REF NO.	ASPECT	MANAGEMENT MEASURE	RESPONSIBLE PARTY
HSHWM 12	Contaminated water	▪ Surface water draining off contaminated areas must be channelled towards a sump which will separate these substances and oils.	ECO / Site manager
HSHWM 13	Sewage	▪ Portable septic toilets are to be provided and maintained for construction crews until permanent facilities are available. Maintenance must include their removal without spillage. Sewage infrastructure must be inspected and maintained to ensure no leaks. Under no circumstances may ablutions occur outside of the provided facilities.	ECO / Site manager
HSHWM 14	Waste storage capacity	▪ The bund walls for all storage facilities containing any industrial or related hazardous substances / wastes will have sufficient storage capacity of 110% from the combined storage capacity.	ECO / Site manager
HSHWM 15		▪ Temporary storage of hazardous waste on site is limited to 80 m^3 at any given time. Greater capacity requires a licence in terms of NEMWA. The waste must be monitored on a continuous basis and the relevant contractor contacted to clear the temporary facilities on a regular basis or on an ad hoc basis if it is evident that the facilities are reaching capacity. Should the mine require a hazardous waste storage capacity greater than 80 m^3 a licence must be obtained.	ECO
HSHWM 16	Waste transport	▪ In order to avoid waste or hazardous substances being exposed while stored or transported, the following must be implemented: o Ensure that the waste is loaded securely for transport when it leaves the site; and o Skips must be constructed from steel and possess a sealable drain outlet.	ECO
HSHWM 17	Disposal	▪ Any other hazardous waste generated on-site for disposal will be collected by a licensed hazardous waste contractor for disposal at a licensed landfill facility.	ECO
HSHWM 18	Certificates	▪ The mine will request a safe disposal certificate for all hazardous waste streams removed by external contractors that will be kept on-file for the life of the mine.	ECO
HSHWM 19	Sewage	▪ The sewage treatment plant and associated sewage infrastructure must be monitored and maintained regularly to prevent any blockages, leaks or spillages. If infrastructure does fail, it must be repaired as soon as possible.	Site Manager

5. FINANCIAL PROVISION

a) Determination of the amount of Financial Provision

Section 24(P)(1) of NEMA states that an Applicant for an environmental authorisation relating to mining or related activities on a mining area must make the prescribed financial provision for the rehabilitation, management and closure of environmental impacts, before the Minister responsible for mineral resources issues the environmental authorisation.

In order to ensure that the Applicant provides sufficient funds for the total quantum to cover the rehabilitation, management and remediation of negative residual environmental impacts, the quantum for closure-related financial provision in terms of Regulation 4 of the NEMA Regulations on Financial Provision (GN940 of 2014) has been determined. Refer to 5(a)(v) below.

i) Describe the closure objectives and the extent to which they have been aligned to the baseline environment described under Regulation 22 (2) (d) as described herein

CLOSURE OBJECTIVES	EXTENT TO WHICH ALIGNED TO BASELINE ENVIRONMENT
Developing a landform that is free draining, with established, self-sustaining vegetation	• The topography will be reshaped to ensure that the area is fee draining towards the Holfontein Stream to represent the baseline state or an improved state as there is currently a steep drop off from historic mining activities • Vegetation rehabilitation will be conducted and monitoring conducted to ensure that vegetation is self-sustaining
Ensure that the ecological sensitivity is returned to the present (or improved) state	• Vegetation rehabilitation will be conducted using indigenous species to ensure that the area is returned to baseline state (i.e. low ecological sensitivity natural land at the Holfontein shaft and haul road areas and low ecological sensitivity transformed agricultural land at the ventilation shaft area) and optimal biodiversity is achieved (possibly resulting in an improved state)
Developing a landscape that is aesthetically acceptable in relation to the existing landscape	• Shafts will be sealed • Landform will be stabilised • All infrastructure will be removed • All waste will be removed
Ensuring that the agricultural potential is returned to the present or improved potential	• Disturbed areas will be rehabilitated to low agricultural potential (ventilation shaft area), medium agricultural potential (portion of

CLOSURE OBJECTIVES	EXTENT TO WHICH ALIGNED TO BASELINE ENVIRONMENT
	haul road in proximity to ME Operations) and wilderness potential (Holfontein shaft area)
Ensuring that the land is acceptable for the end land use in line with planning objectives	• Disturbed areas will be rehabilitated to suit agriculture and urban development land uses
Ensuring community safety	• Shafts will be sealed • Landform will be stabilised • All infrastructure will be removed • All waste will be removed

The Holfontein Interim Closure Plan has been prepared which further details the closure objectives, closure strategy, closure and rehabilitation measures and relinquishment criteria, attached as Appendix 20.

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

The main objective will be to return the area to the present or better state (i.e. aligned to the baseline environment). Further environmental objectives include:

- Developing a landform that is free draining, with established, self-sustaining vegetation;
- Developing a landscape that is aesthetically acceptable in relation to the existing landscape;
- Ensuring that the agricultural potential is returned to the present or improved potential;
- Ensuring that the land is acceptable for the end land use in line with planning objectives (i.e. agriculture and urban development) and as agreed with authorities; and
- Ensuring community safety by sealing all the shafts and stabilising the landform.

The above environmental objectives with regards to closure and rehabilitation have been incorporated into documentation made available, and presentations given, to the landowner (and representatives) and IAPs during the scoping phase of the project. The EIA and EMPr, and the Closure Plan are available during this EIA phase, for comment during the period 15 September 2015 and 15 October 2015. This information will also be made available to the landowner and IAPs via feedback public meeting/s.

The following issues relating to closure and rehabilitation have been raised through the stakeholder engagement process to date:

NAME	ISSUES RAISED	RESPONSE
Mr Berman, Leslie (Landowner)	Asked what guarantee the landowner would have that all surface infrastructure would	PR explained that on awarding a Mining Right (MR) the Department of Mineral Resources (DMR) requires all mining companies to evaluate the cost of closure,

NAME	ISSUES RAISED	RESPONSE
	be removed from the site and that the shaft would be effectively sealed.	including environmental rehabilitation. This cost must be annually reviewed and increased where required. The financial provision required must be provided for via a dedicated trust fund, a financial guarantee and/ or by depositing the funds into an account specified by the DMR. PR explained that if the mining company fails to rehabilitate the area then the financial provision can be used to rehabilitate the mining area. Since the scoping phase, the quantum (amount) for financial provision has been determined and is included in Section 5(a)(v) below. The EIA and EMPr plan for the removal of all infrastructure during decommissioning – the only remaining infrastructure will be that of the sealed shaft (as is on site currently) and the sealed cap of the ventilation shaft.
Dr Chivonivoni, Tamuka (on behalf of the Welgedacht SH residents)	Asked what the closure objectives and plans for the mine and Holfontein shaft are.	PR responded that the concern would be recorded and adequately addressed by specialists during the EIA process.
	Stated that the mine has to have a full closure liability cost calculated (by a qualified engineer) for the Holfontein project.	Since the scoping phase, it has been determined that the closure objectives are to return the land to the current or improved state, ensure that the landform is free-draining and can sustain vegetation, to ensure that the area is made safe and all infrastructure removed, to be aesthetically pleasing, and to align with the proposed development objectives for EMM. A closure liability costing has been calculated and is included in Section 5(a)(v) below.
	Asked how the land-use, mainly farming, will be affected by the proposed operations.	Farming will be affected in that 50 m^2 of agricultural land (of low potential) will be lost permanently due to the capping of the ventilation shaft. The disturbed area surrounding the sealed ventilation shaft will be rehabilitated to low agricultural potential land post-closure. Agricultural land (of medium potential) will be lost for the LoM where the land will be cleared for the construction and widening of a portion of the haul road in proximity to the ME Operations. This area will be rehabilitated to medium agricultural potential land post-closure.

These issues have been addressed in the Holfontein Interim Closure Plan (Appendix 20).

iii) Provide a rehabilitation plan that describes and shows the scale and aerial extent of the main mining activities, including the anticipated mining area at the time of closure

The Holfontein Interim Closure Plan (Appendix 20) includes a rehabilitation plan for the proposed Holfontein project.

iv) Explain why it can be confirmed that the rehabilitation plan is compatible with the closure objectives

The rehabilitation measures in the Holfontein Interim Closure Plan (Appendix 20) were compiled to meet the specific closure objectives as described in Section 5(a)(ii) above.

v) Calculate and state the quantum of the financial provision required to manage and rehabilitate the environment in accordance with the applicable guideline

Quantum for closure-related financial provision in terms of Section 41 of the MPRDA has been determined. The rates were calculated using the recommended DMR rates for closure cost components (updated as of 2012 and escalated using the average CPI). The "Rules-Based Approach" for determination of the Quantum for Closure-Related Financial Provision as per the 2005 DMR Guideline was used.

The financial provision for the proposed activities at Holfontein has been calculated to be R 2 744 034.85 **should rehabilitation activities be undertaken by the Applicant (Year 1 - 2019)**. Should the Mine be faced with unforeseen closure the financial provision required by the DMR was calculated to be R 3 816 404.00. Refer to Table 37 below.

Table 37: Quantum for Closure Related Financial Provision for the Holfontein Project

Holfontein Project, MPRDA Regulation 41(3), Quantum for Closure Related Financial Provision Base Year 2019, Years 1-10	
Site/Facility Name	Holfontein Project
Mineral Mined/Saleable By-product	Gold and associated minerals, aggregate and silver
Primary Risk Class	Class B- Medium risk
Area Sensitivity	Medium (multiplication factor of 1 applying precautionary principle)
Level of Information Available	Limited
Weighting Factor 1: Nature of the terrain/	Flat (multiplication factor of 1 applying precautionary principle)
Weighting Factor 2: Proximity to urban area where goods and services are to be supplied	Peri-urban (multiplication factor of 1.05 applying cautionary principle)
Closure Components, Closure Costs and Weighting Factors	As below

Closure Component No.	Main Description (as per DME Guideline)	Relevant Component On-site (Description)	Unit	DMR 2019 Base Rates / unit	DMR 2028 Base Rates / unit	Quantity Year 1	Quantity Year 10	Multiplication Factor	Nature of Terrain / Relevant Weighting Factor Flat= *1.00*	Amount Year 1 (2019)	Amount Year 10 (2028)
1	Processing Plant	No processing plant facility is associated with the Holfontein Project as ore will be trucked to the existing plant at Modder East. However the removal of the overland powerline to run from the Modder East Operations to Holfontein has been included under this component.	m^3	R 16.55	R 28.27	1 200	1 200	1	1.00	R 19 862	R 33 928
2(A)	Demolition of steel buildings and structures	Includes steel headgear, timber yard and laydown area roof, covered waiting area, first aid room, turnstiles and winders.	m^2	R 230.55	R 393.83	1 000	1 800	1	1.00	R 230 553	R 708 902
2(B)	Demolition of reinforced concrete buildings and structures	Includes headgear bases, timber yard + laydown area, salvage yard, fuel and lube storage bay and explosives loading area.	m^2	R 339.76	R 580.39	2 000	5 600	1	1.00	R 679 524	R 3 250 171
3	Rehabilitation of access roads	Includes the new section of the haul road and the access road to the Holfontein Shaft.	m^2	R 41.26	R 70.48	5 300	5 300	1	1.00	R 218 661	R 373 521
5	Demolition of housing and facilities	Includes toilets, banksman cabin and substation buildings.	m^2	R 461.11	R 787.67	350	600	1	1.00	R 161 387	R 472 601
7	Sealing of shafts, adits and inclines	Sealing of Holfontein shaft and ventilation shaft.	m^3	R 116.62	R 199.22	150	150	1	1.00	R 17 493	R 29 882
10	General surface rehabilitation, including grassing of all denuded areas	Includes provision for ripping, applying topsoil and re-vegetating all mine areas which will be subject to rehabilitation measures leaving denuded footprints. Includes removal/ rehabilitation of the berm.	ha	R 127 653.41	R 218 059.94	7.25	7.25	1	1.00	R 925 487	R 1 580 935
12	Fencing	Fencing around the Holfontein shaft and ventilation shaft.	m	R 145.61	R 248.74	1 400	1 400	1	1.00	R 203 857	R 348 233
13	Water management (Separating clean and dirty water, managing polluted water and managing the impact on groundwater, including treatment, when required)	Includes provision for separating clean and dirty water, treatment of polluted water and discharge to the Blesbokspruit via a pipeline.	ha	R 48 537.42	R 82 912.53	0.837	0.837	0.60	1.00	R 24 375	R 41 639
14	5 years of maintenance and aftercare	Maintenance and aftercare of all areas affected by the proposed mining activities.	ha	R 16 988.10	R 29 019.38	8	8	1	1.00	R 132 167	R 225 771
									SUM OF CLOSURE COMPONENT COSTS	R 2 613 367	R 7 065 582
									SUBTOTAL 1 = (SUM OF CLOSURE	**R 2 744 034.85**	**R 7 418 861.21**
									PRELIMINARY AND GENERAL MANAGEMENT = 12% OF SUBTOTAL 1	R 329 284	R 890 263
									CONTINGENCIES = 10% OF SUBTOTAL 1	R 274 403	R 741 886
									SUBTOTAL 2 = (SUBTOTAL 2) + (PRELIMINARY AND GENERAL MANAGEMENT) = CONTINGENCY	R 3 347 723	R 9 051 011
									SUBTOTAL 3 SUBTOTAL 2 EXCLUSIVE OF VAT AT 14%	R 3 347 723	R 9 051 011
									VAT = 14% OF SUBTOTAL 3	R 468 681	R 1 267 141
									GRAND TOTAL = SUBTOTAL 3 + VAT	**R 3 816 404**	**R 10 318 152**

vi) Confirm that the Financial Provision will be provided as determined

NKGM currently have financial guarantees in place with the DMR for the existing ME operations, as per the requirements of Section 53 of the MPRDA. Quantum for Closure-Related Financial Provision for the Holfontein Project will be included in NKGM's overall Financial Provision. It is anticipated that the additional Financial Provision for Holfontein Project will be added to the current Financial Provision for ME Operations.

6. MECHANISMS FOR MONITORING COMPLIANCE WITH AND PERFORMANCE ASSESSMENT AGAINST THE ENVIRONMENTAL MANAGEMENT PROGRAMME AND REPORTING THEREON (including:

a) Monitoring of Impact Management Actions

b) Monitoring and reporting frequency

c) Responsible persons

d) Time period for implementing impact management actions

e) Mechanism for monitoring compliance)

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES FOR THE EXECUTION OF THE MONITORING PROGRAMMES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Clearing of vegetation; Construction activities; Waste rock and ore handling; Topsoil stockpiling; Hauling; Operation of the ventilation shaft; Decommissioning activities	Generation of dust and inhalable particles resulting in a deterioration of surrounding air quality	Dust fallout monitoring as per the Air Quality Monitoring Programme (Section 6(a))	ECO and appointed specialist service provider	Dust fallout monitoring and reporting must be undertaken monthly throughout the LoM
Clearing of vegetation; Construction of the culvert across the Blesbokspruit; Power lines; Increased surface runoff diverted around infrastructure areas; Discharging into the Blesbokspruit; Hauling; Unsuccessful rehabilitation	Ecological degradation and biodiversity loss	Biodiversity monitoring as per the Biodiversity Monitoring Programme (Section 6(b))	ECO and appointed specialist service provider	Biodiversity monitoring and reporting to be undertaken annually during the summer months, throughout the LoM
Clearing of vegetation; Construction activities; Hauling; Decommissioning activities;	Increase in alien invasive vegetation species	Alien invasive vegetation species monitoring as per the Biodiversity Monitoring Programme (Section 6(b))	ECO and appointed specialist service provider	Alien invasive vegetation species monitoring and reporting to be conducted in November and March each year throughout the LoM and

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES FOR THE EXECUTION OF THE MONITORING PROGRAMMES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Unsuccessful rehabilitation				for two years post-closure
Rehabilitation	Ecological degradation from unsuccessful rehabilitation	Rehabilitation monitoring as per the Biodiversity Monitoring Programme (Section 6(b))	ECO and appointed specialist service provider	Rehabilitation monitoring and reporting to be conducted annually during the summer months for two years post-closure
Construction activities; Recycling of groundwater for underground mining operations; Decommissioning activities	Contamination of groundwater in surrounding aquifers	Groundwater sampling and chemical analysis as per the Hydrogeology Monitoring Programme (Section 6(c))	ECO and appointed specialist service provider	Groundwater monitoring and reporting must be conducted throughout the LoM and post-closure. During construction and operations the following monitoring must be conducted: drinking water quality (monthly), surface water tank and PCD levels be measured (quarterly), discharge volumes (quarterly), water quality (inorganic) (quarterly), ICP-scan (biannual) and water quality (organic) Laboratory analyses for organic (biannual), groundwater quality monitoring at the surface tanks and the PCD (continuous); during decommissioning and ICP-scan (biannual), water quality (organic) at all monitoring boreholes (biannual), water quality (inorganic) at all monitoring boreholes (quarterly), drinking water quality (monthly), groundwater quality monitoring at the surface tanks and the PCD (continuous until final discharge takes place and infrastructure is dismantled); post-closure water quality (inorganic) at all monitoring boreholes be monitored on a quarterly basis for a minimum of 5

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES FOR THE EXECUTION OF THE MONITORING PROGRAMMES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
				years
Dewatering of the underground workings to ensure safe mining conditions	Impact on groundwater levels in surrounding boreholes	Groundwater level monitoring as per the Hydrogeology Monitoring Programme (Section 6(c))	ECO and appointed specialist service provider	Groundwater monitoring (levels) and reporting to be conducted monthly throughout the LoM, groundwater levels in all monitoring boreholes be monitored and reported on, on a quarterly basis post-closure until levels have stabilised (a minimum of 5 years)
Clearing of vegetation; Construction activities; Construction of the culvert across the Blesbokspruit; Discharging into the Blesbokspruit; Hauling; Decommissioning activities	Contamination of watercourses	Surface water sampling and chemical analysis as per the Hydrology Monitoring Programme (Section 6(d))	ECO and appointed specialist service provider	Surface water sampling and water quality monitoring and reporting to be conducted monthly throughout the LoM, the EC and pH of the water to be discharged to the Blesbokspruit must be recorded daily, post-closure monitoring and reporting should also continue on a monthly basis until surface water quality returns to baseline levels
	Contamination of watercourses and the subsequent impact on aquatic biota	DEEEP as per the Hydrology Monitoring Programme (Section 6(d))	ECO and appointed specialist service provider	DEEEP monitoring and reporting to be conducted on a quarterly basis throughout construction and operation
Waste rock and ore handling - loading of trucks; Operation of the ventilation shaft	Generation of noise resulting in a nuisance to surrounding residents	Noise monitoring as per the Noise Monitoring Programme (Section 6(e))	ECO and appointed specialist service provider	Noise monitoring and reporting to be conducted bi-annually throughout the LoM
Construction activities; Waste rock and ore handling - loading of trucks; Operation of the ventilation shaft; Hauling; Decommissioning activities	Socio-economic complaints (nuisance conditions including dust, noise, visual impacts, safety concerns etc.)	Monitoring as per the Socio-economic Management Plan (Section 4(h)(viii)) and Socio-economic Monitoring Programme (Section 6(f))	ECO	Monitoring to be conducted at least every second month throughout the LoM, an annual monitoring report is to be compiled
Clearing of vegetation; Construction activities; Hauling;	Contamination of soil resources	Soil quality monitoring as per the Soil Monitoring Programme (Section 6(g))	ECO and appointed specialist service provider	Soil quality monitoring and reporting to be conducted annually throughout the LoM, an annual

SOURCE ACTIVITY	IMPACTS REQUIRING MONITORING PROGRAMMES	FUNCTIONAL REQUIREMENTS FOR MONITORING	ROLES AND RESPONSIBILITIES FOR THE EXECUTION OF THE MONITORING PROGRAMMES	MONITORING AND REPORTING FREQUENCY AND TIME PERIODS FOR IMPLEMENTING IMPACT MANAGEMENT ACTIONS
Decommissioning activities				report is to be prepared
Topsoil stockpiling	Decrease in soil fertility from stockpiling	Soil fertility monitoring as per the Soil Monitoring Programme (Section 6(g))	ECO and appointed specialist service provider	Soil fertility monitoring and reporting to be conducted during decommissioning prior to rehabilitation
Clearing of vegetation; Increased surface runoff diverted around infrastructure areas; Discharging into the Blesbokspruit; Unsuccessful rehabilitation	Erosion	Erosion monitoring as per the Soil Monitoring Programme (Section 6(g))	ECO	Erosion monitoring to be conducted monthly throughout the LoM and annually post-closure until a closure certificate is awarded
Clearing of vegetation; Construction activities; Construction of the culvert across the Blesbokspruit; Discharging into the Blesbokspruit; Hauling; Decommissioning activities	Decrease in wetland functionality due to habitat destruction, hydrology alterations and contamination of watercourses	Wetland monitoring as per the Wetland Monitoring Programme (Section 6(h))	ECO and appointed specialist service provider	Wetland monitoring and reporting to be conducted monthly during the construction phase and bi-annually throughout operations and decommissioning

a) Air Quality

i) Monitoring Programme

Air quality (dust fallout) monitoring must be conducted to assess the effectiveness of air quality management measures, to qualify air quality at sensitive receptors, to evaluate compliance with the National Dust Control Regulations at key localities, and to provide effective tools for auditing of air quality management performance.

Targeted residential air quality (dust fallout) monitoring must be undertaken at the selected sites (refer to Table 38 and Figure 69).

Table 38: Recommended air quality (dust fallout) monitoring sites

MONITORING SITE	CO-ORDINATES		TYPE OF SITE
Boundary 1	26° 9'55.01"S	28°30'8.87"E	Non-residential
Boundary 2	26° 9'56.38"S	28°30'14.24"E	Non-residential
Boundary 3	26°10'1.28"S	28°30'11.83"E	Non-residential
Boundary 4	26°10'1.69"S	28°30'6.93"E	Residential
Historic Mine House	26°10'3.92"S	28°30'6.66"E	Residential

If the recommendation of paving the unpaved portion of the haul route between the Blesbokspruit crossing and the paved portion of Carnation road (refer to Figure 65) is not implemented, or until such time that it is paved, an additional monitoring point must be located along Carnation Road to monitor dust fallout (refer to Table 39 and Figure 69).

Table 39: Recommended additional dust fallout monitoring site

MONITORING SITE	CO-ORDINATES		TYPE OF SITE
Carnation Road 1	26°10'46.73"S	28°28'35.31"E	Residential

In response to any community complaints relating to air quality impacts, which can be corroborated by monitoring results, additional management measures must be implemented. In response to any community complaints relating to air quality impacts, which cannot be corroborated by monitoring results, consultation with relevant residents must be undertaken to establish additional air quality (dust fallout) monitoring sites.

Dust fallout monitoring must be conducted throughout the LoM. A specialist service provider must install a comprehensive dust bucket monitoring network, and conduct monthly dust fallout monitoring using the American Society for Testing and Materials standard test method for the collection and analysis of dust fallout (ASTM D1739: 1970). A dust bucket must be installed at each of the monitoring sites identified. A total of five (potentially six) single dust buckets are proposed.

Reporting

- Dust fallout must be reported on monthly by the external service provider. Meteorological conditions from the weather station must be included in the report. The report to must meet the National Dust Control Regulations (GNR827 of 2013) prescribed reporting requirements for dust fallout.

- As per the National Dust Control Regulations (GNR827 of 2013) any person who has exceeded the dust fallout limit must, within three months of submission of a dust fallout monitoring report, develop and submit a dust management plan to the air quality officer for approval.

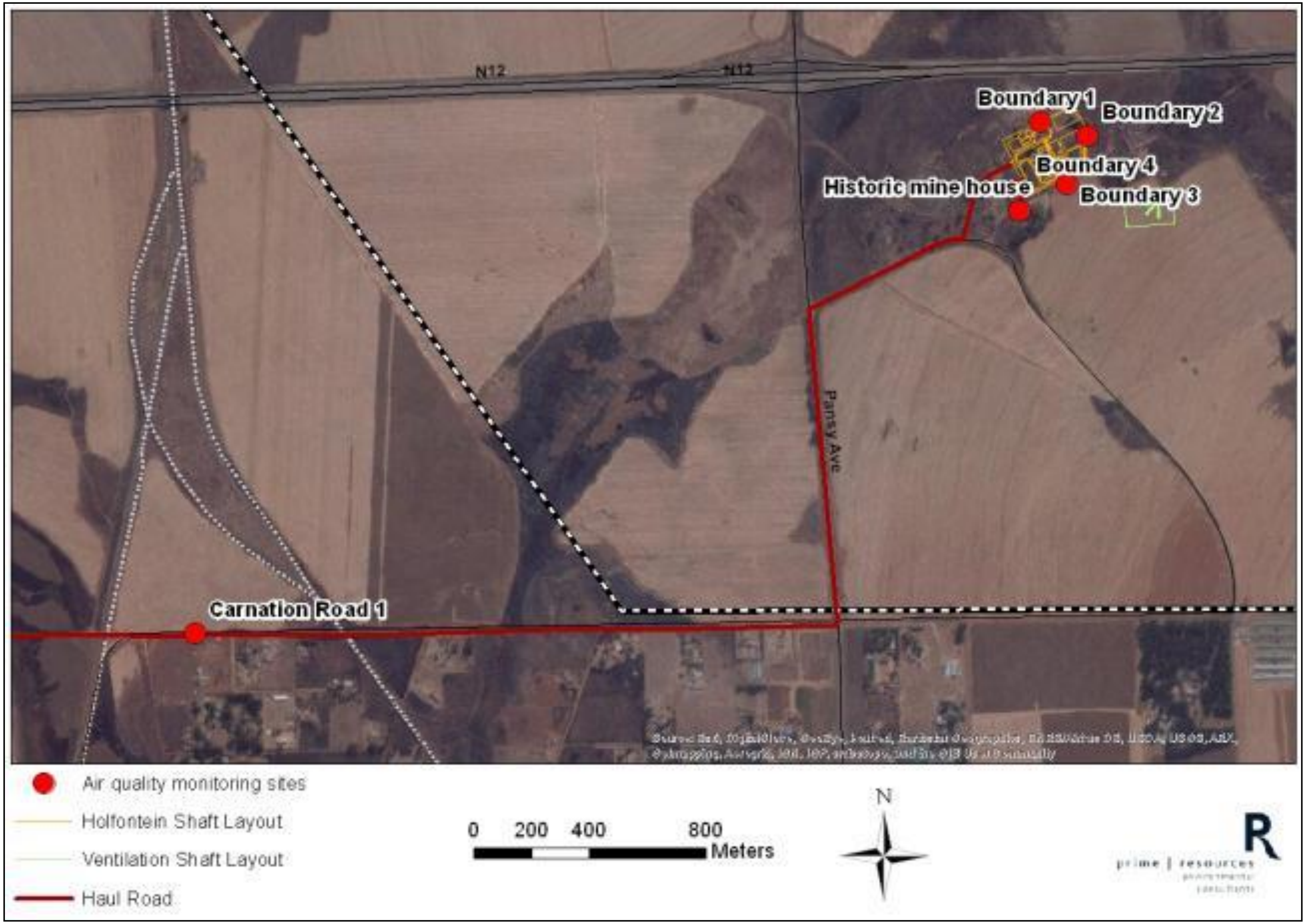

Figure 69: Recommended air quality (dust fallout) monitoring sites

If monitoring objectives are not met, the ECO will be responsible for reporting the findings to the Mine Manager who must then discuss mechanisms to reduce the impact, measure the effectiveness of management measures, and where necessary, intervene further. The effectiveness of additional measures will be assessed through further monitoring. Any complaints received regarding excessive dust generation in the community must be treated similarly.

ii) Monitoring Objectives

- In residential areas dust concentrations should not exceed 600 mg/m²/day over a 30 day averaging period. Two exceedances are allowed within a year but not in sequential months.
- In non-residential areas (beyond the site boundary) dust fallout rates should remain below 1 200 mg/m²/day. Two exceedances are allowed within a year but not in sequential months.

iii) Monitoring Time Frames

- Conduct monthly dust fallout monitoring throughout the LoM.

iv) Responsible Officer

The on-site ECO is responsible for appointing a qualified specialist to undertake monitoring or for undergoing the required training if monitoring will be undertaken in-house

b) Biodiversity

i) Monitoring Programme

Alien Invasive Plant Species Monitoring and Eradication

To maintain the ecological integrity of grassland habitat and species, grasslands must be kept free of invasive alien species and bush encroachment must be controlled. Alien invasive plant species monitoring within the dry grassland adjacent to the proposed haul road, moist grasslands (including the Blesbokspruit), and the disturbed area west of the shaft location (refer to Figure 27) must be conducted by a qualified botanist. The removal of any alien invasive plant species must be conducted as per the instructions of the botanist (mechanical removal methods are preferred). Monitoring must be undertaken twice a year, for the duration of the LoM. A report must be prepared by the qualified botanist after each monitoring survey, indicating the status of the alien invasive species spread and recommended further control measures.

Biodiversity Monitoring

Biodiversity monitoring requires the monitoring of species of conservation interest, as identified by specialists during the EIA. Biodiversity monitoring must take place within the surrounding areas classified as medium to high ecological sensitivity, including the dry grassland adjacent to the proposed haul road, moist grasslands (including the Blesbokspruit), and the disturbed area west of the shaft location. (Refer to Figure 28). Monitoring must be conducted annually by a qualified ecologist, throughout the LoM.

A report must be prepared by the qualified ecologist after each monitoring survey. Reporting will determine whether impacts are being felt on the biodiversity as a result of the project. Where necessary, the qualified ecologist / botanist must recommend further mitigation measures to avoid impacts. Reporting will further inform the rehabilitation planning for the final Closure Plan.

Vegetation Rehabilitation Monitoring

All areas initially disturbed during the construction phase (including the widening of the haul road) must be rehabilitated with indigenous species during the construction phase. The rehabilitation progress must be monitored twice a year over the LoM (until successfully rehabilitated). A report, including photographs of the rehabilitated areas, must be prepared and signed off by the qualified ecologist / botanist.

Vegetation rehabilitation must be monitored annually over at least 2 growing seasons (2 years) by a qualified ecologist / botanist to ensure optimal species diversity within the rehabilitated areas and to ensure that the rehabilitated areas are returned to at least the pre-mining (low ecological sensitivity). A report, including photographs of the rehabilitated areas, must be prepared and signed off by the qualified ecologist / botanist.

ii) Monitoring Objectives

- To preserve and maintain the moist grassland habitat and the faunal and floral species of conservation concern;
- To maintain biodiversity features associated with the small patch of dry grassland north of the proposed haul road;
- To ensure optimal species diversity within the rehabilitated areas; and
- To confirm that vegetation establishment is successful / self-sustaining.

iii) Monitoring Time Frames

- Alien invasive plant species monitoring and eradication must take place at the commencement of the construction phase, and must continue in November and March each year, throughout construction, operation, decommissioning, and for two years post-closure. Rehabilitated areas (those areas damaged during construction) must be monitored according to this same programme.
- Biodiversity monitoring must take place annually during the summer months, throughout construction, operation and decommissioning.
- Rehabilitation monitoring must take place annually during the summer months for two years post-closure.

iv) Responsible Officer

It is recommended that the ECO appoints a suitably qualified ecologist / botanist to conduct the required monitoring.

c) Hydrogeology

i) Monitoring Programme

Groundwater monitoring must be undertaken as per the following monitoring programme and the WUL specifications.

Existing hydrocensus boreholes (WP 1, 2, 4, 7, 10, 11, 12, 20) and additional boreholes (BH Hol 1 to 7) must be monitored (refer to Table 40 and Figure 70). These additional boreholes are still to be drilled. Recommended locations and depths are included in Table 40.

Prior to sampling monitoring boreholes, sampling depths need to be determined. Boreholes which are equipped with pumps must be sampled under application conditions. Open boreholes must be evaluated through electrical conductivity profiling and known water strikes to determine the depth at which samples must be retrieved (i.e. grab-sampling technique).

Monthly Monitoring

- Drinking water on surface and below ground must be monitored for bacteriological and inorganic analysis (during construction, operation and decommissioning); and
- Groundwater level monitoring to be conducted at all monitoring boreholes during the construction and decommissioning phases.

Quarterly Monitoring

- All boreholes must be monitored for groundwater levels during operational and post-closure phases;
- Water levels in the surface water tank and PCD must be monitored during construction and operation;
- Discharge volumes must be monitored during construction and operation; and
- Water quality (pH, EC, TDS, Ca, Mg, Na, K, Cl, SO_4, NO_3, Total Alkalinity, and any parameters stipulated by DWS in the WUL) must be monitored throughout the LoM and for at least 5 years post-closure to determine a trend in water quality and water levels. The hydrogeologist will advise on further monitoring to be conducted based on the results of the initial monitoring. However, it is expected that water levels will only return to baseline levels after 20-30 years, and improved water quality is dependent on this flooding of the underground workings. It must therefore be understood that groundwater monitoring may need to continue after 5 years of initial monitoring post-closure.

Biannual Monitoring

An ICP-scan and laboratory analysis for organic compounds including total petroleum hydrocarbons or similar and CN (as well as any parameters stipulated by DWS in the WUL) must be conducted at all monitoring boreholes (throughout the LoM).

Pre-treatment Monitoring

Groundwater quality monitoring at the surface tanks and the PCD (specifically EC, pH and SO_4, as well as any parameters stipulated by DWS in the WUL) must be conducted prior to treatment in the water treatment plant (throughout the LoM).

Water qualities of treated water should also be measured prior to discharge to ensure qualities meet those stipulated by DWS in the WUL (throughout the LoM).

Table 40: Groundwater monitoring borehole network

TYPE	NUMBER	COORDINATE (WGS84)		ELEVATION (MAMSL)	BOREHOLE DEPTH (M)	GROUNDWATER LEVEL (M)	SAMPLING METHOD	DESCRIPTION	
		LATITUDE	LONGITUDE					AQUIFER TYPE	LOCATION
Hydrocensus Boreholes	WP-1	-26.1792	28.50625	1627	-	-	Pump	Unknown	Farm south
	WP-2	-26.1796	28.50821	1630	-	-	Pump	Unknown	Farm south
	WP-4	-26.1668	28.5249	1631	-	-	-	Unknown	Farm east
	WP-7	-26.1669	28.52553	1633	110*	-	Pump	Dolomite*	Farm east
	WP-10	-26.1674	28.50237	1598	-	-	-	Municipal	Near shaft
	WP-11	-26.1797	28.50003	1610	-	-	Pump	Unknown	Welgedacht
	WP-12	-26.1569	28.49634	1608	-	-	-	Municipal	North
	WP-20	-26.1808	28.48326	1582	24	6.29	Pump	Karoo	Welgedacht
Recommended Boreholes	BH-Hol1	-26.1652	28.50216	1592	40	-	TBD*	Karoo	Near shaft
	BH-Hol2	-26.1655	28.50321	1596	40	-	TBD*	Karoo	Near shaft
	BH-Hol3	-26.1655	28.50357	1596	150	-	TBD*	Dolomite	Near shaft
	BH-Hol4	-26.1663	28.50156	1594	150	-	TBD*	Dolomite	Near shaft
	BH-Hol5	-26.1708	28.4949	1586	150	-	TBD*	Dolomite	Above mining
	BH-Hol6	-26.1794	28.49047	1596	150	-	TBD*	Dolomite	Above mining
	BH-Hol7	-26.1689	28.51004	1610	150	-	TBD*	Dolomite	Above mining

*To be determined

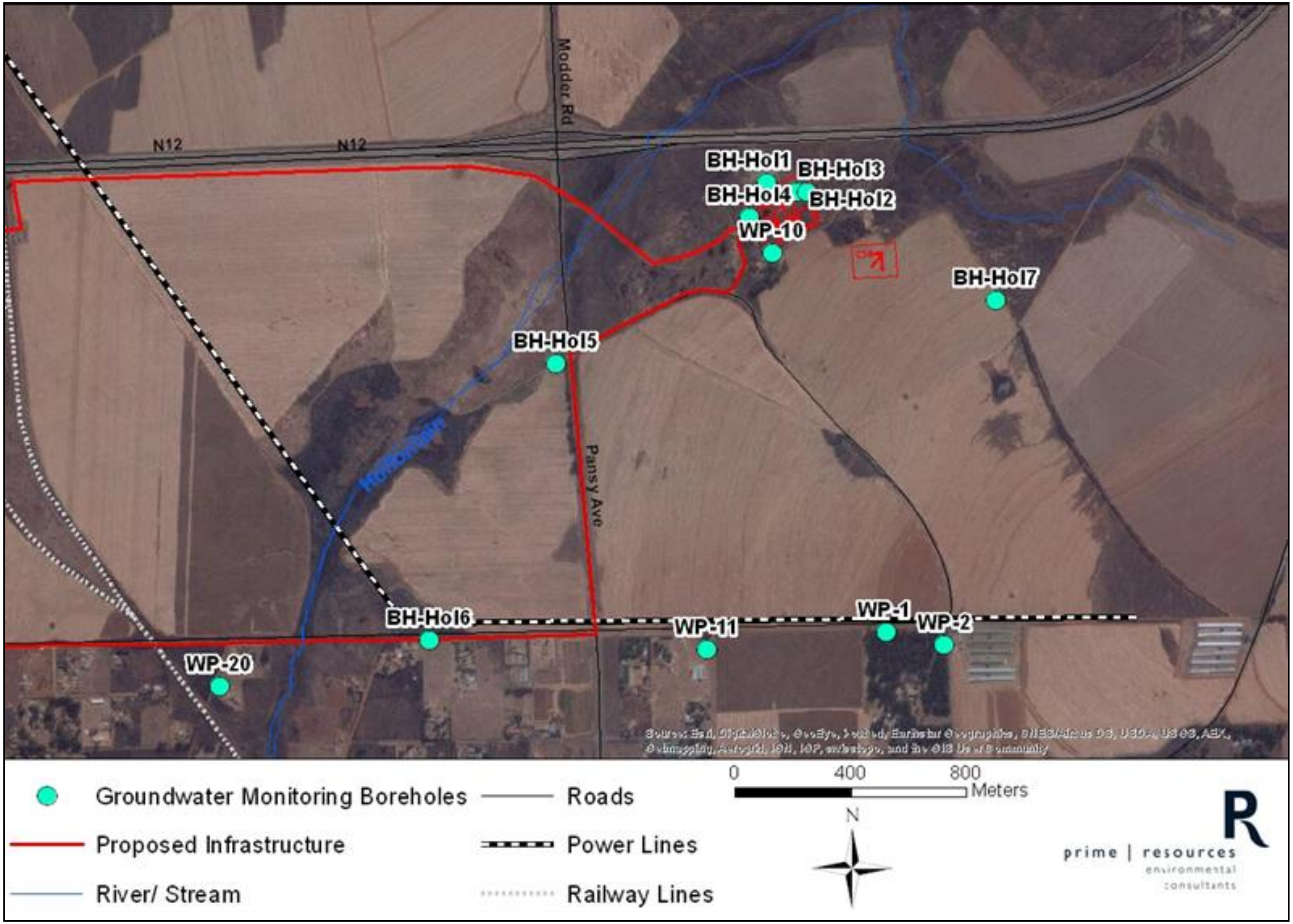

Figure 70: Groundwater monitoring borehole network

Reporting

- One biannual report must be compiled and submitted to mine management, covering 6 months of monitoring. It must include the results of samplings and must highlight any potential concerns and recommend mitigation measures where necessary.
- One annual report must be compiled and submitted to mine and DWS, incorporating the findings of the previous biannual report, and all additional monitoring in the 6 months thereafter. It must
    - Provide a detailed assessment of water quality results;
    - Determine the contamination status and any trends;
    - Describe the relevance of each monitoring point;
    - Assess potential impacts; and
    - Determine the necessity for additional monitoring points or mitigation measures.

ii) Monitoring Objectives

- To verify predictions and record groundwater quality impacts and groundwater levels;
- To meet the specified WUL conditions; and
- Determine whether SO_4 levels are maintained at sufficiently low concentrations to prevent the generation of Acid Mine Drainage (AMD).

iii) Monitoring Time Frames

The recommended monitoring timeframes are detailed below, or as stipulated in the WUL where there are potential conflicts.

Construction phase:

- Groundwater quality monitoring at the surface tanks and the PCD (continuous);
- Groundwater levels at all monitoring boreholes (monthly);
- Drinking water quality (monthly);
- Levels of surface water tank and PCD (quarterly);
- Discharge volumes (quarterly);
- Water quality (inorganic) at all monitoring boreholes (quarterly);
- ICP-scan (biannual); and
- Water quality (organic) at all monitoring boreholes (biannual).

Operational phase:

- Groundwater quality monitoring at the surface tanks and the PCD (continuous);
- Drinking water quality (monthly);
- Groundwater levels at all monitoring boreholes (quarterly);
- Levels of surface water tank and PCD (quarterly);
- Discharge volumes (quarterly);
- Water quality (inorganic) at all monitoring boreholes (quarterly);
- ICP-scan (biannual); and
- Water quality (organic) at all monitoring boreholes (biannual).

Decommissioning phase:

- Groundwater quality monitoring at the surface tanks and the PCD (continuous until final discharge takes place and infrastructure is dismantled);
- Drinking water quality (monthly);
- Groundwater levels at all monitoring boreholes (monthly);
- Water quality (inorganic) at all monitoring boreholes (quarterly);
- ICP-scan (biannual); and
- Water quality (organic) at all monitoring boreholes (biannual).

In addition, the geochemical model must be updated throughout the LOM in order to assess the potential post-closure impacts and to inform the Final Closure Plan.

During post-closure (until a steady state water level and groundwater quality is reached which is likely a minimum of 5 years), it is recommended that:

- Groundwater levels in all monitoring boreholes be monitored on a quarterly basis; and
- Water quality (inorganic) at all monitoring boreholes be monitored on a quarterly basis.

iv) Responsible Officer

The on-site ECO is responsible for conducting the groundwater monitoring and collecting groundwater samples. The ECO must appoint a suitably qualified geohydrologist to interpret the data and compile a report.

d) Hydrology

i) Monitoring Programme

Direct Estimation of Ecological Effect Potential (DEEEP)

A monitoring programme utilising the DEEEP approach must be established for the water and sewage treatment facilities at a screening level. This will assess and monitor the efficacy of these facilities and the potential impact in terms of toxicity to aquatic biota. Discharge effluent must be sampled, as well as water from within the channel at a point upstream and downstream of the discharge point. Samples must be analysed and compared. In the event that the effluent sample indicates a mortality/inhibition greater than 50 % in the test organisms used in the DEEEP approach, it is further recommended that a definitive assessment be performed on the effluent sample, to estimate the concentration of a toxicant (or dilution of a wastewater) that triggers a response. In the event that toxicity is elevated (i.e. water quality deteriorates), an adaptive management process must be applied and the treatment method must be reviewed and improved. This sampling must be undertaken on a quarterly basis throughout construction and operation.

Water Quality

The purpose of the surface water monitoring programme is to measure, assess and report on the water quality of watercourses which may potentially be impacted by activities associated with the Holfontein Project. Monitoring points are detailed in Table 41 and Figure 71. In addition, the water being discharged must be monitored monthly - with the exception of EC and pH which must be recorded daily, using a portable instrument).

Table 41: Recommended surface water monitoring points

MONITORING POINT	CO-ORDINATES		DESCRIPTION
01	28°30'32.70"E	26°09'24.80"S	Holfontein Stream at the Lushof Dam immediately downstream from the landfill site
02	28°28'18.86"E	26°10'46.83"S	Blesbokspruit immediately downstream from the haul road crossing i.e. the upgraded culvert
03	28°29'39.83"E	26°10'06.62"S	Holfontein Stream at the Pansy Road extension bridge i.e. the first culvert downstream from the shaft
04	28°29'03.80"E	26°11'06.13"S	Holfontein Stream just upstream from the Phlox Road culvert
05	28°28'43.05"E	26°11'36.73"S	Treated mine water being discharged into the Blesbokspruit at the recommended discharge point

The following determinants must be analysed for in the samples collected on a monthly basis - pH, EC, TDS, Ca, Mg, Na, K, Cl, SO_4, NO_3, NH_4, Fe, Mn, U, Total Alkalinity, Total Hardness.

In July and January of each year, a full ICP-MS analysis must be carried out on all the samples, to determine the micro-determinants not analysed for during the monthly analyses.

ii) Monitoring Objectives

Direct Estimation of Ecological Effect Potential (DEEEP)

- To ensure that the quality of the water being discharged to the Blesbokspruit does not impact the aquatic biota.

Water Quality

- To assess the level of compliance of the mine with the Resource Quality Objectives (RQOs) of the associated water resources for the catchment; and
- To assess compliance with conditions stipulated in the WUL to be obtained by DWS.

iii) Monitoring Time Frames

Direct Estimation of Ecological Effect Potential (DEEEP)

- DEEEP sampling and monitoring must be conducted on a quarterly basis throughout construction and operation.

Water Quality

- Water samples must be collected and analysed on a monthly basis prior to and during the construction, operation and decommissioning phases. The EC and pH of the water to be discharged to the Blesbokspruit must be recorded daily. Post-closure monitoring should also continue on a monthly basis until surface water quality returns to baseline levels.

iv) Responsible Officer

It is recommended that the ECO appoints a suitably qualified service provider to conduct the required monitoring.

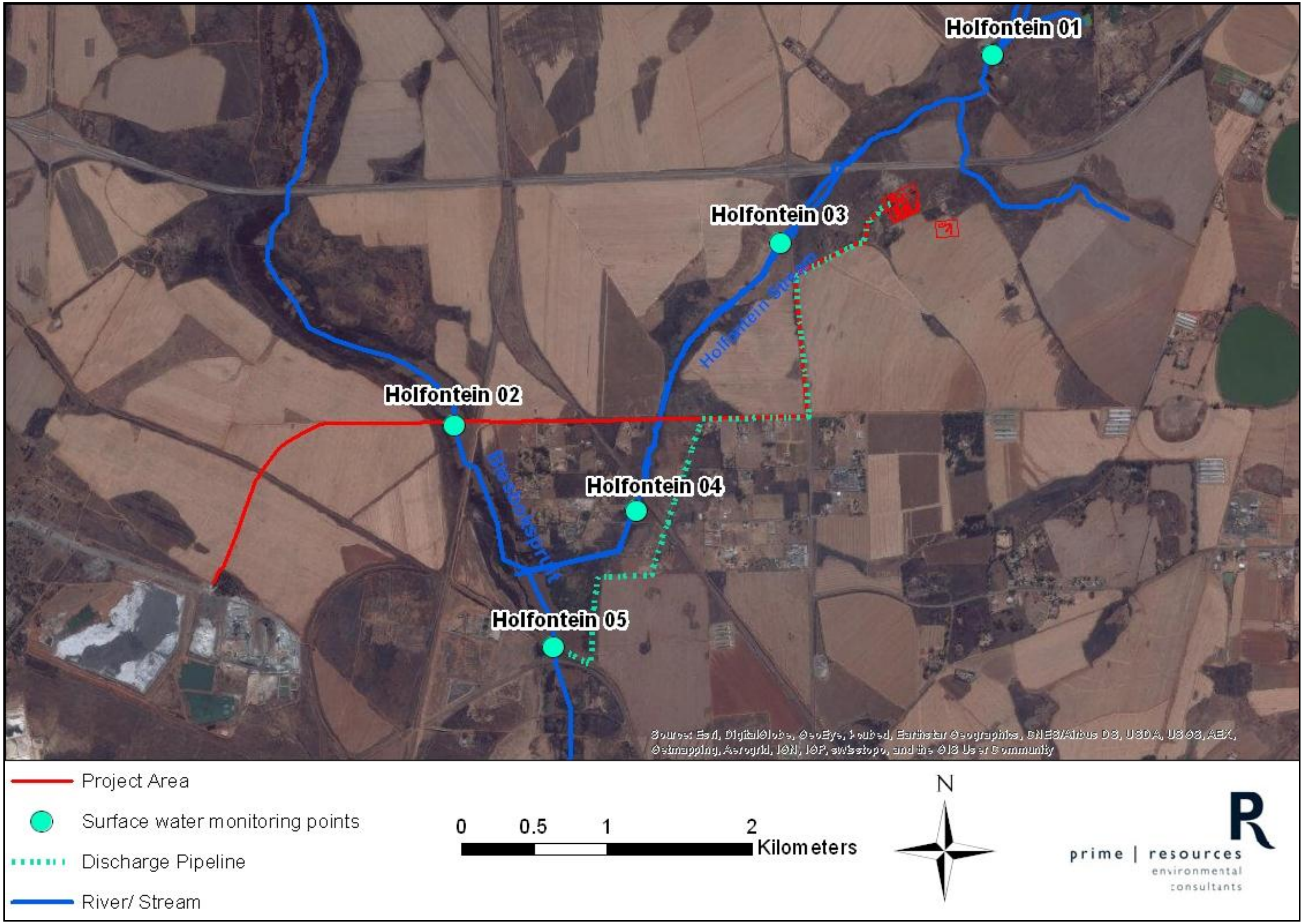

Figure 71: Recommended surface water monitoring points

e) Noise

i) Monitoring Programme

- Environmental noise monitoring must be conducted biannually at the recommended monitoring point near the historic mine hostel, GPS co-ordinates: 26° 9.990'S, 28° 30.266'E, (refer to Figure 72) to determine the noise levels being generated by activities related to the Holfontein Project heard by sensitive receptors;
- Noise monitoring must be carried out according to the SANS Code of Practice 10103:2008 by a specialist with calibrated recording equipment; and
- General monitoring, in line with Mine Health and Safety and Occupational Health and Safety Regulations must also be conducted throughout the construction and operation phases.

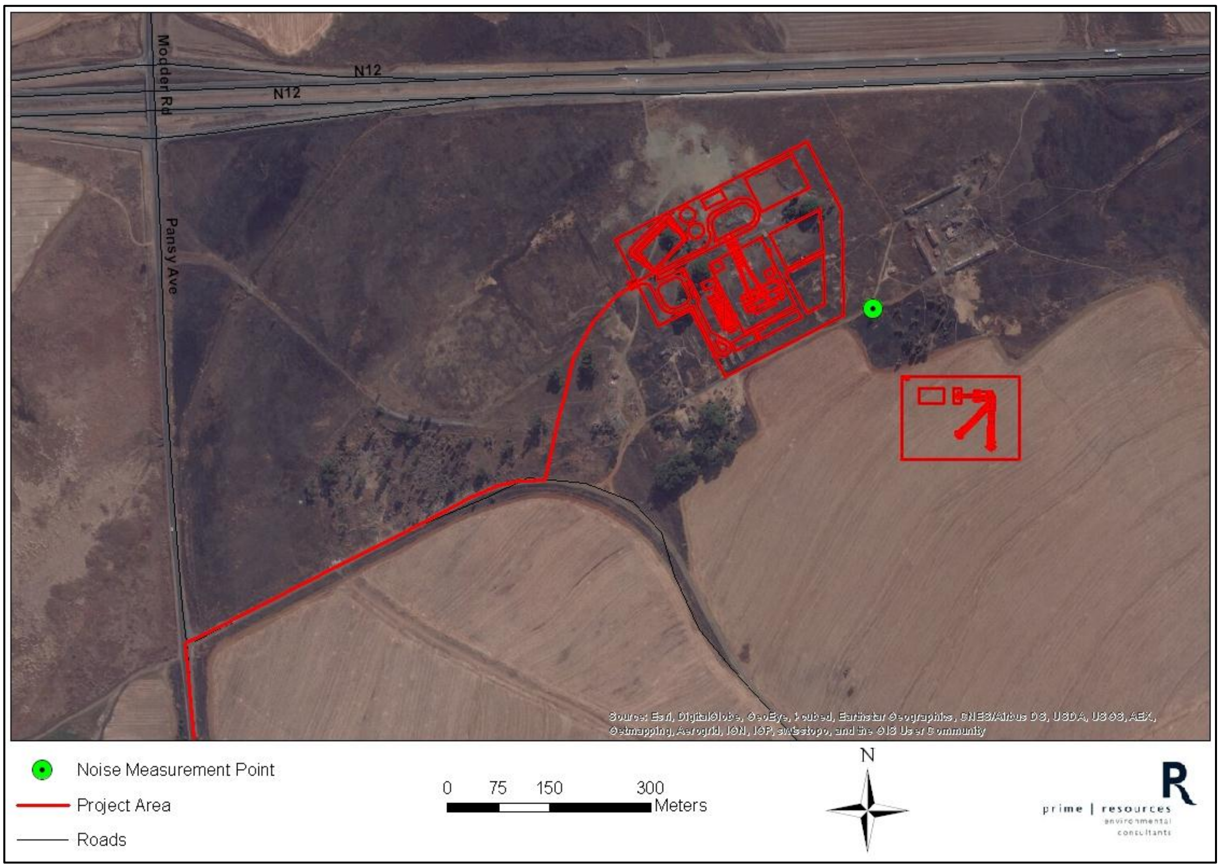

Figure 72: Recommended noise monitoring point

ii) Monitoring Objectives

To detect deviations from predicted noise levels to be generated from activities related to the Holfontein Project and to enable corrective measures to be taken where warranted (if noise levels exceed 55 d(BA) at sensitive receptors adjacent to the shaft area during the day and 45 d(BA) at night by 5 d(BA), or based on complaints).

iii) Monitoring Time Frames

Environmental noise monitoring must be carried out biannually. Readings must be taken hourly for a 24 hour period to determine daytime and night time levels. A report must be prepared after each biannual monitoring visit. This report must be based on the recordings at the proposed monitoring point.

iv) Responsible Officer

- The on-site ECO is responsible for appointing a suitably qualified specialist to carry out the monitoring and reporting; and
- If these monitoring objectives are not met the specialist should liaise with the ECO who will have the responsibility of reporting the findings to mine management, who can then discuss mechanisms to reduce the impact, measure the effectiveness of the management measures which are in place, and where necessary, intervene further. The effectiveness of additional measures will be assessed through further monitoring. The grievance mechanism (i.e. grievance log) must be studied for any complaints relating to noise.

f) Socio-Economic

i) Monitoring Programme

The Khomponi Community (Figure 24) and Welgedacht SH (Figure 26) will need to be monitored in order to ensure that potential socio-economic impacts associated with the Holfontein Project are recorded and documented, which will facilitate effective mitigation and management. The following aspects must be monitored at least every second month, for the duration of the LoM:

Khomponi Community

- Changes in the social conditions at the Khomponi Community. This will entail the development of a Khomponi Community database, which will keep a record of all existing residents, their households and their dwelling type. All existing dwellings should be mapped. This database will assist NKGM in monitoring any increase in population of the Khomponi Community and any increase in informal dwelling development;
- Similarly, the establishment of tuck shops in the vicinity of the mine should be monitored in order to ensure that any informal retail activities are controlled and are not permitted to become nuisance factors or a safety concern;
- The Community's perception and experience of crime in their area must be monitored. Crimes must be reported to the mine so that a record can be kept of criminal activity within and around the mine. This will assist NKGM in monitoring and managing the potential increase in crime as a result of in-migration and community expansion;
- Traffic safety and accidents must be monitored and documented in order to ensure that the residents are utilising the pedestrian walk way and that fatalities are avoided;
- Complaints and grievances must be reported, recorded and records maintained of the manner in which they are addressed;
- Monitoring of dust fallout must be carried out as per the Air Quality Monitoring Programme (Section 6(a));
- Noise monitoring must be undertaken as per the Noise Monitoring Programme (Section 6(e)); and
- Periodic soil contamination assessments must be undertaken as per the Soil Monitoring Programme (Section 6(g)).

Welgedacht SH

- Carnation Road must be monitored and maintained in order to ensure that the road does not deteriorate or become unusable for Welgedacht SH residents;

- The Community's perception and experience of crime in their area must be monitored. Crimes must be reported to the mine so that a record can be kept of criminal activity within the Welgedacht SH. This will assist NKGM in monitoring and managing the potential increase in crime as a result of in-migration;
- Complaints and grievances must be reported, recorded and records maintained of the manner in which they are addressed;
- The dedicated groundwater monitoring boreholes within the Welgedacht SH must be monitored as per the Hydrogeology Monitoring Programme (Section 6(c)) to ensure that the groundwater quantity and quality utilised by the Welgedacht SH are not compromised as a result of the Holfontein Project;
- If the recommendation of paving the unpaved portion of Carnation road is not implemented, or until such time that is paved, monitoring along Carnation Road should be undertaken to determine dust fallout as per the Air Quality Monitoring Programme (Section 6(a)).

Reporting

An annual monitoring report is to be compiled, containing all of the monitoring information, and is to be made available to mine management and the CESF. Trends must be indicated where relevant and possible mitigation measures recommended where necessary.

ii) Monitoring Objectives

- To ensure that potential socio-economic impacts associated with the Holfontein Project are recorded and documented;
- To monitor the progress and effectiveness of proposed socio-economic impact mitigation measures; and
- To ensure stakeholder input is considered as part of the ongoing implementation process.

iii) Monitoring Time Frames

- Socio-economic monitoring is to occur at least every second month and as identified in the relevant air quality, hydrogeology and noise monitoring programmes.

iv) Responsible Officer

It will be the responsibility of the ECO and / or SLP Officer/s to undertake the required socio-economic monitoring and the ECO must appoint suitably qualified service providers to undertake the air quality, hydrogeology and noise monitoring.

g) Soil

i) Monitoring Programme

Soil quality monitoring must be undertaken at the Holfontein Shaft near the northern boundary of the surface infrastructure area. Soil quality monitoring must be undertaken annually during operations.

All areas susceptible to erosion (specifically along the sloped area near the Holfontein Shaft, towards the Holfontein Stream) must be monitored. Erosion monitoring must be undertaken monthly during the LoM, and annually post-closure.

The findings of the soil quality and erosion monitoring conducted throughout the LoM must confirm the potential for and extent of residual impacts on soil and land capability. Recommendations must be made by the appointed service provider to avoid any potential residual impacts and inform the Final Closure Plan to ensure suitability of the soil to support the vegetation in line with the planned end land use.

ii) Monitoring Objectives

- Aid in the assessment of the effectiveness of the soil management measures;
- Ensure timely actions are taken to eliminate or control the sources of soil contamination and prevent or reduce the risk of contaminant transfer from impacted soils to other environmental media (air or water) or potential receptors;
- Ensure that there is no undue soil erosion resultant from activities. If erosion is identified it must not be allowed to develop on a large scale before effecting repairs; and
- To ensure that the soil condition is suitable to support the present / baseline or improved end land use

iii) Monitoring Time Frames

- Soil quality monitoring must be undertaken and reported on annually throughout the LoM. Soil analyses for pH, EC and the metals, metalloids, hydrocarbons and anions listed in terms of the "Soil Screening Values from GNR 331 of 2014 National Norms and Standards for the Remediation of Contaminated Land and Soil Quality" must be carried out;
- During decommissioning a representative sample of the stockpiled soils must be analysed prior to rehabilitation to determine the nutrient status and chemistry of the utilisable materials. As a minimum the following elements must be tested for: EC, CEC, pH, Ca, Mg, K, Na, P, Zn, Clay% and Organic Carbon;
- Erosion monitoring must be undertaken on a monthly basis throughout the LoM; and
- After closure, all areas susceptible to erosion must be monitored annually and repair, maintenance and prevention measures must be implemented where necessary until a closure certificate is awarded.
- An annual report must be made available incorporating the soil quality and erosion monitoring results. Trends must be identified and mitigation measures recommended where necessary.

iv) Responsible Officer

The ECO must appoint a suitably qualified service provider to conduct the required sampling. The ECO/ Site manager can conduct the required erosion monitoring.

h) Wetlands

i) Monitoring Programme

Construction activities must be monitored monthly by the wetland specialist to ensure that all wetland protection infrastructure and stormwater systems are properly installed. The ECO must monitor the construction activities on a daily basis. The ECO must be briefed by the appointed wetland specialist on specific issues which may arise during construction and when the specialist must be consulted in addition to the planned monthly monitoring.

On the completion of construction, the wetland specialist must provide recommendations on where disturbed wetland areas must be rehabilitated. The wetland specialist must also make recommendations on the procedure to be followed to ensure the wetland habitat is successfully rehabilitated.

During operations and decommissioning, wetland monitoring must be undertaken biannually to ensure that the wetland habitats are not being adversely affected by the Holfontein Project. The ECO must be briefed by a wetland specialist on specific issues which may arise during operation and when the specialist must be consulted in addition to the planned biannual monitoring.

During the initial biannual monitoring survey during decommissioning, the specialist must provide recommendations on where disturbed wetland areas must be rehabilitated and the procedure to be followed. During the final biannual monitoring survey at completion of decommissioning, the specialist must confirm that all affected wetland areas have been adequately rehabilitated.

ii) Monitoring Objectives

- That all wetland protection infrastructure and stormwater systems are properly installed;
- That the functionality of the wetlands associated with the Blesbokspruit and Holfontein Stream are not impacted on by activities related to the Holfontein Project; and
- That all affected wetland areas are adequately rehabilitated during decommissioning.

iii) Monitoring Time Frames

Monitoring must be undertaken monthly during the construction phase and biannually during the operational and decommissioning phases.

iv) Responsible Officer

Monitoring must be performed by a suitably qualified wetland specialist appointed by the ECO as well as by the ECO, who must be briefed by the appointed wetland specialist on specific monitoring issues.

f) Indicate the frequency of the submission of the performance assessment report

MPRDA Regulation 55(1) (of the MPRDA Regulations GNR527 of 2004) stipulates the requirements for performance assessments of the EMPr (in sub-regulation [3]) to be undertaken every two years, to ensure compliance with the EMPr and to determine the continued appropriateness and adequacy of the EMPr.

NEMA also makes provision for environmental audits of the EMPr, as per Regulation 34 of the NEMA EIA Regulations (GNR982 of 2014), which must be conducted to determine whether the programme sufficiently provides for the avoidance, management and mitigation of environmental impacts. Regulation 35 of the NEMA EIA Regulations requires an Environmental Audit Report to be submitted to the Competent Authority at the frequency specified within the Environmental Authorisation. The Environmental Authorisation will also specify the frequency of updating the EMPr and Closure Plan.

It is anticipated that the performance assessment report (as required by the MPRDA) and the Environmental Audit Report (as required by NEAMA) will be submitted as a single report, at least once every two years. This report will meet the requirements of both sets of legislation.

7. ENVIRONMENTAL AWARENESS PLAN

a) Manner in which the applicant intends to inform his or her employees of any environmental risk which may result from their work

NKGM has an existing Environmental Awareness Plan detailed in the approved EMPr. All employees at Holfontein will be sourced from the existing employee base at the ME operations. No new employment opportunities will be created. Employees would therefore have undergone environmental awareness training as per the existing Environmental Awareness Plan at ME. Contractors will undergo environmental awareness training as part of induction prior to the commencement of construction and decommissioning activities and a copy of the approved EMP and Environmental Awareness Plan will be provided to all contractors. The Environmental Awareness Plan provides for periodic awareness training throughout the LoM. Adherence to the Environmental Awareness Plan as well as provision of periodic environmental awareness training will be monitored and enforced by the ECO throughout the LoM. The contents of the NKGM Environmental Awareness Plan are detailed below:

Objectives

- All personnel must be made aware of NKGM's environmental management requirements;
- All personnel, as a minimum, will undergo general environmental awareness training, which will highlight the environmental responsibility of all employees (mine employees and contractors); and
- Those personnel whose functions may have a significant impact on the environment will receive the appropriate specialised training, so that they may perform their designated tasks adequately.

Types of Training

There are two types of training that will be undertaken - awareness training and competency training. Awareness training refers to acquiring knowledge of the Environmental Policy, EMPr requirements, legal requirements and key environmental issues. Awareness training is general in nature, similar in content irrespective of job description, delivered from an environmental perspective, and conducted in a classroom or boardroom setting or during site visits.

Competency training is job-orientated. It refers to training that ensures that any task that may have a significant impact on the environment is performed properly. Competency training is specific in nature, dependent on individual job descriptions, aimed at ensuring that key tasks are performed correctly, and involves classroom or boardroom instruction and on-the-job training.

Both types of training will be performed as part of NKGM's environmental awareness plan.

Training Requirements

Personnel at NKGM may require either awareness or competency training, or both, depending on their job description. The agenda for the environmental awareness course must consist of the following:

- A definition of what the environment is;
- Environmental rights;
- Constitutional rights;
- NEMA, and the rights of a whistle blower;
- Why we must look after the environment;

- How we should look after the environment;
- Details of working areas;
- Management of streams, rivers and wetlands;
- Management of animals and plants;
- Details regarding smoking and fires;
- Management of petrol, oil and diesel (and other chemicals);
- Dust management;
- Ablution facilities;
- Waste management;
- Traffic safety;
- Emergency procedures and numbers; and
- Appropriate manner of interacting with neighbouring communities.

Frequency of Training

All new employees, as well as contractors, will be expected to undergo environmental awareness training as part of their induction when joining NKGM. This induction will occur within the first two weeks of employment.

New NKGM employees who undertake activities that have or may have a significant environmental impact will, upon employment, have a personalised training programme developed as part of his/her job description. This programme will include any required competencies associated with that employee's environmental management role, and the means and timeframe by which this competency is meant to be achieved. Adherence to this programme will be monitored. The employee will be required to successfully complete the programme.

Contractor employees who undertake activities that have or may have a significant environmental impact will undergo awareness training prior to the commencement of any such activities.

b) Manner in which risks will be dealt with in order to avoid pollution or the degradation of the environment

The EMPr details commitments in order to avoid pollution or the degradation of the environment (refer to Section 4(g)). Compliance with the EMPr commitments will form part of the contractors' contract, and a copy of the EMPr commitments will be provided to the contractors. Employees will also be briefed regarding the EMPr commitments prior to the commencement of operations. The ECO will monitor that the commitments are being adhered to by the contractors during the construction and decommissioning phases as well as by employees during the operational phase.

NKGM has an existing Emergency Preparedness and Response Plan (EPRP) detailed in the approved EMPr to be consulted in the event an emergency condition occurs which may result in the pollution or the degradation of the environment.

Contractors will be provided with a copy of the EPRP and will be briefed on the contents of the plan during induction prior to the commencement of construction activities. As all employees at Holfontein will be sourced from the existing employee base at the ME operations, employees would have been briefed regarding the EPRP as part of their in induction at the ME operations. The ECO will monitor that the EPRP is being adhered to by the contractors during the construction and decommissioning phases as well as by employees during the operational phase.

Components of the NKGM EPRP relevant to the Holfontein Project are detailed below:

General Communication Procedures

Communication procedures include:

- Communication of hazards to local communities and local authorities; and
- Co-ordination of emergency response (both internal and with local emergency services) that will deal effectively with accidents and prevent major disasters.

Emergency and Hazard Identification

The EPRP identifies all environmental emergencies or hazards that may arise on the NKGM site, for which emergency procedures must be developed.

The following emergencies / hazards may occur at the Holfontein site:

- Hazardous chemical spill;
- Oil spill;
- Bulk fuel spillage;
- Large-scale erosion;
- Uncontrolled fires;
- Traffic accident; and
- Natural disaster (i.e. earth tremor).

Emergency Procedures

The following are the standard emergency procedures for each of the emergencies / hazards which may occur at the Holfontein site (as listed above):

Hazardous Chemical Spill

- Detoxification, clean-up and rehabilitation of spillages;
- All personnel who form part of emergency reaction teams for hazardous chemical spillages will be trained and able to apply detoxification procedures;
- Spillages will be cleaned up as soon as possible to minimise the exposure to members of the public, production personnel and the environment;
- Notification of mine personnel, emergency services and relevant government departments;
- Procedures to be followed by mine and plant personnel;
- Protection of sensitive habitats, fauna and flora, and livestock; and
- Evacuation of local communities.

As far as possible, assistance will be obtained from Hazchem emergency response units for dealing with major spills. Where this is not possible, production personnel required to enter the area will be trained and fully equipped with Material Safety Data Sheets (MSDS) and approved Personal Protective Equipment (PPE).

The following actions must be taken when a hazardous chemical spill occurs:

- Establish what has happened, the nature and extent of the spill, and the chemical involved. Obtain MSDS. If staff are unsure of what has occurred and what chemicals have been spilled, the area must be isolated;
- Casualties must be identified and treated;

- The responsible area manager, Health and Safety representative, Environmental Control Officer (ECO), and emergency response team must be informed. These contact numbers must be on the list of emergency contact details; and
- To contain and clean a chemical spill, the instructions on the MSDS must be followed. The area must be cordoned off and kept clear until the spill has been cleaned.

Oil Spill

Oil spills can occur over most of the site and the major sources will be leaks from mobile plant, machinery, winding and compressor rooms, hydrocarbon stores and recycling area. These spills may be minor (i.e. a few spots) or major (i.e. a 220 ℓ drum falling over onto the soil). Negligence is also a source of oil spills where contractors or site staff are servicing machinery and plant, and allow used oil to spill onto the ground. There is also the potential for equipment and machinery breakdowns on the site. MSDS will be kept at the stores for each type of hydrocarbon on the site. These will contain information on decontamination procedures and the correct procedure to follow in the event of a spill. The mine manager will also place emergency spill kits (i.e. plastic tarpaulin, a 220 ℓ drum, a broom and an absorbent to soak up the material) at strategic locations around the site and these will be audited annually.

The following actions must be taken in the event of an oil spill:

- Establish what has happened, and the nature and extent of the spill and obtain the relevant MSDS;
- The responsible area manager and ECO must be informed. These contact numbers must be on the list of emergency contact details; and
- To contain and clean a spill, the instructions on the MSDS must be followed. The area must be cordoned off and kept clear, and the spill contained and cleaned up immediately. Any contaminated soil, vegetation or rock must be removed and disposed of at a licensed landfill facility.

Bulk Fuel Spillage

The following actions must be taken in the event of a bulk fuel spill:

- Establish what has happened, and the nature and extent of the spill, damage to bund walls, when last the tanks were pressure tested and whether this is within the supplier specifications. Obtain MSDS;
- The responsible area manager, Health and Safety representative, ECO, and emergency response team must be informed. These contact numbers must be on the list of emergency contact details;
- The spill must be prevented from entering into any watercourses;
- If it is unclear whether the fuel has spilled from, the area must be isolated; and
- To contain and clean a spill, the instructions on the MSDS must be followed. The area must be cordoned off and kept clear. Any contaminated soil, vegetation or rock must be removed and disposed of at a licensed landfill facility, or be treated at a bioremediation facility.

Large-scale Erosion

The area is relatively flat with a gradient towards the Holfontein Stream in the vicinity of the infrastructure area and the Blesbokspruit in the vicinity of portions of the haul road. Erosion may occur on the exposed areas, including roads. Any sediment that is eroded must not be allowed to enter the Blesbokspruit catchment.

The following actions must be taken in the event large-scale erosion:

- The ECO must be informed. The contact number must be on the list of emergency contact details;
- Establish whether erosion is being prevented or controlled, especially alongside unpaved roads and at the discharge point, and whether erosion is occurring on any slopes, what has caused the erosion to occur, and the nature and extent of the erosion;
- The area must be stabilised and where possible, soil exposed to rain and wind should be vegetated; and
- Where sediment is eroding towards a watercourse, this must be prevented and any sediment must be contained.

Uncontrolled Fire

The responsible area manager in conjunction with the ECO on site must take measures to prevent fires on the site. These parties will ensure that there is adequate fire-fighting equipment, which is regularly maintained and that specified workers will receive formal fire-fighting training. Finally, it is the responsibility of mine management to ensure that there is an adequate system of firebreaks in place and that all fire hazard 'hotspots' have been identified.

The fire emergency procedure is as follows:

- Raise the alarm by sounding the fire alarm system, informing responsible area manager, Health and Safety representative, ECO, and the mine fire fighting representative;
- Determine the location and severity of the fire;
- The EMM fire department must be notified if the fire cannot be extinguished by the fire fighting representative. The emergency number for the closest EMM fire station must be located on the list of emergency contact details; and
- Apply basic fire-fighting procedures if possible and apply evacuation procedures if necessary;
- If evacuation is deemed necessary, assemble at the emergency control point and obey all instructions from the fire fighting representative.

Traffic Accident

This procedure addresses accidents that occur within the site boundary, including the access road as well as accidents along the haul route involving a hauling truck and/or bus transporting employees from the ME operations to Holfontein. All bulk chemical transporters will be the responsibility of the supplier and accident management will be according to their procedures.

The following actions must be taken in the event of a traffic accident:

- Establish what has happened, including the location, nature, and status of the accident; the nature and extent of injuries or damage; and the nature and extent of any spills or leaks (where chemicals may be involved – refer to earlier relevant procedures);
- The responsible area manager, Health and Safety representative, Environmental Control Officer (ECO), and emergency response team must be informed. These contact numbers must be on the list of emergency contact details;
- Isolate the accident scene and spill area, and treat any casualties; and

- Depending on the seriousness of the accident, notify the closest EMM emergency services. The emergency number for the closest EMM emergency services must be on the list of emergency contact details.

Natural Disaster

The NKGM manager in conjunction with the group environmental manager and the ECO on site will co-ordinate their response with that of the EMM Disaster Management team. All parties and section managers will ensure that there is adequate equipment (fire fighting, medical, rescue, etc.), which is regularly maintained. This team will ensure that all workers will receive training on how to respond in the event of a natural disaster (i.e. earth tremor or in the unlikely event of subsidence occurring).

The disaster management emergency procedure is as follows:

- Raise the alarm by breaking the nearest break-glass unit on the fire alarm system;
- Inform site management, EMM fire station, closest Joint Operations Centre (JOC), and the EMM Disaster Management Centre. These contact numbers must be on the list of emergency contact details;
- Determine the location and severity of the disaster;
- Apply basic disaster management procedures and ensure that dangerous areas are cordoned off, and apply evacuation procedures if necessary;
- Ensure the evacuation of local communities if necessary; and
- Assemble at the emergency control point and obey all instructions from the emergency representative.

8. SPECIFIC INFORMATION REQUIRED BY THE COMPETENT AUTHORITY (among others, confirm that the financial provision will be reviewed annually)

The Applicant commits to reviewing the Financial Provision on an annual basis as per the requirements of 1) Section 24(P)(3) of NEMA, which states that every holder must annually assess his or her environmental liability and, if circumstances so require, must adjust his or her financial provision to the satisfaction of the Minister responsible for mineral resources; and 2) Regulation 54(2) of the MPRDA Regulations (GNR527 of 2004), which states that the holder of a prospecting right, mining right or mining permit must annually update and review the quantum of the financial provision.

The Competent Authority has not requested any additional information.

9. UNDERTAKING

The EAP herewith confirms

a) the correctness of the information provided in the reports X

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

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

d) the acceptability of the project in relation to the finding of the assessment and level of mitigation proposed; X

Signature of the EAP
DATE: 4 September 2015

-END-